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## Need for space governance for India and global space governance

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## 1. Why state policy

Global space economy consisting of activities of governments and private companies grew to \$314 billion in 2013. Private-sector commercial space activity is now growing at a faster pace, while governmental activity is slowing down. Between 2012 and 2013, commercial space products and services revenue grew 7%; commercial infrastructure and support industries grew by nearly 5%; while government spending decreased by almost 2%. Space investment is a major part of the infrastructure of communications—both telecommunications and broadcast—of weather and geological monitoring, and defense. Thus, commercial development of outer space is outpacing governmental activities in space. As private firms launch commercial space activities, the legal obligations and liability of space-faring states proliferate as well.

With the growth of number of states in space activities, many nations have enacted their own space legislations. Many are enacting national space legislation, establishing governmental space regulatory institutions and giving them jurisdiction to license private sectors and ensure compliance with regulatory requirements. In order to fulfill their international obligations based on space treaties ratified by them and to protect the citizens from harm, to protect their treasuries from liability, and to encourage and foster the development of commercial space activities, many states have their own rules and regulations on space issues generally harmonious with international treaties. This can be interpreted as filling a void in absence of an international regulatory regime addressing safety and navigation of aerospace vehicles. Though a number of commentators (including the present one) have urged the International Civil Aviation Organization [ICAO] [1] to regulate the safety and navigation of aerospace vehicles, to date, this has not been done. Moreover, the world community has failed to draft a single multilateral treaty addressing space issues since 1979. ICAO and UNOOSA held for the first time a joint meeting in 2015 at the ICAO headquarters in Montreal to consider the issues of management of aerospace. This was the first step toward getting ICAO

involved in issues of aerospace travel. There is a need for framing of standard and recommended practices (SARPs) like ICAO is doing for aviation.

Five multilateral conventions, drafted in a dozen years, place numerous obligations upon states. Further, space law consists of a growing number of international multilateral and bilateral agreements and conventions, U.N. resolutions, decrees by international organizations, national legislation and regulations, and court decisions. These require states to adhere to principles of international law, assume responsibility and liability for activities in space (whether governmental or non-governmental), authorize and supervise the activities of their nationals in space, and notify and register their space objects. Among requirements imposed by the Outer Space Treaty of 1967 are the following:

- States must carry on space activities in accordance with principles of international law;
- States bear international responsibility for national activities in space and on the moon and celestial bodies, including activities of both governmental and non-governmental entities;
- States must authorize and supervise the activities of its nationals in space;
- States that (a) launch, (b) procure the launch, or (c) from whose territory or facility an object is launched, are internationally liable for damage to another or its national or juridical persons by such object in the air or in space;
- States on whose registry an object is launched must retain jurisdiction and control over the object and any personnel thereon;
- States must avoid harmful contamination and adverse environmental consequences from the introduction of extraterrestrial matter; if it believes an activity or experiment by it or its nationals in space would potentially harm or interfere with activities of other states in space, it must consult with such states before proceeding; and
- States must inform the UN Secretary General of the “nature, conduct, locations and results” of its activities in space.

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Several of these provisions also are elaborated upon by the Liability Convention of 1972. Building on Article VII of the Outer Space Treaty, the Liability Convention imposes liability upon a launching state (i.e., the state that launches, procures the launch, or from whose territory or facility a space object is launched) to pay compensation for personal injury and property damage

caused by its space objects on the surface of the Earth, or to aircraft. The convention establishes a two-tier liability regime, providing that the “launching state” is absolutely liable for damage caused by its space objects on the surface of the Earth or to an aircraft in flight, and liable in negligence for damage caused to a space object of another state or to persons or property on board. Where there is more than one launching state, they shall be jointly and severally liable for the damage they cause. Hence, by ratifying or acceding to either the Outer Space Treaty of 1967, or the Liability Convention of 1972, the launching or launch-procuring state becomes potentially liable for damages caused by itself and its commercial launch sector. A ratifying state accepts absolute liability for damage on the ground or to aircraft in flight outside its territory when a launch takes place from its territory or facilities, or when it procures a launch from another state. A state incurs fault-based liability for damage caused in outer space. In addition to these multilateral conventions, additional legal obligations are imposed upon states through customary international law, an array of United Nations Security Council and General Assembly Resolutions, and a growing body of “soft law.”

Further, the role of ICAO is to harmonize state regulation of aircraft safety and navigation in—may apply to vehicles transporting space objects through air space. But to date, ICAO has promulgated no Standards and recommended practices governing aerospace vehicles or rockets, though in time, it may.

