



Nishith Desai Associates  
LEGAL AND TAX COUNSELING WORLDWIDE

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Research

# Horizon Technologies

Umpteen Opportunities for  
Technologists, Entrepreneurs and  
Investors

January 2025

Research

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**Umpteen Opportunities for  
Technologists, Entrepreneurs and  
Investors**

January 2025

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A Knowledge Paper prepared by



**Nishith Desai** Associates  
LEGAL AND TAX COUNSELING WORLDWIDE

for



**Global Summit on Impact of Technology at Work**

17th to 19th Jan, 2025

Jio World Convention Centre, BKC, Mumbai

# Memorandum of Understanding

Between



&



## 'Sprinting to the Future of Law'

— A joint R&D Project

Nishith Desai Associates (“**NDA**”), having its registered office at 93 B, Mittal Court, Nariman Point, Mumbai 400 021, India

And

Pan IIT Alumni India (“**PanIIT**”), having its registered office at 112 Nalanda House, IIT Delhi, Hauz Khas, New Delhi 110016, India

with effect from 1 January 2025.

### 1. Background:

- 1.1 NDA is a research and strategy driven international firm with offices in Mumbai, Bangalore, New Delhi, GIFT City, Palo Alto (Silicon Valley), Singapore, New York, and Dubai. The team comprises of specialists who provide strategic advice on legal, regulatory, and tax related matters. NDA is known by 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. NDA’s three-fold purpose sufficiently summarises its distinctiveness: “Simply put, (1) We exist to innovatively solve complex legal problems of our clients; (2) To foster the next generation of socially conscious lawyers and (3) Shape the future of law.”
- 1.2 PanIIT is a society of IIT Alumni from across the world, constituted to give back to the nation and the society with a Vision is to empower the IIT alumni community to become a force for positive change and transformation in society through innovation.
- 1.3 Both the parties share a working relationship and deep commitment for innovation, capacity building and nurturing new ideas. In alignment with these shared values, it was mutually agreed to pursue an initiative that would benefit both technology and legal professionals. Hence, this arrangement.

## **2. Objective:**

- 2.1 This Memorandum of Understanding (MoU) establishes a framework of cooperation between NDA and PanIIT to organise quarterly research and development events titled “Sprinting to the Future of Law” in a hybrid format.

## **3. Roles and Responsibilities:**

### **3.1 NDA:**

- 3.1.1 Design the event agenda, including the theme, speakers, and discussion topics.
- 3.1.2 Provide subject-matter experts and ensure the delivery of high-quality content.
- 3.1.3 Host the events in a hybrid format and provide technical and logistical support.
- 3.1.4 Promote the event to its network, including clients and collaborators.
- 3.1.5 Develop and share post-event resources (e.g., recordings, summaries, or research papers).
- 3.1.6 Create background paper for Track and Panel Subject.
- 3.1.7 Capture points discussed.
- 3.1.8 Post event analysis and position paper on the subject.

### **3.2 PanIIT:**

- 3.2.1 Contribute to the design of the event themes by leveraging its alumni networks' expertise in technology and management.
- 3.2.2 Identify and invite prominent speakers or panelists from the IIT alumni community.
- 3.2.3 Promote the event to its alumni network and ensure widespread participation.
- 3.2.4 Assist with participant registration and event feedback collection.

### **3.3 Joint Responsibilities:**

- 3.3.1 Both parties will collaborate on identifying mutually relevant topics to ensure the event's impact.
- 3.3.2 Both parties will co-brand the events, featuring their logos on all promotional and event materials. NDA logo will be displayed as Knowledge Partner, as per PanIIT's scheme.
- 3.3.3 Upon the conclusion of each event, both parties shall exchange all relevant materials pertaining to the event, including but not limited to, participant details, feedback, recordings, and other post-event resources, within a reasonable period of time.
- 3.3.4 All intellectual property rights, including but not limited to materials, recordings, presentations, and research created for or arising from the events, shall remain the joint property of NDA and PanIIT collectively.

## **4. Financial Terms:**

- 4.1 Any expenses incurred in hosting the events, such as venue, technology platform, and speaker honorariums, shall be mutually agreed upon.

## **5. Duration and Termination:**

- 5.1 This MoU will be valid for a period of one (1) year from the Effective Date, renewable by mutual agreement.
- 5.2 Either party may terminate the MoU with 30 days' written notice to the other party.

## **6. Confidentiality:**

- 6.1 Both parties agree to maintain the confidentiality of all proprietary or sensitive information shared under this MoU and will not disclose such information without prior written consent.

**7. Dispute Resolution:**

- 7.1 Any disputes arising under this MoU shall be resolved amicably through discussions. If unresolved, the matter will be referred to arbitration in accordance with the Arbitration and Conciliation Act, 1996. The seat of arbitration shall be Mumbai, and the language shall be English.

**8. Miscellaneous:**

- 8.1 This MoU does not constitute a legal partnership or joint venture between NDA and PanIIT.
- 8.2 Any modifications to this MoU shall be in writing and signed by authorised representatives of both parties.

Signatories

\_\_\_\_\_

For Nishith Desai Associates:

Name: NISHITH DESAI

Designation: FOUNDER

Date:

\_\_\_\_\_

For Pan IIT Alumni India:

Name: DEBASHISH BHATTACHARYYA

Designation: CHAIRMAN, PAN IIT ALUMNI INDIA

Date:



Ranked as the 'Most Innovative Indian Law Firm' in the prestigious FT Innovative Lawyers Asia Pacific Awards for multiple years. Also ranked amongst the 'Most Innovative Asia Pacific Law Firm' in these elite Financial Times Innovation rankings.



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# Introduction

Technological advancements over recent decades have transformed every aspect of our lives—how we live, work, and connect. These innovations are breaking down geographical and cultural barriers, fostering global connectivity, and enabling the exchange of news, ideas, and experiences.

In just the past two years, generative artificial intelligence (Gen AI) has emerged and demonstrated its transformational potential. Yet, on the horizon lie many more groundbreaking technologies. These emerging “Horizon Technologies” are on the brink of widespread adoption and promise to redefine industries, economies, and societies. They hold the potential to address persistent global challenges and unlock transformative opportunities for creating new paradigms and industries.

This knowledge paper delves into these emerging technologies, exploring both deep foundational advancements and their convergence into Horizon Technologies. By examining key use cases, it aims to guide technologists, entrepreneurs, and investors in identifying areas of impactful opportunities.

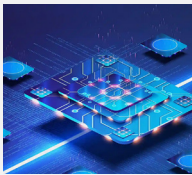
The paper also highlights investment strategies essential for the growth of these technologies and discusses their alignment with global social development goals. As a research-driven law firm focused on shaping the future of law, we also address the critical legal, regulatory, and tax frameworks necessary to foster their growth.

