



Effective and Adaptive Governance for a Lunar Ecosystem

Executive Summary

Approved and adopted by SGAC

May 10th, 2021



SPACE GENERATION
ADVISORY COUNCIL



SPACE GENERATION
ADVISORY COUNCIL



c/o European Space Policy Institute (ESPI), Schwarzenbergplatz 6, Vienna A-1030, AUSTRIA
www.spacegeneration.org/eagle, eagle@spacegeneration.org, + 41 1718111830
© May 2021 E.A.G.L.E. Action Team & Space Generation Advisory Council

E.A.G.L.E. TEAM MEMBERS

The Action Team on Effective and Adaptive Governance for a Lunar Ecosystem (E.A.G.L.E. Team) was established in June 2020 by the Space Generation Advisory Council (SGAC) to provide the inputs of the young generations for peaceful and sustainable lunar development. In furtherance of this mandate, the E.A.G.L.E. Team developed a Lunar Governance Report, the present Executive Summary and a Lunar Manifesto. On May 10th, 2021 these documents have been officially endorsed by SGAC and consequently submitted as conference room papers at the 60th Session of the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).

Name	Nationality	Background
Antonino Salmeri (Lead/Editor)	Italy	Law & Policy
Nuria Ali	Kenya	Geology
Ghaida Aloumi	Saudi Arabia	Literature
Amelia Batcha	USA	Aerospace Engineering
Erwan Beauvois	France	Systems Engineering
Erin Gibbons	Canada	Earth and Planetary Sciences
Mclee Kerolle	USA	Law & Policy
Martin Losekamm	Germany	Aerospace Engineering
Carlos Mariscal	Mexico	Computer Engineering
Mariam Naseem	Canada/ Pakistan	Engineering, Business
Paolo Pino	Italy	Systems Engineering
Giuliana Rotola	Italy	Law & Policy
Mehak Sarang	USA	Strategy, Physics
Jenna Tiwana	UK	Business, Aerospace Engineering



ACKNOWLEDGMENTS

We would like to thank the **outstanding individuals** we have interviewed for the precious time and invaluable expertise offered in support of our work: **Aaron Boley** (Outer Space Institute - OSI), **Alessandro José Ferreira Carvalho** (Brazilian Space Agency), **Ian Christensen** (Secure World Foundation - SWF), **Marino Crisconio** (Agenzia Spaziale Italiana), **Carlos Espejel** (ispace), **Rodrigo Fernandez** (Asociación Chilena del Espacio - ACHIDE), **Steven Freeland** (Western Sydney University), **Mike Gold** (Redwire Space), **Michelle Hanlon** (For All Moonkind), **Chris Johnson** (SWF), **Aram Kerkonian** (Canada), **Koichi Kikuchi** (Japan Aerospace Exploration Agency), **Tanja Masson-Zwaan** (International Institute of Air & Space Law), **Dovilė Matulevičiute** (Luxembourg Space Agency), **Micheal Mealling** (Starbridge Venture Capital), **Piero Messina** (European Space Agency), **Loreto Moraga** (ACHIDE), **Dennis O'Brien** (The Space Treaty Institute), **Jose Ocasio-Christian** (Caelus Partners), **Dumitru-Dorin Prunariu** (Romania), **Giuseppe Reibaldi** (Moon Village Association), **Chelsea Robinson** (Open Lunar Foundation - OLF), **Masashi Sato** (SPACETIDE Foundation), **Jessy Kate Schingler** (OLF), **Andrew Simon-Butler** (OSI), **Rodrigo Suarez** (ACHIDE), **Mark J. Sundhal** (Global Space Law Center), **Gabriel Swiney** (U.S. Department of State), **Guoyu Wang** (Beijing Institute of Technology). We also would like to express our gratitude to **Catrina Melograna** for the design of the E.A.G.L.E. logo.

