

A Nanosatellite Data Center software tool for Technology Readiness Assessment

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ABSTRACT

Small satellite platforms have helped to democratize access to space. Currently developing countries can join the group of nations that have space technologies in orbit, giving opportunity to their engineering students to participate of real space projects. Nanosatellites are largely used for scientific and technological experiments in orbit, as well as educational missions. This means that the number of innovative technologies being validated in space environment has grown every year. Since 2012, INPE supports the development of several nano and pico satellites in cooperation with Brazilian universities and educational centers. Launched in 2014, the NanosatC-Br1 is a 1U-Cubesat-based mission still in operation that takes on board scientific and technological experiments. The mission data are storage at INPE and available for the scientific community. However, there are no evidences about how the Technology Readiness Level (TRL) of these technologies increases. TRL is an indicator with nine levels proposed by NASA and adopted by several governmental institutions to evaluating the maturity level of a technology, aiming to mitigate risk on the acquisition of innovative technologies. This paper presents a software tool, named TRAnano, developed to be integrated in INPE´ Nanosatellite Data Center for the propose of monitoring the evolution of space technologies on board nanosatellites. The tool allows assessing the maturity of a space technology using the Technology Readiness Level (TRL) indicator. The TRAnano tool implements an algorithm that classifies the appropriate TRL level using the answers given by the researcher about the target technology and its performance on flight on board one or more nanosatellite mission. The first version of the implemented algorithm was inspired on the TRL Calculator, designed by Air Force Research Laboratory (AFRL), taking the advantage of both being integrated to a nanosatellite Data Center and being extended in order to reduce the subjectivity of an assessment process. Moreover, TRAnano tool helps to document the evolution of either innovative space technologies still under development or during operation in orbit and after mission disposal as well.

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