

Innovation in India: deciphering environmental, socio-economic and technical issues

1st AVRIST Webinar on Wednesday January 20th 2021

Roundtable on Space research and industries:

chaired by Pierre-Bruno RUFFINI (University of Le Havre- Normandie and AVRIST).

Panellists: A. ARUNACHALAM (Executive director of NewSpace India Ltd), Narayan PRASAD (Chief operation officer of Satsearch, Kerala), Isabelle SOURBES-VERGER (Geographer, historian and technologist, CNRS), Mathieu WEISS (Managing director, CNES Representative, Bangalore).

Narayan Prasad, from Bangalore in a space station decor, gives a presentation of the new space ecosystem in India, since the 70s: the supply chain is composed now of 500 suppliers who are working on space activities, with a core of 200 and Satsearch is the global market place for space.

Space is risky and expensive, the risks are mostly taken by government (ISRO) that develops the industrial policy. Industries support activities by helping in manufacturing.

Today the new space India industries want to build launchers, satellites and applications. Start-ups and industrial companies aim to provide an offer to the market demands both in India and internationally (end to end solutions and integrated services). India is small in comparison of USA and Europe but grows quickly in B to B. In the last 10 years more than 20 space tech start-ups were created, 10 of which have received funding from investors; as an example, Team Industry was founded in 2010 and supported by 5 investors with a contribution of 18M\$.

For the next future, the recommendations are: build initiatives for G2G cooperation, invite people from other fields of expertise (economist, social scientist...) to take part in the space related areas, build a memorial history of the people involved (e.g. Prof Sarabhai and Blamont) since the beginning, evaluate the impact of space on the Indian economy (productivity, detection and reserves, asset construction tax, job creation in supply chain...), organise a space users community.

If you have New space India on your favorite Apps, you can learn more. See also the link to the episodes of the NSI podcast <https://newspaceindia.transistor.fm/episodes>

Arunachalam, gives a description of the Indian space programme and its dimension.

The vision of the Indian Space Programme is to Harness space technology for national development, while pursuing space science research and planetary exploration. The major dimensions of Indian pace program are:

- Space Transportation (launchers),
- Space Infrastructure (Satellites for observation, communication, navigation),
- Space Applications (Socio-economic security, sustainable development, disaster management support, and Developmental Governance),
- Capacity building (human resources, indigenization, cooperation, academia and industries).

India has realised about 192 missions (76 launches, 111 satellites, 5 experimental missions) and launched more than 300 customer satellites on-board PSLV. 3 launchers are in operation (PSLV, GSLV, GSLV Mk3). More than 300 Transponders operating in C, Ext-C, Ku and Ka Band provide services for Satellite Communication applications. The Indian regional navigation system is composed of 7 satellites and provides a position accuracy of 5 meters for aviation and others.

Remote sensing has a lot of applications in agriculture, water resources, Bio-resources and Environment, oceanography, high resolution mapping, Urban planning and rural development besides providing crucial space based inputs for Disaster Management and Climate Change studies climate change. The presentation also underlines earlier cooperation between CNES and ISRO while realising Meghatropiques and SARAL satellite missions.

Isabelle Soubès Verger underlines that India is Member of the selected Space Club since 1960. The annual space budget is around 1,500M\$ (like Japan), 2 % of the satellites in operation are Indian and 19 launches have been realized in 2018. India have conducted a planet Mars mission in 2013/2014.

Today space priorities are technology development and indigenization. India is in a good position in the field of the small satellites, including the launch.

The new challenges are defence, manned flights, AI, commerce and private industries.

Mathieu Weiss recalls that ISRO is since 2015, behind the American NASA, the 2nd cooperative partner of the CNES in the world. Innovation and stimulation are important trends in India. The French Indian space cooperation is approved

at the Prime minister's level, and since the 1963 agreement, has been pursued without interruption. This continuity provides a deep natural link between CNES and ISRO. Two French Indian satellites on climate survey are in operation and provide informations for food crops and water management.

Ocean meteorology and marine survey are also a common objective in the context of the Space Climate Observatory. In this area a lot of programs are in operation, like Saral-Altika since 2013 and Argos 3, and in development, like:

-in 2021, Oceansat 3 Argos 4: an element of the global system Argos is in the Indian ocean ;

- for 2025, Trishna 3: infrared observer for temperature.

Maritime satellites contribute also to the survey (security and defence).

In 2019, India has create a dedicated Defence space agency.

The CNES will take also, with the Viral instrument, a participation in the Venus Indian mission (2025) and is involved in the manned space Gaganyaan 2022 program.

With the "make in India" policy, in 2020 India decided to involved private actors in the space challenge with objective to build 70 application satellites in 5 years. Electronic industries are potential main suppliers for space and the Indian solutions are a model of frugality and efficiency.

CNES and ISRO facilitate the development of partnerships between SMEs of the 2 country involved in space industry.

Indian flights and satellites are very competitive with an excellent capacity; this provides good opportunities; cooperative actions and business projects are particularly attractive.

Rédacteur : Serge Gregory