



THE HAGUE  
INTERNATIONAL  
SPACERESOURCES  
GOVERNANCE WORKING GROUP

## FINAL REPORT

THE HAGUE INTERNATIONAL SPACE RESOURCES  
GOVERNANCE WORKING GROUP

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## EXECUTIVE SUMMARY

This is the final report of The Hague International Space Resources Governance Working Group for its operation during the period January 2018 to December 2019. The final report for the operational period from January 2016 to December 2017 was concluded on 18 December 2017. It was sent to the members of the Working Group by email and was made available on the [website](#) of the Working Group.

The second phase of the Working Group was based on the Project Plan, which was distributed to the members on 1 December 2017 and evolved from the Project Plan of Phase 1 that established the Working Group and set out the main provisions for its operation. The project plan of the second phase included, amongst other things, an overview of the activities and schedule, as well as the preliminary estimate of the budget. According to its terms of reference, the objectives of the Working Group were the enhancement of its credibility by increasing its membership to a number of 35, further development of the Building Blocks, organization of outreach activities on the achieved results by involving local and regional actors, preparation for the development of an international agreement or non-legally binding instrument for the governance of space resource activities, the identification of relevant forums for the development of a governance framework, as well as its operation as a platform to exchange information among the stakeholders on progress of issues related to the use of space resources.

During the second phase, the Working Group continued the activities of the first phase and resumed the discussions on the Draft Building Blocks for the Development of an International Framework on Space Resource Activities, that were circulated on September 2017 as preliminary result of the Working Group.

The Building Blocks form the basis for a future governance framework agreement and are the focus of the work of the Working Group. They lay the ground for further discussion within the Working Group during and in the aftermath of the four face-to-face meetings that were held between April 2018 and November 2019. Their final text was adopted on 12 November 2019, under the title “Building Blocks for the Development of an International Framework on Space Resource Activities”.



## INTRODUCTION

The Hague International Space Resources Governance Working Group (the Working Group) was created in January 2016 on the basis of a Project Plan, and comprises of 32 members and 94 observers. Its platform is a Consortium serviced by a Secretariat. The Consortium consists of eight partners representing organizations from around the world and is functioning under a Memorandum of Understanding. The Secretariat consists of the Working Group's Executive Secretary and an Assistant Executive Secretary. The Working Group has a Chair and two Vice-Chairs. Most of the activities are carried out by email or teleconference calls, while face-to-face meetings are planned twice every year. The Working Group operates in a transparent and open manner, and important information is posted on the [website](#), as well as on its [facebook page](#) and [twitter account](#).

### I. OPERATION OF THE WORKING GROUP

#### *A. Platform: The Memorandum of Understanding on The Consortium of The Hague International Space Resources Governance Working Group*

The Memorandum of Understanding between the Consortium partners of the Working Group (MoU) was signed and copies were provided to each of the partners. The founding Consortium partner is the International Institute of Air and Space Law of Leiden University, The Netherlands. The Secretariat of the Working Group is hosted here. The other Consortium Partners are the Catholic University of Santos, Brazil; the Indonesian Centre for Air and Space Law of Padjajaran University, Indonesia; the Secure World Foundation, United States; the SpaceLab of the University of Cape Town, South Africa; the Nishimura Institute for Advanced Legal Studies, Japan; the University of Luxembourg, Luxembourg; and the Tenth to the Ninth Plus Foundation, United States.

According to the provisions of the Memorandum of Understanding, an evaluation call is held twice per year, in order to assess the implementation of the MoU by the Consortium partners. Four evaluations calls took place during the second phase, on 14 February 2018, on 15 October 2018, on 18 February 2019 and on 30 August 2019, and



were attended by the majority of Consortium Partners. During the calls, the activities carried out by the partners and the execution of the MoU provisions in the past as well as in the future were discussed.

### *B. Secretariat of the Working Group*

The Secretariat consists of the Executive Secretary and the Assistant Executive Secretary, who are in charge of managing the operation of the Working Group. Weekly status meetings have been held between the Executive Secretary and the Assistant Executive Secretary, in order to organize the activities of the Working Group and to set out its working plan. Coordination calls have also been arranged with the Chairs and the Vice-Chairs of the Working Group to discuss critical issues and prepare for the face-to-face meetings.

The Secretariat also created a webpage for the Working Group (<https://www.universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group>), which is continuously updated with the most recent developments and related documents, and maintains its social media accounts on twitter ([@SpaceResourceWG](https://twitter.com/SpaceResourceWG)) with more than 1,100 followers and on facebook with more than 700 followers (<https://www.facebook.com/TheHagueSpaceResourcesGovernanceWG/>).

### *C. Participation in the Working Group*

- *Members*

Members are major stakeholders from government, industry, universities and research centres. A list of the current members of the Working Group (Annex I) can be found online on the website of the Working Group. The number of members is limited to 35 and is currently fixed at 32. At the beginning of the second phase, in January 2018, the Secretariat announced an open call for membership, according to which the members of the second phase were selected, based on the criteria of geographical and background representation.

Members are responsible for making the decisions and are invited to attend all teleconferences and meetings of the Working Group. They are consulted before and



after every meeting, in order to provide their input for the discussions of the Group. They are also the primary participants of the face-to-face meetings.

- *Observers*

Observers are professionals directly involved in space resources issues and are invited to attend face-to-face meetings, but not teleconferences. During the meetings, they are heard after the members have presented their opinions. There is no restriction on the overall number of observers to the Working Group, but the number of observers per organisation is limited to two. Currently there are 94 observers to the Working Group, a list of whom can be found in Annex I. Since the beginning, the circle of observers has been extended to include representatives of international organisations, space agencies and start-up companies. A formal application to and admission by the Secretariat is required in order to become an observer. During the open call for membership, the applicants that were not accepted as members were invited to participate as observers.

The Working Group also maintains a mailing list of people who wish to receive updates on its developments, without being involved as members or observers.

- *Technical and Socio-Economic Panels*

In order to further validate the content of the Draft Building Blocks, in 2018 the Working Group introduced two panels to focus on specific aspects of space resource utilization. The Technical Panel was established in January 2018 and the Socio-Economic Panel was established in June 2018. Both panels reported to the Working Group during the meetings of April 2018, November 2018 and April 2019 and concluded their activities after the meeting of April 2019.

