

Research, Development and Innovation (RDI) Scheme

Sectors, Sub-sectors and Types of Projects

The Research, Development & Innovation (RDI) Scheme represents a major leap forward in India's commitment to technology leadership.

On July 1, the Union Cabinet approved a historic initiative to set up a ₹1 Lakh Crore Research, Development and Innovation (RDI) Scheme aimed at spurring a private sector-driven R&D ecosystem. The RDI Scheme has been established with the clear objective of bridging persistent gaps and addressing current limitations in critical areas for indigenous development, while simultaneously reducing dependence on imports by fostering domestic innovation and production capabilities. Recognising the need to move beyond fragmented efforts, the Scheme aims to support the integration and coordination of R&D initiatives across sectors, thereby catalysing a robust and cohesive ecosystem for private-sector innovation. The scheme has been designed to overcome the constraints and challenges in funding of private sector in research, development, and innovation. This scheme is directed towards providing unsecured long-term financing or refinancing with low or nil interest rates or equity for startups or contribution to a Deep-Tech Fund of Funds to scale up research, development and innovation in sunrise domains and other strategic sectors. The scheme will encourage the private sector to scale up research, development, and innovation (RDI) in sunrise domains and in other sectors relevant for economic security, strategic purpose, and self-reliance.

RDIF Priority Sectors:

The sectors listed below have been identified for funding under the scheme:

Sunrise Sectors

- a. Energy security and transition, and climate action;
- b. “Deep Technology” including quantum computing, robotics and space;
- c. Artificial Intelligence and its application to Indian problems, including in agriculture, health, and education;
- d. Biotechnology, biomanufacturing, synthetic biology, pharma, medical devices;
- e. Digital economy, including digital agriculture.

Other Sectors

- a. Technologies whose indigenization is important for strategic reasons or for economic security and *Atmanirbharta*; and
- b. Any other sector or technology deemed necessary in public interest.

Any Ministry which wants to have a technology included under the scheme can send a proposal to Department of Science & Technology (DST) for the consideration of the Executive Council of the Anusandhan National Research Foundation - (ANRF) and recommendations to the Empowered Group of Secretaries (EGoS) for appropriate decision.

Through such concerted efforts, the Scheme seeks to propel India from a consumer nation to a product nation, strengthening the foundation for knowledge driven economy and national self-reliance.

Under the sunrise sectors, the following types of indicative sub-sectors and types of projects may be considered.

1. Energy security and transition, and climate action

Need for RDI Funding

Ensuring energy security and leadership in climate action is essential for sustainable growth and resilience. This will help in reducing import dependence, delivering affordable and reliable power, and protecting the economy from global disruptions.

Case for Government and Market

Energy security and transition, and climate action are central to India's developmental agenda, underpinning commitments to achieve net-zero by 2070, provide affordable and reliable power to all, and reduce economic vulnerability to global supply disruptions and price shocks. As the world's third-largest energy consumer with high import dependence for oil, gas, and critical minerals, India must secure diversified, resilient, and low-carbon energy systems to sustain economic growth, meet SDG targets, and fulfil global agreement obligations. Accelerating next-generation renewables, storage, hydrogen, and nuclear technologies is essential to decarbonise hard-to-abate sectors, enhance rural energy access, and position India as a global leader in clean energy manufacturing and innovation.

Robust energy security and transition addresses chronic supply instability, high input costs, and growing corporate ESG mandates, while unlocking multi-billion-dollar domestic markets in renewables, storage, hydrogen, and green fuels. It creates new business opportunities across manufacturing (turbines, solar cells, battery gigafactories etc.), services (energy analytics, grid management etc.), and export markets for clean tech solutions. For industry, it mitigates risks from carbon border taxes, supply chain disruptions, and fuel price volatility, while enabling participation in emerging green value chains. The convergence of policy push, falling technology costs, and investor appetite for sustainable assets positions the sector as a high-growth, innovation-driven opportunity for private capital.

Global Scenario

- US, EU, China, Japan, and South Korea have committed tens of billions towards net-zero by 2050–2070, funding next-gen renewables, grid-scale storage, hydrogen, modular nuclear, and carbon capture; major policies like the US Inflation Reduction Act and EU Green Deal drive large-scale deployment and R&D, while China dominates solar and battery manufacturing and global agencies coordinate standards and supply chain security.
- Companies worldwide are commercializing advanced tech such as perovskite/tandem solar cells, offshore wind, battery gigafactories, SMRs, and fusion research, with coordinated international R&D through bodies like the IEA and Mission Innovation, ensuring robust, decarbonized, and resilient energy systems.

