Channelized efforts to
ensure level-playing grounds

Enhancing the private participation in Space activities

India on a track to serve global needs

March 2023

“Technology is the most powerful weapon the government has to utilise, for good governance, transparency, and accountability”

“There should be no ‘space’ between common man and space technology”

CONTENT

NEED FOR REFORMS

The global space economy is currently valued at about USD 360 [1] billion. Despite being one among a few spacefaring nations in the world, India accounts for only about 2% of the space economy.

Over the last 2 decades, the private sector has played an increasingly important role in other spacefaring countries within the global space economy. Companies like SpaceX, Blue Origin, Virgin Galactic, and Arianespace have revolutionized the space sector by reducing costs and turnaround time, with innovation and advanced technology. In India however, players within the private space industry have been limited to being vendors or suppliers to the government's space program.

Thus, there was a need to provide scope for Non-Governmental Entities (NGEs) for enhanced participation in Indian space programme and playing key roles to boost India's market share in Global Space Economy.

[1] https://www.pwc.in/assets/pdfs/research-insights/2020/preparing-to-scale-new-heights.pdf

Our Honorable Prime Minister has emphasized the need to promote private sector activity in all high technology areas including space, to fully unlock the potential of India's youth and entrepreneurs.

To realize this vision, it is necessary to enable private entities within the Indian space sector to establish themselves as independent players capable of end-to-end space activities. Many Indian private companies and start-ups have been showing keen interest in space activities, services, and applications, and are requesting a conducive policy environment for this.

Promoting the private sector will enable the Indian space program to remain cost competitive within the global space market, and thus create several jobs in the space and other related sectors.

Our Honorable Prime Minister is also convinced of the potential catalytic role that the space sector could play for high-technology industries and start-ups in the country.

The recent reforms have been warmly welcomed by all stake holders and the number of space sector players in India continue to expand.

PRIME MINISTER'S VISION

The guiding light for this reform has been the vision of our Honorable Prime Minister. As our talisman, he asserts that the benefits of space technology should be made known to every Indian citizen, who will in turn become stakeholders in the development of this sector.

He strongly believes that the optimal utilization of space technologies can revolutionize delivery of governance services and boost developmental efforts.

Our Honorable Prime Minister sees 'outer space' as an avenue to inspire scientific cur iosity amongst the youth and to encourage them to look towards academic pursuits in STEM.

Above all, he maintains that the space sector has the potential to incubate a vibrant ecosystem of startups and private industr ies. By becoming a leading contributor to India's economic growth story, the space sector is replicating the success seen in the IT sector today. This would also increase India's share in the global space market significantly.

It is our Honorable Prime Minister's conviction that India also needs to actively participate in the emergence of cutting- edge space technology, to ensure national security and aligned strategic interests.

Indian space contribution
2% of global market share

Potential to capture
9% of global market share by 2030

% of global market share	
US	**40%**
UK	**7%**
India	**2%**

Global space economy (in 2021)	**USD 386B**
India (in 2021)	**USD 7.6B**
India to grow (by 2025)	**USD 50B**


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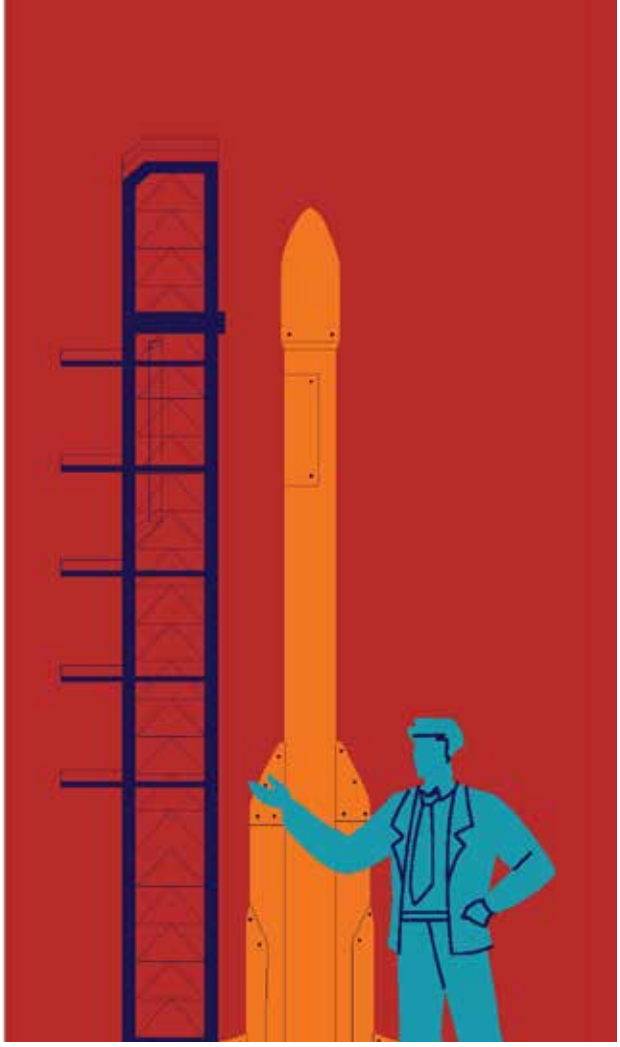
GUIDING PRINCIPLES OF REFORMS



