

15th Poultry
Kn**wledge**
Day 21 NOVEMBER

SHAPING THE FUTURE

OF INDIAN POULTRY SECTOR

Dr Mylswamy Annadurai





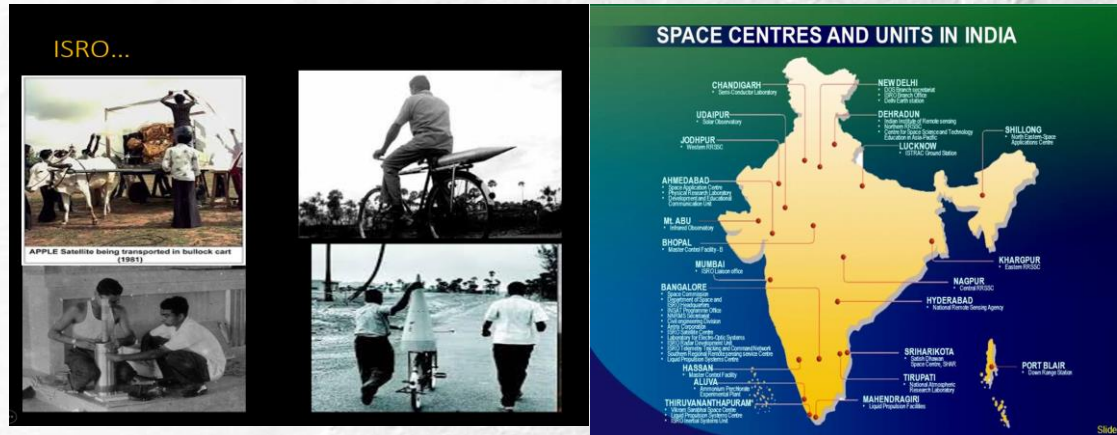
“There are some who question the relevance of space activities in a developing nation. To us, there is no ambiguity of purpose. We do not have the fantasy of competing with the economically advanced nations in the exploration of the moon or the planets or manned space-flight. But we are convinced that if we are to play a meaningful role nationally, and in the community of nations, we must be second to none in the application of advanced technologies to the real problems of man and society.”

~ VIKRAM SARABHAI

Born in 60's with a vision of national development and benefit to common man through Space



Humble beginning to front liner in the world:



Major milestones in ISRO's International Relations

- 6 Foreign instruments in Chandrayaan-1 (2008)
- Satellite building with Foreign partner – W2M (2008)
- Joint mission with French Space Agency (2011 Megha Tropiques; 2013 SARAL)
- South Asia Satellite (2017)
- 104 satellites in single mission (2017)
- UNNATI (2019 & 2020)
- 36 One web satellites launch on board LVM 3 (2022)

- Launch of German and Korean satellites by PSLV (1999)
- Cryogenic engines from Russia

- Launch of APPLE by France (1981)
- Launch of INSAT-1A by USA (1982)
- First Indian in Space with USSR (1984)
- Launch of IRS-1A by USSR (1988)

- Remote Sensing Experiment with USSR – USA (1972-76)
- Launch of ARYABHATA by USSR (1975)
- SITE -Television Expt. with USA (1975-76)
- STEP -SATCOM Expt. with France – Germany (1977-79)

- TERLS with USSR-USA-France (1962)

2000s+...
partnering
with space-
faring
nations

1990s

1980s

1970s

1960s

125 state of the art Satellites for **Societal / National** Applications



1. Agriculture
2. Energy and Environment
3. Infrastructure
4. Water Management
5. Development Projects
6. Communication
7. Navigation
8. Meteorology & Disaster Management
9. Health & Education
10. Space Science & Exploration : Signature Missions

For the people , By the people & Taking people along

Launch of 424 satellites for 34 countries



Destination Moon is ISRO's next big thing

PALLAVA BAGLA
NEW DELHI, MAY 11

THE INDIAN EXPRESS
MAY 12, 1999 - FRONT PAGE

TODAY may have been the anniversary of Pokharan II but what caused more excitement in the scientific community was chairman K Kasturirangan's announcement that ISRO's Polar Satellite Launch Vehicle will "undertake a mission to the moon." And a core team of scientists is being put together to work out the details.

In his technology Day lecture here this evening on "The Indian Space Odyssey," Kasturirangan said that India could easily launch a small satellite of about 275 kg in a "fly-by mission" to the moon or even place a 140-kg satellite in an orbit around the moon. The mission: to study the moon's core. A manned mission, however, is still far away.

Destination Moon, he said, could symbolise the next big challenge for ISRO which has satellite technology well under its belt.

Working out the mission's objectives and payload could take time and if all goes well, it could be a reality by 2008.

