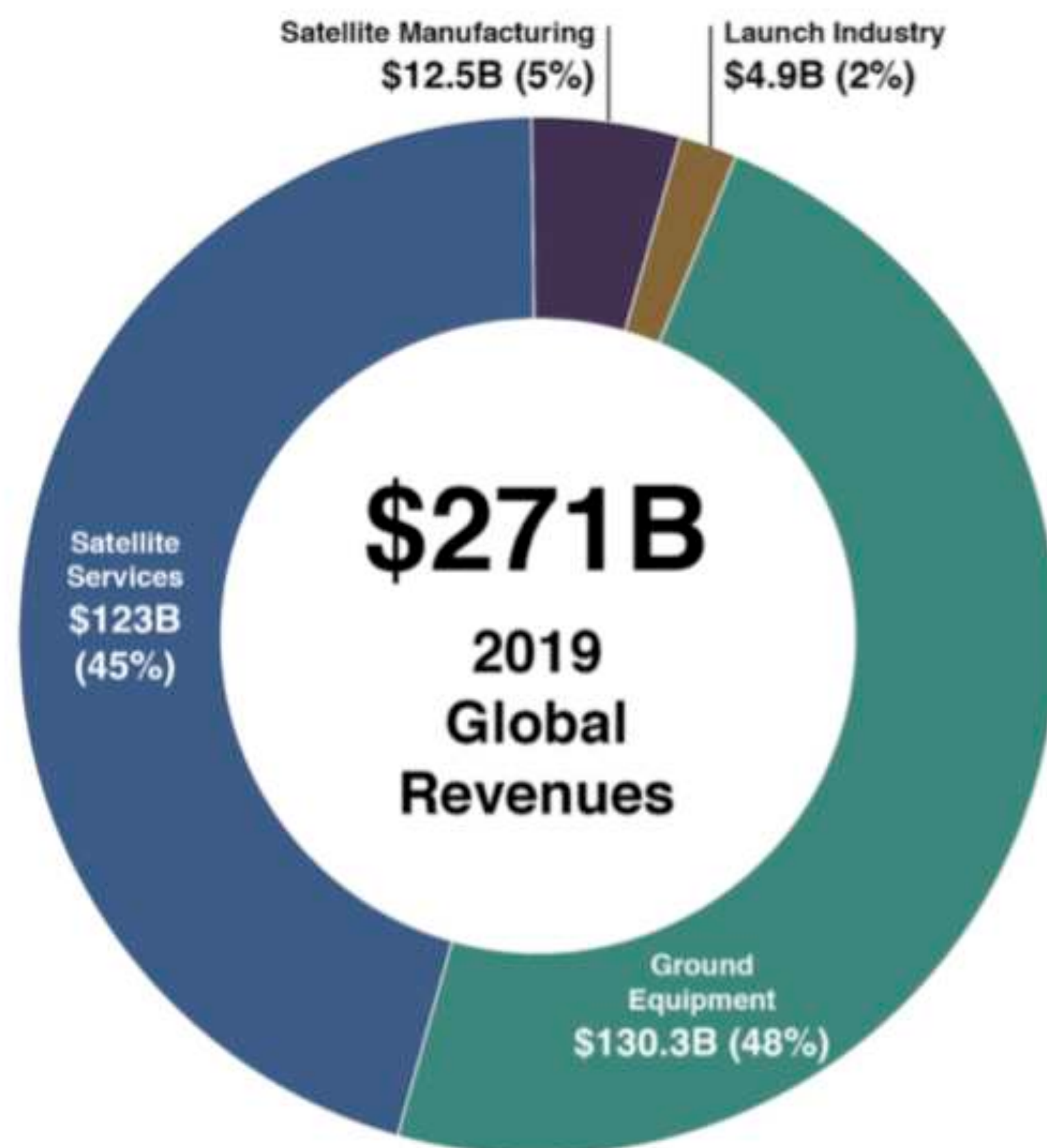


The rise of the private space industry

Implications for space policy and law

Narayan Prasad

2019 Top-Level Global Satellite Industry Findings