# A Peep into the Future

## A. Deep Foundational Technologies

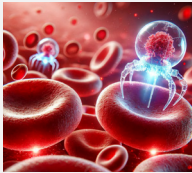
Deep Foundational Technologies are the core technologies that are building blocks for developing technology-based products and services. They are results of major scientific research and involve complex engineering processes requiring significant breakthroughs. Here are six examples of such deep foundational technologies. But many more of such technologies are being developed and advanced by research institutions, startups and R&D labs of large companies.

### Quantum Tech



- They use the principles of quantum mechanics by leveraging subatomic level phenomena like superposition, entanglement, and quantum interference to process information.
- They include quantum technologies for computing, communication, sensing, measuring, data storage, cryptography and simulation.
- They can outperform current binary-based computers by millions of times. For example, recently Google announced a new quantum chip called Willow, which will solve a problem in five minutes that would take ten septillion years for the current fastest computer to solve.

### Nanotechnology



- They focus on the design, production and applications of structures, material, devices and systems at the scale of 1 to 100 nanometers, thousands of times smaller than the width of a human hair.
- The key areas include nanomaterials, nanoelectronics, nanomedicine, nanofabrication, nanocoating, and nanoenergy.
- By manipulating matter at the atomic and molecular scale, nanotech unveils new possibilities in medical diagnostics and treatment, material science, energy efficiency, resource optimization, and pollution control.

### Blockchain



- A decentralized, distributed ledger technology based cryptographic techniques to record transactions across a vast network of private or public computers. It prevents any single entity from altering the record without the consensus of the network.
- They offer unparalleled levels of immutability, transparency, tamper-resistance, verifiability, decentralization, security and trust in the validity of the recorded transaction.
- Operating on the concept of Zero Trust, they eliminate the need for a trusted intermediary and enable transactions through smart contracts in areas such as digital assets, communication networks, supply chains, real estates, voting, etc.

## A Peep into the Future

## CRISPR



- CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) is a genetic “scissor” that allows us to precisely remove, add or alter a section of the DNA.
- It replaces tradition gene editing methods such as ZFNs, TALENs, electroporation, targeted breeding, etc. It offers significantly improved precision, targeting ability, efficiency, simplicity, flexibility, and economic equation.
- With uses in a variety of organisms, including humans, animals, insects, plants and microorganisms, it will transform treatment of diseases with genetic predispositions, cancer treatment, crop improvement, regenerative agriculture, pollution reduction, etc

## Nuclear Fusion



- It overcomes electrostatic repulsion between positively charged atomic nuclei to combine two light atomic nuclei to form a heavier nucleus. In the process, it releases a massive amount of energy, like in the Sun and stars.
- Traditional nuclear fission uses rare, heavy atoms, like uranium and plutonium, whereas nuclear fusion uses abundant light atoms, like deuterium and lithium. So, it does not produce long-lasting radioactive waste nor carries the risk of catastrophic accidental meltdown of reactors.
- In future, it is anticipated to solve our insatiable hunger for energy with added benefits of clean energy, high energy density, continuous baseload power, and safety.

## Photonics



- Photonics is about using the power of photons. In contrast to electronics-based equipment and networks, where information is transferred using electrons, in photonics-based equipment and networks, it is done using light.
- It offers greater speed, energy efficiency, larger bandwidth, better integration, more security, and high precision.
- In addition to traditional applications like lasers, fiber optic cables, LEDs, night vision, optical switches, and photovoltaic cells, it is used promising applications like optical coherence tomography, biophotonics, optical data storage, photoacoustic imaging, fluorescence measurement, etc.

## B. Horizon Technologies

Horizon Technologies come about when multiple relevant deep foundational technologies are combined into one ensembled technology for a special purpose. Such convergence of technologies offers unique opportunities to deliver transformational capabilities and applications in target industries and markets. Here are some examples of Horizon Technologies that we expect to emerge and come-of-age in the next eight to ten years.

### Cyborgs



- Cyborgs—portmanteaus of cybernetics and living biological organisms, are formed when electro-mechanical components are integrated within any living organisms to add or enhance certain capabilities. The living organism can be any—an insect, a bird, or a mammal, not just a human.
- Blurring the lines between biology and technology, cyborgs extend, amplify or modify biological functions to the extent that it can even change the concept of death.
- Prosthetic limb or pacemaker are most basic form of cyborg technologies, but advancements are happening at a rapid pace. Elon Musk's company Neuralink has successfully tested a brain-computer interface and has received approval from US FDA and Health Canada for the first-in-human clinical trials

### Digital Twins



- Digital twins are virtual representations of real-world objects, processes, or systems. They use real-time data collected through sensors and inputs and advanced computational models with AI to simulate and monitor the behavior, performance and future state of their counterparts.
- They help us recognize future problems and preemptively address them to avoid damage or failures. They can also help us redesign products and processes to increase efficiency, effectiveness, and appeal.
- General Electric uses digital twins to monitor the performance of turbines and engines. Cities like Singapore using it for city planning, traffic management and public safety. Siemens Healthineer uses it for better diagnostics and treatment planning.

### Space Internet



- Unlike traditional internet systems that rely on terrestrial infrastructure such as fiber optics and cell towers, space internet leverages satellites orbiting the Earth to deliver broadband services.
- Space Internet offers many unique benefits, including bypassing geographical limitations, global coverage, low latency, scalability, backup connectivity, etc.
- In recent years, many companies such as SpaceX Starlink, OneWeb, Amazon Kuiper, Telesat, LeoSat, etc. have been building up constellations of private satellites to provide seamless internet services to mobile travelers and IoT-enabled device.

A Peep into the Future

**NetZero Buildings**



- A NetZero building is an energy efficient building that fully balances its energy consumption and the renewable energy it produces on-site so that the net external energy demand of the building over a period (e.g., one year) is zero.
- Buildings consume 40% of total energy production (22% by residential buildings and 18% by commercial buildings). So, NetZero technology can help reduce global warming and resulting climate changes.
- International Energy Agency (IEA) has established aggressive goals of have all new building to be NetZero buildings by 2030 and over 85% of all building converted to NetZero buildings by 2050.

**Ambient intelligence**



- Ambient intelligence (Aml) refers to an AI-based system that is sensitive, adaptive and responsive to human presence, activity and needs. It understands an individual person's needs, preferences, actions, and emotions, and responds accordingly to create the most-suitable personalized ambience without the need for direct interventions by the individual.
- Aml can work in our living rooms, kitchens, workplaces, retail stores, cars, hotels, and even in hospitals.
- A paradigm changing example of Aml would be in autonomous driving. Instead of installing various sensors and computing algorithms in each car, if they are installed in the environment, e.g. traffic signals, streetlights, traffic signs, building corners, etc. they can monitor the current state and direct all cars in their vicinity. In a way, similar to air traffic control.

**Sea Drones**



- Sea drones are unmanned vessels that operate in water bodies, such as oceans, lakes, rivers and canals. Because no humans are onboard, they can operate in hazardous conditions, stay underwater longer, go deep in ocean waters, are smaller in size, are easy to maneuver, cost significantly less, and be less conspicuous to and interfering with wildlife.
- Various types of sea drones are available, each with different capabilities and purpose, such as surface drones, submersible drones, solar-powered sea drones, wired drones, autonomous drones, etc.
- They can help us explore the unexplored parts of our vast oceans, strengthen maritime logistics and transportation, help develop aquaculture and fisheries, and more effectively monitor ocean health and endangered marine species.

