



Space Alert

Volume VI, Issue 1 – January 2018

ORF Quarterly on Space Affairs

CONTENTS

COMMENTARIES

India's Space Activities Bill – A Good Start but Needs to get Better

By Narayan Prasad

The Act needs to consider breaking down the activities within the space and space-based ground activities to frame clear laws for the conduct of business, international obligations, national security concerns, protection of IP.

A Review of The Space Activities Bill, 2017

By Ashok G.V.

The bill, to achieve its stated objectives, must however introduce clarity on the qualifying criterion for securing a license, policy framework for access to government facilities, technology transfer guarantees, buy back guarantees for Indian businesses and startups and a more rational approach to penalising offences involving space activities and Intellectual Property ownership.

American Space Commerce Free Enterprise Act: A Look between the Lines

By Daniel Porras

A close look at the Free Enterprise Act shows that the US Congress is putting a great deal of faith in commercial actors, treating space activities very much as “business as usual”. Whether this is the best approach for all States may or may not matter if the new regime works for the US.

FROM THE MEDIA

- 39 successes later, PSLV launch fails
- India natural partner of US in space technology: Congresswoman
- L&T, Godrej, HAL, Isro to sign pact to build PSLV rockets
- ISRO plans to scale up outsourcing, double satellite launches
- Wi-Fi in India skies soon: TRAI to issue rules in 15 days
- ISRO developing a compact launcher for small satellites
- China launches VRSS-2 remote sensing satellite for Venezuela
- UAE Space Agency signs MoU with Luxembourg
- Voyager 1 Just Fired Up its Backup Thrusters for the 1st Time in 37 Years
- STRATCOM chief Hyten: ‘I will not support buying big satellites that make juicy targets’

OPINIONS AND ANALYSES

NEW PUBLICATIONS

EDITORIAL BOARD

Editor: Dr. Rajeswari Pillai Rajagopalan

Associate Editor: Vidya Sagar Reddy

India's Space Activities Bill – A Good Start but Needs to get Better

Narayan Prasad

The Department of Space (DoS), Government of India, recently put out a draft Space Activities Bill to essentially regulate the commercial space activities in India. The rationale for a national space legislation set out in the draft of the bill is providing support for the overall growth of the space activities in India and encouraging the enhanced participation of non-governmental/private sector agencies in space activities, in compliance with the country's international treaty obligations.

While the initial reaction from the Small and Medium Scale Enterprises (SMEs) working on the Indian Space Research Organisation's (ISRO) programmes have naturally appreciated the effort towards creating a framework to regulate commercial space activities in the country, a detailed reading of the draft shows that this may be only a preliminary foundation for laying much necessary detailing needed for it provides a holistic support to commercial investment and growth.

The Act has not specified any specific Department or body within the Government of India to take ownership of regulating space activities. Today, some of the activities such as satellite-based communications need inter-Ministerial as well as inter-Departmental inputs today. For example, the Wireless Planning Commission of the Department of Telecommunications plays a vital role in the assignment of frequencies for space-based communications. Therefore, a nodal agency that has involvement of other Government of India Ministries/Department that are stakeholders in the space activity will ensure

'ease of doing business' and can enable single-window clearances in licensing, promote better conditions for Foreign Direct Investment (FDI), provide regulatory transparency among others.

The nodal body can also take up the onus on providing support frameworks for export of space products/services related matters, frame rules specific to authorisation, govern insurance/liability in accordance to international obligations in critical activities. The nodal agency can also act in providing regulatory support in the downstream ecosystem with taking up the governance of remote sensing data which today has not kept pace with international standards. Therefore, having an independent nodal agency will ultimately impact entrepreneurial activity and will make or break the stimulation and catalysis needed to enable a space-based digital economy in the country.

The term 'space activity' as presented in the draft Bill seems to be vague, giving room to several interpretations. The value chain of space activities is quite complex starting from manufacturing, services, upstream development (conception to AIT to operations) to downstream utilisation of products of remote sensing, navigation, communication satellites. Therefore, each category has unique characteristics that need regulation specifically tailored to their goals within the value chain to encourage transparency. Grouping all activities within one large Bill may not provide justice to all the different roles performed by commercial space businesses in different parts of the value chain.

From an implementation perspective, it makes more sense to break down the Act into multiple sections that will address specific parts of the value chain. Division of the

upstream and downstream and further breakdown to the activities within upstream and downstream will allow legislators to provide a solid foundation to products/services developed by the non-governmental and private sector within the value chain.

For example, the upstream activity can be broken down in development and manufacturing of satellites, rockets and services rendered to enable getting space objects up into orbit. Similarly, the downstream can be broken down into development and manufacture of ground segment, receivers, ground equipment and services include broadcasting, VSAT, imagery/GIS, navigational products/services, voice/data services. There are new services that are today emerging internationally such as satellite-based broadband, satellite-based IoT, satellite-based blockchain services.

One of the other critical aspects of Bill is the licensing of businesses to perform space activities. It is important to note that the legal framework needed for operation for each of these activities are very different from each other. Some of the activities such as development and manufacturing of launch vehicle and other such critical export-controlled items under SCOMET, need to have an enhanced legal framework to meet international obligations of non-proliferation. Similarly, there are legitimate national security concerns of downstream products such as images and communications.

