

# PM vows 1st Indian manned mission by '22, spurs Isro

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**New Delhi/Bengaluru:** Prime Minister Narendra Modi chose his Independence Day speech on Wednesday to give a Sputnik moment to Indian Space Research Organisation (Isro), vowing to put an Indian in space by 2022.

The PM's statement took Isro scientists by surprise, but it also spurred them to put on fast track the Human Spaceflight Programme (HSP) that has made slow progress from the drawing board since 2004. So far only the US, Russia and China have sent people to space using their own rockets.

"When India celebrates Independence Day in 2022, or maybe even before that if it's possible, an Indian son or daughter will undertake a manned mission aboard 'Gaganyaan'," Modi said.

Isro chairman K Sivan said it was a "very, very tight schedule", but achievable.

"It's pleasant news for us as it shows the PM's confidence in our capabilities. We won't let him down," he said.

The plan is to send two or three 'gagannauts' (Indian astronauts) to a low-earth orbit (more than 100km from earth) in a crew module that will orbit the earth. The gagannauts will carry out experiments in space, for three to seven days before the module re-enters the atmosphere and lands on sea after deploying parachutes. The Navy will help retrieve the crew module and the gagannauts. The mission is likely to cost up to Rs10,000 crore.

No final call on how many days it would be has been taken, but sources said it could be 3-7 days. "The astronauts will carry out some experiments. However, at this stage we aren't sure what those would be. We are yet to prepare a project report. After that we will make an announcement of opportunity through which we'll source ideas for this," Sivan said.

## Developing systems

After the UPA government sanctioned Rs 145 crore for pre-launch activities, Isro had developed several critical technologies for the project. While none of these systems is mission ready, some are at a nascent stage. Critical technologies needed for HSP include a crew module (CM), crew escape system (CES) and environmental control and life support system (ECLSS). An advanced version of the GSLV-MkIII is

designated as the launch vehicle. Isro had flight-tested an earlier version of the crew module in December 2014, followed by a test of the crew escape system in an emergency pad abort test at the Sriharikota base on July 5.

Former Isro chairman K Kasturirangan said 2022 as a target was achievable with the right strategy. "One crucial aspect would be achieving the right angle of re-entry (into the earth's atmosphere) and the right kind of pro-

tection from friction. GSLV-MkIII will need changes. Isro is working on all these things," said Kasturirangan, who is an advisor to Isro.

A senior scientist said work is in progress on systems to maintain the right temperature and humidity inside the crew module, and remove carbon dioxide and odour from it. "These systems have been integrated into the 'cabin environment simulation chamber,'" he said. "Tests on crew cabin volume are on."

## Testing the launcher

GSLV-MkIII, the chosen vehicle for the manned mission, has had only one flight so far. "The next flight will be next month," said Sivan. "We are confident of having 10 to 15 flights before the manned mission." Directorate General of Civil Aviation (DGCA) will have to certify the launcher as 'man-rated'.

Among other challenges will be keeping gagannauts safe from complications ar-

ising out of G-force during acceleration. Sivan said Isro will launch two unmanned missions of the vehicle in the next two years before moving to manned mission.

Isro will prepare a detailed project report and put together the project team. Sivan said it would be a national project, with Isro partnering with several agencies and industries. "This will create at least 15,000 jobs," he said.

## It could be a woman

The process to select the gagannauts is yet to begin. Scientists at Isro said that they would be shortlisted from the Indian Air Force.

"As the PM said, there could even be a woman gagannaut," said Sivan. "We will be glad to train and send a woman to space."

Institute of Aerospace Medicine (IAM), Bengaluru, will be involved in training the gagannaut recruits. Isro is also looking at foreign collaboration for this.