

The Use of a Voluntary Code of Conduct for Space Sustainability: A Practical Governance Tool¹

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ABSTRACT

The article calls for the need of a Voluntary Code of Conduct for the space industry, given the sector's increasing reliance on private actors. With the Fourth Industrial Revolution (4IR) driving rapid advancements in artificial intelligence, automation, and digital connectivity, space activities are evolving beyond traditional government-led initiatives. The private sector now plays a pivotal role, not only in technological innovation and economic expansion but also in shaping a more sustainable and responsible commercial space environment. Considering the absence of binding international regulations that adequately address today's challenges, such as satellite congestion, environmental risks, and commercial ethics, a structured, self-regulatory framework can serve as a practical governance tool.

Keywords: sustainability, code of conduct, space policy, branding, ethical investing

El uso de un código de conducta voluntario para la sostenibilidad espacial: una herramienta práctica de gobernanza

RESUMEN

El artículo insta a la necesidad de un Código de Conducta Voluntario para la industria espacial, dada la creciente dependencia del sector de los actores privados. Con la Cuarta Revolución Industrial (4RI), que impulsa rápidos avances en inteligencia artificial, automatización y conectividad digital, las actividades espaciales están evolucionando más allá de las iniciativas gubernamentales tradicionales. El sector privado desempeña ahora un papel fundamen-

¹ This is a shorter and significantly revised version of the article: Chrysaki, M. (2020). The sustainable commercialisation of space: The case for a voluntary code of conduct for the space industry. *Space Policy*, 52, 101375. <https://doi.org/10.1016/j.spacepol.2020.101375>

tal, no solo en la innovación tecnológica y la expansión económica, sino también en la creación de un entorno espacial comercial más sostenible y responsable. Ante la ausencia de regulaciones internacionales vinculantes que aborden adecuadamente los desafíos actuales, como la congestión satelital, los riesgos ambientales y la ética comercial, un marco estructurado de autorregulación puede servir como una herramienta práctica de gobernanza.

Keywords: sostenibilidad, código de conducta, política de espacio, branding, inversión ética

使用自愿行为准则实现太空可持续性： 一项实用的治理工具

摘要

鉴于航天行业越来越依赖私营企业，本文呼吁制定一项航天业自愿行为准则。随着第四次工业革命(4IR)推动人工智能、自动化和数字互联互通的快速发展，航天活动正在超越传统的政府主导举措。私营部门现在不仅在技术创新和经济扩张方面发挥着关键作用，而且在塑造更可持续和负责任的商业太空环境方面也发挥着关键作用。鉴于缺乏具有约束力的国际法规来充分应对当前挑战（例如卫星拥塞、环境风险和商业伦理），结构化的自监管框架能作为一种实用的治理工具。

关键词：可持续性，行为准则，空间政策，品牌化，伦理投资

Introduction. The Growth and Influence of the Private Space Industry

Over the past few decades, the space industry has undergone a profound transformation, shifting from a domain dominated by government agencies to a vibrant ecosystem enriched by private enterprises, startups, and small to medium-sized

enterprises (SMEs). This evolution has democratized access to space, fostering substantial growth and innovation in space technologies and services, which are integral to the digital infrastructure underpinning the Fourth Industrial Revolution (4IR). The space economy divided into upstream (research, development, manufacturing, launch), (satellite and Earth Observation based products, applications, and services),

and activities related to technology transfers from the space sector to other sectors (OECD, 2020, October 7) generated \$400 billion in revenue in 2023 (Satellite Industry Association report, 2024), and it is estimated to grow to over \$1 trillion by 2040 (Bryce Space and Technology, 2022).

The private sector's expansion has brought numerous benefits, including enhanced digitalization, the development of new technologies, and solutions for various global, national and regional/local challenges such as environmental monitoring, disaster management, and agricultural management. Investments from both public and private sectors underscore the importance of the space industry, with government budgets reaching \$79 billion in 2019 and private investments rising significantly sectors (OECD, 2020, October 7). Investment in the space sector reached \$12.5 billion in 2023, a figure significantly higher than the \$9.3 billion raised in 2022 but remains below the record \$15.3 billion achieved in 2021 (Space IQ, 2024).

However, this growth also presents significant challenges, such as the increasing threat of space debris due to the deployment of mega-constellations like SpaceX's Starlink (Suri, 2022, July 13), which could escalate the risk of collisions and jeopardize space and terrestrial infrastructure; activities could hinder astronomical observations (Mróz et al., 2022); disrupt the democratic use of orbits, and marginalize smaller players in the space sector (Ogden, 2022, May 16).

