

How Do We Legislate For Space Sustainability Without International Cooperation?

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Abstract

After around 60 years of space exploration sustainability has come to the forefront of international efforts. The United Nations Sustainable Development Goals outline the global aims to reduce, reuse and recycle in order to mitigate some of the effects of human activity on the environment both on Earth and beyond. Since the very beginning of the space era planetary protection mechanisms have been put in place to ensure that earthly bacteria and biological material don't reach the virgin landscapes of other celestial bodies. More recently, private companies have launched a range of projects tackling the rising issue of space debris and governments adopted new space strategies and plans to decrease the human impact on pollution in Earth's orbit.

Whilst space sustainability is an undeniable priority for humanity due to the strategic importance of space infrastructure, how does one ensure the implementation of much needed measures if international cooperation is staggering? For the past 30 years the space industry has benefited from ongoing cooperation on all levels leading to an exponential increase in New Space ventures relying on multigovernmental infrastructure or legal framework to flourish. Whilst sovereign states are free to enact their own legislation tackling sustainability issues, arguably none of them would be truly meaningful if the mechanisms don't have the support of the global community.

This paper aims to answer the question of legislation in the case of discontinued international cooperation through historical parallels with the legislative process during the Cold War era, taking into account the recent developments of space sustainability and analysis of the current situation in the industry through the eyes of the law maker.

Drawing experience from other industries and taking into account the fact that humanity has already accumulated a high number of debris orbiting the planet, the paper will recommend potential measures and regimes to alleviate the burden on technology makers and address the ongoing problems with space sustainability.

Finally, the paper will reflect on the practicality of any legislation enacted internationally in the context of the current political situation.

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1. Introduction

Sustainability is currently a hot topic around the world. Governments, industry and the general public alike are discussing and working on models, various technologies and projects in order to decrease the impact humanity has on the environment and ensure longevity and productivity of available resources. This movement has extended to the space industry, with a significant push on space operators to promote and develop space tech which lives up to its name of cutting edge and trailblazing in more than one aspect. The domain of space has seen quite a few changes in the past decades, starting out of the Cold War and now being a private and startup playground for the most daring of entrepreneurs. Understandably, this came with the appropriate development of international relations which created an environment of cooperation among many space faring states, and exchange of data and information unseen in previous eras.

Since the 1990's, space exploration and operations have enjoyed increasing international collaboration in many areas, arguably peaking at the creation and running of the International Space Station, a pinnacle in human ingenuity. The ISS is also known to be a prime example of legal excellency with its regulatory framework often cited as one of the greatest achievements of the legal and political professionals.¹

Nonetheless, the international dynamics have shifted in recent months, with noticeable changes of policy and rhetoric among the space faring nations and those intending to become space faring in the next few years. Whilst the situation is not comparable to the mid-20th century, the division that's now established among states participating in space activities poses challenges similar to those experienced in the past.

Now, in 2022, with sustainability becoming among the priorities of the industry, the question of how we regulate these projects is posed and unfortunately, given the circumstances, there is no straight answer. To prove that "sustainability" is not just a buzzword to generate clicks on the internet, the international community must come together and resolve the challenges attached to it. This, in all scenarios, extends to regulation and legislation.

This paper will examine sustainability as a concept, explore some of its technical challenges and take examples from other industries to demonstrate the imperative need for sustainable development in all areas of human activity. The analysis will then continue with a closer look into sustainability in the space industry, the current developments in the area and position these

1 F. von der Dunk, *Space Law in the Age of the International Space Station*, in: L. Codignola, K.-U. Schrogl, A. Lukaszczyk, N. Peter (Eds.), *Humans in Outer Space - Interdisciplinary Odysseys*, Springer Vienna.

against the standard legislative process in space law and its applicable national and international policies. We'll dive deeper and study the intersection of international cooperation, policy, legislation and sustainability and explore some of the factors one must take into account when assessing the practicality of any projects and their respective regulatory frameworks. Finally, the paper will finish its analysis with some suggestions based on the considerations in its previous sections which may indeed help relieve the burden of legal uncertainty for all space actors.

2. Sustainability as a wider concept

2.1. Sustainable development initiatives

Sustainability is now at the forefront of societal goals. Pledges are made, campaigns are led and the public has developed a new understanding of the impact of humanity on the planetary environment and the need to reverse the existing and prevent any further damage done due to human activity.

Many international companies are making sustainability pledges which often surpass those of governments around the world.²

There are ratings and traceability systems already in place which help businesses and individuals track their footprints and help them become environmentally friendly.³ Transparency is of utmost importance for sustainable development as it is crucial for analysts and scientists to have the right data when assessing the impact we all have on the environment.

