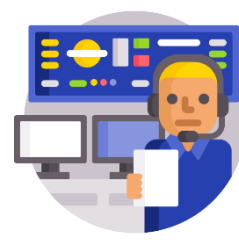




SPACETECH FRAMEWORK (DRAFT)

EMERGING TECHNOLOGIES WING,
INFORMATION TECHNOLOGY, ELECTRONICS &
COMMUNICATIONS (ITE&C) DEPARTMENT,
GOVERNMENT OF TELANGANA

SEPTEMBER 2021



NOTICE

This a draft policy framework that has been formulated by the Emerging Technologies Wing of ITE&C Department, Government of Telangana, in consultation with the industry and academia. The draft framework seeks to provide for consideration and discussion, a policy framework that will support private sector's participation in the space economy.

Comments/suggestions on this draft framework are hereby invited from stakeholders. The last day for sharing the same is 25th October. The comments can be submitted at the following online form: <https://forms.gle/PikAGqNN5HQHGzzn6> or may email to osd_itc@telangana.gov.in with a copy to consultant-itc@telangana.gov.in with the subject 'Comments on Telangana's SpaceTech Framework'.

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Preface

Space Technology has evolved beyond curious explorations to solving real-life problems on earth. It plays an increasingly pivotal role in the efficient functioning of modern societies and their economic development. Space holds the power to unlock highly impactful solutions at scale and directly impact the lives of billions of humans.

SpaceTech offers new means to address global challenges and encompasses satellites, space stations, ground stations, monitoring and tracking centres, downstream analytics and AI, software, etc. Satellites offer a cost-effective way to build capacity for earth observation, communication and navigation services even in the remotest of locations. Satellite-based earth observation data is essential, reliable and accurate and its effective use can support data-driven decisions for businesses and governments.

The satellites can be used to enable high-speed connectivity for the underserved and otherwise non-economically viable geographies. The satellite data can be effectively used in the implementation of action plans for intelligent agriculture, managing land & water resources, developing urban & rural infrastructure, monitoring weather & climate, protecting the environment including disaster risk reduction and more.

Globally, the space industry was valued at USD 360 Bn in 2018 and is expected to grow to USD 558 Bn by 2026 and USD ~1 Trillion by 2040. Currently, India occupies a meagre 2% or USD 7 Bn of this market value and that is despite Indian Space Research Organization (ISRO) being one of the leading space agencies globally with projects such as Mars Orbiter Mission (MOM) and Indian Regional Navigation Satellite System (NavIC). A possible reason is that traditionally ISRO has carried out the critical value addition activities in-house and the private industry's contribution to the Indian space sector has been mostly limited to subcontracting by ISRO. Hence, Indian private players have lacked end-to-end capabilities in SpaceTech compared to other global leaders.

There is now a national impetus to accelerate the private industry's contribution in the Indian space sector with the release of SpaceCom Policy 2020, Space RS Policy 2020, Geospatial Policy 2021, etc. and the establishment of agencies like NewSpace India Ltd (NSIL) and Indian National Space Promotion and Authorisation Centre (IN-SPACe). Further, the Department of Space (DOS) has also indicated that a comprehensive Space Act and various other policies such as for launch vehicles and space exploration policy are also in the pipeline.

Hyderabad, the capital city of Telangana, is uniquely positioned to become a hub for space related activities owing to synergies with the existing Aerospace and Defence ecosystem and its global supply chain. The availability of infrastructure such as 4 dedicated aerospace parks, 2 hardware parks and 50 general engineering parks, T-Works - India's largest prototyping center shall streamline the manufacturing and time to market. The presence of national facilities like National Remote Sensing Centre (NRSC), International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), etc. shall further boost collaborative development efforts.

Telangana is already a leader in SpaceTech with the existing presence of global companies, mid-size and startups in the sector. This is evident as the state produced 30% of parts for the Mars Orbiter Mission. Hence, the state shall leverage its innovation ecosystem to provide holistic support to the industry and be key to the national growth of the SpaceTech industry.

Vision

The Government of Telangana has been one of the frontrunners in adopting emerging technologies and has taken up several initiatives to develop a conducive ecosystem for the industry in the State. It recognizes the potential of space technology and its applications for the socio-economic development of the state and the nation. In line with the ongoing efforts of Department of Science and Technology (DST), Department of Space (DoS) and Indian Space Research Agency (ISRO) to encourage private sector's participation in SpaceTech, the Telangana state envisions to:

Establish Telangana as a globally recognized one-stop destination in Space Technology.

