

Function modelling for Integrated Modular Avionics

Best practice in aircraft electronics design has moved from a federated architecture where each function came with its own custom hardware, to an Integrated Modular Avionics (IMA) where functions are hosted on standard hardware modules with resource-sharing enforced by a real-time OS. With the IMA approach, the design process has a new focus on planning of resource sharing in terms of I/O, memory and computation resources between functions. In this process, the airframer's system designers work closely with 3rd party function suppliers to allocate resources and evaluate design qualities.

The problem addressed in this paper is how function suppliers and airframer system designers can utilize domain specific modelling languages (DSMLs) to improve the IMA design process. The design and lessons learned from developing a DSML for the initial parts of the IMA design process with focus on planning of functions and their use of shared resources is described. Goals for the tool design have been to improve visualisation, validation, traceability and integration with other tools compared to a current spreadsheetbased tool used for the same purpose. The results are based on co-design between the researchers and airframer (Airbus), as well as evaluation with a function supplier. The results are classified according to set of model quality criteria. Our main findings are twofold: our evaluations indicate that consistency and changeability are the most challenging model quality goals to reach, and secondly, non-technical challenges such as acquiring domain knowledge, access to stakeholders and IPR can be more challenging than technical issues.

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