Back to the Moon: Legal Challenges for Future Lunar Exploration

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Abstract

In the light of the recently renovated interest in returning humans to the Moon, this paper addresses the main legal challenges related, with the goal to show practical solutions under the current system of international space law.
In order to do so, the paper first presents an overview of current lunar exploration programs, arguing that public and private missions raise different challenges and thus require specific models.
Following, it accordingly assesses possible legal solutions for the regulation of these programs. On the one hand, States' exploration programs may be governed by a revised version of the Intergovernmental Agreement already concluded for the International Space Station. On the other hand, private activities could be better organized relying on Articles VI-IX OST as integrated by a new UNGA Resolution, *ad hoc* bilateral agreements and specific provisions in national space legislations.
Finally, the paper concludes underlining the importance of international cooperation as the key to ensure the peaceful use and exploration of outer space.

Introduction. *Back to the Moon*

Forty-six years. This is how long Humankind has been missing from the Moon, after the US Apollo 17 mission made commander Eugene Cernan, command module pilot Ronald Evans and lunar module pilot Harrison Schmitt the last humans to reach it in December 1972.[1] Since then, crewed mission on the Moon were considered to be too expensive and unnecessary, with a major focus on low Earth orbit applications.[2]

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1 *See* https://www.nasa.gov/mission_pages/apollo/missions/apollo17.html (last visited January 2018).

2 A. Lebeau, *Space: the Routes of the Future,* in *24 Space Policy 45 (2008).*

However, the *status quo* is different nowadays. Thanks also to the *New Space* revolution, both public and private actors are now determined to establish permanent human presence on the Moon by the end of the next decade. In the words of NASA Chief administrator Jim Brindestine, we are going back to the Moon and this time we are going to *stay*.
Needless to say, developing the appropriate legal solutions for the implementation of these ambitious programs will be crucial for effectively sustaining their eventual success. Hence, this paper addresses the main legal challenges related to future human exploration of the Moon, with the goal to suggest practical solutions.
In order to do so, Chapter 2 first presents an overview of current lunar exploration programs, arguing that public and private missions raise different challenges and thus require specific models. Accordingly, Chapters 3 and 4 will then assess possible legal solutions for the regulation of these programs.
Finally, the paper will conclude by underlining the importance of international cooperation as the key to ensure the peaceful use and exploration of outer space.

1. Current Lunar Exploration Programs

After years of steadiness, on the 16th of April 2018 NASA presented its new Moon exploration program, which sees the US committed to build a Lunar Orbital Platform-Gateway beginning in 2022.[3]
Less than two days after, on the 18th of April 2018, Roscosmos proposed to add a research module to the gateway and fly crews there using a super heavy-lift rocket and manned spaceship,[4] pursuant to a cooperation agreement the two space agencies had signed in August 2017.[5]
While the Chinese space agency had already concluded a memorandum of intents with Roscosmos for joint cooperation on future human exploration of the Moon,[6] at the last International Astronautical Congress in Bremen, China announced that it will invite international partners to place a small payload on a planned lunar sample return mission.[7]
As to Europe, soon after his nomination in 2015 ESA Director General Jan Wörner has announced the concept of a *Moon Village,* as "an environment

3 *See* https://www.nasa.gov/feature/nasas-exploration-campaign-back-to-the-moon-and-on-to-mars (last visited January 2019).
4 I. Klotz, *Russia Wants Lunar Gateway to Be Global Project,* in *Aerospace Daily & Defence Report (19/04/2018)*.
5 *See* https://www.nasa.gov/feature/nasa-roscosmos-sign-joint-statement-on-researching-exploring-deep-space (last visited January 2019).
6 *See* https://www.aerospace-technology.com/news/russia-china-partner-new-lunar-exploration-mission/ (last visited January 2019).
7 *See* https://gbtimes.com/china-invites-international-cooperation-in-change-6-moon-sample-return-mission (last visited February 2019).

where both international cooperation and the commercialization of space can thrive".[8] A recent follow-up for the implementation of the Moon Village concept can be found in a report drafted by the European Space Agency on the challenges of Lunar Resources In Situ Utilization.[9]

