

SPACE OPERATIONS SYMPOSIUM (B6)
Mission Operations, Validation, Simulation and Training (3)

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RULE-BASED PLANNING TOOLKIT FOR OPERATIONAL PLANNING SYSTEMS

Abstract

The VEGA Planning Toolkit (VPT) was developed by Telespazio VEGA on the basis of the lessons learned from developing numerous planning systems for ESA: for Earth observation missions such as ENVISAT; for science missions such as Mars-Express and Venus-Express; or for ground station network such as ESTRACK.

The specificity of the modelling and of the planning algorithms required in a given context and the sensitivity of the planning systems to changes to the operations strategy led to the conception of a planning software infrastructure for space missions that is very flexible, and provides extensions for dedicated mission families or domains.

The toolkit includes a modelling framework for the planning domain, libraries of algorithms, MMI's and a core planning application. It relies on a rule-based planning engine that can be used to integrate in the planning work flow specific algorithms, relying or not on external COTS libraries.

VPT has been successfully used in the last three years to support the development of three planning systems for Earth observation missions and test systems. The applicability of the toolkit has also been evaluated in the context of other domains such as ground station networks or communications missions, where specific extensions would help bridging effectively the gap between the core planning application and an operational implementation.

The paper will introduce the tool and present the characteristics of its configuration and deployment for Earth observation missions, illustrated in the context of the PRISMA mission planning system.

The PRISMA planning algorithm implements global optimization of image take and downlink planning of a single satellite Earth observation mission. The algorithm is based on hill climbing methods with a suitably chosen search space. The integration of the specific planning algorithm in the planning logic, and the usage of VPT to support the algorithm implementation will be described.

Finally, the lessons learned from the usage of VPT for planning system developments and the challenges to be met when building future planning applications on the basis of the toolkit will be reviewed and discussed. The extensions of the toolkit required to support this extended functionality will be presented.