NASA SBIR 2007 Phase I Solicitation

O3.04  Mission Operations

Lead Center: ARC

Participating Center(s): JSC, MSFC

The objective of this subtopic is to develop advanced capabilities for mission operations software, with particular emphasis on providing situational awareness and decision-making assistance for mission and flight controllers. Earlier phases of mission operations include pre-planning phases, procedure development, contingency development, and other preparatory tasks. Flight phases include telemetry analysis, state determination, situational assessment, plan revisions, decision-making, commanding, fault responses, and procedure execution. Support phases include data management, plan and procedure revisions, changes to operations practices and rules, etc.

Proposals in the following technical areas are of high interest:

- Situational awareness capabilities for controllers and crew: This subject includes a wide range of capabilities, such as: (1) Methods to determine situational information from multiple data sources, possibly noisy and incomplete, and present those to the user; (2) Methods to track user intent and provide the appropriate situational information; and (3) Methods to track actions of other users or systems, including automated systems, and keep user aware of the situation.

- Mission operations planning and plan management: Methods and tools for creating, validating, evaluating, and revising operations plans, taking into account collaborative aspects, complex flight rules, resource limitations and need for one-time constraints and exceptions.

- Plan, procedure and sequence validation: Techniques for checking or simulating plans, procedures, sequences and other combinations of commands and actions, in order to acquire a level of trust or assurance that the combination is correct and will satisfy desired safety properties in actual execution.

- Telemetry management and visualization: Methods for acquiring, evaluating, and displaying telemetric information, so as to provide users with flexibility and easy access to desired information in desired format.

- Adjustable automation for operations: Development of approaches and supporting tools for adjustable automation in operations. Includes specification of automation information, mechanisms for controlling degree of automated/manual control, and tools for transitioning control between user and automation with minimal loss of context and situational awareness.
Plug-and-play technologies for operations software: Development of software frameworks or architectures, as well as exemplars of tools, interfaces and applications, that enable re-use of functionality across disciplines and software systems.