NASA SBIR 2004 Phase I Solicitation

A1.01 Crew Systems Technologies for Improved Aviation Safety

Lead Center: LaRC

NASA takes a crew-centered approach to improving aviation safety and, therefore, specifically investigates human error roots of accidents and incidents to identify the basis for innovating crew-centered automation and interface technologies. These technologies must be evaluated sensitively and in operationally-valid contexts. NASA develops evaluation methodologies and tools to sensitively and robustly assess aviation safety technologies. Finally, to ensure adoption, NASA investigates how innovative aviation safety technologies can be effectively used in airspace operations and be supported by pilot procedures and instruction.

NASA seeks highly innovative technologies to improve airspace safety with a crew-centered focus. Such advanced technologies may meet these goals 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 individuals have access to use the airspace system as appropriate. In addition, NASA seeks tools and methods for measuring and assessing pilots' and collaborating operators' performance in complex, dynamic systems. 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. Technologies should have a high potential for emerging as marketable products, of which there are a number of examples:

- Novel technologies to improve information presentation;
- 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 disparate sources of 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 pilots and pilot populations with special requirements;

• 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, and designs that consider presentation of uncertain data; and

• Individual and team performance metrics, analysis methods, and tools to better evaluate and certify human and system performance for use in operational airspace environments, simulation, and model-based analyses.