NASA SBIR 2005 Phase I Solicitation

A1.01 Crew Systems Technologies for Improved Aviation Safety

Lead Center: LaRC

NASA seeks highly innovative, 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 ensuring appropriate access to airspace as constrained by safety and security concerns. We require 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 and in operationally-valid contexts. Therefore, NASA also seeks tools and methods for measuring and evaluating aerospace system operator performance, and as this performance is reflected by system performance. Technologies may take the form of tools, models, operational procedures, instructional systems, prototypes, and 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
- Decision-support tools and methods to improve communication, collaborative, and distributive decision-making
- Data fusion technologies to integrate flight-related information for improved situation awareness and appropriate workload modulation
- Support for crew response planning and selection
- Computational approaches to determine and appropriately modulate crew engagement, workload, and situation awareness
- Human-centered information technologies to improve the performance of less-experienced operators, and pilots from special population groups
- Avionics designers and/or certification specialist tools to improve the application of human-centered principles
• Human-error reliability approaches to analyzing flight deck displays decision aids, and procedures;

• 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

• 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

Proposals should describe technologies, tools, and approaches with high potential to serve NASA program objectives, and to be developed as marketable products.