Also the private sector is quite interested in lunar exploration. While the US company *Moon Express* has been the first private company to get governmental approval for its lunar payload,[10] the Japanese start-up *ispace* is likely to be the first one to *actually* get it to the Moon. Following the record-raise of 90 million dollars to fund its project of a *Moon Valley,*[11] *ispace* has concluded an agreement with *SpaceX* to bring its rovers to the Moon.[12]

On this note, the International Institute of Space Commerce has recently released an executive summary of its "Lunar Economic Action Plan" (LEAP), discussing what role private industry and investments could and should logically play in Humankind's efforts to return to the Moon.[13] *Inter alia,* the summary found that a private settlement on the Moon should be welcomed as "feasible and even cost effective".[14]

It is a matter of fact that private and State missions on the Moon present slightly different challenges. As to the latter, the first question is whether the major space powers will ultimately cooperate together for a truly global exploration of the Moon.[15] Following, the main challenge will be how to frame the terms of their eventual cooperation, considering that Russia and China are not likely to accept the one-party dominance that NASA currently

8 T. Whipple, *Space Chief Sets His Sights on European Moon Village (rocket salad optional),* in *The Times* (20/06/2015).

9 *See* http://exploration.esa.int/moon/59878-workshop-towards-the-use-of-lunar-resources/ (last visited February 2019).

10 *See* https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=20595 (last visited January 2019).

11 *See* https://www.forbes.com/sites/alexknapp/2017/12/13/this-japanese-space-startup-raised-90-2-million-to-go-to-the-moon/#197ffa9876b6 (last visited January 2019).

12 See https://spaceresources.public.lu/en/actualites/2018/lunar-exploration-startup-ispace-partners-with-spacex-for-2020-2021-moon-missions.html (last visited February 2019).

13 International Institute Of Space Commerce, *The Lunar Economic Action Plan: A Business Plan For The Moon*, (2018). Available at https://iisc.im/portfolio-items/leap-executive-summary/ (last visited January 2019).

14 *Id.*, at 3. In particular, while current technological development has brought the cost for an initial private settlement on the Moon at less than 5 billion dollars, the potential expansion of the global economy coming from the successful establishment of such a settlement has been estimated in *trillion* of dollars. *Id.* at 5, 10-11.

15 S. Pace, *Space Cooperation Among Order-Building Powers,* in *36 Space Policy 25 (2016)*. In this respect, very positive signals came from Roscomos' director of human spaceflight Sergei Krikalev, who recently pointed out the primary importance of international cooperation in the construction of a cislunar station. *Supra* 5.

enjoys under the Intergovernmental Agreement[16] (IGA) of the International Space Station (ISS).
For what concerns private missions, the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) has recently pointed out a number of "concerns" that need to be addressed. *Inter alia,* the Legal Subcommittee addressed the question related to the legal status of space resources, which is still unclear under international space law,[17] and to whether their utilization by private entities could be "for the benefit of all Humankind".[18]
Hence, it seems that different legal models will have to be developed for an appropriate regulation of public and private activities on the Moon.

2. Legal Models For States Lunar Exploration

Every analysis related to future States exploration programs on the Moon should always begin with the ISS experience. Moving from this assumption, this chapter will analyse the ISS framework so to show its suitability for future international cooperation on the Moon.
Notably, the ISS framework resembles a pyramid structured in three levels.[19] At the top of the pyramid there is the IGA renegotiated and signed by all ISS partners in 1998,[20] after the inclusion of the Russian Federation.[21]
The agreement is based on "genuine partnership" for the detailed design, development, operation and utilisation of a permanently inhabited civil ISS designed exclusively for peaceful purposes.[22] The IGA stipulates high-level, programmatic commitments and obligations, aiming to establish a long-term international cooperative framework among the partners.[23]