Enable and promote Non-Governmental Entities (NGE) to carry out independent space activities

Provide a level playing field and favorable regulatory environment for players within the Indian private sector, to allow them to become independent actors in the space sector instead of being solely vendors or suppliers to the government program.

This can be achieved by enabling ease of business through single-window mechanisms, with predictable timelines. IN-SPACe has been the single window agency for promoting the NGEs and to receive the proposals online at www.inspace.gov.in

Open up ISRO Infrastructure and Facilities

The reform also aims to make national space infrastructure developed over the years, available for use by the private industry through a business friendly mechanism.

Facilities pertaining to testing, tracking and telemetry, launch-pads, and laboratories, created by ISRO, would also enable the private space industry to climb the value chain.

A mechanism has been created, where in industries can approach IN-SPACe for utilizing the ISRO facilities.

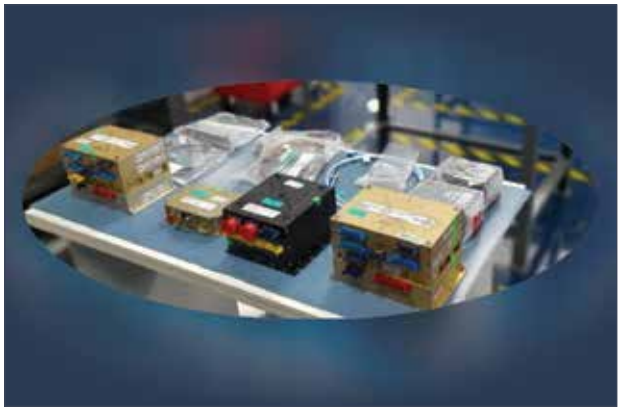
Demand-driven approach for development of space assets

Optimizing the utilization of space assets such as satellites and launch capacity by determining accountability amongst various stakeholders. Creation of new assets to be made contingent on confirmation of demand from user agencies/ entities.

Government extending the support to start-ups with critical items

The Department of Space supported Agnikul Cosmos, a space technology startup based in Chennai, with the supply of flight termination system (FTS). Rounds of interactions were held about interfacing, handling and using these systems on Agnikul's launch vehicle "Agnibaan".

This was the first time that a system used for ISRO's vehicles was supplied for supporting a private launch vehicle built in India.



Inspection of thruster testing at M/s Bellatrix Aerospace

Shri. S. Somanath, Secretary, Department of Space motivated M/s Bellatrix's Aerospace by witnessing the testing of high performance green monopropellant thruster and Hall Effect Thruster. He inaugurated their headquarters at Bengaluru on Nov 13, 2022 and wished Bellatrix, engaged in development of propulsion systems, to grow globally.

First private launch pad & mission control centre established in ISRO campus

The department campus now houses a private launch pad and mission control centre. An Indian space-tech start-up Agnikul has designed, set-up and operates the facility at Satish Dhawan Space Center (SDSC), SHAR, Sriharikota. The facility was inaugurated on November 25, 2022 by Shri S. Somanath, Chairman, ISRO & Secretary, Department of Space (DOS) who asserts that, now, India can travel to space from one more space platform. Agnikul thanked ISRO and IN-SPACe for this privilege and acknowledged that the new reforms brought by DOS truly accommodate everyone's dream of going to space. Agnikul plans to guide & control their upcoming launches from this facility.

Launch of SSLV-D2

In its second developmental flight, Small Satellite Launch Vehicle (SSLV) successfully launched EOS-07, Janus-1 and AzaadiSAT-2 satellites into 450 km circular orbit on February 10, 2023 from SDSC-SHAR, Sriharikota.