Using a blanket cover within the Act to use abstract licensing procedures to address upstream activities and downstream does not make business sense. Instead, breaking down the Act into specific activities will allow to frame business rules and need for address international obligations, national security, environmental, health/safety, etc., in an

alignment to the activity within the value chain.

Space is a tremendously difficult sector to do business in with barriers to entry being quite high in some activities in both requirements of capital as well as requirements in IP. Inserting blanket licensing requirements at the beginning of the tunnel for start-ups/SMEs will make it harder to even start their product/service development. Therefore, licensing may be placed as a requirement just before the release of the product/service into the market or export of it. This will ensure that start-ups can focus on getting their product/service ready and not worry about licensing requirements to start developing any preliminary IP on their product/service.

From dealing with liabilities perspective, the Act uses a vague blanket cover against liabilities that is to be passed to the actors. There is a very real necessity of dealing with liability. Liabilities are very different for upstream activities such as spacecraft operations, launch/in-orbit operations against the use of space-based products/services on.

There are several established models for covering liability in international practices according to the kind of activity within the value chain (upstream/downstream) which can be employed and adjusted that resonates to the local Indian ecosystem. Using a blanket cover without any details on the ceiling for activities will make it extremely difficult for both the entrepreneurs as well as insurance providers to conduct any business. Therefore, the Act should consider aligning towards international best practices in dealing with liabilities.

The Act needs to consider breaking down the activities within the space and space-based ground activities to frame clear laws for the conduct of business, international obligations,

national security concerns, protection of IP. It does not do justice to the entrepreneurial community if implemented as is. One of the exercises that can be conducted to align the Act to enable competitive ecosystem building for commercial space in India is to conduct a review of international best practices in managing the space value chain and inducting them within the Act.

Narayan Prasad is Co-founder of Dhruva Space, a NewSpace company based out of Bangalore and also the Co-founder of ReBeam, a wireless energy technology startup based out of Mountain View, California. He can be reached @cosmosguru

(Back to Contents)

A Review of The Space Activities Bill, 2017

Ashok G.V.

India's place among the space faring nations of the world is now beyond question. With its track record of innovation and cost effective technology, ISRO has removed barriers for imagination in the world of space technology and forged a path which will undoubtedly make space more accessible for humanity.

To lend further strength and encouragement to the Indian space program, the Space Activities Bill of 2017 seeks to make the Indian space program more inclusive for the private sector, not only with the intention of encouraging a commercial space economy but to leverage the talent, skill set and imagination available in the private sector to compliment ISRO's own prowess in this domain.

Context and Background

A national space legislation has inherent challenges associated with its conception and enactment. To begin with, the concept of territorial borders so inherent to sovereignty and its exercise, i.e., legislation, doesn't exist in space. Therefore traditional domestic and international jurisprudence cannot effectively answer or even regulate key areas of concern for a space law such as jurisdiction. To expect one portion of a tiny planet called Earth to regulate activities for the infinite and unknown realm called space, would not only be overstating humanity's significance in the universe but would also then erroneously assume that domestic space law can be perfect.

It is for this reason that concepts like asteroid mining or colonisation of celestial objects remain contentious issues, with the

international community deeply divided in their understanding of international space law on these nascent industries and activities.

Thus, the Space Activities Bill, 2017, regardless of its perception by the larger body of stakeholders, is per se, the product of an extraordinary and significant effort; for like any other domestic space law, it seeks to balance the following seemingly competing objectives,

1. Ensuring compliance of international obligations.
2. Securing India's national interests and security.
3. Enabling commerce for the private sector

As we will see, balancing these three objectives is not an easy job and entails no easy solutions. However, we believe that this is the first step towards a long journey which India will have to walk along with other space faring nations, towards a policy that best advances mankind's aspirations for space. For the sake of brevity, in this article, I will not examine or state what is already covered in the bill but instead focus on the areas that I think will emerge as yet unaddressed in the bill as it stands in its present form.

Compliance of International Obligations

ISRO has a near perfect track record of complying with international obligations around non weaponization of outer space, peaceful use of space for the benefit of all mankind, liability obligations and avoidance of space debris. Though representing a country with significant military strength, the activities of ISRO have always been characterised by a reverence for international jurisprudence and a genuine appreciation that eventually space will be the antidote to mankind's propensity for

conflict and its failure to remain a united community. The Space Activities Bill, 2017 reflects this rich tradition.

However, where the space bill fails is that its inception lacks the perspective of international investment law. The flow and direction of flow of Foreign Direct Investment are dependent on national and international policy environment. In the context of investments into India from foreign sources, it is important to remember that law or policy affects predictability of investment transaction. Max Weber, a German Scholar identified three conditions which a law will have to satisfy in order to help investors predict how national policy will affect their investments, namely,

- 1) Legal text must lend itself to prediction,
- 2) The administration and application of the legal text must not be arbitrary and,
- 3) Contracts must be enforced.

In terms of India's own approach to Satcom, space law and licensing transactions between government and state, our policy and execution has neither been predictable nor have we been able to demonstrate in a satisfactory manner that our approach is non arbitrary and fair. Bilateral Investment Treaties that mandate, among other things, non arbitrary treatment to international investments have in the recent past, led to liability for India in International Arbitration Forums.