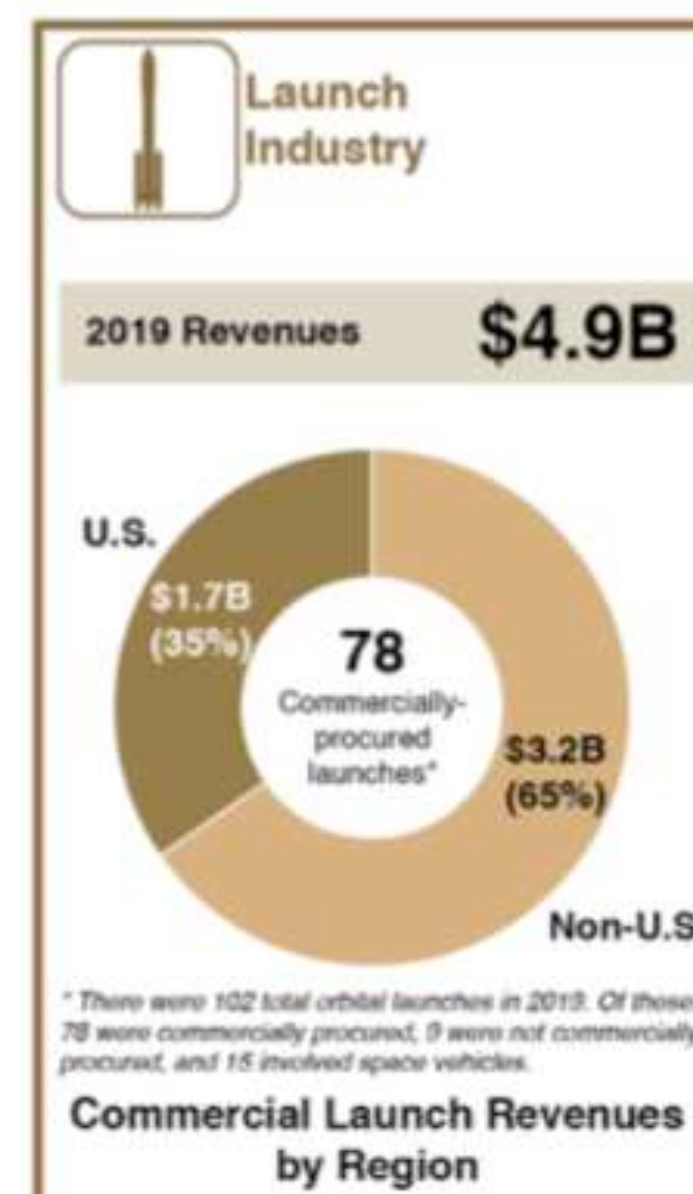
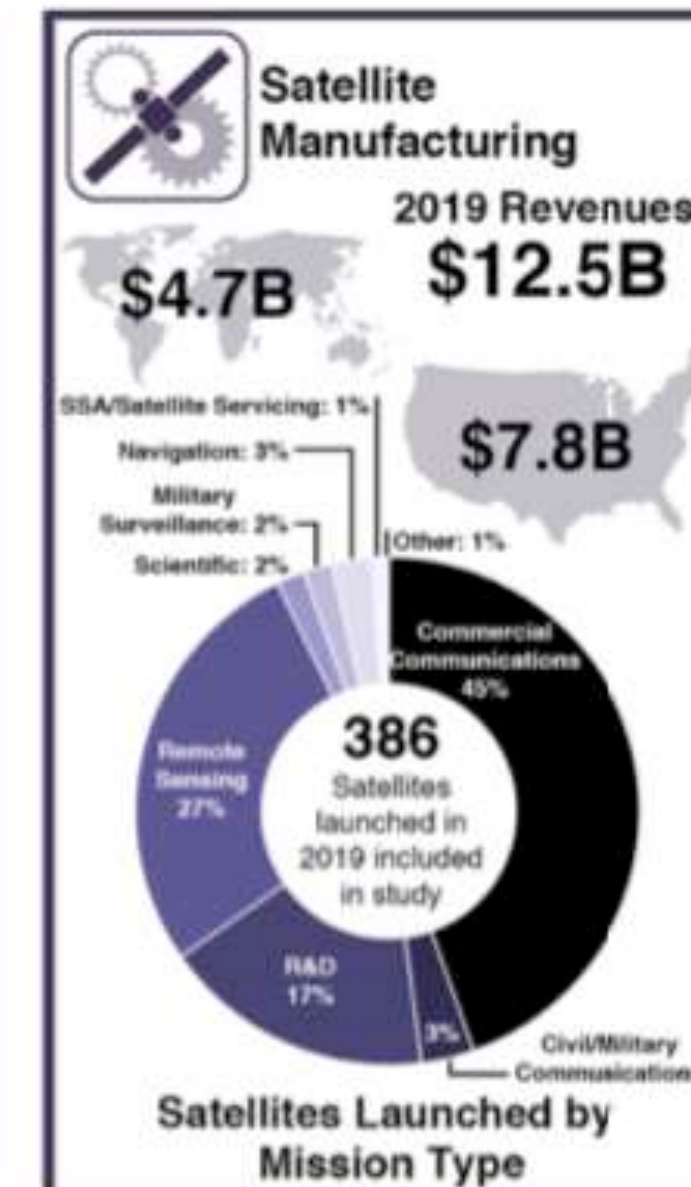
For more information on the satellite industry, or for previous SSIR reports, contact SIA:

