# IMA and multi-core processors

*P. Mendham[1], T. Pareaud[2]*
*SciSys[1] / Astrium[2]*

Two recently completed ESA studies, “Securely Partitioning Spacecraft Computing Resources” (TRP) with SciSys UK and Astrium SAS, have investigated separation kernel technology with a focus on both security and safety issues in spacecraft flight software. The intention is to ensure that flight software applications that are hosted on a single computing platform are provided with security guarantees of non-interference and resilience against malicious actions, while still maintaining the mission safety needs (i.e. resilience against accidental failures).

The activities have identified I/O handling as one of the major constraints in designing and deploying securely partitioned systems. The studies recommend to examine the approaches utilised by other partitioned systems such as Integrated Modular Avionics and assess their applicability to space domain problems with security needs. Additionally, the studies have highlighted the powerful role that hardware assistance for virtualisation and partitioning can play in high performance systems. There is currently limited availability of such hardware for the European space industry and as such the hardware-software interface is a potential area for improving space system security and performance.

Time and Space Partitioning (TSP) techniques have the potential to be a powerful ally in employing multi-core devices. The studies have briefly touched on the use of multiple cores in partitioned and virtualised systems. Many of the issues related to I/O handling become exacerbated when employing a multi-core solution and the need for better hardware-software interface design and hardware assistance increases.