In CC Devas (Mauritius) Ltd. & Anr. V. The Republic of India, PCA Case No. 2013-09, the Arbitral Tribunal had concluded that the actions of India in cancelling the license awarded to Devas constituted a violation of the fair and equitable clause of the India-Mauritius Bilateral Investment Treaty of 1998. Following the Hon'ble Supreme Court of

India's decision in the 2G spectrum case, which resulted in cancellation of licenses for 2G spectrum, Khaitan Holdings Mauritius Limited initiated arbitration proceedings against India for violation of India-Mauritius Bilateral Investment Treaty of 1998. Attempts to levy tax retrospectively under the Income Tax Act on transactions of Vodafone, which ultimately failed before the Hon'ble Supreme Court, have also led to allegations of Bilateral Investment Treaty violations.

In all these cases, officials and lawmakers acting on behalf of India took decisions that were constitutionally questionable (Article 14 of the Constitution prohibits discriminatory and arbitrary actions) and later alleged to be violations of Bilateral Investment Treaties. In the particular case of Devas, India has already suffered an adverse arbitral award, while the Khaitan Holdings dispute is still pending disposal. But on an assessment of these two cases along with the judgement of the Supreme Court of India in the allocation of 2G spectrum, a pattern of error emerges which needs to be addressed,

1. Bureaucratic decisions are often made in ignorance of principles of non discrimination and arbitrariness which are mandated by International Investment law and by the Indian Constitution.
2. Qualifying criterion for grant of clearances and licenses are not clear and later actions around these licenses are legally suspect.
3. Lack of co-ordination between decision makers in the bureaucracy and policy experts often leads to incorrect decisions around investments, albeit driven by bona fide intentions.
4. Policy fails to provide effective guidance to decision making bureaucrats on requirements

of International Investment law as regards managing the relationship with the foreign investor.

5. Failure to be mindful of the fact that in today's world of globalisation, exercise of sovereignty on investment transactions remains ignorant of India's exercise of sovereignty in undertaking International obligations under International Investment law.

In keeping with the lessons offered by these cases, the bill ought to have provided some guidelines on how contractual relationships between Indian state and non state private space operators are to be managed. This could be achieved by ensuring clarity on qualifying criterion for licenses under the proposed space activities legislation, introducing international investment law requirements in the management of licenses and providing a clear framework for exercise of discretion in decisions around licenses.

The space sector is inherently dependant on a global network and an atmosphere of international commerce. For Indian satellite operators to operate ground stations in other countries and to take their transponder capacities to foreign customers, we will also have to ensure foreign satellite operators find fair treatment in India.

The Bill itself remains silent on what are the qualifying factors for the grant of a license to undertake commercial space activities. Section 7 of the bill only requires safeguards for health and safety, compliance of international obligations and protection of India's sovereignty, security and national interests. In Section 8, sub clause (g) and (h) throws additional light on the subject of considerations for grant of license by mandating compliance of international

obligations, prevention of contamination and avoidance of weaponization and interference in space activities of others and securing of insurance.

However, the remaining considerations involved in upstream and downstream activities, namely, the financial health of the operator, the legal requirements for such operators and qualifying factors based on sectors namely smallsats, cubesats, low earth orbit satellites, Geosynchronous and Geostationary satellites, remote sensing services, etc., have not been defined in the Bill and have instead been left to the rule making powers of the Central Government under Section 31. Though such rules could provide the clarity which the bill does not contain, rules are not as stable in their policy outlook as legislations are in Indian law, particularly in view of rules being easier to amend than legislations within India's constitutional setup.

In terms of the 2nd requirement of Weber, the clause pertaining to suspension, variation or revocation of the license, namely Section 10 (1) still does not explicitly impose an obligation on the government to ensure fairness and reasonableness (reasonableness is considered the anti thesis of arbitrariness in Indian jurisprudence) while exercising the powers under Section 10 (1). In fact, besides the three conditions stipulated in Section 10 and particularly in view of the history of arbitrations arising out of BIT violations, a proviso ought to have been introduced in Section 10 requiring the government to verify any Bilateral Investment Treaty obligations relevant to the license before undertaking the suspension, revocation or variation thereof.

Furthermore by leaving the finer details of the licensing regime to be hashed out by the Government through rules which are yet to be formulated pursuant to the act, the bill fails to

address a key concern of the private sector, namely the operator of space activities i.e., ISRO being a regulator through its parent entities, the Department of Space and therefore the Indian Government.

The scope and role of ISRO and Antrix vis-à-vis regulation ought to have been more clearly defined. The bill should have ideally defined a committee independent of the Department of Space to take over the powers, functions and responsibilities of the Committee for Authorising the Establishment and Operation of Indian Satellite Systems under the SATCOM Norms and of the Nodal Agency under the Remote Sensing Data Policy.

With Antrix and ISRO being criticised by Comptroller and Auditor General for not effectively commercialising India's space assets including transponder capacity, any attempts at regulating satellite launch and sitcom services would invite suspicions on the motives of policy makers, even if such regulations accidentally (not deliberately) favour government transponders over private ones. This illustrates the larger issue- so long as decision makers within the government for licenses granted for space activities remain operators competing in the market for business opportunities, the dangers of actions of the Government being perceived as arbitrary and a product of conflict of interest will remain.

In summary, the lack of clarity in qualifying criterion, failure to define a committee to regulate space activities independent of the Department of Space and failure to mandate examination of reasonableness in actions involving grant and cancellation of licenses leaves the bill without resources to ensure compliance of International Investment Law. As a result, I suspect that foreign investors keen to bring space based businesses to India

will still remain hesitant despite the contents of the bill.