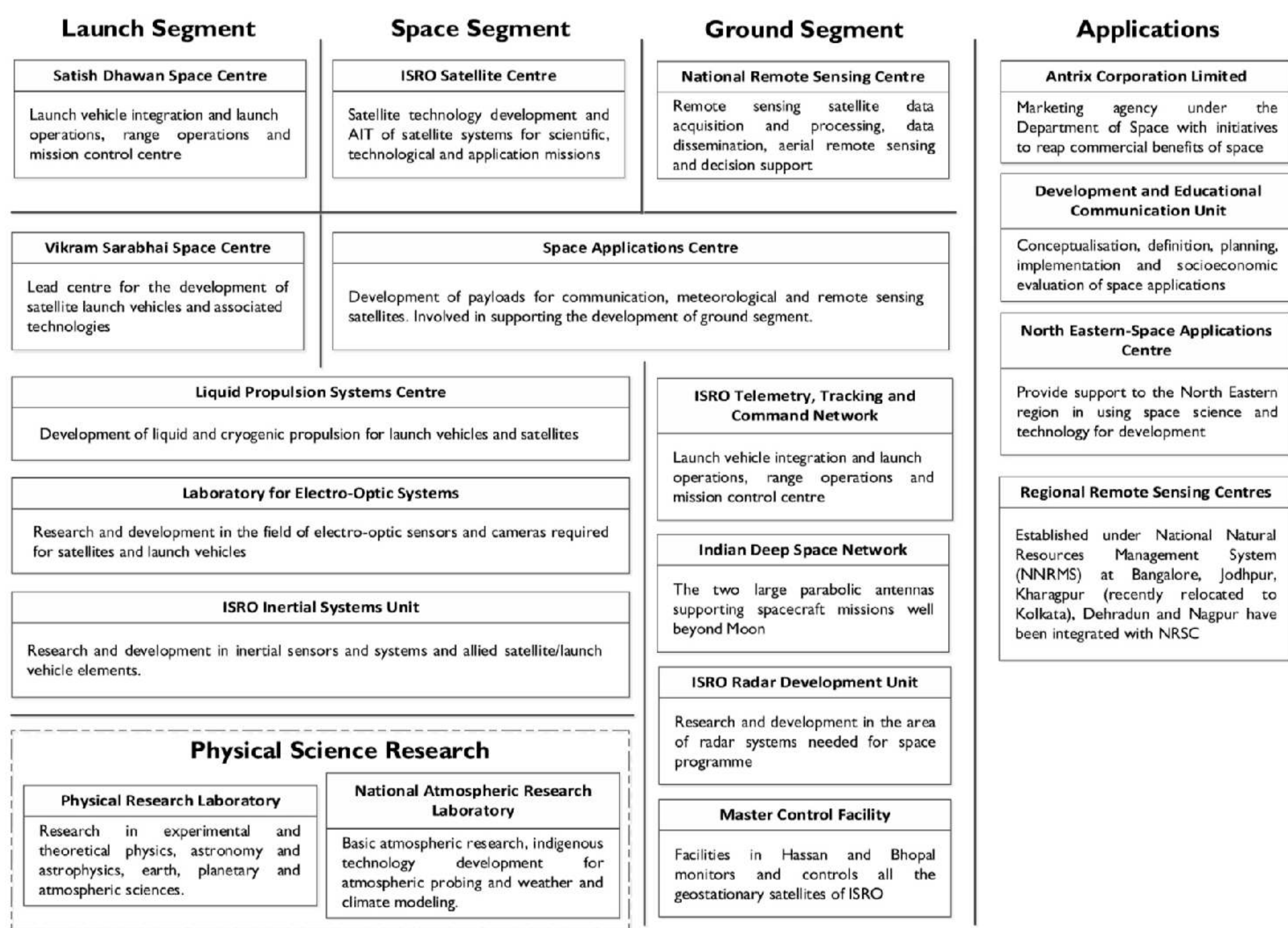


Satellite Industry Association
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www.sia.org