16 Agreement among the Government of Canada, the Government of the ESA Member States, the Government of Japan, the Government of the Russian Federation and the Government of the United States of America concerning Cooperation on the Civil International Space Station, Washington, done on 29 January 1998, entered into force on 28 March 2001.
17 The Hague Space Resources Governance Working Group, *The Hague Working Group Draft Building Blocks On Space Resource Activities,* at p. 2 (2017).
18 Draft Report on *General Exchange of Views on Potential Legal Models for Activities in the Exploration, Exploitation and Utilization of Space Resources,* UN DOC A/AC.105/C.2/L.304/Add.3 at p. 5.
19 Pursuant to Article 4, paragraph 2 of the IGA, the IGA takes precedence over the MoUs, and the MoUs prevail over the Implementing Arrangements.
20 *Supra* 16.
21 T. Cline et al., *Structuring Future International Cooperation: Learning from the ISS,* in M. J. Rycroft (ed.), *Beyond The International Space Station: The Future Of Human Spaceflight. Proceedings Of An International Symposium 43 (*2002).
22 Article 1, paragraph 1 of the IGA. *Supra* 16.
23 M. Fukushima, *Legal Analysis of International Space Station (ISS) Program Using the Concept of "Legalization",* in *24 Space Policy 34 (2008).*

Below, we find four Memoranda of Understandings (MoUs) concluded between NASA and each of the other cooperating agencies of the ISS partners.[24] The MoUs lay down the management structure of the ISS, stating in detail each partner's roles and responsibilities so to ensure the effective operation and utilisation of the station.[25]

At the bottom of the pyramid there are the Implementing Arrangements, providing material guidelines and tasks among the partners so to concretise the provisions of the MoUs. Currently, there is a number of implementing arrangements concluded between NASA and relevant Cooperating Agencies.[26]

Significantly, the illustrated framework sees a dominating role of NASA as leading partner of the ISS. Indeed, the MoUs structure allowed NASA to "divide and conquer", effectively controlling the four individual negotiations of the ISS's programmatic details.[27]

This has been reflected into the management structure of the station, as NASA chairs every single ISS administrative body, from the Programme Coordination Committees (PCCs) to the Single Space Station Control Board (SSCB) and the Multilateral Coordination Board (MCB).[28] Significantly, although all these bodies work by consensus,[29] where the latter cannot be reached it is always NASA as chair that has the power to take the final decision.[30]

Considering now the application of this framework to the hypothetical lunar space station that the US, Russia, China and all other eventual partners might build together, the following issues may arise and thus need to be addressed.

First, it is clear that at least Russia and China are not willing to accept any form of dominance by NASA.[31] However, this does not mean that the current ISS framework could not be maintained. On the contrary, most likely it will be preserved but with appropriate corrections to maintain a fair balance among the partners.[32]

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24 *Ibidem.*

25 *Supra* 21.

26 It is worth mentioning, *inter alia,* the various NASA-ESA Barter Agreements which regulate the exchange of space products and services between the two agencies. Available at: https://www.esa.int/Our_Activities/Human_Spaceflight/International_Space_Station/ESA_s_International_Space_Station_barter_agreements (last visited January 2019).

27 *Supra* 21, at 53.

28 *Supra* 23, at 38-39.

29 In truth, it should be noted that there have been hardly any instances where NASA has had to take a unilateral decision. *Supra* 20, at 49.

30 J. M. Logsdon, *International Cooperation in the Space Station Programme. Assessing the Experience to Date*, in *7 Space Policy 41, 42 (1991).*

31 At the 34th Space Symposium in Colorado Springs, Roscosmos' director for human spaceflight Sergei Krikalev defined a future Cislunar station "as an international project without the primacy or the priority of one of the participating partners". *Supra* 4.