Enabling commerce for the private sector in space

The definition of space activity is very wide and covers launch of space object, use of a space object, operation, guidance and entry of space object into and from outer space and all functions for performing the said activities including the procurement of the objects for the said purpose. The challenge remains formulating regulations for the various industries that come within this definition, each of which have their own unique dynamics, supply chain, business model and revenue streams. We will have to wait for these regulations to arrive before we analyse their impact on industry.

The first key scope for improvement for the bill is addressing the issue of access to government facilities and relationships with the private sector. Ideally the bill at least ought to have specified the economic rationale for grant of access to government facilities for testing and launch and for transfer of government owned technology, presumably leaving the same for the domain of the rules contemplated in Section 33 of the Act.

In addition, the vision of India's "Make in India" and "Startup India" programs i.e., to encourage domestic trade and small businesses have not translated to buy back guarantees for Indian companies, particularly Indian startups engaging in space activities. Of course, ISRO has adopted a business and startup friendly vision and language in recent times and the rules could clarify where the bill remains silent.

However, rules themselves will have to address some tall challenges. Take for

example remote sensing. With the right to privacy assuming a significant place in Indian jurisprudence in view of the recent verdict of the Hon'ble Supreme Court, a remote sensing data policy will have to address privacy implications arising out of remote sensing satellites coupled with data analytics being used in a manner that affects privacy of individuals.

On the positive side, to the credit of the bill, Section 17 provides scope for the Government to impose confidentiality obligations on its officials in respect of any information pertaining to space technology relating to any space activity. This would go a long way in addressing business concerns around trade secrets. In fact, such an initiative is unprecedented in India's history with business legislations.

However, Section 25 (2) of the Bill vests all Intellectual Property created in space in favour of the Central Government. Such a blanket approach to IP ownership in space would deter businesses from undertaking key Research and Development projects in space, which though involves huge investments can yield significant innovation in science and technology. Section 25 (2) requires critical review to adequately address investor concerns.

In addition, for satellite owners and launch services specifically, present contracts with ISRO and even Section 8 (h) of the bill requires insurance to be procured. However, the fact remains that insurance regulations in India and the insurance ecosystem itself remains highly immature in addressing the risk surrounding launch of space objects. The bill could have paved the way by formulating regulations for insurance service providers for space activities and perhaps even defined an insurance scheme which is a more business

friendly version of the Public Liability Insurance Act, 1991.

Lastly, the most significant hurdle created by the bill for space activities is in the part of the bill dealing with offences. The offences defined in Section 14, 15 and 16 of the bill i.e., those penalising suppression of information for securing license, suppression of information during the launch of a space object and causing pollution though noble in spirit, remains unreasonable as they do not require the prosecution to prove mens rea or criminal intent on the part of the accused.

Pollution in space especially, can occur for a variety of reasons that are sometimes beyond the control of the parties and incapable of being prevented despite exercise of due diligence. In fact, IRNSS-1H, an ISRO satellite itself became debris after the failed launch. To hold ISRO criminally culpable when their intentions were bona fide, would be irrational and absurd. Inter party waivers are a significant theme in launch contracts specifically to negate liability for failed launches that may result in debris and they have been upheld across the globe.

In addition, when evidence required to prove the offence is floating in space, one wonders the practicability of criminalising space pollution. Without specifying the need to prove "wilful negligence" or "deliberate action" as an ingredient of the offence of causing pollution in space, the rationale of Section 16 needs to be reviewed.

Lastly, having a Judicial Magistrate First Class try cases involving offences which are as complex as causing pollution in space as required under Section 19, is one thing. Ensuring a class of judiciary, judges, prosecutors, investigators and lawyers in general equipped to try such cases is an

entirely different affair. Appropriate capacity and infrastructure will have to be created to meaningfully adjudicate complaints of offences in Section 16 especially.

Conclusion

The Space Activities Bill, 2017 must be lauded for its vision and goal. It has marked the beginning of India's destiny as a commercial space economy. With its available talent pool and low cost of labour, India could emerge as a hub for cutting edge research and development of space technology. The bill, to achieve its stated objectives, must however introduce clarity on the qualifying criterion for securing a license, policy framework for access to government facilities, technology transfer guarantees, buy back guarantees for Indian businesses and startups and a more rational approach to penalising offences involving space activities and Intellectual Property ownership.

Other questions remain, independent of this bill, for space activities including indirect taxation of transactions surrounding transfer of licenses and withholding taxes on transponder leasing charges. However, going by the initial draft of this bill and the fine intellect behind it, I have no doubt in my mind that the Indian Government will eventually fine tune and define a Space Activities legislation that will provide the much needed platform to ignite India's own commercial space economy.

Ashok G.V. is Partner at Factum Law

(Back to Contents)

American Space Commerce Free Enterprise Act: A Look Between the Lines

Daniel Porras

While the US Congress spent much of 2017 working on a number of terrestrial issues, it also found time to, yet again, reshape the regulatory framework for activities in outer space. H.R. 2809, also known as the American Space Commerce Free Enterprise Act (Free Enterprise Act), seeks to

“enhance the existing outer space authorization and supervision framework to provide greater transparency, greater efficiency, and less administrative burden for nongovernmental entities of the United States seeking to conduct space activities”.

