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SpaceTech

Exploring the Final Frontier

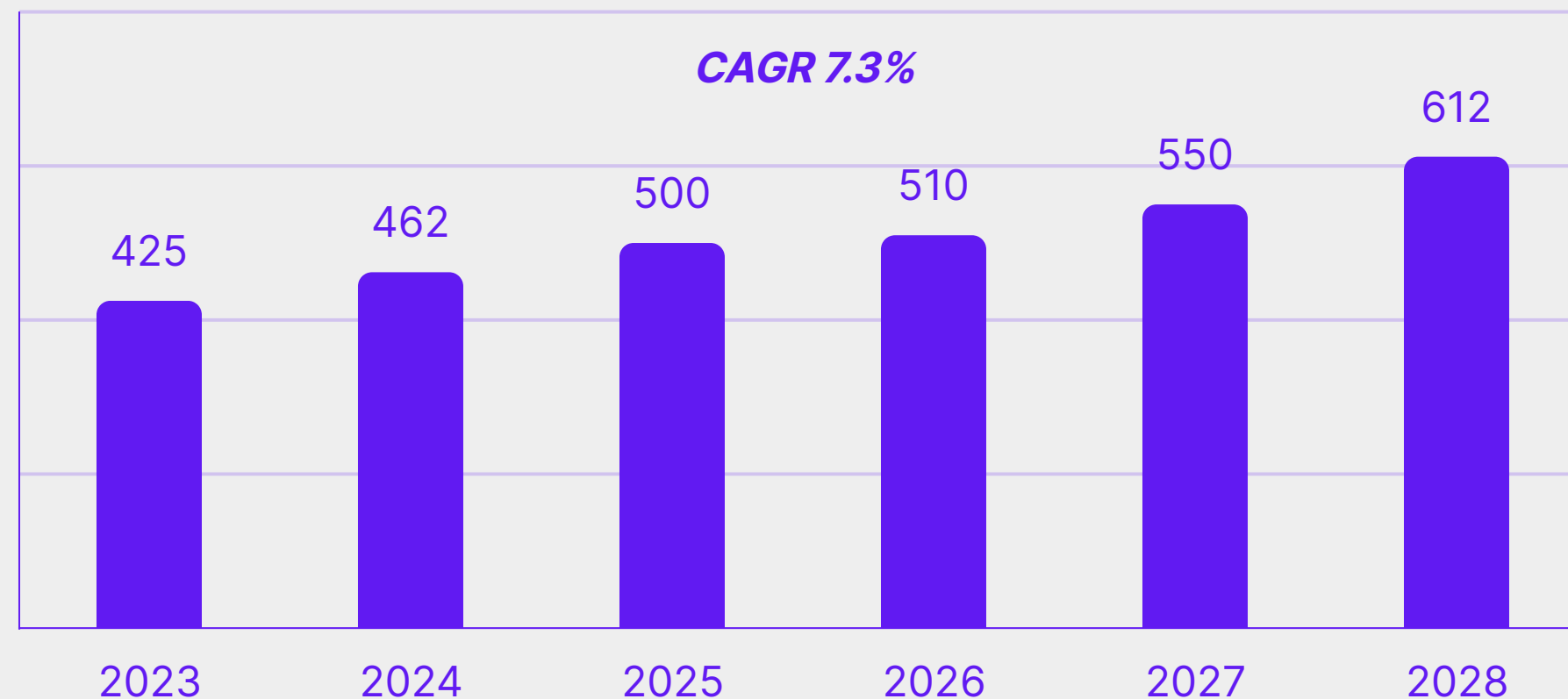
BRC Bytes

Why SpaceTech Matters: Key Drivers Behind Its Growing Importance

What is SpaceTech?

SpaceTech refers to the industry & technologies focused on exploring, utilizing, and commercializing space. With applications ranging from climate monitoring and national security to telecommunications and navigation, SpaceTech plays a critical role in modern economies and geopolitics.

Growing Global Space Economy



Drivers of Growth



Technological Advancements

Innovations like reusable rockets, AI-driven satellite data, and miniaturization are making space more accessible and affordable.



Global Economic Impact

SpaceTech supports GDP growth across sectors, drives job creation, and underpins key services like telecommunications and navigation.



Resurgence of Space Race

Renewed competition among nations & private players is fueling exploration & commercialisation, positioning space as a strategic priority.

Indian Spacetech Industry: Market Overview and Growth Potential

The Indian Spacetech industry is rapidly evolving into a vibrant hub for innovation and investment.

As global interest in space exploration and technology accelerates, India is set for substantial growth, with the space economy projected to achieve a remarkable CAGR of 26% from 2023 to 2030.

Currently holding 2-3% of the global market, India has ambitious plans to expand this share to over 14% by 2030, driven by strong government initiatives and increasing private sector participation.

