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NEW TECHNOLOGIES – NEW RESPONSIBILITIES: A STORY OF CELESTIAL OPERATIONS, DEBRIS AND ARTIFICIAL INTELLIGENCE

Abstract

The newest lunar landings, the Japanese SLIM and American Odysseus, represent the latest technological developments in space activities. However, both experienced difficulties in connecting to the spacecraft post-touchdown, including problems which are limiting the recharging capacity of the batteries. Both continue to reside on the Moon, without plans for retrieval, in a routine practice to save on costs. Technological advantages are used to reach celestial bodies, but not to take responsibility during and after exploration.

Abandoned dead technology adds to the man-made waste obstructing free access to all areas of celestial bodies guaranteed by the Outer Space Treaty. While we should be happy that space technology has evolved opening up new possibilities, it is the responsibility of every space actor, researcher and the international community benefiting from the missions, to ensure it is done sustainably. As a new phase of space exploration and use dawns, governments and other stakeholders must therefore develop policies that from the outset focus on using celestial bodies responsibly and sustainably to guarantee humanity's continued and safe access, which will bring new advancements and lower costs in the long-run.

Numerous contemporary initiatives are focused on mitigating orbital debris, a few on space traffic management and remediation efforts, but almost none on celestial debris. This is akin to the approach adopted toward orbital debris at the dawn of the space age, which ultimately resulted in present-day orbital debris proliferation, threatening space operations.

This contribution looks at two questions, evaluating shortcomings and proposing solutions before problems manifest in real-life. For this, the authors utilise past experiences as teaching aids, building on existing comparable practices and historical patterns to arrive at aforementioned results. First, it analyses the body of law applicable to celestial debris ascertaining potential obligations and proposing further action. For example, including research into returning spacecraft to Earth, or passivating and removing it from its research area at mission-end into technological development studies. Second, the use of artificial intelligence (AI) in space systems opens several advantages as well as potential dangers. AI has shown exceptional potential, however, many uncertainties still shroud its application and use. This contribution therefore examines the present technological possibilities and the legal framework in place governing its use and minimising threats emanating from it. In this manner, this contribution hopes to ascertain the main focal points which should be considered in celestial mission planning to ensure safety and longevity of celestial operations.