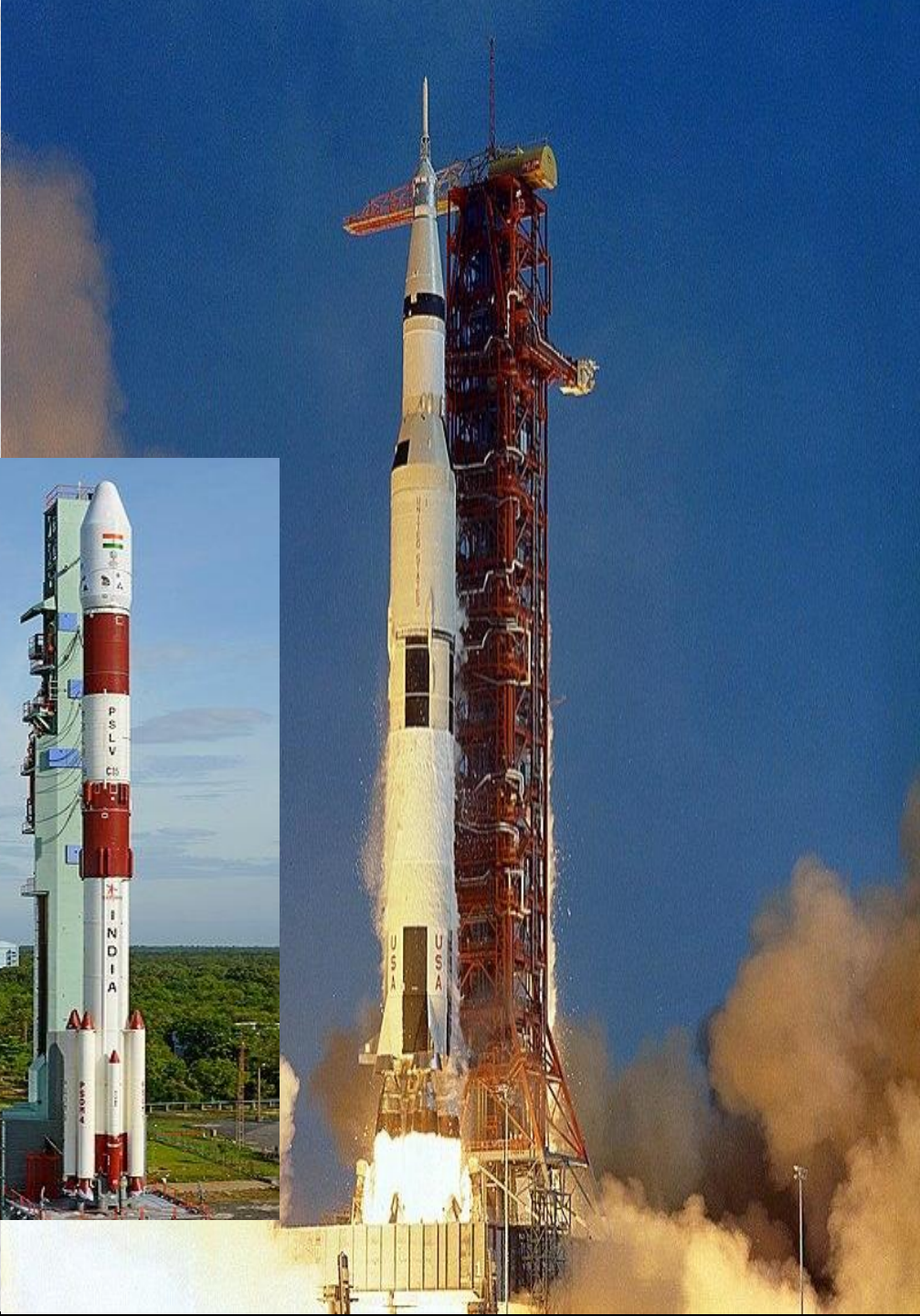
The launch vehicle "will not be the problem" he said. The cost will be estimated, he said, once the scientific details have been worked out and the government will be approached for funds, Kasturirangan said. According to ISRO's plan, the Indian way to go to the moon could be by injecting a satellite that has a lot of onboard fuel into a lunar transfer orbit and then using onboard rockets to nudge the satellite closer to the moon. Later, there could also be a moon landing.

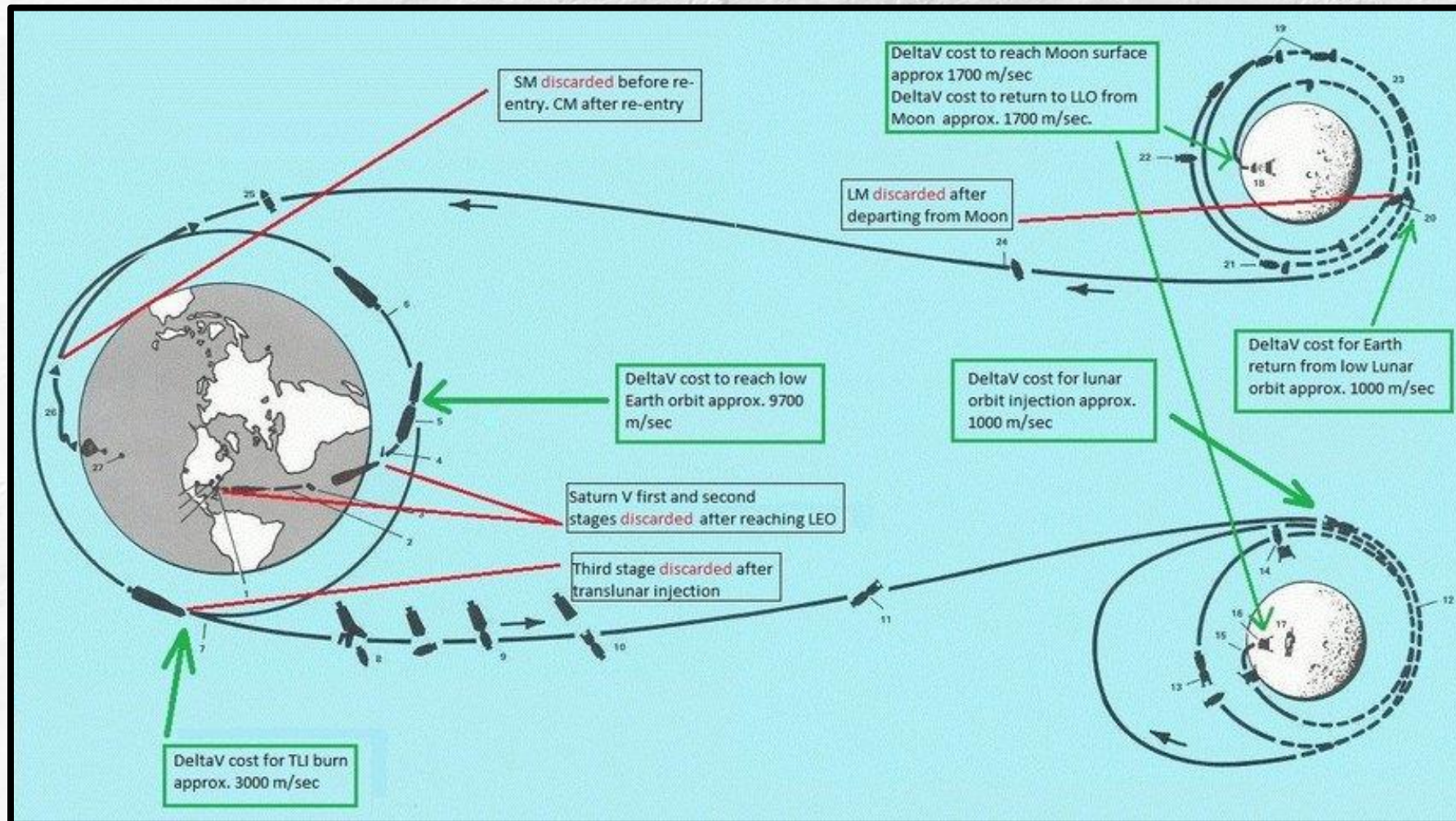
Signature mission
- Innovation, Impact, Incremental & cost effective