In essence, the US is seeking to pass a law that meets its international obligations under the Outer Space Treaty (OST) for any and all “non-traditional space activities”, including space mining, space manufacturing and even commercial habitats. More than that, however, the US is setting the standard by which all other regulatory frameworks will be measured. New regimes will be seen as either more restrictive (and less appealing to entrepreneurs) or less restrictive (and possibly unsafe). A close look at the Free Enterprise Act shows that the US Congress is putting a great deal of faith in commercial actors, treating space activities very much as “business as usual”. Whether this is the best approach for all States may or may not matter if the new regime works for the US.

Why the Act?

The primary purpose of the Free Enterprise Act is to ensure US compliance with Article VI of the OST, which requires that

“[t]he activities of nongovernmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.”

While the language is clear that some type of authorization and supervision is required, it is silent on the particulars. While the US has authorization procedures for launches (through the Federal Aviation Administration), telecommunications (through the Federal Communications Commission) and remote sensing (through the National Oceanic and Atmospheric Administration), there is no mechanism to authorize orbital activities falling beyond the aforementioned categories. This leaves companies like Bigelow Aerospace (space habitats) and Planetary Resources (space mining) without a clear path to authorization.

The US has, therefore, sought to adopt a framework that will permit such a path and have as light a regulatory touch as possible. It is felt that such an approach will help ensure that the US “remains the world leader in commercial space activities” while still meeting its international obligations. Whilst one might expect the US to have issued a highly detailed and demanding set of rules, it is surprising to find that the requirements are extremely general in nature, putting a great deal of trust in private actors themselves.

What’s in the Act?

The first notable element of the Free Enterprise Act is the choice of administrator. While many would have expected this framework to fall under the Department of Transportation (which oversees launches), Congress has seen fit to put the new

certification procedure under the supervision of the Department of Commerce. Furthermore, while the Secretary of Commerce may consult other departments and agencies, they are no longer required to do so. It is hoped that eliminating the number of voices that provide input to the certification process will reduce administrative delays. The reduction of such delays is one of the primary drivers of this Act, not least of all due to the extreme difficulties that have been experienced with remote sensing applications.

The Free Enterprise Act requires that any and all US entities (no foreigners may apply) obtain a certification authority from the Secretary of Commerce who, in turn, has 60 days to approve or deny an application. If denied, there must be a reason given. If no response is issued, then the application receives automatic approval. In this way, it is presumed that all applications should be approved unless there is a good reason to deny them. This gives applicants the benefit of the doubt from the outset.

The application itself is hardly complicated. All it requires is the name and contact details of the applicant along with a description of the space object and its mission. The date and location of the object's launch does not even have to be provided (since it may not yet be available). What is required, however, is a description of space debris mitigation plans and an attestation that the space object is not a nuclear weapon or weapon of mass destruction (WMD).

Regarding the former, the Free Enterprise Act requires that all applicants include a space debris mitigation plan and that the best practice guidelines of the Interagency Debris Coordinating Committee be taken into account. Regarding the latter, applicants must sign an attestation that the space object is not

and does not carry a nuclear weapon or WMD, nor that the object will test any sort of weapon on the Moon or other celestial body.

Conspicuously, this leaves out the testing of weapons of mass destruction in space, presumably so companies are unimpeded in the development of technology that might be construed as a weapon (the testing of nuclear weapons is already prohibited in space by the Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water). Nevertheless, the attention paid to both of these details, space debris and nuclear weapons, demonstrates that the US is not ready to let commercial actors do just anything in space but, rather, will require some adherence to best practices in space.

However, that tends to be the end of the certification requirements. While remote sensing has its own section that addresses certain issues unique to that category of technology, and there is a requirement for third-party liability insurance, the Free Commerce Act leaves much of the onus of carrying out safe, sustainable activities to the applicants. The logic being that a company would not invest the large sums of capital needed to launch a space operation if they weren't fairly certain of its practicability.

What does it mean for the rest of World?

While the US may only intend to regulate its own citizens, the Free Enterprise Act will most certainly have an impact beyond US borders. Countries such as Luxembourg, the UAE and the UK, all working on their own versions of frameworks for space authorization and supervision, will have an eye on the US legislation. They will have to determine for themselves whether to copy the US legislation or deviate from it. The risk in deviation, of course, will be that if the new

rules are too demanding or do not provide sufficient clarity and predictability, companies will be tempted to relocate to the US. However, if the new rules are too lenient, there is a potential that careless companies will flock to that jurisdiction and potentially expose the State Government to liability.

Regardless of the outcome, the US has once more taken the first bold step towards normalizing non-traditional space activities. It might be said that such a step is premature, particularly since the debate on whether activities involving space resource exploitation is still being had at the international level. Nevertheless, the US has chosen to take the lead and others are following suit. Should this trend continue, the US approach to Article VI of the OST will become the default interpretation, meaning that the US will lead not only in the technological sense of space activities, but in the regulatory one as well.

The Free Enterprise Act is expected to pass in 2018.

Daniel Porras is Space Security Fellow at the UN Institute for Disarmament Affairs (UNIDIR). He can be reached @spacedaporras

(Back to Contents)

FROM THE MEDIA

ISRO's New Baby: Building Secure Quantum Communications in Space

Existing communications systems are not hack-proof. Raman Research Institute (RRI) in Bengaluru has joined hands with the Indian Space Research Organization (ISRO) to develop the quantum technologies that ISRO's satellites would need to establish such a network.

