

Building Indigenous Space Industry Capacities: The Indian Experience

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*Space Industry in Emerging Nations
Symposium to strengthen the Partnership with Industry
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Indian Space Programme 1963-2008

- 48 Indian Satellite Missions
- 25 Launch Vehicle Missions
- 8 Foreign Satellites launched
- Space Applications touching Human life

1963

1975

1985

1995

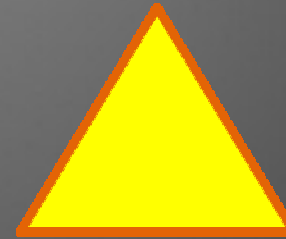
2005

2010

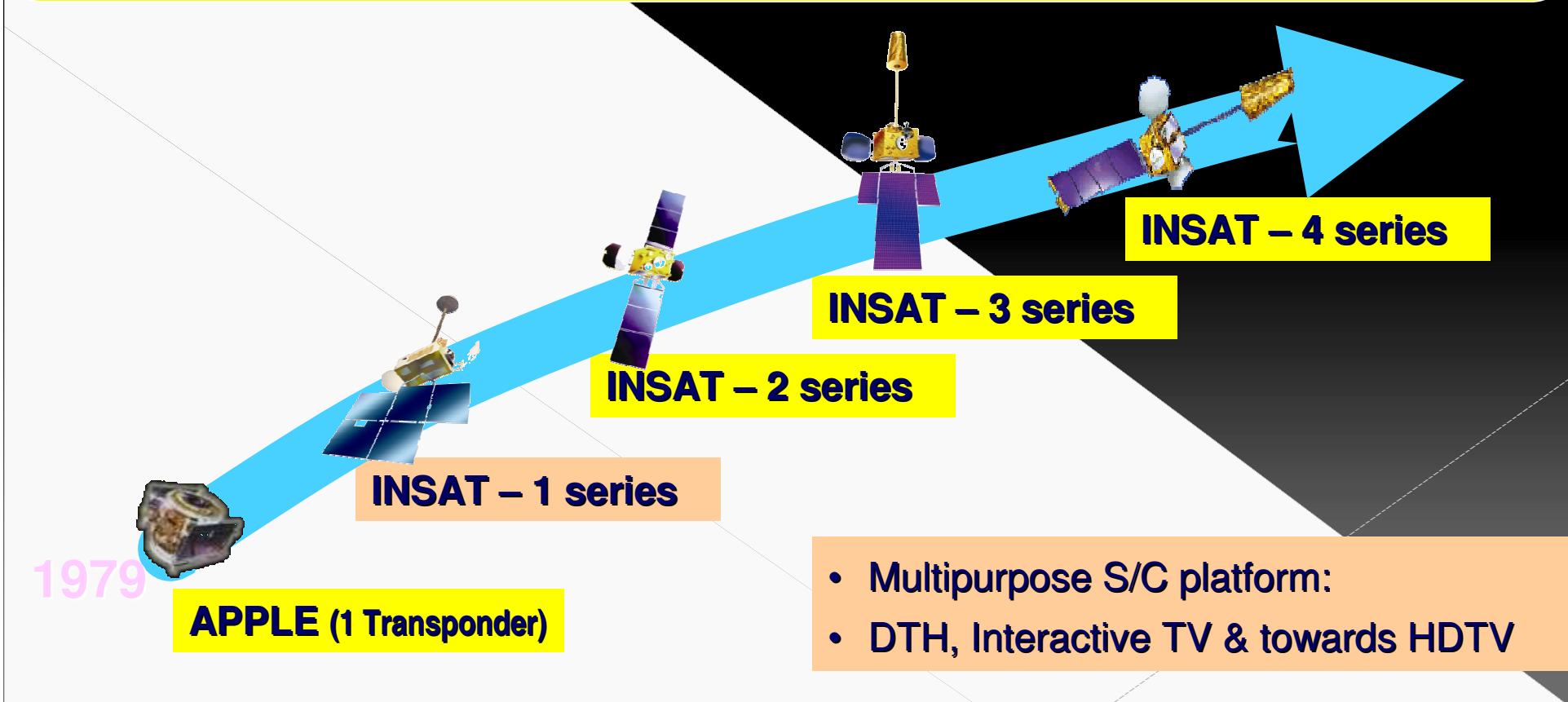
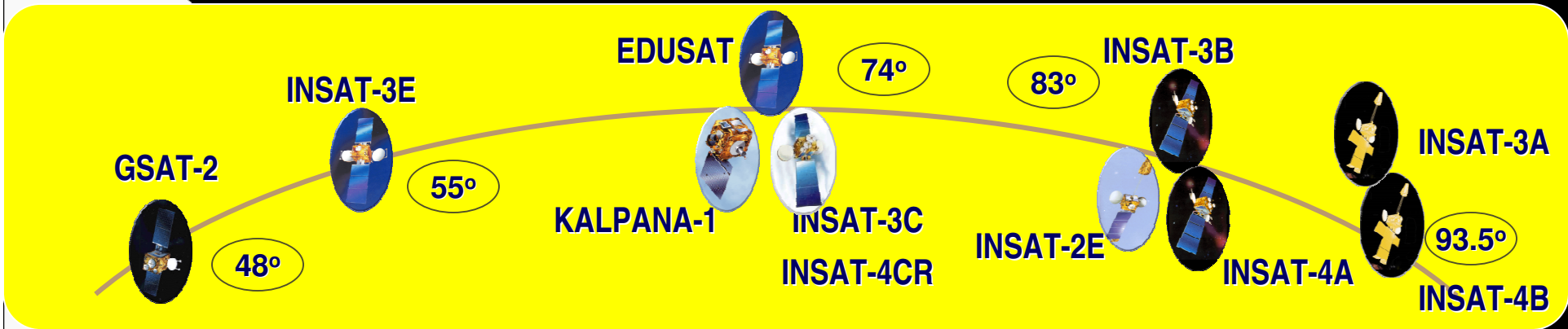
Indian
Industry