Challenges

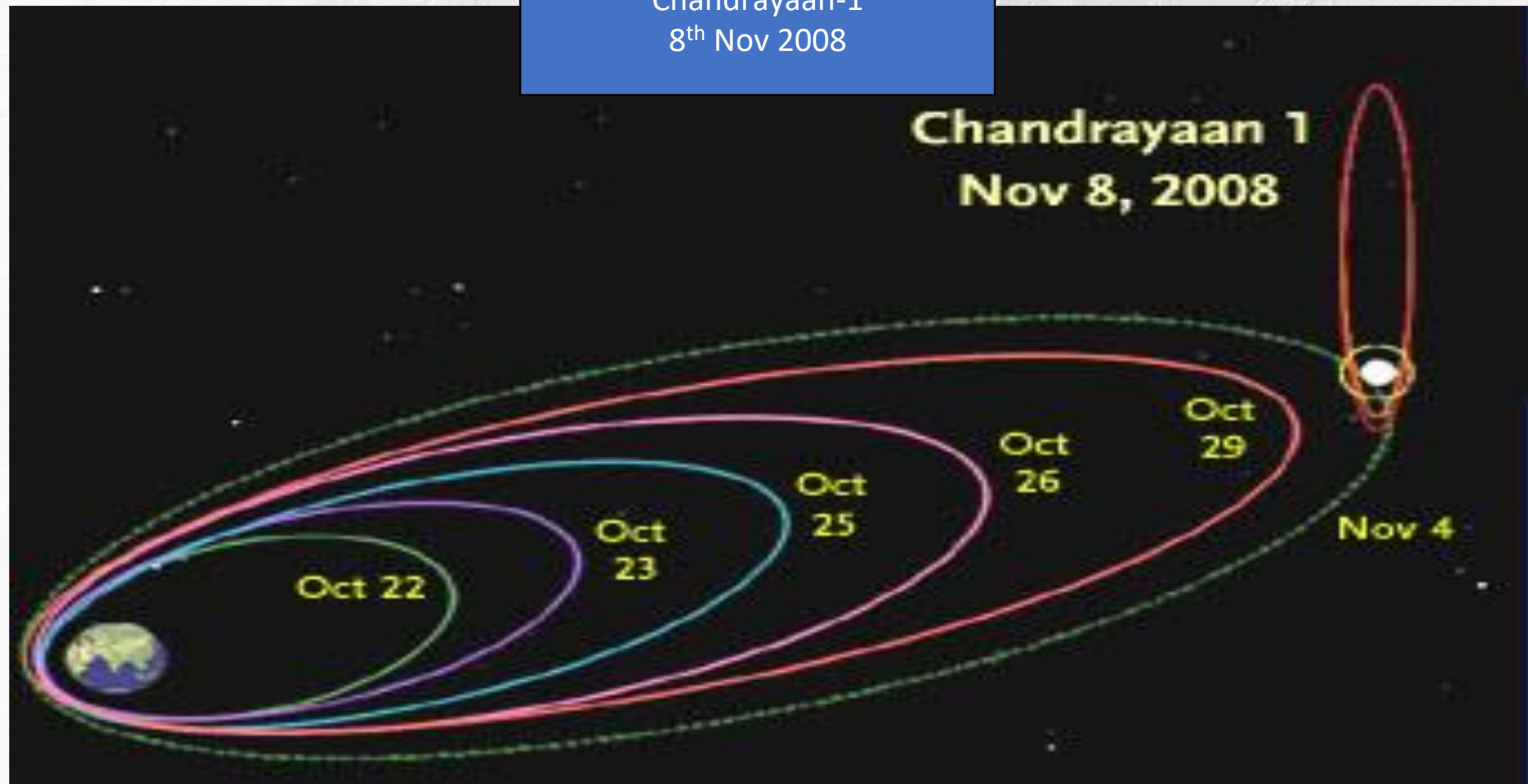
NUMBER OF Launches to Moon	
Decade	
<u>1950s</u>	13
<u>1960s</u>	63
<u>1970s</u>	23
1980s, 1990s	0

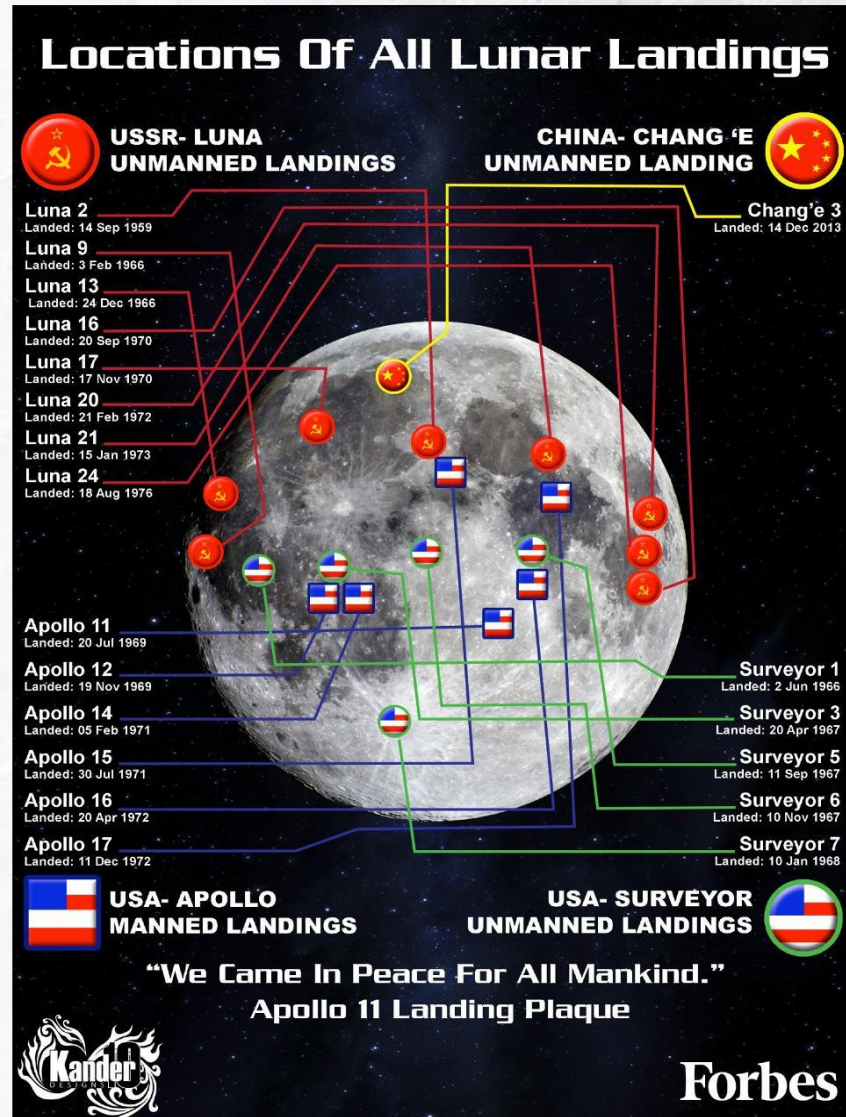
	Saturn PSLV
Size	
Height	110.6 m 44 m
Diameter	10.1 m 2.8 m
Mass	2,970,000 kg 320,000 kg
Capacity	
Payload to LEO	
Mass	140,000 kg 3,800 kg