\$245M+

Raised by 100+ Indian startups since 2020

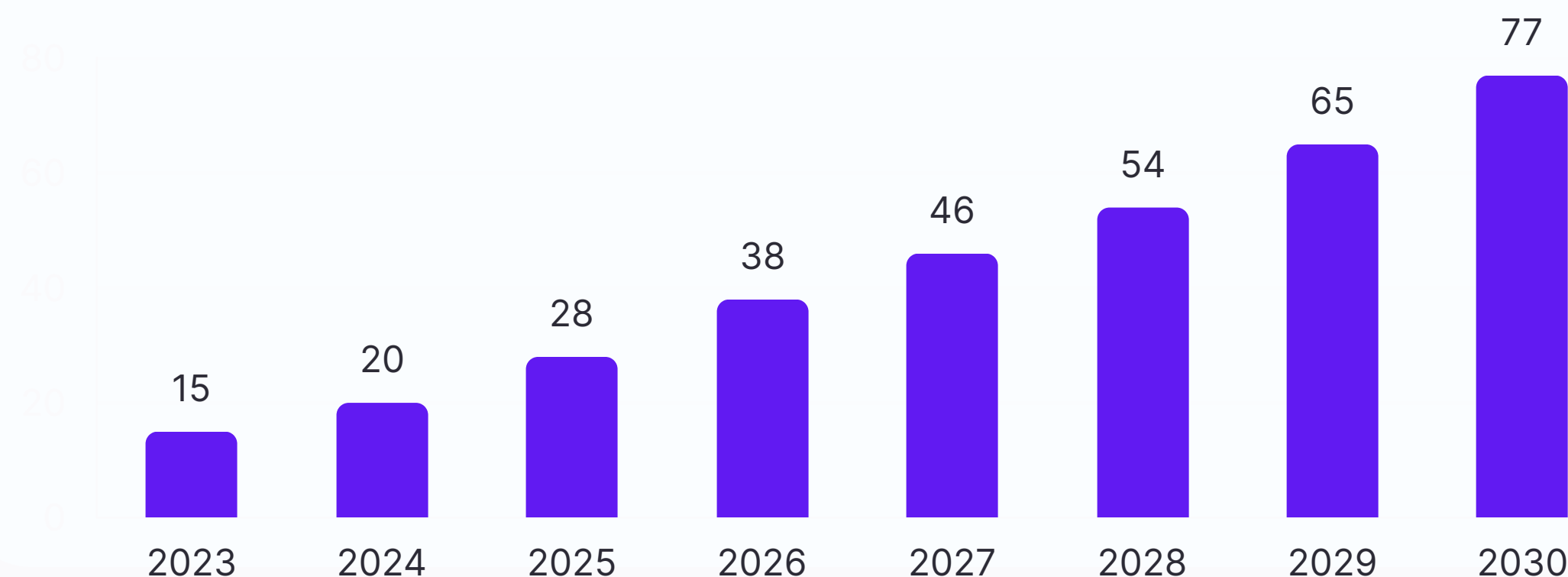
430+

Satellites launched by India for 34 countries

36%

Growth in ISRO's budget between 2020-2023

Indian SpaceTech Market Opportunity in US\$ Bn



Actors in the Ecosystem

Empowering the next generation of innovators, India is laying the groundwork for a thriving space startup ecosystem with strategic programmes and initiatives aimed at nurturing entrepreneurial talent and advancing space technology.



Startups

Emerging companies driving innovation in space technology, developing cutting-edge solutions for satellite communication, Earth observation, and data analytics.

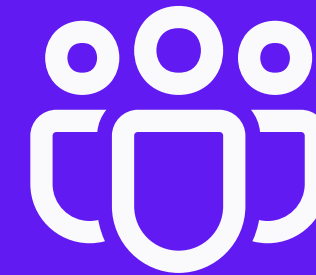
Examples: Astranis, Impulse Space



Funds/Investors

Venture capital, research labs, and incubators providing financial support, infrastructure, mentorship, and strategic guidance to early-stage space startups.

Examples: Inflexor Ventures, Techstars Space Accelerator



Agencies

National agencies responsible for strategic space missions, satellite development, defense-related research, and fostering international collaborations in space exploration.

Examples: ISRO, NASA

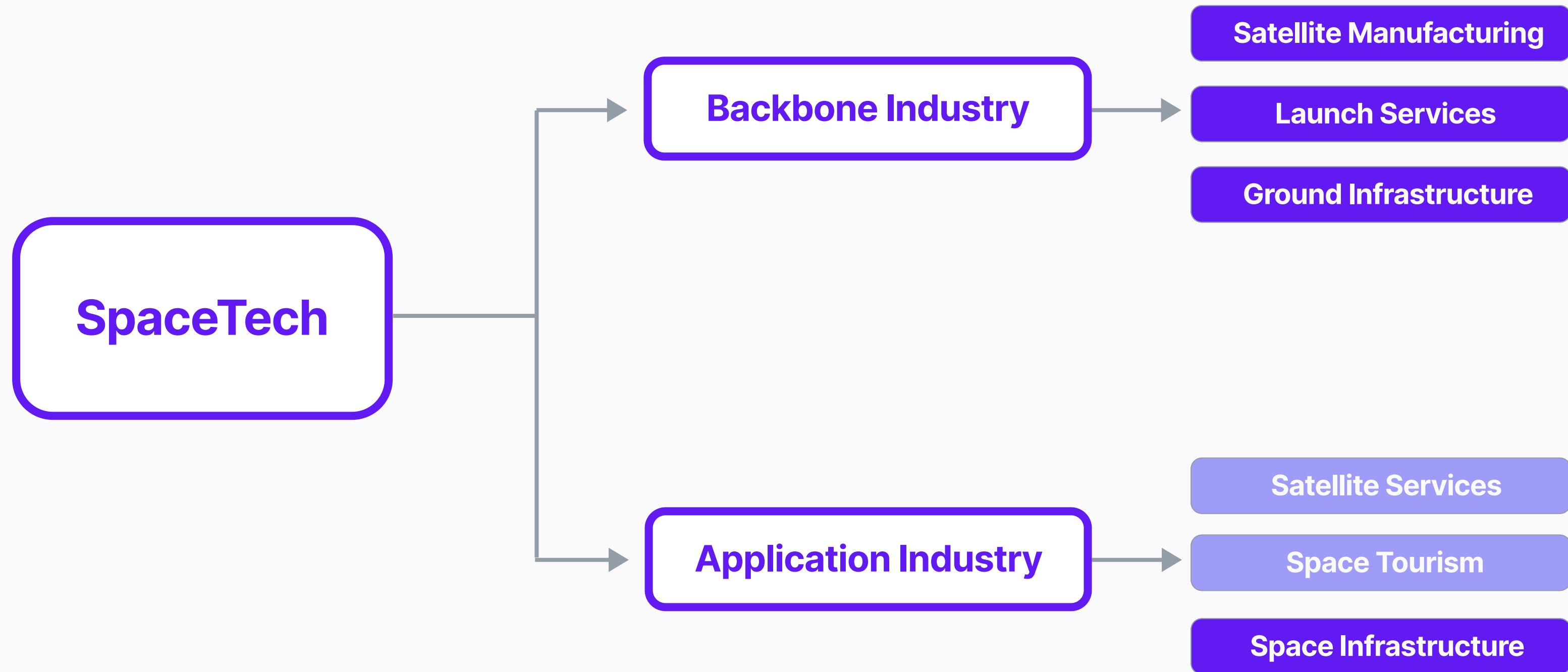


Government

Policymakers and regulatory bodies shaping India's Spacetech landscape, creating policies that encourage private sector growth and international cooperation.

Examples: IN-SPACe, US DoD

SpaceTech Industry Framework: Breakdown by Sector & Sub-Sector



Upstream Service

Downstream Service

1. Diving Deeper into the Backbone Industry



Satellite Manufacturing

The design, development, and production of satellites and satellite components for various applications such as communication, navigation, earth observation, and scientific research.



Launch Services

The provision of rockets and launch vehicles designed to transport satellites, spacecraft, and other payloads into space. These services are critical for deploying assets into orbit, enabling space exploration & communication.



Ground Infrastructure

The network of ground stations, control centers, & related infrastructure required to support satellite operations, communication, and coordination, ensuring the continuous & reliable functioning of space assets.

2. Diving Deeper into the Application Industry



Satellite Services

Services provided using satellites, including communication, broadcasting, navigation, earth observation, & remote sensing, which enable applications in industries like telecom, weather forecasting, and environmental monitoring.



Space Tourism

Efforts to send humans to space, including government-led missions and commercial space tourism ventures, which aim to make space travel accessible for research, exploration, and recreational purposes.



Space Infrastructure

The development of infrastructure necessary for long-term human presence in space, including space stations, habitats, life support systems, and other essential facilities to sustain human life and operations beyond Earth.

