



Human Capital

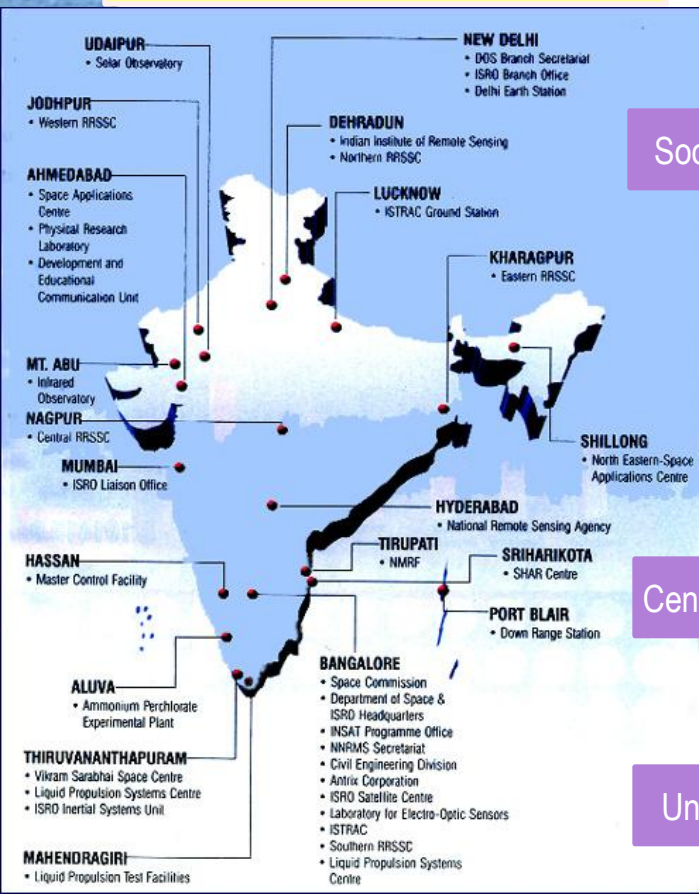
Scientific/
Technical

Admin

~ 12,000

~5500

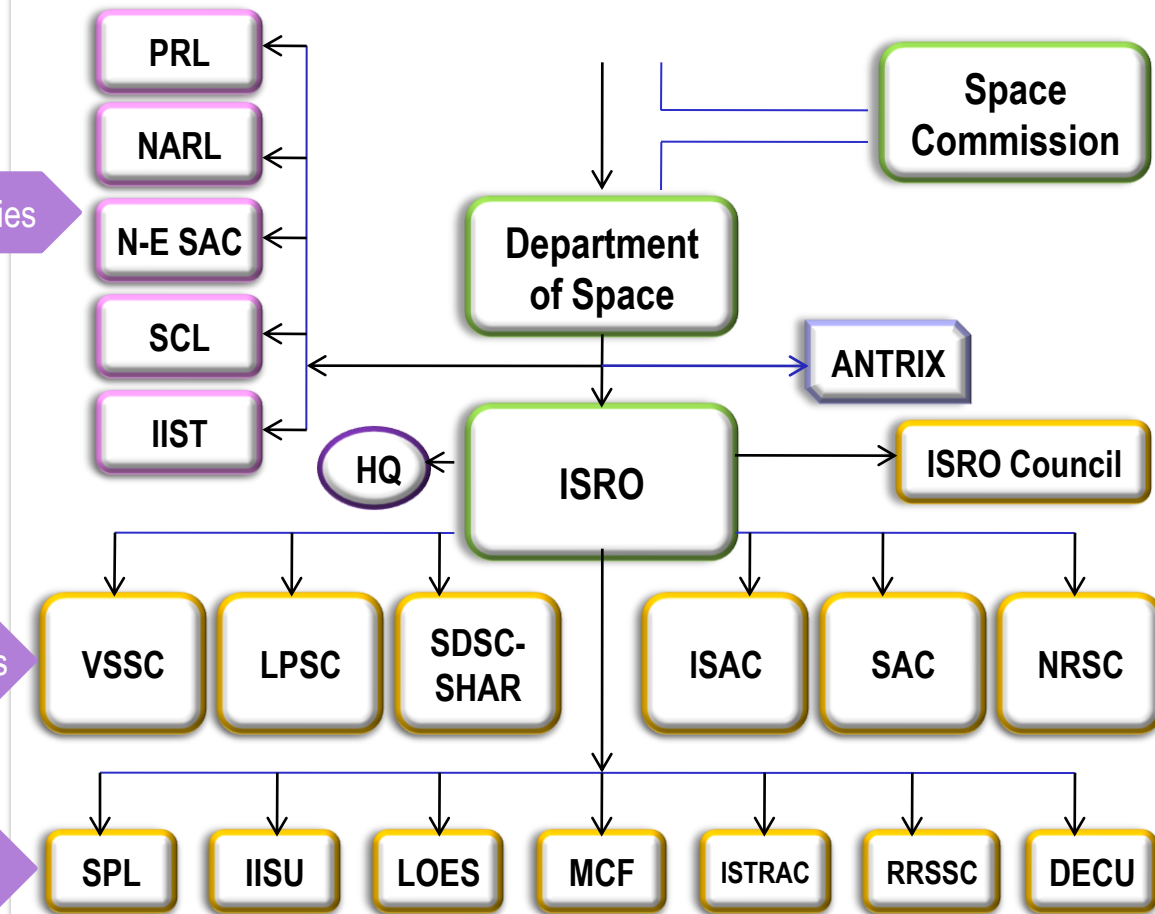
Indian Space Research Organization



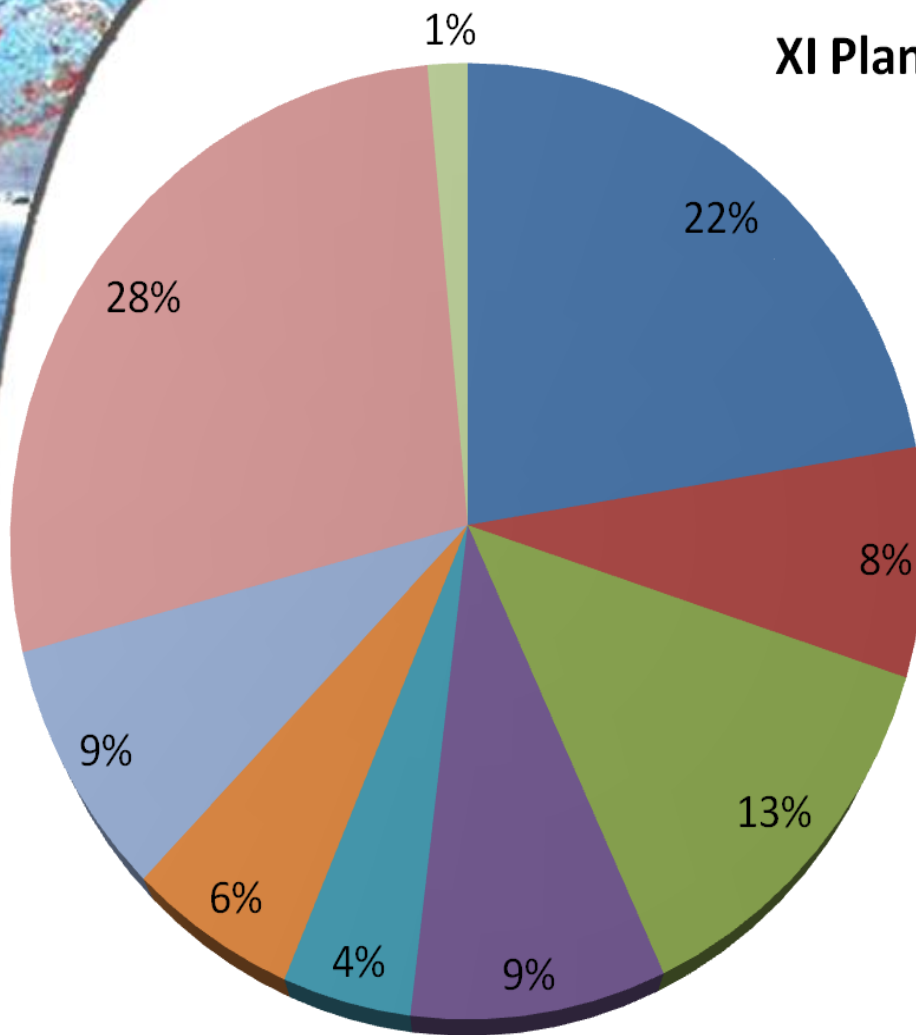
Societies

Centres

Units



XI Plan Outlay: Rs 30,883 Crores



- Launch Vehicles
- Earth Observation Missions
- Satellite Communication
- Satellite Navigation
- Space Science Missions
- Human Spaceflight
- Space Applications
- R&D, Tech. development, Facilities
- Indian Institute of Space Science & Technology

ISROs Launch Vehicles



Launch Vehicle	SLV	ASLV	PSLV	GSLV	GSLV Mk-3 (Under development)
Lift-off weight (tons)	17	40	295	450	635
Payload (kg)	40 (LEO)	150 (LEO)	1600 (SSO)	2000 (GTO)	4000 (GTO)

DEVELOPMENT

14 Successive Successful Flights



- Multiple Satellites Missions
- Sun-synchronous Polar Orbits
- Geo Transfer Orbit (Kalpana)
- Inclined Orbit (Chandrayaan)
- Low Inclination Orbit (AGILE)

PAYLOAD IMPROVEMENT PACKAGES

- Propulsion Modules up-rated
- Hardware design optimized
- Mission Sequence optimized