Even the United Nations, in its Agenda for Sustainable Development, adopted by all member states, established the 17 Sustainable Development Goals (SDGs), with their respective yearly implementation progress reports.⁴ These do concern states as the UN does not have direct power to regulate businesses, however many companies have pledged and started working on supporting the SDGs through their own efforts.⁵ Some of these goals have been recognised as relevant to space, as space provides vital infrastructure for Earth observation, remote sensing, weather forecasting and navigation.

2 H. Broadman, Sustainability Pledges By Business Are Outshining Those By Government, 30 November 2021, <https://www.forbes.com/sites/harrybroadman/2021/11/30/sustainability-pledges-by-business-are-outshining-those-by-government/?sh=296153112309> (accessed 01.09.2022).

3 United Nations Economic Commission for Europe, The Sustainability Pledge, <https://thesustainabilitypledge.org/> (accessed 01.09.2022).

4 United Nations, Sustainable Development Goals, <https://sdgs.un.org/goals> (accessed 01.09.2022).

5 PWC, Sustainable Development Goals - impact on business, <https://www.pwc.com/gx/en/services/sustainability/sustainable-development-goals.html> (accessed 01.09.2022)

2.2. Public push for sustainable development and industrial and governmental response

The general public has played a vital role for sustainability both on global and local level. It's been noted that the younger generations prefer sustainable brands and are more environmentally aware than any of their predecessors.⁶ Exposed from a young age to the problems that come with lack of sustainability and the aftermath of years of unsustainable industrial practices, the new generations are more keen to experience some inconveniences in order to maintain a sustainable lifestyle and those born in the 20th century.

A world that's now dominated by internet trends and personalities have seen its fair share of environmental activists and advocates and even entire channels dedicated to educating the general public on the topic of sustainability.⁷

Generally, governments have been slow to respond to the growing demand for sustainable initiatives, however in recent years, some more decisive actions have been taken. For example, the UN Climate Change Secretariat has pushed for firmer regulation in order to reverse the damage done to the environment and its implication on the climate globally.⁸

2.3. Other industries' and criticism

Despite the global efforts, there has been a fair share of criticism, mainly that the expectations when it comes to enforceable measures frequently do not match the reality.⁹ There is still very little national legislation addressing all areas of sustainable development and there is a global problem of circumvention of these rules. One such example is carbon emissions in countries which have tighter regulations: Emissions have now been practically turned into a trading commodity with larger economies offsetting their own emissions by selling and buying mandates with smaller, less developed countries.¹⁰

6 G. Petro, Gen Z Is Emerging As The Sustainability Generation, <https://www.forbes.com/sites/gregpetro/2021/04/30/gen-z-is-emerging-as-the-sustainability-generation/?sh=23e997638699> (accessed 01.09.2022).

7 Florida State University, Sustainable Campus Staff Picks: 10 Sustainability-Focused YouTube Channels, <https://sustainablecampus.fsu.edu/blog/sustainable-campus-staff-picks-10-sustainability-focused-youtube-channels> (accessed 01.09.2022).

8 United Nations News, 'We can do better, we must' declares departing UN climate change chief, as COP27 looms over horizon, 6 June 2022, <https://news.un.org/en/story/2022/06/1119792> (accessed 01.09.2022).

9 H. Mountford et al, COP26: Key Outcomes From the UN Climate Talks in Glasgow, 17 November 2021, <https://www.wri.org/insights/cop26-key-outcomes-un-climate-talks-glasgow> (accessed 01.09.2022).

10 I. Ben-David, S. Kleimeier, M. Viehs, Research: When Environmental Regulations Are Tighter at Home, Companies Emit More Abroad, 04 Feb 2019, <https://hbr.org/2019/02/research-when-environmental-regulations-are-tighter-at-home-companies-emit-more-abroad>, (accessed 01.09.2022).

On the other hand, other industries have shown examples of successfully implementing strategies to support their own sustainable development, and by extension, provide means for their customers and partners to build on them.¹¹ Architecture and construction, as well as parts of the energy industry, have demonstrated true dedication to sustainability through many new and bigger projects taking place globally.

There are certain commentators that note that perhaps, sustainability initiatives are overselling what they can actually offer and efforts to mitigate human damage on the environment are too little, too late.¹²

It must be understood that without the appropriate and enforceable regulation in place, sustainability is a concept that is susceptible to being warped and turned into simple “greenwashing” as the world has witnessed many times before.¹³

The space industry, ever since its genesis in the late 1950s has been notoriously unsustainable, with missions paying very little regard to anything that concerns leftover rocket parts, defunct satellites or indeed the availability of orbits, which now seem more finite than ever before. The next part of this paper will examine the status of sustainability in the space industry and the response from the legal and regulatory community in order to tie it together with the current state of international cooperation.

