Abstract
In 2012, a World Economic Forum panel concluded that “a day without satellites” would spell global economic collapse – GPS, communications, security, environmental data, and more are all provided via spacecraft in orbit. It might seem difficult to comprehend an apocalypse not instigated by catastrophe on the surface of the planet Earth, but, without proper protection and management of space operations, a collapse of some kind would be disastrous. Man-made space debris is arguably the most significant obstacle to the security of space, as its potential to create a “cascade effect” of collisions in orbit has reached a point of no return. Actions must be taken – but they require significant efforts in both engineering and policy.

This study asks: What is the state of debris observation (monitoring debris), mitigation (pre-launch prevention of debris creation), and remediation (removal of existing debris) efforts today? What are its deficiencies? What future methods will resolve these deficiencies? Furthermore, what is the efficacy of legal and political factors related to these debris issues? How can law/policy allow the engineering solutions to become real-world possibilities?

Through an extensive study of the academic literature in the field, the study seeks to synthesize the state of debris resolution efforts today, from both an engineering and a legal/policy point of view. The study finds that, while states and corporations across the globe have pioneered several research projects, theoretical and otherwise, in methods of debris mitigation and remediation, efforts on the whole are sparse and mostly theoretical, while domestic and international efforts in law and policy remain similarly thin and abstract. This study concludes by proposing several directions for engineers and policymakers in order to alleviate these issues.

Keywords: space debris, spaceflight, Kessler Syndrome, space policy, satellites