Key Players and Leaders in Spacetechnology: Across Sectors and Categories

Satellite Manufacturing

Traditional	New Entrant

Launch Services

Traditional	New Entrant

Ground Infrastructure

Traditional	New Entrant

Satellite Services

Traditional	New Entrant

Space Tourism

Traditional	New Entrant

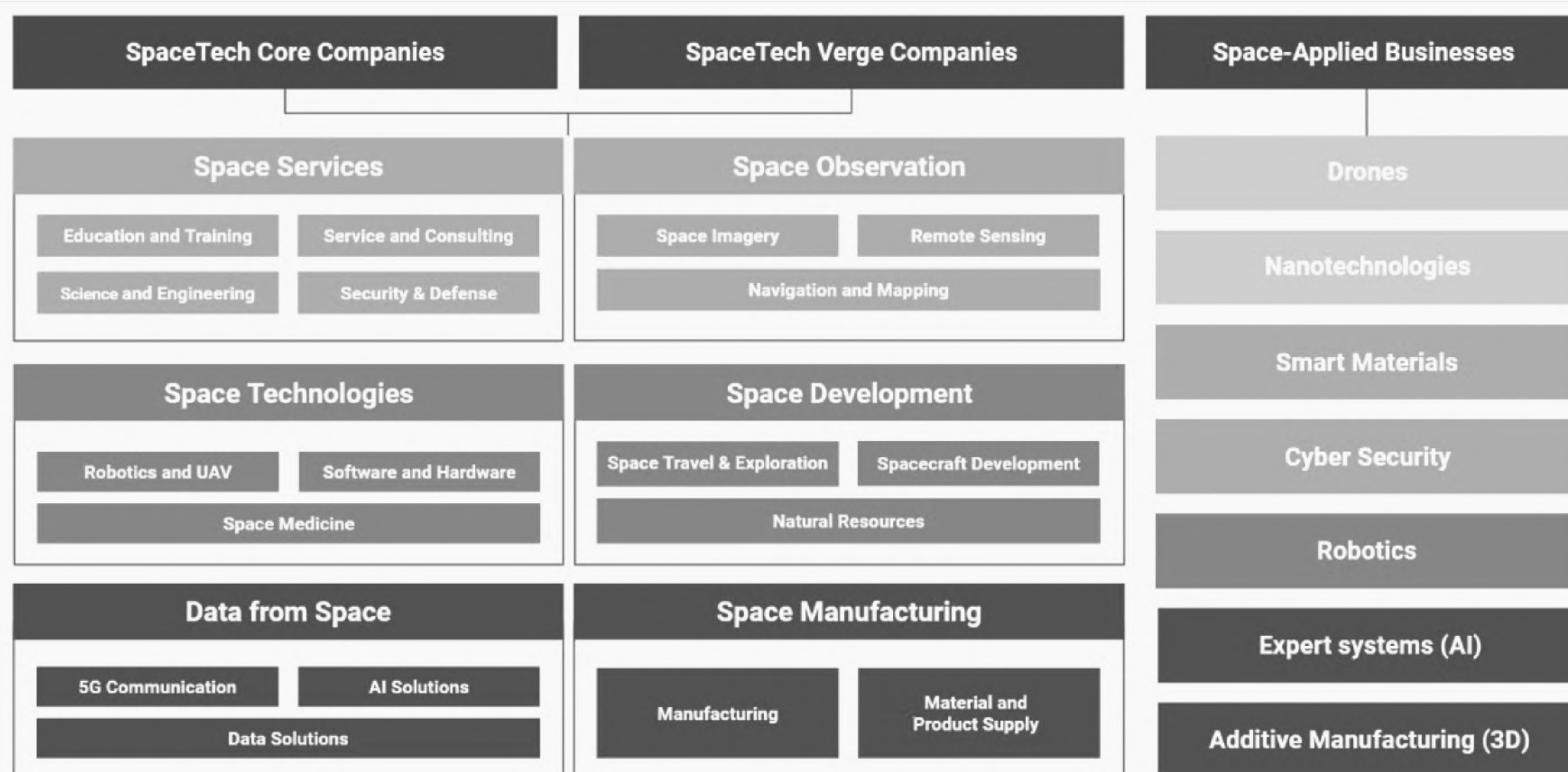
Space Infrastructure

Traditional	New Entrant

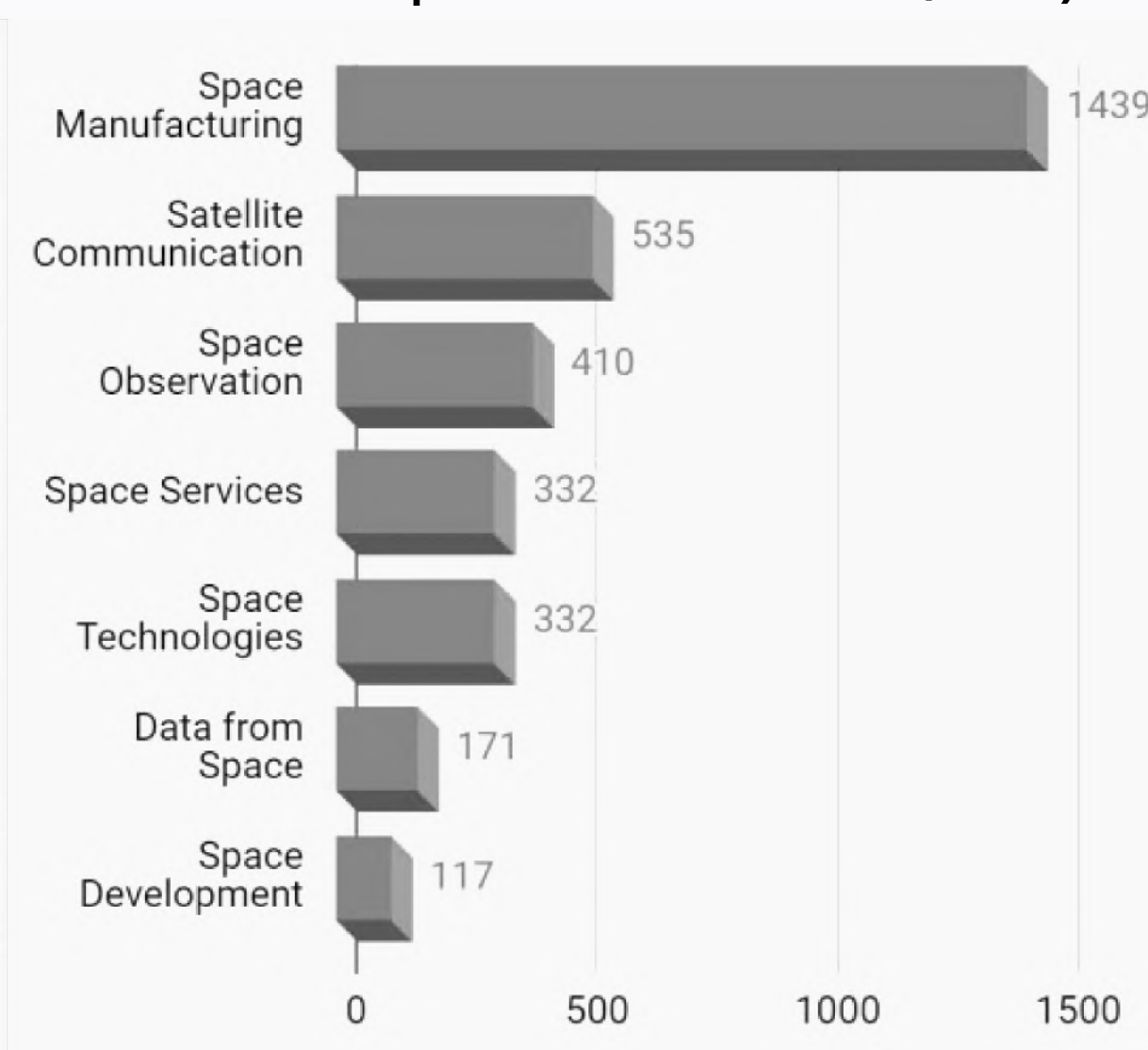
Real-World Applications: SpaceTech Company Use Cases