3. Sustainability in space

3.1. Current developments

Sustainability initiatives are becoming increasingly prominent in the area of space, with the conversation about space debris reaching new audiences and bringing in more experts to the industry. Besides this, many observers placed their hopes on the future of Earth on space tech and have expressed concerns regarding the current state of affairs both on the surface of the planet and beyond.¹⁴ Professor Masson-Zwaan has addressed the issue, by expressing her concern directly: “*Space is becoming more contested, congested, competitive, and contaminated.*”¹⁵ This is more than true, as now, with all

11 Technia, Which Industries Are Leading Sustainable Innovation? <https://www.technia.co.uk/blog/which-industries-are-leading-sustainable-innovation/> (accessed 01.09.2022).

12 K. Pucker, Overselling Sustainability Reports, <https://hbr.org/2021/05/overselling-sustainability-reporting>, (accessed 01.09.2022).

13 C. Edwards, What is Greenwashing and How Do You Spot it?, 5 August 2022, <https://www.businessnewsdaily.com/10946-greenwashing.html> (accessed 01.09.2022).

14 F. Haroun, S. Ajibade, P. Oladimeji, J.K. Igbozurike, Toward the Sustainability of Outer Space: Addressing the Issue of Space Debris, *New Space*, 9 (2021) 63-71.

15 T. Masson-Zwaan, Sustainability in Space, 19 February 2021, <https://www.leidenlawblog.nl/articles/sustainability-in-space> (accessed 01.09.2022).

new players on the market and all past activities which generated extortionate amounts of space junk, the future of space is indeed questioned. Despite the damage that has already been done, there are many ventures, both public and private, which aim to mitigate some of the harm past space campaigns have caused. The UK is enjoying a fair share of successful experiments and private enterprises which are looking to help with the world's sustainable efforts, by being a seat of companies like Space Forge and Astroscale.¹⁶ The country is leading the way with its new package of measures to ensure long-term sustainability for space operations and offers extended business opportunities and support to anyone who is willing to tackle the problem of space debris.¹⁷ Japan is another example of a state directly supporting sustainability efforts, directly recognising space as an enabler to achieve SDGs.¹⁸ The European Space Agency has a list of schemes promoting and supporting sustainable development both on Earth and in space.¹⁹

Across the Atlantic, the White House has announced sustainability to be part of the Space Priorities Framework, recognising the importance of preserving space as a vital infrastructure for the future generations.²⁰

Although space sustainability has witnessed great support and development, there have been some significant setbacks and problems in the recent months. In November 2021, Russia conducted a direct ascent anti-satellite test to destroy a defunct satellite and generated a massive amount of smaller space debris that intersected the orbit of the ISS and prompted the astronauts on board to seal off station modules and retreat.²¹ This is not the first anti-satellite test that has created a significant amount of debris in orbit, with tens

16 Space Wales, A Sustainable Space Nation, the Report, 2021, <https://spacewales.co.uk/wp-content/uploads/2021/06/Space-Wales-The-Report-low-res.pdf> (accessed 01.09.2022).

17 Department for Business, Energy & Industrial Strategy, UK Space Agency, and George Freeman MP, Government announces package of new measures to drive space sustainability, 23 June 2022, <https://www.gov.uk/government/news/government-announces-package-of-new-measures-to-drive-space-sustainability> (accessed 01.09.2022).

18 I. Yasuo, Space as an enabler to achieve the Sustainable Development Goals, ITU News Magazine, June 2020, https://www.jaxa.jp/about/iso/sdgs/pdf/2020_ITUNews06-jaxa.pdf, (accessed 01.09.2022).

19 European Space Agency, ESA and the Sustainable Development Goals, https://www.esa.int/Enabling_Support/Preparing_for_the_Future/Space_for_Earth/ESA_and_the_Sustainable_Development_Goals, (accessed 01.09.2022).

20 United States, Space Priorities Framework, December 2021, https://www.whitehouse.gov/wp-content/uploads/2021/12/united-states-space-priorities-framework-_december-1-2021.pdf (accessed 01.09.2022).

21 S. Bugos, Russian ASAT Test Creates Massive Debris, December 2021, <https://www.armscontrol.org/act/2021-12/news/russian-asat-test-creates-massive-debris> (accessed 01.09.2022).

of tests being carried out since the 1950's by the main space superpowers. This has been the cause of calls for a global ban on anti-satellite tests, however no decisive action has been taken by any governmental or intergovernmental organisations.²²

The inaction of those with power to enact laws and make regulatory decisions can have a high cost to the whole of humanity, but it must be remembered that the legislative process is a lengthy and complex one. The next subsection will look into the criticisms surrounding the lack of regulation that supports sustainability in outer space and will go into the reasons calls have been made for faster legal solution to the problem.

3.2. Lack of legal support

There is almost universal consensus among space professionals that the legal community is lagging behind technological development and that there is a need to address the legal challenges that sustainability in space poses and do it sooner rather than later.²³ There have been numerous calls coming from industry experts asking their policy counterparts to take action and help navigate the ever changing landscape of regulation. There have been similar appeals coming from people outside the space bubble, who are sometimes caught unprepared by the lack of regulation in a crucial infrastructure such as space. With questions of security, interference and all other possibilities for abuse that exist in the domain, it may appear surprising that there is nothing to prevent misuse and potential damage.