The Telangana state is keen on ensuring that it becomes an end-to-end manufacturing hub from design to testing and launch as the private industry builds system-level integration capacity. The downstream applications of the space technology shall be leveraged to directly impact citizen's life with agricultural studies, disaster management, weather forecasting among others. The technology shall be promoted across all areas such as scientific research, mapping and surveying, environmental monitoring, natural resources management, geological and oceanographic studies, and more. The direct multiplier effect resulting from the growth of the industry shall boost the economic output of associated industries such as manufacturing, telecom, insurance, among others. This policy aims to achieve the following objectives:

Policy Objectives



Become a **global technology hub** for SpaceTech



Foster and support **business and entrepreneurship** in SpaceTech



Attract **global investments and partners**



Boost **space-related manufacturing** and become a preferred destination



Become the **preferred testbed for remote sensing applications** especially for socioeconomic development

Figure 1: Policy Objectives

SpaceTech Framework

In an effort to achieve the above discussed objectives and position Telangana as the primary hub for all space-related activities, the government has consulted various stakeholders from industry, academia, national agencies, startups and other domain experts to come up with the state's strategy which is summarized in the following framework:



Figure 2: Framework Overview

Since outer space is governed by international laws and requires globally collaborative efforts, it is understood that the nation as a whole shall have to play a role for India's journey towards emerging as the leader in the global space sector. But Telangana as a state shall play a role of the facilitator and endeavour to develop a conducive ecosystem such that it becomes a go-to place for all new as well as existing startups or corporates in the sector. In order to fulfil its vision, the state shall set up a separate body which shall be a separate body to accelerate the state's vision by spearheading all initiatives and act as the central agency for all the stakeholders. This separate body shall be responsible for the implementation of this framework and the identified pillars. It shall be supported by the state's innovation ecosystem comprising T-Hub and WeHub (women focused) to support the startups; T-Works as the upcoming India's largest prototyping facility, Telangana Academy for Skill and Knowledge (TASK) for training the workforce; Telangana State Innovation Cell (TSIC) for fostering innovation at grassroots level, and RICH (Research and Innovation Circle of Hyderabad) for facilitating the process of taking research to market.

Key Pillars

1. Enabling Access to Infrastructure

Telangana based entities were responsible for 30% of the parts for the much applauded ISRO's Mars Orbiter Mission (MOM). The state is also leading the way in supporting downstream service providers to build and test solutions such as for agriculture. To further establish Telangana as the go-to location for activities across the space market's value chain, requisite infrastructure is a necessity and the state endeavors to facilitate the same.

