Fiscal Year:	FY 2012	**Task Last Updated:**	FY 03/12/2012
PI Name:	Sebok, Angelia M.S.		
Project Title:	S-PRINT: Development and Validation of a Tool to Predict, Evaluate, and Mitigate Excessive Workload Effects		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Space Human Factors Engineering		
Joint Agency Name:		**TechPort:**	Yes
Human Research Program Elements:	(1) **SHFH**:Space Human Factors & Habitability (archival in 2017)		
Human Research Program Risks:	(1) **HSIA**:Risk of Adverse Outcomes Due to Inadequate Human Systems Integration Architecture (2) **Sleep**:Risk of Performance Decrements and Adverse Health Outcomes Resulting from Sleep Loss, Circadian Desynchronization, and Work Overload		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	asebok@alionscience.com	**Fax:**	FY
PI Organization Type:	INDUSTRY	**Phone:**	720-389-4562
Organization Name:	Alion Science and Technology		
PI Address 1:	4949 Pearl East Cir		
PI Address 2:	Suite 100		
PI Web Page:			
City:	Boulder	**State:**	CO
Zip Code:	80301-2560	**Congressional District:**	2
Comments:			
Project Type:	Ground	**Solicitation / Funding Source:**	2010 Crew Health NNJ10ZSA003N
Start Date:	04/01/2012	**End Date:**	03/31/2015
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA ARC
Contact Monitor:	Kaiser, Mary	**Contact Phone:**	650-604-4448
Contact Email:	mary.k.kaiser@nasa.gov		
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Sargent, Robert (Alion Science And Technology Corporation) Wickens, Christopher (Self) Clegg, Benjamin (Colorado State University)		
Grant/Contract No.:	NNX12AE69G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	This proposal describes a plan to research, develop, and validate a prototype human performance model-based tool for researchers, system designers, and mission planners to evaluate potential missions for their effects on astronaut fatigue, workload, and performance. The tool will enable analysts to identify, early in the design process, potential design, task allocation, or mission planning issues that could negatively impact astronaut performance. The proposed tool, SPACEPRINT, will leverage a human performance modeling environment, the Improved Performance Research Integration Tool (IMPRINT), and tailor it to space mission applications. IMPRINT was developed for the Army Research Laboratory, and is available, free of charge, to U.S. government agencies. IMPRINT includes algorithms to study performance shaping factors such as fatigue, training, and use of protective clothing with human performance models that include workload. SPACEPRINT will be based on an extensive literature review and meta-analysis, in which the team systematically evaluates human-in-the-loop research and lessons learned to identify and quantify factors in long-term space missions that affect astronaut workload, fatigue, and performance. The result of this meta-analysis will be used to update IMPRINT algorithms so they more accurately reflect space-specific conditions. The tool will be developed so it can be run in a predictive mode, to evaluate performance in missions that are being planned, and so it can run in a live mode, using real-time astronaut inputs on workload, fatigue, and wellness. The live mode will allow planners to identify potential problems as missions are being performed, and evaluate potential mitigation strategies. The team will identify scenarios of interest, perform task analyses with subject matter experts (SMEs), and develop models to reflect those situations. SMEs will review the models and their predictions an early validation study. The team will also perform an empirical, human-in-the-loop validation study. Results of the validations will be used to refine the models. Our scenario development and research efforts will focus specifically on situations that result in workload transitions (e.g., automation failures, other off-nominal events), placing the astronauts in potential overload situations. These conditions, when addressed by fatigued astronauts, constitute worst case scenarios and require specific, in-depth investigation. One particular goal of this project is to develop a prototype tool that is both usable and useful for analysts, allowing them to easily modify scenarios and evaluate the effects of different factors on mission performance. This tool will provide data entry screens that guide the user through the process of building a scenario. It will allow the researchers to specify numerous relevant factors, e.g., operators, tasks, equipment, environmental conditions, and sleep schedules. The output of the model run will include parameters of interest such as perceived workload, fatigue, time to initiate tasks, time to complete tasks, task accuracy, task failures (representing human error), results of task failures, and overall mission success.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2012.
Bibliography Type:	Description: (Last Updated: 09/07/2020)