**Artificial Womb**



- It is an ectogenesis system that replicates the conditions of a natural womb, allowing for the development and growth of embryos or fetuses outside of a natural body.
- It combines mechanical systems, sensors, AI, bioreactors, and artificial environments to mimic the biological processes of gestation, such as nutrient delivery, waste removal, temperature regulation, etc.
- Each year hundreds of thousands of women and millions of neonatal or newborn die due to the complications of pregnancy and childbirth. Artificial wombs not only significantly reduce these deaths but can also eliminate the legal and social issues involved with surrogacy.

## A Peep into the Future

## Robotic Chefs



- Robotic Chef is an artificial intelligence-enhanced robot designed to prepare and cook food, including performing various cooking related tasks, such as cutting vegetables, gathering various ingredients and condiments as per the recipe, adding them in the cooking pot at the right time, stirring, flipping, preparing plates, garnishing, cleaning up, etc.
- They reduce laborious tasks in cooking, increase hygiene, improve energy efficiency, reduce kitchen accidents, minimize contamination of food, decrease foodborne diseases, better control storage conditions, offer consistent culinary quality, etc.
- Given all these benefits, robotic chef technologies are useful not only in households, but also in food services industry, military, schools, workplace cafeterias, disaster sites, hospitals, etc.

## Bioacoustics



- It is the study of how sounds produced by living organisms, specifically birds, marine life, insects and mammals, are used for communication, navigation, mating and other behaviors.
- It helps us understand animal behavior and provides ways to communicate with them. They can also be early warning signs for impending natural disasters and the build-up of environmental stressors like climate change and noise pollution.
- Apart from its use in ecological research and conservation, bioacoustics can be immense help agriculture, fisheries and aquaculture, medical research, military, and offshore oil exploration.

## Vertical Farms



- Unlike in traditional farms, in vertical farms crops, fruits, vegetables and flowers are grown in stacked layers or vertically integrated structures, often in controlled indoor environments, such as skyscrapers, warehouses, or shipping containers.
- They utilize artificial lighting, climate control and automated systems to create optimal growing conditions. Techniques like hydroponics, aeroponics, and aquaponics, can also help grow plants without soil, minimizing the need for traditional farming land.
- Companies like AeroFarm and Plenty in the USA, Sky Greens in Singapore and The Vertical Farm in the UK are key players specifically catering urban populations with fresh food sources.

# Use Cases

Horizon Technologies are going to transform all industries in different ways. They will enable new, innovative companies to break the market hold of and disrupt the market positions of existing players. Here are some examples of how new types of products and services can be provided in select industries by startups or existing companies.

## Healthcare & Life Sciences



- Cyborg technology can help develop better artificial vital organs such as heart, kidney and lungs and bionic implants for vision, hearing or cardiac support that are less likely to be rejected by the patient's body.
- Artificial womb technologies can be used to dramatically increase the survival chances of extremely premature babies. They can also help revolutionize the field of reproductive medicine and treatments.
- Digital twin of human organs and biological systems can be used for simulated testing of trial drugs, which can quicken the pace of drug discovery and individualized medicine. They can also help in training for complicated surgical procedures.

## Energy & Utilities



- Sea drones can help monitor and repair the underwater structures and pipelines of offshore oil platforms. They can also carry out routine inspection of hydroelectric plant inlets and underwater structures health of dams.
- Digital twins can be used by utilities to simulate effects of various conditions on the electricity usage and resulting impact on the grid. They can also carry out predictive circuit breaker operations to avoid blackouts and brownouts.
- Space internet enables oil and gas companies to connect with crew and equipment at their offshore and onshore drilling sites and remote stations on pipelines. Utilities can monitor equipment placed at transmission lines and substations.

## Agriculture



- Vertical farms bring food production closer to food consumers, specifically in urban areas, offering fresher quality, food variety, sustainable farming, higher yield for resource usage and minimum pollution.
- In agriculture, bioacoustics can be used to keep pest and crop-annihilating animals away from the fields and orchards and attract pollinating insects at the time of the bloom.
- Digital twin of farms combined with soil and weather conditions can help make better crop decisions and rotations in massive farms. They can also be used for land mapping and title management.



Use Cases

Rural Economy



- Space internet can be huge boon for rural areas. People living and visiting remote areas can get connected to Internet-based digital commerce, news services, entertainment, financial markets, agricultural produce market data, etc.
- Rural economy is heavily dependent on agriculture and livestock industries. Cyborg insects can help increase pollination and crop yield and cyborg mammals can eat targeted weed and spare crop plants. Cyborg technologies can help improve health and lengthen the productive life of livestock.
- India has a lot to gain from robotic chefs. Most women in rural India spend a huge part of their day in cooking related activities. Robotic chefs can reduce their workload and free them up to earn economic independence.

Retail



- In Retail, superstores use significant amount of energy, especially those that are open 24 hours. Converting them into NetZero buildings has not only reduce energy dependence on the grid but also improve the bottom line.
- Digital twin technologies can help optimize the design and layout of retail superstores for greater convenience to customers, enhanced shopping experience, and smoother foot-traffic flow.
- Space internet can significantly expand the reach of retail companies offering digital commerce. People can have access to products and service available beyond their vicinity areas at competitive prices. Retailers providing such services can also have real-time data exchange with delivery service.

Automotive



- Car companies can use ambient intelligence to automatically provide differentiating in-vehicle experience for different drivers from music selection to temperature settings to car seat adjustments.
- Digital twin can help automobile companies in designing vehicles and assessing the performance of various designs. They can also simulate diver assist systems under various conditions. For electric vehicle manufacturers, they can help optimize the locations and usage of charging stations.
- Automotive companies can install equipment for space internet services in their vehicles to offer internet services to vehicle users and get real-time data about the vehicle and its current condition. Even immediately inform emergency services when vehicle is met with an accident and driver is not responding.

Aerospace & Defense



- Digital twins can help in aircraft design and simulate aerodynamic performance of various designs. They can also help in airport designs by simulating the flow of people in terminals, the luggage in baggage handling areas, the movement of aircrafts and airport vehicles on jet bridges, taxiways and aprons.
- Cyborg technologies can augment the abilities of human soldiers and enhance the lives of wounded veterans. In future, the military may even develop cyborg warriors for specialized missions.
- Sea drones have both defensive and offensive uses for military. They can undertake anti-sabotage inspections, locate naval mines, and carry out autonomous coast guard patrols. They can help carry weapons to ships as well as even carry out offensive missions sabotaging naval infrastructure and bridges critical for wartime supplies.