32 Again in the wording of Mr. Krivalev, "we see this new international initiative as a sequel of the International Space Station program to be built under the same principles". *Ibidem.*

This could be done first enabling all the involved national space agencies to reciprocally conclude MoUs among each other. To avoid the risk of unsustainable divergences, this solution could be coupled with standard MoU clauses inserted into the IGA for the most important provisions.
Additionally, the chairs of the administrative bodies might be equally shared among the partners or, if the numbers do not match, at least periodically rotate. In this way there will still be a viable method to effectively handle disagreement, but in a way that spreads the power to take ultimate decisions among all the partners.
Second come the issues of military and commercial uses. As is well-known, the ISS is devoted to peaceful purposes only,[33] but the IGA does not define this term in a clear and precise manner. On the contrary, Article 9, paragraph 3 (b) of the IGA merely stipulates that the ISS partner "providing an element shall determine whether a contemplated use of that element is for peaceful purposes".
Notably, this means that each ISS partner can use this vagueness for its own advantage, with significant repercussions also on the commercial side.[34] As underlined in doctrine, this impreciseness could invite a situation in which "a European weapons manufacturer has more chance to do business on the American module than on the European one, given the tendency on the American side to interpret peaceful purposes much more broadly".[35] Finally, the actual commercialisation of the ISS has been left to the decision of the relevant partners, which are of course exclusively concerned with their own national policies.[36]
How to cope with these issues is not an easy task. While the meaning of peaceful purposes is still unclear under international space law,[37] a possible solution might be to develop an *ad hoc* definition explicitly limited to the purpose of the lunar station. As to the commercialisation, as long as the station will maintain the modular structure adopted for the ISS, it seems best to leave the decision to the relevant jurisdiction.

33 *Supra* 23.
34 *Supra* 23, at 37.
35 F. Von Der Dunk, *Pandora's Box? The Basic Legal Framework for Doing Business with a Space Station: An Inventory of Problems,* in *K. Tatsuzawa (ed.), Legal Aspects Of Space Commercialization 127 (1992).*
36 For instance, pursuant to the 1998 US Space Commercialization Act, NASA offered 30% of its access rights to the ISS for commercial exploitation. Following, in May 1999, the ESA Ministerial Council indicated the very same percentage for the European capability and noted the promotion of the ISS's commercial utilization. T. Masson-Zwaan & R. Veldhuyzen, *ESA Policy and Impending Legal Framework for Commercial Utilization of the European Columbus Laboratory Module of the ISS,* in *F. Von Der Dunk & M. Brus (eds.), The International Space Station 51, 56* (2006).
37 E. Galloway, *United States National Space Legislation on the Exploration and Use of Outer Space for Peaceful Purposes,* in *1987 Proceedings Of The 30th Colloquium On The Law Of Outer Space 39.*

Having said that, it is also true that some successes of the ISS model are likely to be integrally repeated. *Inter alia,* it is certainly worth mentioning the Crew Code of Conduct (CCOC) adopted in September 2000.[38] In the everyday life aboard the ISS, the CCOC has proved to be of utmost importance, thanks to the established standards for work, safety and disciplinary regulations.[39]
All in all, it can be concluded that when the time will come to draft a legal framework regulating States cooperation for Moon exploration, the ISS may properly serve as optimal model,[40] although with some corrections to ensure that this time the partnership will be truly "genuine".[41]

3. Legal Models For Private Lunar Exploration

As seen in Chapter 2, private missions on the Moon present slightly different challenges and needs. In this respect, many authors share the opinion that the current space treaties are "hopelessly outdated" to deal with them.[42]
Against these attitudes, it seems worth to recall the words of Prof. Eilene Galloway, which in August 2008 wrote to Prof. Tanja Masson: "we need to explain what needs to be done to bring private space activities under the control of the space system we have [...] If we can suggest the legal language for implementing Article VI, it would be a real contribution for the future".[43]
Moving from this perspective, this chapter will analyse Articles VI-IX of the Outer Space Treaty[44] (OST) in order to show to what extent they can regulate future private missions on the Moon, and what can be done in order to further clarify/supplement their application. The chapter will first briefly recall the relevance and the problems of each provision. Following, it will suggest a comprehensive answer so to address them in the context of future private missions on the Moon.
Before turning to Articles VI-IX OST, it seems appropriate to remind first a true cornerstone of international space law, i.e. Article I OST. Pursuant to