SSLV caters to the launch of up to 500 kg satellites to Low Earth Orbits on 'launch-on-demand' basis. It provides low-cost access to Space, offers low turn-around time and flexibility in accommodating multiple satellites, and demands minimal launch infrastructure.

Global business opportunities discussed post Space-sector reforms

Discussion on potential opportunities for expanding the space activities across the globe through the collaboration at industry level and capacity building marked an agenda during the visit of delegation or meetings of Ambassadors, Embassies, Heads of Space agencies of Argentine Republic, USA, Costa Rica, Mexico, Czech Republic, ESA etc.

4th edition of Space Economy Leaders Meeting G20 SELM

The government is looking ahead for the 4th edition of Space Economy Leaders Meeting G20 SELM to explore the opportunities to expand the Space activities globally.

4th edition of Space Economy Leaders Meeting G20 SELM

Participation in the Indian Pavilion in AeroIndia-2023, Bengaluru

Key space technologies and equipment leveraging the defense-space were showcased. The Prime Minister of India was briefed by the Secretary, DOS /Chairman of ISRO on recent developments in space and critical technologies relevant to the defense space industry. DSA, ISpA, 25 start-ups, MSMEs, and corporates participated in the Defence Space Gallery.

UNNATI batch- 3

ISRO completed the third batch of UNispace Nanosatellite Assembly & Training (UNNATI) where over 30 personnel from 19 countries participated. Theory and practical training sessions helped the participants to acquire the knowledge and potentially enhance India's Space Programme and business opportunities in those countries.

Facilitation of testing of a rocket motor built by a private industry

The department facilitated the testing of an industry-built solid motor. After the receipt of transfer of technology from VSSC in 2019, Economic Explosives Ltd., Nagpur built PS OM XL motor. The motor was tested on Dec 07, 2022 at SDSC-SHAR where ISRO tests its motors. The performance was satisfactory. It marked a significant step towards industry's capability to produce the PS0 stage for PSLV leading to end-to-end production of PSLV through Industry.