The general public also seems unaware of the fact that space is fairly unsustainable with no real solution to space junk fully functioning yet. Many general new outlets are now trying to inform the public and there is real criticism coming from them as space industry experts are sometimes unable to address the problems adequately.

Space traffic management and space debris, along with all other questions of sustainability, pose their own challenges to the legal experts. As there is no universal interpretation of the rules applicable to sustainable development of space operations, it remains up to the ones participating in space activities to interpret them in a way they see fit. There are of course the UN Guidelines on Space Debris Mitigation, however, as the name suggests they remain an example of best practice, rather than a binding rule. Another problem for the legal community, and perhaps a more challenging one, is the removal of

22 B. Weeden, V. Samson, It's Time for a Global Ban on Destructive Antisatellite Testing, 14 January 2022, <https://www.armscontrol.org/act/2021-12/news/russian-asat-test-creates-massive-debris> <https://www.scientificamerican.com/article/its-time-for-a-global-ban-on-destructive-antisatellite-testing/> (accessed 01.09.2022).

23 C. Newman, and M. Williamson, Space Sustainability: Reframing the Debate, *Space Policy*, 46. (2018), 30-37.

orbital debris.²⁴ There is no guideline for remediation and the ultimate responsibility for the clean up of defunct debris remains legally unclear.

Considering the factors discussed previously, it must be mentioned that the industry has largely agreed that space debris is a problem and there are initiatives of setting standards for sustainability in future missions. However, this comes without any legal framework and all projects that use sustainable practices do so entirely at their discretion.²⁵

This apparent lack of support from the policy makers and the legal community is inevitably influenced by the political outlook and agenda of national governments and international organisations. In order to better understand the factors that drive policy making, the next section will study the history of international cooperation in space and how it is influenced by the latest events on the international political stage.

4. International Cooperation in Space

4.1. The past standards

From Sputnik I in 1957, until the fall of the Iron Curtain in the 1990's, international collaboration in space was marked by the division of the two greatest space powers -the United States of America and the USSR. Their respective blocs were working together developing technologies and launching humans in space in separate but equally important programmes achieving technical successes unseen in any previous eras of human history.

In the meantime, the legal and political community, in the name of peace for all and protection of the space domain gathered together at the United Nations and drafted the basis of space law as we know it today. The five main international treaties - the Outer Space Treaty, the Rescue Agreement, the Liability Convention, the Registration Convention and the Moon Agreement, were all drafted and adopted in the 1960's and 1970's and still enjoy varying levels of ratification and signature among most nations, members of the UN.²⁶

Whether these treaties were the result of true cooperation or a manifestation of the desire and intention to prevent the opposing ideologies from causing harm to one another is no longer a relevant topic, as the treaties were and still are a proven success in international law.

Since the end of the 20th century space exploration enjoyed new heights of international cooperation, with many projects being practically borderless

24 UNOOSA, Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space, 2010, https://www.unoosa.org/pdf/publications/st_space_49E.pdf accessed 01.09.2022.

25 No. 14 above.

26 United Nations, Outer Space Treaties, <https://treaties.un.org/pages/showdetails.aspx?objid=0800000280128cbd> (accessed 01.09.2022).

and many new countries entering the space domain on almost equal footing with the big players. This allowed space to become an industry and a commercial market with private enterprises spawning from different parts of the globe and challenging the status quo. Space exploration and operations are no longer reserved for governments and now they are becoming one of the most promising industries in the world, mostly in the financial sense of the word.

All players on the market now operate on the basis of contracts and contract law, with its flexible rules and agility, which can support their development on the shortest time scales. Since all main international treaties were adopted, no significant international effort was made to draft any further conventions or similar documents, so the countries willing to further develop their legal frameworks catering for space activities were left to legislate as they saw fit. This allowed for flexible legal development and many countries enacted their own laws depending on their level of progress in space.

Furthermore, space has become a fully commercial industry with its applicable rules and self-regulation, similar to many emerging areas of technological development. Because of this, the exchange of knowledge, data and technology has become unprecedented, with many scientific projects and commercial ventures becoming multinational and many professionals gaining the ability to travel and move around to accommodate the development of space as a fully functioning industry.

