Standardization as an Instrument of Cooperation: A Silver Lining for Harvesting Common Benefits on the Way Back to the Moon?

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Abstract

Humankind's return to the Moon has begun, and this time it will be a journey that builds upon six decades of spaceflight experience. Technical standards are capturing the essence of this experience and fill a gap left by space law. They provide for elaborated indications of what is to be regarded as diligent or negligent. Far from being law, they become benchmarks for lawfulness. However, their nature, objectives and consequences are not uniform, and whether or not they are adequate tools to precede or even substitute new legal norms, remains to be decided. Starting from the premise that standardization has the inherent potential to foster international space cooperation, this paper explores whether it may also be a way to enhance participation and benefits sharing in the new age of exploration. Can standards really open a level playing field that is so costly, complex and exclusive? Or are they, on the opposite, a means to raise the barrier such that only few can join the limited circle of lunar returners?

Keywords: space law, standards, standardization, regulation, cooperation, space exploration.

1. Introduction: standards and international space cooperation

Technical standards are important in space activities, including space exploration.[1] They enable compatibility of technologies, allow interoperability, ensure quality and safety. However, standard setting is often

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1 'Technical standards' are hereinafter referred to as 'standards'.

seen as a merely technical exercise, a view that overlooks the role that standards play in space governance. The exercise of standardization, and the resulting standards, provide for means to achieve results that may go beyond the mere technical subject matter they address. Standards can be used to benefit certain actors or technologies and exclude others, or to allow cooperation by leveraging technological solutions. Standards have the potential to support the peaceful exploration of space for the benefit of all countries, and to complement international law – as long as they are not used to substitute or circumvent it.

The space sector is currently undergoing an important transformation fuelled by the rise of the private sector, the entry of new actors and an evolving geopolitical arena. Considering the increasing importance of space to social and economic development and security, together with a wave of new space exploration initiatives including the return to the Moon, standardization can become a tool for geopolitical leadership. At the same time, it helps tackling issues of spaceflight safety and sustainability. Considering this double-fold potential, the process, integrity and objectivity of standardization – predominantly carried out by the technical community – still receives comparatively little attention in the context of the governance and regulation of space activities.[2]

The angle of this study is cooperation through regulation. The first space missions launched end of the 1950s drove the need for legal principles governing the activities of states in outer space. Recognising that the peaceful exploration and use of outer space requires continuous intergovernmental dialogue, and building on a central notion of the UN Charter,[3] the UN space treaties call for international cooperation. They also establish principles emanating from the cooperation precept, including due regard, information sharing and mutual assistance.[4] Further, exploration and use of outer space shall be carried out in the benefit and interests of all countries, irrespective of their degree of economic or scientific development.[5] These guiding principles remain at the heart of space law in the 21st century. However, *space governance* has become considerably more complex. It embodies an intricate mix of legal and non-legal norms, including standards, which are devised by a variety of actors in different international and national fora.

2 The relationship between trade and regulation (e.g. competition law) however has been subject to extensive research.

3 Charter of the United Nations, entered into force 24 Oct. 1945: 1 UNTS XVI.

4 Art. IX-XII Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, done on 27 January 1967, entered into force on 10 October 1967, 610 UNTS 205 (OST).

5 Especially Art. III, IX and X OST and the Space Benefits Declaration (A/RES/51/122 (13 Dec. 1996).

In the light of the new era of space exploration, these developments trigger important questions; among those: What are the legal consequences of using standards in spaceflight? Can 'regulation through standardization' help to solve key problems, or does it rather create new challenges, for the governance of space activities? Do standards fuel unity or division?

2. On the nature of standards and the process of standardization

> *Standards are formulas that "are the distilled wisdom of people with expertise in their subject matter."*[6]

There is no internationally agreed definition of the term 'standard'. This is in part owed to a linguistic reason; the word 'standard' has a variety of meanings. Moreover, there are various types of standards produced by different international, national and private bodies. Hence, the supposedly uniform group of 'standards' is heterogeneous. What is referred to as standards may greatly vary with respect to scope, type, specificity and process of creation. The proliferation of other non-legally binding instruments (such as guidelines, best practices, 'rules of the road'), their changing nomenclature and the lack of legal definitions further blurs the line.

