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REQUIREMENTS MODELLING FRAMEWORK FOR SHARED SATELLITE MISSIONS

Abstract

EnduroSat is launching and operating multiple nanosatellite missions through its Shared Satellite Service (SharedSat), a service which enables clients to fly their own payload without having the complexity of developing and operating an entire satellite. The SharedSat service is applicable for a plurality of missions ranging from Earth sensing and scientific experiments to communications, technological validation, and in-orbit demonstration. While these missions will fly on EnduroSat's software-defined standardized 6U and 12U platforms, each mission has a unique set of requirements that drive the design specifications and final implementations. These requirements are all derived from the stakeholder expectations and mission objectives which can be entirely different for each mission. Managing numerous requirements for multiple missions is a complicated task which requires traceability and a well-defined Systems Engineering infrastructure. Envisioning the high reusability and scalability needed for the expected expansion of the SharedSat Service, the EnduroSat Systems Engineering team is investigating the application of Model-Based Systems Engineering practices and inserting them into their processes. In this context, a project is currently being developed in partnership with the Critical Systems Research Group from the Budapest University of Technology and Economics to develop a framework for modelling the requirements in a formalized manner using the SysML requirements package. This framework allows the requirements and associated information to be interpreted and have values assigned to system components and related tasks, through a developed plugin for Papyrus, an open-source tool based on the Eclipse Modelling Framework. The plugin traverses the model according to the pre-defined rules, capturing the model elements, and exports them into other project management tools used at EnduroSat to propagate them into design specifications and implementations. By modelling a standardized subset of requirements for EnduroSat's platforms and associated test cases which can be refined for each specific application, the resulting model can enhance and speed up the verification and validation process, reducing the costs and necessity of extensive testing for every case. This paper presents the requirements modelling framework and plugin, and shows results and applicability of the project through a modelling example.