

PROJECT NETRA



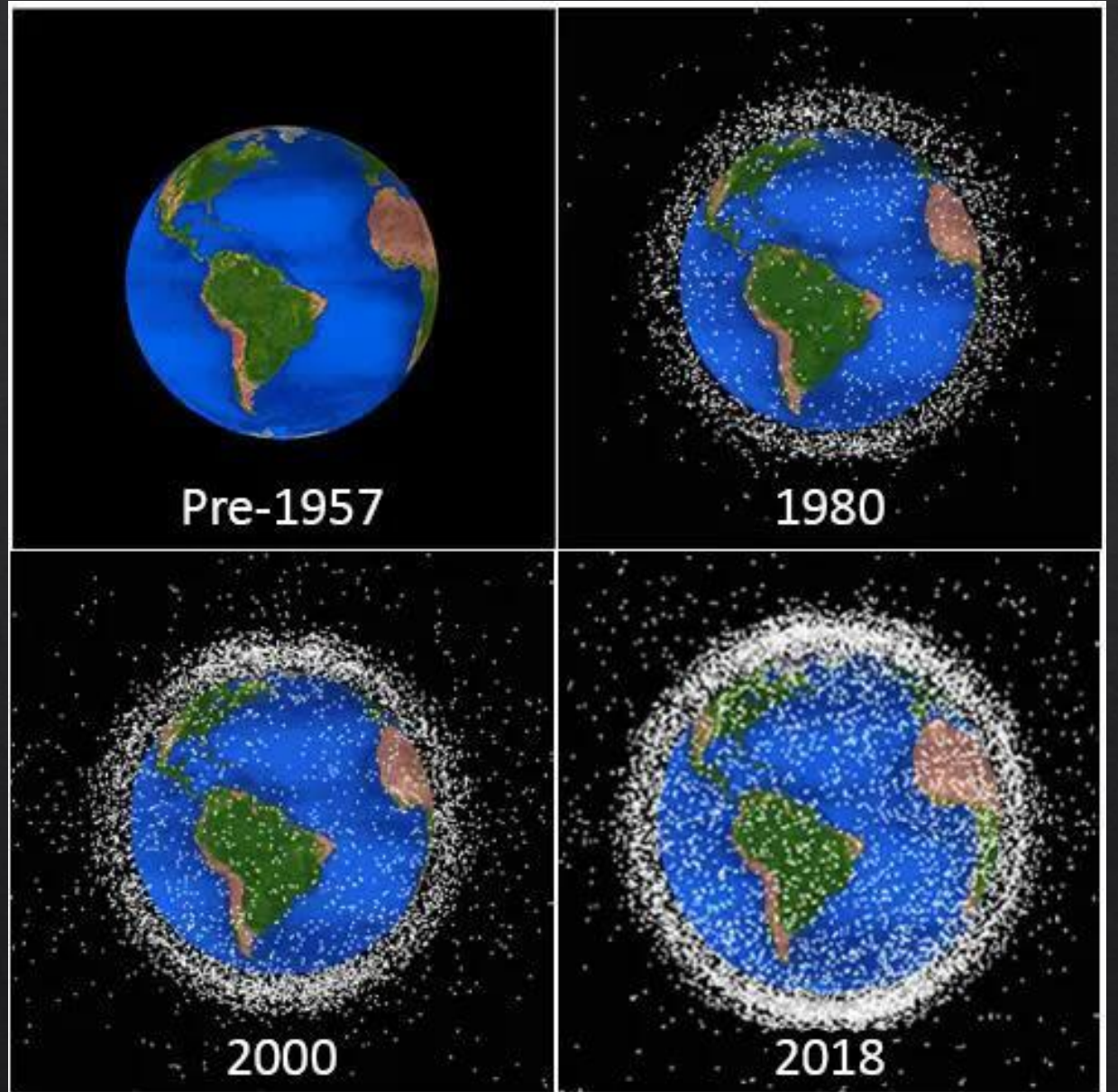


**THERE IS NO ELEVATOR TO
SUCCESS. YOU HAVE TO
TAKE THE STAIRS.**

With space junk posing an increasing threat to Indian assets in space, the Indian Space Research Organization (ISRO) is building up its orbital debris tracking capability.



❑ Space junk or debris consist of spent rocket stages, dead satellites, fragments of space objects and debris resulting from Anti-satellite (ASAT) System (ASAT).



❑ Hurling at an average speed of 27,000 kmph in Low Earth Orbit (LEO), these objects pose a very real threat as collisions involving even centimeter-sized fragments can be lethal to satellites.

❑ This free floating space debris is a potential hazard for operational satellites and colliding with them can leave the satellites dysfunctional.