Chandrayaan-1
8th Nov 2008





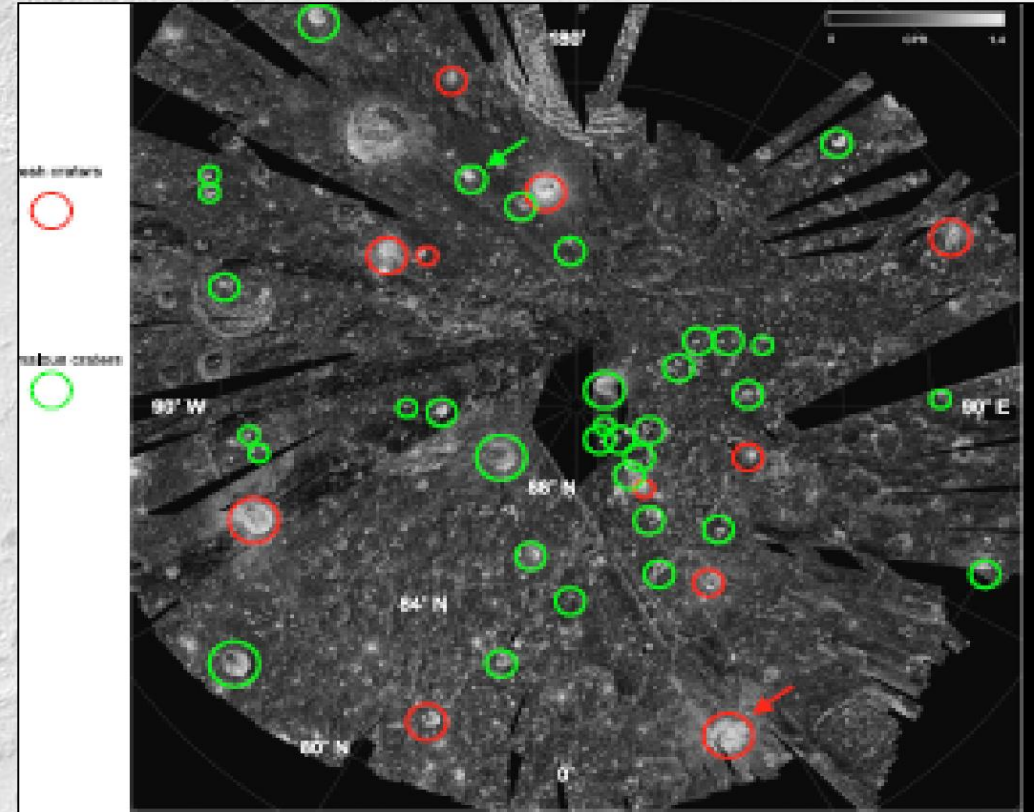
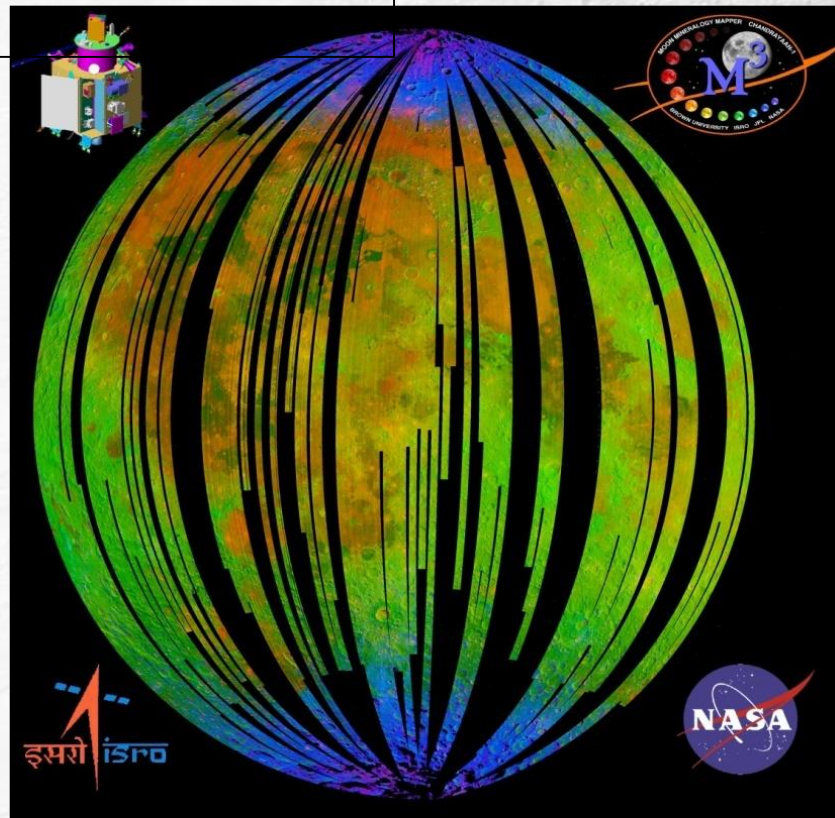
Land and Search for WATER



Search for WATER and Land



Accomplishment : Water on Moon , India leading a Global effort



Destination **MARS** is ISRO's next big thing

PALLAVA BAGLA
NEW DELHI, MAY 11

THE INDIAN EXPRESS
MAY 12, 1999 - FRONT PAGE

Signature mission
- Innovation, Impact, Incremental & cost effective

TODAY may have been the anniversary of Pokharan II but what caused more excitement in the scientific community was chairman K Kasturirangan's announcement that ISRO's Polar Satellite Launch Vehicle can "undertake a mission to the moon." And a core team of scientists is being put together to work out the details.