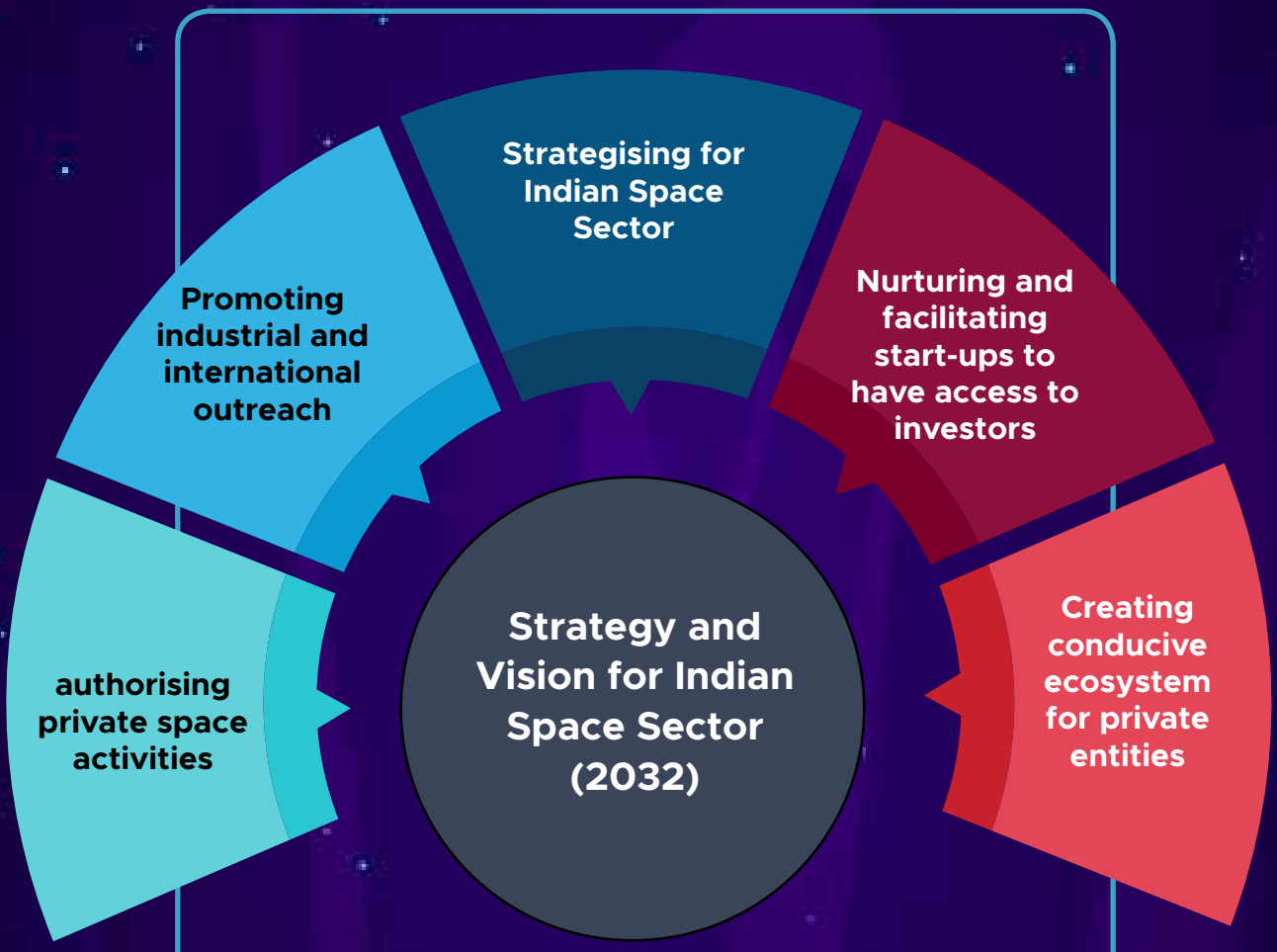
Upskilling the human-power

DoS and Ministry of Skill Development & Entrepreneurship (MSDE), under an MoU, conduct ISRO Technical Training Programme (ITTP) at various National Skill Training Institutes (NSTIs) across the country to upskill / reskill 4000 Technicians / Technical / Scientific Assistants of ISRO in four to five years in phased manner in line with objectives of Skill India Mission. In FY 2022-23 28 skill development programmes (ITTPs) were conducted at five locations viz. NSTI Bengaluru, NSTI Chennai, NSTI Mumbai, NSTI Thiruvananthapuram, NSTI Vidyanagr and Ramanthapur at Hyderabad by imparting training of approximately 500 Technicians / Technical / Scientific Assistants on 20 different technical domains.

Signing MoU with a platform for innovation curation and venture development

ISRO signed an MoU with Social Alpha on Dec 06, 2022 to launch SpaceTech Innovation Network (SpIN), India's first dedicated platform for innovation curation and venture development for the burgeoning space entrepreneurial ecosystem. A one-of-its-kind public-private collaboration for start-ups and SMEs in the space industry, this novel partnership is a significant step forward in providing further stimulus to India's recent space reform policies and will work towards identifying and unleashing the market potential of the most promising space tech innovators and entrepreneurs in India.

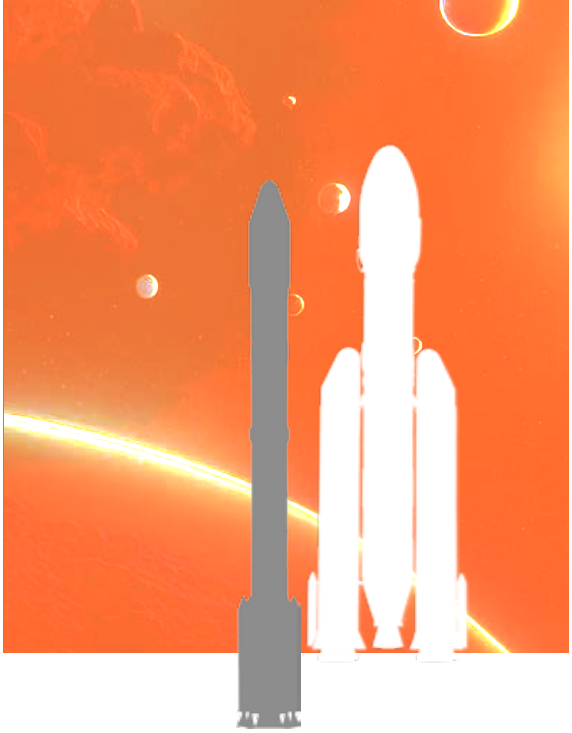
"IN-SPACe will give opportunities to the best scientific minds working in government or private sector" - Hon'ble Prime Minister Shri Narendra Modi



Strategy and Vision for Indian Space Sector (2032) to increase India's share in the global space economy and to become leading player in space landscape, Government of India is formulating decadal vision and strategy for Development of Indian Space Ecosystem