TABLE OF CONTENTS

1. INTRODUCTION	3
2. THE STATUS QUO	4
3. THE WAY FORWARD	6
4. CONCLUSION	12

1. INTRODUCTION

A new era of lunar exploration is upon us. Through a suite of missions to the lunar surface and its vicinity, discoveries of resource deposits in the lunar regolith and ice traps at the poles, among other features, have transformed our conception of humanity's potential future on the Moon. Consequently, private entities and nations worldwide with newly developed spacefaring capabilities have set their sights on returning to the Moon. As representatives of the young generations, we look at these plans with great interest and trepidation, thrilled at the idea of humanity becoming a multiplanetary society. At the same time, the Moon is humanity's only natural satellite. Its importance for our species transcends borders and unites generations since time immemorial. Thus, we want to ensure that all actors, present and future, can have shared and assured access to its exploration and use, while protecting



the unique features of its environment. In our view, the only way to do this is if we develop the Moon as an ecosystem: a circular environment where all humanity can thrive in peace.

As lunar plans turn to actions, it is essential to develop common guidelines and norms of behaviour as well as mechanisms to ensure their respect by all relevant actors. Coordinating activities on the surface of the Moon and ensuring the sustainable use of its resources are unprecedented endeavours that will require the development of innovative regulatory tools. To result in a circular ecosystem, we believe that a lunar governance regime should be based on four components: fairness, effectiveness, adaptiveness and sustainability. First, a lunar governance regime should guarantee safe access to, and shared enjoyment of, the exploration and use of the Moon as the province of all humankind. Second, a lunar governance regime should achieve these goals through stable decision-making processes and fast implementing procedures. Third, a lunar governance regime should connect these regulatory elements with the results of in-situ learning, incrementally evolving hand in hand with our knowledge of the lunar environment and experience with operations thereby. Fourth and finally, a lunar governance regime should pay due regard to the interests of future generations, preserving and enhancing their parallel right to explore and use the Moon.

Space Generation Advisory Council (SGAC) is the largest network of students and young professionals in the space industry. SGAC was conceived at UNISPACE III in 1999, whereby States resolved, as part of the Vienna Declaration, “to create a council to support the United Nations Committee on the Peaceful Uses of Outer Space, through raising awareness and exchange of fresh ideas by youth. Its vision is to employ the creativity and vigour of youth in advancing humanity through the peaceful uses of outer space”. In pursuance of this vision, SGAC recently entered the global debate on lunar governance to provide the perspective of the young generations on this crucial topic for the future of humanity. To this end, it established an action team focused on Effective and Adaptive Governance for a Lunar Ecosystem - the E.A.G.L.E. Action Team - consisting of 14 scientists, engineers, lawyers, policy analysts, and more, with representation from 10 countries. Built upon a genuine understanding of the value of cooperation and coordination across borders, the diversity of our team reflects our desire for international coordination. Over the course of a year, the E.A.G.L.E. Team analysed the technical, policy and legal landscape for lunar activities to understand how these elements come together to compose a bigger picture. To complement this analysis, the Team also met with 21 stakeholders across national space agencies, private industry, and non-governmental organisations, to stitch together the viewpoints and proposals of these various groups. The results of these efforts have been condensed in the E.A.G.L.E. Lunar Governance Report, which lays down the views and proposals of the young generations for a fair, effective, adaptive and sustainable lunar governance regime. Through our Report, we want to seal a global, intergenerational, and multistakeholder pact for the exploration and use of the Moon under a shared narrative of peace, inclusiveness, prosperity and sustainability.

This Executive Summary outlines the essential elements and proposals laid down in the [E.A.G.L.E. Report](#), to which we refer the reader for more specific and extensive arguments.

2. THE STATUS QUO

Section 2 of the report provides an overview of the *status quo* for the conduct and regulation of lunar activities. Section 2.1 considers technological firsts for lunar exploration, together with their legal and policy implications. Based on the conducted analysis, the Section found that the historical progression of lunar activity has shaped lunar exploration's legality, encompassing critical milestones related to space objects, debris, orbiting spacecraft, terrestrial organisms, crewed landings, sample removals and commercial lunar activities. To complement this analysis, the section also considered the current technical realities behind the renewed global interest in lunar exploration. These new realities have shaped the current interest in different lunar surface regions that provide a variety of value to scientific investigations, crewed exploration missions and, potentially, future commercial operations. In recent years, as a result of this renewed interest in the Moon, lunar policy developments have greatly accelerated, with the goal to operationalise the rules of international space law. Section 2.2 analyses these developments, including the Artemis Accords and documents produced by groups like the Hague Working Group, the Moon Village Association, the Open Lunar Foundation, the Space Treaty Project, and others, to identify shared ground and contentious issues around lunar policy developments.