38 Pursuant to Article 11 of the IGA. Code of Conduct for the International Space Station Crew (2000).
39 Alongside a clear chain of command to ultimately enforce them.
40 As recently confirmed by Roscomos' director of human spaceflight Sergei Krikalev, who declared at the 34th Space Symposium in Colorado Springs that "the most important issue today is establishing an international legal framework for cooperation on construction of a cislunar station, similar to the ISS program." *Supra* 4.
41 T. Masson-Zwaan, *Current Issues & Prospects of International Space Law,* in *25 Korean Journal Of Air And Space Law 239 (2010).*
42 T. Masson-Zwaan, *Article VI of the Outer Space Treaty and Private Human Access to Space*, in *2008 Proceedings Of The International Institute Of Space Law 537.*
43 *Ibidem.*
44 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies, 18 UST 2410 (1967) (OST). Further provisions of the OST could have not been addressed in this paper for natural reasons of space.

this provision, the gates of outer space have been opened to those interested in crossing them.[45] At the same time, purely *unilateral* uses of outer space do not seem to be in line with Article I OST, as it declares its exploration and use "the province of all mankind".

While many scholars have been debating whether this provision entails an enforceable legal obligation or just a moral duty,[46] one thing that should be borne in mind is that as space has different applications there are as well many ways to share benefits. Examples specific to lunar exploration range from the return to Earth of Moon samples for scientific analysis to the sharing of the technology necessary to get there.

Having said that, we can move to Article VI OST, a provision of paramountcy importance in international space law.[47] It enables also non-governmental entities to benefit from the freedom of exploration and use of outer space, under the authorization and continuing supervision by the "appropriate State Party to the Treaty".[48]

Accordingly, the Article incorporates the principle of international responsibility of States for national space activities and sets out the legal basis for justifying commercial activities in outer space.[49] As Article VI actually implies an obligation of due diligence,[50] States will have to actively verify that private activities in outer space comply with international space law.[51]

Problems in relying on Article VI OST for future private missions on the Moon come from the identification of the "appropriate State Party"[52] and the possible divergences in implementing the duty to authorise and supervise in national space legislations.

Article VII OST establishes the international liability of the launching State for any damage caused by its space object,[53] and has a crucial role within the current system of international space law. As the launching State is the common denominator of all provisions involving responsibility in the OST,

45 S. Gorove, *Freedom of Exploration and Use in the Outer Space Treaty: A Textual Analysis and Interpretation,* in *1 Journal Of International Law And Policy 100 (1971).*

46 B. Cheng, *Studies In International Space Law* 188 (1997); A. Cassese, *International Law* 168 (2005).

47 *I. H. Diederiks-Verschoor, An Introduction To Space Law 26 (2008).*

48 Article VI OST, *supra* 44.

49 *Supra* 45.

50 *Supra* 46.

51 *Inter alia*: consistency with State's international obligation; safety of persons and goods; national security and public health; environmental concerns; financial issues. *Supra* 42.

52 K. H. Böckstiegel, *The Term "Appropriate State" in International Space Law*, in *1994 Proceedings Of The 37th Colloquium On The Law Of Outer Space 77.*

53 Article VII OST, *supra* 44.

the Liability Convention (LIAB)[54] and the Registration Convention (REG),[55] in fact Article VII OST determines the subject responsible for the major obligations set out by international space law.[56]

The direct application of Article VII OST to future private missions on the Moon entails delicate problems caused by its main focus on launch activities and the fact that the status of launching State is not always clear.[57] Furthermore, the connection between liability and registration could be a problem in case of future transfer of ownership.[58]

Article VIII is one of the key provisions for future lunar exploration as it creates quasi-territorial jurisdiction of the State of Registry over its space objects.[59] Accordingly, this provision makes for a rather effective structure of legal control over space manned activities, enabling States to regulate them as if they were taking place in their territory.[60]

There are no issues specific to future private missions on the Moon raised by the direct application of Article VIII OST, apart from the already mentioned connection between launch and registration.[61]