IN-SPACe Industry Outreach :

- Connecting the dots through inter departmental coordination among Department of Space (DOS), Ministry of Information and Broadcasting (MI&B), Department of Telecommunication (DOT), Department of Promotion and Internal Trade (DPIIT) etc.
- Received over 250 applications from MSMEs, start-ups, academia, and large established business houses for authorization, hand-holding, facility support & consultancy and technology transfer.
- Over 30 MoUs signed.
- Five authorizations issued to NGEs. Three objects realized by NGE's are registered as Indian Space Objects.
- Several Joint Project Implementation Plans signed with various NGEs & centers providing a range of services and support like Engine Test, Launch pad & Complex Utilization, Ranging, Tracking, Telemetry, Technical Reviews, Range Safety, Antenna test, and Thermovac Utilization.
- A seed fund scheme finalized to provide financial assistance to Indian space tech start-ups, with core objectives:
  i. To promote Space technology start-ups.
  ii. To facilitate new and innovative technologies in Space Sector
  iii. To create a framework to engage with Space Sector Start-ups
  iv. To encourage a culture of technology co-creation in Space Sector



IN-SPACe International Outreach:

- Working with the Ministry of External Affairs towards placing India as a preferred global Space Sector requirement provider through space diplomacy.
- Projecting India as a Global Manufacturing Hub for space activities through PPP Model towards Aatmnirbhar (आत्मनिर्भर) Bharat.

IN-SPACe Student Outreach:

- A new Space Technology minor launched in association with IIT-Bombay, IIT- Madras, IIRS Dehradun, and IIST Thiruvananthapuram. Offering Space Technology minor courses to all streams of engineering is suggested.
- **CANSAT** competition launched to attract the youth towards space sector by identifying new opportunities like Model Rocketry

IN-SPACe achievements so far

- The first ever sub-orbital launch of rocket –called Vikram-S— by an Indian private company, Skyroot Aerospace, happened on November 18, 2022.
- Dhruva Space built and launched satellites Thybolt-1 and Thybolt-2 aboard the PSLV-C54.
- Launch of Space image-based weather information in Pataa(पता) mobile app facilitating the creation of smart digital addresses with accurate geotagged location, short custom code, recommended routes, recorded voice direction etc.
- Collaborating with MapmyIndia to enable hybrid maps illustrating the capabilities of India in Geospatial analytics domain.

IN-SPACe Technical Centre

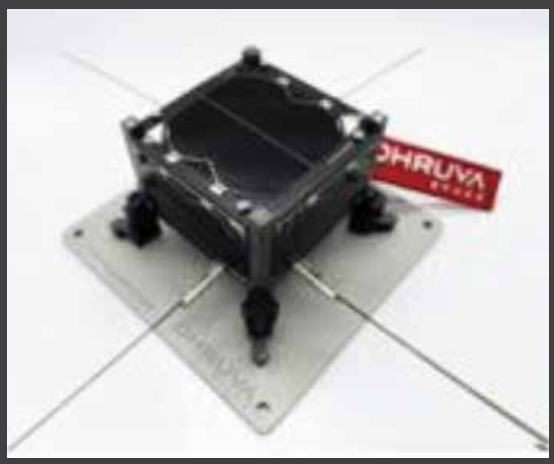
Creation of one-stop solution to foster and transform the innovations into full-fledged space products. Initiated a design Centre equipped with high- end simulation tools required from mission planning to RF, structural, and thermal design and analyses of space systems to offer the access to the start-ups.

- Three Authorizations issued since last board meeting. Total 08 authorizations issued so far.
- 11 MoUs signed with NGEs since previous board meeting . Total 31 signed so far.
- No. of proposals closed/identified for closure: 23

Authorization issued for Azaadisat-2, an 8U satellite weighing 8 kgs. It was launched successfully onboard SSLV-D2 on Febrruary 10, 2023 from SDSC, SHAR. The satellite health parameters and the payload data were received and the satellite performance is satisfactory.

The maiden launch of sub-orbital launch by a Start-Up carried out on November 18, 2022.

IN-SPACe facilitated the launch of Vikram-S by M/s. Skyroot Aerospace Pt Ltd., with the support of ISRO.