The SpaceTech industry is experiencing rapid growth, driven by advancements in satellite technologies, AI, and reusable rockets that reduce costs and enhance efficiency. With innovations enabling smaller, more powerful satellites, AI-powered data analysis, and cost-effective space vehicles, the sector is poised for significant expansion. This growth is fuelled by satellite development, space exploration, breakthroughs in IT and other digital technologies.

Company Breakdown by Use Case



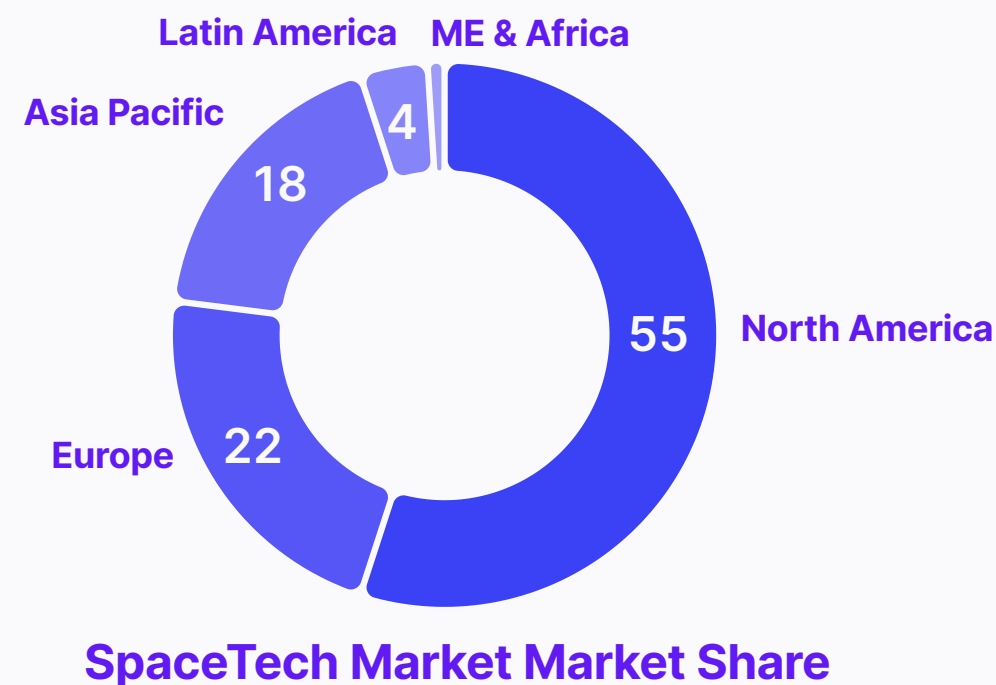
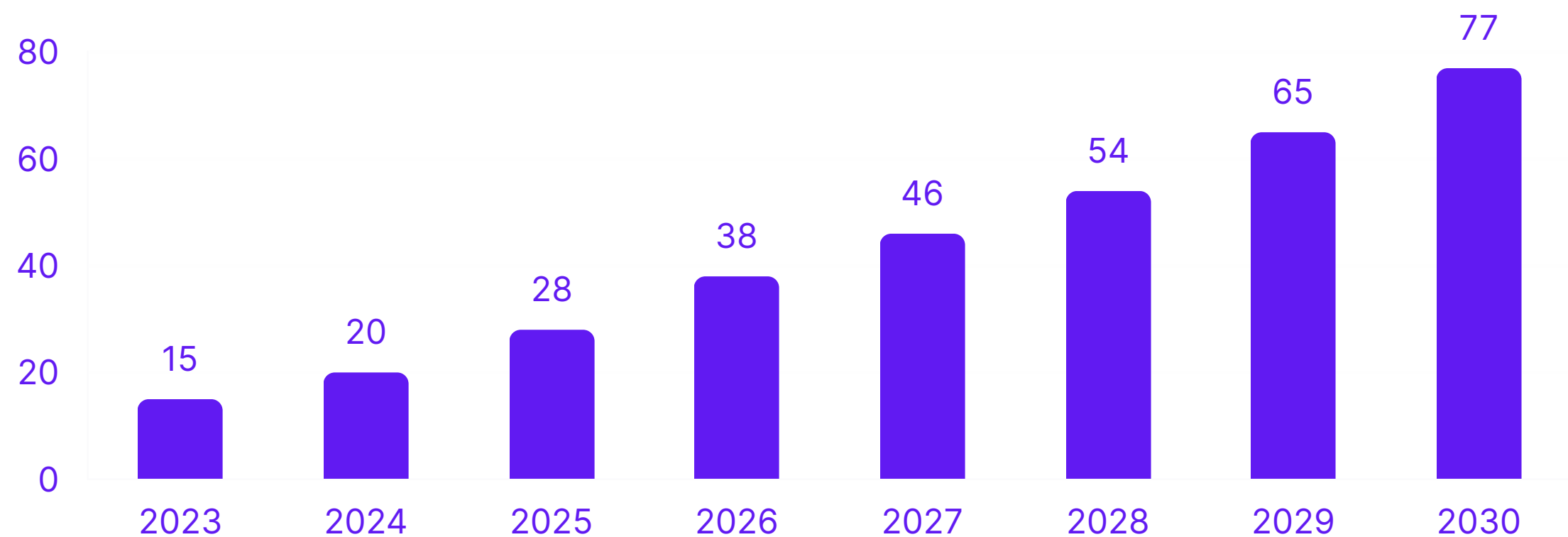
Number of Companies across Use Cases (Global)



