

# The Hague Space Resources Governance Working Group *Second Progress Report and the Way Forward*

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## **Abstract**

This paper reports on the developments of The Hague Space Resources Governance Working Group since its establishment in 2015, and more specifically it provides an update since the first Progress Report presented during the IISL Colloquium at the 67<sup>th</sup> International Astronautical Congress in Guadalajara in September 2016 (IAC-16-E7.2.1).

After a brief reminder of the purpose, objectives and structure of the Working Group, the paper elaborates on the progress made on the “Building Blocks” that the Group formulated for a future governance system for the use of space resources. It reports on the outcome of the four face-to-face meetings of the Working Group held in 2016 and 2017 in Leiden, three of which took place after the first Progress Report was presented. These meetings resulted in a considerable level of agreement among the members of the Working Group on the nineteen Building Blocks that could form the basis of negotiations on an international framework. The paper elaborates on the content of the said building blocks, with reference to the discussions that took place during the meetings of the Working Group. Finally, the paper provides insight into the prospects for a successful conclusion of the activities of the Working Group and the way forward toward an international framework for the governance of space resources.

All authors are closely involved with the creation and activities of the Working Group.

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## **I. Introduction**

### **I.1 Origin of the Working Group**

The Working Group was the outcome of a Roundtable on the Governance of Space Resources, convened by The Hague Institute for Global Justice on 1 December 2014. The Roundtable was attended by industry leaders, scientists, diplomats, as well as political and legal experts from across the globe and it served as a forum to discuss and propose solutions for the current lack of a framework for the use of space resources found on asteroids and other celestial bodies. The Hague Space Resources Governance Working Group has been established to support this process and promote its advancement, within a reasonable timeframe and in accordance with international law. The Working Group operates in a transparent and open manner and important information is posted on its website and communicated through twitter and Facebook.<sup>1</sup>

### **I.2 Objectives of the Working Group**

The purpose of the Working Group is to assess, on a global scale, the need for a framework for space resource activities and to prepare the basis for such framework to be discussed and established. Where the need is identified, the Working Group will encourage States to engage in negotiations for an international framework.

### **I.3 Activities of the Working Group**

In achieving the above objectives, the key activities of the Working Group are the identification and formulation of building blocks for the governance of space resource activities and the provision of recommendations on the implementation strategy.

## **II. Structure of the Working Group**

### **II.1 The Consortium**

The founding Consortium partner is the International Institute of Air and Space Law (IIASL), Leiden Law School, Leiden University (The Netherlands). The Secretariat of the Working Group is hosted here. The other Consortium partners are the Catholic University of Santos (UNISANTOS) (Brazil), The Centre for Resources, Energy and Environmental Law (CREEL), University of Melbourne (Australia), The Indonesian Centre for Air and Space Law (CASL), Padjajaran University (Indonesia), The Secure World Foundation (SWF) (USA), and The University of Cape Town (UCT) (South Africa). The

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1 <http://law.leiden.edu/organisation/publiclaw/iiasl/working-group/the-hague-space-resources-governance-working-group.html>; Facebook: <https://www.facebook.com/TheHagueSpaceResourcesGovernanceWG/>; twitter: <https://twitter.com/SpaceResourceWG>.

Consortium Partners are convening on a regular basis to evaluate the Memorandum of Understanding that was signed among them and established the Working Group.

### *1. Members*

Members are major stakeholders from government, industry, universities and research centres. A list of the current members of the Working Group can be found online on its website. Members are responsible for making the decisions and are invited to attend all teleconferences and meetings of the Working Group. The number of members to the Working Group is limited to 25, and is currently fixed to 22 members. They are consulted before and after every meeting, in order to provide their input on the discussions of the Group. They are also the primary participants of the face-to-face meetings.

### *2. Observers*

Observers are professionals directly involved in space resources issues and are invited to attend face-to-face meetings, but not teleconferences. They are not permitted to actively participate in the meetings, but are heard after the members have presented their opinions. There is no restriction on the overall number of observers to the Working Group, however the number of observers per organisation is limited to two. Currently there are 42 observers to the Working Group, although this number is increasing consistently. Since the past progress report, the circle of observers has been extended to include representatives of international organisations, space agencies and start-up companies. A formal application to the Secretariat is required in order to become an observer.