Source: [News 18](#), October 26, 2017

ISRO to set up centre in Assam

It is for the first time that ISRO is setting up such an exclusive research facility in Assam to explore the possibility of using geospatial technology, which includes data generated through Global Positioning System, Geographical Information Systems and Satellite Remote Sensing for expediting development of Assam and using the remote sensing technology for accurate flood warning system, prevention of soil erosion and land slide.

Source: [Economic Times](#), October 5, 2017

India natural partner of US in space technology: Congresswoman

"Everyone felt very positive about the partnership and the ability to do more. What a vital partner our Indian colleagues are because of the advancement in these areas," she said. The lawmakers also met 'Team Indus', who are preparing for an independent space launch.

Source: [Economic Times](#), October 26, 2017

L&T, Godrej, HAL, Isro to sign pact to build PSLV rockets

A company is being formed with Antrix, the commercial arm of Isro, as an anchor but with a larger stake for private players. L&T, which builds equipment for rockets and satellites, Godrej that makes the Vikas engines for the PSLV, and HAL which makes its composite frame will be the main partners.

Source: [Business Standard](#), October 30, 2017

ISRO plans to scale up outsourcing, double satellite launches

"Wherever it's possible to get the things done through the industry, we are doing and it will only increase in the coming days because we need to do more frequent activities. There will be an increase in the usage of industry for the activities," ISRO Chairman said.

Source: [Hindu Business Line](#), November 6, 2017

ISRO opens doors to private sector

In an attempt to increase the number of satellite launches and build the capacity of the private sector, the Indian Space Research Organisation issued a tender on Monday to the private industry for Assembly, Integration and Testing of 30-35 satellites.

Source: [The Hindu](#), November 20, 2017

Wi-Fi in India skies soon: TRAI to issue rules in 15 days

Telecom Regulatory Authority of India chairman R. S. Sharma said "inflight connectivity (IFC) shall be allowed" and the

way how that is to be done will be given by the month-end. "We are working on that and will issue the parameters for IFC of by the end of this calendar year, which means in the next 15 days or so," Sharma said.

Source: [Times of India](#), December 13, 2017

Bengaluru gets India's first space technology gallery

The gallery, which is dedicated to Indian space technology and its space-related achievements, has been curated with smaller replicas of launchpads at the Sriharikota launch complex and demonstrates how rockets are used to launch satellites.

Source: [Times of India](#), November 29, 2017

ISRO developing a compact launcher for small satellites

Preliminary work to design and develop an ambitious small launch vehicle began about three months ago, said K. Sivan, Director of ISRO's rocket development node, Vikram Sarabhai Space Centre. Its design will enable a handful of engineers to assemble it within a week. And the launcher should be able to put satellites of up to 500-600 kg in orbits close to the Earth.

Source: [The Hindu](#), December 11, 2017

China to become 'world space power' by 2045: expert

China will become a world space power by 2045 in an all-round way, catching up with the US in some key aerospace projects, a space expert vowed on the sidelines of the 19th National Congress of the Communist Party of China as an echo to the strategic goal on aerospace capabilities put forward by Chinese President Xi Jinping.

Source: [People's Daily](#), October 22, 2017

China launches VRSS-2 remote sensing satellite for Venezuela

A Chinese Long March 2D rocket launched the VRSS-2 satellite for Venezuela early on Monday, underlining cooperation between the countries and marking a return to flight for the launch vehicle. The 942 kg remote sensing satellite was launched from the Jiuquan Satellite Launch Centre.

Source: [GB Times](#), October 9, 2017

China, Russia agree cooperation on lunar and deep space exploration, other sectors

A press release from Roscosmos space agency states that the cooperation between Russia and China in the field of space consists of six sectors, including lunar and deep space, joint spacecraft development, space electronics, Earth remote sensing data, and space debris monitoring.

Source: [GB Times](#), November 2, 2017

Turkey, Russia to Enhance Cooperation in the Field of Space Technologies

"It is important for Turkey that this project is implemented as soon as possible. If you want to become an advanced country in the world, then you need to strengthen your position in the space field, you need to develop technologies and export them."

Source: [Sputnik News](#), October 6, 2017

UAE Space Agency signs MoU with Luxembourg

The MoU promotes cooperation in various aspects of space exploration, including space science, research, technology, remote sensing and navigation. In addition to this, the MoU encourages collaboration in space policy, law,

regulation, and personnel training for space activities.

Source: [Economic Times](#), October 10, 2017

General Atomics buys Surrey's US smallsat factory

SSTL and General Atomics announced that the facility and accompanying workforce at SST-US's Englewood, Colorado location will become part of the San Diego, California company's Electromagnetic Systems Group. Neither company disclosed the financial terms of the transaction.

Source: [Space News](#), November 13, 2017

Bigelow and ULA announce plans for lunar orbiting facility

The companies said they are working together on a concept for a "lunar depot" using an expandable module provided by Bigelow and launched by a next-generation ULA rocket that could support both NASA and commercial uses as soon as 2022.

