MATTS – Model Based Testing of Spacecraft on-board Software

Prime contractor: DNV GL & Airbus DS ~ Presenters: tbc

ESA TO: Pedro Barrios

Abstract:

Due to the criticality and complexity of the spacecraft flight software (FSW), space industry is investigating formal methods for more for more cost efficient verification and validation (V&V) of FSW while maintaining a high quality level. In this case study, a model-based testing approach has been piloted, utilizing Sequence-Based Specification (SBS) as the basis for V&V of FSW. The intention of the case study was to empirically evaluate cost-effectiveness, applicability, and scalability of the chosen method. First, software requirements written in natural language were manually converted into SBS models through use of a tool internally developed at DNV GL (SBS-Super). The tool also has the capability to automatically generate a set of state machines from the SBS models, and to export these state machines to an open source tool (JUMBL), which was used to auto generate abstract test cases covering all possible state transition rules identified through the SBS modelling. Afterwards, these abstract test cases were converted into tests that can be executed in a Software Validation Facility (SVF), a tool chain at Airbus Defence and Space was enhanced to support this conversion. Results of the study show that the chosen model-based testing method can be applied to V&V of FSW, such that it increases the granularity in testing compared to nominal V&V, in addition missing requirements are found.