Our analysis has highlighted seven topics on which existing policy proposals seem to generally align (listed in no particular order):

- 1) The importance of multilateralism.
- 2) The need for heritage protection.
- 3) The registration of lunar objects.
- 4) The importance of benefit sharing.
- 5) The need for dispute resolution.
- 6) The role of space resources.
- 7) The importance of interoperability.

To complement our analysis on the shared ground, we have also identified five contentious aspects in the development of lunar policies (listed in no particular order):

- 1) The governance regime.
- 2) The registration of activities.
- 3) Resource rights.
- 4) The role of safety zones.
- 5) Modes of coordination.

From this analysis, three overarching topics stood out both as shared ground and contentious issues: multilateralism, registration and space resources. While all actors praise the importance of multilateralism, they do not seem to agree on what should be the way forward to pursue it. Even though it is widely regarded that lunar objects should be registered under the Registration Convention, parties are divided as to the creation of a dedicated registry for lunar activities, the kind of activities that should be included in it, and what entity should maintain it. Finally, although it is generally recognised that sustainable

space exploration inevitably relies on *in situ* resources utilisation, there is debate as to how exactly this endeavour should be regulated, especially in view of its commercialisation. Given the early stages of lunar policy, the lack of a clear demarcation line between shared grounds and contentious issues is normal. Our analysis also revealed that proposed policies tend more to agree than disagree, and where there is disagreement, this seems to be primarily caused by a lack of clear understanding of the “adversary” positions.

To conclude the analysis on the status quo, Section 2.3 presents the needs and priorities of the global space community beyond what has been recommended in existing policy documents. These findings have been developed based on a series of interviews conducted by the E.A.G.L.E. team between September 2020 and February 2021 with 21 stakeholders representing the various segments and interests of the global space community. During our interviews, the development of a lunar economy has been constantly underlined as an essential component of sustainable lunar activities. To address this, we have found that lunar companies may benefit from more robust integration with terrestrial industries and markets. In the meantime, a greater in-space demand for products and services should be fostered with the enabling support of the public sector. This is where governments and space agencies come into play. These entities could and should provide better support to non-governmental lunar activities. From our understanding, public institutions are eager to act as catalysts for the growth of a stable lunar economy. The multi-stakeholder development of global standards and shared and interoperable infrastructures can prove to be a useful step forward in this direction. Adding the academic perspective into the equation, we have turned our attention to the potentially harmful and detrimental consequences of poor regulation and coordination. From the perspective of academia, the need for balanced solutions is underlined as more important than the need for *any* solution. Ultimately, we distilled the following five key global priorities, listed in no particular order, based upon our analysis of the lunar policy landscape:

1) International harmonisation is the key to adaptive governance.

The first priority refers to the development of a middle-level framework that could guide the application of the principles of the Outer Space Treaty (OST) to lunar activities, in order to enable international coordination among operators, enhance shared exploration among partners and provide sound guidance to companies.

2) Inclusive and transparent negotiations are vital for legitimate governance.

The second priority underscores the importance of inclusive and open diplomatic negotiations conducted with due regard to the interests of all States, as a fundamental condition to provide lunar governance with an adequate level of democratic legitimacy.

3) Multi-stakeholder discussions are crucial for effective governance.

The third priority reveals the added value of complementing diplomatic negotiations with contributions from a plurality of actors across the global society, to increase the effectiveness of the governance system thanks to their instances and expertise.

4) Public/private partnerships will be an essential component of a lunar economy.

The fourth priority refers to public entities supporting private lunar enterprises in the

development of robust business cases that can attract private financial investments, to democratise access to the Moon and reduce pressure upon States.

5) Technical aspects are just as critical as legal and policy developments.

The fifth and final priority underlines the critical role that can be played by technical integration for the establishment of a thriving lunar ecosystem, in particular through the development of shared standards, interoperable systems and common infrastructure.

This list of five global priorities is permeated by an overarching trend that we recognised as utmostly defining: sustainability. There cannot be a positive future on the Moon without this element, which must play a central role in the design of laws, technologies and missions.