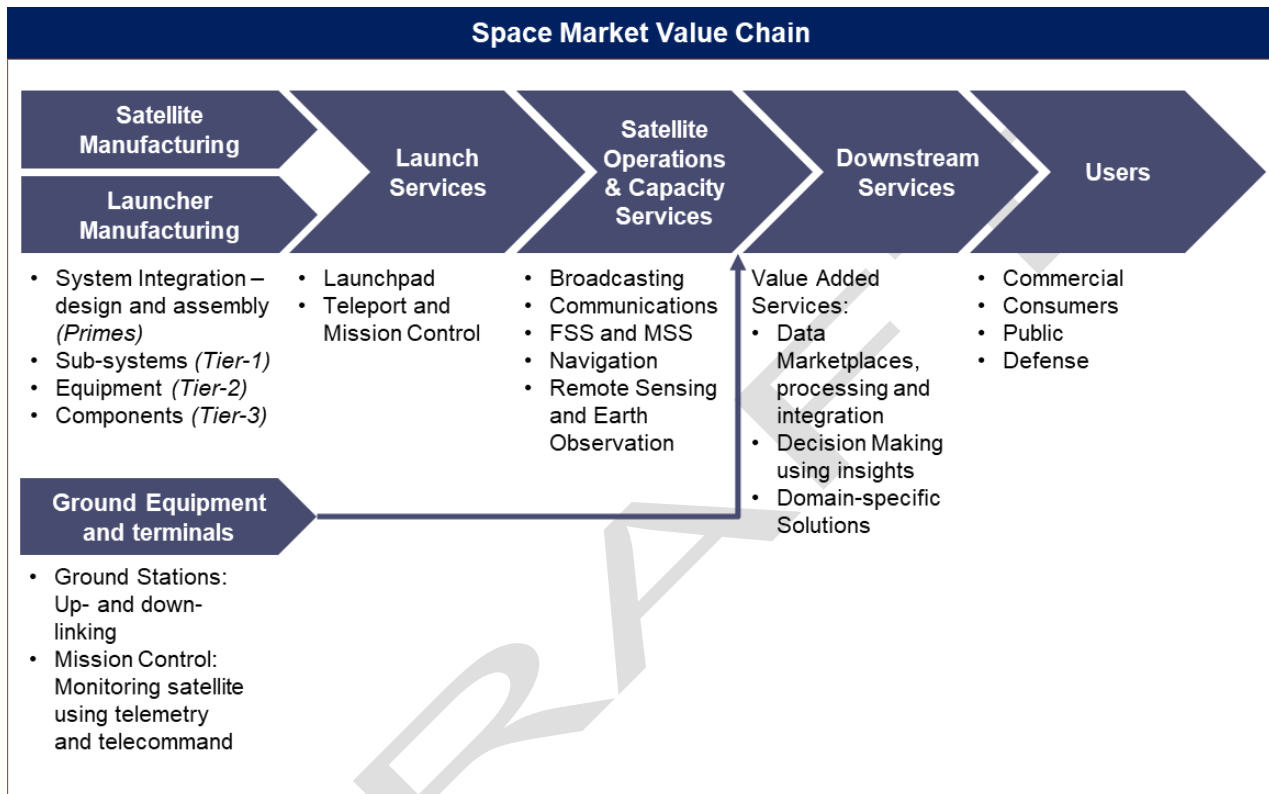


Figure 3: Space Technology Market Value Chain

1.1. Procurement and Development of Materials

Manufacturing of satellites and launchers utilizes various materials that at times requires very specific characteristics or relies on proprietary materials. To support the industry in this procurement process, state agencies like T-Works shall leverage their network of suppliers for the best possible outcome. Further, to reduce the dependencies on imports, the state government shall partner with institutions such as Hyderabad based ARCI (autonomous R&D centre of DST, Govt. of India) to undertake material research, standardization and development efforts in partnership with the SpaceTech industry.

1.2. Rapid Prototyping

Under the state government's initiative T-Works, India's largest prototyping facility in Hyderabad, and in partnership with various CoEs and academic/research institutions in the state, a pay-per-use model shall be established to allow access to fabrication and testing equipment along with required skilled labour to enable prototyping of various satellite/launch components.



1.3. Public Private Partnerships

The state government has identified two areas that require shared infrastructure to support the rapid growth of the sector: Small satellite manufacturing units and state-of-the-art assembly, integration and testing (AIT) facilities. The former is the primary focus as the small size LEO satellites are increasingly becoming mainstream and bear low-risk compared to larger projects. The state government is willing to engage in public private partnership with any potential partner to set up such a facility in Telangana, and any decision shall be made on thorough evaluation of the proposals and their value propositions for the ecosystem.

1.4. MSME Connect for Manufacturing

The component manufacturing is usually led by MSMEs and Telangana has 1,000+ such entities in the synergetic aerospace and defence industry. Telangana's GlobalLinker team already has a platform to support the connect with the state's MSME ecosystem and the same may be leveraged and scaled to support the SpaceTech sector. The manufacturing capabilities already exist in the state and the government would attempt connecting the stakeholders.

1.5. Shared Testing Facilitation

The satellites and launch vehicles undergo extensive testing. The flight hardware and systems undergo various environmental and operational tests and the requirement is not just for the complete spacecraft, but for each individual part. Currently, there is a huge dependency on ISRO's capabilities to offer testing services but that is not the optimum solution. While certain infrastructure would only be available with ISRO, a set of sector agnostic infrastructure would be available in national, academic and research institutions across the state such as ARCI, NRSC, Electronics Corporation of India Limited (ECIL), Defence Research and Development Organisation (DRDO), and more. The state government shall facilitate and establish a system where under-utilized infrastructure of such institutions, wherever applicable, can be leveraged for testing of SpaceTech systems.