4.2. Current situation

As of 2022, however, the global political landscape has changed and, with it, the scientific and business cooperation in outer space. Since the Russian Federation invaded the independent state of Ukraine, the relationship between the main space superpowers and their partners has crumbled, bringing a significant number of projects to a halt. The international community distanced itself from Russia, imposing serious sanctions. As a result, the Russian space agency - Roscosmos - and its representatives threatened to pull out of a significant number of common activities in space, including the ISS.²⁷

This has caused worrying instability in space operations and caused many problems for governmental and private departments alike. By extension, the military conflict has caused significant damage to the budding space industry in Ukraine which has already established great working relationships with countries like the United Kingdom, which sees many UK projects actually

27 W. Whitman Cobb, Russian invasion of Ukraine and resulting US sanctions threaten the future of the International Space Station, 25 February 2022, <https://theconversation.com/russian-invasion-of-ukraine-and-resulting-us-sanctions-threaten-the-future-of-the-international-space-station-177891> (accessed 01.09.2022).

being built and developed by Ukrainian teams. Some of these projects are directly related to the space sustainability efforts of the UK.²⁸

Active war in Europe is not accepted as the norm and many observers expressed the opinion that this may be the end of international cooperation as we know it.²⁹ Indeed, there is an imminent threat to space security and peace, and the division that was created as a result will inevitably prevent many promising space businesses and projects from even launching, especially in cases where they were planned as a collaborative effort between a Russian and a Western entity.

Despite the fact that international regulation of space activities has stayed the same throughout the different stages of political development of the industry, this new division both on ground and in space has the potential to forever inhibit the advancement of new regulatory frameworks, ever so needed to ensure that sustainability is not just a concept on paper.

In order to understand better how the current lack of international cooperation may influence the legislative process that is to support the sustainable development efforts in outer space, the paper will now examine the standard methods of enacting laws and rules applicable to space operations and exploration.

5. Legislative Process in Space

5.1. National Level

Generally speaking, independent states are free to make laws according to their own constitutional rules and any international treaties they may have signed and ratified. Often, it is the large and more powerful states that lead the way with enacting national laws that support the development of new technologies. However, in some instances, smaller nations may lead the way when it comes to legislation. One such example is Luxembourg, which has been truly proactive with enabling starbound businesses to thrive.³⁰

Normally, legislation lags behind technological progress and this has been the case of outer space as well. For example, the United States enacted their Commercial Space Launch Act in 1984, 12 years after the last Apollo mission reached the Moon. The same is generally applicable in other parts of the world, where lawmakers act once the stakes are too high not to intervene.

28 T. Pultarova, British rocket startup's staff helping defend Dnipro, Ukraine's space city, 3 March 2022, <https://www.space.com/skyrora-ukraine-staff-defend-space-city-dnipro> (accessed 01.09.2022).

29 J. Este, Space Blocs: The future of international cooperation in space is splitting along lines of power on Earth, 21 April 2022, <https://theconversation.com/space-blocs-the-future-of-international-cooperation-in-space-is-splitting-along-lines-of-power-on-earth-180221> (accessed 01.09.2022).

30 Luxembourg Space Agency, Legal Framework, 2 March 2022, <https://space-agency.public.lu/en/agency/legal-framework.html> (accessed 1.09.2022).

Another example is the USSR which had practically no laws to govern its extensive space activities.³¹ Only in 1993, after the fall of the Union, was the first space act adopted by the new Russian government.³²

In rare cases, space laws are drafted and put into force prior to any specific space activities taking place. The Duchy of Luxembourg is once again a trailblazer in this regard, having enacted a law governing the use of space resources in 2017, before any viable missions were actually launched.³³ This is no mere political whim, as Luxembourg is known for its efforts to stimulate a lucrative environment for cutting-edge business which can stimulate its economy in the long run.

It has been proven many times that having a stable national legal framework supports the development of sustainable business models and stimulates positive immigration of ideas and professionals who have not found support and the required stability elsewhere.³⁴

It must be understood that national legislation does not exist in a vacuum and all states must comply with their international obligations in order to secure the future of their economies and the advancement of new and leading businesses. This is why it is important to discuss space legislation in its international sense as well, since outer space is a borderless domain governed by international rules.

5.2. International Level

As previously mentioned, the main body of international space law consists of five main treaties. With the exception of the Moon Agreement, they all have been signed by the main space faring states.³⁵

The remainder of international space law consists of recommendations and other soft law instruments which allow states to regulate their own space activities and offers a level of flexibility when interpreting the rules applicable to each state and space operator. Some have argued that the use of soft law is beneficial whilst others have expressed the opinion that stronger enforcement

31 S. Malkov, Normativno Pravovye Osnovy Kosmicheskoi Deyatelnosti, https://aerohelp.com/sites/default/files/malkov_normativno-pravovye_osnovy_kosmicheskoi_deyatelnosti.pdf (accessed 01.09.2022).

32 *Ibid.*

33 No.30 above.

34 J. Wang, Rule of Law Ensures Long-term Sustainable Development of Outer Space Activities, September 2019, https://www.unoosa.org/documents/pdf/spacelaw/activities/2019/T4-3-JW_Rule_of_Law_Ensures_Long_Term_Sustainable_Development_of_Outer_Space_Activities.pdf (accessed 01.09.2022).

