FlexPlan: An Operational Mission Planning & Scheduling COTS used Internationally

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Every scientific satellite ground segment architecture has its particularities, but they all share certain elements such as the Mission Planning and Scheduling system. This system is highly specific to each mission because of the specific nature and architecture of each mission's Ground Segment, as well as the specific needs of the satellites themselves. Developing a new Mission Planning system from scratch for each mission is a costly endeavor. In order to provide a method for efficiently reusing Mission Planning systems (and thereby, significantly reducing costs), GMV developed a Generic Mission Planning kernel called FlexPlan.

FlexPlan is a highly configurable tool which covers the end-to-end loop of Mission Planning & Scheduling. It allows users to adapt the system to their requirements quickly and easily by using the Soft Algorithm Generator within it. FlexPlan was implemented in such a way that it can be operated by non-experts and can be easily customized to many different types of platforms and missions.

The usefulness of the tool can be seen in the missions and agencies which have selected it. FlexPlan has been selected by three Space Agencies on both sides of the Atlantic for use in a variety of missions. The adaptability of FlexPlan to different mission types is shown by the range of missions which have selected it for their Mission Planning & Scheduling facility. They are LEO, Lunar, single satellite and multi-satellite missions.

EUMETSAT selected FlexPlan for the EPS (European Polar System) program which is part of a joint EUMETSAT and NOAA multi-satellite International Global Precipitation mission. For this LEO mission, FlexPlan handles the mission operations for the Metop satellites, and provides support to the NOAA satellites as well.

ESA selected FlexPlan for the SMOS Planning Generation Facility. SMOS (Soil Moisture Ocean Salinity mission) is a LEO satellite scheduled to be launched by ESA in 2007.

NASA Goddard Space Flight Center selected FlexPlan for the Lunar Reconnaissance Orbiter (LRO) Mission Planning & Scheduling Facility. LRO is NASA Goddard's first Lunar mission and it is scheduled for launch in 2008. As part of the LRO Mission Planning & Scheduling Facility, FlexPlan includes some additional modules for On-Board Memory Management and General Ground Event and Configuration management control.

In a recent upgrade to the tool, a number of modules of have been enhanced, and new features added. These enhancements include:

- A upgraded GUI which provides a clearer graphical representation of planned tasks, as well as an improved representation of conflicts and how to resolve them.

- Planning policies can be based not only upon event triggers (i.e. when a station acquisition occurs, do a data dump), but also upon resource states (i.e. when the SSR fills up, do a data dump)

- An XML interface has been implemented and schema defined for the exchange of information with external entities.

This paper will discuss the general SW architecture of FlexPlan, the underlying concepts which it uses, the recent upgrade, current mission implementations, and discuss future upgrades which are either underway or under consideration for the tool