850 kg

Payload in Sun Synchronous Polar Orbit

OPERATIONAL PSLV

PSLV



1600 kg

PSLV
CORE ALONE

1100 kg

PSLV – XL



1750 kg

2000

GSLV : Evolution and Growth

2009

2010

Russian
Cryogenic Engine & Stage

Last Launch
Russian Cryo



GSAT-1
1530 kg

GSAT-2
1800 kg

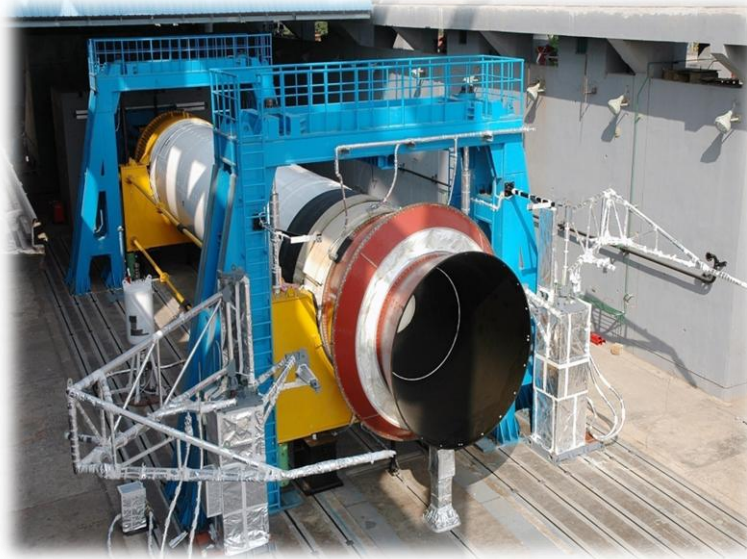
EDUSAT
1950 kg

INSAT-4C INSAT-4CR
Mission failed 2130 kg

GSAT- 4
Mission Failed

GSAT-5P
2300 kg
Mission Failed

ISROs New Heavy Lift Launch Vehicle



S200 motor in static test bed at SHAR



L110 Stage Test at Mahendragiri