1.6. Land at Competitive Prices

In order to support Telangana based SpaceTech companies to develop end-to-end capabilities in the state, the government shall provide land at strategic locations where development can be undertaken. The allocation of land parcels may be done in the state's aerospace or other allied parks such that the industry player can leverage the synergies.

1.7. Availability of Additive Manufacturing

The state government in partnership with MeitY, Govt. of India is establishing the National Centre for Additive Manufacturing (NCAM) in Hyderabad. The center shall be responsible for enabling access to infrastructure and shall procure Additive Manufacturing machines across materials viz. Metal, polymer and carbon fiber. These machines and the support in leveraging the same shall be made available to the SpaceTech companies and thereby support local manufacturing of complex parts.

1.8. Facilitating Data Access

The Draft National Geospatial Policy 2021 discusses the availability of data in real & near real time data and the standardization of formats so that Geospatial data is available in an interoperable machine readable format. In order to deliver impactful solutions, this data also needs to be integrated with other ground data such as agricultural yield, political boundaries,



etc. and the same shall be facilitated via Telangana's Open Data Platform. The access of ground truthing data would be abundantly available in the state owing to growth in IoT and Drone ecosystem driven by state's policy frameworks. Further, the state government shall partner with NRSC to address any industry concerns on data access.

1.9. Commercial ground stations

Ground Stations are used to receive data collected by the satellites and are referred to as Midstream as it connects the upstream and downstream segments. The recent policy reforms have allowed private players to set up commercial ground stations in India, otherwise India entities had to rely on foreign ground infrastructure to commercialize the data. The downstream sector is the largest in terms of market opportunity and the demand from it is rapidly growing and thus driving the entire ecosystem. For Telangana to be a one-stop destination, it shall support the development of any commercial ground stations with strategic land allocations and facilitating approvals.

1.10. Shared R&D Labs

The SpaceTech industry undertakes cutting edge research that is both time and resource intensive, and at times the output volume may not justify the cost of exclusive infrastructure and facilities. Hence, the state shall engage academic institutions like IITH, IIITH, NITW, etc. such that their existing infrastructure can be made available to the industry on mutually agreeable terms. The partnership may even be further extended to pooling of skilled human resources to jointly undertake and deliver projects by sharing of IP rights or otherwise.

1.11. AI and Data Infrastructure under T-AIM

Telangana AI Mission (T-AIM) is a Telangana government body established in partnership with NASSCOM to undertake activities under the state's AI Framework. Various innovative applications in the downstream segment employ the use of AI to build solutions that deliver socio-economic impact and are thus also aligned with the state's AI Framework. Hence, all initiatives such as High-Performance AI Computing Facility (HPAIC) shall also be made available to downstream SpaceTech companies.



2. Business Facilitation and Collaboration

The global space industry is growing at a CAGR of 5.6% to reach USD 558 Bn in 2026. Of the USD 360 Bn world market in 2018, India was valued at just USD 7 Bn or ~2% but now the Indian space ecosystem is undergoing several policy reforms to engage private players and attract innovation and investment. It is paramount to nurture the growth in the sector to ensure its rapid growth and hence, the Government of Telangana has identified key support areas to support the industry in achieving the same.

2.1. Investments for Startups

As part of the state's ICT Policy 2021-26, a fund of INR 1,300 Cr is being set up to support the startups. The SpaceTech startups shall also be considered under this fund and the special body, set up under this framework, will facilitate the process. Further, out of the 1300 Cr cited above, 100 Cr for social-impact startups.

2.2. Incentives

The SpaceTech companies and startups would be eligible to avail applicable incentives under state's Industrial, Innovation, Electronics and other allied policies. In reference to the Industrial policy, this shall include "tailor-made incentives" for Mega Projects, and consideration of incentives to the entrepreneurs under the T-IDEA (Telangana State Industrial Development and Entrepreneur Advancement) incentive scheme.

2.3. Partnership Facilitation

In order to efficiently leverage the existing ecosystem in the state, the state government agencies would assist in channelizing the synergies in the ecosystem and enable collaboration amongst companies, startups, manufacturers, SMEs and academia. The state shall facilitate partnerships amongst the national centers, PSUs, state's Aero-defence parks, academic institutions, Foreign or domestic OEMs, Domestic SpaceTech industry and startups, local industry associations, and more. The scope of the partnership may range from material development, manufacturing, testing, research, mentorship, market entry, technology transfer, etc. as required by the market.