### *3. Secretariat*

The Secretariat is entrusted with overseeing the activities of the Working Group and is in charge of its administrative functions. It comprises of the Chair of the Working Group, Dr. René Lefeber, the Vice-Chairs, Dr. Michael Simpson and Prof. Olavo Bittencourt Neto, and the Executive Secretary, Dr. Giuseppe Reibaldi. The Secretariat is holding regular teleconferences, in order to coordinate the activities of the Working Group and evaluate their progress, as well as to determine its future actions.

## **III. Building Blocks**

### **III.1 Background Information**

The building blocks of the project are the basis for the discussions on a possible international framework for the governance of space resources. The formulation and preliminary elaboration of the building blocks was discussed

in the previous progress report.<sup>2</sup> The initial set was composed during the first meeting of the Working Group in April 2016, and included eighteen building blocks. The latter were further developed through the subsequent meetings of the Group, in November 2016 and in April 2017. In their present draft form, following the latest meeting of September 2017, there are nineteen building blocks, which have been developed and elaborated on the basis of the initial ones.

The building blocks address non-substantive matters, such as the objective of an international framework, the definition of key terms, and the scope and principles of an international framework, as well as substantive matters, such as the exercise of jurisdiction over space resource activities, access to and utilization of space resources, as well as the sharing of benefits arising out of the utilization of space resources, the exchange of information under the international framework, and liability, monitoring and compliance issues.

Some building blocks generated particularly rigorous discussion, including the objective of the international framework, and the definition of key terms, both of which are important elements in laying the basis for the framework. In relation to the former, Article I of the Outer Space Treaty,<sup>3</sup> which states that “The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interest of all countries”, is a pivotal factor. The considerations under the latter building block include the definition of ‘space resource activities’ and within that, the meaning of ‘resource’, as well as the definitions of ‘space object’ and ‘operator’. The building block addressing the sharing of benefits arising out of the utilization of space resources has also given rise to considerable debate amongst the participants of the Working Group. Within the framework of this building block, the scope of the term ‘benefit’ was addressed, as well as potential methods of sharing.

The headlines of the building blocks have remained mainly unchanged until the most recent fourth face-to-face meeting of the Group, which took place from 11 to 13 September 2017 in Leiden, The Netherlands. However, their specific content was discussed extensively during each meeting and modified accordingly after its conclusion.

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2 T. Masson-Zwaan, R. Lefeber, G. Reibaldi, M. Stewart, *The Hague Space Resources Governance Working Group: A Progress Report*, 59<sup>th</sup> IISL Colloquium on the Law of Outer Space, 2016.

3 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 610 UNTS 205, 1967.

### **III.2. Current Status of the Building Blocks**

#### **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.
- 1.2 To achieve this objective, the international framework should:
  - a) Identify and define the relationship of space resource activities with existing international space law, including the provisions of the United Nations treaties on outer space;
  - b) Propose recommendations for the consideration of States for the application or development of domestic frameworks;
  - c) Propose recommendations for the consideration of intergovernmental organizations for the application or development of internal frameworks;
  - d) Promote the identification of best practices by States, intergovernmental organizations and non-governmental entities.

#### **2. Definition of key terms**

- 2.1 Space resource: an extractable abiotic resource *in situ* in outer space.<sup>4</sup>
- 2.2 Utilization of space resources: the recovery of space resources and the extraction of raw mineral or volatile materials therefrom.<sup>5</sup>
- 2.3 Space resource activity: an activity conducted in outer space for the purpose of searching for space resources, the recovery of those resources and the extraction of raw mineral or volatile materials therefrom, including the construction and operation of associated extraction, processing and transportation systems.
- 2.4 Space object: object launched into outer space from Earth, including component parts thereof as well as its launch vehicle and parts thereof.<sup>6</sup>
- 2.5 Space product: product made in outer space wholly or partially from space resources.<sup>7</sup>
- 2.6 Operator: a governmental, intergovernmental or non-governmental entity conducting space resource activities.

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4 According to the understanding of the Working Group, this includes mineral and volatile materials, including water, but excludes (a) satellite orbits; (b) radio spectrum; and (c) energy from the sun.

