S8.01 Automation and Planning for Complex Tasks

This subtopic solicits proposals for technologies and systems that allow spacecraft and ground systems to robustly perform complex tasks in dynamic environments with minimal human direction. Areas of interest include support of decision support systems, distributed sensor webs and component systems, and the creation of automation loops connecting scientific modeling and analysis to mission planning, data collection, processing and operations. NASA is moving from a stove-pipe observational architecture to one that permits data interoperability and dynamic coordination of observational assets to generate desired data products. Technology innovations include, but are not limited to:

- Automation and autonomous systems that support high-level command abstraction;
- Efficient and effective techniques assessing gaps in data collection to assure complete coverage;
- Intelligent searches of distributed data archives, and data discovery through searches of heterogeneous data sets and architectures; and
- Automation of routine, labor intensive tasks to that either increase reliability or throughput of current process.

Specific areas of interest include the following:

- Search agents that support applications involving the use of NASA data using emerging interoperability such as Sensor Model Language;
- Methods that support the planning and scheduling of sensor webs in support of data product processing when given a set of high-level goals and constraints;
- Autonomous data collection including the coordination of space or airborne platforms while adhering to a set of data collection goals and resource constraints;
- System and subsystem health and maintenance, both space- and ground-based;
• Distributed decision making, using multiple agents, and/or mixed autonomous systems;
• Automatic software generation and processing algorithms; and
• Control of Field Programmable Gate-Arrays (FPGA) to provide real-time products.