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Political, Legal, Institutional and Economic Aspects of Space Debris Mitigation and Removal - STM
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LIGHTING UP DOWN UNDER: A SCIENCE AND TECHNOLOGY STUDIES EXAMINATION OF
POLICY, LEGAL AND ORGANISATIONAL CHALLENGES ENCOUNTERED DURING THE
DEVELOPMENT OF ACTIVE DEBRIS REMOVAL TECHNOLOGY IN AUSTRALIA

Abstract

On 8 April 2021, Australian / US company Electro Optic Systems (EOS) announced the development of a guide star laser to track and move space debris. The technology promised to measure in almost real-time the perturbations in the atmosphere, which could then feed through an adaptive optics loop and enable a second laser to deliver a burst of high-power infrared energy direct to an object in low-earth orbit, moving it out of the way of a collision, or pushing it into a lower orbit to re-enter the atmosphere. This dual-use technology was billed as a method of Active Debris Removal (ADR), attracting significant interest in Australia and internationally. It was developed by a Cooperative Research Centre ('CRC') called SERC (Space Environment Research Centre), a type of private-public partnership with a specific structure, funded in part by the Australian Government, and in part by various academic and private entities, between 2014 and 2021. This paper presents a detailed sociological study carried out between 2018 and 2021 of SERC's operations through an STS (Science and Technology Studies) lens. Although ADR is currently unfeasible at scale, both technologically and legally, this has not prevented continued investment in ADR internationally, presenting growing challenges for international and domestic law. This paper demonstrates how SERC used institutional structures available in Australia to temporarily resolve some of the problems associated with the development of dual-use technology. In particular, it outlines how a diverse range of scientific and industrial interests were brought together and enacted through its specific research, corporate, financial, and social structure. Through a detailed description of SERC's ADR technology (in particular, the guide star laser, adaptive optics system, and high power laser) which combines published materials with first-hand accounts, this paper demonstrates how development was impacted at various points by a combination of technological, legal, and organisational challenges. In doing so, it provides empirical input to ongoing legal and technical conversations about the development of ADR policy, process, and technology, promoting a transdisciplinary approach to the examination of ongoing efforts to improve debris mitigation and removal practices internationally.