5 According to the understanding of the Working Group, this excludes secondary utilization of space resources, i.e. (a) utilization of raw materials derived from space resources; and (b) marketing and distribution of space resources.

6 According to the understanding of the Working Group, this includes objects made wholly or partially from space resources.

7 According to the understanding of the Working Group, this excludes raw mineral and volatile materials, including water, irrespective of form.

### **3. Scope**

- 3.1 The international framework should address States and intergovernmental organizations.
- 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 so as to:
  - a) Incrementally regulate space resource activities at the appropriate time (principle of adaptive governance);
  - b) Promote consistency and predictability among domestic frameworks of States and internal frameworks of intergovernmental 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 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) Space resource activities shall not harmfully interfere with other ongoing space activities, including other space resource activities;
  - d) International cooperation in space resource activities shall be conducted in accordance with international law.

### **5. International responsibility for space resource activities and jurisdiction over space products**

- 5.1 The international framework should provide that States and intergovernmental organizations shall be responsible for space resource activities authorized by them in accordance with their international obligations.
- 5.2 The international framework should provide that space resource activities require prior authorization and continuing supervision by the appropriate State or intergovernmental organization.

5.3 The international framework should provide that States and intergovernmental organizations shall exercise jurisdiction and control over space products used in space resource activities authorized by them.

## **6. Access to space resources**

6.1 The international framework should enable the unrestricted search for space resources.

6.2 The international framework should enable the attribution of priority rights to an operator to search and/or recover space resources *in situ* 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, duration and the area of the priority right should be determined on the basis of the specific circumstances of a proposed space resource activity.

## **7. Utilization of space resources**

7.1 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, and provide for the mutual recognition between States of such resource rights.

7.2 The international framework should ensure that the utilization of space resources does not contravene the principle of non-appropriation under Article II OST.<sup>8</sup>

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

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

## **9. Avoidance of harmful impacts resulting from space resource activities**

Taking into account the current state of technology, the international framework should provide that States and intergovernmental organizations authorizing space resource activities shall adopt a precautionary approach with the aim of avoiding 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;

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8 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.

- e) Harmful contamination of outer space, including the creation of harmful persistent space debris;
  - f) Harmful interference with other on-going space activities, including other space resource activities;
  - g) Changes to designated and internationally endorsed outer space natural or cultural heritage sites;
  - h) Adverse changes to designated and internationally endorsed sites of scientific interest.
- 10. Technical standards for prior review of, and safety zones around space resource activities**
- 10.1 The international framework should provide that States and intergovernmental organizations shall require the conduct of a review prior to the authorization of a space resource activity to ascertain that such an activity is carried out in a safe manner to avoid harmful impacts.
- 10.2 The international framework should:
- a) Encourage the development of a domestic approval process to ensure that equipment, operational procedures and processes applied in space resource activities avoid harmful impacts;
  - b) Encourage the development of a methodology to assess that equipment, operational procedures and processes applied in space resource activities meet common technical standards (conformity assessment);
  - c) Encourage operators to develop technical standards for equipment, operational procedures and processes applied in space resource activities (standardization).
- 10.3 Taking into account the principle of non-appropriation under Article II OST, the international framework should permit States and intergovernmental organizations authorizing 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. A safety zone shall not impede the free access, in accordance with international law, to any area of outer space of personnel, vehicles and equipment of other governmental, intergovernmental and non-governmental entities conducting space activities. A State or intergovernmental organization may authorize the restriction of access to a safety zone for a limited period of time, provided that timely public notice has been given setting out the reasons for such restriction.



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

11.1 The international framework should provide that States and intergovernmental organizations shall monitor whether any harmful impacts result from space resource activities authorized by them.

11.2 If a harmful impact resulting from a space resource activity occurs, the international framework should provide that the State or intergovernmental organization that authorized 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).

**12. Sharing of benefits arising out of the utilization of space resources**

12.1 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 intergovernmental organizations authorizing 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) Development of space science and technology and of its applications;
  - b) 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) Exchange of expertise and technology among States on a mutually acceptable basis;
  - g) Establishment of an international fund.
- 12.2 The international framework should not require compulsory monetary benefit-sharing.