The Technical Panel provided technical expertise regarding the content of the Building Blocks and advised the Working Group on Technical aspects of space resource utilization. In particular, the Technical Panel was divided into three teams, each of which examined one of the following topics:

1. Frequency and orbit allocation for deep space missions,
2. Safety zones around space resource activities, and
3. Technical validation of the Building Blocks



The Technical Panel was chaired by Kyle Acierno and consisted of Angel Abbud Madrid, Kieran Carroll, Matt Cosby, Lindy Elkins-Tanton, Mike Gold, Sebastian Hernandez, Deepika Jeyakodi, Jan King, Bob Lamboray, Hannah Lindberg, Attila Matas, Scott Millwood, Rhonda O' Sullivan, Maria Antonieta Perino, John Rummel, Mitsuhiro Sakamoto, Franz Schilling, Ben Schwarz, Alan Scott, Emilie Siemssen, Sam Spencer, Peter Stibrany, Chris Verhoeven, Maneesh Verma, Yuguang Yang and Lynn Zoenen.

The Socio-Economic Panel worked on identifying the socio-economic challenges of space resource utilization and advised the Working Group about relevant developments, as well as the feasibility of the implementation of the Building Blocks. The Socio-Economic Panel provided input on the socio-economic aspects associated with the Building Blocks, including the sharing of benefits related to space resources utilization, the financing aspects and environmental impact of space resource activities, as well as the historical significance of space resources. During its function, it focused its analysis on the following topics:

1. Capacity building for benefiting from the exploration and utilization of space resources,
2. International cooperation models,
3. Principles of responsible investment for space resources, and
4. Social license to operate

The interdisciplinary panel was chaired by Ian Christensen and was joined by Marcia Alvarenga, Tamara Alvarez, Sergio Camacho, Gabriele Checcia, Kenji Fuma, Thema Iso, Muhammad Abdullah Khawar, Nikolai Khlystov, Ian Lange, Dovelé Matuleviciute, Juliette Neu, George Profitiliotis, and Giuseppe Reibaldi.

#### *D. Meetings of the Working Group*

##### *➤ First face-to-face meeting of the second phase, Leiden, 23-24 April 2018*

The first face-to-face meeting of the second phase of the Working Group was held from 23 to 24 April 2019, at the Old Observatory of Leiden University, the Netherlands. It was attended by a majority of members and observers and focused on the assessment of the Draft Building Blocks of September 2017. The Technical Panel



reported about its findings and suggested amendments to the text of the Draft Building Blocks, taking into account the technical aspects of space resource activities. The notes of the meeting were made available to the members and to the attending observers.



➤ *Second face-to-face meeting of the second phase, Luxembourg, 29-30 November 2018*

The second face-to-face meeting of the second phase was held from 29 to 30 November 2018 at the Weicker Building of Luxembourg University. The meeting was dedicated to the feedback received from the public consultation of the Draft Building Blocks of September 2017, which was distributed to the participants in advance of the meeting. During the meeting, the participants focused on the remarks that were most relevant to the text of the Draft Building Blocks and proposed changes and additions. Furthermore, the Technical Panel provided additional comments and the Socio-Economic Panel reported on its developments. The minutes of the meeting were distributed to all the participants.





➤ *Third face-to-face meeting of the second phase, Leiden, 15-16 April 2019*

The third meeting of the second phase of the Working Group took place at the Old Observatory of Leiden University from 15 to 16 April 2019 and was joined by many of the Working Group's members and observers. Before the meeting, the participants received the submitted comments regarding the Building Blocks, which were thoroughly discussed and changes to the Draft Building Blocks of September 2017 were made. The updated version of the Building Blocks was distributed to all members and observers, with the invitation to provide their feedback for consideration during the meeting of November 2019. During this third meeting, the Socio-Economic Panel presented its finding and suggestions to the Working Group. The notes of the meeting were distributed to the members and the participating observers.

After the meeting, the Netherlands Space Society (NVR), in collaboration with the IIASL of Leiden University and SpaceNed organized a symposium on "The Role and Relevance of the The Hague International Space Resources Governance Working Group", on the occasion of the appointment of Tanja Masson- Zwaan as Honorary Member of the Netherlands Space Society. The Chair, René Lefeber, the Vice-Chair Mike Simpson and members Mahulena Hofmann and Ian Crawford spoke about different topics related to space resource utilization and the Working Group.





➤ *Fourth face-to-face meeting of the second phase, Luxembourg, 11-12 November 2019*

The fourth face-to-face meeting of the second phase and last meeting of the Working Group was held from 11 to 12 November 2019 in Luxembourg. The meeting was organized in cooperation with Luxembourg University and took place at the Weicker Building. The purpose of the meeting was to finalise the Building Blocks and the deliverables of the Working Group. On 12 November 2019 the Working Group adopted the Building Blocks for the Development of an International Framework on Space Resource Activities. The Working Group also agreed that the Building Blocks will be published on the website and will be printed in booklets to be distributed to members, observers and other interested parties. The Building Blocks will be presented during the UNCOPUOS Legal Subcommittee 2020 by the Dutch Delegation. Furthermore, the Working Group agreed that a commentary of the Building Blocks will be published in early 2020 and will be available for purchase and for reading online on the website of the Working Group.





## II. OUTCOME OF THE SECOND PHASE: THE BUILDING BLOCKS FOR THE DEVELOPMENT OF AN INTERNATIONAL FRAMEWORK ON SPACE RESOURCES AND THE COMMENTARY TO THE BUILDING BLOCKS

### *A. The Building Blocks*

The Building Blocks for the Development of an International Framework on Space Resources represent the final result of the work of the Group and implement the input provided by members and observers before, during and after the eight face-to-face meetings that took place over its two phases. The initial set of building blocks was presented to the members of the Working Group during the first teleconference meeting in January 2016. The members were asked to provide their comments on the building blocks, in order to initiate discussion on their content. The building blocks were revised accordingly by the Working Group and formed the basis of discussion for the first face-to-face meeting in April 2016. Between each subsequent meeting, the members and observers of the Working Group were invited to provide their input regarding each revised version of the Building Blocks. During each meeting the participants proposed and agreed to changes and amendments to the Building Blocks. The Draft Building Blocks for the Development of an International Framework on Space Resource Activities were agreed on September 2017 and were circulated among the participants, as well as to the general public, for the purpose of soliciting feedback regarding their text. Toward this end, the Draft Building Blocks were printed and distributed by the Secretariat and by the members and observers in various events. Furthermore, a questionnaire about the Draft Building Blocks was made available on the website. The Working Group received 30 responses to the call for feedback via email and 60 responses to the questionnaire. The deadline for providing feedback was closed on 15 October 2018.