2.1. Taxonomy and categories of standards

A 'standard' can be defined as a "document, established by consensus and approved by a recognized body, that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context."[7] Such standards approved by standard development organizations (SDO)[8] are often referred to as *formal* standards or *de jure* standards.[9]

In contrast, *de facto* standards, i.e. a group of *other* or *private* standards are not developed in SDOs but are factually accepted as binding, even without a defined standardization process. *De facto* standards can be formulated in any process, for example by industry for a specific branch. The process (or lack thereof) has an impact on the content and legitimacy of the standard, and on

6 https://www.iso.org/standards.html.

7 ISO/IEC Guide 2:2004, definition 3.2.

8 In the United States Federal Technology Transfer and Advancement Act (TTAA) reference is made to 'voluntary consensus standards body', which is here understood to refer to an SDO (https://www.nist.gov/standardsgov/national-technology-transfer-and-advancement-act-1995); Often SDO is used interchangeably with 'standard setting organization' (SSO).

9 In the authors' opinion, as *de jure* is an expression commonly used by the legal profession, understood to mean 'by right' or 'by law', this term is misleading in relation to voluntary technical standards.

the interests it reflects. Moreover, not all *de facto* standards are made public, as is usually the case with the standards developed within an SDO.[10]

This article follows the ISO/IEC[11] approach and understands the term 'standard' in its narrow, formal context, as "a normative document"[12] produced by an SDO at national, regional or international level. Due to the global character of space exploration, the focus will be on regional and international standards.

2.2. Standardization: the activity of creating standards

The process of standard-setting, i.e. 'standardization', denotes the "activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context."[13] The set processes in SDOs aim at addressing concerns about participation and implied motives by *inter alia* defining decision-making processes in a clear and transparent manner, agreeing on improved coordination and implementing effective patent policies. The second part of the definition, achievement of "the optimum degree of order in a given context", takes place outside the SDO, mainly during the implementation phase of a standard; it is here that a standard may also be adopted as part of binding regulation, for example in a national space law.

2.2.1. Standardization bodies in the context of space activities

The presumably best-known international standard setting organization is the International Organization for Standardization (ISO).[14] Despite common belief, ISO is not an international intergovernmental organization.[15] Its member organizations can be governmental as well as non-governmental. Currently, ISO comprises 165 national standards bodies.[16] Formally, it is a Swiss private association, and has been characterised e.g. as an "international

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10 Definition of 'publicly available standards' ISO/IEC Guide 2:2004, definition 3.2.1, underlining the importance of publicizing standards.

11 International Electrotechnical Commission.

12 Introduction, ISO/IEC Guide 2:2004.

13 ISO/IEC Guide 2:2004, definition 1.1.

14 International Telecommunication Union (ITU), ISO, and IEC set up in 2001 World Standards Cooperation to facilitate cooperation between the organizations https://www.worldstandardscooperation.org/.

15 An IGO is defined in Article 2 (a) of the International Law Commission's *Draft articles on the responsibility of international organizations* (2011) as "an organization established by a treaty or other instrument governed by international law and possessing its own international legal personality."

16 https://www.iso.org/members.html

private standard-setting organisation".[17] Other prominent examples are the European Committee for Standardization (CEN) or the European Committee for Electrotechnical Standardization (CENELEC).[18] These bodies are also relevant for space-related standardization.[19]
Standards related to spaceflight are also developed in other fora, notably by space agencies and industry, such as in the European Cooperation for Space Standardisation (ECSS),[20] and the Consultative Committee for Space Data Systems (CCSDS) for standardization in space data related matters.[21] These two are representative of organizational structures that fall between what is traditionally understood as an SDO and 'purpose driven' or 'promotional' consortia'.[22] Space technology is also subject to various actors developing ad hoc standards, guidelines and best practices for specific fields of space activities, including space industry associations such as close proximity operations for on-orbit servicing (CONFERS).[23]
While standardization is relevant for the entire space sector, it plays a particular role for space exploration activities.[24] Space exploration, including human spaceflight and interplanetary robotic spaceflight, is complex, costly

