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KEYNOTE: REPRODUCIBILITY: A NEW PHENOMENON IN SPACE BARTER AGREEMENTS

**Abstract**

A new strain of transatlantic partnership is underway. The European Space Agency (ESA) and the National Aeronautics and Space Administration (NASA) recently announced the signature of an Implementing Agreement (IA) under which ESA will supply the first service module for NASA's Orion Multi-Purpose Crew Vehicle (MPCV). The service module sits directly behind the NASA-built crew module and provides the propulsion, power, temperature control, as well as holding the astronauts' supplies of water and air.

Following the successful completion of a feasibility study conducted in 2011, both parties can claim to benefit substantially from this arrangement. NASA will be able to point to significant cost savings in its MPCV Programme, while ESA will be able to offset its obligations to NASA for the International Space Station (ISS) Common System Operations Costs and compensate NASA for the provision of other services and costs incurred in relation to the ISS Programme until the end of 2020. More broadly, human space flight stands to benefit from the cooperation of the two major space agencies with the combined expertise of their industrial partners.

Bartering arrangements of this sort have a clear precedent in ESA's delivery of cargo to the ISS platform using Automated Transfer Vehicles. However, one notable novel feature of the MPVC-IA is the principle of 'reproducibility'. That is to say, ESA undertakes to provide NASA with the means to reproduce the ESA-designed service module for future Orion missions. Meanwhile, the parties have left open the possibility for NASA to procure a further flight unit from European industry. Under the reproducibility principle, NASA will be able to obtain intellectual property licences from ESA or European industry in order to enable US manufacture of a significant part of the service module. In this respect, this international collaboration marks a subtle but significant departure from its predecessors in that IPRs are being used as bargaining assets.

The MPCV collaboration will serve as the case study and focal point of the paper. In so doing, this paper will address legal issues of general application should reproducibility ever gain momentum as a bargaining tool in future collaborative space programmes. It takes as a starting point an examination of the IPR and licensing aspects of reproducibility, whilst offering a broader perspective on related constraints to the principle, principally in the field of export controls.