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IN SEARCH OF CIRCULARITY FOR REUSE OF SPACECRAFT MATERIALS

**Abstract**

In 2020 Luleå University of Technology (LTU) in Northern Sweden – recognizing the necessary change of both trade and industry and the society at large for a more sustainable future – initiated two new cross-border areas to contribute to the transformation required for such sustainable industry and social transformation. CREATERNITY: sustainable material usage in a connected and circular economy, is one of the two very interdisciplinary areas. The research area sees the latest developments in artificial intelligence, telecommunications and sensor technology, to just name a few, as an opportunity to connect and connect people, products and processes to achieve a circular use of materials and thus reach a carbon dioxide- and resource-neutral society.

The need for material circularity is not limited to human activities on Earth, but in fact stretches into space – recognized in recent years as an opportunity by several start-ups as well as academia. With digitalization and connectivity for Earth applications, an immense increase is foreseen in the number of satellites and other spacecraft being launched into an increasingly “crowded” orbital space, where risk of collisions with human-made objects is prevalent. The initiated research will not be able to address the whole range of the problem but strives to investigate the possibilities to reuse material from obsolete satellites in space, as an alternative to its disposal.

A conceptual solution is suggested, to approach, collect, process, convert, store and transfer valuable material content of obsolete satellites for reuse in space, and it is strongly connected – but not limited – to several academic and research topics, among them: spacecraft and satellite mission design, business case and product innovation, national and international treaties and policies, governmental and industry stakeholders, entrepreneurial and commercial space ecosystem.