## Use Cases

## Space Exploration



- Space internet is a must for human and non-human missions in the Space for astronauts and equipment to connect with Internet-based services and monitoring.
- Cyborg technology can strengthen human's ability to survive in harsh environments and enable habitation of life on other planets with different atmospheric makeup.
- Vertical farm technologies grow vegetables and fruits without soil and in small, enclosed environments. Outer space missions, especially for establishing habitats on the Moon, Mars and other planets, to grow the food locally.

## Manufacturing



- Digital twins can help design shop floors for optimal flow of raw materials and work-in-progress inventory. They can also help determine preventive maintenance for machine tools and factory equipment.
- Cyborg technologies can enhance skills and efficiency of human labor. They can also improve the control of shop floor through quicker and clearer transmission of information.
- Manufacturing and assembly plants with huge warehouses to store raw material, parts and work-in-progress inventory can benefit from NetZero building technologies. It will reduce the need of depending on utilities for energy supplies.

## Logistics &amp; Transport



- Using space internet, logistics companies can stay continuously connected with and know the location and condition of their mobile assets, such as trucks, vans, and cargo containers.
- For maritime transport, sea drones help monitor ship movements in busy harbors. They also enable underwater inspection and certain types of repairs of the ship's hull, rudder and propellers even when ship is sailing.
- In a fleet of vehicles, digital twins can help track and simulate usage patterns and automatically schedule preventive maintenance of each individual vehicle in the fleet.

# Investing in Horizon Technologies

Investing in Horizon Technologies is necessary to unlock the vast potential for innovation, economic growth, and long-term societal impact. Such investments can fuel rapid advancements in critical sectors, from healthcare to sustainable infrastructure, and provide solutions to some of the most pressing global challenges especially in emerging economies. By fostering an environment that encourages funding, research, and collaboration, these technologies can be developed effectively and scaled globally.

The evolution of Horizon Technologies is expected to emerge through nascent startups, which will play a pivotal role in iterating and bringing related innovations to market. These startups, often at the cutting edge of technological advancements, will require strategic investments to fuel their growth and development. By investing in these early-stage companies, investors can help foster breakthrough solutions that can have far-reaching societal and economic impacts.

There are several ways in which such investments can happen. Here are the most important ones.

## A. Angel Investments

It refers to the financial support provided by high-net-worth individuals, known as “angel investors,” to early-stage technology startups in exchange for equity or convertible debt. These investments typically occur when the tech company is still in its infancy—developing its product, refining its business model, or seeking to gain market traction—and when securing traditional funding.

### Benefit of Investment Through Angel Investors



#### Faster and Less Formal Process

It often involves a quicker, less formal investment process. This agility can be crucial in the fast-moving tech landscape where timing is often key to gaining a competitive edge.



#### Potential for Follow-up Funding

If the startup shows promise angel investors may be more keen to provide potential for follow - up funding



#### Flexible Investment Terms

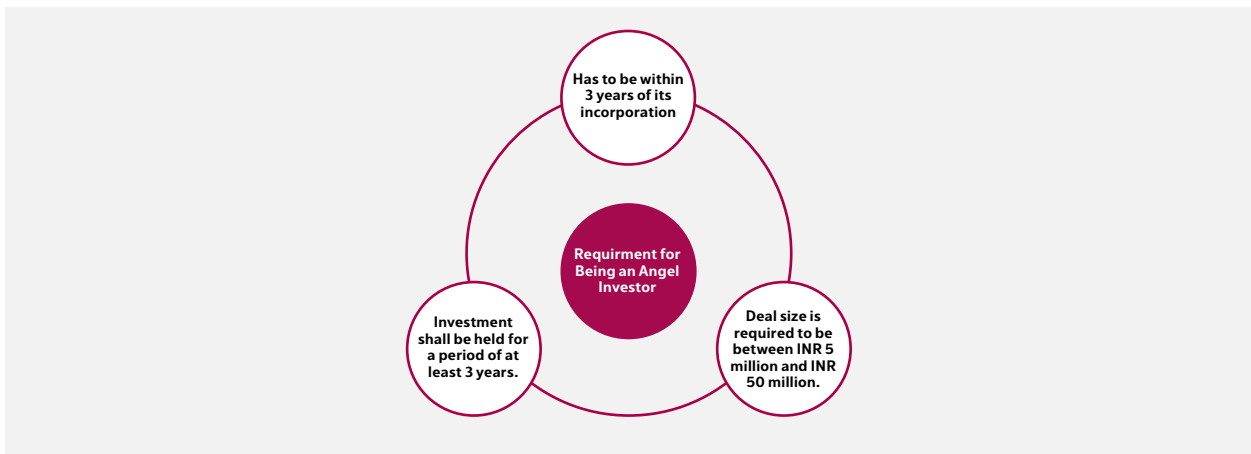
Angel investments are often more flexible than venture capital funding. This flexibility can provide significant comfort to startups, especially those in the early stages, as they may lack extensive legal or financial resources.

#### *Examples of Companies with Angel Investments*

*DeHatt: App-based platform offering AI-enabled agriculture solutions.*

*Leucine: Offers cloud-based digital twin solution for pharmaceutical manufacturing floors.*

## Investing in Horizon Technologies



## B. Seed Financing

Seed financing refers to the initial investment made by an investor, either an individual or a syndicate of individual investors, in an early-stage startup company, typically through a convertible note, like SAFE, which will be exchanged for an equity stake when the startup receives funding in the first valuation round. The term “seed” indicates that financial support is provided to kickstart a startup before it becomes self-sustaining by generating its own cash flow or until it is ready for further rounds of investment by professional investors.

### Benefit of Investment Through Seed Financing



#### Help in the Diversification of Portfolio

Allows investors to diversify their portfolios by adding early-stage companies, which often operate in different industries and have different risk profiles than more established businesses.



#### Increased Control and Negotiation Leverage

Because seed investments are made early on, investors typically have more leverage when negotiating terms. This might include securing favorable equity stakes, board seats, or influence over key business decisions.



#### Flexible Investment Terms

Seed investors often have the opportunity to negotiate more flexible investment terms compared to later-stage investors.

#### Examples of Companies with Seed Financing

*BlueQubit: Quantum software platform that offers software library for enterprise, defense, and academic customers.*

Investing in Horizon Technologies



### C. Strategic Venture Capitalism

Investments in startups focusing on Horizon Technologies can also be made by strategic venture investors, often termed as corporate venture capital. They have multi-layered objectives, not only for financial returns but also to achieve broader strategic objectives, such as gaining access to innovative technologies, entering new markets, fostering synergies with existing business operations, or positioning for future mergers or acquisitions. For Horizon Technologies, this model is ideal, as the investing entities may offer access to complementary backup technologies that can supplement the startup’s growth or initial projects where the proof of concept can be tested and fine-tuned.

#### Benefit of Investment Through Strategic Venture Capitalism



**Access to Innovation:**

Allows investors (especially corporations) to gain early access to cutting-edge technologies, business models, or product innovations that they may not develop internally.



**Operational Support and Guidance**

Investors often come with a strong network of industry professionals, experts, and potential partners that startups can tap into.