ANTRIX
Corporation

ISRO



Indian Strides in Communication Satellites



National Services through INSAT Satellite System

11 INSAT Satellites placed at 5 Orbital Locations in GSO
212 Transponders in S, C, Ext C and Ku bands- *presently*

Telecom Speech
Circuits on Trunk
Lines - DOT/BSNL

TV Broadcasting,
Direct-to-Home -
Doordarshan

Mobile Satellite Service,
Search and Rescue,
Satellite Navigation

Private and News
gathering services

Radio Networking-
All India Radio

250 Cyclone Warning
Dissemination Systems

Training and Developmental
Communication and GRAMSAT
(5500 Direct Receive Systems)

Disaster Management Support,
Emergency Communication,
60,000 V-SATs

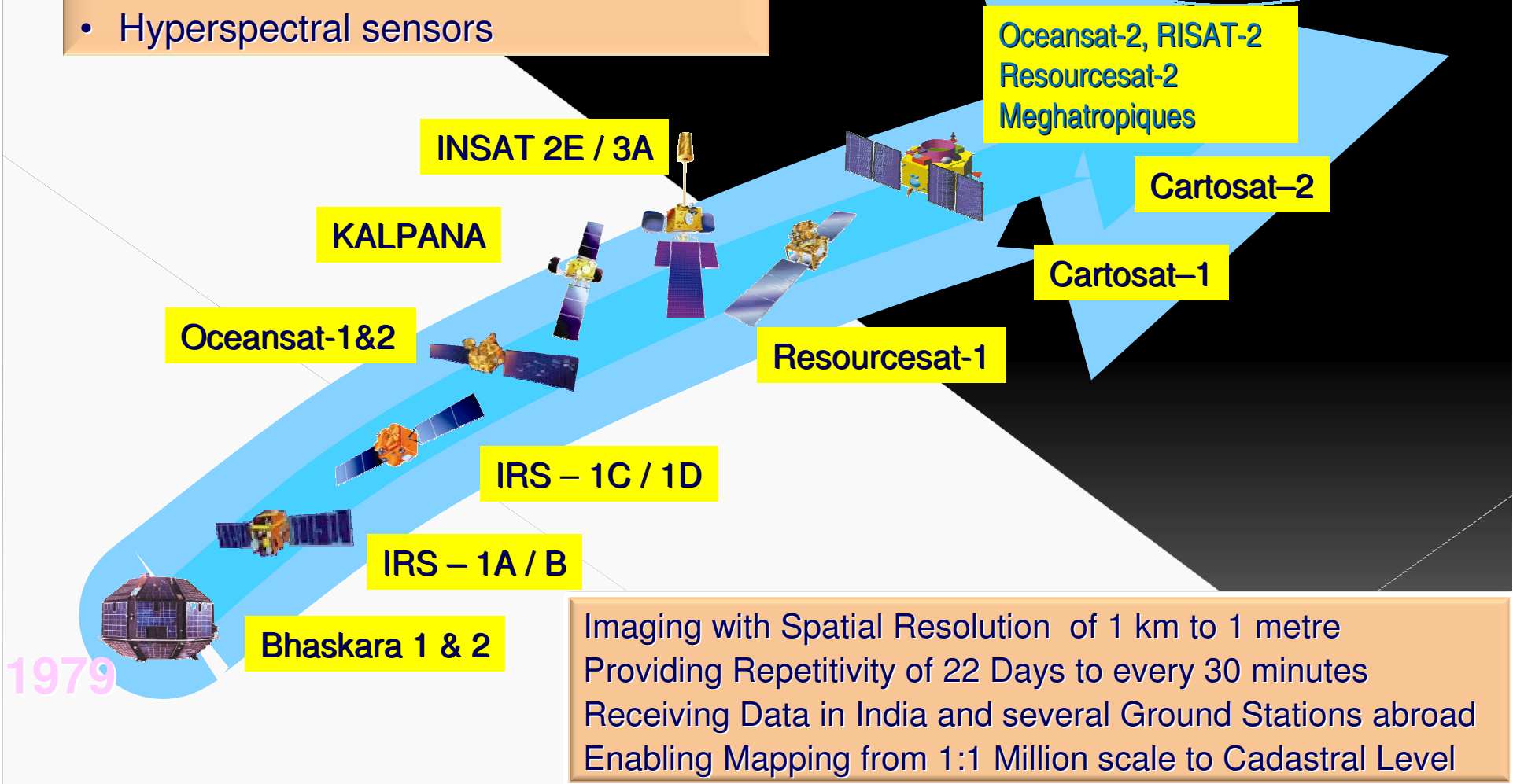
Telemedicine, Tele-education

100 Meteorological Data
Dissemination Centres

Village Resource Centres

Indian Strides in Earth Observation Satellites

- Thematic Satellites: Land & Water; Cartography; Ocean & Atmosphere
- Visible, IR, Microwave regions
- Hyperspectral sensors