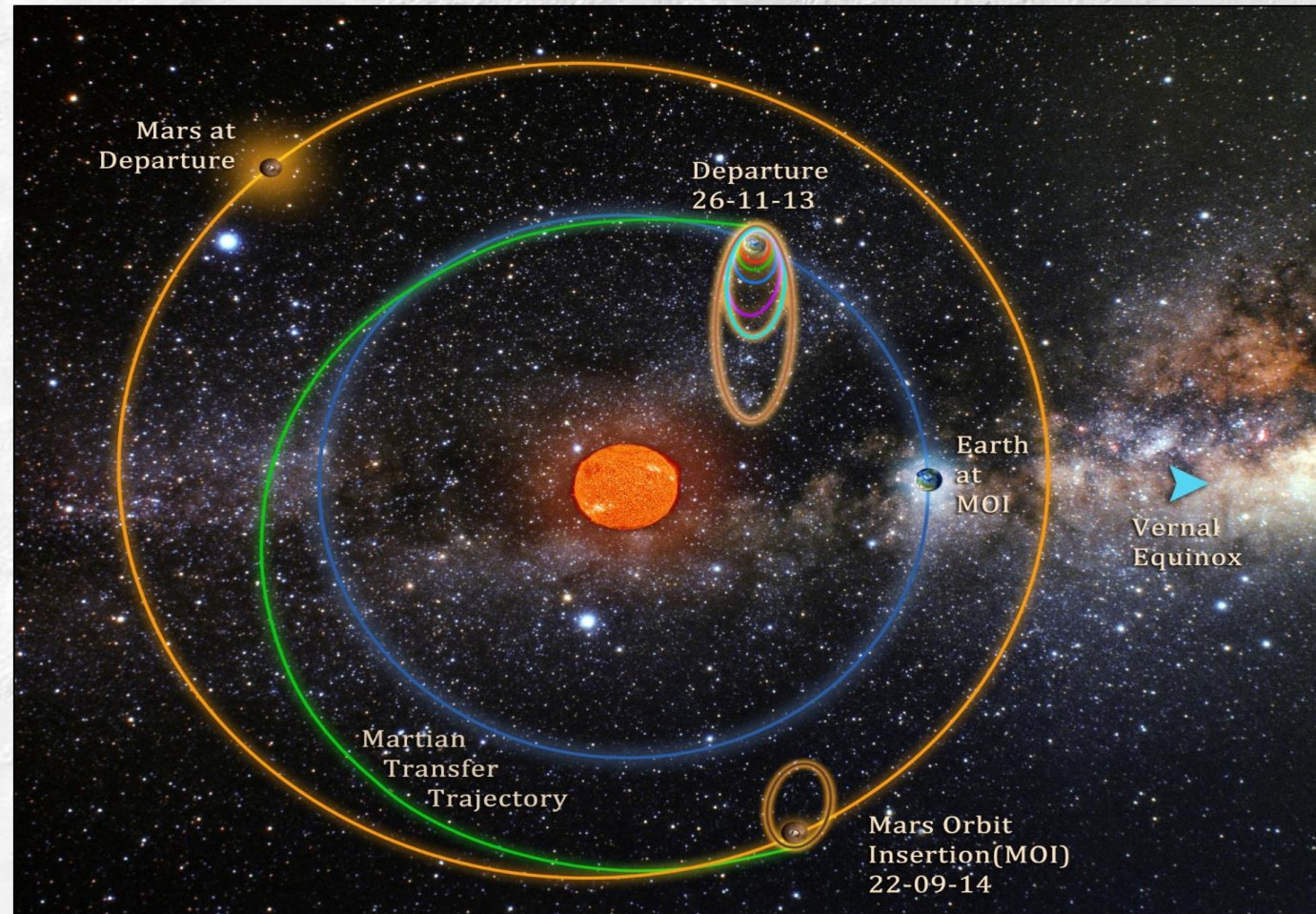
In his Technology Day lecture here this evening on "The Indian Space Odyssey," Kasturirangan said that India could easily launch a small satellite of about 275 kg in a "fly-by mission" to the moon or even place a 1,000-kg satellite in an orbit around the moon. The mission: to study the moon's core. A manned mission, however, is still far away.

Destination Moon, he said, could symbolise the next big challenge for ISRO which has satellite technology well under its belt.

Working out the mission's objectives and payload could take time and if all goes well, it could be a reality by 2013 - 14.

The launch vehicle "will not be the problem," he said. The cost will be estimated, he said, once the scientific details have been worked out and the government will be approached for funds, Kasturirangan said. According to ISRO's plan, the Indian way to go to the moon could be by injecting a satellite that has a lot of onboard fuel into a lunar transfer orbit and then using onboard rockets to nudge the satellite closer to the moon. Later, there could also be a moon landing.

