IAF SPACE SYSTEMS SYMPOSIUM (D1)
Systems Engineering Modeling and Analysis (5)

Author: Mr. Theodor Neacsu
ReOrbit, Finland

Dr. Jeremi Gancet
Space Applications Services, Belgium
Mr. Andrés Martín-Barrio
European Space Agency (ESA-ESTEC), Netherlands Antilles
Dr. Pierre Letier
Space Applications Services, Belgium
Mr. Carsten Plasberg
FZI Research Center for Information Technology, Germany
Mr. Martin Schulze
FZI Research Center for Information Technology, Germany
Mr. Ernst Wehtje
ReOrbit, Finland

RESONANCE: A SATELLITE CONSTRUCTION KIT (SCK) SOFTWARE TOOL FOR SATELLITE MODULES DESIGN

Abstract

The entry barrier into the European and Global space industry market must be lowered to allow for the entire potential of the future space economy. An increasing community of New Space actors has the capabilities and potential to contribute substantially to the development of the space economy, however it remains a costly and complicated process to design and deliver reliable space grade equipment fulfilling customer needs.

The SCHUMANN Consortium initiated the development of a Satellite Construction Kit (SCK) software solution, also called RESONANCE, with the objective to support space equipment (aka. Functional Satellite Module - FSM) developers designing new items through a fast, simple, reliable and flexible methodology by leveraging frameworks of standardized elements. Similarly to the AppStore, RESONANCE provides FSM manufacturers (Tier 1) with a collection of sound space grade components (Tier 2) that can be selected, compared and for which compliance with each other can be checked. Resulting SCHUMANN certified FSMs are presented to satellite manufacturers (Tier 0) at system level, accompanied by defined levels of information and assurances linked to the SCHUMANN certification.

CubeSat Standard is a successful development effort which shares similar key objectives with SCHUMANN's SCK. However the RESONANCE tool ambitions to enable this paradigm at a larger scale and with different ecosystems, fostering the modularization and standardization of space equipment.

The SCK consists of a framework including: an ontology addressing FSM needs, design specification and methodology procedures, a SCHUMANN certification process and complementary supporting tools. In the initial version of the SCK, the following spacecraft subsystems and functions will be addressed as a baseline:

- Power handling: generation, storage and distribution
- AOCS: sensors and actuators, avionics, software

- Command and Data Handling: on-board computers and networking, software
- Communications subsystem: radios receivers and transmitters (S-Band/X-Band), optical communication terminals
- Mechanical infrastructure and actuators: solar array driver motors, HDRM, standard interconnects

The RESONANCE SCK will be released to a wide user community by Q4 2024, after an initial round of testing and evaluation with a smaller group of early adopters.