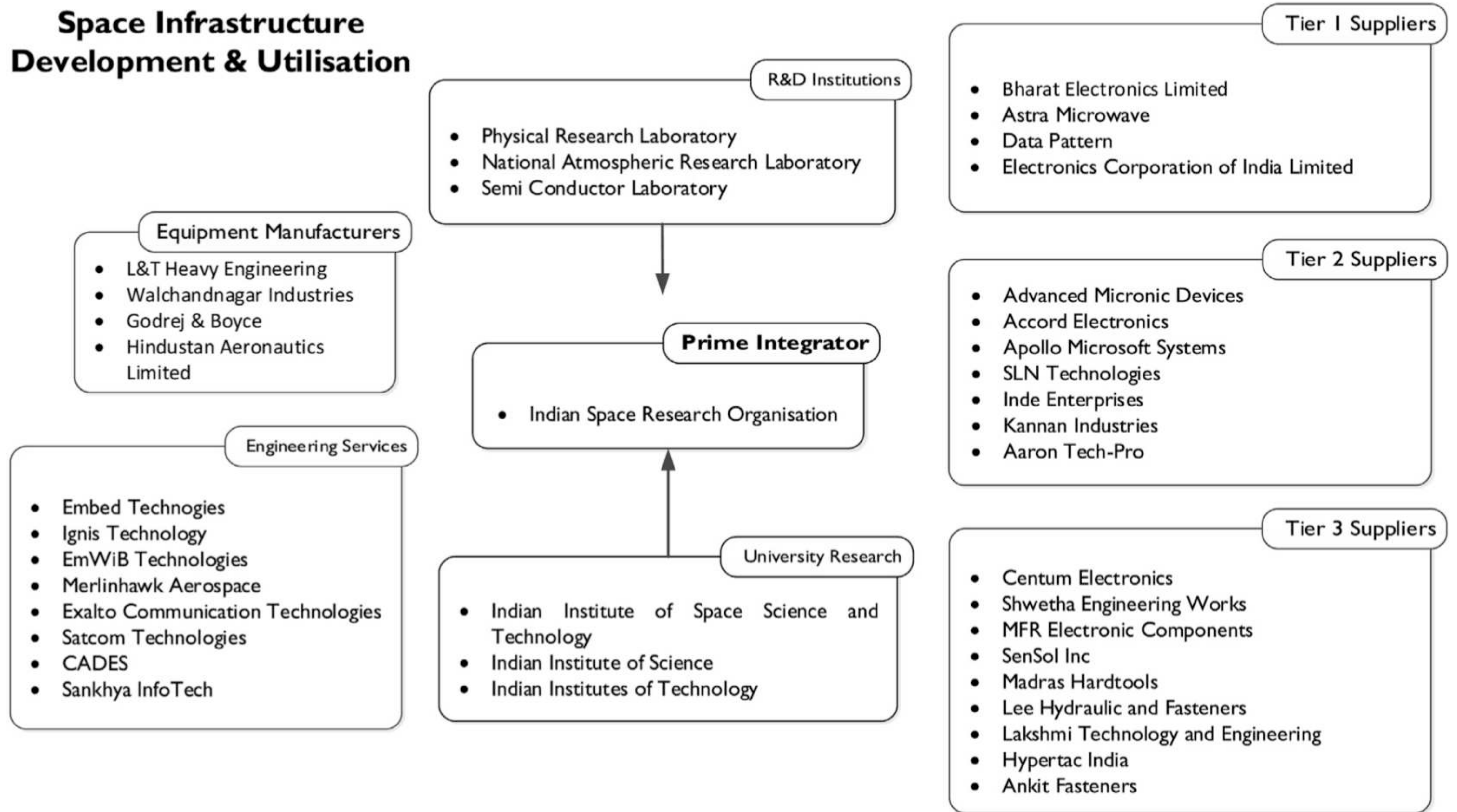


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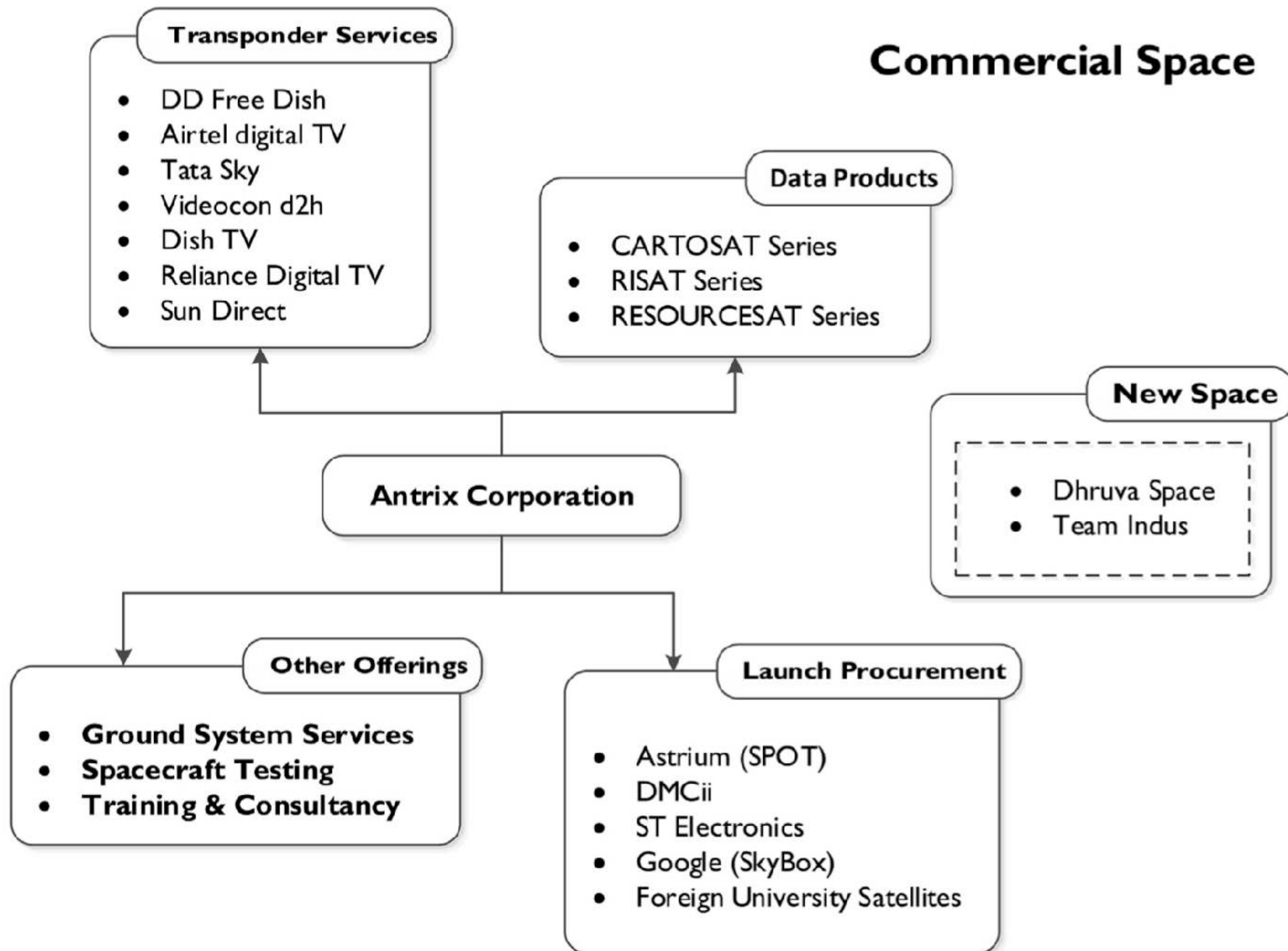




Space Infrastructure Development & Utilisation



Commercial Space



Satellite Services Satellite	Manufacturing	Launch Industry	Ground Equipment
Consumer Services • Satellite TV • Satellite Ration • Satellite Broadband	Satellite Manufacturing	Launch Services	Network Equipment • Gateways • Control Stations • Very Small Aperture Terminals (VSAT)
Fixed Satellite Services • Transponder Agreements • Managed Network Services	Parts, Components & Subsystem Manufacturing	Launch Vehicles Services	Consumer Equipment • Direct Broadcast Satellite (DBS) Dishes • Mobile satellite terminals (including satellite phones) • Digital Audio Radio Service (DARS) Equipment • Navigation stand-alone Hardware
Mobile Satellite Services • Mobile Data • Mobile Voice			
Remote Sensing			
Space Flight Management Services			