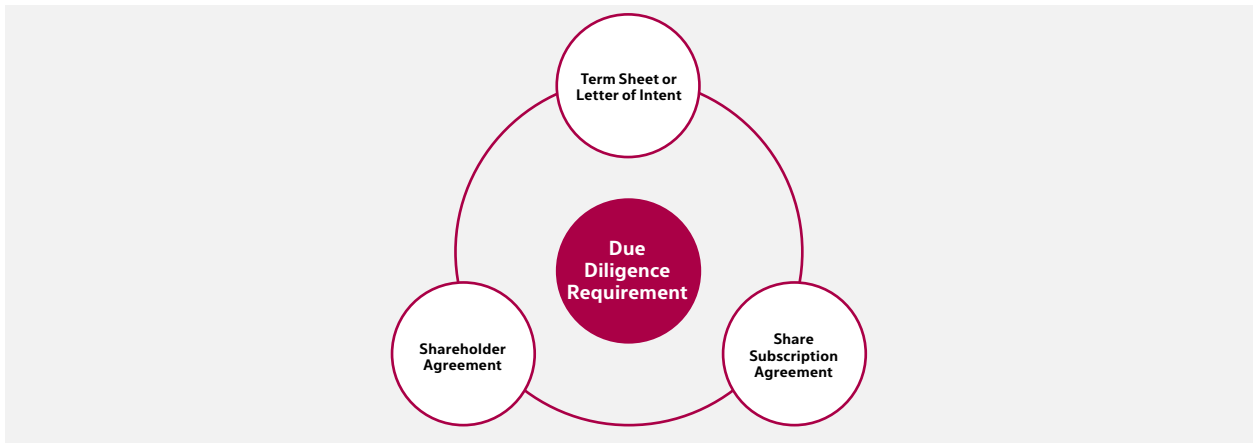
**Credibility and Increased Visibility**

Having a reputed venture capital firm adds to the credibility and enhances reputation in the market.

*Examples of Companies with Strategic Venture Capitalist Investment:*

*Pratititech: Offers digital twin technology-based solution for solar plants*

*Figure AI Inc.: Robotics company working to enable AI – powered humanoid robots*



## D. Incubators And Startup Schemes

These include startup schemes launched by ministries to provide financial assistance and facilitate market entry for startups. Moreover, they also include assistance and endowments provided by government-aided institutes like the IIMs and IITs to boost entrepreneurship.

### Benefit of Investment Through Incubators/Startup Schemes



#### Helps Protecting Equity

Allows investors to protect their equity as funding is condition based.



#### Improved Credibility and Validation

Being selected for a prestigious incubator or startup scheme can act as a stamp of approval for a business and improve credibility.

*Examples of Companies with Investment from Incubators/Startup Schemes:*

*Planys Technologies: Assists in underwater asset inspections by using marine robotics and other efficient technologies*

*CropIn: Offers deep-learning models to solve diverse challenges agri-stakeholders*

#### Due Diligence

While no specific legal requirement exists, State governments, Union governments, and universities set their own eligibility criteria for funding. Startups meeting these criteria, such as innovation or societal impact, are granted support to align with the government/institution's strategic goals.

## E. Startup Accelerator

It refers to a program designed to help early-stage companies grow and scale quickly. It is generally a mentor-based program that provides guidance, support and limited funding in exchange for equity. Startup accelerators are usually time-limited (e.g., 3-6 months) and culminate in a “demo day,” where startups pitch their businesses to investors.

## F. Debt Financing

Debt financing is a method of raising capital through borrowing, where a company receives funds from lenders or investors with the agreement to repay the borrowed amount, along with interest, over a specified period. However, this model is not common for technology-based investments.

## G. University Funding

It refers to the funding done by universities to support early-stage startups and entrepreneurs by providing both funding and mentorship. This model typically involves collaboration between academic institutions, students, and faculty members to help transform innovative ideas into viable businesses. Professors, with their expertise and industry connections, act as mentors to guide startups through the process of growth and development.

### Benefit of Investment Through University Funding



#### Holistic Support

Universities offer a combination of financial resources, mentorship, research capabilities, and student involvement, which help startups grow in a comprehensive and sustainable manner.



#### Reduced Costs



With university resources such as office space, equipment, and legal services, startups can save on operational costs.

### How University Funding Works

- University-Backed Financing
- Professor-Driven Mentorship
- Student Involvement To Build Startups
- Access to University Resources
- University as a Testing Ground for Products

## H. Other Sources

In addition to traditional equity and debt financing, there are several alternative sources of investment that can be leveraged to bring capital into Horizon Technologies. Two most common are through Corporate Social Responsibility (CSR) initiatives and Crowdfunding.

 <p><b>Corporate Social Responsibility</b> Financial support provided by companies to startups, social enterprises, or initiatives that align with their corporate social responsibility goals.</p>	 <p><b>Crowd Funding</b> This involves pooling small contributions from a wide network of individuals who are often motivated by interest in the business, its products, or the potential for a financial return.</p>
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### Due Diligence for Incubators/Startup Schemes and Crowdfunding



**Funding via CSR**

While no specific legal requirement exists, companies need to ensure that the startup is created for a bona fide purpose and that the aim of the company is to help society, rather than just earning a profit.



**Crowdfunding**

There is no specific legal requirement for crowdfunding, but entities must ensure that they do not allow equity-based crowdfunding, as it is prohibited by SEBI.

*Examples of Companies with Investments from Crowdfunding*

*Terria: Simplifies the complex process of creating digital twins, and online virtual replicas of buildings, cities, regions and countries for modelling and investigation.*

*Robotix: Develops robots that helps children learn computational thinking through coding and robotics.*



## I. Steps To Encourage Investment

Securing investment is a critical step for Horizon Technologies to realize their potential and bring innovative solutions to market. To attract investors, businesses must strategically highlight their unique value proposition, market relevance, and alignment with global and industry trends. Below are some practical steps that Horizon Technology-based companies can take to secure investment.



# Social Good

Sustainable development, social upliftment, and inclusive growth are vital pillars for creating a fair and equitable future for all. These interconnected goals aim to address pressing global challenges such as inequality, environmental degradation, and economic disparities, ensuring that progress benefits everyone without compromising the needs of future generations. Central to this vision is the imperative to uplift marginalised communities, promote equity, and foster development that is inclusive and sustainable.

## A. Sustainable Development Goals

The United Nations Sustainable Development Goals (“SDGs”) provide a robust framework for achieving these aspirations, offering a roadmap to address critical areas such as peace and justice, affordable and clean energy, good health and well-being, innovation in industry and infrastructure, and responsible consumption and production. These goals not only serve as benchmarks for societal progress but also highlight the need for solutions that balance social, economic, and environmental priorities. Horizon technologies present a transformative opportunity to accelerate progress towards these SDGs. By aligning technological advancements with the principles of sustainability and inclusivity, it becomes possible to tackle systemic challenges and enable meaningful change at scale. Evaluating the potential of such technologies against the SDGs offers valuable insights into their impact and effectiveness, providing a metric to measure how well they contribute to building a better, more inclusive world.