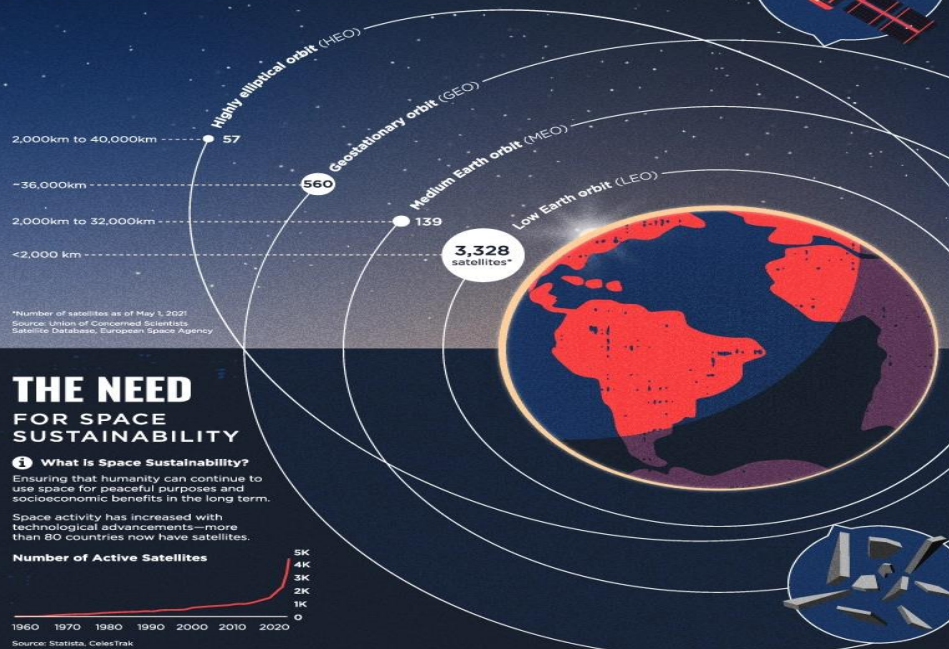
SPACE SUSTAINABILITY

PRESERVING THE USABILITY OF OUTER SPACE

HOW WE USE SPACE

SATELLITES AND THEIR ORBITS

Thousands of satellites orbit the Earth at different altitudes, enabling many of the technologies we use on a daily basis.



Space holds vast benefits to humanity that we leverage through satellites.

However, the orbits in which satellites travel constitute a limited natural resource because there is a finite amount of space becoming increasingly crowded with satellites and space junk.

Managing this resource for the future requires the world to look towards sustainable management of space through policy and technical capacity.

As of May 2021, there were 4,084 operational satellites in space, with several applications:

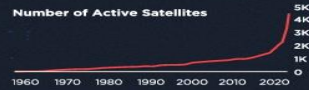
- Science and exploration
- Environmental monitoring
- Military surveillance
- Navigation
- Research and development
- Disaster management
- In-orbit satellite servicing
- Missile warning systems
- Satellite broadband

THE NEED FOR SPACE SUSTAINABILITY

1 What is Space Sustainability?

Ensuring that humanity can continue to use space for peaceful purposes and socioeconomic benefits in the long term.

Space activity has increased with technological advancements—more than 80 countries now have satellites.



3 CHALLENGES TO SPACE SUSTAINABILITY

1 SPACE JUNK

Space junk or orbital debris refers to defunct satellites, rocket bodies, and fragmented objects in space that no longer serve a useful purpose. There are millions of debris objects in space, traveling at high impact speeds.



8,800 metric tons ---- The mass of debris objects in space.
 29,000 km/h ----- Speed at which space junk can travel.

Increasing space debris poses a threat to active satellites and human spaceflight, especially as orbits get more crowded.

Source: European Space Agency, NASA

2 ORBITAL CROWDING

The space in Earth's orbits is limited. Satellite constellations—large networks of satellites that surround the Earth—are becoming more common.

Examples of Planned Satellite Constellations*



Physical crowding of orbits with satellites and debris can lead to a chain reaction, known as the **Kessler syndrome**.

Physical congestion and electromagnetic interference from orbital crowding has adverse effects on communication and security in space.

*as of August 10, 2021
 Source: NewSpace Index, Lynk Global

3 SPACE SECURITY

Militaries are developing capabilities to disrupt, degrade, or destroy satellites for national security reasons. Such actions could have unforeseen consequences for other actors in space.

Debris Generated by Anti-satellite (ASAT) Tests

Since 1959, China, India, Russia and the U.S. have carried out more than 70 tests collectively.



Besides the debris that is large enough to be tracked, deliberately destroying satellites can create thousands of objects too small to track.

Source: Secure World Foundation

SOLVING THE SPACE SUSTAINABILITY PROBLEM

As global reliance on satellite services and applications grows, the importance of policies, practices, and technologies to use space sustainably becomes more critical.



Space is critical for modern life and the technologies we use daily. Space sustainability is of key importance to maintaining these benefits for the future.

PRESENTED BY



Promoting Cooperative Solutions for Space Sustainability

- ❑ **'Project NETRA' is an early warning system in space to detect debris and other hazards to Indian satellites.**
- ❑ **Once operational, it will give India its own capability in Space Situational Awareness (SSA) like the other space powers.**



- ❑ **For protecting its space assets, the ISRO was forced to perform 19 Collision Avoidance Manoeuvres (CAM) in 2021.**

❑ MODUS OPERANDI:

Under NETRA, the ISRO plans to put up many observational facilities: connected radars, telescopes, data processing units and a control center.

BENEFITS:

- ❑ **NETRA can spot, track and catalogue objects as small as 10 cm, up to a range of 3,400 km and equal to a space orbit of around 2,000 km.**
- ❑ **The NETRA effort would make India a part of international efforts towards tracking, warning about and mitigating space debris.**
- ❑ **More importantly, the SSA also has a military quotient to it and adds a new ring to the country's overall security, against attacks from air, space or sea.**

CURRENCY SSA CAPABILITY:

- ❑ At present, India uses a Multi Object Tracking Radar at SrihariKota range (Andhra Pradesh), but it has a limited range.











Consider the following statements: (2016)

The Mangalyaan launched by ISRO

- 1) is also called the Mars Orbiter Mission**
- 2) made India the second country to have a spacecraft orbit the Mars after USA**
- 3) made India the only country to be successful in making its spacecraft orbit the Mars in its very first attempt.**

Which of the statements given above is/are correct?

- (a) 1 only**
- (b) 2 and 3 only**
- (c) 1 and 3 only**
- (d) 1, 2 and 3**



THANK YOU