Testing of C25 Turbo pump with GG & Startup system



LH2 Turbo pump



LOX Turbo pump



Gas generator

GSLV Mk III PROGRAMME

GSLV- Mk III

Launch capability

- 4 tonnes to GTO



24th January 2010

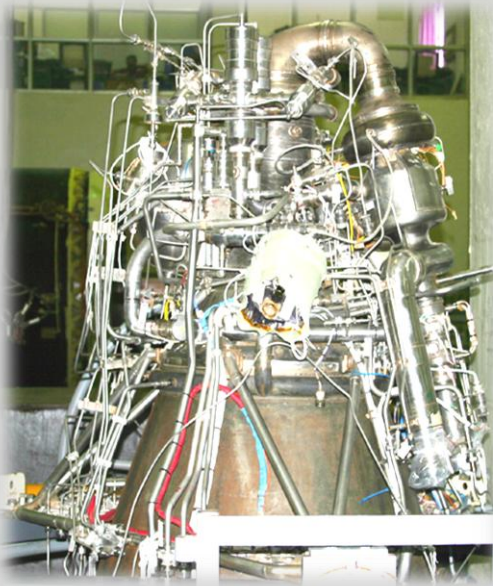
SALIENT FEATURES

- Motor Length : 21.9 m
- Number of segments : 3
- Propellant mass : 207 ton
- Burn time : 103 s
- Initial Thrust : > 4750 kN

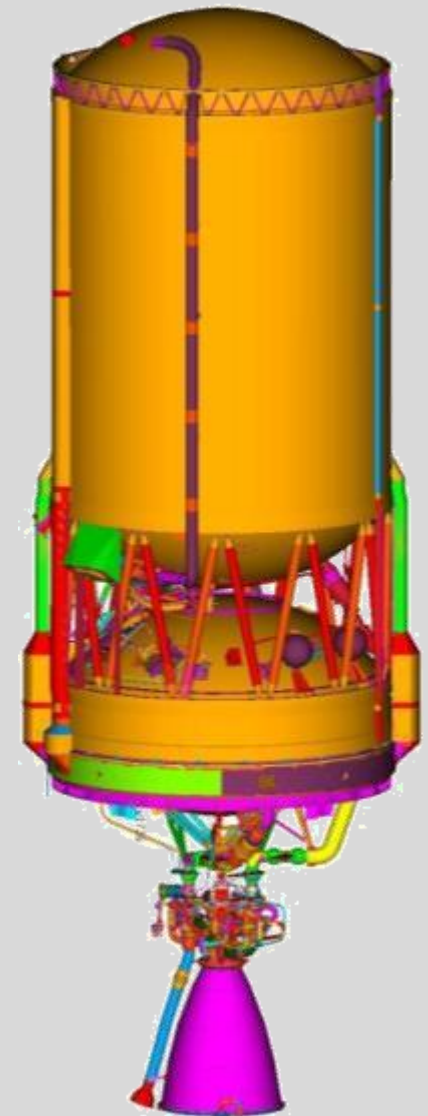




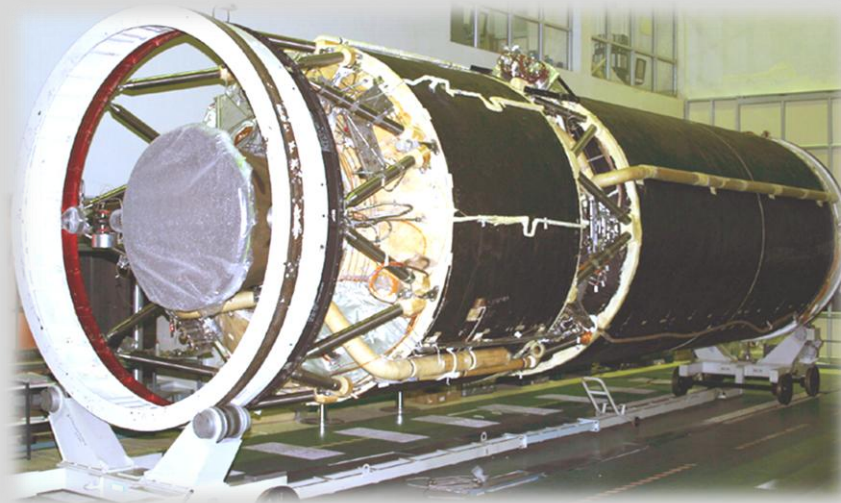
Cryogenic Engine & Stage



Cryogenic Engine (GSLV)