Indian Scenario

- India now exceeds 50% installed non-fossil power capacity and is accelerating additions toward the 2030 target of 500 GW non-fossil, underpinned by large scale Renewable Energy schemes and projects especially in Solar and Hydrogen power, and pilots across offshore wind, storage, green ammonia, and advanced nuclear, alongside participation in ITER fusion.
- Key challenges remain thorough including dependence on imported high-tech components and critical minerals, supply chain risks, the need for giga-scale domestic manufacturing, intermittent renewables complicating grid integration and rural access, and high upfront costs with limited localized supply chains slowing large-scale adoption.

Potential projects for funding

(Indicative sub-sectors along with types of projects which may be considered for funding are listed below)

1.1 Advanced Wind Energy Systems

- i. Offshore and vertical-axis turbine innovation

1.2 Hybrid Renewable Integrations

- i. Combined solar-wind, solar-biomass, and other hybrid systems

1.3 Next-Generation Solar Cells

- i. Cells with higher power conversion
- ii. Field efficiency enhancements
- iii. Innovations in solar supply chain resilience
- iv. Reducing levelized cost of utility-scale PV

1.4 Energy Storage

- i. Innovative battery chemistries (lithium-ion, sodium-ion, solid-state, etc.)
- ii. Flow Batteries (Vanadium/ Next Generation)
- iii. Secured supply chains for battery components (cathode, anode, electrolyte)
- iv. High energy density, long cycle life
- v. Battery safety and thermal management

1.5 Hydrogen Economy

- i. Green hydrogen via electrolysis, blue hydrogen with carbon capture
- ii. Seawater Electrolysis
- iii. Storage and use, including fuel cells and ammonia as carrier/fuel
- iv. Hydrogen Conversion into energy (Fuel Cells, ICE)
- v. Hydrogen Compressors

1.6 Carbon Capture, Utilization & Storage (CCUS)

- i. Low-cost CO₂ capture, mineralization, bioconversion, enhanced oil recovery
- ii. Utilization for building materials, chemicals, fuels

1.7 Modular Nuclear Reactors

- i. Small Modular Reactors (SMRs), thorium-based reactors, fast breeder technologies

1.8 Advanced Clean Energy Systems

- i. Fusion R&D plasma containment, superconducting magnets

1.9 Decentralized and Off-Grid Solutions

- i. Solar home systems, micro-hydro, biomass gasification for rural areas
- ii. Innovations for last-mile energy access

1.10 Energy-Efficient Cooling

- i. High efficiency air conditioners
- ii. Affordable, localized supply chains to cut import dependency of components essential for energy efficient cooling systems

1.11 Seaweed-Based Energy & Biochemical Alternatives

1.12 Methane Capture & Bioconversion

1.13 Critical Minerals, Metals and Rare Earth Processing & Recycling

- i. Critical Minerals and Metals Processing Solutions
- ii. Recycling systems for critical minerals and metals
- iii. Rare earth-free magnets: Innovate high-performance magnets without rare earth elements
- iv. Advanced surface coating and additive manufacturing technologies for aerospace, defence, chemical, oil & gas, and biomedical sectors.

1.14 Ocean Farming & Marine Biotechnology

1.15 Nuclear Fusion R&D

1.16 Comprehensive Climate Action Initiatives

- i. High-resolution climate modelling/simulation tools
- ii. Low-carbon tech for hard-to-abate sectors (steel, cement, chemicals)
- iii. Electrification and green alternatives for industrial heating
- iv. Carbon footprint monitoring and life-cycle assessment
- v. Nature-based solutions: blue carbon, green infrastructure, agroforestry
- vi. Climate-resilient infrastructure (smart cities, sustainable drainage, heat-resilient materials)
- vii. Net-zero/low-carbon materials (e.g., cement with $\geq 90\%$ lower emissions, fiber-based composites, passive thermal management)
- viii. Waste-to-energy, industrial symbiosis, rare earth/critical minerals/e-waste recycling, decarbonized desalination

2. “Deep Technology” including quantum computing, robotics and space

Need for RDI Funding

India’s future competitiveness and security depends on mastering deep technologies, quantum, semiconductors, robotics, advanced manufacturing, space etc.

- Progress in these sectors enables transformative applications in communications, defence, healthcare, and the economy.
- Strong Deeptech ecosystem will integrate Indian industry and research with global value chains and make India a global source of advanced solutions.