The Working Group addressed the received feedback during the meeting of November 2018 and proceeded to revise the text of the Draft Building Blocks during the meetings of April 2019 and November 2019. The final Building Blocks were adopted on 12 November 2019 and can be found below. They will be printed in booklets, which will be distributed to members and observers, as well as to relevant events.



# BUILDING BLOCKS FOR THE DEVELOPMENT OF AN INTERNATIONAL FRAMEWORK ON SPACE RESOURCE ACTIVITIES

## Introduction

*The utilization of space resources has great potential for the future of humankind. In order to create an enabling environment for space resource activities, The Hague International Space Resources Governance Working Group was created to promote international cooperation and multi-stakeholder dialogue. It has designed the building blocks below to lay the groundwork for international discussions on the potential development of an international framework, without prejudice to its form and structure. The Working Group adopted the Building Blocks on 12 November 2019. Pending the adoption and the operationalization of the international framework, States, international organizations, and non-governmental entities are encouraged to consider and use the Building Blocks.*

*Guided by the principle of adaptive governance, the Working Group considered it neither necessary nor feasible to attempt to comprehensively address space resource activities in the building blocks: space resource activities should be incrementally addressed at the appropriate time on the basis of contemporary technology and practices.*

*A commentary on the development of the Building Blocks with information on each of the Building Blocks will be made available at the beginning of 2020. Information about its publication will be posted on the website of the Working Group.<sup>1</sup>*

*The Working Group hopes that its activities will complement other efforts at the national, regional and global level to address space resource activities.*

### 1. Objective

- 1.1 The international framework should create an enabling environment for space resource activities that takes into account all interests and benefits all countries and humankind.

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<sup>1</sup> <https://www.universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group>





### **3. Scope**

- 3.1 The international framework should address States and international organizations, and could provide for the regulation of the conduct of States, international organizations, and non-governmental entities.
- 3.2 The international framework should address space resource activities within the solar system.

### **4. Principles**

- 4.1 The international framework should be consistent with international law.
- 4.2 The international framework should be designed to:
  - a) Adhere to the principle of adaptive governance by incrementally regulating space resource activities at the appropriate time;
  - b) Promote compatibility and predictability of domestic frameworks of States and internal frameworks of international organizations;
  - c) Contribute to sustainable development;
  - d) Prevent disputes arising out of space resource activities;
  - e) Promote and secure the orderly and safe utilization of space resources;
  - f) Promote the sustainable, rational, efficient and economic use of space resources;
  - g) Promote the use of sustainable technology;
  - h) Provide legal certainty and predictability for operators;
  - i) Take into particular account the needs of developing countries;
  - j) Take into particular account the needs of science;
  - k) Take into particular account the contributions of pioneer operators.
- 4.3 The international framework should provide that:
  - a) Space resources shall be used exclusively for peaceful purposes;
  - b) Space resource activities shall be carried out for the benefit and in the interests of all countries and humankind irrespective of their degree of economic and scientific development;



- c) Appropriate international consultations shall be undertaken in accordance with Article IX OST<sup>5</sup> if there is a reason to believe that any potentially harmful interference may be caused;
- d) International cooperation in space resource activities shall be conducted in accordance with international law.

## **5. International responsibility for space resource activities**

The international framework should provide that:

- a) States shall bear international responsibility for national space resource activities, whether such activities are carried out by governmental agencies or non-governmental entities, and for ensuring that such activities are carried out in conformity with the international framework;
- b) Non-governmental space resource activities shall require prior authorization and continuing supervision by the appropriate State;
- c) When space resource activities are carried out by an international organization, responsibility for compliance with the international framework shall be borne by the international organization and by the States participating in such organization.

## **6. Jurisdiction and control over space-made products used in space resource activities**

The international framework should provide that States have jurisdiction and control over any space-made products used in the space resource activities for which they are responsible.

## **7. Priority rights**

The international framework should enable the attribution of priority rights to an operator to search for and/or recover space resources for a maximum period of time and a maximum area upon registration in an international registry, and provide for the international recognition of such priority rights. The attribution,

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<sup>5</sup>1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.



duration, and the area of the priority right should be determined on the basis of the specific circumstances of a proposed space resource activity.

## **8. Resource rights**

- 8.1 The international framework should ensure that resource rights over raw mineral and volatile materials extracted from space resources, as well as products derived therefrom, can lawfully be acquired through domestic legislation, bilateral agreements and/or multilateral agreements.
- 8.2 The international framework should enable the mutual recognition between States of such resource rights.
- 8.3 The international framework should ensure that the utilization of space resources is carried out in accordance with the principle of non-appropriation under Article II OST.

## **9. Due regard for corresponding interests of all countries and humankind**

The international framework should provide that States and international organizations responsible for space resource activities shall give due regard to the corresponding interests of all countries and humankind.

## **10. Avoidance and mitigation of potentially harmful impacts resulting from space resource activities**

Taking into account the current state of technology, the international framework should provide that States and international organizations responsible for space resource activities shall adopt appropriate measures with the aim of avoiding and mitigating potentially harmful impacts, including:

- a) Risks to the safety of persons, the environment or property;
- b) Damage to persons, the environment or property;
- c) Adverse changes in the environment of the Earth, taking into account internationally agreed planetary protection policies;
- d) Harmful contamination of celestial bodies, taking into account internationally agreed planetary protection policies;
- e) Harmful contamination of outer space;
- f) Harmful effects of the creation of space debris;



- g) Harmful interference with other on-going space activities, including other space resource activities;
- h) Changes to designated and internationally endorsed outer space natural or cultural heritage sites;
- i) Adverse changes to designated and internationally endorsed outer space sites of scientific interest.