Incremental effort from Moon to Mars

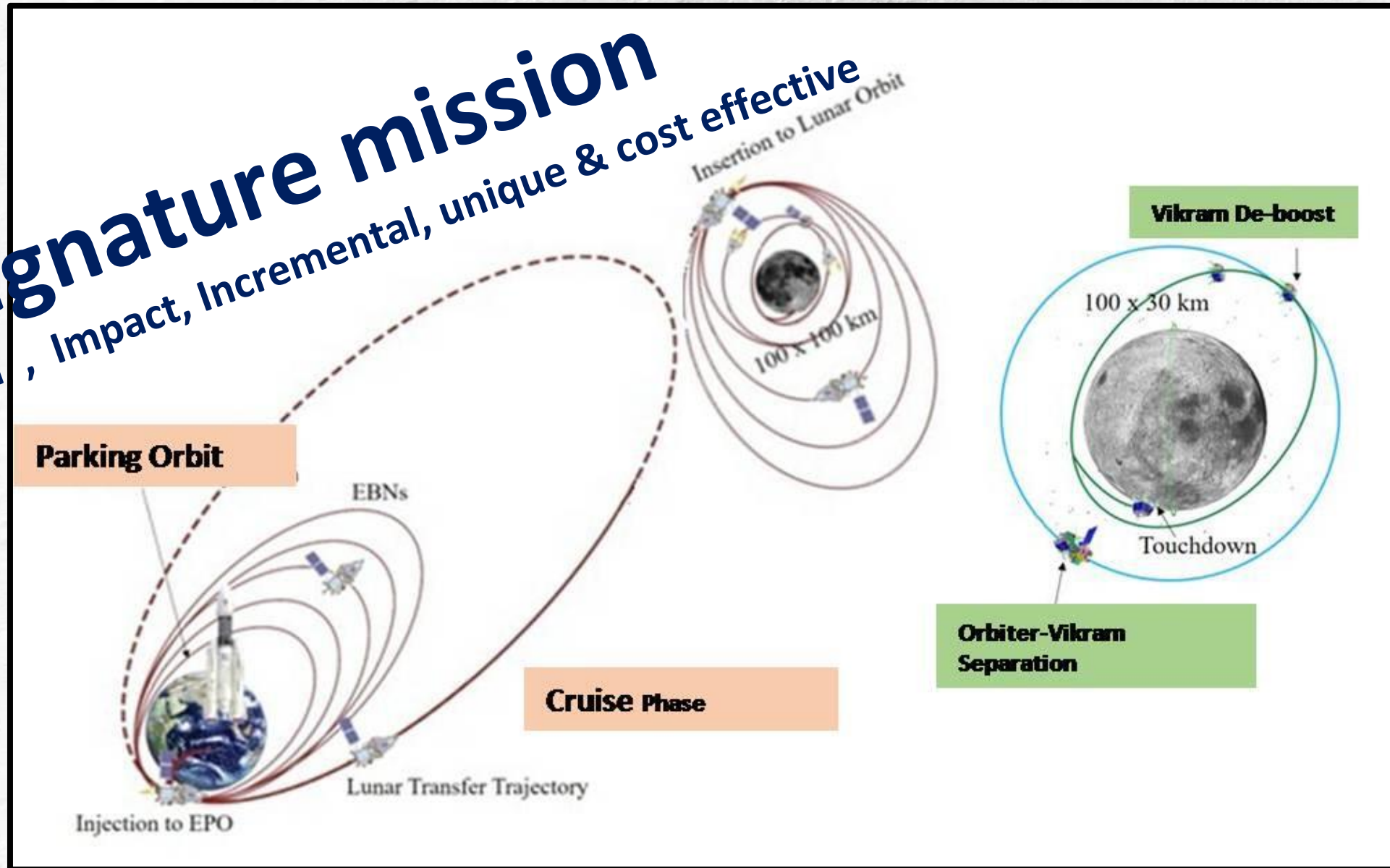


NUMBER OF LAUNCHES TO MOON	
Decade	
<u>1950s</u>	13
<u>1960s</u>	63
<u>1970s</u>	23
1980s, 90s, 2000	0
2010s	??
2020s	20

12

Chandrayaan 2: Mission Profile

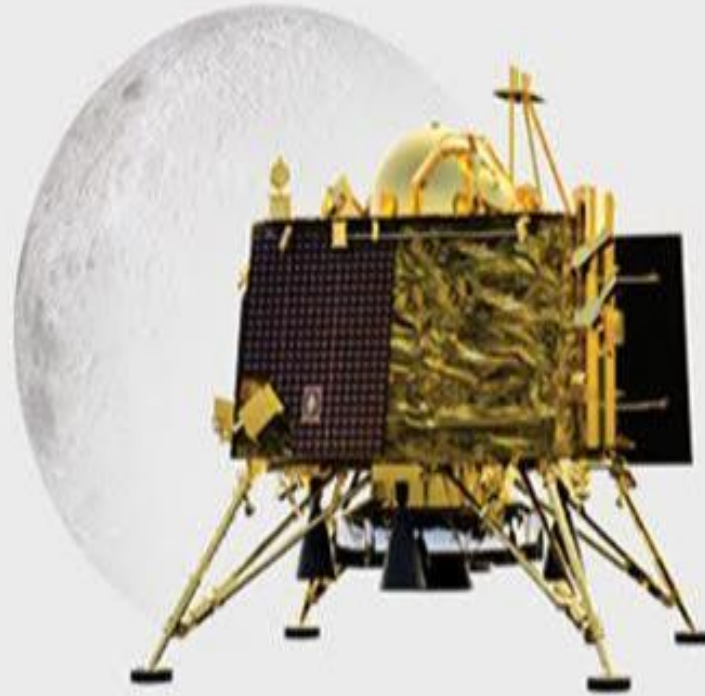
Signature mission
- Innovation, Impact, Incremental, unique & cost effective



Chandrayaan-3 : Learning from Ch-2 and Optimizing the Mission Configuration to save cost



Ch-2
Orbiter



Ch-3
Lander



Ch-3
Rover

Destination **SUN** is ISRO's next big thing

Signature mission
- Innovation, Impact, Incremental & cost effective

TODAY may have been the anniversary of Pokharan II but what caused more excitement in the scientific community was chairman K Kasturirangan's announcement that ISRO's Polar Satellite Launch Vehicle could undertake a mission to the moon. And a core team of scientists is being put together to work out the details.