3. THE WAY FORWARD

During our interviews, the work conducted by the E.A.G.L.E. Action Team has been greeted with great enthusiasm. In particular, much emphasis has been placed on the fact that as representatives of the new generations, we have the possibility and the responsibility to express our perspectives for the future of lunar governance. To this end, the third section of the Report outlines our proposal for a way forward. We hope it can contribute to the early solutioning of what a lunar governance landscape could look like, acknowledging that it will naturally evolve as human presence further expands on the Moon.

Driven by adaptiveness and inclusiveness, rather than crafting a dry list of fixed recommendations, we decided to focus on the development of a sharable narrative. The importance of this element became clear to us once we began to track the development of international space diplomacy, and noticed that there is a pattern. The regulatory tools devised in UNCOPUOS seemingly follow a life span of roughly 20 years. Treaties, principles, and guidelines each characterised two decades of international space diplomacy by providing a reference narrative for the community. After long reflection, we realised that the narrative of the next two decades could be captured by charters. With this term we refer to a legal document enacted to define the essential features and boundaries of a legal framework through the solemn commitment of its signatories. Examples of famous charters used in this sense include the *Magna Carta Libertatum*, the Charter of the United Nations and the Charter of Fundamental Rights of the European Union. All these documents implement the general properties of charters in different ways, depending on their context and purposes. Based on the analysis conducted in our Report, we found many reasons why a Charter could be the type of legal instrument needed at this point in international space diplomacy. Historically, charters fit in a time where technology and economic development constantly progresses at a rapid rate, like ours. Conceptually, charters encapsulate a general but coherent approach to the regulation of a given topic, like the one we need now. Finally, charters have a flexible legal nature: they can either be binding or non-binding, depending on the intents driving their processes.

Applying this reasoning to the regulation of lunar activities, Section 3 outlines our proposal for the global development of a Lunar Governance Charter. We believe that this Charter could help us achieve the peaceful development of the Moon as well as the sustainable use of its



resources. Broadening the discourse initiated already in various policy documents, a Lunar Governance Charter can clarify issues or misunderstandings on concepts such as safety zones, priority rights, heritage protection, interoperability, and commercial space. A Lunar Governance Charter can also consolidate existing consensus on the operationalisation of fundamental principles of space law within the context of lunar activities. Framed in these terms, we believe a Lunar Governance Charter will help us move forward from solid foundations while guiding the development of new ones.

Consistently with the analysis conducted throughout this Report, our proposal for a Lunar Governance Charter is not conceived as a finished product, but rather as the beginning of it. At the same time, we felt the responsibility of accompanying it with some substantive and procedural suggestions to help frame the development of multi-stakeholder dialogue. Section 3.2 addresses the fundamental topics that we believe should be included in the Charter. These could be divided into two groups: the foundations of the Charter and its potential provisions. Within the first group, we believe that a Lunar Governance Charter should begin by restating the fundamental rules of international space law that we all share, as well as the guiding principles shaping the development of the way forward. Within the second group, we believe that a Lunar Governance Charter should address ten aspects:

- 1) Inclusiveness.
- 2) Interoperability.
- 3) Human life protection.
- 4) Heritage preservation.
- 5) Science/business balance.
- 6) Use of lunar resources.
- 7) Safety zones.
- 8) Registration and liability.
- 9) Minimum coordination.
- 10) Conflict resolution.

Finally, Section 3.3 provides two fundamental procedural considerations for the development of the Charter. As a starting point, we naturally recognise UNCOPUOS as the primary forum for the negotiations of a Lunar Governance Charter. At the same time, we believe the global significance of the Moon requires a multi-stakeholder process drawing from the various perspectives of all humanity. Therefore, we suggest that UNCOPUOS find appropriate ways to receive and implement inputs from global society. Structurally speaking, for each item of Sections 3.2 and 3.3 we present a synthetic recommendation and then an elaboration on its reasons and goals. What follows below is the list of the substantive and procedural recommendations composing our proposal for a Lunar Governance Charter.