Case for Government and Market

Deep technologies are now foundational to India's economic resilience, strategic autonomy, and security. They underpin critical infrastructure, defence capabilities, and next-generation industries, directly impacting digital sovereignty, supply chain security, and high-value job creation. Global powers treat these domains as national security assets, investing billions to dominate future value chains. For India, leadership in deep tech is essential to reduce reliance on imported chips, satellite systems, and precision manufacturing equipment, while enabling indigenous solutions in communications, healthcare, defence, and climate resilience. This aligns directly with national missions like the India Semiconductor Mission, National Quantum Mission, and ISRO's space technology roadmap, ensuring India's position in the global tech order.

Deep tech unlocks transformative business opportunities in high-growth, high-margin sectors, enabling Indian companies to supply advanced components, platforms, and services to global markets. Commercial applications span quantum-secure communications, AI accelerators, semiconductor fabrication, satellite-based services, precision robotics for manufacturing and healthcare, and novel materials for energy, transport, and consumer products. These technologies address pressing market pain points such as cybersecurity threats, chip shortages, automation gaps, and performance limits in existing infrastructure. With rising global demand and strong policy incentives, private-sector players can capture strategic niches in multi-trillion-dollar global deep tech markets, integrate into high-value supply chains, and develop export-ready IP-led businesses.

Global Scenario

- China, US, Japan, EU and South Korea dominate the global Deeptech race, through initiatives like the US CHIPS and Science Act, EU Chips Act, China's Made in China 2025, and multi-billion quantum, semiconductor, and space programs, treating these domains as essential for economic and national security leadership.
- Global industry and governments are rapidly advancing scalable quantum computing (IBM, Google), quantum-secure communications (China's Micius), commercial chip foundries (Intel, TSMC), and space systems (SpaceX, Blue Origin, Starlink), with international consortia (ESA, CNSA) pushing R&D frontiers and supply chain resilience.

Indian Scenario

- India has launched the National Quantum Mission, India Semiconductor Mission, and expanded ISRO's advanced launch, satellite, and planetary programs, achieving indigenous quantum key distribution, basic chip design, and the successful deployment of CubeSats.
- Persistent challenges include scaling up quantum talent and hardware, establishing commercial chip fabs and supply chains, advancing robotics and automation, and integrating

indigenous R&D into industry and global tech markets for long-term self-reliance and competitiveness.

Potential projects for funding

(Indicative sub-sectors along with types of projects which may be considered for funding are listed below)

2.1 Quantum Technologies

- i. Quantum Computing: Scalable qubit architectures, quantum algorithms for Indian applications, cryptographic security and post-quantum cryptography, error correction and noise mitigation, quantum sensing and metrology
- ii. Quantum Communication: Quantum Key Distribution (QKD) over fiber and free space, quantum repeaters, satellite-based quantum communication
- iii. Quantum Software & Imaging: Quantum software, compilers, quantum imaging, non-invasive diagnostics
- iv. Quantum Materials

2.2 Semiconductors & Electronics

- i. Chip design and advanced node fabrication
- ii. Electronic control systems
- iii. High-precision components

2.3 Advanced Manufacturing & Robotics

- i. High-precision tools and dies
- ii. Advanced automation/control systems for manufacturing assembly lines
- iii. Metal/multi-material 3D printing for next-gen hybrid components

2.4 Photonics & Optoelectronics

- i. Photonics for data centres, ultra-high-speed communications, optical transceivers
- ii. Next-gen materials (direct bandgap silicon, 2D materials, >100 GHz modulators, silicon photonics)
- iii. High-efficiency, integrated single photon sources
- iv. Nanophotonic devices (on-chip integration)

- v. Beyond CMOS integration, neuromorphic photonics, deep tissue imaging, fully optical internet
- vi. Optical imaging of the nervous system, photonic-enabled synthetic fuels and energy storage
- vii. Chemistry controlled by light, nanoscale light manipulation, and regenerative medicine through optical cell manipulation

2.5 Space Technologies

- i. Satellite systems (miniaturized CubeSats, NanoSats, MicroSats)
- ii. Advanced and reusable launch vehicles, propulsion innovation (cryogenic/green propellants)
- iii. Rocket launcher systems and debris management
- iv. Satellite communications and high-throughput satellites
- v. Geospatial and remote sensing applications (including hyperspectral imaging)
- vi. Space intelligence satellites, space station development, deep-space missions
- vii. Next-gen payloads for earth observation, climate, agriculture, urban connectivity
- viii. AI-based space traffic monitoring, active debris removal, on-orbit servicing/refuelling/life-extension
- ix. Moon/Mars technology demonstrations and planetary science instruments