## **11. Technical standards for, prior review of, and safety zones around space resource activities**

11.1 The international framework should provide that States and international organizations shall require the conduct of a review prior to a decision to proceed with a space resource activity to ascertain that such an activity is carried out in a safe manner to avoid harmful impacts.

11.2 The international framework should encourage the development of:

- a) Procedures to ensure that equipment, operational procedures, and processes applied in space resource activities avoid harmful impacts;
- b) Methodologies to assess that equipment, operational procedures, and processes applied in space resource activities meet common technical standards (conformity assessment);
- c) Technical standards for equipment, operational procedures, and processes applied in space resource activities (standardization).

11.3 Taking into account the principle of non-appropriation under Article II OST, the international framework should permit States and international organizations responsible for space resource activities to establish a safety zone, or other area-based safety measure, around an area identified for a space resource activity as necessary to assure safety and to avoid any harmful interference with that space resource activity. Such safety measure shall not impede the free access, in accordance with international law, to any area of outer space by personnel, vehicles and equipment of another operator. In accordance with the area-based safety measure, a State or international organization may restrict access for a limited period of time, provided that timely public notice has been given setting out the reasons for such restriction.



11.4 The international framework should provide that appropriate international consultations are undertaken in case of possible overlap of safety zones or conflicts involving the freedom of access recognized by international law.

## **12. Monitoring and redressing harmful impacts resulting from space resource activities**

12.1 The international framework should provide that States and international organizations shall ensure monitoring of any harmful impacts resulting from space resource activities for which they are responsible.

12.2 If a harmful impact resulting from a space resource activity occurs, or is reasonably expected to occur, the international framework should provide that the State or international organization responsible for the space resource activity shall implement measures to respond to such harmful impact (response measures) and consider whether the space resource activity should be adjusted or terminated (adaptive management).

## **13. Sharing of benefits arising out of the utilization of space resources**

13.1 Bearing in mind that the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and humankind, the international framework should provide that States and international organizations responsible for space resource activities shall provide for benefit-sharing through the promotion of the participation in space resource activities by all countries, in particular developing countries. Benefits may include, but not be limited to, enabling, facilitating, promoting, and fostering:

- a) The development of space science and technology and of its applications;
- b) The development of relevant and appropriate capabilities in interested States;
- c) Cooperation and contribution in education and training;
- d) Access to and exchange of information;
- e) Incentivization of joint ventures;
- f) The exchange of expertise and technology among States on a mutually acceptable basis;



g) The establishment of an international fund.

13.2 The international framework should not require compulsory monetary benefit-sharing.

13.3 Operators should be encouraged to provide for benefit-sharing.

#### **14. Registration and sharing of information**

The international framework should provide that States and international organizations shall:

- a) Register priority rights of an operator to search and/or recover space resources in accordance with the international framework;
- b) Give advance notification of space resource activities, including any area-based safety measure associated with them, for which they are responsible through an international database;
- c) Register space objects in accordance with the REG,<sup>6</sup> United Nations General Assembly Resolution 1721 B (XVI),<sup>7</sup> or Article XI OST, taking into account United Nations General Assembly Resolution 62/101;<sup>8</sup>
- d) Notify frequency assignments for recording in the Master International Frequency Register in accordance with the Radio Regulations of the International Telecommunication Union;
- e) Provide, taking into account Article XI OST and the legitimate interests of operators, information and best practices on the prior authorization and continuing supervision of space resource activities for which they are responsible through an international database, including:
  - i. The purposes, locations, orbital parameters, and duration of space resource activities;
  - ii. The nature, conduct, and locations of space resource activities and associated logistic activities, for example deployment of stations, installations, equipment and vehicles;

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<sup>6</sup> 1975 Convention on the Registration of Objects Launched into Outer Space.

<sup>7</sup> 1961 Resolution 1721 B (XVI) adopted by the United Nations General Assembly, International Cooperation on the Peaceful Uses of Outer Space.

<sup>8</sup> 2008 Resolution 62/101 adopted by the United Nations General Assembly, Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects.



- iii. The results of space resource activities;
  - iv. Any phenomena discovered in outer space which could endanger terrestrial life or health, as well as of any indication of extraterrestrial life;
  - v. Any harmful impacts resulting from space resource activities for which they are responsible and the measures planned or implemented to redress such impacts;
- f) Notify the termination of space resource activities for which they are responsible through an international database together with a statement on the condition of the area where the space resource activity was carried out, including the presence of any space objects or space-made products, or parts thereof.

## **15. Provision of assistance in case of distress**

The international framework should provide for the applicability of Article V OST and the ARRA<sup>9</sup> to persons involved in space resource activities.

## **16. Liability in case of damage resulting from space resource activities**

16.1 The international framework should provide for the applicability of Articles VI and VII OST and the LIAB<sup>10</sup> to damage resulting from space resource activities.

16.2 The international framework should encourage initiatives of operators to provide, individually or collectively, compensation for damage resulting from their space resource activities.

## **17. Visits relating to space resource activities**

The international framework should provide for the applicability of Article XII OST, taking into account the legitimate interests of operators, including safety of operations and protection of intellectual property.

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<sup>9</sup> 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Space.

<sup>10</sup> 1972 Convention on International Liability for Damage Caused by Space Objects.



## **18. Institutional arrangements**

The international framework should provide for:

- a) The establishment and maintenance of a publicly available international registry for registering priority rights of an operator to search and/or recover space resources;
- b) The establishment and maintenance of an international database, in addition to the international registry, for making publicly available:
  - i. Advance notifications of space resource activities, including any area-based safety measures;
  - ii. Information and best practices;
  - iii. The list of designated and internationally endorsed outer space natural and cultural heritage sites; and
  - iv. The list of designated and internationally endorsed sites of scientific interest;
  - v. Information and best practices on the prior authorization and continuing supervision of space resource activities for which States and international organizations are responsible;
  - vi. Notifications of the termination of space resource activities for which States and international organizations are responsible.
- c) The designation or establishment of an international body or bodies responsible for:
  - i. The consideration and promotion of best practices;
  - ii. The listing of designated and internationally endorsed outer space natural and cultural heritage sites, and sites of scientific interest;
  - iii. The monitoring and review of the implementation of the international framework; and
  - iv. The governance of the international registry, the international database and any other mechanism that may be established for the implementation of the international framework.