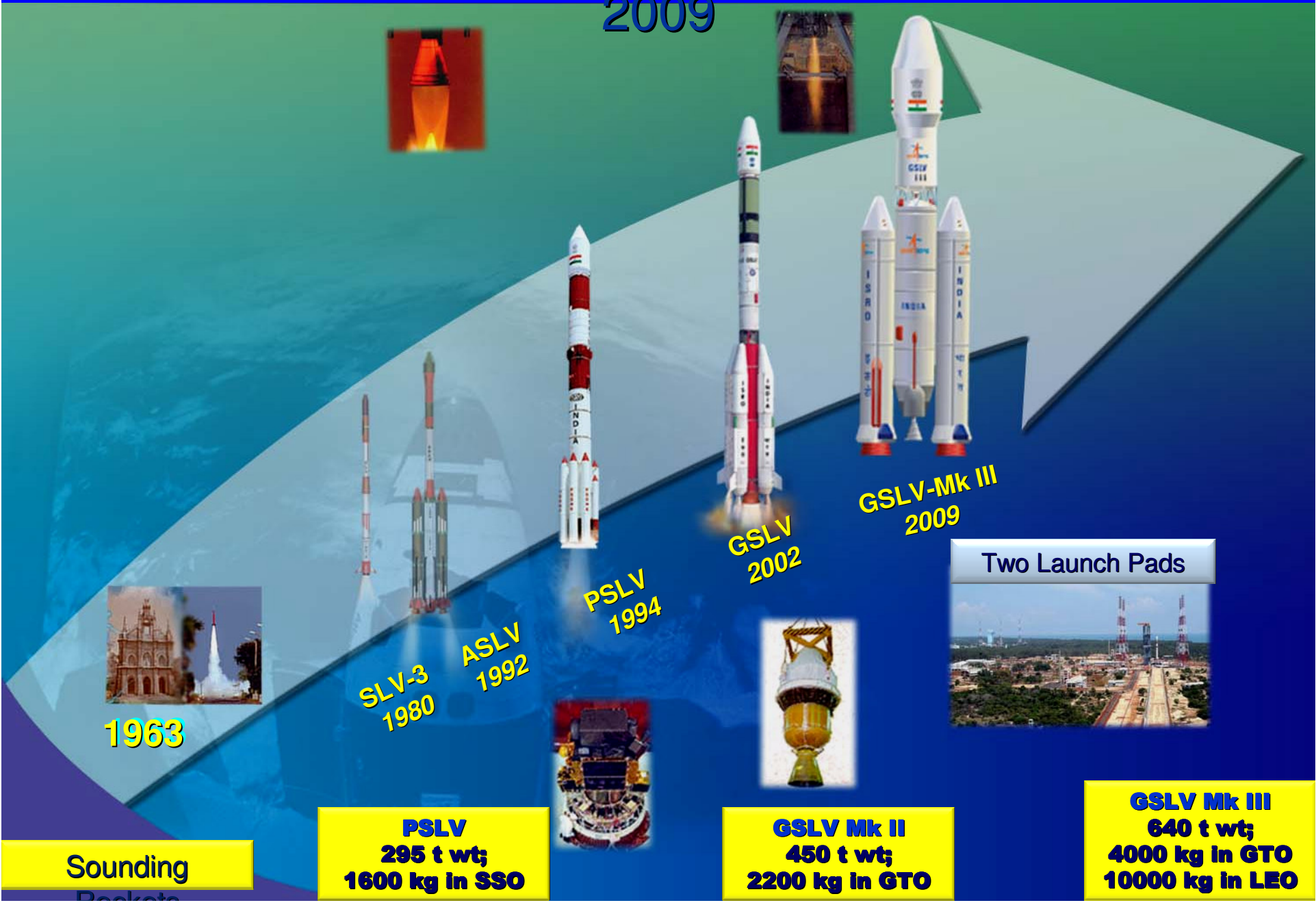
Imaging with Spatial Resolution of 1 km to 1 metre
Providing Repetitivity of 22 Days to every 30 minutes
Receiving Data in India and several Ground Stations abroad
Enabling Mapping from 1:1 Million scale to Cadastral Level

Earth Observation Satellite Constellation contributing to national imperative needs e.g.