Private / Commercial Industry	Government / ISRO / DoS	Quasi Government
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Table 1 - Space Industry Subsectors and Stakeholders

Strengths

- Proven technology transferred based on long-term partnership
- Handholding by ISRO via supervision and infrastructure

Weakness

- Dependency on ISRO/taxpayer money for orders
- Inertia in capacity building leading to longer cycles to achieve complete know-how

Opportunities

- Ability to achieve volumes in production
- Expand capacity and skill within the workforce at minimal cost

Threats

- Lack of institutional investor confidence due to single-customer relationship
- No policy/legislative framework for independent expansion

SWOT Analysis of Traditional Space in India

Reaching for the stars

In the past ten years, more than 20 space-tech start-ups have emerged in India, out of which 10 have received funding

	Founded	Funding (\$ million)	Major investors
Team Indus	2010	18.01	NT Consulting, Sasken Communication, Rakesh Jhunjhunwala, Binny Bansal, Ratan Tata
Vesta Space	2018	10	NXT Capital
AgniKul	2016	3.58	CIIE, Globevestor, LetsVenture, Artha Venture Fund, Pi Ventures
Bellatrix Aerospace	2015	3.01	CIIE, GrowX Venture Management, Parampara Capital
Skyroot	2018	1.49	Mukesh Bansal
Dhruva Space	2012	0.69	Ravikanth Reddy
Kawa Space	2007	0.59	AngelList, Speciale Invest, Vijay Shekhar Sharma
Astrome	2015	0.046	Cisco LaunchPad, Karnataka Startup Cell
Astrogate Labs	2017	0.019	Speciale Invest, IKP EDEN
Pixxel	2017	Seed	Starburst, GrowX Venture Management

Source: Tracxn

Strengths

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SWOT Analysis of NewSpace in India

Indian Industry in Space

Traditional Industry

- Do not have IP rights / shared IP
- Mostly provide manufacturing/ service support for ISRO
- No end-to-end products that are sold locally/globally
- Depend mostly on ISRO as a sole biggest customer in space