## **19. Settlement of disputes**

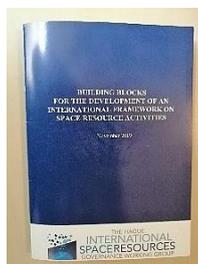
The international framework should encourage recourse by States, international organizations and operators to the resolution of disputes



through adjudicatory, non-adjudicatory or hybrid mechanisms, for example by developing procedures for consultation or promoting the use of the 2011 Permanent Court of Arbitration Optional Rules for Arbitration of Disputes Relating to Outer Space Activities.

## 20. Monitoring and review

Mechanisms should be developed for monitoring implementation of the international framework, for example on the basis of reports of States and international organizations, as well as for its review and further development consistent with the principle of adaptive governance.



The printed booklet of the Building Blocks

### *B. The Commentary*

During its second phase, the Working Group prepared a Commentary to the Building Blocks, which would offer background information about the Working Group and the formulation of the Building Blocks. The drafting of the Commentary was managed by Olavo Bittencourt. An Editorial Committee consisting of Olavo Bittencourt, Mahulena Hofmann, Tanja Masson-Zwaan and Dimitra Stefoudi worked on compiling the Commentary. They were assisted by a Resources Team consisting of Thomas Cheney, Sara Ferreira, Dovilė Matuleviciute, Antonino Salmeri and Martin Svec, which provided the material for the initial draft.

The Commentary was approved by the Working Group as an effort of the Editorial Committee that reflects the work of the Working Group during its two phases from 2016 to 2019. The Commentary will be published in early 2020 and will be available for purchase by Eleven Publishers, as well as for reading on the website of the Working Group.



### III. OUTREACH ACTIVITIES

The Working Group has been present, through its members and observers, at various international events in an effort to increase the transparency and outreach of its activities. Furthermore, the Consortium Partners have organized several activities, in an effort to promote the work of the Group and raise awareness on the issue of space resource governance.

#### A. *Activities of the Working Group*

➤ *57<sup>th</sup> UNCOPUOS Legal Subcommittee, Vienna, Austria, 13 April 2018*

The Working Group, in cooperation with the University of Vienna and observer Irmgard Marboe, organized a side-event during the 57<sup>th</sup> session of the UNCOPUOS Legal Subcommittee. The event consisted of a panel discussion during the break between the morning and the afternoon sessions and a catered lunch. The purpose of the event was to inform the UNCOPUOS Delegates about the developments of the Working Group and the Draft Building Blocks. The panel was introduced by Prof. Irmgard Marboe and was joined by the Executive Secretary, Giuseppe Reibaldi, who spoke about the Working Group, Vice-Chair, Olavo Bittencourt, who presented the Draft Building Blocks and member, Sagi Kfir, who added some industrial perspectives on space resource utilization. During the event copies of the Draft Building Blocks' booklets were distributed to the attendants.

➤ *69<sup>th</sup> International Astronautical Congress, Bremen, Germany, 1-5 October 2018*

A paper reporting on the progress of the Working Group was submitted for the IISL Colloquium on the Law of Outer Space during the International Astronautical Congress in Bremen, Germany. The paper was titled "The Hague International Space Resources Governance Working Group: Third Progress Report" and was presented on 5 October 2018, during the session "The relationship between space law and cyberlaw, and other recent developments in space law". The paper was co-authored by René



Lefeber, Tanja Masson-Zwaan, Giuseppe Reibaldi and Dimitra Stefoudi and was published in the Proceedings of the International Institute of Space Law 2018.

The Working Group also organized a side event during the International Astronautical Congress, with the purpose to raise awareness about its work and the Draft Building Blocks among the congress participants. During the event, Executive Secretary Giuseppe Reibaldi presented the Working Group purpose and developments, and Vice-Chair Michael Simpson spoke about the status of and the feedback received on the Draft Building Blocks. The Chair of the Technical Panel, Kyle Acierno and the Chair of the Socio-Economic Panel, Ian Christensen, discussed respectively the technical and socio-economic aspects of space resource utilization.

➤ *NewSpace Europe 2018, Luxembourg, 27 November 2018*

The NewSpace Europe 2018 conference included a session on lunar economy, where space resource utilization was discussed. During this panel the Executive Secretary, Giuseppe Reibaldi, and members Tanja Masson-Zwaan and Mathias Link spoke about the progress of the Working Group and the Draft Building Blocks.

➤ *70<sup>th</sup> International Astronautical Congress, Washington DC, United States, 21-25 October 2019*

The final progress report paper was submitted at the International Astronautical Congress, which took place in Washington DC in October 2019. The paper titled “The Hague International Space Resources Governance Working Group: Final Progress Report” was co-authored by René Lefeber, Tanja Masson-Zwaan, Giuseppe Reibaldi and Dimitra Stefoudi and was presented on 24 October 2019 during the session “Space resources: Technologies, Systems, Missions and Policies” of the IAA Symposium on Visions and Strategies for the Future.

➤ *NewSpace Europe 2019, Luxembourg, 13 November 2019*

During the NewSpace Europe 2019 conference, a session was dedicated to the Working Group, titled “Special Announcement from the Hague International Space Resources



Governance Working Group”. The session was chaired by the Executive Secretary, Giuseppe Reibaldi and focused on the adoption of the Building Blocks for the Development of an International Framework on Space Resource Activities, the Commentary to the Building Blocks, the national implementation of the Building Blocks, the Consortium of the Working Group, as well as the technical and the socio-economic aspects of space resource utilization.

The panel consisted of Vice-Chair Olavo Bittencourt and Mike Simpson, members Mahulena Hofmann and Mathias Link and the Assistant Executive Secretary Dimitra Stefoudi.

The Working Group has also been quoted on many occasions, such as news items, academic articles and newsletters of organizations, thus managing to increase its visibility and prove its status as authoritative point of reference on the issue of space resources governance.