Source: [Space News](#), October 17, 2017

Companies seek roles in NASA's return to the moon

At the annual meeting of the Lunar Exploration Analysis Group (LEAG) and a follow-on "Back to the Moon" workshop, four companies presented plans to develop robotic lunar landers that they argued could serve both commercial and government missions to the lunar surface in support of that new policy.

Source: [Space News](#), October 17, 2017

China and US quietly hold third Civil Space Dialogue, discuss exploration plans and cooperation

Beijing quietly hosted the third China-US Civil Space Dialogue on November 30, with the two sides exchanging plans for human and robotic space exploration, and discussing engagement through multilateral mechanisms.

Source: [GB Times](#), December 11, 2017

Blue Origin Launches New Crew Capsule on Third New Shepard Rocket

The seventh flight of New Shepard was the first flight of a new rocket booster, the third Blue Origin has built. The capsule achieved an altitude of 99.39 kilometers which is just shy of the internationally recognized boundary for space at 100 kilometers, known as the Karman line. The booster then returned for a propulsive vertical landing and the capsule landed using a parachute.

Source: [Popular Mechanics](#), December 13, 2017

SpaceX, OneWeb detail constellation plans to Congress

Testifying before the Senate Commerce, Science and Transportation Committee, executives from SpaceX and One web provided updates on their constellation deployment, as well as steps they've taken to mitigate the risk of space debris from thousands of satellites they aim to deploy into low Earth orbit in the years ahead.

Source: [Space News](#), October 26, 2017

Voyager 1 Just Fired Up its Backup Thrusters for the 1st Time in 37 Years

Voyager 1 hadn't used its four "trajectory correction maneuver" thrusters since November 1980, during the spacecraft's last planetary flyby - an epic encounter with Saturn. But mission team members fired them

up again Nov. 28 to see whether the TCM thrusters were still ready for primetime.

Source: Space.com, December 1, 2017

Earthworms Reproduce in Simulated Mars Soil - a First

For Wamelink, who's been working in the research lab since 2013, the successful births indicate that worms digging through the simulated soil can not only live—they might just thrive. On Earth, worms play a crucial role in the agricultural cycle, and this gives researchers hope they might one day do the same thing on another world.

Source: National Geographic, November 28, 2017

STRATCOM chief Hyten: 'I will not support buying big satellites that make juicy targets'

When he ran U.S. Space Command, Hyten regularly reached out to “new space” entrepreneurs Elon Musk and Jeff Bezos, and he likes the way they think. “They are great partners, they have a great vision of the future,” Hyten said. “Talk about going fast, they’re going fast. And it’s always awesome to see companies that embrace a different vision of the future, that invest and go fast.”

Source: Space News, November 19, 2017

Virgin signs agreement with Saudi Arabia for billion-dollar investment

The non-binding memorandum of understanding between the Virgin Group and the Public Investment Fund (PIF) of Saudi Arabia covers a partnership whereby the fund will take a “significant” stake in Virgin Galactic, Virgin Orbit and The Spaceship Company for \$1 billion, with an option for

\$480 million in future investment in the companies.

Source: Space News, October 26, 2017

European space officials outline desired contribution to Deep Space Gateway

Detlef Wilde, head of robotics projects at Airbus Defence and Space, said that ESA has been discussing the Deep Space Gateway concept with NASA for the past two years and although the venture is not yet approved, “the increasingly engaging discussions show that it has sense.”

Source: Space News, October 26, 2017

Luxembourg to invest in Spire

San Francisco-based Spire Global announced it will establish a European headquarters in Luxembourg that will support engineering, data analytics and business development work. In turn, Luxembourg Future Fund will invest in Spire as part of a \$70 million Series C round Spire plans to close by the end of the month.

Source: Space News, November 15, 2017

Japan eyes free satellite imaging data for businesses

The economy ministry hopes combining imagery taken at various angles by special cameras will draw interest from a range of fields. For example, agricultural companies could use infrared and other types of imaging to study crop characteristics invisible to the naked eye, like sugar content and protein volume. This would help pinpoint the optimal time to harvest.

Source: Nikkei Asian Review, October 28, 2017

ISRO, Japan space agency JAXA discuss joint mission to moon

Speaking on the sidelines of the 24th meeting of the Asia Pacific Regional Space Agency forum, ISRO chairman A S Kiran Kumar and JAXA director Naoki Okumura said that the two agencies have begun exploring the possibility of combining forces for a joint lunar mission.

Source: [Indian Express](#), November 18, 2017

Investor interest in space companies remains strong despite no big deals

Speaking at the SpaceCom Expo, Carissa Christensen, chief executive of Bryce Space and Technology, said there's been a consistent level of overall investment activity by venture capital firms into the industry this year.

Source: [Space News](#), December 5, 2017

Japanese start-up ispace raises funds for first two lunar missions starting in 2019

"We needed to secure research and development and two missions with this money," CEO Takeshi Hakamada told CNBC. "We're going to bring scientific instruments to the moon, and then sell the right to use our data to space agencies and other institutions, as well as provide transportation services, for profit."