Why Is It Important for a Space Company to Embrace a Code of Conduct?

The concept of sustainability is crucial for the future development of the space industry. The article aligns with the definition of sustainability as a process where technological, economic, and social development improves the quality of life for current and future generations without compromising environmental, economic, or societal aspects (World Commission on Environment and Development, 1987, August 4). Given the interconnected nature of space activities with other sectors and their critical impact on daily life, sustainable practices in the space sector become essential (Ochoa et al., 2018).

There are five compelling reasons that highlight the urgent need for sustainable development in the space industry and the creation of tools to support this effort. First, the 4IR links human and digital dimensions to technologies transforming global production systems; space activities must align with these values. Second, outdated space treaties necessitate new frameworks and guidelines, such as those published by the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and national regulations, to promote responsible behavior (Martinez, 2019, November). Third, the rise of ethical investing underscores the importance of environmental, social, and corporate governance (ESG) factors, which are increasingly influenc-

ing investors and companies (Business Committee to examine ESG and rise of ethical investment banking, 2022, October 6). Fourth, public perception plays a vital role in shaping the reputation of companies, making sustainable practices essential for maintaining a positive image (Burke, Graeme, & Cooper, 2011). Fifth, political factors and geopolitical dynamics significantly impact space industry operations, as government policies, international collaborations, and national security concerns shape funding, regulatory frameworks, and strategic partnerships (Berkeley Political Review, 2024). These factors collectively emphasize the importance of integrating sustainability into the core strategies of space industry companies, not only to align with global technological and ethical trends but also to ensure their long-term viability.

Introducing a Voluntary Framework for Ethical Conduct in the Space Industry

The primary objective of the proposed governance tool is to drive the sustainable commercialization of space, reflecting the growing urgency of responsible practices in the industry. This aligns with other international efforts, such as the Draft International Code of Conduct for Outer Space Activities and CONFERS, initiatives spearheaded at the intergovernmental level and by industry associations to address space sustainability. However, the Code of Conduct presented here takes a more progressive approach by offering a comprehensive framework that

embeds sustainability principles within both individual companies and across various sectors of the space industry.

In light of recent trends, such as the increasing emphasis on environmental, social, and corporate governance (ESG) and the rapid expansion of private sector space activities, this self-regulatory system is flexible enough to allow companies across different space domains to customize the standards to their specific needs. At the same time, it ensures consistent application across the industry, creating a cohesive approach that supports responsible growth, mitigates space debris, and fosters long-term environmental stewardship in the face of emerging challenges like space traffic management and resource utilization.

The proposed Voluntary Code of Conduct is grounded in the “do no harm” principle (Charancle & Lucchi, 2018), emphasizing the importance of understanding and mitigating potential negative impacts of interventions. This principle, rooted in humanitarian aid, encourages organizations to assess risks before taking action to ensure their activities do not lead to unintended harm. and is built on four core values—precaution, protection, respect, and accountability—drawn from environmental law, human rights, and humanitarian aid. It also includes three key operating principles: risk assessment, impact minimization, and remedy provision to reduce negative effects of space activities (For a more extensive discussion of the proposed code, see Chrysaki, 2020).

The Code introduces a two-tier compliance system: internally, companies are responsible for appointing compliance officers and setting minimum standards; externally, a “Contact Group” of experts, investors, and academics will oversee peer reviews to guide companies and ensure adherence to the Code. This approach aligns with the growing trend of “soft law” in the space sector, where flexible, non-binding guidelines and codes of conduct are used to promote responsible behavior without imposing rigid regulations (Chrysaki, 2020).

Conclusion: Towards a Sustainable Space Industry through a Strong Governance Tool

The adoption of a Voluntary Code of Conduct serves to bridge the gap between existing space legal frameworks and the imperative to safeguard humanity’s interests amid the burgeoning activities of the space industry. This Code should be viewed as a complementary governance tool, enhancing and contributing to existing initiatives aimed at operationalizing sustainability in space endeavors.

Recent developments underscore the necessity of such a Code. The Global Satellite Operators Association (GSOA) released its Code of Conduct on Space

Sustainability in November 2023, urging operators to adopt responsible practices that mitigate risks like in-orbit collisions and space debris (GSOA, 2023). Similarly, the Italian Space Agency emphasizes that private investment is crucial for the sector’s growth, projecting the global space economy to reach \$1.8 trillion by 2035. However, ASI President Teodoro Valente also highlights the need for clear regulations to ensure sustainable development (Reuters, 2024).