Last comes Article IX OST, which has been set to ensure international cooperation in space activities, requiring States to mutually assist each other and to pay due regard to their corresponding interests.[62] Unfortunately, the system designed in the Article poses more questions than those it provides answers.[63] Indeed, for situations of "potentially harmful interference" among various States' activities in outer space Article IX OST merely provides the right/obligation to request/undertake "appropriate international consultations" concerning with any such activity.[64] Clearly, the political nature of this dispute settlement method is inadequate for properly dealing

54 Convention on International Liability for Damage Caused by Space Objects, *entered into force* Oct. 9, 1973, 24 U.S.T. 2389, 961 U.N.T.S. 187.

55 Convention on Registration of Objects Launched into Outer Space, *entered into force* Sept. 15, 1976, 28 U.S.T. 695, 1023 U.N.T.S. 15.

56 M. S. Aranzamendi, *Who is the Launching State? Looking for the Launching State in Current Business Models,* in *2011 Proceedings Of The International Institute Of Space Law 378-379.*

57 *Id.*, at 380.

58 *Ibidem.*

59 F. G. Von Der Dunk, *The Role of Law with Respect to Future Space Activities,* in *12 Space Policy 6 (1996).*

60 *Id.*, at 7.

61 Since only a launching State can register a space object. Article II of the Registration Convention, *supra 55.*

62 Article IX OST, *supra* 41.

63 S. Marchisio, *Article IX of the Outer Space Treaty: An Overview,* in *J. Sandalinas (Ed.) Report Of The 5th Eilene M. Galloway Symposium On Critical Issues In Space Law 1 (2010).*

64 *Supra* 62.

with the issues emerging from conflicting commercial activities on the Moon.[65]

Providing solutions to these fundamental issues is of course far from being easy, but also not impossible. As underlined by Professor Galloway,[66] the key is in finding the appropriate legal language to implement Article VI OST. Accordingly, this chapter suggests an integrated approach between international and national instruments, leading to the adoption of a comprehensive framework specific to lunar exploration.[67]

Specifically, a new UNGA Resolution providing "Recommendations on International Cooperation and National Legislation Relevant to the Private Exploration and Use of the Moon" should be enacted and modelled on UN Res 68/74.[68] While the latter already provides very useful recommendations for States wishing to adopt national space legislation, the former could further complement it with specific guidelines for licensing private activities on the Moon.

States involved in a certain mission should be invited to cooperate at the bilateral (or, where appropriate, multilateral) level for the purpose of jointly regulating responsibility, liability and registration issues. As private missions on the Moon are intended to be permanently carried on in outer space for a significant lifetime, it seems that these three elements should be reconducted under the State of the Operator.

The reason behind this choice lays in the different nature of future lunar activities, compared with traditional space activities. Usually, the most "dangerous" part of a space activity is the launch, and that is the reason why the current system of space law has the launching State as common denominator for responsibility, jurisdiction and liability.[69]

However, in the case of a *permanent* mission on a celestial body, such as the Moon, the more serious damage is likely to happen there rather than during the launch, given the long lifetime of the mission and the inherent dangerous nature of outer space.

Hence, in the language of the Space Treaties, the State of the Operator is to be considered as indeed "procuring the launching of an object into outer space" (Article VII OST), thus being "the appropriate State Party" to authorize and continuing supervise the mission (Article VI OST) and to "retain jurisdiction and control" over its space objects (Article VIII OST).

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65 J. Long, *China's Space Station Project and International Cooperation: Potential Models of Jurisdiction and Selected Legal Issues*, in *36 Space Policy 35 (2016)*.

66 *Supra* 42.

67 For the idea of developing different licensing regime depending upon the particular space activity for which authorization is being sought, *see* S. Freeland, *Matching Detail With Practice: The Essential Elements of National Space Legislation,* in *2010 Proceedings Of The International Institute Of Space Law 542*.

68 *See* UN DOC A/RES/68/74.

69 *Supra* 56.

