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Corresponding author: SAADA Adrien

e-mail of corresponding author: [adrien.saada@epfl.ch](mailto:adrien.saada@epfl.ch)

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### Title

## Promoting responsible space practices: A primer on the Space Sustainability Rating

### Authors

Adrien SAADA <sup>1\*</sup>, Florian Micco <sup>1</sup>, Emmanuelle David <sup>2</sup>, Jean-Paul Kneib <sup>2</sup>, Mathieu Udriot <sup>2</sup>, Danielle Wood <sup>3</sup>, Scott Dorrington <sup>3</sup>, Francesca Letizia <sup>4</sup>, Stijn Lemmens <sup>4</sup>, Moriba Jah <sup>5</sup>, Simon Potter <sup>6</sup>, Minoo Rathnasabapathy <sup>7</sup>, Nikolai Khlystov <sup>7</sup>

\* Corresponding author

<sup>1</sup> Space Sustainability Rating association, Switzerland, [adrien.saada@epfl.ch](mailto:adrien.saada@epfl.ch)

<sup>1</sup> Ecole Polytechnique Fédérale de Lausanne (EPFL) eSpace, Switzerland

<sup>2</sup> Massachusetts Institute of Technology (MIT), Space Enabled Research Group, , United States

<sup>3</sup> European Space Agency (ESA), Germany

<sup>4</sup> The University of Texas at Austin, United States

<sup>5</sup> BryceTech, United-Kingdom

<sup>6</sup> World Economic Forum, Switzerland

### Abstract

More than one million objects larger than one centimetre are currently orbiting the earth. Among them, less than one percent are active satellites, leaving an overwhelming majority of the orbital population being composed of inactive objects, also referred to as space debris. As the space industry is developing rapidly, a growing number of actors and plans for large constellations are emerging in a complex regulatory landscape where best practices, guidelines, and norms need to be enforced. Latest long-term simulation of the space environment suggested that the absence of a behavioural change towards a more responsible use of the space would result in an unstable environment, in which the collision rates would increase exponentially. There is consequently a critical need to consider implementing tools that will incentivize space actors to foster responsible behaviour and implement debris mitigation measures in order to ensure long-term sustainability of the space environment.

In that context, the Space Sustainability Rating (SSR) has been developed since 2019, and is operated by a non-profit organisation hosted at EPFL, Switzerland. The SSR is an innovative tool that aims to promote the responsible and sustainable use of outer space. It supports space actors, such as governments, space agencies, and commercial companies, to understand the impact of their activities on the space environment, and to identify opportunities to reduce those impacts. The SSR is a rating system based on a set of criteria that cover a range of areas, including the mission's collision risk footprint, collision avoidance and post mission disposal strategies, data sharing, compliance to existing standards, detectability and trackability, and readiness to on-orbit servicing and removal. As the SSR went through a beta testing phase in which the rating methodology and process were streamlined and fine-tuned, the first official ratings were delivered in 2022.

This paper provides an updated guide to the SSR, covering the different scoring categories and the process for evaluating space activities. It explains the background and purpose of the SSR, and outlines the key principles that underlie the rating system. It describes its various modules, including the criteria used to evaluate space activities in each module. The process for using the SSR is also being discussed, including the steps involved in completing and maintaining a rating valid. The paper concludes by discussing the potential benefits of using the rating system, and by exploring some of the challenges and opportunities that lie ahead for the SSR and for space sustainability more broadly. It is hoped that this updated guide will provide a useful resource for space actors looking to understand and use the SSR, and will help to promote the long-term sustainability of outer space activities.