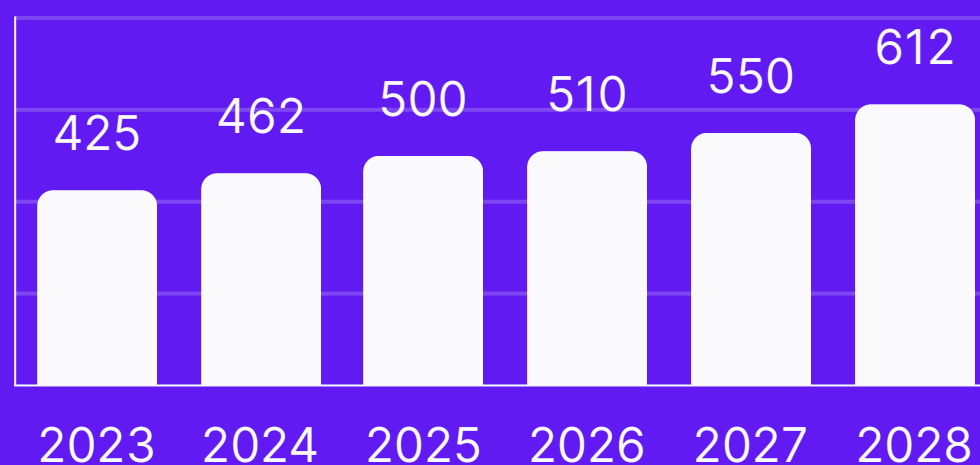
*SpaceTech Analytics

SpaceTech Market: Unlocking the TAM

Indian SpaceTech Market Opportunity in US\$ Bn



CAGR 7.3%



SpaceTech Market Global

Tailwinds for Indian Market



Cost Efficiency

India's ability to deliver cost-effective space missions makes it a competitive player in the global SpaceTech market.



Skilled Talent Pool

India's affordable and highly skilled IT workforce supports advancements in satellite technology, data analytics, and space services.



Geopolitical Importance

India's strategic location & growing geopolitical significance boost demand for space-based defence and communication solutions.

Levers Driving Market: Navigating the Road Ahead

The Indian space tech sector is on the cusp of exponential growth, driven by a blend of supportive government policies, emerging private investments, and technological advancements. Key trends shaping the future include:

FDI & Tax Incentives

The current FDI policy allows 100% foreign investment in satellite operations through the government route. Proposed changes aim to ease restrictions further, tax benefits include GST exemptions and IT deductions, encouraging greater private participation.

Government Support & Schemes

The government has allocated \$1.6 billion to the Department of Space. Key initiatives like Startup India Seed Fund, DRDO's Technology Development Fund, iDEX, and Atal Innovation Mission have significantly boosted innovation and private investments.

2024 Budget Initiatives

Proposed ₹1,000 crore venture fund and customs duty exemptions on critical minerals will accelerate space sector growth and boost resource supply for space technologies.

IN-SPACE: Catalyzing Private Participation

IN-SPACE fosters collaboration between the private sector & ISRO, streamlining access to facilities, expertise, and resources. This initiative is opening doors for innovation and investment in Indian SpaceTech.

The Way Forward

As the Indian space market continues to evolve, fuelled by increased FDI, government support, and technological advancements, we are witnessing the emergence of new themes such as Ultra Low Earth Orbit (ULEO) satellites. These satellites are becoming pivotal in enhancing global connectivity and driving innovation across various sectors, marking a significant evolution in the NewSpace era.

Regulations in Indian Ecosystem: Over the Years

1960s-1990s

→ 1990s-2019

→ 2019 onwards: **NewSpace**

Major Players

ISRO & Government:

ISRO was the main driver and government funding was the main source

ISRO & Government:

Continue to be the main players with increased collaborations with private industries

PSUs & private players acting as major suppliers for all ISROs missions

ISRO & Government:

Continued Leadership with increasing emphasis on involvement of private players

Private Players: Emergence of startups offering launch services, satellite manufacturing & applications

Budgets & Financing

Average Annual Budget: INR 100-200 Cr

Average Annual Budget: INR 5000-10000 Cr

Average Annual Budget: INR 10000-13000 Cr

Measures like the government's approval of a INR 1000 crore VC Fund under IN-SPACE boosts innovation

Regulations

Initially dominated by government bodies, with no need for regulations.

ISRO Established: Formed as the national space agency, evolving from INCOSPAR.

Space Commission: Created to oversee and guide ISRO's activities.

Space sector opened to private participation, fostering industrial growth.

Antrix Corporation: ISRO's commercial arm established for satellite services and tech transfers.

Policy initiatives like the **SATCOM Policy** and **Remote Sensing Data Policy** introduced to regulate & promote the use of space assets for national development and commercial activities like broadcasting.

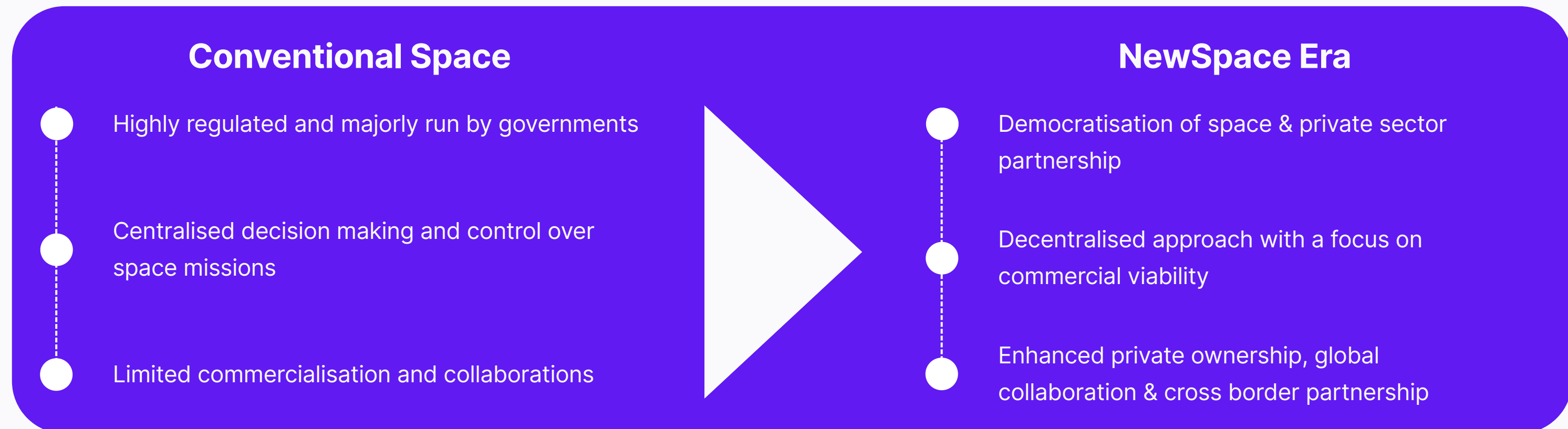
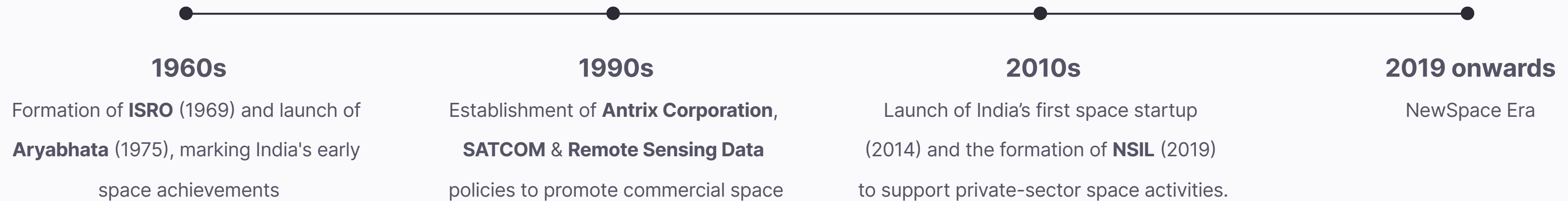
NSIL and **IN-SPACE** established to promote commercial space activities.

