

SPACE SYSTEMS SYMPOSIUM (D1)
System Engineering Tools, Processes & Training (I) (3)

Author: Mr. Sam Gerene
J-CDS, The Netherlands, sam.gerene@j-cds.nl

Mr. Massimo Bandecchi
European Space Agency (ESA), The Netherlands, Massimo.Bandecchi@esa.int

THE ESA DATA MODEL FOR CONCURRENT DESIGN OF SPACE SYSTEMS

Abstract

The ESA Concurrent Design Facility (CDF) has successfully applied Concurrent Engineering for more than 10 years to over 100 pre-phase A studies and phase-B reviews. It was established in 1998 and since then has evolved from its experimental basis to an operational facility of the ESA for the assessment of technical and financial feasibility of future space missions and new spacecraft concepts. Studies have been performed for the following programmes: Science, Exploration, Telecommunications, Launchers, Earth Observation, Education, and more recently Integrated Applications and System of Systems.

Due to the success of the CDF and the improvement in performance of multidisciplinary design activities and the great interest of the European Space Industry and Institutional partners the CDF Integrated Design Model (IDM) has become widely used in Europe amongst these partners; encouraging them to setup their own Concurrent Design Facilities and Concurrent Design applications. The experimental nature of the CDF-IDM and implementation, that is solely based on spreadsheet technology, makes it easy to distribute and use but not ideally suited as a robust and supported platform to perform Concurrent Design activities. Therefore ESA has decided to “industrialize” the IDM based on open standards, this has become the Open Concurrent Design Server (OCDS) product.

The OCDS is the vehicle to distribute ESA’s CDF Concurrent Design data model, methodology and tools to the Space industry, organisations and academia. At the same time it represents the open data exchange standard for early phase space system engineering and design activities described in an ECSS Technical Memorandum (TM), ECSS-TN-10-25. The TM has been prepared by an appointed Working Group whose members include representatives from ESA, Institutional Partners and industry and is currently awaiting formal publication by the ECSS secretariat. The Space Engineering Information Model (SEIM) and Space Engineering Reference Data Library (SERDL) designed in the OCDS project is the implementation of the TM. It includes a complete set of SERDL Parameters, with relevant explanations and meta-data, as well as a formalised version of the SEIM, represented in a set formal modelling diagrams with explanation and meta-data for Information Model Objects.

The main objectives of the OCDS are to:

- replace the current Excel based Data Exchange in the CDF IDM.
- serve as the start building block for ESA’s industrial partners to implement their own concurrent design infrastructure
- enable collaborative, concurrent and distributed engineering of space systems between different organizations, using standard object definitions.