### Key SDGs

### About

<b>Peace Justice and Strong Institution</b>	Promote peaceful, inclusive societies, provide access to justice, and build accountable, effective institutions.
<b>Affordable and Clean Energy</b>	Ensure universal access to sustainable, reliable, and modern energy sources.
<b>Good Health and Well-Being</b>	Promote physical and mental health and ensure equitable access to quality healthcare for all.

Social Good

Key SDGs	About
<b>Industry Innovation and Infrastructure</b>	Foster resilient infrastructure, sustainable industrialisation, and innovation for economic growth and development.
<b>Responsible Consumption and Production</b>	Encourage sustainable practices to minimise waste, conserve resources, and reduce environmental impacts.
<b>Decent Work and Economic Growth</b>	Promote inclusive, sustainable economic growth with productive employment and decent work for all.

## B. Advancing SDGs Through Horizon Technologie

### Peace, Justice and Strong Institution



**Ambient Intelligence**

Facilitate secure and intelligent public spaces that enhance safety, provide real-time data for law enforcement, and support justice systems through evidence-based decision-making.



**Digital Twins**

It can help enhance transparency and policy effectiveness by simulating governance systems and replicating real-world environments for better disaster management

### Affordable and Clean Energy



**Vertical Farms + Rengerative Agriculture**

Reduce energy consumption through efficient indoor systems powered by renewables, promoting sustainable practices that minimise fossil fuel reliance.



**Sea Drones**

Aid in exploring and maintaining offshore renewable energy sources, such as wind and tidal power, enhancing efficiency and reducing operational energy costs.

Social Good

## Good Health and Well Being



### Bioacoustics

Monitor environmental and biological health using sound-based technologies, enabling early detection of diseases and improving public health responses.



### Artificial Womb

Support neonatal care by providing a safe environment for premature babies, reducing infant mortality and improving long-term health outcomes.

## Industry, Innovation and Infrastructure



### Cyborgs

Enhance workforce productivity and safety in industries by integrating human capabilities with advanced technology.



### NetZero Buildings

Promote sustainable industrial infrastructure by reducing carbon footprints and incorporating energy-efficient systems to support innovation and long-term resilience.

## Responsible Consumption and Production



### Space Internet

Enable global connectivity to promote awareness and adoption of sustainable consumption practices through digital education and resource-sharing platforms.



### Robotic Chefs

Minimise food waste through precise portion control and optimised ingredient usage, supporting efficient and sustainable food production practices.

## Decent Work and Economic Growth



### Vertical Farms + Regenerative Agriculture

Create sustainable job opportunities in innovative farming techniques while boosting agricultural productivity and reducing environmental impact.



### Digital Twins

Optimise industrial processes and infrastructure, enhancing efficiency and productivity, while enabling skill development in advanced technologies for a resilient workforce.

## C. Key Challenges

Achieving the full potential of Horizon Technologies implementation is not without hurdles. Achieving the full potential of these technologies requires addressing challenges related to infrastructure, accessibility, ethical concerns, and environmental sustainability. By identifying and resolving these barriers, we can harness these advancements to drive impactful and inclusive progress toward a sustainable future.

Key Challenges	Solutions
<b>Limited Access:</b> Limited access to advanced technologies in underdeveloped regions.	To implement affordable financing models and establish partnerships between governments and private entities to ensure equitable distribution of technological infrastructure, such as space internet and vertical farms.
<b>High Energy Use:</b> High energy consumption associated with deploying advanced technologies like digital twins and ambient intelligence.	To integrate renewable energy sources, such as those used in NetZero buildings, to power these systems sustainably
<b>Ethical Issues:</b> Ethical concerns around technologies like artificial wombs and cyborgs.	To develop robust regulatory frameworks and promote public dialogue to address ethical issues and build trust in these technologies.

Challenges	Solutions
<b>Ethical Issues</b>	Developing Robust Legal Framework
<b>High Energy Consumption</b>	Integration of Renewable Energy
<b>Limited Access to Technology</b>	Affordable Financing Models

# Policy and Legal Regime

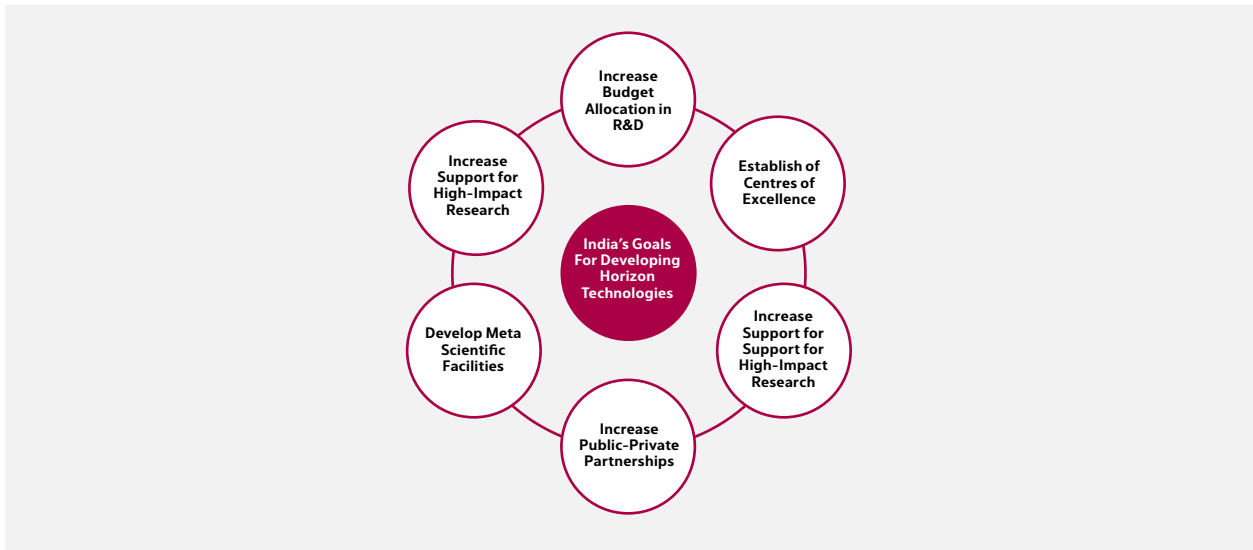
## A. Technology Policy Of India – Laying The Foundation

India's Science and Technology Policy 2013 and Draft Science and Technology Policy 2020 aims to foster innovation, self-reliance, and the development of cutting-edge technologies to drive economic growth and improve societal well-being. It focuses on strengthening indigenous capabilities, promoting research and development (R&D), and encouraging public-private partnerships and boosting Horizon Technologies. The core components of the policy include:



India's horizon technology industry is experiencing rapid growth and diversification, driven by increased government investment, targeted initiatives, and fostering innovation and entrepreneurship. With strategic focus areas like clean energy, drone technology, digital twin, and public-private partnerships, the sector is evolving into a globally competitive and sustainable ecosystem.