➤ *The Working Group in the press*

The Working Group has been featured in a number of occasions on various media outlets. The following articles were dedicated to the adoption of the Building Blocks:

- <http://www.parabolicarc.com/2019/12/18/building-blocks-of-a-future-space-economy/>
- <https://spacewatch.global/2019/12/adoption-of-the-building-blocks-for-the-development-of-an-international-framework-on-space-resource-activities/>

B. *Activities of the Consortium Partners*

➤ *International Institute of Air and Space Law, Leiden University, The Netherlands*

The International Institute of Air and Space Law committed to the work of the Group by hosting its Secretariat. Assistant Professor Tanja Masson-Zwaan focused on outreach by presenting the developments of the Working Group in events around the world, including the World Government Summit (February 2018), the International



Space Exploration Forum in Japan (March 2018), the Space Symposium in Colorado Springs (April 2018), the ESTEC In-Situ Space Resource Utilization Workshop (July 2018), NewSpace Europe (November 2018), the Bocconi School of Business “Mining the Moon for Profit” Workshop (March 2019), and the UN/APSCO Space Law Conference (September 2019).

Tanja Masson-Zwaan has also been interviewed on several occasions, where she mentioned the contributions of the Working Group, and has co-authored the progress report papers submitted during the International Astronautical Congress in 2018 and 2019.

The International Institute of Air and Space Law addresses the issue of space resource governance in the academic curriculum of the Adv. LL.M. in Air and Space Law of Leiden University, where the Working Group developments are discussed. Furthermore, the Academic Staff of the Institute supervises every year LL.M. theses and student papers on topics related to space resources. Tanja Masson-Zwaan and Dimitra Stefoudi have also addressed the governance of space resources and the Working Group in the framework of the International Space University Space Studies Program 2018 and 2019, where they organised workshops about space resource activities and the Draft Building Blocks, as well as during the Executive Space Course in 2018 with a presentation by Tanja Masson-Zwaan on the legal issues related to space resources. Tanja Masson-Zwaan has also participated in a panel discussion on the legal aspects of space resources at the ECSL Summer Course on Space Law and Policy in 2018.

Tanja Masson-Zwaan, together with Mahulena Hofmann, presented the Draft Building Blocks during the official visit of the King of The Netherlands to Luxembourg in May 2018, and invited the members of the International Institute of Space Law to read and comment on their text.

➤ *Catholic University of Santos, Brazil*

The Catholic University of Santos organised the 1<sup>st</sup> Latin American Workshop on Global Governance of Space Resources, which took place from 16 to 17 May 2018 and included a break-out session about providing feedback on the Draft Building Blocks.



In May 2019, Olavo Bittencourt presented the developments of the Working Group during a conference organized by RELACA (Red Latino Americana y del Caribe de Universidades e Instituciones que Investigan sobre la Tecnología, la Política y el Derecho del Espacio Ultraterrestre), an organization that focuses on space technology, policy and law.

The University contributed in raising awareness on the role and progress of the Working Group through its media channels, especially its TV channel, which hosted a dedicated presentation by Olavo Bittencourt. The University also maintains cooperation with other Latin American Universities and promotes research collaboration on space law and the governance of space resources.

Olavo Bittencourt also leads the Astropolitics Research Group at the Catholic University of Santos, which includes research on the governance of space resources and took into account the Draft Building Blocks. He has incorporated the topic of space resources, including references to the Working Group, into the teaching of space law at the Catholic University of Santos and has supervised LL.M. theses on the same topic.

Olavo Bittencourt is managing the Editorial Committee of the Commentary on the Building Blocks for the Development of an International Framework on the Governance of Space Resources and has worked on translating the Building Blocks in Portuguese.

➤ *Indonesian Centre for Air and Space Law, Jakarta, Indonesia*

The Indonesian Center for Air and Space Law has organized a series of Focus Group Discussions with LAPAN and invited legal experts on the development of issues concerning space resources and on the progress of the Working Group. Furthermore, Atip Latifulhayat has participated to the conference on “The Blue Print of the Indonesian National Space Policy” organized by LAPAN in collaboration with Padjajaran and Airlangga universities, which included a session dedicated to space resources.



➤ *Secure World Foundation, USA*

The Secure World Foundation in cooperation with the Space Economy Evolution Lab of the SDA Bocconi School of Management and the Space Policy Institute of the George Washington University organized the workshop "Mining the Moon for Profit: A Case Study in Space Resource Utilization" in Milan on 11 March 2019. It also organized, in collaboration with the South African National Space Agency (SANSA) and the Department of International Relations and Cooperation (DIRCO), a Workshop on the "Socio-Economic Benefits of Space Resource Utilization, African Perspectives", which took place in Pretoria from 23 to 24 May 2019.

Ian Christensen introduced the Building Blocks in the events to which he participated, including the 1<sup>st</sup> Latin American Workshop on Global Governance of Space Resources (May 2018), the Roundtable on Space Resources at the Colorado School of Mines (June 2018) and the ORF Kalpana Khawla Annual Space Policy Dialogue (April 2019). He also presented on the topic Civil Society Participation in Space Exploration Policy: An NGO's experience with Hague International Space Resources Governance Group" during the UN/Jordan Workshop "Global Partnership in Space Exploration and Innovation", which took place in Amman in March 2019. He has also has co-authored an article titled "New policies needed to advance space mining", published in the Issues in Science and Technology and is regularly lecturing at the Colorado School of Mines on the policy and legal aspects of space resources governance, with reference to the Working Group. Finally, Ian Christensen presented a paper during IAC 2019 titled "Characterizing and Classifying International Cooperation for Space Resources Development: Actors, Objectives, and Models", which referred to the work of the Socio-Economic Panel and to the Building Blocks.

➤ *Space Lab, University of Cape Town, South Africa*

Prof. Peter Martinez represented the University of Cape Town and the Secure World Foundation, as Executive Director, since elected in 2018. The SpaceLab of the University of Cape Town organised from 23 to 24 May 2019 in Pretoria a Workshop on the "Socio-Economic Benefits of Space Resource Utilization, African Perspectives", in cooperation with the South African Space Council and the Secure World



Foundation. During the Workshop, the Draft Building Blocks were presented and discussed, along with the technical, socio-economic and legal aspects of the governance of space resources.