35 Committee on the Peaceful Uses of Outer Space, Status of International Agreements relating to activities in Outer Space as at 1 January 2022, 28 March 2022, https://www.unoosa.org/res/oosadoc/data/documents/2022/aac_105c_22022crp/aac_105c_22022crp_10_0_html/AAC105_C2_2022_CRP10E.pdf (accessed 01.09.2022).

is needed to ensure that all actors involved in space operations and missions are compliant with the rules.³⁶

Whilst there have been calls for appropriate amendments of the already existing treaties, especially in the light of the rising need to reevaluate the environmental impact of space activities, it must be understood that negotiating a global treaty takes a great amount of political will, compromise, and lengthy and expensive preparatory works. Unfortunately, at the moment there does not seem to be a common understanding between the leading space fairing states of what is necessary to ensure sustainability in space. In some cases, even the concept of “sustainability” varies among states.³⁷ Whilst drafting a new space treaty is not completely impossible, for the time being and considering the international political situation, it is out of the question until an international agreement is reached here, on Earth.

Leaving aside for a moment any proposed international treaty governing space sustainability, this paper will proceed to investigate the current state of international cooperation, sustainability, and legislation as it stands today before proceeding with suggestions which may alleviate the burden on lawmakers whilst also allowing for order and stability for sustainable space projects.

6. Intersection of cooperation, legislation and sustainability

6.1. Current rules-based order

The body of international law consists of binding rules imposed on states either by treaty or by customary law. The notion of “rules-based order” is one that carries a broader meaning, incorporating international law and other binding principles with which states, individuals and businesses must comply.³⁸ This has been widely used in the countries of the Global North or in other words, those holding Western values and has been openly criticised by political representatives of the Russian Federation.³⁹ Whilst the concept of

36 U. Bohlmann, G. Petrovici, *Developing planetary sustainability: Legal challenges of Space 4.0*, *Global Sustainability*, 2, 2019, <https://www.cambridge.org/core/journals/global-sustainability/article/developing-planetary-sustainability-legal-challenges-of-space-40/AFAB9868060B7B9A535261A46F6D544A#article> (accessed 01.09.2022).

37 P. Walker, *Sustainability: a discipline and a political agenda?*, *Environmental Hazards*, (2017) 16:2, 93-98.

38 J. Cimmino and M. Kroenig, *Strategic context: The rules-based international system*, 16 December 2020, <https://www.atlanticcouncil.org/content-series/atlantic-council-strategy-paper-series/strategic-context-the-rules-based-international-system/> (accessed 01.09.2022).

39 S. van Seveeren, *Lavrov’s Lament: A Russian take on the rules-based global order*, 16 July 2021, <https://www.ejiltalk.org/lavrovs-lament-a-russian-take-on-the-rules-based-global-order/> (accessed 01.09.2021).

“rules-based order” may not satisfy all, it is one that most accurately describes the functioning of the space industry on an international level.

There is the main body of international law that governs all space activities - the five main space treaties, and there are many soft law guidelines and recommendations along with the contractual obligations of those involved in space operations. In the case of sustainable development, since there is no body of international law that regulates it, the other elements of a rules based order come into play. As it will be discussed further in this paper, there is a clear desire coming from within the industry to self-regulate and provide solutions to the problems coming from the unsustainable use of space and space technology. Therefore, any new contractual obligations, or those voluntarily imposed by companies or national agencies alike, would constitute binding rules on those who sign or voluntarily enrol in them. It can be concluded that, if the more powerful industry players push for a change within the industry and there is the appropriate support, albeit not legal, coming from governments or agencies, then what is now “best practice” may become an essential requirement for the functioning of a space mission.

6.2. Monetary considerations

In the age of structural changes within the space business, lowering of mission costs and multi-billion investments, investing the time and money to negotiate, lobby and draft a new set of legally binding international rules may not be the cost-effective solution to the legislative problems of the industry.

Governments around the world are already increasing their investment in space activities and budgets sometimes may not allow for directly legislating for a particular branch. With the United Nations funded by states' contributions and in many cases those are voluntary.⁴⁰ In order to sponsor the creation of a new international draft, this may require further funding which can be limited.

Whilst sustainable practices may boost profitability in the long run, initiatives supporting sustainability are rarely profitable right away. This is a very important factor in the decision making processes of space actors and must not be ignored when analysing the lack of legal framework governing those practices. Of course, it is true that sustainability initiatives within corporate structures can mitigate risk and drive long-term growth,⁴¹ however the right leadership is necessary to realise this potential.

40 UNA-UK, UN briefings: The UN's finances, 7 July 2017, <https://una.org.uk/news/un-briefings-uns-finances> (accessed 01.09.2022).

41 C.P. Gurnani, Sustainability and profitability can co-exist. Here's how, 7 January 2020, <https://www.weforum.org/agenda/2020/01/sustainability-profitability-co-exist/> (accessed 01.09.2022).