17 Introduction, 9, *International Regulatory Co-operation and International Organisations: The Case of the International Organization for Standardization (ISO)*, OECD/ISO (2016) [hereinafter 'OECD/ISO, 2016].
18 A specific feature of the CEN-CENLEC is that the same European standards are in force in all CEN Member States.
19 In ISO/TC20, an ISO technical committee in charge of aerospace standardization, two subcommittees are dedicated to space standardization (SC13 'Space data and information transfer systems', and SC14 'Space systems and operations'). In the European context, the CEN committee 'CEN/CLC/TC 5 Space' deals with space standardization.
20 ECSS members https://ecss.nl/organization/members/; ISO, CEN/CELELEC, ECSS and CCSDS cooperate to reach common standards and participate in the field of space standardization in each other's work e.g. as observers within their respective competence areas); In May 2013, a memorandum of understanding between CEN/CENELEC and ECSS was signed covering mainly the transfer of existing ECSS standards into European norms (EN) and the joint development of new standards.
21 Members of CCSDS https://public.ccsds.org/participation/member_agencies.aspx.
22 Some label such more formally operating *de facto* cooperatives as SSOs. However, this distinction may prove problematic as the term SSO is often used also interchangeably with SDO.
23 The Consortium for Execution of Rendezvous and Servicing Operations https://www.satelliteconfers.org/about-us/.
24 For the purpose of this article, 'space exploration' is understood to include human and robotic exploration of the Moon and other celestial bodies, in line with the understanding of the term by leading space agencies. As such, it is distinguished from space applications, space science and predominantly commercial-oriented space activities in Low Earth Orbit or beneath (e.g. space tourism).

and often carried out through international cooperation. Safety, reliability, and interoperability therefore play central roles. As exploration capabilities have traditionally been in the hands of few actors only, standards in this area have mostly been developed through agreements and *de facto* standards. An example are the International Deep Space Interoperability Standards of the International Space Station (ISS) developed by the International Space Station Partner Agencies.[25] The *Artemis Accords*[26] recognize the importance of interoperability by underlining that "the development of interoperable and common exploration infrastructure and standards, including but not limited to fuel storage and delivery systems, landing structures, communications systems, and power systems, will enhance space-based exploration, scientific discovery, and commercial utilization."[27] At the same time, they call for its signatories "to use reasonable efforts to utilize current interoperability standards for space-based infrastructure, to establish such standards when current standards do not exist or are inadequate, and to follow such standards."[28]

Finally, there is a growing body of standards and other instruments relevant to the space sector but not specific to exploration, for example, in relation to space debris.[29] With the increasing debris population in Lower Earth Orbit (LEO), the risk of placing humans there, or let them cross LEO regions on the way to the Moon or beyond, augments. The space debris mitigation guidelines of the IADC,[30] the Long-Term Sustainability Guidelines[31] of COPUOS or the Space Sustainability Rating (SSR)[32] are examples of behavioral norms (however not technical standards) which aim at preserving the sustainability of the space environment, and therefore support exploration, too.

Space standardization is often driven by operational and technical needs, including the facilitation of procurement processes. ECSS provides a good example of this, as its standards are frequently referenced as requirements in procurement contracts, for example by the European Space Agency (ESA).

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25 International Deep Space Interoperability Standards, https://www.internationaldeepspacestandards.com/.

26 Artemis Accords are a set of non-legally binding principles prepared by the US space administration relating to various aspects in space exploration, https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf.

27 Section 5, Artemis Accords.

28 *Ibid*.

29 E.g. ISO Standard 24113 on Space Debris Mitigation Requirements.

30 IADC Space Debris Mitigation Guidelines 2006.

31 UN document A/74/20, 20Aug2019.

32 https://www.weforum.org/projects/space-sustainability-rating.

While ECSS may not be fully categorized as a SDO, its standards are public, free of charge and can be used by also non-members based on agreement.[33]

2.2.2. Participation and decision-making in setting standards

Standardization processes vary from one SDO to another. Since the members of international SDOs are not *per se* states, the legal effects of representation deserve attention: even if a vote is cast in the name of a country, the 'delegate' is not likely a representative of the respective government, or acting on its behalf.[34] National standards bodies, as typical members of SDOs, may not even be public entities. Representation in standardization therefore often happens without direct governmental involvement or oversight. This is a substantial difference to decision-making processes in IGOs, where delegates usually represent governments, ensuring that public power is exercised in accordance with administrative and constitutional law. Nevertheless, national standard bodies are often of a mixed public-private character, and there are mechanisms for the respective government to ensure a minimum of 'checks and balances'.[35] Such arrangements however do not usually extend to the level of decision-making in technical committees. Moreover, such processes may not include any formal consultation towards the government to deal with cases where a standardization committee is to take a decision on a matter perceived to have wider public or political interest.