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

**13. Registration and sharing of information**

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

- a) Register priority rights of an operator to search and recover space resources *in situ* in accordance with the international framework;
- b) Give advance notification of space resource activities authorized by them through an international repository;

- c) Register space objects in accordance with the REG,<sup>9</sup> United Nations General Assembly Resolution 1721 B (XVI),<sup>10</sup> or Article XI OST, taking into account United Nations General Assembly Resolution 62/101;<sup>11</sup>
- d) Notify frequency assignments for recording in the Master International Frequency Register in accordance with the Radio Regulations of the International Telecommunication Union;<sup>12</sup>
- e) Provide, taking into account Article XI OST and the legitimate interests of operators, information and best practices on the authorization and supervision of space resource activities authorized by them through an international repository, 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;
  - iii. The results of space resource activities;
  - iv. Any phenomena discovered in outer space which could endanger human life or health, as well as of any indication of life;
  - v. Any harmful impacts resulting from space resource activities authorized by them and the measures planned or implemented to redress such impacts;
- f) Notify the termination of space resource activities authorized by them through an international repository 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 products, or parts thereof.

#### 14. Provision of assistance in case of distress

The international framework should provide for the applicability of Article V OST and the ARRA<sup>13</sup> to persons involved in space resource activities.

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9 1975 Convention on the Registration of Objects Launched into Outer Space.

10 1961 Resolution 1721 B (XVI) adopted by the United Nations General Assembly, International Cooperation on the Peaceful Uses of Outer Space.

11 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.

12 The Radio Regulations, edition of 2016.

13 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Space.

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

15.1 The international framework should provide for the applicability of Articles VI and VII OST and the LIAB<sup>14</sup> to damage resulting from space resource activities.

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

## **16. 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.

## **17. 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 recover space resources *in situ*;
- b) The establishment and maintenance of an international repository, in addition to the international registry, for making publicly available:
  - i. Information and best practices;
  - ii. The list of designated and internationally endorsed outer space natural and cultural heritage sites; and
  - iii. The list of designated and internationally endorsed sites of scientific interest;
- c) The designation or establishment of an international body or bodies responsible for:
  - i. The identification 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 as well as its modification or amendment; and
  - iv. The governance of the international registry, the international repository and any other mechanism that may be established for the implementation of the international framework.

## **18. Settlement of disputes**

The international framework should encourage recourse by States, intergovernmental organizations and operators to the amicable resolution of disputes, for example by developing procedures for consultation or promoting

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14 1972 Convention on International Liability for Damage Caused by Space Objects.

the use of the 2011 Permanent Court of Arbitration Optional Rules for Arbitration of Disputes Relating to Outer Space Activities.

#### **19. Monitoring and review**

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

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

The Working Group functions on different levels. The Consortium partners attend a teleconference once per year moderated by the Secretariat, focusing on the activities carried out by the Consortium Partners, in order to increase the outreach of the Working Group and raise awareness on the use of space resources. Finally, the Consortium partners, the members and the observers are invited to attend the face-to-face meetings.

##### **IV.1 1<sup>st</sup> Face-to-Face Meeting, 18-19 April 2016**

The previous progress report included more details on the initial meeting of the Working Group, the teleconference of 22 January 2016, which focused on the drafting of the primary text of building blocks. It also elaborated on the outcome of the first face-to-face meeting, held from 18 to 19 April 2016 in Leiden, The Netherlands, which facilitated an extensive discussion on the proposed building blocks. The building blocks were discussed and revised several times since that report.

##### **IV.2 2<sup>nd</sup> Face-to-Face Meeting, 7-8 November 2016**

From 7 to 8 November 2016 the Working Group convened for the second time at the Academy Building of Leiden University in The Netherlands. Following the first meeting, based on the remarks made regarding certain points of the text, the building blocks were revised accordingly by the Secretariat, and were distributed to the members and participating observers for comments in advance of the second meeting. The latter elaborated further on the revised building blocks, aiming at developing a concrete set of guidelines.