2.6 Advanced Materials

- i. Nanomaterials, adsorbates, and composite materials (e.g., for potable water generation, fluoride removal etc.)
- ii. Health and pharmaceutical materials: Solutions for wound healing, non-invasive continuous monitoring, ceramic implants, titanium/alloys, silicon, biomaterials for prosthetics, spinal screws, sensors
- iii. Infrastructure building materials: Smart, self-healing, and self-luminous concrete, 3D graphene, aerographite, hydroceramics, composite foams, pre-fabrication/modular construction, transparent oxide-based electronics
- iv. 2D materials

- v. Advanced catalysts for energy generation and storage
- vi. Composites: Carbon, glass, silicon, lithium, nickel for wind blades, PV cells, batteries, smart grids
- vii. Food and agriculture materials: EcoWool box liners, cyclic olefin polymer, biodegradable materials for efficient and sustainable cold chains
- viii. Metal/multi-material 3D printing for hybrid properties
- ix. Data-driven approaches in materials research: Material informatics, computational techniques, machine learning, artificial intelligence for accelerating discovery and development of next-gen materials
- x. Biodegradable implants
- xi. Quantum dots for solar energy
- xii. Carbon Fibre g>T1000 Grade
- xiii. Smart & Self-Healing Materials

2.7 Intelligent Systems & Robotics

- i. Modular Robotic Platforms
- ii. Edge Intelligence & Swarm Robotics
- iii. Human-Robot Interaction (HRI)
- iv. Autonomous Navigation & Perception

2.8 Neuromorphic Computing & AI Hardware

- i. Edge AI Accelerators
- ii. Neuromorphic Processors

3. Artificial Intelligence and its applications to Indian problems including in agriculture, health, and education

Need for RDI Funding

AI is now a foundational enabler for India's economic growth, social development, and national competitiveness, being central to solving challenges in agriculture, healthcare, education, and governance.

- Focused investment in AI R&D is crucial for India to develop indigenous, context-specific solutions, promote digital inclusion, and ensure equitable access to emerging technologies across all regions and demographics.

Case for Government and Market

Artificial Intelligence is a force multiplier for India’s growth, equity, and governance, with direct relevance to national priorities such as doubling farmers’ incomes, delivering affordable healthcare, improving learning outcomes, and enabling citizen-centric services at scale. As a digital-first economy with over 1.2 billion mobile connections and vast linguistic diversity, India requires AI systems tailored to local languages, socio-economic contexts, and infrastructure realities. Indigenous AI capabilities reduce dependence on foreign models, safeguard data sovereignty, and ensure ethical, transparent deployment in line with national values. Strategic investment in AI R&D complements flagship programmes like Digital India, Bhashini, and the IndiaAI Mission, positioning AI not just as a tech sector, but as an enabling layer across agriculture, health, education, and public service delivery.

AI addresses structural inefficiencies across Indian markets such as low productivity in agriculture, urban congestion, healthcare access gaps, and manual bottlenecks in MSMEs, while enabling entirely new value propositions in fintech, logistics, retail, and education. Business opportunities range from precision farming platforms and AI-powered diagnostic tools to multilingual conversational agents, adaptive learning solutions, and automation-as-a-service for SMEs. Global demand for context-specific, scalable AI solutions is accelerating, and India’s unique datasets, engineering talent pool, and policy support create a competitive edge for exporting “frugal AI” innovations. For enterprises, adopting AI delivers measurable gains in efficiency, accuracy, and customer engagement, turning AI from an experimental capability into a core profit driver.

Global Scenario

- Top economies such as the US, China, EU, UK, Israel, and Canada are investing heavily in AI research, talent development, and digital infrastructure. Major initiatives include the US CHIPS and Science Act and executive actions on AI safety; the EU’s AI Act and Digital Europe Programme; China’s “New Generation AI Plan”; and the UK’s AI Safety Summit and Frontier AI Taskforce. South Korea and Japan are also making major investments in AI chips, edge-AI, and sectoral applications.
- Industry adoption is surging globally, AI now powers advanced medical diagnostics (Google DeepMind, Siemens, Arterys), precision agriculture (IBM Watson, John Deere), EdTech (Duolingo, Khan Academy), and leading foundation models (GPT-4, Gemini, Llama 2, Grok). The global focus is on responsible and explainable AI, regulating high-risk use cases, cross-lingual models, and integrating AI hardware-software for rapid and safe deployment.