6.3. Timelines of development

With the rise of NewSpace ventures and the increasing commercialisation of space, the timescale of launch and completion of space missions has decreased significantly. This is not only pertinent to the smaller and more agile companies as the bigger and more traditional enterprises and governments have followed suit. Missions that may have taken decades to develop and launch in the past, now may be completed in a few years.

Considering the new speed of mission evolution, it may not be surprising that lawmakers are slow to catch up. Drafting and negotiating a new law takes a lot longer, sometimes it may never happen if the administration changes or if there is no public support for the new introduction.

In international law things may move even slower. To illustrate, it took nearly 10 years for the Outer Space Treaty to become reality, after the UN adopted a resolution on space in 1958.⁴²

As shown, 10 years is an incredibly long time, especially in the era of raising investment, space startups and paradigm shifts. With the rising need of answers to the sustainability question, there may not be practical time to develop any new laws, therefore the industry would need to address those needs on its own.

6.4. Holistic approach to regulation

Regulation and law making cannot exist in a vacuum. Oftentimes, lawmakers fail to conduct the right conversations with stakeholders before formulating and drafting rules. Sometimes, those responsible for putting together regulations do not fully understand the topics they have been called to legislate on and lately, this has been the subject of much criticism. One example, outside of the space industry was the lack of understanding of Facebook's work and algorithms by US lawmakers which drew the attention to the common lack of preparation and industry insight among legal and policy experts.⁴³

There is an evident shortage of legal experts who also have knowledge and experience in the space domain, with only a handful graduates coming out every year from a handful of universities around the world.⁴⁴ Many space entrepreneurs have expressed concerns that there is no one to help them

42 United Nations Office for Outer Space Affairs, The Outer Space Treaty, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introouterspacetreaty.html> (accessed 01.09.2022).

43 E. Steward, Lawmakers seem confused about what Facebook does – and how to fix it, 10 April 2018, <https://www.vox.com/policy-and-politics/2018/4/10/17222062/mark-zuckerberg-testimony-graham-facebook-regulations> (accessed 01.09.2022).

44 A. Marinova, M. Gould, M. Zara, NewSpace, Old Rules: An Empirical Approach To Understanding The Needs Of Young Space Businesses In Relation To Current Space Regulation, 64th Colloquium on the Law of Outer Space, Dubai, 2021.

navigate the legal challenges their ventures are facing and this has a negative impact on the development of new technologies, both in the financial and the corporate sense.⁴⁵

Overall, it is an absolute necessity to bring people from diverse backgrounds into the industry in order to make tangible changes to its regulation and provide the legal certainty so many businesses are asking for. With sustainability being a wide and all encompassing concept, we must now, more than ever, rely on external views, experience and find solutions to regulation which are applicable both in the short and long term. The next section analyses some propositions to the growing demand for sustainable development of space and discusses their applicability in the context of international cooperation and the current state of lawmaking.

7. Possible solutions and outcomes

7.1. Extended ITU mandate

One of the possible ways to regulate sustainability compliance for space operators is to grant the International Telecommunication Union (ITU) with an extended mandate to oversee sustainable practices for satellite operators. At the moment, the ITU only regulates the use of radio frequencies and does not address the other aspects of having a physical object in orbit, for example satellites.⁴⁶

The ITU Radio Regulations and ITU Constitution (No. 197 of Article 45) provide that "*all stations, whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other Members, recognized operating agencies, or other authorised operating agencies which carry on a radio service, and which operate in accordance with the Radio Regulations*". However, it recognises that with the exponential growth of launches and objects in orbit, the likelihood of interference is getting higher with every new mission. The ITU efforts are collaborative in nature, with all rules and regulations coming from its member states. It is up to the member states to licence their missions and in a way, it remains up to the states to regulate their sustainable practices or lack thereof. Nevertheless, if the ITU is granted an extended mandate to perform checks or require certain measures to be taken by mission operators, that could be a possible way to ensure that there is no interference as per the ITU's own regulations.

⁴⁵ *Ibid.*

⁴⁶ International Telecommunication Union, Regulation of Satellite Systems, February 2022, <https://www.itu.int/en/mediacentre/backgrounders/Pages/Regulation-of-Satellite-Systems.aspx> / (accessed 01.09.2022).

Further to this, there is the possibility for the ITU to require an internationally recognised certification, for example a certain rating for sustainability, a suggestion which is explored in the next subsection.

7.2. Industrial standards

Another way to tackle the lack of a harmonised international framework would be to adopt industrial standards applicable to the different parts of a space mission. So far, no harmonised manufacturing requirements are in existence and there isn't one single requirement to monitor the lifespan of satellites or deorbit defunct mission parts.