Source: [CNBC](#), December 12, 2017

(Back to Contents)

OPINIONS AND ANALYSES

Mike Pence, “[America Will Return to the Moon—and Go Beyond](#),” *The Wall Street Journal*, October 4, 2017

Jeff Foust, “[Back to back to the Moon](#),” *The Space Review*, October 16, 2017

Cody Knipfer, “[Why should we go? Reevaluating the rationales for human spaceflight in the 21st century](#),” *The Space Review*, October 16, 2017

Steven Freeland, “[Regulating Space to Boost Australian Opportunity](#),” *Australian Institute of International Affairs*, October 31, 2017

Joe Landon and Etienne Schneider, “[These 5 industries will be first to do business in space](#),” *World Economic Forum*, November 24, 2017

Eva Xiao, “[How blockchain in space aims to challenge the dominance of Google and Amazon in internet services](#),” *Tech in Asia*, November 22, 2017

Narayan Prasad, “[Why You Should Care About India’s New Private Sector Space Activities Bill](#),” *The Wire*, November 29, 2017

Kumar Abhijeet, “[Gateway under Construction](#),” *The Statesman*, November 29, 2017

Jon Daly, “[Gold, water and platinum: Australians lead the way towards asteroid mining boom](#),” *WA Today*, December 4, 2017

Narayan Prasad, “[Why You Should Care About India’s New Private Sector Space Activities Bill](#),” *The Wire*, November 29, 2017

Jeff Foust, “[Seeking regulatory certainty for new space applications](#),” *The Space Review*, December 4, 2017

Matthew Bodner, “[Russia looks past Soyuz-2 failure to Soyuz-5](#),” *Space News*, December 6, 2017

Suraj Radhakrishnan, “[Could Google Lunar XPrize Catalyze Long-Term Deep Space Exploration?](#),” *International Business Times*, October 6, 2017

Lee Billings, “[Where Will NASA Go Next? Saturn’s Moon Titan, or Maybe a Comet](#),” *Scientific American*, December 20, 2017

Vidvuds Beldavs and Jeffrey Sommers, “[The emerging field of space economics: theoretical and practical considerations](#),” *The Space Review*, December 18, 2017

Peter Garretson and Namrata Goswami, “[Is India looking towards space-based resources?](#),” *The Space Review*, October 2, 2017

Nigel Fountain, “[Bruce McCandless obituary](#),” *The Guardian*, December 29, 2017

Narayan Prasad, “[The Future of India’s Commercial Spaceflight Is Closely Tied to the PSLV’s](#),” *The Wire*, December 28, 2017

Ephrat Livni, “[A stray dog became the world’s first cosmonaut 60 years ago today](#),” *Quartz*, November 3, 2017

Rebecca Kheel, “[Why the military’s Space Corps isn’t dead yet](#),” *The Hill*, November 19, 2017

Sarah Scoles, “[To Fix the Space Junk Problem, Add a Self Destruct Module](#),” *Wired*, December 12, 2017

[\(Back to Contents\)](#)

NEW PUBLICATIONS

REPORTS / STATEMENTS / MULTIMEDIA

Jerry Hendrix and Adam Routh, "[A Space Policy for the Trump Administration](#)," *Center for a New American Security*, October 2017

Lee Billings, "[Q&A: Plotting U.S. Space Policy with White House Adviser Scott Pace](#)," *Scientific American*, November 6, 2017

Timiebi Aganaba-Jeanty, "[Satellites, Remote Sensing and Big Data Legal Implications for Measuring Emissions](#)," *Centre for International Governance Innovation*, November 2017

"[Space Traffic Management \(STM\): Balancing Safety, Innovation, and Growth - A Framework for a Comprehensive Space Traffic Management System](#)," *American Institute of Aeronautics and Astronautics*, October 2017

"[Japan Aerospace Exploration Agency \(JAXA\) Signs Implementation Arrangement \(IA\) with Indian Space Research Organization \(ISRO\) concerning joint study of Joint Lunar Polar Exploration](#)," *Japan Aerospace Exploration Agency*, December 6, 2017

JOURNAL ARTICLES

Capt. Michael Nayak, "Deterring Aggressive Space Actions with Cube Satellite Proximity Operations," *Air & Space Power Journal*, Vol. 31, Issue 4, November 2017, pp. 92-102

Lt. Col. Mark Reith, "Brandishing Our Air, Space, and Cyber Swords," *Air & Space Power Journal*, Vol. 31, Issue 4, November 2017, pp. 103-114

Fernando Barcellos, "The Brazilian Space Industry: Geostationary Satellite of Defense and Strategic Communication Program," *Astropolitics*, Vol. 15, Issue 3, pp. 264-276, October 2017

Narayan Prasad Nagendra and Tom Segert, "Challenges for NewSpace Commercial Earth Observation Small Satellites," *NewSpace*, Vol. 5, Issue 4, December 2017, pp. 238-243

Laszlo Bacsardi et. al., "Present and the Future of Space Internet: The Space Generation Perspective," *NewSpace*, Vol. 5, Issue 4, December 2017, pp. 257-267

CHAPTERS / BOOKS / MONOGRAPHS / OCCASIONAL PAPERS

Sunny Tsiao, *Piercing the Horizon: The Story of Visionary NASA Chief Tom Paine* (Purdue University Press, October 2017)

Gurbir Singh, *The Indian Space Programme: India's incredible journey from the Third World towards the First* (Astrotalkuk Publications, October 2017)

Scott Kelly, *Endurance: A Year in Space, A Lifetime of Discovery* (Knopf, October 2017)

Laurence Nardon, "European Space Programs and the Digital Challenge," *Institut français des relations internationales*, November 2017

(Back to Contents)