Furthermore, the topic of space resources governance has been added to the curriculum of the Space Studies Master of the University of Cape Town. In February 2018 Peter Martinez gave a presentation on space resource utilization and the developments of the Working Group in the framework of the post-graduate course Space and Society. The presentation was attended by officials from the Department of Trade and Industry and from the South African Space Council and was followed by discussion on the Draft Building Blocks.

➤ *University of Luxembourg, Luxembourg*

Professor Mahulena Hofmann organised a workshop titled "Developing Space Resource Activities: Regulatory Aspects" in Prague in April 2019 with presentations on topics related to space resource utilization, as well as a specific panel dedicated to the Building Blocks.

Mahulena Hofmann has presented the progress of the Working Group and the Building Blocks in several international events, including the ILA Conference (August 2018), the UNOOSA/Roscosmos Space Law Conference (September 2018), the 10<sup>th</sup> International Symposium "Rethinking the Future" (September 2018), the conference on "Innovation, Space Technologies and Patents" organized by the European Patent Office (October 2018), the 2<sup>nd</sup> International BIT Space International Symposium (November 2018), and the Global Space Congress (March 2019). Together with Tanja Masson-Zwaan, she presented the Draft Building Blocks during the official visit of the King of The Netherlands to Luxembourg (May 2018).

Mahulena Hofmann has contributed to a number of publications on space resource utilization, where she refers to the developments of the Working Group, including a chapter on space resources in the revised edition of the "Introduction to Space Law", co-edited with Tanja Masson-Zwaan (2019), and a paper titled "ITU Framework: A Model for an International Regime of Space Resources?", published in the 2018 Proceedings of the IISL.



The University of Luxembourg has implemented the teaching of space resources governance in the curriculum of the Master on Space, Communication and Media Law, and it introduced this subject in a new Interdisciplinary Master (ISM). Professor Mahulena Hofmann supervises a number of LL.M. and PhD theses on topics related to space resources. She has also incorporated the topic of space resource utilization into the teaching of international law at Charles University in the Czech Republic.

➤ *Nishimura Institute of Advanced Legal Studies, Japan*

The Nishimura Institute of Advanced Legal Studies organized on 4 March 2018 a Workshop on the “Space Law and Policy Strategies for Building Moon Bases and Exploiting its Space Natural Resources” in the framework of the International Space Exploration Forum. One of the sessions focused specifically on the utilization of space resources and addressed the content of the Draft Building Blocks.

The Nishimura Institute has briefed on several occasions government representatives about the progress and outcomes of the Working Group. In particular, the Building Blocks have been brought to the attention of, among others, the Cabinet Office Task Force “Regulatory Environment to Support New Space Business” and the “NewSpace Study Group” of the governing political party. The Nishimura Institute will provide a Japanese translation of the Building Blocks and has published an article concerning the progress of the Working Group in the Japanese Legal Journal “Journal of International Business Law”. It has also cooperated with Neural, Inc., which specializes in sustainable business and business ethics, to introduce the Building Blocks to the “Sustainable Japan” portal.

➤ *Tenth to the Ninth Plus Foundation, USA*

Michael Simpson addressed the draft Building Blocks at several events, including UNISPACE +50 (June 2018), IAC 2018 (October 2018), and IAC 2019 (October 2019). He has also been involved in the organization of activities relating to space resource utilization, with reference to the work of the Working Group, during the International Space University Space Studies Program 2018 and Southern Hemisphere Space Studies Program 2019.



Mike Simpson gave a presentation titled “Benefit and the Outer Space Treaty: Principle and Pathway”, emphasising on the developments of the Working Group in this regard, during the symposium “The Role and Relevance of The Hague International Space Resources Governance Working Group”, on 16 April 2019.

## CONCLUSION

During its second phase of operation, The Hague International Space Resources Governance Working Group has functioned in a transparent manner as a multi-stakeholder platform with diverse representation from governments, industry, academia, and international organizations, among others.

The Working Group has managed to fulfill its objectives to assess the need for a regulatory framework for space resource activities and to prepare the basis for such a regulatory framework. It also achieved meeting its deliverables, namely the identification and formulation of building blocks for the governance of space resource activities with the adoption of the Building Blocks for the Development of an International Framework on Space Resources. The Working Group concluded its activities in 31 December 2019.



## ANNEX I – Participants of The Hague Space Resources Governance Working Group

Surname	Name	Affiliation	Country
<b>Members and Consortium Partners</b>			
Bittencourt Neto	Olavo	Catholic University of Santos	Brazil
Christensen	Ian	Secure World Foundation	USA
Fujii	Kojiro	Nishimura Institute for Advanced Legal Studies	Japan
Hofmann	Mahulena	University of Luxembourg	Luxembourg
		Indonesian Institute of Air and Space Law, Padjajaran	
Latifulhayat	Atip	University	Indonesia
Martinez	Peter	SpaceLab, University of Cape Town	South Africa
Masson-Zwaan	Tanja	IIASL, Leiden University	The Netherlands
Simpson	Michael	Ten To The Ninth Plus Foundation	Ireland
<b>Members</b>			
Acierno	Kyle	ispace Inc.	Luxembourg
Al Rashedi	Naser	UAE Space Agency	UAE
Cheney	Thomas	Space Generation Advisory Council	UK
Crawford	Ian	Birbeck College	UK
Gold	Michael	MAXAR Technologies	USA
Hunter-Scullion	Mitch	Asteroid Mining Corporation	UK
Kfir	Sagi	Deep Space Industries	USA
Kriening	Torsten	PT Scientists	Germany
Link	Mathias	Ministry of the Economy	Luxembourg
Marchisio	Sergio	Agenzia Spaziale Italiana	Italy
Mariez	Julien	CNES	France
Nair	Praveen	Indian Space Research Organisation	India
Porras	Daniel	UNIDIR	Mexico
Ramirez	Rosa Maria	Mexican Space Agency	Mexico
Reinohl	Michal	Ministry of Transport	Czech Republic
Rummel	John	COSPAR	USA
Sakamoto	Mitsuhiro	International Telecommunication Union	Japan
Sundahl	Mark	Cleveland-Marshall College of Law	USA
Supancana	Ida Bagus Rahmadi	Catholic University of Atma Jaya	Indonesia
Veneziano	Anna	UNIDROIT	Italy
Wang	Guoyu	Institute of Space Law, Beijing Institute of Technology	China
Welch	Chris	International Space University	France
De Wet	Sandea	Government of South Africa	South Africa
Yahaya	Isah Akor	National Space Research and Development Agency	Nigeria
<b>Observers</b>			
Abbud-Madrid	Angel	Colorado School of Mines	USA