Indian Scenario

- India is scaling up AI as a national priority, launching the National AI Portal, National AI Mission, and NITI Aayog’s #AIForAll strategy with sectoral focus on health, agriculture, education, smart cities, and mobility. Initiatives like Bhashini (National Language Translation Mission, 2022) are developing Indian language datasets and speech models for over 22 scheduled languages. The IndiaAI programme (₹10,000 crore, Budget 2024) funds AI compute infrastructure, indigenous large language models, startups, and public sector adoption.

- India faces significant challenges such as lack of large-scale, diverse Indian datasets; urgent need for affordable, high-quality AI models in Indian languages; developing compute infrastructure for public sector and academia; talent and skills gaps in responsible AI; and the need for robust standards, validation, and ethical guidelines for safe, explainable, and unbiased deployment.

Potential projects for funding

(Indicative sub-sectors along with types of projects which may be considered for funding are listed below)

3.1 AI in Agriculture

- i. Precision farming techniques using AI
- ii. AI-driven soil, irrigation, and fertilization management
- iii. Disease and pest prediction through computer vision and sensors
- iv. Yield estimation with satellite/drone imagery and data analytics
- v. AI-driven market linkage and agri-supply chain optimization
- vi. Livestock monitoring and health management with AI
- vii. Farmer-centric AI solutions in regional languages

3.2 AI in Healthcare

- i. AI-based diagnostics in radiology, pathology, and genomics
- ii. Early disease detection for cancer, TB, diabetes using predictive models
- iii. AI-powered telemedicine and remote patient monitoring
- iv. Predictive epidemic response and outbreak modeling
- v. Natural Language Processing (NLP) for Electronic Health Records
- vi. AI for mental health, speech therapy, and rehabilitation support
- vii. AI assistive technologies for people with disabilities

3.3 AI in Education

- i. Adaptive learning platforms for personalized education
- ii. Speech-to-text and text-to-speech in Indian languages
- iii. Automated grading and assessment
- iv. AI for learning disabilities and student engagement tracking
- v. Content recommendation engines for personalized learning paths
- vi. Teacher-assist AI tools for curriculum and classroom support
- vii. Virtual labs and STEM simulations

3.4 Cross-Domain & Enabling AI Technologies

- i. Predictive analytics for agriculture, health, and disaster management
- ii. AI for disaster and emergency response systems
- iii. AI testing, validation, safety, and bias mitigation frameworks
- iv. Development of indigenous AI chips and accelerators
- v. Edge-AI hardware for deployment in low-resource and rural settings
- vi. Immersive digital health and education platforms (XR/AR/VR-enabled)
- vii. AI Tools for MSME Automation

4. Biotechnology, biomanufacturing, synthetic biology, pharma, medical devices

Need for RDI Funding

Biotechnology, biomanufacturing, synthetic biology, pharmaceuticals, and medical devices are strategic sectors driving global health security, sustainable production, and economic growth. Breakthroughs in these areas enable solutions for personalized medicine, pandemic preparedness, precision agriculture, climate action, and advanced healthcare.

- India's investment in R&D is essential to build domestic innovation capacity, strengthen supply chains, reduce dependence on imports, and harness new economic opportunities, spanning

next-gen therapeutics, diagnostics, sustainable materials, and bio-based manufacturing for self-reliance and global competitiveness.

Case for Government and Market

Biotechnology and its allied domains are highly critical to India’s health security, sustainable industrial growth, and bioeconomy ambitions. As the world’s third-largest producer of pharmaceuticals and vaccines, India’s next developmental leap depends on shifting from generics manufacturing to innovation-led discovery, advanced biologics, and high-value medtech solutions. Indigenous capabilities in genomics, synthetic biology, and biomanufacturing will reduce import dependence on critical APIs, diagnostics, and high-end medical devices which were clear vulnerabilities sharply exposed during COVID-19. Strategic investment in these sectors supports national missions on pandemic preparedness, One Health, climate-smart agriculture, and “Atmanirbhar Bharat,” while opening pathways for leadership in sustainable materials, biofuels, and next-gen therapeutics. With global markets converging on precision medicine, regenerative therapies, and sustainable biomanufacturing, India must embed R&D leadership into its industrial and public health strategy.