1) Fundamental principles of space law

A Lunar Governance Charter should naturally build upon the OST and invite all States planning to engage in lunar activities to ratify it. To this end, the Charter should underline the critical importance of the fundamental principles of international space law as laid down in the OST for the peaceful and sustainable development of the Moon. As a

complement to these principles, the Charter should recognise the usefulness of developing rules of responsible behaviour for sustainable activities within the lunar environment, similar to those provided for terrestrial ones by the UN Debris Mitigation Guidelines and the 2019 Long-Term Sustainability Guidelines for Outer Space Activities.

2) Guiding Principles for a Lunar Governance Charter

The development of a Lunar Governance Charter should be guided by the principles of adaptive governance and inclusiveness. The purpose of this Charter should be to enhance the peaceful development of the Moon as well as the sustainable use of its resources. To achieve these goals, the Charter should act as a minimum but comprehensive starting point providing the basis for further international and national regulation of lunar activities.

3) Inclusiveness

A Lunar Governance Charter should stress the importance of the province principle laid down in Article I OST and invite all States to cooperate and be inclusive in their exploration and use of the Moon. Accordingly, the Charter should invite all States involved in lunar operations to engage in capacity building and benefit sharing activities to the greatest extent practical, taking into particular account the needs of developing countries. To this end, the Charter should include an Annex laying down a protocol for internationally agreed benefit sharing and capacity building mechanisms for lunar activities. Following the principle of adaptive governance, this Annex should be updated by means of dedicated UNGA resolutions as developed in UNCOPUOS.

4) Interoperability

A Lunar Governance Charter should recognise the fundamental importance of interoperability for the sustainable development of the Moon. Based on the principle of subsidiarity, the Charter should invite States to identify a global platform for the multi-stakeholder development (and subsequent regular updates) of multiple open international standards for lunar activities.

5) Human Life Protection

Building upon Art. V OST and the Rescue and Return Agreement, a Lunar Governance Charter should declare the protection of human life as an absolute priority for every lunar operation. Accordingly, the Charter should invite all States to render all possible assistance to astronauts in distress no matter their nationalities. To this end, the Charter should underline the critical importance of developing interoperable human-life-support systems based on open international standards and invite States to prioritise them within the multi-stakeholder process suggested above.

6) Heritage Preservation

A Lunar Governance Charter should define a mechanism for identifying internationally recognised heritage sites on the Moon and invite all States to refrain from altering them to the greatest extent practical. To this end, the Charter could include an Annex providing

a non-definitive list of internationally recognised heritage sites on the Moon. Following the principle of adaptive governance, this Annex should be updated by means of dedicated UNGA resolutions as developed in UNCOPUOS.

7) Science/Business Balance

A Lunar Governance Charter should recognise that both scientific and commercial activities are equally important and that their interests should be adequately balanced on a case-by-case basis. To protect the fundamental freedom of scientific investigation on the Moon, the Charter should invite States to develop an Annex with a list of internationally recognised scientific sites on the Moon, including appropriate preservation measures, as soon as technological developments will allow for such assessments and in cooperation with relevant stakeholders. Following the principle of adaptive governance, this list should be updated through dedicated UNGA resolutions as developed in UNCOPUOS. To promote the development of a Lunar economy, the Charter should recognise the role of pioneering commercial operators and invite States to take appropriate measures to support their activities and protect their legitimate interests.

8) Use of Lunar Resources

A Lunar Governance Charter should recall that while the Moon is free for exploration and use by all States, this freedom is subject to the applicable limits as defined by existing international space law. In accordance with the principle of adaptive governance, we believe these limits must evolve in time to reflect scientific, technological, and economic developments. At the very least, the Charter should require that the Moon's territorial-based uses must be limited in time and size to ensure compliance with Articles I and II OST. Further, we suggest that the Charter acknowledges that the definition of what constitutes a lunar resource will likely evolve in time due to scientific, technological, and economic advancements and that related laws and governance principles must adapt accordingly. To ensure the sustainable development of the Moon, the Charter should invite States to develop an Annex with a list of internationally recognised scarce resources and appropriate preservation measures as soon as scientific and technological occurrences will allow for such assessments. Following the principle of adaptive governance, this list should be updated through dedicated UNGA resolutions as developed in UNCOPUOS.

