

<b>Fiscal Year:</b>	FY 2009	<b>Task Last Updated:</b>	FY 06/18/2009
<b>PI Name:</b>	O'Donnell, Robert Ph.D.		
<b>Project Title:</b>	Integrated Cognitive Assessment: Combining Measurement, System, and Mission		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>	HUMAN RESEARCH		
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Behavior and performance		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>BHP</b> :Behavioral Health & Performance (archival in 2017)		
<b>Human Research Program Risks:</b>	(1) <b>BMed</b> :Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
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<b>Comments:</b>			
<b>Project Type:</b>	GROUND	<b>Solicitation / Funding Source:</b>	SBIR Phase II
<b>Start Date:</b>	03/05/2009	<b>End Date:</b>	03/04/2011
<b>No. of Post Docs:</b>	<b>No. of PhD Degrees:</b>		
<b>No. of PhD Candidates:</b>	<b>No. of Master' Degrees:</b>		
<b>No. of Master's Candidates:</b>	<b>No. of Bachelor's Degrees:</b>		
<b>No. of Bachelor's Candidates:</b>	<b>Monitoring Center:</b> NASA JSC		
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>			
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>			
<b>Grant/Contract No.:</b>	NNX08CC20P		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			
<b>Task Description:</b>	<p>Existing cognitive performance test batteries consist of synthetic tasks that, while they may probe isolated cognitive functions, provide an incomplete and unconvincing picture of an individual's true cognitive capacity within the total context of space missions. In essence, they are 'laboratory' measures that appear unrelated to the real-world environment. This leads to user non-compliance or rejection. The present proposal describes a technique for integrating traditional cognitive performance measures with assessment of the system and mission in which the individual must operate. This yields quantified measures of the person's cognitive ability to perform specific jobs in space. Specifically, an entertaining and scientifically rigorous assessment tool is integrated with a sleep/fatigue model and a quantified workload estimate for each task. This is accomplished by selecting tests based on task analyses of what the astronaut actually has to do, using the Fatigue Avoidance Scheduling Tool (FAST) to predict performance capacity as a function of sleep/rest, and integrating a mathematical vector to quantify the workload of specific tasks. The resulting "Person-System-Mission (PSM) index" provides a totally new and unique way not only to assess present cognitive</p>		

	<p>capability, but to diagnose specific causes of decrement, and to suggest remedial actions.</p> <p>POTENTIAL NASA COMMERCIAL APPLICATIONS : Measurement and prediction of the cognitive effects of stressors such as fatigue and workload on specific tasks required of the astronaut are critical to NASA. The existence of a valid metric that is expressed in terms of the individual's ability to carry out specific tasks, rather than in terms of esoteric cognitive skills, will dramatically increase the value of an assessment tool to the individual, the commander, and the flight surgeon, thereby increasing user acceptance. This will lead to incorporation of such a metric on all spaceflights, especially those of long duration.</p>
<b>Rationale for HRP Directed Research:</b>	
<b>Research Impact/Earth Benefits:</b>	<p>The principal non-NASA Government applications for the technology developed here will be in the Department of Defense and the Homeland Security Department. Mission- and safety-critical jobs frequently involve stressful conditions such as fatigue and high workload in both of these agencies. In DoD, for instance, the need to assess the combat readiness of the dismounted warrior has led to the establishment of the "Cog-Fit" program, which is attempting to model the effects of combat stresses on the person's ability to perform their job. The Air Force has similar programs. Homeland security, in addition to Coast Guard operations, requires personnel such as airport screeners to maintain high levels of cognitive alertness for long periods of time. It is expected that each of these agencies will have immediate applications for this technology. Non-NASA commercial applications will involve marketing the technology to transportation, shipping, and freight organizations that routinely carry out safety-sensitive operations, as well as to educational, industrial, and self-help organizations that will recognize the value of a scientifically well-grounded, entertaining cognitive assessment system.</p>
<b>Task Progress:</b>	New project for FY2009. Reporting not required for this SBIR Phase 2 project.
<b>Bibliography Type:</b>	Description: (Last Updated: )