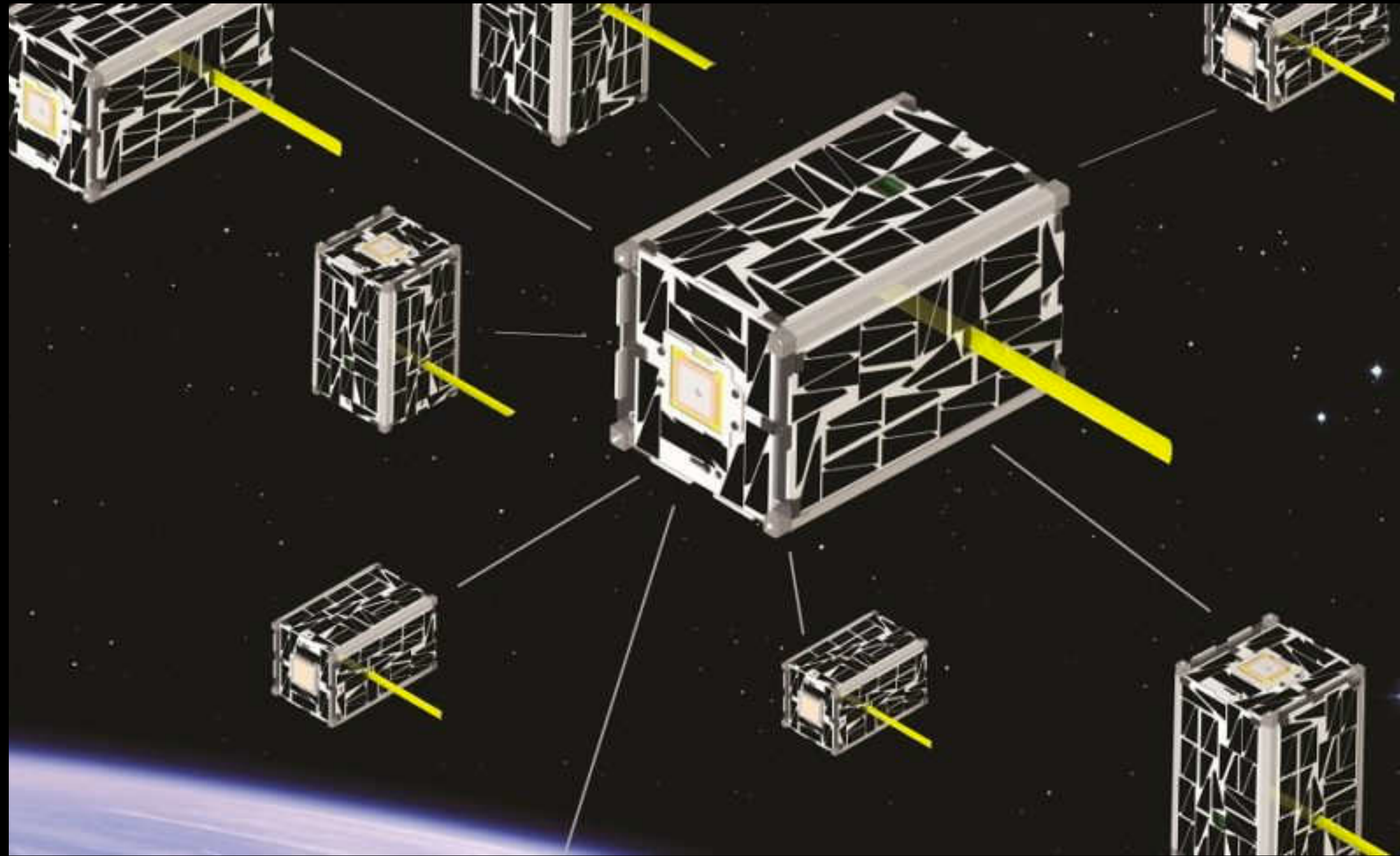
NewSpace India

- Novel product/service IP
- Investment into creating original products/services
- Build end-to-end products for both local and global markets
- Try to capture customers from global market



Old Space

pride/prestige, expensive, time consuming, mostly G2B, restricted to large OEMs & advanced countries



NewSpace

Integration to terrestrial business, B2B/B2C, agile,
low-cost, start-ups, VCs, new countries

The rise of NewSpace

- Over 1000 NewSpace companies in US alone have come up in the last decade
- Compared to India -> 50 NewSpace startups in last 10 years
- 100+ in China in the last 5 years



New entrants in the space sector



Innovative industrial approaches

- COTS electronics
- 3D printing / Additive manufacturing
- Mass / Serial production
- Fast iterations / versioning updates

Disruptive market solutions

- Reusability
- Sharing economy models
- API-based imaging stacks
- Direct to mobile solutions

Substantial private investments

- Space Capital reports a total of \$12.1B invested in space companies in Q1 & Q2 2020, with \$303M of that being allocated to early-stage investment
- Chinese commercial companies have raised a total of at least US\$1.85 billion since 2014.

New industry verticals and space markets

- Space traffic management
- Space tourism
- Space mining
- Space manufacturing

Innovative public procurement and schemes

Risk sharing to create competitive industry

- **USA**

- Commercial Lunar Payload Services program
- SBIR/STTR grants
- AFRL technology development programs

- **Europe**

- Horizon 2020
- Technology Research Programme (TRP)
- General Support Technology Programme (GSTP)
- Advanced Research in Telecommunications Systems (ARTES)

Business models in space industry.

Schemes	Space Industry examples
Service Contracts	Arianespace was created using such a contract between CNES and private stakeholders
Operation and Management Contracts	Manpower contracts at NASA and ESA for operational work at spaceports and ground stations (like Telespazio Vega, HE Space)
Leasing type Contracts	
■ Build-buy-operate	The United Launch Alliance between Boeing Space Systems and Lockheed Martin has a similar contract for operating launchers Delta-IV and Atlas V
■ Lease develop operate	
■ Wrap around additions	
Build Operate Transfer	
■ Build-Own-Operate-Transfer	The Wideband Global System (WGS), built by the U.S. Department of Defense is following this kind of model, to operate it's 8-satellite constellation
■ Build Rent Own Transfer	
■ Build Lease Operate Transfer	
■ Build Transfer Operate	
Design Build Finance Operate	
■ Build Own Operate	Satellite fleet operators like Intelsat and SES follow such type of policy
■ Build Design Operate	
■ Design Construct Manage	
Finance	

