**Factors Influencing the Development Time from TRL4 to TRL8 for CubeSat Subsystems at a University**

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1. **Introduction**

CubeSat projects at university have gained tremendous popularity the past decades. The objectives of the projects have been two-fold, providing experience of space systems and project to students, and providing scientific data from CubeSat missions such as Earth Observation. Some of the challenges these projects experience are project management; balancing coursework and satellite work; high turnover; and ensuring mission success [1]. These challenges result in cost or schedule overruns and add to the difficulty to manage and enable estimation of the development time of CubeSat subsystems at university. To achieve better estimates, we first need to understand the factors influencing the development time.

1. **Case study**

We have followed a university CubeSat team from Phase 0/A to Phase D/E, in which the payload subsystem has been developed from Technology Readiness Level 4 (TRL4) to TRL8. The payload includes both software and optomechanical hardware. The university CubeSat team consists of ~20 students and 6-8 Ph.D. and Post.Doc. fellows. The students join for 1-2 semesters as part of their thesis. The method used for the case study has been action research.

1. **Findings**

The project started in 2017 with a planned launch in mid-2019. This schedule has been delayed at several project gateways, and we have identified different factors that influence the development time from this experience. On one hand, the technical attributes of the payload were more challenging than anticipated. On the other hand, managing knowledge collection and dissemination within the team has shown to be critical to ensure mission success. While TRL is used to measure the maturity of the technology itself, the Integration Readiness Level (IRL) is just as important when developing subsystems, because they will be integrated to build the satellite system [2]. Our findings show that to achieve a higher IRL concurrently with a higher TRL, knowledge and interface management is essential.

1. **Conclusion**

Managing the development time and cost is important to satisfy stakeholders and secure additional funding for university CubeSat projects. When projects are delayed, the funding may run out or be taken away. Our experience indicates that there are two critical factors that must be considered, namely the people and the management of the technology itself.

1. **References**

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