Policy and Legal Regime



**Key Initiatives**

**About the Initiatives**

<p><b>Creation of Domain Specific Centres of Excellence</b></p>	<p>Operationalized Centers of Excellence in diverse areas of national interest for driving self-sufficiency and creating capabilities to capture new and emerging technology areas.</p>
<p><b>Launch of National Initiative for Developing and Harnessing Innovations (“NIDHI”) Scheme</b></p>	<p>Facilitate setting up of incubation centers throughout the country, which provide hand-holding support to youth to become budding entrepreneurs and innovators.</p>
<p><b>Launch of Vigyana Dhara and BioE3 Policy</b></p>	<p>Vigyan Dhara Scheme aims to enhance India’s scientific research, innovation, and global competitiveness, while the BioE3 Policy focuses on boosting biomanufacturing for economic growth, environmental sustainability, and employment generation.</p>

Without bolstering the entrepreneurship infrastructure, India cannot realise its potential in Horizon Technologies. India has introduced various schemes to promote entrepreneurship and innovation by focusing on creating an enabling ecosystem for sustainable growth, fostering S&T-enabled enterprises, and integrating grassroots innovations and Traditional Knowledge Systems (TKS) into the broader innovation framework. It aims to build globally competitive, innovation-driven enterprises while addressing societal challenges and achieving sustainable development goals.

## Key Objective of India's Tech - Entrepreneurship Policy



### Enabling Ecosystem

Development of infrastructure such as innovation clusters, technology parks, and virtual incubators.



### Industry-Academia Collaboration

Strengthening linkages between academia and industry for knowledge exchange and practical exposure.



### Gender and Community Inclusion

Promotion of gender inclusion in entrepreneurship and broader participation from local and grassroots communities.



### Focus on Regional and Sectoral Innovation

Special emphasis on fostering innovation in rural, remote, and underrepresented regions and addressing sector-specific challenges.

## Government Initiatives to Promote Entrepreneurship and Ecosystem Development

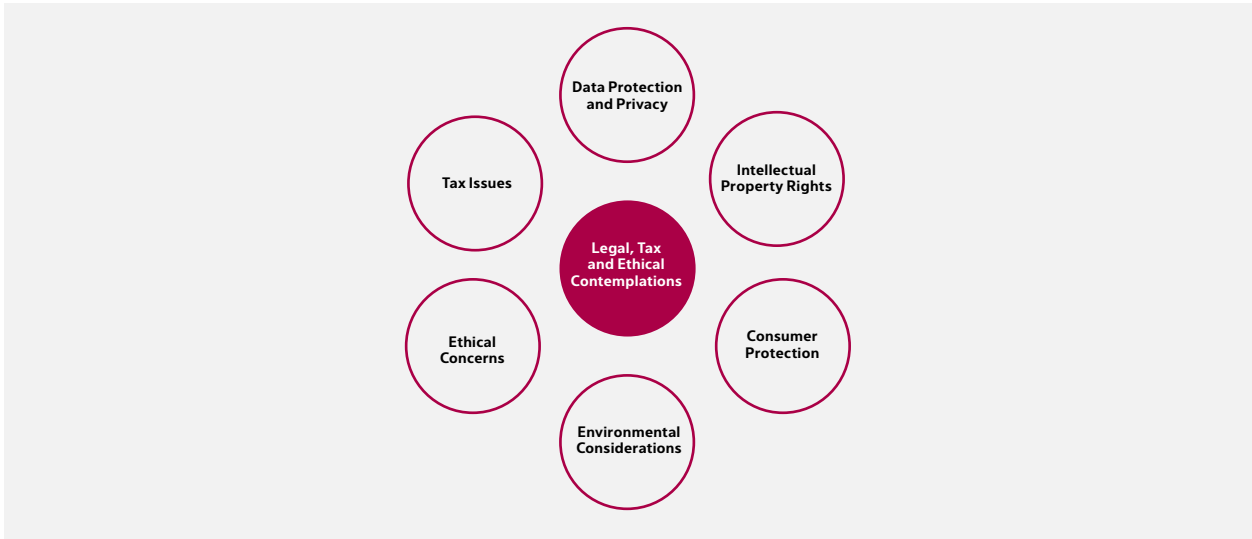
- Atal Innovation Mission & Atal Tinkering Labs
- Technology Incubation and Development of Entrepreneurs (TIDE) 2.0
- Startup India
- National Deep Tech Startup Policy (NDTSP)

## B. Legal, Tax And Ethical Contemplations

While Horizon Technologies offer immense potential for growth and disruption, they also present unique legal and tax challenges that require careful navigation. Legal frameworks and tax policies often struggle to keep pace with the speed of technological advancement, creating a dynamic landscape of compliance, governance, and strategic planning. Understanding the key legal and tax considerations is essential for organisations seeking to harness these technologies effectively while mitigating risks.



Policy and Legal Regime



Data Protection and Privacy

The rapid evolution of technology introduces new dimensions to data-related concerns. These include issues like data ownership, privacy breaches, cybersecurity risks, and the ethical use of personal data. Furthermore, emerging technologies often operate across global jurisdictions, creating complications around compliance with diverse regulatory frameworks. The unique capabilities and implications of each technology necessitate targeted solutions to mitigate risks and ensure responsible innovation.

Challenges	Solution and Changes Required
<p><b>Risks of unauthorised use of personal data against the owner’s consent.</b></p>	<p>Stronger Consent Frameworks and Transparency.</p>
<p><b>Challenges in Ensuring User Consent For Personal Data Collection and Usage.</b></p>	<p>Enhanced Security Protocols for Sensitive Data.</p>
<p><b>Threats of ransomware and malicious attacks for technologies such as digital twins targeting both digital twin and the physical counterpart.</b></p>	<p>Cross-Jurisdictional Compliance and Data Sovereignty Management.</p>
<p><b>Issues related to data sovereignty due to cross-border operations.</b></p>	<p>Clear Protocols for Law Enforcement Access and Privacy Safeguards.</p>

As Horizon Technologies evolve, ensuring clear consent mechanisms, enhanced security measures, and cross-border data management solutions are necessary to protect individuals’ rights. Also, international collaboration and updated legal frameworks are essential to maintain privacy while allowing innovation to thrive, ensuring responsible data use and fostering trust in emerging technologies.

## Intellectual Property (“IP”) Issues

The present IP framework is inadequate to address the challenges posed by these technologies. To protect the rights of creators, developers, and consumers, it is crucial to establish updated and clear legal standards for IP ownership and licensing. This includes developing new laws and modifying existing ones to account for the unique characteristics of these advanced technologies.