Abhijeet	Kumar	National Law School of India University, Bangalore	India
Agnan	Marco	Odysseus Space	Israel
Aloia	Vinicius	Catholic University of Santos	Brasil
Alvarez	Tamara	New School for Social Research	UK
Arnould	Jacques	CNES	France
Baseley-Walker	Ben	Andart Global	USA
Black	Charles	Sen	UK
Blount	PJ	University of Luxembourg	Luxembourg
Burger	Edward	ESPI	Austria
Camacho	Sergio	National Institute of Astrophysics, Optics and Electronics	Mexico
Castillo Olascoaga	Teresa	Mexican Space Agency	Mexico
Cecchia	Gabriele	Ambassador (ret.)	Italy
Clanton	Michael	Mothership Communications	USA
Cocco	Magda	Vieira de Almeida	Portugal
Correia Mendonca	Helena	Vieira de Almeida	Portugal
De Man	Philip	Katholieke Universiteit Leuven	Belgium
Dinsley	Ralph	Northern Space and Security Limited & Reflecting Space	UK
Di Pippo	Simonetta	UNOOSA	Austria
Eldholm	Maria	PT Scientists	Germany
Ellis	Kim	Earth and Space Technology Pty Ltd	Australia
Faires	Wes	Space Rights, LLC	USA
Ferreira	Luis	Airbus	Germany
Fuma	Kenji	Neural Inc.	Japan
Gabrynowicz	Joanne Irene	University of Mississippi	USA
Galache	JL	Aten Engineering, Inc.	USA
Gladysz	Blazej	Arendt & Medernach SA	Luxembourg
Goncharova	Victoria	Embassy of the Russian Federation in The Netherlands	Russia
Graps	Amara	Baltics in Space	Latvia
Hanlon	Michelle	For All Moonkind, Inc.	USA
Harrington	Andrea	Air Command and Staff College	USA
Hearsey	Chris	OSA Consulting	USA
Hedman	Niklas	UNOOSA	Austria
Hernandez	Sebastian	Trimble, Inc.	Spain
Hobe	Stephan	Institute of Air and Space Law, Cologne University	Germany
Huidobro	Marina	Catholic University of Santos	Brasil
Israel	Brian	Planetary Resources	USA



Jah	Moriba	The University of Texas at Austin	USA
Jeffreys	Rachel	UK Space Agency	UK
Johnson	Chris	Secure World Foundation	USA
Kaesmann	Oriane	Luxembourg Space Tech Angels Association	Luxembourg
Kapoglou	Angeliki	ESA	Netherlands
Keravala	Jim	OffWorld	USA
Keunen	Lisa	University of Glasgow	UK
Khawar	Muhammad Abd.	Engro Corp.	Pakistan
Khlystov	Nikolai	World Economic Forum	USA
Kozuka	Souichiro	Gakushuin University	Japan
Kumar	Saurabh	National Law University, Jodhpur	India
Kunstadter	Chris	XL Catlin	USA
Kyriakopoulos	George	National and Kapodistrian University of Athens	Greece
La Regina	Veronica	RHEA Group	Italy
Lange	Ian	Colorado School of Mines	USA
Liang	He	Ministry of Foreign Affairs	China
Listner	Michael	Space Law & Policy Solutions	USA
Marboe	Irmgard	University of Vienna	Austria
Marinova	Aleksandra	Asteroid Mining Corporation	Bulgaria
Martin	Anne-Sophie	University La Sapienza	Italy
Masaki	Sugamiya	JAXA	Japan
Matuleviciute	Dovile	Ministry of the Economy	Luxembourg
Messina	Piero	European Space Agency	France
Mijovic	Milan	SERBSPACE	Serbia
Miller	Zachary	VAERO Space Research, LLC	USA
Millwood	Scott	DLR Scientific Research Center (personal capacity)	Germany
Muzyka	Kamil	EX-PL - Polish Space Exploration Group	Poland
Neu	Juliette	Cingeto	USA
O'Brien	Dennis	The Space Treaty Project	USA
Ocasio-Christian	Jose	Caelus Partners	USA
O'Sullivan	Rhonda	Glencore	Australia
Othman	Mazlan	Academy of Sciences	Malaysia
Palkovitz	Neta	Innovative Solutions in Space B.V.	Netherlands
Profitiliotis	George	National Technical University of Athens	Greece
Ranyuk	Ekaterina	Roscosmos	Russia
Redchyts	Natalia	Ukrainian State Space Agency	Ukraine
Rhimbassen	Maria	University of Toulouse 1 Capitole	France/Canada
Rideout	Sally	Canadian Space Agency	Canada
Roberts	Ben	Moon Express	USA



Salmeri	Antonino	Asteroid Mining Corporation	Italy
Schingler	Jessy Kate	Open Lunar	US
Shackleford	Scott James	Indiana University	USA
Simberg	Rand	Interglobal Media LLC	USA
Simpson	Carol	Ten to the Ninth Plus Foundation	USA
Smith	Lesley-Jane	Leuphana University	Germany
Spencer	Sam	Etiam Engineering	Australia
Stemmet	Andrea	Embassy of South Africa in The Netherlands	South Africa
Svec	Martin	Charles University	Czech Republic
Sweers	Jerre	Stellar Space Industries	Netherlands
Swiney	Gabriel	Department of State	USA
Takashi	Iwai	JAXA	Japan
Tronchetti	Fabio	HowlyMo - Beihang University	Italy/China
Tumlinson	Rick	New Worlds Institute	USA
Tung	Helen	Legal Futurist - Independent Consultant	Australia
Vannitsen	Jordan	Odysseus Space	Israel
Wang	Jilian	China Academy of Space Technology	China
Zhang	Zhenjun	China Institute of Space Law	China
Zhu	Juliette	Viant Commodities	China
Zoenen	Lynn	i-space	Luxembourg