The sector solves fundamental market challenges, rising healthcare costs, unmet medical needs, supply chain vulnerabilities, and demand for sustainable production methods, while unlocking high-growth, IP-intensive opportunities. Business cases span AI-driven drug discovery, mRNA vaccine platforms, wearable diagnostics, biodegradable biomaterials, and synthetic biology-based industrial inputs etc. India’s cost-efficient manufacturing base, deep clinical trial ecosystem, and expanding biotech talent pool provide a competitive advantage for serving both domestic and export markets. Global demand for vaccines, advanced therapeutics, and affordable medtech is projected to grow exponentially, offering Indian firms the opportunity to move up the value chain from contract manufacturing to proprietary product development. The convergence of biotechnology with AI, materials science, and engineering further multiplies potential, creating new revenue streams in precision agriculture, climate action, and bio-based consumer goods.

Global Scenario

- Leading economies globally are focusing on investments in biotechnology, advanced biomanufacturing, synthetic biology, and medtech - through policies such as the US “National Biotechnology and Biomanufacturing Initiative” (2022), EU “Biotechnology Strategy,” China’s “14th Five-Year Plan” for Bioeconomy, and large-scale public-private partnerships supporting genomics, personalized medicine, and sustainable bio-based industries.
- Globally, there is rapid industry adoption of AI-driven drug discovery (e.g., DeepMind, Recursion, Insilico), genome editing (CRISPR, base editing), mRNA vaccines (Pfizer/BioNTech, Moderna), high-throughput screening, bioprinting, wearable/implantable medical devices, and platform technologies for infectious disease diagnostics, alongside a strong policy push for regulatory harmonization, supply chain security, and sustainability.

Indian Scenario

- India is the world’s third-largest producer of pharmaceuticals (by volume) and vaccines, a major supplier of generic drugs globally, and home to rapidly growing biotech, medtech, and synthetic biology sectors, supported by flagship organisations and schemes like the

Biotechnology Industry Research Assistance Council (BIRAC), Production Linked Incentive (PLI) for pharma and medtech, and the National Biopharma Mission.

- Key challenges include scaling indigenous R&D in genomics, synthetic biology, and bioengineering; expanding high-quality manufacturing and regulatory compliance for global markets; advancing domestic innovation in medical devices, diagnostics, and biomaterials; and building advanced skills, AI-driven platforms, and infrastructure for next-generation biologics, precision medicine, and sustainable bio-industries.

Potential projects for funding

(Indicative sub-sectors along with types of projects which may be considered for funding are listed below)

4.1 Biotechnology & Life Sciences

- i. Genomics, genome editing, and next-generation sequencing
- ii. Multi-omics platforms: transcriptomics, proteomics, metabolomics
- iii. Functional and systems biology
- iv. Bioinformatics and computational/AI-driven life sciences
- v. Cellular reprogramming and stem cell technologies
- vi. Environmental biotechnology (bioremediation, wastewater treatment)

4.2 Biomanufacturing & Bioengineering

- i. Microbial, plant, and mammalian cell factories for biosynthesis
- ii. Metabolic pathway engineering for optimized production
- iii. Sustainable bioprocesses using agro-waste and CO₂ conversion
- iv. Advanced fermentation technologies and downstream processing
- v. Scale-up and production of bio-enzymes, biosurfactants, and biopolymers
- vi. Biomanufacturing of diagnostics, vaccines, and therapeutic proteins

4.3 Synthetic Biology & Industrial Biotech

- i. Design and synthesis of genetic circuits and minimal cells

- ii. Biofoundry development for high-throughput strain engineering
- iii. Chassis organism engineering (bacteria, yeast, microalgae)
- iv. Biosensors for environmental and medical applications
- v. Biodesign automation and use of AI in strain design/pathway optimization
- vi. Synthetic biology solutions for sustainable fuels, chemicals, and materials

4.4 Pharmaceuticals & Drug Development

- i. Pre-clinical and clinical pharmaceutical R&D
- ii. AI/ML-driven drug discovery and target identification
- iii. Development of active pharmaceutical ingredients (APIs) and biosimilars
- iv. Structure-based drug design and high-throughput screening
- v. Next-gen vaccine development (mRNA, recombinant, vector-based)
- vi. Pharmacogenomics, personalized medicine platforms, and drug repurposing
- vii. Orphan drug development and advanced therapeutics

4.5 Medical Devices & Diagnostics

- i. Indigenous diagnostic kits (point-of-care, rapid, multiplexed)
- ii. Wearable health monitors and implantable biosensors
- iii. Image-guided and robotic surgical systems
- iv. Smart prosthetics and rehabilitation technologies
- v. AI/ML-powered diagnostic and imaging devices
- vi. Advanced drug delivery systems and biocompatible materials
- vii. Devices for cancer care/radiotherapy, radiology, nuclear imaging, anesthesia, cardio-respiratory, and renal care
- viii. Implants (bone, cochlear, pacemaker), neural chip implants, and wound healing materials