2.4. Authorization Facilitation

The space industry, due to its very nature, requires adherence to regulations and authorizations by the Indian Government. The recent policies by the Department of Science (DST) and Technology and the Department of Space (DOS) have enabled private players to prosper under the frameworks. Alignment with the national goals is essential, and the state shall facilitate Telangana based entities in coordinating with the concerned national institutions and support in the compliance and authorization processes.

2.5. Workshops on Insurance and Financing

The Indian banking and insurance sector currently have a disconnect with the SpaceTech ecosystem as historically the private participation sector has been relatively low and as a result, there is a lack of understanding of the risks and mitigation measures. SpaceTech, especially the upstream segment (satellites, rockets, etc.), is generally capital-intensive and the business has a very different risk-potential profile compared to more traditional industries. Hence, the state government shall facilitate and organise workshops for the industry

stakeholders and the financial institutions to empower the latter with the required information and knowledge for suitably addressing the needs of the sector.

2.6. International Relations

While the products and services in SpaceTech are to be developed locally, the true potential of the Indian space sector lies in offering them globally. The Telangana Government shall support the Indian innovators in their international outreach and collaborations by becoming a key partner and facilitating partnerships. It shall also act as a key partner for national organizations and build capacity for international collaborations.

2.7. Legal and Intellectual Property (IP) Advisory

SpaceTech has always been one of the most advanced technical areas but was largely led by government agencies. It is only in recent years that due to the increase in private and commercial activities, the issues with intellectual properties and legal compliance are becoming prominent. The knowledge of and adherence to both national and international legal framework is required to flourishing in the industry. The Telangana government would support the startups and companies in legal compliance, patent filing, and protecting IPs by providing advisory services in partnership with legal institutions such as NALSAR University of Law and state agencies such as RICH and T-Works.

2.8. Co-Working Space

Hyderabad is a booming IT hub of the country and is also a centre for aerospace and defence activities. Being located in Telangana's capital shall yield various intangible benefits in terms of partnerships, collaborations and synergetic support. In order to support the establishment of the local presence of the SpaceTech industry, the Telangana government may offer co-working spaces either at its own sites or in partnership with industry, academia, and incubators, at competitive rates.

2.9. SpaceTech Accelerator

The state government will set up a world class SpaceTech Accelerator Center in partnership with T-Works, RICH, T-Hub and We-Hub to provide the required incubation, infrastructure, authorization support, market insights, investor connect and mentorship support to SpaceTech startups. It will operate in three stages which includes Idea Evaluation, Prototype Development and Commercialization of the market-ready products or services.

2.10. Implementation of Government Projects

The downstream applications of SpaceTech have the potential to directly impact citizen's life. This is well understood by the government and hence it shall adopt the best solutions in the government and implement them at scale in the identified focus areas mentioned in Figure 2. The government shall actively work with such innovators across all steps of the project lifecycle. Given the expected nature of most such projects, Telangana State Remote Sensing Applications Centre (TRAC) shall actively collaborate with the concerned partners and jointly undertake the projects wherever necessary.



3. Skill Development & Training

Quality manpower is critical in the SpaceTech sector, esp. in the upstream segment, as there is limited scope for error. In order to establish Telangana as the beacon of private innovation in SpaceTech, attracting and grooming talent is paramount. The bright future of the SpaceTech industry has been unlocked by recent reforms and an associated massive demand for an employable workforce is imminent. Hence, the state government with the Telangana Academy for Skill and Knowledge (TASK) shall undertake initiatives to train the youth in required skill sets.

3.1. Graduate and Postgraduate Programs in SpaceTech

Space industry is technology intensive and to drive innovation in the space, the participation of highly educated professionals is essential. While various areas of SpaceTech are areas of research across institutes of national importance such as IIIT-H and others, limited institutes have focused programs in the sector. The students have mostly been leveraging the fundamentals learned in allied disciplines such as electrical, mechanical, aerospace, and others. Hence, the state government would collaborate with Telangana based universities to introduce both upstream and downstream focused SpaceTech programs in consultation with Indian Institute of Space Science and Technology (IIST), Indian Institute of Remote Sensing (IIRS), ISRO, and other relevant stakeholders.