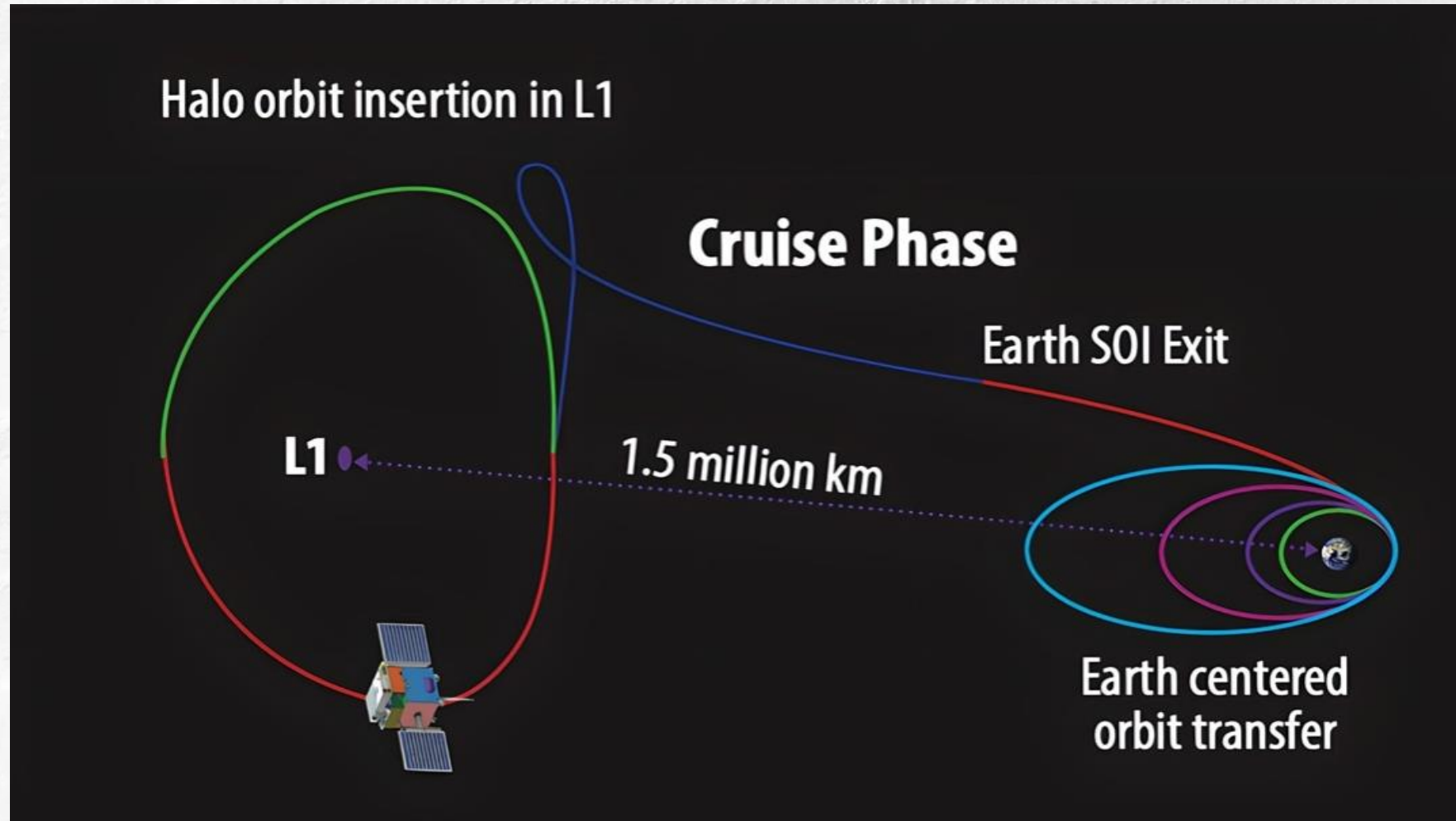
In his technology lecture here this evening on "The Indian Space Odyssey," Kasturirangan said that India could easily launch a small satellite of about 275 kg in a "fly-by mission" to the moon or even place a 40-kg satellite in an orbit around the moon. The mission: to study the moon's core. A manned mission, however, is still far away.

Destination Moon, he said, could symbolise the next big challenge for ISRO which has satellite technology well under its belt.

Working out the mission's objectives and payload could take time and if all goes well, it could be a reality by 2023 - 24

The launch vehicle "will not be the problem," he said. The cost will be estimated, he said, once the scientific details have been worked out and the government will be approached for funds, Kasturirangan said. According to ISRO's plan, the Indian way to go to the moon could be by injecting a satellite that has a lot of onboard fuel into a lunar transfer orbit and then using onboard rockets to nudge the satellite closer to the moon. Later, there could also be a moon landing.

Incremental effort from Moon , Mars to Sun



Signature mission

- Innovation , Impact, Space Diplomacy and Space Commerce



UNNATI (UNispace Nanosatellite Assembly & Training by ISRO)



Batch 1: Jan-March 2019



29 Participants from 17 Countries

Algeria, Argentina, Azerbaijan, Bhutan, Brazil, Chile, Egypt, Indonesia, Kazakhstan, Malaysia, Mexico, Mongolia, Morocco, Myanmar, Oman, Panama & Portugal

Batch 2: Oct-Dec 2019



30 Participants from 16 Countries

Bahrain, Bangladesh, Belarus, Bolivia, Brunei, Colombia, Kenya, Mauritius, Nepal, Nigeria, Peru, South Korea, Sri Lanka, Thailand, Tunisia & Vietnam