- ix. Platform technologies for infectious disease detection and management

4.6 Advanced Biomaterials & Regenerative Medicine

- i. Multi-functional, very low-toxicity biomaterials
- ii. Advanced 3D bioprinting and biofabrication technologies
- iii. Biomaterialomics platforms using AI for discovery and prediction
- iv. Automated preclinical validation and regulatory compliance (in vitro/in vivo, high-throughput)
- v. Smart and personalized implant design (patient-specific CAD/CAM, embedded sensors, functionalized implants)

4.7 Advanced Therapeutics and Biologics

- i. Broad-spectrum antibiotics targeting antimicrobial resistance (AMR)
- ii. Microbiome-based therapeutics
- iii. Sustainable biologics for agriculture, aquaculture, and animal health

5. Digital economy including Digital agriculture

Need for RDI Funding

Crucial for India's accelerated economic growth, enhanced transparency, and inclusive development, investments in indigenous digital infrastructure, secure digital platforms, advanced fintech, and AgriTech will transform how citizens access services, participate in markets, and benefit from public initiatives.

- By supporting R&D in digital tools, core infrastructure, data platforms, e-governance, and smart agriculture, India can leapfrog legacy barriers, bridge the urban–rural divide, strengthen supply chains, and establish global leadership in digital innovation.

Case for Government and Market

The digital economy is the backbone of India's ambition to become a \$5 trillion economy, enabling inclusive growth, efficient governance, and global competitiveness. Indigenous digital infrastructure such as secure cloud, sovereign data platforms, AI-enabled citizen services along with digital agriculture are essential to bridge the urban–rural divide, modernise service delivery, and strengthen economic resilience. As agriculture sustains nearly half of India's workforce, precision digital tools can address structural challenges like low productivity, climate variability, and fragmented value chains. Investments in this domain align with national priorities under Digital India, BharatNet, India Stack, and the National Digital Agriculture Mission, while reinforcing data sovereignty, cybersecurity, and

interoperability. By embedding innovation in public service delivery, agriculture, and fintech, India can achieve both developmental and strategic objectives such as universal access, financial inclusion, and competitive positioning in global digital trade.

The digital economy unlocks scalable, cross-sector business opportunities such as digital payments, AI-driven governance platforms, agri-tech marketplaces, supply chain traceability, and immersive education/health solutions while addressing long-standing market inefficiencies. For agriculture, digital tools reduce input costs, optimise yields, enhance market access, and enable farm-to-fork transparency, creating value for both producers and consumers. In the broader economy, sectors from MSMEs to logistics benefit from blockchain-based contracts, predictive analytics, and automation. Rising smartphone penetration, affordable data, and robust digital public infrastructure create a fertile market for private innovation, while global demand for secure, interoperable, and privacy-respecting platforms positions India to export “DPI-as-a-service.” This convergence of policy push, infrastructure readiness, and entrepreneurial capacity makes the digital economy, particularly AgriTech, one of the highest-potential investment and innovation frontiers in the decade ahead.

Global Scenario

- Leading countries are focusing significantly in next-generation digital infrastructure, sovereign cloud, AI/ML-powered citizen services, 5G/6G rollouts, digital identity, open data platforms, and fintech, with national strategies promoting secure, resilient, and inclusive digital economies.
- Globally, digital agriculture is expanding rapidly via IoT-enabled smart farming, precision soil analytics, drone-based monitoring, blockchain-based supply chains, and open data systems, while digital financial platforms, e-governance solutions, and immersive digital health/education platforms are transforming service delivery and market access.

Indian Scenario

- India’s digital transformation is being driven by flagship initiatives such as Digital India, BharatNet, India Stack, and the Unified Payments Interface (UPI), with rapid rollout of indigenous hardware, secure cloud, e-governance platforms, digital public infrastructure, and AgriTech adoption, positioning India as a global digital innovation hub.
- Key challenges include expanding high-speed connectivity to rural and remote areas, scaling up advanced digital agriculture and financial inclusion platforms, strengthening cybersecurity and privacy frameworks, and fostering talent and innovation ecosystems to unlock the full potential of the digital economy across all sectors.

