

Fiscal Year:	FY 2015	Task Last Updated:	FY 08/19/2015
PI Name:	DeChurch, Leslie Ph.D.		
Project Title:	SCALE: Shared Cognitive Architectures for Long-term Exploration		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Behavior and performance		
Joint Agency Name:	TechPort:	No	
Human Research Program Elements:	(1) HFBP :Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) Team :Risk of Performance and Behavioral Health Decrements Due to Inadequate Cooperation, Coordination, Communication, and Psychosocial Adaptation within a Team		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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PI Organization Type:	UNIVERSITY	Phone:	954-646-5083
Organization Name:	Northwestern University		
PI Address 1:	Northwestern University		
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PI Web Page:			
City:	Evanston	State:	IL
Zip Code:	60208	Congressional District:	9
Comments:	NOTE: Previously at Georgia Institute of Technology until July 2016.		
Project Type:	GROUND	Solicitation / Funding Source:	2014-15 HERO NNJ14ZSA001N-Crew Health (FLAGSHIP & NSBRI)
Start Date:	07/01/2015	End Date:	10/05/2016
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 JSC		
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Flight Program:			
Flight Assignment:	NOTE: End date changed to 10/5/2016 (original due date was 6/30/2018) due to PI move to Northwestern University and new award granted (Ed., 2/12/18)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Contractor, Noshir Ph.D. (Northwestern University) Johnson, Jeffrey Ph.D. (University of Florida, Gainesville)		
Grant/Contract No.:	NNX15AM26G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Among the remarkable team challenges NASA faces in long distance space exploration (LDSE) missions is the need to maintain team shared mental models (SMMs). Maintaining team SMMs requires the ability to detect shifts in cognition that will likely occur during the mission that could lead to ineffective crew functioning and performance. Maintaining team SMMs also requires validated countermeasures for bringing team members' cognitive understanding back into alignment. Leaving low Earth orbit is extreme teamwork - team SMMs need to be maintained within teams operating close up (the crew), and between teams operating at an unprecedented distance (i.e., the crew & ground; 33 million miles in the case of a Mars Mission). A multidisciplinary research team will leverage expertise in Psychology, Industrial Engineering, & Anthropology to understand the emergence and outcomes of critical shifts in team cognition over LDSE missions. What are the triggering events of SMM divergence, how can we detect them, and which countermeasures most effectively bring them back into alignment? This project leverages a novel conceptual framework of shared cognitive architecture (SCA) to understand the patterns of SMMs that dynamically link members of teams, and teams to other teams, as they go beyond low Earth orbit. We use semantic analysis to identify cognitive shifts, and relational event network analysis to understand the antecedents and consequences of these shifts. We use these alongside an agent-based model fit on LDSE analogue data, so that we can explore an exhaustive set of potential triggering conditions that must be unpacked to conduct efficient ground analogue research. We then conduct this research in HERA (Human Exploration Research Analog), Moonwalk, and Antarctica. The project culminates in the evaluation of a dashboard fed with the results of computational modeling, human validation, and lexical markers to detect and suggest countermeasures to maintain SMMs through time and space.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2015.
Bibliography Type:	Description: (Last Updated: 10/25/2023)