Also, the decision-making method of a standardization process deserves attention. ISO, for example, operates on the basis of consensus, reflective of a wide variety of interests.[36] However, consensus-building in ISO takes place among the national standards bodies involved in a given technical committee, not among all of ISO's 165 member organizations. Hence, the number of participants in the decision-making of a specific technical committee can be substantially smaller than may appear at first glance. There are currently only 15 member organizations represented in the technical committee dealing with space systems and operations (ISO/TC20/SC14).[37] In comparison, the principle of consensus is also applied in COPUOS, however as the decision-making principle among meanwhile 100 member states and being regarded as an attribute of the "law-making or quasi-law-making" qualities of that

33 https://ecss.nl/. Within ECSS, the governance is clearly defined but participation is limited to European space agencies, and the industry is represented through Eurospace.

34 In relation to *de facto* standards, the participation is as open or as limited, as desired.

35 E.g. through yearly reporting of the activities and possibly some financial contribution towards the activities.

36 Or even 'double consensus', firstly among the experts (in the WG), and secondly among the member bodies (at the TC/SC level and publication stage).

37 https://www.iso.org/committee/46614.html?view=participation.

body.[38] Decision-making that may look similar at first glance is therefore to be challenged to scrutinize its actual propositions and legal effects.

2.3. Perspectives on standardization: interests, motivations, impacts on governance

Whose interests' does standardization serve? Regulation made outside traditional circles is criticized for shortcomings in the procedural democracy that is guaranteed either by administrative or constitutional rules. However, is it a realistic expectation that standard-setting institutions would necessarily work in a way that ensures wide participation and fair representation, to produce standards that are objectively 'state-of-art' not only by technical characteristics, but also in a governance context? Is it fair to expect that 'bottom-up regulation' by standards would have to uphold the same values expected from public regulation? Is the transfer of a 'regulatory function' to the process of standardization permissible, required – or even desirable?

It has been observed that "international standards and public policy often share similar objectives".[39] But converging objectives are not necessarily sufficient to guarantee upholding the legal principles set out in the UN space treaties. By their very nature, standards are no instruments of regulation. Rather, the goal of standardization is to make "a product, process or service fit for its purpose".[40] However, there are also other motivations for standardization and the participation therein: "Although the standards involved are often called 'technical', they are construed in a process that appear to be anything but technical."[41] In the space sector, standards arguably have an impact on space governance at large. It is therefore important to understand who drives the process of standardization, based on which motivation, for what purposes and how. The role of those who are actively participating in the process (or predominantly driving it), and those who are only affected by it, may be rather different.

The motivation of actors to embark in the process of standardization differs based on interests. One of them is to be able to promote preferable – or preferred –solutions, or to influence, within possible margins, requirements such that compliance with the standard corresponds to one's interests or to

38 Manfred Lachs, *The Law-Making Process for Outer Space*, 20, in Edward McWhinney and Martin A. Bradley (eds.) *New Frontiers in Space Law* (A.W. Sijthoff, 1969) making reference to other UN bodies with the same procedures and asking if this gives a special standing to the resolutions accepted under this procedure.

39 OECD/ISO, 2016, 15.

40 ISO/IEC Guide 2:2004, definition 2.

41 Nils Brunsson and Bengt Jacobsson, *The Contemporary Expansion of Standardization*, 9, in *A World of Standards* Nils Brunsson and Bengt Jacobsson (eds.), (OUP, 2000).

an already implemented practice. While a standard aims to provide for the best possible solution, there is no guarantee that the result is 'best' in any absolute sense.[42] Consequently, "depending on the process of standard-setting, standards can imply a lowest common denominator of available options, the power of the strongest party in standardization, a negotiated order among some or all stakeholders, or a confirmation of how things are already done by most parties."[43]

Consequently, a significant role in a standardization process can be a source of power and direct the way "how the reality is to be constructed".[44] The ability to control operational costs and the prospect of making a profit through technology licensing are some of the incentives by businesses to participate in the standardization process. Having a standard approved or preventing another one from being adopted may give a competitive advantage. Similarly, while governments do not traditionally participate in standard-setting, they can have an interest to support standardization – and push for widespread adoption of resulting standards – to gain competitive advantages, promote industrial policy objectives, address safety and risk concerns or pursue geopolitical interests.[45] This is particularly true when it comes to entirely new activity areas, for example in-orbit servicing or surface operations on other celestial bodies.