##### **IV.3 3<sup>rd</sup> Face-to-Face Meeting, 10-12 April 2017**

The meeting was held at the Gravensteen of Leiden University, in The Netherlands, from 10 to 12 April 2017 and was attended by the greatest majority of members and observers. Similarly, the building blocks were once again revised before the meeting, implementing the improvements suggested during the second meeting and the comments provided by the participants.

#### **IV.4 4<sup>th</sup> Face-to-Face Meeting, 11-13 September 2017**

The 4<sup>th</sup> face-to-face meeting took place from 11 to 13 September in Leiden, The Netherlands. It was attended by most members, along with a representative number of observers and resulted in the “Draft Building Blocks for the Development of an International Framework on Space Resource Activities”.<sup>15</sup> The text of the Draft Building Blocks was included in previous section (III.2).

This was the last meeting under the current setup. The next steps were also extensively discussed during this meeting. More information on the future of the Working Group can be found under section VI.

### **V. Outreach**

#### **V.1 UNCOPOS Legal Subcommittee 56<sup>th</sup> Session**

The activities of the Working Group were presented on 27 March 2017 during the Symposium organised by the International Institute of Space Law and the European Centre for Space Law, in the framework of the 56<sup>th</sup> Session of the Legal Subcommittee. The Symposium focused on “Legal Models for Exploration, Exploitation and Utilization of Space Resources 50 Years after the Adoption of the Outer Space Treaty”.<sup>16</sup> In addition, a statement on The Hague Space Resources Governance Working Group was made by the Dutch Delegation to UNCOPUOS in April 2017 at the 56<sup>th</sup> Session of the Legal Subcommittee,<sup>17</sup> as well as on 2016 during its 55<sup>th</sup> session.

#### **V.2 Activities of the Consortium Partners**

As part of the transparent manner in which the Working Group is functioning, a number of outreach activities supported by members and observers have taken place, while several others are coming up.

Among the provisions of the Memorandum of Understanding signed by the Consortium Partners is the commitment to disseminate information about the Working Group in their own country. In this framework, in April 2016 the International Institute of Air and Space Law of Leiden University organised the Symposium on the Legal Aspects of Space Resources, just prior to the first face-to-face meeting.<sup>18</sup> In October 2016, in the framework of the 4<sup>th</sup> International Congress on Environmental Law held under the auspices of the University of Santos, Brazil, one of the panels addressed the issue of space

15 This document is preferably cited as “The Hague Working Group Draft Building Blocks on Space Resource Activities 2017” and is also available online on the webpage of the Working Group.

16 [www.unoosa.org/oosa/en/ourwork/copuos/lsc/2017/symposium.html](http://www.unoosa.org/oosa/en/ourwork/copuos/lsc/2017/symposium.html).

17 A/AC.105/C.2/2016/CRP.17.

18 The presentations of the Symposium can be found here: <https://www.universiteitleiden.nl/en/events/2016/04/symposium-on-legal-aspects-of-space-resource-utilisation>.

resource utilization. Furthermore, the Indonesian Institute of Air and Space Law of Padjajaran University organised a Workshop on Space Resources Governance in August 2017 in Jakarta, Indonesia, in collaboration with the Indonesian Space Agency (LAPAN). Moreover, the Executive Secretary discussed the Working Group during the 2016 Practitioners' Forum of the European Centre for Space Law, dedicated to the subject of "The Exploitation of Natural Resources in Outer Space", as well as during the 10<sup>th</sup> International Academy of Astronautics Symposium on the Future of Space Exploration, held in Turin in June 2017. Similarly, members and observers of the Group regularly refer to its activities during their presentations in various conferences and events worldwide.

## **VI. Future of the Working Group**

The initial mandate of the Working Group extends through the end of 2017. During the fourth face-to-face meeting, Consortium partners and members decided to prolong the activities of the Group for the period 2018-2019. Discussions on the format, membership and funding of this second phase are currently ongoing. The purpose of the extension of the duration of the Working Groups is to increase its legitimacy by involving more stakeholders in continuing to explore the need and form of any future mechanism for the governance of space resource activities.

*Comments and remarks on the building blocks are welcome until 1 July 2018 via email to [spaceresources@law.leidenuniv.nl](mailto:spaceresources@law.leidenuniv.nl).*