National Geospatial Policy introduced to democratize data and commercialize geospatial services.

Upcoming FDI policy expected to boost private investments and regulate space activities through a new space bill.

Understanding NewSpace: Evolution

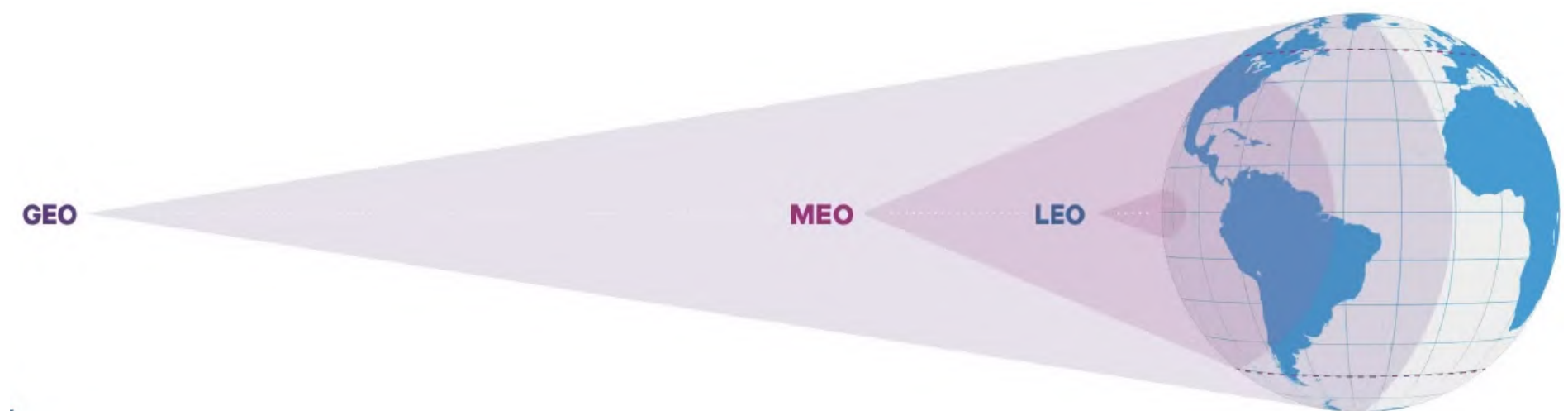
The NewSpace era marks a major shift in India's space landscape, driven by private participation and a more flexible regulatory framework. Formalised through the Indian Space Policy 2023, this new approach has opened up significant growth opportunities. Unlike the traditional model where government agencies led space activities, NewSpace is powered by private enterprises & startups—rising from just one startup in 2014 to over 200 by 2024.



Explaining Satellite Orbits: LEO, MEO, and GEO Explained

- Satellites orbit the Earth at varying altitudes, each suited to specific functions and use cases
- Depending on their distance from Earth, they can be classified into Low Earth Orbit (LEO), Medium Earth Orbit (MEO), and Geostationary Earth Orbit (GEO)
- These different orbits influence factors such as coverage, latency and the types of applications they support
- Understanding the distinctions between these orbits is essential for grasping the range of satellite services available, from global communication networks to precise Earth observation and navigation systems.

Category	LEO	MEO	GEO
Distance	400km -2,000km	2,000km - 35,786km	>35,786km
Use Cases	Earth observation, imaging, communications, IoT, remote sensing	GNSS (GPS), satellite communication, timing, regional navigation	Broadcasting (TV, radio), weather monitoring, communications
Pros	Low latency, detailed observations, faster communication, cheaper	Wider coverage, balanced latency and cost, ideal for navigation	Large coverage, ideal for continuous data transmission
Cons	Requires many satellites for coverage, shorter lifespan	More expensive than LEO, higher latency than LEO	High latency, very expensive launches and maintenance



Understanding Themes: The Shift Towards LEO & ULEO Satellites

What are LEO & ULEO Satellites?

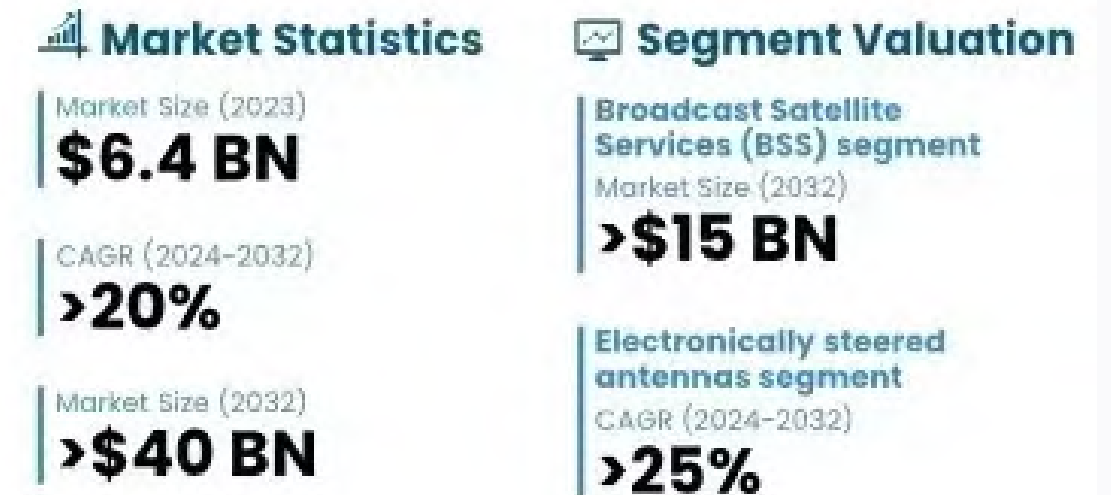
ULEO & LEO (Low & Ultra Low Earth Orbit) satellites operate at altitudes below 2000 km, enabling high-speed data transmission and low latency for various applications, including global broadband services and real-time monitoring systems.

Why are they Important?

In India, LEO & ULEO satellites are crucial for enhancing connectivity to underserved regions, with initiatives like SpaceX's Starlink aiming to provide internet access to millions, supporting the government's goal of bridging the digital divide and fostering economic growth.