**New Cryogenic Stage for
GSLV Mk-III**



Cryogenic Stage

Cryogenic Engine and Stage qualified successfully for GSLV Mission

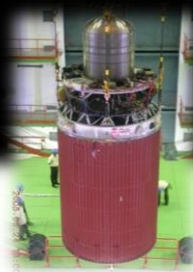
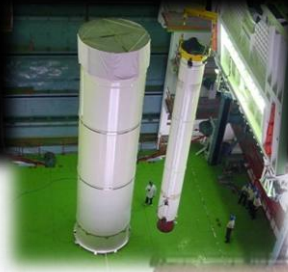
PSLV C7 / Space Capsule Recovery

Recovery on January 22, 2007
at a pre-determined location in
the Bay of Bengal

Launched on January 10, 2007



Indian Space-port at Satish Dhawan Space Centre, Sriharikota



ISRO Launch pads

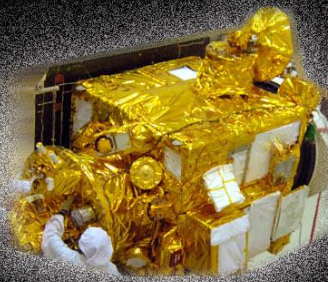
First Launch Pad (FLP)

Second Launch Pad (SLP)





Water on Moon:
Findings by M3
payload by
NASA and MIP
of ISRO



INDIA'S FIRST LUNAR EXPLORATION

PSLV-C11 CHANDRAYAAN-1 MISSION



The Scientific Payloads / Experiments:



6 International payloads on-board Chandrayaan-1

- Chandrayaan-1 X-ray Spectrometer (C1XS) through ESA - A collaboration between Rutherford Appleton Laboratory, UK and ISRO Satellite Centre,
- Near Infra Red spectrometer (SIR-2) from Max Plank Institute, Lindau, Germany through ESA
- Sub KeV Atom Reflecting Analyser (SARA) through ESA, from Swedish Institute of Space Physics, Sweden and Space Physics Laboratory, VSSC,. The Data Processing Unit of this payload / experiment is designed and developed by ISRO, while Swedish Institute of Space Physics develops the payload.
- Radiation Dose Monitor Experiment (RADOM) from Bulgarian Academy of Sciences
- Miniature Synthetic Aperture Radar (MiniSAR) from Applied Physics Laboratory, Johns Hopkins University and Naval Air Warfare Centre, USA through NASA
- Moon Mineralogy Mapper (M3) from Brown University and JPL, USA through NASA



Chandrayaan-1: the Scientific Objectives

- High-resolution Remote Sensing of the Moon from Orbiter (Chandrayaan) (In Visible, Near-Infrared, Microwave, X-ray and Gamma Ray Windows)
- (Very) High Resolution Imaging and Altimetry for short period in a selected track using Impact Probe

Hyper Spectral Imager (80m)

Miniature Synthetic Aperture Radar

Smart Infra-red Spectrometer

Lunar Laser Ranging Instrument

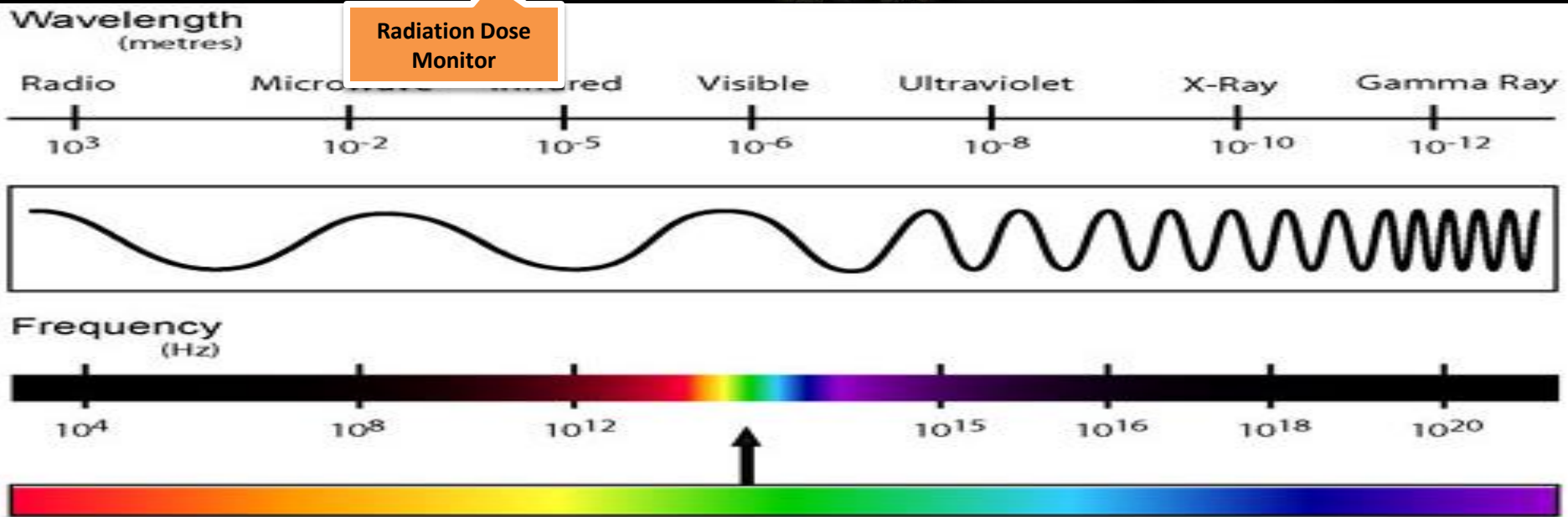
Terrain Mapping Stereo Camera (5m)

