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**CATCHING A RIDE ON THE PEREGRINE FALCON – MASCOT'S RACE TO
RYUGU WITH HAYABUSA2 IN 6 YEARS, 4 MONTHS, AND 48 HOURS**

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ABSTRACT

10 years after the first ideas of an European asteroid lander, their first result has reached its final phase of implementation – science data analysis. The first plan was established around 2008 in the framework of the European MARCO POLO Assessment, studying the possibility to collect pristine samples of a primitive Near-Earth Asteroid and returning them safely back to Earth. MASCOT, then the MarcoPolo Asteroid Surface Scout, was proposed to be carried by the main spacecraft, to land on the surface and to relocate to investigate multiple surface locations, to scout the best possible sampling site.

After the discontinuation of the original study, MASCOT, now the Mobile Asteroid Surface Scout, received an invitation from JAXA to join the HAYABUSA2 mission, a direct follow-on of the first mission to return samples from beyond the Earth-Moon

system, HAYABUSA. However, in mid-2011 MASCOT was selected at a point in time when its conceptual design and scientific payloads had not been fully defined; with the carrier spacecraft already in its critical design phase having most of its interfaces fixed; no heritage to use off-the-shelf bus equipment directly; and only 3 years left until the final delivery deadline of the FM.

After years of studies, the Preliminary Design Review on June 6th, 2012, kicked off the production phase. The tight schedule, tightly defined envelope, and strict margins policy were challenges during its development at all levels. The MASCOT FM was delivered for integration to HAYABUSA2 in the summer of 2014. HAYABUSA2 and MASCOT were successfully launched on December 3rd, 2014. After almost 4 years in space, MASCOT successfully landed and completed its mission on October 3rd, 2018.

We provide a review of the performed MASCOT development process including its verification strategy from the first unit hardware test to the final check-out before launch, and analyze it on the background of former fast-paced programs in space.
