Global Future Council on Space

Space Sustainability Monitor

CONCEPT PAPER

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WORLD ECONOMIC FORUM

Purpose and scope

The World Economic Forum's Global Future Council on Space is proposing the creation of the **Space Sustainability Monitor (SSM)**, a dedicated tool to track states' implementation of international frameworks and best practices that are designed to ensure the safety and sustainability of outer space activities.

The most relevant frameworks include – but are not limited to – the IADC Space Debris Mitigation Guidelines and United Nations Guidelines for the Long-term Sustainability of Outer Space Activities, as well as general accepted international space safety standards and any additional measures that may be developed in the future. These frameworks are voluntary and used as a reference by responsible and environmentally conscious space actors. Despite their non-binding nature, implementation is indispensable to ensure that current and future generations can continue benefiting from using space and taking advantage of space technologies.

The goal of the SSM is to make a positive impact on implementation of these frameworks by states and encourage new sustainably-driven initiatives. The SSM accomplishes this goal through a set of instruments that are designed to measure how countries are implementing these frameworks and the impact implementation efforts have on the space environment.

The SSM is designed to monitor government-level activities and to help encourage states implement international frameworks that contribute to the safety and sustainability of outer space activities. These activities include introducing enforcement mechanisms through application of legally-binding measures, such as national laws and regulations, as well as non-binding instruments, such as guidelines and other statements of policy.

The purpose of SSM is not to assess compliance, nor is it to highlight countries that are not implementing measures, but rather to showcase those who are taking positive actions to enhance the safety and sustainability of the space environment. It is designed to interact with additional stakeholders, specifically international intergovernmental organizations and non-governmental entities that are involved in space activities and governance. For example, the SSM can be used to help inform the work of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) to track implementation of the international guidelines for the long-term sustainability of space activities that were adopted by the UN in 2019.

In addition, the SSM provides data for non-governmental organizations that are studying the development of sustainability initiatives and industry groups that are developing their own best practices and standards.

The SSM will complement other initiatives that also focus on the safety and sustainability of the space environment. This includes the Space Sustainability Rating (SSR), a tool that incentivizes satellite operators to conduct space activities in a more sustainable manner. The SSR concept was also developed by the Global Future Council on Space, and after a development period of collaboration between the World Economic Forum, European Space Agency, Space Enabled Research Group within the MIT Media Lab, BryceTech and University of Texas at Austin, it is now being operationalized by the EPFL Space Center (eSpace) at the Swiss Federal Institute of Technology Lausanne.

Methodology

The SSM will consist of two parts. The first is a questionnaire that states can voluntarily answer to provide information about how they are implementing the frameworks covered by the SSM. The current set of topics and questions are:

Authorization and continuing supervision under OST Article VI

- How does your country define authorization and continuing supervision for your national space activities?
- Does your country anticipate changing the definition or standards for authorization and supervision as key Earth orbits become more crowded?
- How do you implement and enforce authorization and continuing supervision for your national space activities?

National space policy

- How do your country's space policies support the long-term sustainability of the space environment?
- How are your national space policies implemented for governmental and non-governmental space activities?
- Does your country have a cross-government platform to discuss measures for space sustainability?

Initiatives to mitigate and remediate orbital debris

- Are the IADC Space Debris Mitigation Guidelines and the ISO 24113 space debris mitigation standards integrated into national requirements?
- What standards or requirements does your country have for post-mission disposal of objects on orbit?
- How does your country monitor compliance with these orbital debris mitigation guidelines and post-mission disposal requirements?

Space situational awareness (SSA) and data sharing

- How is your country collaborating in building improved SSA capabilities?
- What are the sources of SSA data (governmental, academic, commercial) used in your country?
- What current efforts do you have to share satellite location data with other countries and space actors?

International collaboration

- How does your country seed international collaborations?
- Is your country actively involved in any international space safety and sustainability-focused initiatives?
- Does your country take an open position on issues of space safety and sustainability? If yes, at which international fora?
- Do you share any domestic space safety- and sustainability-related best practices on the international space policy and tech arenas? If yes, which practices and how?

The second part of the SSM is envisioned to be a metric called the orbital footprint, which will measure how a country's implementation of these frameworks affects the safety and sustainability of its space activities. As a starting point, the orbital footprint metric might take into account the following data:

- Number (and/or mass and size) of active satellites
- Maneuverability of active satellites
- Number (and/or mass and size) of orbital debris
- Estimated lifetime of orbital debris

The data used to measure the orbital footprint can be provided by states or non-state actors based to assess or compile publicly available data. The orbital footprint is deliberately designed to echo the concept of a carbon footprint and thus provide increased awareness of the impact that activities may have on the space environment.

However, in contrast with the carbon footprint, the goal of the orbital footprint is not to discourage or eliminate space activities, but rather encourage them to take place in a more sustainable manner. Therefore, the SSM will look at how a country's orbital footprint changes over time as a result of its implementation efforts and in comparison to what would have happened without those efforts, not the absence of any space activity at all.

Next steps

The Global Future Council on Space is introducing the SSM concept within the space community and other stakeholders in the hope of sparking interest and feedback, which will be incorporated into a forthcoming concept paper.

Contact us
For more information, contact Nikolai Khlystov by email at nikolai.khlystov@weforum.org, or visit the Global Future Council on Space website at https://www.weforum.org/communities/gfc-on-space.