Paper ID: 69410
oral
student

IAF BUSINESS INNOVATION SYMPOSIUM (E6)
Innovation: The Academics' Perspectives (3)

Author: Mrs. Margot Clauss
Luleå University of Technology, Sweden

Mr. Bernd M. Weiss
Luleå University of Technology, Sweden
Prof. Rene Laufer
Luleå University of Technology, Sweden
Prof.Dr. Anna Ohrwall Ronnback
Luleå University of Technology, Sweden
Dr. Andreas Losch
University of Bern, Switzerland

CREATERNITY SPACE: IN SEARCH OF CIRCULARITY FOR REUSE OF SPACECRAFT MATERIALS

Abstract

The need for material circularity and sustainability is not limited to human activities on Earth and in fact, has broad implications for the utilization of outer space. With the increased digitalization, global location and observation needs, and connectivity demands for Earth applications, an ever-growing number of spacecraft being launched into an already "crowded" orbital space at the fast growing risk of collisions. Sustainability, stewardship, and circularity have been identified as key concepts and enablers for the save and long-term utilization of outer space. However, as research projects related to space sustainability, recycling of spacecraft materials, and space debris mitigation gain traction, a mutual understanding of definitions and concepts is missing and the prospects and viability of circularity in space are unclear. This research attempts to fill this gap with an investigation into the possibilities to re-use spacecraft materials as an alternative to its complete disposal. A review of circularity and sustainability definitions is conducted and this paper makes an initial effort to examine and map requirements for re-manufacturing, refurbishment, and the re-use of spacecraft materials. A literature review is conducted to identify fundamental concepts to enable circularity. This research reviews best practices and approaches in areas like aviation, electronics, and car manufacturing to thoroughly examine similarities and to create a mapping for the space sector. Following this cross-industry approach, the research surveys academic and industrial topics like spacecraft and satellite mission design, business models and product innovation, and entrepreneurship and space ecosystems to find common patterns within sectors and activities. The paper further presents findings and a preliminary roadmap and future research topics related to circularity in space.