Batch 3: October 15 to December 15, 2022

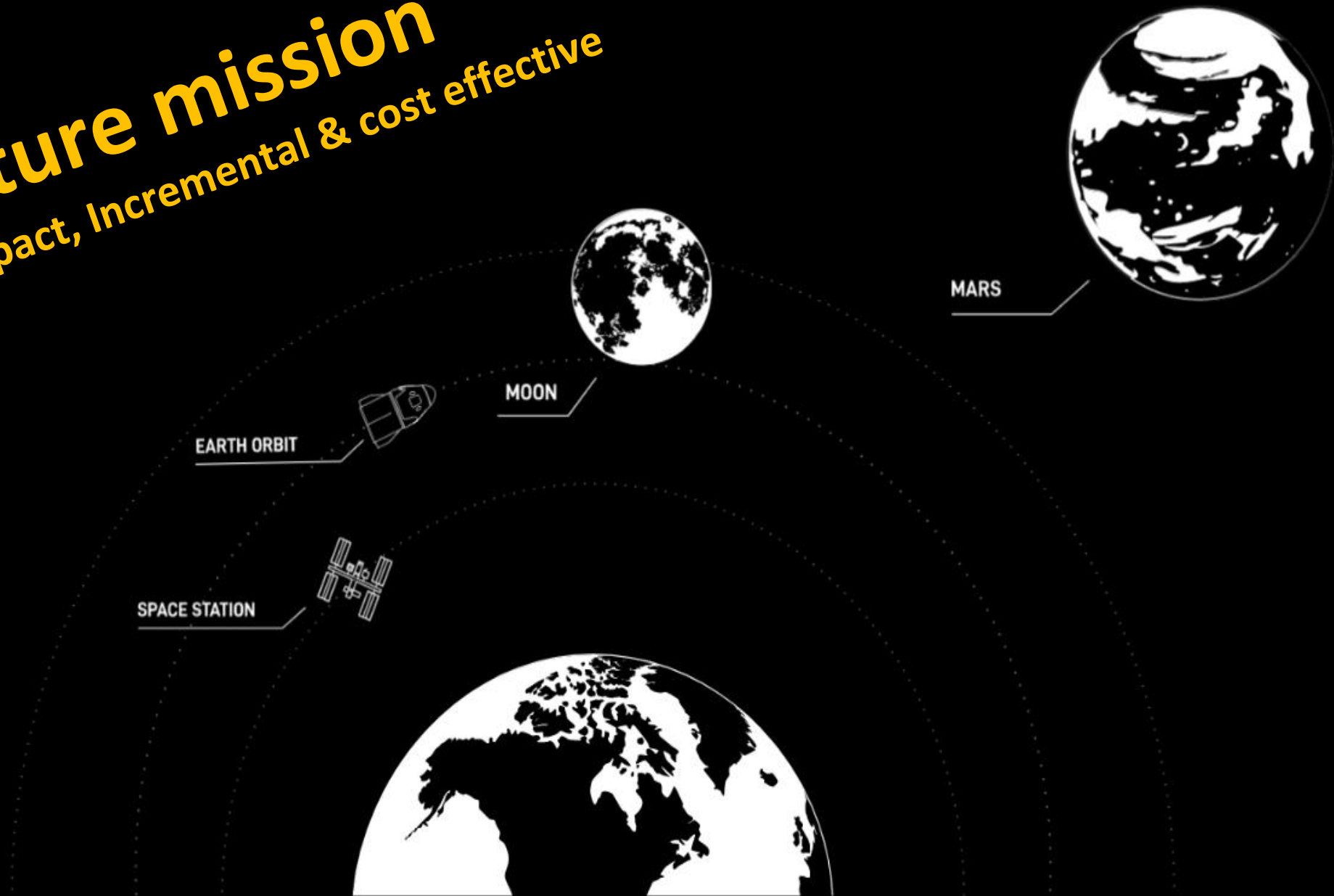


31 Participants from 19 countries.

Argentina, Armenia, Bhutan, Chile, Dominican Republic, Ecuador, El Salvador, Ethiopia, Fiji, Mexico, Nicaragua, Panama, Papua New Guinea, Philippines, Singapore, Slovakia, Sudan, UAE, and Uzbekistan

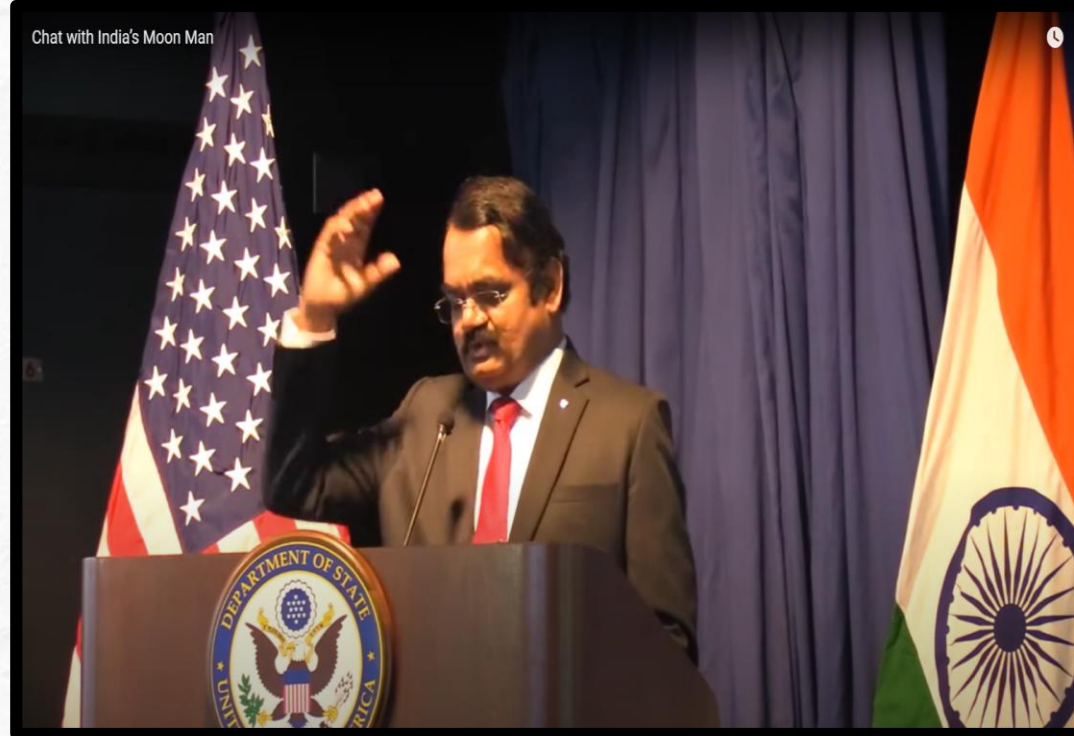
DESTINATIONS

Signature mission
- Innovation , Impact, Incremental & cost effective



50 years of Moon Landing

21 July 2019 @ US consulate



“It’s time for us to find Extended habitat(s) beyond earth.....”



2015-18
30 state of the art Satellites were launched



Other Opportunities & Challenges in Space

- More satellites
- Big Launch Vehicles
- Re-usable Launch vehicles
- Big and Powerful satellites : Natl Com & defense
- Small & Compact Satellites : Global Com and RS □ on demand launches
- Materials
- Spacecraft automation
- Manned Missions
- Space tourism
- Lunar and Martian Colonies
- Space Debris Management
- Threats from Outer Space
- UAVs / Drones : Technologies and applications

International
Co-operation

Thank You