1. Natural Resources Data base
 - Land use/Land Cover; Wastelands
 - Geomorphology; Soils
 - Glaciers, snow melt run-off
 - Forest Cover....
2. Agricultural Crop Inventory
3. Watershed development planning and monitoring
4. Irrigated Command Area Monitoring
5. Irrigation Infrastructure monitoring
6. Potential Ground Water Zones
7. Potential Fishing Zones
8. Urban /Infrastructure planning
9. Biodiversity at Landscape level
10. Spatial Data base; Space-based Information and Decision support Systems for Disaster Management Support



Indian Strides in Space Transportation System 1963 - 2009



1963

SLV-3
1980

ASLV
1992

PSLV
1994

GSLV
2002

GSLV-Mk III
2009

Two Launch Pads



Sounding
Rockets

PSLV
295 t wt;
1600 kg in SSO



GSLV Mk II
450 t wt;
2200 kg in GTO



GSLV Mk III
640 t wt;
4000 kg in GTO
10000 kg in LEO

Technology Transfer & Industry Role

ISRO: End-to-End Capability

- Satellite Design and Development
- Satellite Launch
- Systems Management
- Utilisation

ISRO associates with > 500 small, medium & large scale industries

Industry Role

Commercialise
Value-add
Subcontract

- Technology Transfer (280 Items)

Space-Industry Partnerships

- Spin-offs

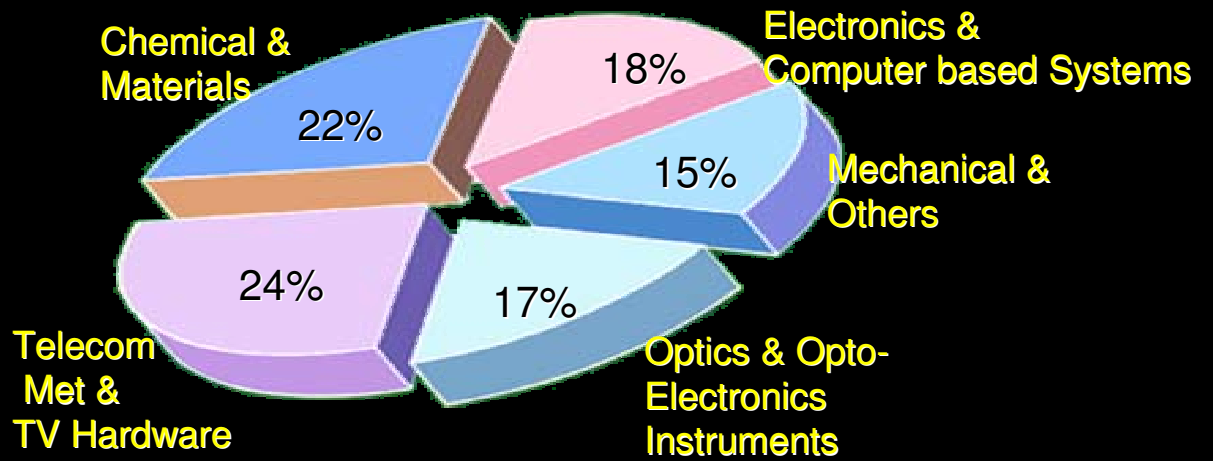
Technical Consultancy

- 270 Consultancy Projects

Technology Utilisation

- Systems Development
- Fabrication/ supply
- Testing & QA

Spectrum of Technologies Transferred



165 Patents; 10 Trademarks; 17 Copyrights

Antrix Corporation

Reaching Indian Space Excellence to the Global Markets

Antrix Portfolio

- Earth Observation Data & Services
- Remote Sensing Satellites
- Telecommunications Satellite
- Launch Services
- Mission Support
- Consultancy & Training
- Satellite Components & Ground Systems
- Other Services



Customer Profile

HUGHES Space Communications, MATRA MARCONI Space, CNES, DLR, BRASILIAN Industry, etc., Space Imaging, MDA, ALENIA, RESTEC....

International Launch Service Customers

KAIST- Korea : KITSAT
DLR – Germany : TUBSAT, BIRD
Verhaert, Belgium : PROBA
Italian Space Agency: Agile
Singapore University, Italy & Indonesia (launches)
EADS- Astrium: WTM, Hylas (Commn. Satellite Designing)



Thank you for the kind attention