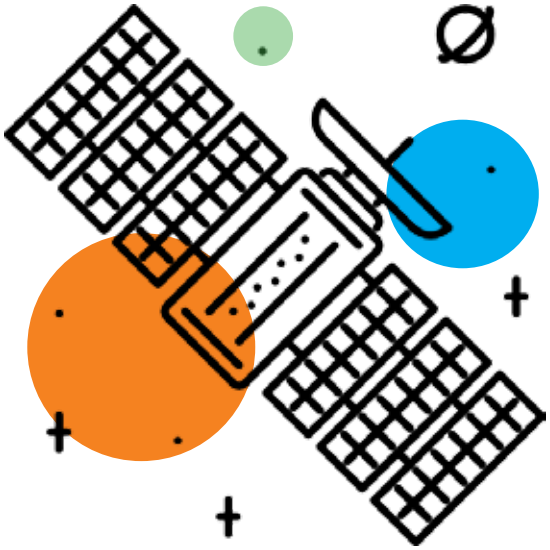


Thybolt-1 & 2 Satellites realized by M/s. Dhruva Space Pvt Ltd., Hyderabad were launched onboard PSLV-C54

Azaadisat-2 Satellite by SpaceKidz launched in SSLV-D2 on 10th Feb 2023

A private launchpad and missions control center established within the ISRO campus for the first time by M/s. Agnikul Cosmos Pvt Ltd.

Sub-orbital launch by Agnikul scheduled shortly



Private Satellite Assembly Facility

Secretary, Department of Space inaugurates a private satellite assembly facility built by Anant technologies in Thiruvananthapuram

INDIA INTERNATIONAL SCIENCE FESTIVAL
21-24 January, 2023 MANIT, Bhopal 2022

Motivating the future leaders

ISRO participates in India International Science Festival 2022 at Bhopal

Space Systems Design Lab inaugurated

One-stop solution to foster and transform innovations into a full-fledged space product.

Periodic training and workshops.

Covers Modelling, analysis and simulations in mission planning, RF, STRUCTURE, Thermal management, Optical and Multiphysics domains.

Indian industry enhances its capability to meet the stringent requirements of Space systems.

A private firm realised and delivered Crew Module structure simulated assembly for India's Gaganyaan mission.

NSIL completes one of the biggest contracts.

Launches 72 satellites belonging to OneWeb India Gen-1 in LVM3 M2 and M3 flights.

Non Governmental Entities in the Space Business in India

AGNIKUL

SKYROOT AEROSPACE

ANANTH TECHNOLOGIES

LARSEN & TOUBRO

HAL

ALPHA DESIGN TECHNOLOGIES

BELLATRIX AEROSPACE

DHRUVA SPACE

Azista

CENTUM

DATA PATTERNS

Astra Microwave Products Ltd.
On A Winning Wavelength

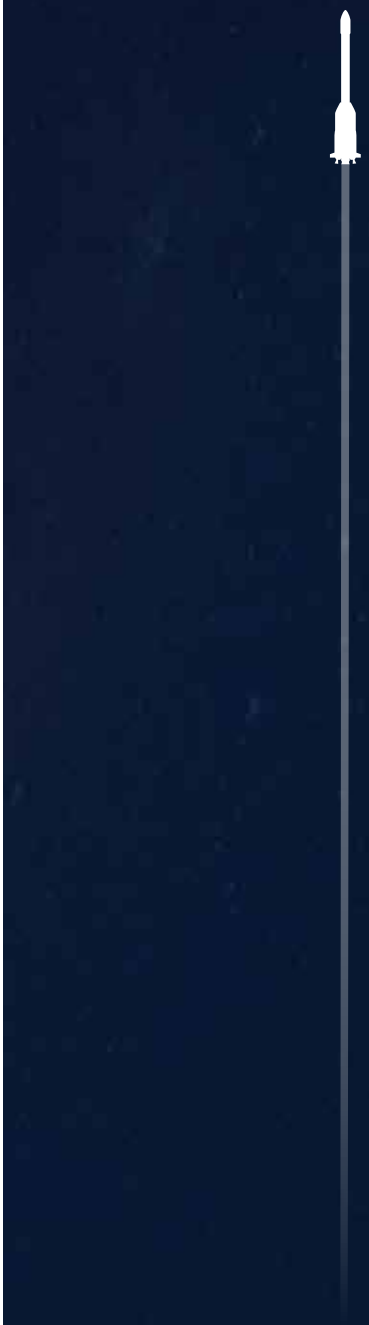
avantel
connect • create • conserve

SatSure

MIDHANI

MapmyIndia

WALCHANDNAGAR
A Tradition of Engineering Excellence



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