Evidence based policy making

- We do not know the size of the Indian space economy (we know how much the government spends on space activities)
- We do not know the contribution of space based services to the job creation/productivity/GDP
- We do not have comprehensive mapping of the overall ecosystem in terms of industry involvement
- We do not know the scale at which India's space based assets are being used by its citizens (e.g. how many fishermen are using NAVIC based services in the country today)
- We do not know the size and scale of the spin-offs

Major issues for India

Stakeholder Representation

- Active Start-up/SME participation in Govt. Policy and Decision-Making Bodies.
- Start-up/SME Composition of INSPAC-e Board and Evaluation Committee.
- Co-development and co-funding of high stakes projects between SMEs and IN-SPACe.

Facility Utilization

- Simplified usage of ISRO facilities with an online portal for requisitioning, booking and approvals.
- Start-ups to be charged minimally/actual cost basis on consumables and minimum insurance fee where there is concern on usage of expensive equipment.
- IN-SPACe should work with industry in establishing clear guidelines to enable minimal premium for insuring Private Space activities from testing to operations and shall fix an upper cap in advance.
- Open up ISRO infrastructure/facilities or establish separate rocket test zones to conduct model, amateur and experimental rocketry events, activities and competitions.

White Paper on IN-SPACe to be released explaining

- Role and function of IN-SPACe, Approach to Legal/Regulatory, Procedural and Management elements; Composition of INSPAC-e Board and Evaluation Committee.
- Eligibility criteria and process for evaluation and acceptance/rejection of applications;
- Goods & Services which Private Sector will be authorized/permitted to integrate into the international supply.
- Develop a long-term Policy Vision along with the Implementation Roadmap by combining the potential of Indian Private Space Sector companies.

Regulatory Clearances & Licensing

- Establishing clear licensing guidelines and provide single window clearance for all licensing requirements including, but not limited to Launch, Spectrum, Operating Satellites/Ground stations etc.
- Clearly defined timelines for responses on clearance/next steps via a portal.
- Communication System providers should also be allowed to set up ground stations in India in a seamless manner for enabling more robust in-space testing.

Data Access

- EO Data should be openly available and easily accessible to Indian Companies for free to provide an internationally level playing field to the Indian operators.
- There should be a licensing, audit and traceability mechanism built for facilitating buying of EO imagery directly from satellite operator or reseller.
- High Resolution EO data purchase threshold should be reduced to 50cm from the current 1m, as there are a lot of civilian applications.

Funding and Market Creation

- Constitution of a Space fund by GoI to invest in emerging Space start-ups on either Equity basis or Grant basis (Ministry of Agriculture recently did the same by allocating funds to support 112 Agri-tech start-ups in India).
- Allow Start-ups/MSMEs to directly take part in the RESPOND program, Announcement of Opportunities (AO's) & Expression of Interests (Eols). These are currently only for academic institutions or have revenue prerequisites.
- Request for removal of GST for launch of satellites manufactured in India by Indian Launch Vehicles in similar lines as foreign satellites launching from India. This would increase the competitiveness of Indian satellite manufacturers in the global marketplace.
- Create a focused program to strategically fund and support home-grown solutions which can replace current imports and enable development of new critical technologies or materials.

Outreach & Capacity Building

- Individual ISRO centres should have a focused incubation centre on campus which would allow for better dissemination of knowledge.
- Opportunities for Startup/MSME participation in national and international space exhibitions and events
- IN-SPACe could consider formally instituting a division within itself involving social scientists, economists and space technologists to create a framework to map and monitor space activities' contribution to the economy. This can help policy makers make data-driven decisions and keep track of competitiveness in global scale.

Global Issues

Space Debris

- Who pays for the clean up?
- How do you manage space traffic?
- Government vs private industry advisory on space traffic?

Space Mining

- US and Luxembourg have passed laws to provide foundation for appropriation of space-based resources by companies
- How can there be international consensus for private sector space mining?
- Will other countries accept these laws?

Jurisdiction

Starlink Recognizes Mars as “Free Planet” in Terms and Conditions

- *“For services provided on Mars, or in transit to Mars via Starship or other colonisation spacecraft, the parties recognise Mars as a free planet and that no Earth-based government has authority or sovereignty over Martian activities.”*

KNOW MORE?



Space India 2.0

**Commerce, Policy, Security and
Governance Perspectives**

Rajeswari Pillai Rajagopalan
Narayan Prasad (Eds.)

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