

## **ESA Technical Research Studies on Domain Engineering and Component Oriented Development Techniques**

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This position paper is a common ESA/Astrium/Thales/GMV presentation on three parallel ESA studies executed by the primes Astrium and Thales, and by GMV.

The European Space Technology Harmonisation Dossier for On-Board software already focuses on the need to identify generic architectures and standardized building blocks as well as to define families or reference architectures of space software systems.

In the frame of this harmonization dossier, the activities "Component Oriented Development Techniques" (2 TRPs) and "Framework for Domain engineering" (GSTP) were initiated and have as overall goal to assess the state of the art in the field of Component based development, to clarify the various denomination and techniques, and to investigate their use for the production of space on-board software generic architecture. Several previous activities (e.g. ASSERT) have proposed and exercised techniques for specifying and developing generic architectures and are considered in these studies.

The applicable process to perform these studies is gathered under the name "Domain Engineering" in the ISO world. Domain engineering is the process of analysis, specification, and implementation of software assets in a domain which is used in the development of multiple software products. Its interest is to build a rationale based on objective criteria (existing technology, future perspective, business goals, etc) to trade-off different architectural solutions, to include variability at the right place, and prepare its instantiation into a future product.

Three main tasks are performed during the studies:

1. Define the knowledge domain relevant to spacecraft (satellites and space exploration systems) identifying system families and associated domain models at the level of avionics and application software (domain analysis)
2. Identify suitable technologies (methods and tools) to support the domain engineering
3. As the overall goal: Define generic architectures (design models) for the future implementation of the components (building blocks) and Propose a building block and interface standardisation scheme.

Although the three studies are executed by different primes, a close cooperation and synchronisation in the studies execution is implemented and the studies are coordinated and executed in a friendly and harmonized context. In particular a joint domain engineering networking workshop is organized in parallel to this ADCSS workshop. However the three activities have still slight variations on the focus and methods/tools.

The expected interest for ADCSS is to expose avionics architecture people to the techniques of Domain Engineering, then to get a flavour of the first findings from the software side perception of avionics reference architectures.

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