Challenges	Solution and Changes Required
<p><b>Ambiguity regarding IP ownership created by entities such as cyborgs or digital twins.</b></p>	<p>Establish Clear Guidelines and Rules for Determining IP Creator, IP Owner, and Fair Use.</p>
<p><b>Issues relating to infringement of third-party IP rights by Horizon Technologies.</b></p>	<p>Ensure IP Agreement Clearly Define All Entities and Outline Ownership of Various Components of the Technology.</p>
<p><b>Overlap of certain technologies such as Ambient Intelligence with existing IP rights and patents resulting in potential patent disputes/legal complexities.</b></p>	<p>Implementing Robust IP Management Systems and Conducting IP Audits To Prevent Overlap.</p>

By addressing these intellectual property challenges with the proposed solutions and necessary changes, we can establish clear, enforceable frameworks that foster innovation while ensuring that creators’ rights are protected and respected across emerging technologies.

## Consumer Protection

As technology advances, consumer protection faces new challenges related to privacy, product safety, and the rights of individuals in the digital age. These concerns necessitate updated regulatory frameworks to ensure that consumers are protected from exploitation, harm, or privacy violations.

Challenges	Solution and Changes Required
<p><b>Issues regarding product safety and accountability</b></p>	<p>Establish Mandatory Product Testing and Safety Standards</p>
<p><b>Absence of regulations for exploitation and unfair practices</b></p>	<p>Comply with Market Recommendations (such as ASCI Guidelines) Until Proper Law is Enforced</p>
<p><b>Monopoly and market dominance of large tech companies in developing Horizon Technologies</b></p>	<p>Need for Robust Regulators and Strong Law to Detect and Prevent and Restrict Monopolistic Practices</p>

## Environmental Considerations

The rapid advancement of technologies such as space internet, cyborgs, digital twins, and ambient intelligence systems has brought significant benefits but also raised environmental concerns.

Policy and Legal Regime

These concerns are multifaceted, affecting both physical and digital landscapes, and require targeted solutions to minimise their environmental impact.

Challenges	Solution and Changes Required
<b>Hazardous materials like electronic waste, fuel for satellite launches, and battery components harms environment</b>	Encouraging Sustainable Design and Material
<b>Heavy reliance on natural resources, which leads to about depletion and environmental degradation</b>	Need For Principle-Based Waste Management Regulations
<b>Excessive waste generation and pollution caused due to Horizon Technologies</b>	Need for Global Cooperations and Better Framework to Address Environmental Concerns

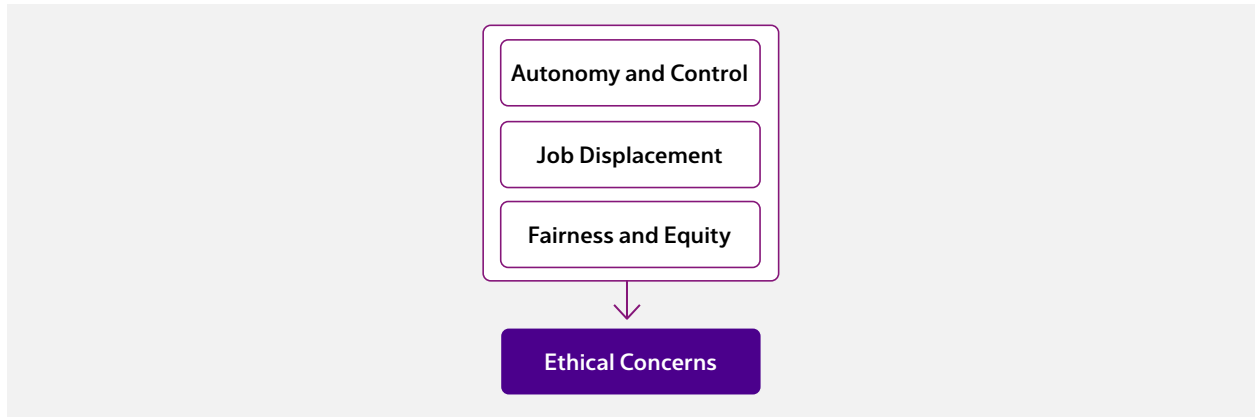
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Tax Issues

Traditional tax laws are not envisaged to consider Horizon Technologies, and this has resulted in the emergence of new tax challenges that current frameworks are not fully equipped to handle. It is crucial for tax laws to evolve, ensuring clarity and fairness for businesses, especially those leveraging advanced technologies in their operations. Establishing clear tax guidelines for emerging technologies will not only ensure compliance but also foster innovation and international collaboration.

Challenges	Solution and Changes Required
<b>Ambiguity surrounding the scope of taxation of income earned by AI entities and cyborgs</b>	Need to Amend Existing Law to Enhance the Scope of Taxable Entities
<b>Ambiguity regarding Permanent Establishment guidelines in context of cyborgs, digital twins, and other automated technology systems</b>	Need for Tax Authorities to Reinterpret Rules that Define Physical Presence (May use Websites, Servers, and Other Means to Categorize Physical Establishment)
<b>Jurisdiction issues regarding cross-border taxation for technologies operation beyond a physical presence</b>	Need to establish international tax standards for digital and automated services
<b>Lack of clarity on double taxation agreements in the existing systems as applicable to Horizon Technologies</b>	Revise and expand Double Taxation Agreements (DTAs) to provide fair and predictable tax treatment to digital and automated services

## Ethical Concerns



### Issue

**Autonomy and Control:** The increasing use of AI and autonomous systems may lead to a loss of human control in decision-making.

**Job Displacement:** Automation and AI could cause job losses in multiple sectors, leading to unemployment and social inequality.

**Fairness and Equity:** Certain groups may be excluded from the benefits of new technologies, or biased algorithms may lead to discrimination.

### Solution

Establish clear accountability structures for AI decisions. Ensure human oversight in critical decisions (human-in-the-loop).

Invest in reskilling and education programs to prepare workers for new roles in tech. Promote job creation in emerging industries like AI maintenance and robotics.

Implement inclusive design for universal access. Use bias mitigation strategies and conduct regular AI audits for fairness.

## Conclusion

This knowledge paper has explored the possibilities offered by Horizon Technologies in redefining the boundaries of human capabilities. They will reshape industries, economies, and societies in the future. We have to be prepared for them. They will offer umpteen opportunities to technologies, entrepreneurs and investors.

However, we will also have to understand their social, commercial, psychological, ethical and environmental impacts. This will help us prepare our legal systems to address negative implications without choking up the development and growth of these technologies. In addition, we will have to ensure that the growth is inclusive and sustainable.

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In addition, please visit Sprinting to the Future of Law ([www.SprintingSeries.com](http://www.SprintingSeries.com)), Nishith Desai Associates. Outputs of various generative AI search engines and tools have been used in preparing this report.



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We are a research and strategy driven international firm with offices in Mumbai, Palo Alto (Silicon Valley), Bengaluru, Singapore, New Delhi, Munich, and New York. 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.

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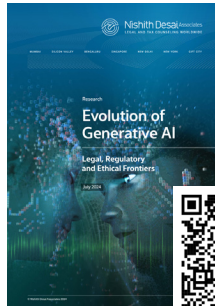
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