As far as national standards are concerned, they are still heavily dependent on domestic regulation. As previously mentioned, some countries around the world have already started adopting measures to ensure the sustainability of space missions launched from their territory or in which they are direct participants. It may be argued that if any national standards are to be adopted it must be sooner rather than later, as the extent of the damage of human activity in orbit is already significant and threatens the existing infrastructure.

In addition to national standards, there is the possibility for international certifications or best practices to be promoted among all players on the market. A system similar to the International Standardization Organization (ISO) provides some answer to the need for transparency in space operations and their footprint on the environment.

There has been movement in this direction with the Space Sustainability Rating (SSR) being developed by the World Economic Forum and supported by powerful names in the industry such as Lockheed Martin and Airbus.⁴⁷ The SSR is based on transparency and data, however its disadvantage is that it is completely voluntary and it only launched in mid-2022, so its impact is unknown yet.

The SSR is shown to be another sign of the space industry's willingness to self-regulate. There is a will to resolve the situation through already existing industry practices, however a voluntary scheme just shows the lack of general coordination and agreement between all actors in space on what is truly necessary to prevent a catastrophe.

One way of resolving this is requiring contractual partners for collaborative missions to have a certain certification or a rating, similar to ISO standards. Whilst having an ISO certification is not a legal requirement, in some industries, having one is the general rule as customers may not work with a supplier if they can't provide a valid ISO compliant certification. One such

47 K. Clift, We launched the first sustainability rating for space exploration, 26 July 2021, <https://www.weforum.org/impact/world-s-first-space-sustainability-rating-launched#:~:text=The%20world%27s%20first%20Space%20Sustainability,are%20managed%20safely%20and%20sustainably> (accessed 01.09.2022).

example is the manufacturing of medical devices.⁴⁸ This means that the adoption of an international space sustainability certification must come from the industry itself to the extent that not having one comes with the applicable financial implications.

7.3. The conversation about new UN treaties and their possibilities

The Outer Space Treaty, the foundational document of space law has enjoyed a long reign and compliance since it was published in 1967. Unfortunately, it does not address the issue of space sustainability as at the time of drafting this was not a topic of considerable debate. At the moment, it seems the future of global space governance is left in the hands of the existing treaties and the principles of “global commons” and “shared benefit”. This lack of international policy development has led some technological commentators and those outside the space industry to note that this significant delay is in sharp contrast with the fast technical advances that space is known for. There have been clear calls for the UN to take action on the fact that all treaties currently in force are over 50 years old and the challenges that come with space being commercialised are not adequately addressed by the international legal framework.⁴⁹

Questions addressing security, traffic management, debris and tourism in space are coming from all corners of the world and unfortunately, the space community cannot provide a straight answer. Whilst those same issues are regularly discussed at UNCOUPUS fora, the international legal regime for space remains reliant on soft law, recommendations and multilateral contracts.

In an ideal world for those supporting wider international regulation, there would be an new, overreaching and widely accepted international treaty which regulates sustainable development and practices in space. However, at the moment, with the crumbling relationship between key stakeholders, a treaty drafting process at UN level is becoming an ever more distant possibility.

8. Conclusion

As explored in this paper, the topic of space sustainability in the context of international cooperation is a complex one with many challenges and problems waiting for their resolution. Sustainable development in itself is a complicated concept which sometimes remains open to interpretation. As of 2022, the international political situation remains unstable with the future of

48 P. Elson-Vinning, What is ISO Certification and do I need it?, <https://processbliss.com/iso-certification> (accessed 01.09.2022).

49 T. Woodwall, Space policy is finally moving into the 21st century, 29 September 2021, <https://www.technologyreview.com/2021/09/29/1036313/space-policy-united-nations-security-treaty/> (accessed 01.09.2022).

many projects threatened by the disappearing cooperation between the main space superpowers. To summarise the conclusions this paper comes to one must understand the processes of drafting legislation on national and international level as well as industry considerations and the general flexibility of the definition of sustainability.

Whilst there are evident efforts to ease things for space operators and there is will to regulate the industry so the attempts to mitigate the damage already caused by humans in orbit are not undermined, it must be noted that they are certainly not enough and may be a little late.

The short answer to the question of how we legislate for space sustainability without international cooperation is that we simply do not. At least not on an international level. However, for the time being it can be truly beneficial if space faring nations take it upon themselves to place strict rules on sustainable practices for their own space operators and missions and show the political will to do so. There are many bitter lessons to be learned from the past and other areas, especially now, that we, as species, are facing a climate crisis as a result of our own actions. Space, despite its vastness, is not immune to the same problems and with every day we are getting closer to experiencing what would be the onset of the Kessler syndrome, which is indeed the situation everyone wants to avoid. Even domestic regulation is dependent on financial considerations, timescales beyond what some generations might comprehend and the current political understanding of each individual state.

Until more stringent regulation takes place, it is left to the space industry to impose its own rules and move towards sustainable practices through self-regulation, something that would be a first in history if achieved.