

Over The Moon

ISRO is a case study of how to build a world-class government institution

FIFTY YEARS LATER, I vividly remember the grainy black-and-white television images of the giant gantries falling away like a spurned embrace as the giant Saturn V rocket lifted off, carrying three astronauts in a tiny cone on an audacious mission to the moon, 384,400 km away.

The July 20 anniversary of Neil Armstrong's giant leap for mankind from the ladder of the Eagle landing craft to the moon's surface in Tranquility Base has unleashed an avalanche of memories. But I turned the clock back another seven years, to September 12, 1962, to the thrilling speech in which President John F. Kennedy vowed that America would put a man on the moon within that decade, and set out a charter for exploration because there was "no strife, no prejudice, no national conflict in outer space". Towards the end, JFK said: "Many years ago, the great British explorer George Mallory, who was to die on Mount Everest, was asked why did he want to climb it. He said 'Because it is there'. Well, space is there. And we are going to climb it. And the moon and the planets are there."

In early 2018, a bold startup based in Bangalore nearly put a robotic rover on the moon in quest of a \$20 million prize. I wrote about Team Indus, but the project unravelled because of a last-minute funding gap.

India decided to go to space in 1962, the same year as Kennedy's Rice University speech, when Vikram Sarabhai was asked by Jawaharlal Nehru to head the Indian National Committee for Space Research, which metamorphosed into the Indian Space Research Organisation (ISRO) in 1969, the year of the moon landing.

Fittingly, the lander to be lofted by India's Chandrayaan-2 mission to the moon is named Vikram. The powerful Geosynchronous Launch Vehicle (GSLV) Mark III, with its cryogenic upper stage booster, was designed and built by ISRO and can place a four-tonne satellite in orbit 40,000 km above the Equator. It is also planned to carry three Indian astronauts into

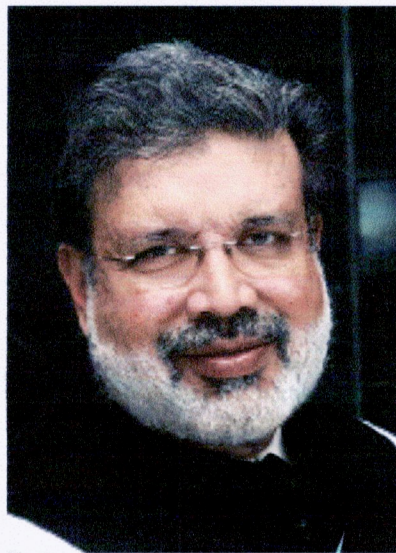
a low-earth orbit sometime in 2022 as part of the ambitious Gaganyaan programme. After its successful Mars mission Mangalyaan in 2013-14, ISRO has now set its sights on a flight to Venus in 2023.

Over the years, ISRO's scientists and engineers have won the world's respect for their successes in rocketry and satellite and remote-sensing technology. They have achieved this despite years of being blacklisted for technology exports by the United States after India's 1998 nuclear tests (the ban was

lifted in 2011). Their talent is entirely homegrown. The transponders on Indian communication satellites are in great demand. The ISRO has launched 239 satellites for 28 countries with its Polar Satellite Launch Vehicle, including 104 on a single rocket in February 2017. The cryogenic engine powering GSLV Mk III, developed by ISRO's Liquid Propulsion Systems Centre, is the envy of other space powers. These successes have spurred the government to set up a new commercial arm, New Space India Limited.

The ISRO's budget for 2019-20 is \$1.6 billion; NASA's is \$21.5 billion. Both space agencies have about the same number of employees: 17,000. What is the secret? Great leadership, considerable autonomy, and non-partisan government support. The same characteristics have brought us success in the nuclear arena. If only we could follow a similar path in all our institutions. **BW**

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