Finally, standards do not define their own legal value. Everyone can produce and offer them in principle. Their value and effects are determined by those who opt to use them. It is therefore legitimate to ask based on which choices – and limits – a standard is chosen as an element of regulation, cooperation, or governance; and through which process such choice is made. By referencing standards, regulators or parties "[capitalize] on private expertise and experience to develop a more robust regime and one that is better able to keep pace in a changing technological environment."[46]

42 Kirsten Juhl, *Standardization of Risk: Conceptual Analysis*, 20 in Odd Einar Olsen, Kirsten Juhl, Preben H. Londoe, and Ole Andreas Engen (eds.) *Standardization and Risk Governance, A Multidisciplinary Approach* (Routledge, 2020) [hereinafter 'Olsen, 2020']; it should be noted that there is not usually any requirements or checks made regarding the competence of the participants.

43 Stefan Timmermans and Steven Epstein, *A World of Standards but not a Standard World: Toward a Sociology of Standards and Standardization*, 79, Annual Review of Sociology, 36:69–89.

44 Odd Einar Olsen, *Dilemmas of Standardization in Risk Governance*, 276, 278-280 in Olsen, 2020.

45 *Standards and Patents* (SCP/13/2), 2-3, World Intellectual Property Organization (WIPO), Standing Committee on the Law of Patents, February 18, 2009.

46 Preben H. Londoe and Michael S. Baram, *The Role of Standards in Hard and Soft Approaches to Safety Regulation*, 237, in Olsen 2020.

Thus, despite their technical nature, standards are seldom entirely neutral elements of governance. The excuse that they are 'just technical' falls short of the wider dimension and implications of standardization. This is true for standards in general; and it is particularly true for standardization in the context of the exploration and use of outer space. On the road that will bring humans back to the Moon, and possibly beyond, standards will play an important role. Their legal and policy effects deserve adequate attention.

3. Standards as tools of space governance and international cooperation

It has been established above that standards have no legal force *per se*. However, states may incorporate them into domestic law, and, as "best practices", they can impact their obligations under public international law (for example in the area of trade restrictions). Where standards are used in governance or for regulatory purposes, several preconditions and effects must be considered.

a) **Standards have a normative character.** Far from being legal norms, standards nevertheless produce legal effects. This can be in the narrower sense, i.e., effects on an individual norm-addressee in or through a legal instrument (see b) below), or in the wider sense, i.e., effects on the organization or relationship of actors. Standards can create markets, have lock-on effects for an entire industry, support the removal of trade barriers within and between markets; enable interoperability and interconnectivity; allow governments to regulate. In contrast to traditional legal rules, the implementation of technical standards depends on compliance, not enforcement. This underscores the importance of adequate coordination mechanisms, intermediaries for interpretation, quality systems as well as ways and means to certify compliance with the standards, especially in the international context of exploring outer space.
b) **Standards can become *de jure* binding.** They can be given binding force through normative referencing in legislation (public level) or contracts (private level).[47] Owed to the voluntary nature of standards, standardization bodies, such as ISO, are not considered a regulator in the traditional sense. However, when governments and industry opt to resort to standards for a space mission licensing or procurement process, or for international space cooperation, such standards are no

47 Soucek, A & Tapio, J: *Normative references to non-legally binding instruments in national space laws: A risk-benefit analysis in the context of domestic and public international law*, in *Proceedings of the International Institute of Space Law*, vol. 2018, no. 4, 553-580.

longer merely 'neutral' but determine regulatory decisions, promote policy goals, or create best practices. As a result, they turn into governance tools. Normative referencing therefore blurs the line between public norms and private standards, and between 'voluntary' and 'mandatory'.

c) **Standards can become 'technically mandatory'.** While it still may be the case that the implementation of a standard remains voluntary, absent a legal requirement to follow it, a situation may arise where there are no viable alternatives to adhering to the standard, for example for the purpose of interoperability or safety in a space exploration context. As standards usually distil a most desired – or sometimes the only viable – solution, non-adherence may be no option in practice.