3.2. Training Programs

The state government shall forge partnerships to conduct training programs that shall be driven by industry demand to ensure employability of the trained manpower. These will be offered to school and college students, graduates, etc. based on pre-requisite knowledge required and complexity of the program. The focus would be on fundamental skills required for bottom of the pyramid roles in manufacturing, testing, launch, data processing, etc.

3.3. Space Exploration Labs

The State would set up Space Exploration Labs across schools in partnership with NITI Aayog's Atal Innovation Mission, the spacetech industry and academic institutions to nurture the foundation of space technology and catch them early and young. The adoption of 100 Atal Tinkering Labs has already been announced by ISRO, and out of the 45 already adopted in Phase-1, 10 labs are situated in Telangana across two districts and will be supported by NRSC. The state shall coordinate the efforts with ISRO to provide hands-on opportunities in the form of mini satellite projects and culminate student's interest in exploring SpaceTech as a career.

3.4. Faculty Development Programs

The State, in partnership with the industry and academia, would co-develop a curriculum and a training programme for school and college-level teachers. These programmers will focus on skill development for trainers and would be responsible for the standardisation of learning facilities in the State. The trainers would be equipped to train the youth for roles at and below middle level.

3.5. Space Internships

The State in partnership with startups, local industry and academic research institutes will offer SpaceTech Internships to Telangana's college students. This opportunity will help



students to undertake applied research programmes under a space scientist, culminate their interest in space science, and hone their skills in SpaceTech.

3.6. Upskilling Programs

The State will co-develop upskilling programmes for already working professionals and research scientists to learn the new trends in space science and understand the business utility of space technology applications. The training will be focused on the key functionalities of space technology and its applications in various business domains. These newly trained professionals would drive the adoption of downstream space applications across their primary industries.

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4. Promoting Research & Innovation

Technology dominance across industries is the key to a nation's growth as apart from domestic applications, it unlocks international opportunities. SpaceTech in particular has witnessed countries race towards establishing their superiority. Research and innovation are the most critical levers to deliver growth in a highly competitive industry and truly unlock the impact that SpaceTech can have on citizens. The state government shall undertake initiatives in this pillar in close collaboration with RICH.

4.1. Space Tech Research Programme

The State Government will initiate a SpaceTech Research Programme in partnership with the industry, academia, and other government agencies to catalyze the innovation in the state. The Government will also facilitate grants, suitable incentives and infrastructure support to promote research and development to boost space tech innovation.

4.2. Applied Space GovtTech Projects:

The downstream SpaceTech applications have the potential to directly impact citizen's life and so the government would support pilots and Proof-of-Concepts with the various government departments. The departments shall assist with on-ground implementation, provide mentorship, and closely monitor the deployment to leverage the developed solution across the state/it across these projects, and will leverage the application at the State level.

4.3. SpaceTech Research Fellowship Programme

The state shall offer Space-Tech Fellowships to students from India and abroad, to work on high end use cases in partnership with government departments, national and international research academic institutions. The fellowships shall focus on both the technical as well as business aspects in order to ignite the spirit of entrepreneurship.

4.4. SpaceTech Innovation Cohorts

The state would set up SpaceTech innovation cohorts in partnership with industry and in focus areas of the state viz. Agriculture & Insurance, Urban Planning & Flood Modelling, Disaster Management, Forestry & Environment, and Internet & Communication. These cohorts will be carefully mentored by both the SpaceTech and target domain experts across industry, academia and government agencies.

4.5. International Academic Collaborations

The state shall forge partnerships with prominent academic and research institutions globally to collaborate with Telangana based universities and work towards applied SpaceTech research and innovation. The government shall facilitate joint projects between researchers with both virtual collaborations and active exchange programs.

4.6. SpaceTech Grand Challenges

With a focus to deliver socio-economic impact that may arise from use of SpaceTech, the State shall identify high impact use-cases and shall conduct grand challenges for the same. This initiative will allow innovators to work towards building applications that can alleviate various problems for the citizens. The best solutions shall be onboarded on the proposed SpaceTech accelerator to build a comprehensive business model, quickly go to market and deploy the solutions at scale.



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