Considering the gap created by international treaties on space without proper international space legislation as done by ICAO for air, the international obligations and the liability exposure created thereby, as well as a desire to protect the health and safety of their citizens, their property and the environment, a growing number of states have promulgated national legislation to regulate commercial space activities. As one source notes, “Since a government can only act on the basis of laws or respective regulations, the establishment of national space laws is the most effective way of providing the state with the means to authorize and supervise non-governmental space activities.” At least twenty-six states—about 14% of the members of the United Nations—regulate space activities. Among the states that have enacted national space legislation are Algeria, Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, the People’s Republic of China [PRC], Colombia, France, Germany, Italy, Japan, Kazakhstan, Netherlands, Nigeria, Norway, Russian Federation, South Africa, the Republic of Korea [South Korea], Spain, Sweden, Ukraine, United Kingdom, United States, and Venezuela. Hong Kong also regulates space activities.

The United Nations Committee on the Peaceful Use of Outer Space [COPUOS] recommends that, “Space activities should require authorization by a competent national authority; the authorities and procedures, as well as the conditions for granting, modifying, suspending and revoking the authorization should be set out clearly to establish a predictable and reliable regulatory framework.

The conditions for authorization should be consistent with the international obligations and commitments of States, in particular under the United Nations treaties on outer space” Governmental oversight of space activities is essential to protect public safety, property, and the environment, and to fulfill state obligations under international law. Licensing becomes the bedrock of governmental regulation of commercial space activities.

## 2. India: background to space activities

India established Indian Space Research Organization (ISRO) in 1969. With self-reliance as a goal, the space program was based on the premise of ‘end to end’ system concept. This premise enabled the Indian Space Program to overcome numerous hurdles and challenges in leaning and experimenting with new technologies [2].

The Indian Space Program was started not by addressing India’s military requirement but rather developmental needs. Satellite based instructional television was the beginning. The first was the Satellite Instructional Television Experiment (SITE) with telecommunication satellites. By 1970 s, India had procured its own communication satellite ‘Aryabhata’, a 360 kg satellite named after an Indian astronomer. It was launched by Russian launch vehicle. India by then decided to have its indigenously designed space worthy satellite, conduct a series of complex operations in space, set up ground based receiving, transmitting and tracking stations, and also establish an infrastructure for fabrication of spacecraft systems.

The second phase of grand plan for indigenous ‘end to end’ system for development and manufacture started with satellite Aryabhata, led to Bhaskara series—India’s first experimental geostationary satellite. Thereafter came the development of Launch Vehicles such as SLV-3 and ASLV. By the late 1970s, India had already built a considerable infrastructure of laboratories and facilities and also initiated a 3-pronged program—INSAT (Indian National Satellite) program for communication satellites; IRS (Indian Remote Sensing Satellite) for remote sensing; and launch vehicle programs for launching of Polar and Geo-synchronous satellites.

In the third phase starting in the year 2000, India had achieved the basic technological maturity required for developing a space system. However, India also announced around this time its augmentation satellite to compliment GPS in GNSS and further announced seven satellite based Indian Regional Navigation System known as IRNSS. This mini-constellation would be operational by the end of April 2016. It also started planning for an unmanned mission to Moon with Chandrayaan I, which was successful in 2008–09. It is now planning to go in for reusable launch vehicle.

Later in 2011, ISRO took upon a new challenge of a foray to Mars in 2013. The Mars Orbiter Mission (MOM) was successfully launched in November 2013 and has already completed more than 90% of its traverse to Mars. MOM has entered mars orbit and has started its experiments of imaging and measurements. But more significantly, MOM would establish the fact that India can successfully undertake long-duration planetary missions and has gained tremendous experience in this regard.

So far, the achievements of Indian space policies have been mainly due to government funding with ISRO as its implementer. The achievements can be summed up as:

- A full space infrastructure has been built up over half a century.
- Approval for 200 missions has been accorded by Indian government but 125 missions have been accomplished—out of which 111 missions have been successful.
- Leading satellite capability that covers a wide variety of applications satellites. These can be grouped in five categories:
  - i) Satellite communications,
  - ii) Broadcasting satellites,
  - iii) Remote sensing (Earth observation),
  - iv) Location and timing satellites,
  - v) Metrological satellites.
- Use of INSAT communications systems have resulted in the wide outreach of TV signals (from early 1980s onward) to almost whole of the country. In addition, growth of

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