NASA SBIR 2007 Phase I Solicitation

A1.02 Crew Systems Technologies for Improved Aviation Safety

Lead Center: LaRC

Participating Center(s): ARC

NASA seeks highly innovative and crew-centered technologies to improve aerospace system safety. Such advanced technologies may meet this goal by ensuring appropriate situation awareness: facilitating and extending human perception, information interpretation, and response planning and selection; counteracting human information processing limitations, biases, and error-tendencies; assisting in response planning and execution; and fostering successful, closely-coupled joint cognitive human/automation systems. NASA requires improved methods and tools for characterizing current and future users of aerospace systems, and tailoring designs to users. Such advanced technologies must be evaluated sensitively in operationally-valid contexts. Therefore, NASA also seeks tools and methods for ascertaining, measuring and evaluating aerospace system operator performance in advance aviation contexts, and how this performance is reflected in system performance.

Technologies may take the form of tools, models, operational procedures, instructional systems, prototypes, and/or devices for use in the flight deck, elsewhere by pilots, or by those who design systems for crew use. Specific topical areas of interest include the following:

- Intelligent systems monitoring and alerting technologies for improved failure mode identification, recovery, and threat mitigation;
- Designs for human-error prevention, detection, and mitigation;
- Support for crew response planning and selection;
- New sensors and/or new associated algorithms for determining operator states of attention, awareness, engagement, and intent;
- Approaches that appropriately modulate crew attention, engagement, workload, and situation awareness;
- Human-centered technologies to improve the performance of less-experienced operators and of pilots from special population groups;
- Human-error reliability approaches to analyzing flight deck displays, decision aids, procedures, and human/automation integration policies;
- Presentation and aiding concepts for the display and use of data with spatial or temporal uncertainty and of integrated streams of data with various levels of integrity;

- Naturalistic dialog approaches for interacting with aircraft systems and external agents in flight;

- Individual and team performance metrics, analysis methods, and tools to better evaluate and certify human and system performance for use in operational environments, simulation, and model-based analyses with focus on sequential behavior analysis.