LEO Terminal Market

For Asia Pacific



Trends Driving Market

Technological Advancement

Enhanced GNSS Receivers, Multi-Orbit Integration, Higher Bandwidth

Enhanced Global Connectivity

Broadband Access, Rapid Sector Adoption

Strategic Industry Developments

Increasing Partnerships, Regulatory Support, Growing Competition

Key Takeaway

Both these systems are crucial for providing high-speed internet access to over 3 billion unconnected people globally while supporting key industries like aviation and defense. The competitive landscape is driving innovation, with satellite technology investments projected to surpass \$500 billion in the next decade, these satellites are well positioned to significantly influence the future of global communications and connectivity as regulatory frameworks evolve.

Understanding Themes: SpaceTech's Role in Global Issues

SpaceTech's Role in Climate Change

SpaceTech enables precise climate monitoring by leveraging Earth Observation Satellites that provide data on greenhouse gas (GHG) emissions, deforestation, sea-level rise, and ice melt. This technology allows scientists & policymakers to track climate change in real time, model the Earth's climate systems, and predict environmental shifts, forming the backbone of efforts to combat global warming.

National Security Implications

SpaceTech plays a strategic role in enhancing national security by improving defense, surveillance, and cyber intelligence. Space-based assets are essential for detecting threats, managing crises, and ensuring resilience against cyber vulnerabilities. With rising space militarization, the sector contributes significantly to maintaining national and regional stability.

Initiatives Taken Across the Globe

**Global Stocktake
by France**

**Copernicus
Programme**

**UAE's
MBRSC**

**Project Kuiper by
Amazon**

**EU Satellite
Centre**

Case Study: Looking at the Evolution of SpaceX



Launched in 2002

SpaceX revolutionised the market by introducing reusable rockets and vertical integration, starting with **Falcon 9**.

This breakthrough reduced the cost of launches dramatically, setting a new industry standard.

SpaceX's Impact

- **Cost Reduction:** SpaceX has drastically reduced launch costs, transforming the economics of space access.
- **Agile Innovation:** Its focus on reusability and innovative rocket design set new industry standards, increasing accessibility for commercial, government, and private missions.
- **Market Leadership:** By dominating the satellite launch market, SpaceX has pioneered ambitious projects like Starship and Starlink, pushing the boundaries of space travel.
- **Global Impact:** SpaceX's advancements have spurred worldwide competition and inspired a new era of space exploration and commercialization.

How Did they Disrupt the Market?



**Introducing Vertical
Integration**



**Innovation &
Reusability in Rocket
Design**



**Strategic Government
Contracts**

Investment Trends: Funding Growth in India's SpaceTech Sector

India's space tech sector secured \$126 million in funding in 2023, marking a 7% increase from 2022 and a 235% rise from 2021. Despite global funding challenges, the sector continues to grow, fueled by government support and key innovations.

Key Funding Trends

Focus on Upstream Ventures

Funding is increasingly directed towards upstream ventures especially in satellite manufacturing and propulsion systems

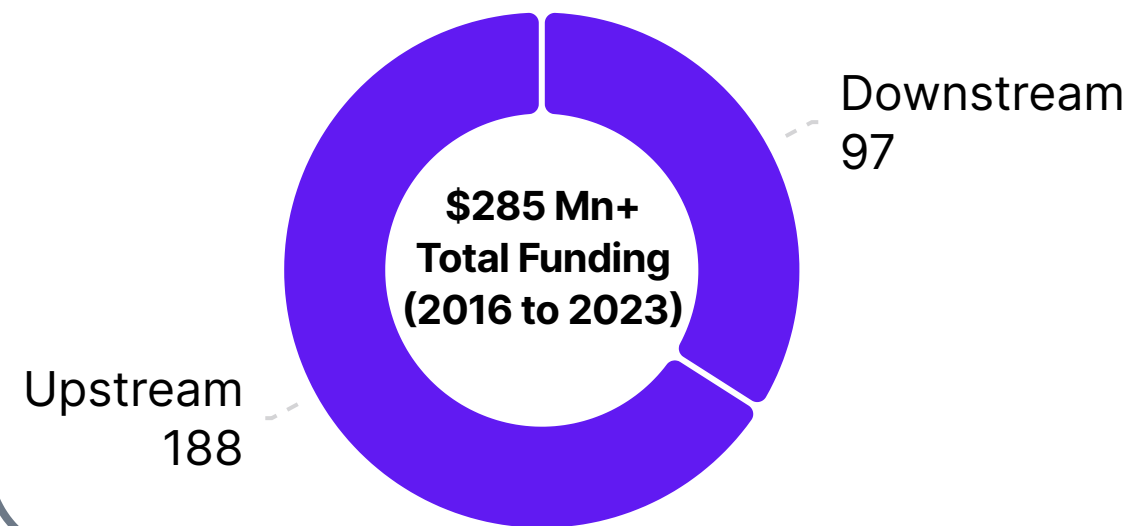
Satellite-as-a-Service (SaaS)

This trend is opening up new revenue streams and reducing the barrier to entry for smaller businesses

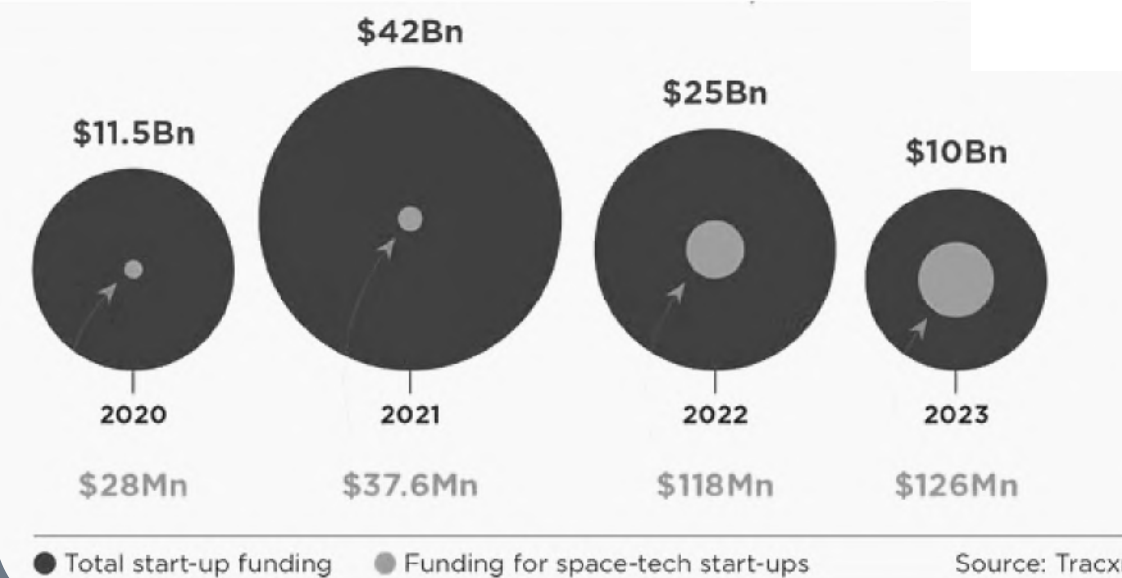
Dual-Use Technology Prioritised

Increased interest in startups solving for both commercial and defence applications

Breakdown of Funding Received by Indian Startups (Upstream & Downstream)



Total Startup Funding vs SpaceTech Funding



Key Indian Investors



Growing Innovation: Key Achievements of Indian Startups

8th

India ranks as the 8th largest operator of active satellites globally

381

Between 1999 and 2022, India launched 381 satellites for 34 countries

1st

Successfully becoming the first country to enter Mars' orbit on its inaugural attempt

AADYAH AEROSPACE
Successfully developed a cube set dispenser that securely holds satellites in position during launches until they are deployed into Low Earth Orbit (LEO)

AGNIKUL
One of the first Indian private enterprises to forge partnerships with both ISRO and IN-SPACE for the development of its projects.