9) Safety zones

A Lunar Governance Charter should define the fundamental purposes and features of safety zones. To this end, we suggest that the purpose of safety zones should be to avoid harmful interference among lunar operations. Further, we recommend that the size of safety zones should be limited to what is strictly necessary for avoiding harmful interference. Finally, we believe that the temporal extension and classification of safety zones should always be connected with ongoing operations in the concerned area. In compliance with Articles I, II, and IX OST, the Charter should clarify that safety zones cannot be keep-out zones and that actors entering a safety zone should previously consult with the State who declared it. To foster transparency and ensure coordination,

the Charter should invite States to timely and publicly declare their safety zones to the UN under Art. XI OST.

10) Liability and Registration

A Lunar Governance Charter should invite all States involved in lunar activities to ratify both the Liability and Registration Conventions. To enhance the applicability of liability rules, the Charter should clarify that States deviating from the standards developed pursuant to the Charter should be considered at fault in case of damages caused to compliant States. To promote transparency and foster coordination in the exploration and use of the Moon, the Charter should invite all States to promptly register their lunar objects and provide fundamental information on their nature, location and purposes.

11) Minimum Coordination

In accordance with the principle of adaptive governance, and building upon existing norms of international space law, a Lunar Governance Charter should identify minimum mechanisms for international coordination among both planned and ongoing lunar activities. To this end, the Charter should invite all States to proactively share essential information on their lunar activities under Article XI OST. Complementarily, the Charter should remind all States of their obligation to pay due regard and consult in case of potentially harmful interference with said activities under Article IX OST. To ensure uniformity in the national regulation of lunar activities, the Charter should invite all States to develop dedicated licensing systems for private lunar missions based on the principles of this Charter. To prevent contrasts among these missions, the Charter should invite all States to mutually recognise foreign licenses on a basis of reciprocity.

12) Conflict Resolution

In order to preserve the peaceful exploration and use of the Moon, a Lunar Governance Charter should stress the importance of having internationally recognised mechanisms for the amicable resolution of disputes in case bilateral negotiations would prove unsuccessful. As a starting point, the Charter should invite all States involved in lunar activities to include references to arbitration before international institutions like the Permanent Court of Arbitration (PCA) or the Dubai Space Court (DSC) within their agreements and contracts.

13) Multilateral Development

We recommend that UNCOPUOS should be the primary forum for the development of the proposed Lunar Governance Charter. To begin this process, we suggest the establishment of a new agenda item on "Adaptive Governance for Peaceful and Sustainable Lunar Activities" within the appropriate UNCOPUOS subcommittee(s). Consequently, we recommend entrusting the development of the Lunar Governance Charter to a dedicated working group established under the proposed agenda item.

14) Multi-Stakeholder Dialogue

We believe that UNCOPUOS should not be the only body involved in the development of a

Lunar Governance Charter. To ensure multi-stakeholder discussions, we recommend that the dedicated working group proposed in 3.3.1 admits UNCOPUOS observers, relies on the support of internal expert groups and dialogues with external multi-stakeholder platforms discussing similar topics. Should the development of the Charter not be entrusted to a dedicated working group, we recommend that States actively engage with non-governmental and private entities to leverage their perspective and contributions.

4. CONCLUSION

For one year, we listened to the voices of the space community. With this proposal, the time has come to express our own. Mindful of the benefits of plurality, we would like for our voice to help synchronise all the others, turning the current cacophony into a harmonious choir. Above all, we hope to spark the bright flame that has lit the best years of international space law, catalysing the existing potential for developing a lunar legal ecosystem that can honour the exploration and use of the Moon as the province of all humankind. With this purpose in mind, we birthed the idea of a Lunar Governance Charter as a shared narrative that could frame the global debate on lunar governance within pragmatic but also idealistic terms. We believe a Lunar Governance Charter could be a unique opportunity to seal an intergenerational pact for the peaceful and sustainable development of the Moon. As representatives of the young generations, to us the Moon is just the beginning, a springboard for our future interplanetary society. Similarly, we truly hope that our Report could be the beginning of a new process uniting all humanity under a narrative of peace, prosperity and sustainability. Sixty-two years ago, on July 20th 1969, an eagle carrying two men had landed on the Moon. Today, as humanity prepares for the historical landing of the first woman, a new eagle with fourteen young space enthusiasts onboard is taking off. And we cannot wait to see where it will land.

The SGAC Eagles

You can find us on:



spacegeneration.org/eagle