Low Energy X-ray Spectrometer

High Energy X-ray Spectrometer (40 km)

Moon Mineralogy Mapper

Radiation Dose Monitor



Bilateral Meeting between Chairman, ISRO and Administrator, NASA
September 28, 2010 at Prague, Czech Republic



Co-operation with US

ISRO working with JPL on possible participation in “Moon Rise Mission” by NASA for Lunar Sample Return [500 kg Indian Communication Orbiter around Moon, to be launched by NASA]



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MoonRise

A Sample-Return Mission from the Moon's South Pole Aitken Basin

MISSION OVERVIEW

Four decades after the Apollo astronauts first brought samples from the Moon's surface back to Earth for study, NASA has selected MoonRise for a Phase A study under the "New Frontiers Program" for Solar System exploration.

The MoonRise mission would focus on the giant South Pole-Aitken (SPA) Basin on the far side, which lies between the Moon's South Pole and Aitken Crater, just 16° south of the Moon's equator. The SPA Basin is the oldest, deepest, observable impact basin on the Moon and ranks among the largest recognized impact structures in the Solar System at nearly 2500 kilometers (1553.4 miles) in diameter and 12 kilometers (7.5 miles) deep. The SPA Basin represents a window into the deep crust of the Moon and a portal to the past history of heavy bombardment of

1. International Space Station: ISRO Team to define possible Instruments for Earth Observation/Climate studies
2. “ISRO-IIST Satish Dhawan Graduate Fellowship at CALTECH” for one candidate at a time.

International Co-operation



1. Minister of Sciences and Universities, UK visited ISRO Satellite Centre, on November 15, 2010. A draft MoU between ISRO and UK Space Agency on cooperation in peaceful uses of outer space proposed.



1. Collaborated with SEP in the joint development of the VIKING engine and technology transfer in the 80s.
2. MOA of June 2005 between ANTRIX Corporation Limited & EADS-ASTRIUM, France renewed till December 2015;
3. MoU signed between ISRO and CNES on "Cooperation in Earth System Science and Climate using Space".
4. Work is progressing for the Mission, "Megha-Tropiques" to be launched by PSLV.



1. OCEANSAT -2 data reception and processing facility established at Mauritius, fulfilling the Governmental level commitment.
2. A joint working group to be set up to pursue applications



1. Procured Cryogenic Stages used in GSLV
2. Joint Working Group on access to High Precision GLONASS signals
3. Chandrayaan -2 Joint Project is progressing. This mission will have a Lander and rover on the Moon
4. YOUTHSAT launched on 20th April 2011 as auxiliary payload of PSLV C-16 mission.
5. ROSCOSMOS had completed two studies on Human spaceflight.



1. ISRO Proposals to set up Satellite Tracking, Data Reception Station and Data Processing Facility in an **ASEAN** country and to train annually 10 persons from ASEAN countries
2. A Workshop for Heads of Space Agencies of ASEAN countries planned in Bangalore during April-May 2011.