Accordingly, qualifying the State of the Operator as launching and responsible State will also help solving liability and registration issues. Pursuant to Article V LIAB, the above suggested bilateral agreements should also include the "apportioning among themselves of the financial obligation" connected to the lunar mission.

Furthermore, pursuant to Recommendation Three of UN Resolution 62/101 of 2007,[70] these agreements should also clearly identify the State of the Operator as the one in charge of registration. As to the implementation of Article IX OST[71], the suggested UNGA Resolution should invite States to adopt the Optional Rules for Arbitration[72] as agreed (and ideally *binding*) dispute resolution mechanism for such bilateral agreements. Finally, States could forward a *note verbale*[73] to the UN Secretary General informing of such agreements so to clarify their positions at the international level.

At the national level, States should be invited to create a special authorisation regime for private missions exploring the Moon.[74] Apart from appropriate insurance requirements, such regime should also include a twofold prohibition ensuring compliance with the above suggested international agreements.

In particular, it should be prohibited for national companies to launch their lunar missions from abroad in the absence of bilateral agreements with the State from whose territory or facility the launch will take place. Reciprocally, States with launching facilities should also deny authorisation to launch in the absence of bilateral agreements with the State procuring the launch.

A further issue that should also be addressed in this integrated approach is the transfer of ownership of a space object. Accordingly, the proposed UNGA Resolution might invite State to adopt a system similar to the one designed for Aviation by Article 83-bis of the Chicago Convention.[75]

At the national level, States should condition the transfer of ownership of space objects used in lunar missions to the existence of appropriate bilateral agreements. These should be formulated so to ensure that the new State of

70 *See* UN DOC A/RES/62/101.

71 G. M. Goh, *Dispute Settlement In International Space Law: A Multi-Door Courthouse For Outer Space 339-358 (2007)*.

72 Optional Rules for Arbitration of Disputes Relating to Outer Space Activities, Permanent Court of Arbitration, Effective December 6, 2011. UN DOC A/AC.105/C.2/2012/CRP.17.

73 As shown by the case of the Netherlands, *notes verbale* to the UN might be a suitable way to address issues not covered by the space treaties.

74 *Supra* 67.

75 The Chicago Convention has been adopted in 1944 with the purpose to develop an international legal framework for the regulation of *Civil Aviation*. Nearly 50 years after its adoption, Article 83-bis has been inserted in order to provide for the transfer of certain functions and duties from the State of Registry to the State of the Operator. *See* Convention on International Civil Aviation, done at Chicago in 1944.

Operator will respectively replace and indemnify the previous one in its responsibility and liability obligations. As to the rights coming from registration, again drawing insights from Aviation, such agreements should be provided with a formal delegation from the State of Registry to the new State of Operator for the exercise of jurisdiction and control over the object(s).
All in all, it can be concluded that there is no need to amend the Space Treaties to properly regulate private activities on the Moon. On the contrary, appropriate regulation can be ensured relying on Articles VI-IX OST as integrated by a specific UNGA Resolution and *ad hoc* provisions in national space legislations.

Conclusion. Future perspectives

At the end of our analysis, it should be clear how crucially important is international cooperation for the future exploration of the Moon.
Nowadays, all the major space powers have plans to permanently establish humans on the Moon by the end of next decade. Furthermore, the private sector is looking at the same goal with growing interest and will probably take the lead of future missions, once the possibility to make profits will be finally clarified. Legally speaking, it seems better to regulate States and private lunar exploration programs in different ways.
As to the former, it can be said that international cooperation between major space-powers will be better dealt in a revised version of the ISS' IGA. On the contrary, it appears that private activities and the *Moon Village* concept will be better served relying on Articles VI-IX OST as integrated by a new UNGA Resolution, *ad hoc* bilateral agreements and specific provisions in national space legislations.
As always, there is no right answer but just responsible choices. Whatever solutions one might prefer, it is of utmost importance that we all share the same goal to preserve the peaceful and free use of outer space. Doing otherwise will maybe prove to be beneficial in the short term, but in the long run it will certainly lead to the collapse of the current system of international space law, to the detriment of us all.

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Chapters

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