BELLATRIX AEROSPACE
First startup in India to be awarded a developmental contract by ISRO towards satellite propulsion technology.

DHRUVA SPACE
▶ First Indian entity to secure an order for the design and development of space-qualified solar arrays from inception
▶ The startup further successfully tested and space-qualification of its '3U and 6U Satellite Orbital Deployers' and 'Orbital Link' in April 2023.

SKYROOT
First Private Indian Company to launch a rocket into space on November 18, 2022

pixxel
First Private Indian Startup to launch its satellite Shakuntala, to a low earth orbit

Funding the Future: News & Key Players

Startup	Sector	Funding	Time to Market	Investors
Pixxel	Hyperspectral Satellites	\$73Mn	1-2 Years*	Blume Ventures, Lightspeed, Omnivore
Skyroot	Launch Vehicles	\$66.5Mn	2+ Years	Temasek, Sherpalov Ventures, GIC
Agnikul Cosmos	Launch Vehicles	\$51.2Mn	2+ Years	Pi Ventures, Speciale Invest, Mayfield
Satsure	Data Analytics, Optical Satellites	\$20Mn	Already Commercial	Promus Ventures, Baring PE Partners
Dhruva Space	Satellite Manufacturing, Ground Stations	\$15Mn	Commercial Ready	Blue Ashva Capital, Silverneedle Ventures
Digantara	Space Situational Awareness	\$12.5Mn	2+ Years	Kalaari Capital, Peak XV Partners
Galaxeye	SAR, Optical Satellites	\$12Mn	2+ Years	Mela Ventures, Speciale Invest
Bellatrix Aerospace	Propulsion, ULEO Satellites	\$11Mn	Commercial Ready	Parampara, Inflexor, Growx, BASF VC
Manastu Space	Satellite Propulsion (Green)	\$3Mn	2+ Years	Capital 2B, Big Capital, E2MC

THE ECONOMIC TIMES | Careers

English Edition | Today's ePaper

Record funding, policy support drive hiring boom in spacetechnology sector

By Sreeradha Basu & Brinda Sarkar, ET Bureau - Last Updated: Aug 02, 2024, 11:18:00 PM IST

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Indian Spacetechnology Startups See Record-Breaking Funding Amid Government Push

India News | Indo-Asian News Service | Updated: July 30, 2024 1:28 pm IST

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INDIA TODAY

India's spacetechnology sector grew 235% in 2 Years, secured \$126 million in 2023

India has emerged as a formidable player in the global spacetechnology arena, with more than 100 spacetechnology startups, the majority of which were founded in the past five years.

*Future contracts signed already

Spacetechn Commercialization : India

Companies that have led the spacetechn commercialization in India are across categories - Satellite Manufacturing, Ground Services and Analytics

Space qualification is a key moat to be on the path of commercialization for Backbone Industry and gives significant advantage to companies like Bellatrix and Dhruva Space.

Depending on the kind of sub-sector, some players have used capital more efficiently and have raced ahead in commercializing their products, with a mix of Indian and international customers

However, competitive landscape for each of these sub-sector needs to be analyzed to fully understand the global markets for each of these companies

Already Achieved Space Qualification / Commercialisation

DHRUVA
SPACE

BELLATRIX
AEROSPACE
Propelling Dreams

SATSURE

Working Towards Space Qualification / Commercialisation

DIGANTARA

AGNIKUL

SKYROOT
AEROSPACE

pixxel

Paving the Way: Players Shaping the Future of the Backbone Industry



**Trailblazing Space
Propulsion Innovation**

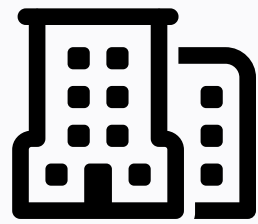
- Bellatrix Aerospace stands as a pioneer in satellite propulsion, with a fully market-ready and space-qualified product portfolio that's already proving successful.
- Their advanced propulsion systems, which are entirely developed in-house, include groundbreaking innovations like the world's first heaterless cathode for hall thrusters and a high-performance green propellant, only second to NASA's.
- Bellatrix has secured contracts with prestigious organisations, including ISRO and DRDO, establishing a strong market fit for their propulsion technologies.



Pioneering Satellite Assembly

- Dhruva Space has established itself with expertise in satellite assembly and solar panel technology, achieving a heritage of two successful cubesats that significantly reduces operational risks.
- While current assembly relies on imported components, Dhruva's focus on innovative assembly processes positions them to drive forward in the Indian SpaceTech landscape.
- As they work toward reducing import dependencies, Dhruva Space is paving the way for more resilient and sustainable satellite solutions in India.

Basic Roots: Analysis and Insights for Indian Spacetech



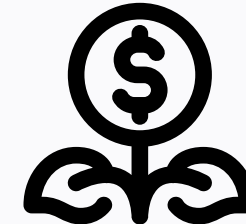
Boosting Infrastructure

Modernizing ground infrastructure is essential to meet the growing demand for high-resolution data. Enhanced data processing, cloud integration, & secure storage will improve service quality & support broader applications across sectors.



Data Analytics

The Indian space tech market lacks robust data aggregation and advanced analytics capabilities. There is significant potential for companies that specialize in data fusion and deriving actionable insights from multiple sources.



Maximising ROI

Justifying return on investment (ROI) remains a challenge in the space sector due to the high costs involved. By driving standardization in satellite design and exploring new business models, companies can improve ROI while maintaining value.



Govt Involvement

As the space sector liberalizes, state governments can play a pivotal role as both enablers and consumers of Earth observation-based services. Government support for use cases in areas like defense and insurance could further drive adoption.

Final Takeaway

India is pushing the envelope to build a stronger backbone of startups that are commercially ready, globally competitive, and price-efficient. By expanding in areas like data analytics, infra development, and applicatory services, SpaceTech companies can thrive independently while also benefitting from coordinated efforts with public initiatives, creating a robust and forward-looking ecosystem.

Thank You !