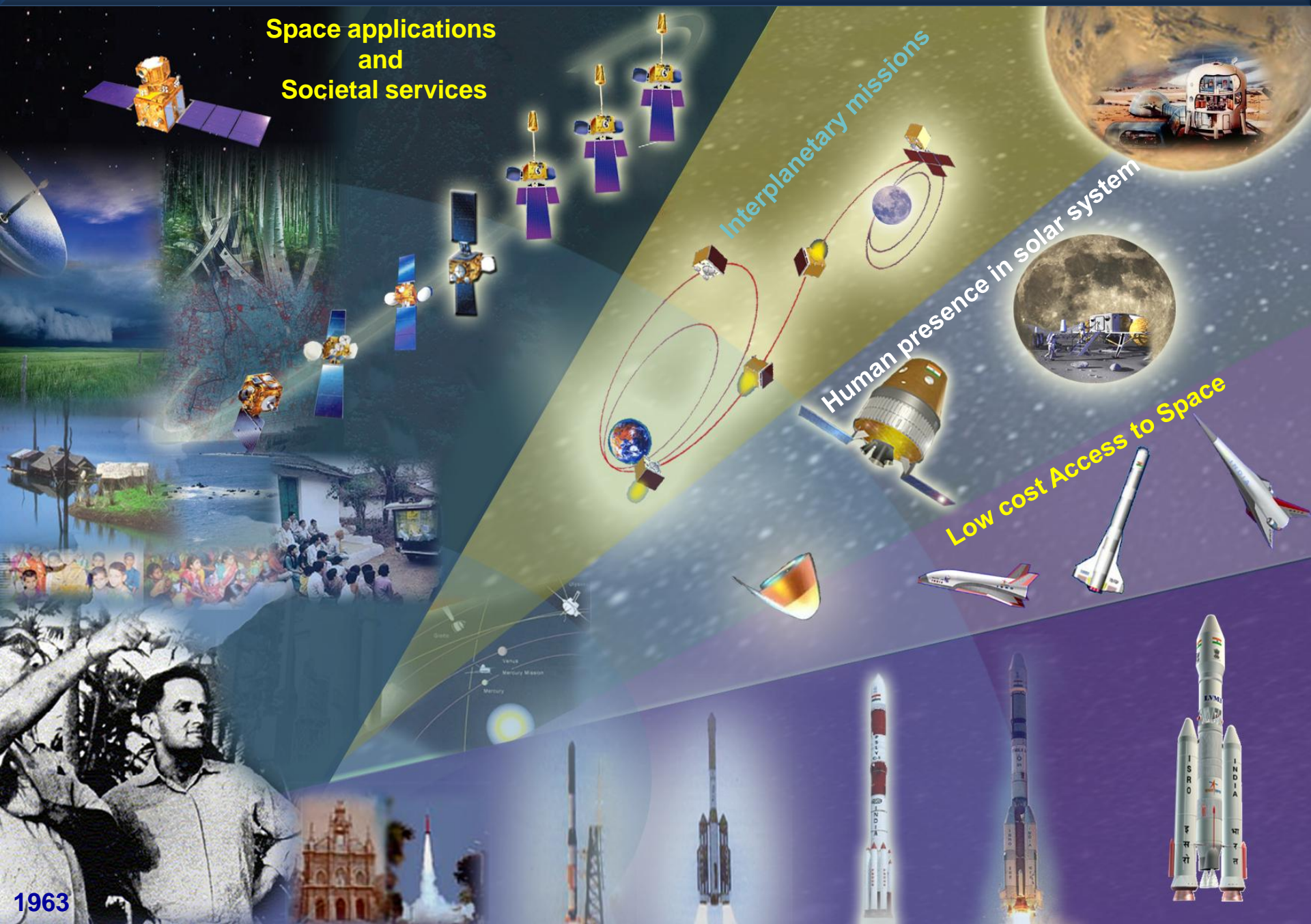
Space application for societal development

Space applications
and
Societal services

Interplanetary missions

Human presence in solar system

Low cost Access to Space



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