

ECSS E40-07 Demonstration Simulator

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The ECSS E40-07 working group is finalising the definition of the Simulation Model Portability Standard (SMP2) - based on its predecessor SMP2 v1.2 - that aims to improve simulation model portability and reuse. The group comprises ESA, CNES, space primes and simulation technology companies.

ESA has commissioned SciSys and its partners SpaceBel and Atos Origin to develop a simulator to demonstrate the E40-07 SMP2 on several platforms. This ECSS E40-07 Demonstration Simulator is based on ESA's Virtual Spacecraft Reference Facility (VSRF), which in turn derives its heritage from the Generic Project Test Bed (GPTB). Developed to run in Eurosim, the VSRF models are a mixture of C, C++ and Matlab/Simulink models autogenerated to C using Real-Time Workshop.

Because E40-07 is not yet finalised, the demonstration simulator will be based on the SMP2 v1.2 (from a model point of view there are few differences from E40-07). Several simulation tools support SMP2 v1.2 to varying degrees. The Demonstration Simulator will be first demonstrated with ESA's SIMSAT 4, CNES' Basiles and Eurosim. SIMSAT 4 and BASILES support SMP2 to Compliance Level 2, while Eurosim currently supports Level 1 only, although there are plans to upgrade to Level 2. ESA's EGOS Modelling Framework (MF) has been used to create the SMP2 catalogue files from UML and ESA's Model Integration Environment (MIE) for code generation, and creation of assemblies, schedules and other SMP artefacts such as packages. All models will be SMP2 managed models.

The E40-07 Demonstration simulator is first porting the VSRF models to SMP2, reintegrating them into an SMP2 assembly and revalidating them first in the SIMSAT 4 environment. It will then be ported to run under BASILES (Level 2) and Eurosim (Level 1). For Eurosim, the Eurosim model integration and schedule editor tools will be used to rebuild the simulator. SMP2 does not define a standard for scripting or data files, so all scenarios will be ported to the native scripting environment and data formats required by each of the tools.

The ECSS E40-07 Demonstration Simulator will not only demonstrate that the simulator can be easily ported and run on various simulation environments it will also demonstrate specific features of SMP2, which will include, among others:

- Interface Based Links and Event Links (all VSRF models have data flow links)
- Binary Model exchange
- Dynamic Exchange of Models

The paper will describe the project in more detail, describe our experiences with the tools/technology and present latest the status of the E40-07 Demonstration Simulator and the results obtained to date.