Potential projects for funding

(Indicative sub-sectors along with types of projects which may be considered for funding are listed below)

5.1 Core Infrastructure for Digital Economy

- i. Development of indigenous processors, chipsets, sensors
- ii. Secure/sovereign cloud and edge computing platforms
- iii. Decentralized data storage solutions
- iv. Privacy-preserving digital architectures
- v. 5G and 6G technologies for industry, health, and rural connectivity
- vi. Quantum-safe encryption methods and advanced cybersecurity frameworks
- vii. Green and energy-efficient computing infrastructure

5.2 Digital Agriculture (AgriTech)

- i. Smart farming systems leveraging IoT, AI, and remote sensing
- ii. Digital soil health monitoring and advisory systems
- iii. Precision irrigation and climate-smart input optimization technologies
- iv. Agri-data and yield analytics platforms for crop forecasting
- v. Digital farm-to-market value chains (logistics, traceability, e-mandis)
- vi. Drone-based solutions for crop monitoring, spraying, and land mapping
- vii. Blockchain-based produce traceability and contract farming platforms

5.3 Precision Agriculture & Soil Health

- i. Advanced soil carbon sensing (in-situ sensors, IoT probes, remote sensing)
- ii. AI/ML-enabled analytics for soil health, land degradation neutrality, targeted interventions
- iii. Equipment for residue management and sustainable soil incorporation
- iv. Soil erosion prevention: conservation agriculture machinery, cover cropping, runoff control

- v. On-farm biomass conversion, biochar, microbial consortia, and composting for soil organic carbon enhancement

5.4 Digital Financial Systems & Fintech

- i. Blockchain-based digital payment solutions and smart contracts
- ii. Digital lending and micro-insurance platforms
- iii. Credit scoring tools for MSMEs and financial inclusion solutions for rural/informal sectors
- iv. Central Bank Digital Currency (CBDC) pilots and applications
- v. Cybersecurity and fraud detection tools for secure digital transactions
- vi. AI-based KYC automation and regulatory compliance systems
- vii. Alternative-Data-Based Credit Scoring Models
- viii. Mobile-First ERP Platforms

5.5 e-Governance and Citizen Services

- i. AI/ML-powered platforms for public service delivery and grievance redressal
- ii. Scalable, interoperable systems for real-time governance
- iii. Digital twins for urban/resource planning and optimization
- iv. Multilingual voice/text-based citizen service platforms
- v. Aadhaar-enabled and mobile-first innovations for last-mile service inclusion
- vi. Smart Contracts for Governance
- vii. Decentralized Identity (DID) Systems
- viii. Blockchain for Public Asset Traceability
- ix. Energy-Efficient Blockchain Protocols

5.6 Digital Health and Education Platforms

- i. Integrated digital health records and interoperable health stacks

- ii. AI-driven telemedicine and mobile diagnostics
- iii. Adaptive AI learning systems for personalized education
- iv. Vernacular content platforms for digital skilling and literacy
- v. Immersive AR/VR/XR-based platforms for STEM and vocational education

5.7 Data Economy and Platforms

- i. Development of open and federated data platforms
- ii. Advanced tools for data anonymization, consent management, and sharing
- iii. AI governance and responsible data use frameworks
- iv. Creation of indigenous large language models (LLMs) and datasets in Indian languages
- v. Socio-economic data-driven platforms for policy modeling

5.8 Emerging Digital Economy

- i. Metaverse applications for industry, culture, and education
- ii. Digital avatars, virtual marketplaces, and creator economy platforms
- iii. AI in legal, regulatory (RegTech), and digital judiciary systems
- iv. Robotics and automation solutions for MSMEs and e-commerce logistics
- v. Digital intellectual property (IP) creation, protection, and monetization tools
- vi. Vernacular Voice Interfaces

5.9 Digital Public Infrastructure

- i. Composable Open-Source DPI Modules
- ii. API Interoperability Protocols AI-Powered DPI Orchestration Tools
- iii. Multi-Lingual DPI Interfaces
- iv. Homomorphic Encryption Models

- v. Federated AI Algorithms
- vi. Lightweight Privacy-Enhancing Technologies (PETs) for Mobile

Enabling Role, Capabilities and Flexible Mandate

In addition to the above domains, the RDI Scheme may remain responsive to other high-potential areas as identified through ongoing expert deliberations and evolving national priorities. In all cases, the Scheme’s mandate is to provide enabling support for the development and scaling of emerging technologies across India’s private-sector R&D landscape.

The RDI Scheme will also focus on enabling broader sectoral capabilities for India’s R&D ecosystem with targeted support for technology acquisition, technology and IP sovereignty, breakthrough technologies in deep tech, reducing dependency on imports, and aligning efforts closely with India's National Missions. The Scheme will consistently play an enabling and catalytic role, ensuring successful development and adoption by relevant stakeholders.