d) **Standards can be restrictive.** A standard may mirror technology that is protected by intellectual property rights, for example a patent (standard essential patent, 'SEP'). The implementation of such a standard requires entering into a license agreement with the owner of the SEP (who in turn is under no obligation to license the patent and may determine freely its pricing). The potential of receiving royalty payments of the underlying patented technologies may incentivize inventors to participate in standardization. This underlines the importance of standardization processes that guarantee an adequate balance of interests, for example through agreement according to which the IPR owner licenses the patent under fair and reasonable terms and conditions (FRAND) or even royalty free (RF) terms to those who are willing to implement the standard in question. In this respect, in comparison to *de facto* standards, SDO processes allow for more transparency.

4. Space standardization between pre-eminence and governance: concluding remarks

"There is therefore no reason to maintain a romantic view about global governance bodies in whatever shape or form. But there is no reason to be negative about them either. Just as domestic governance is indispensable, so is global governance. The challenge that remains is how to tame power, level the institutional playing field and ensure that all affected interests are adequately represented or at least taken into account."[48]

48 Eyal Benvenisti, *The Emergence of Global Governance and the Corresponding Need to Regulate it*, 41, Global Trust Working Paper 3/2014.

Standards are 'neutral' on paper at most. Standardization can be the product of 'regulatory cooperation' as much as a tool for 'regulatory competition'; either way, it is increasingly difficult to decouple it entirely from norm-setting as part of global space governance. This is neither a criticism nor a shortfall of standardization. The process of defining what is technically desired as the 'state of the art' or the 'optimal solution' carries profound implications for regulators and legislators alike.

In a field where international law-making is currently slowed down and national law-making confronted with an increasingly complex technical field of regulation, standards can be a welcome addition to norm-making. Developed by experts in their area, seemingly free of political bias, they offer the results that are cutting edge. But the idea of 'regulation by standards' runs the risk of awarding to standardization a role that may be bigger than it can carry. States, responsible under international space law to authorize and supervise non-governmental space activities, obliged to cooperate and to coordinate, called to exercise due regard and to avoid harmful interference, cannot merely outsource norm-making to standardization processes and actors. From the perspective of international cooperation, it seems equally undesirable to see standardization be used as a tool of (political or industrial) pre-eminence. Ideally, standards take a subordinate role in the normative hierarchy of space governance: technical answers to technical problems; indispensable for the safe and sustainable conduct of space activities, however complementing regulation rather than substituting it.

The new era of space exploration opens ample room for new standardization. Owed to the distance and complexity of space operations in or around the Moon, reliable operations will be key for success, and so will be the interoperability of systems. Based on the analysis presented in this paper, the following conclusions can be drawn:

1. Standardization should not be exclusively left to private actors. Public actors must assume their appropriate role in the process, too, seeking ways and means to ensure that the result fits in the overall system of regulatory governance.
2. Regulators cannot rely on standardization to 'do their job'. Public participation and representation, impartiality and independence of decision-makers, and accountability of decisions, must be ensured. A technically best solution is not automatically the best democratic or politically most warranted solution, and vice versa.
3. Cooperation and the sharing of best practices in international, multilateral forums are ways to consider the interests of others in space governance, a process that can be referred to as 'soft

standardization', i.e., fostering mutual understanding, developing common language, and removing barriers.[49]

4. As a result, 'triangular cooperation' is necessary: the regulator may participate in the making of the standards (perhaps as an observer) but cannot deny the responsibility to check whether the standards are adequate to contribute to space governance and such contribution is in line with international law.[50]

The above findings are not confined to humankind's return to the Moon, or to space exploration in a wider sense. Rather, they are valid for space governance more generally, not least for the evolving discussion about space traffic management. Provided that states assume their role and responsibility in the wider context of standardization, technical standards can further unfold their potential to contribute to global space governance and make humankind's continued presence in outer space, including the return to the Moon, safe, sustainable – and international.

49 These terms are used in connection with EU standardization by Claudia Morsut, *Towards a standardization of EU risk management?*, 45, in Olsen, 2020.

50 See the notion of regulators as "'orchestrators' of the use of standards", Preben H. Londoe and Michael S. Baram, Standards in approaches to safety regulation, 250, in Olsen, 2020.