Implementing a Voluntary Code of Conduct would enable the space industry to play a pivotal role in sustainable commercialization, effectively addressing emerging environmental, social, and economic challenges. Moreover, it would provide a competitive edge to space companies by promoting ethical leadership and attracting investment through a demonstrated commitment to sustainability.

The rapid expansion of the private space sector necessitates the adoption of responsible practices to ensure that space activities benefit all of humanity and align with global sustainability objectives. By embracing such governance tools, companies can position themselves as paragons of ethical leadership, inspiring peers and paving the way for innovative sustainability concepts within the industry.

References

- Berkeley Political Review. (2024, December 15). *Space Race 2.0: Profits, Power, and the Politics of the Cosmos*. Berkeley Political Review. <https://bpr.studentorg.berkeley.edu/2024/12/15/space-race-2-0-profits-power-and-the-politics-of-the-cosmos/>
- Bryce Space and Technology. (2022). *State of the satellite industry report 2022*. https://brycetechnology.com/reports/report-documents/SIA_SSIR_2022.pdf
- Burke, R. J., Graeme, M., & Cooper, C. L. (2011). *Corporate reputation: Managing opportunities and threats*. Ashgate Publishing.
- Business Committee to examine ESG and rise of ethical investment banking. (2022, October 6). *UK Parliament*. <https://committees.parliament.uk/committee/365/business-energy-and-industrial-strategy-committee/news/173408/business-committee-to-examine-esg-and-rise-of-ethical-investment-banking/>
- Charancle, B., & Lucchi, E. (2018). Incorporating the principle of “Do No Harm”: How to take action without causing harm: Reflections on a review of Humanity & Inclusion’s practices. *ALNAP*. <https://alnappublications.org/help-library/resources/incorporating-the-principle-of-do-no-harm-how-to-take-action-without-causing-harm/>
- Chrysaki, M. (2020). The sustainable commercialisation of space: The case for a voluntary code of conduct for the space industry. *Space Policy*, 52, 101375. <https://doi.org/10.1016/j.spacepol.2020.101375>
- Global Satellite Operators Association. (2023, November). Global Satellite Operators Association releases Code of Conduct on Space Sustainability <https://gsoa-satellite.com/news/global-satellite-operators-association-releases-code-of-conduct-on-space-sustainability>
- Martinez, P. (2019, November). The UN COPUOS guidelines for the long-term sustainability of outer space activities. *Secure World Foundation*. https://swfound.org/media/206891/swf_un_copuos_its_guidelines_fact_sheet_november-2019-1.pdf
- Mróz, P., et al. (2022). Impact of the SpaceX Starlink satellites on the Zwicky Transient Facility survey observations. *The Astrophysical Journal Letters*, 924(2).
- Ochoa, J. J., et al. (2018). Learning from best practices in sustainable urbanization. *Habitat International*, 78, 83-95. <https://doi.org/10.1016/j.habitatint.2018.05.013>

OECD. (2020, October 7). *Measuring the economic impact of the space sector: Key indicators and options to improve data* (Background paper for the G20 Space Economy Leaders' Meeting, Space20). Saudi Arabia. p. 3.

OECD. (2020, October 7). *Measuring the economic impact of the space sector: Key indicators and options to improve data* (Background paper for the G20 Space Economy Leaders' Meeting, Space20). Saudi Arabia. p. 5.

Ogden, T. (2022, May 16). Wealthy nations are carving up space and its riches – and leaving other countries behind. *Encyclopedia Britannica*. <https://www.britannica.com/story/wealthy-nations-are-carving-up-space-and-its-riches--and-leaving-other-countriesbehind>

Topnotch Research. (2024). *PESTLE analysis of SpaceX*. Topnotch Research. <https://topnotchresearch.org/pestel-analysis/pestle-analysis-of-spacex>

Reuters. (2024, October 13). *Private investments in space are essential, head of Italian space agency says*. Reuters. <https://www.reuters.com/technology/space/private-investments-space-are-essential-head-italian-space-agency-says-2024-10-13>

Satellite Industry Association. (2024). *State of the satellite industry report 2024*. <https://sia.org/news-resources/state-of-the-satellite-industry-report/>

Space Capital. (2024, October 10). *Space Investment Quarterly: Q3 2024*. <https://www.spacecapital.com/publications/space-investment-quarterly-q3-2024>

Suri, R. (2022, July 13). What's the environmental impact of space debris and how can we solve it? *World Economic Forum*. <https://www.weforum.org/agenda/2022/07/environmental-impact-space-debris-how-to-solve-it/>

World Commission on Environment and Development. (1987, August 4). *Our common future (Brundtland Report)*. UN Doc. A/42/427. <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>