Fiscal Year:	FY 2011	**Task Last Updated:**	FY 11/15/2011
PI Name:	Roma, Peter Ph.D.		
Project Title:	Psychosocial Performance Factors in Space Dwelling Groups		
Division Name:	Human Research		
Program/Discipline:	NSBRI		
Program/Discipline--Element/Subdiscipline:	NSBRI--Neurobehavioral and Psychosocial Factors Team		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **BHP**:Behavioral Health & Performance (archival in 2017)		
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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City:	Houston	**State:**	TX
Zip Code:	77058	**Congressional District:**	36
Comments:			
Project Type:	Ground	**Solicitation / Funding Source:**	2007 Crew Health NNJ07ZSA002N
Start Date:	08/01/2011	**End Date:**	09/30/2012
No. of Post Docs:	3	**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:**	NSBRI
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:	Dr. Peter Roma has taken over as PI as of August 1, 2011, following the passing of the previous PI, Dr. Joseph Brady, in July 2011.		
COI Name (Institution):	Hursh, Steven (Institutes for Behavior Resources, Inc.)		
Grant/Contract No.:	NCC 9-58-NBPF01602		
Performance Goal No.:			
Performance Goal Text:			
	The aims of this project focuses upon the development of an experimental test bed for modeling performance effectiveness and psychosocial adaptation in support of exploratory spaceflight missions beyond Earth's atmosphere. The physical, hardware, and software environment which serves as the experimental platform is referred to as the Planetary Exploration Simulation (PES), and provides an automated means for analyzing space crew performance as well as monitoring electronically the interactive effects of simulated communication modality constraints, mission management systems, and other stressful conditions. Within this context, the objectives of this project are to provide risk assessment and countermeasure evaluation of the following fundamental behavioral interaction operations that will most likely affect crew performance effectiveness and psychosocial adaptation: 1) the structure and function of communication channels within and between simulated space-dwelling and Earth-based groups; 2) factors associated with variations in		

Task Description:	the behavioral management systems between space-dwelling and Earth-based groups; 3) factors associated with variations in workloads, stressful time pressure, and conflict conditions; and 4) behavioral and psychosocial interaction systems between spaceflight crews and Earth-centered mission support operations that are most likely to influence individual and group performance during long-duration missions. The results show that cooperative and productive interactions are maintained between individually isolated and dispersed crew members in a task-driven environment, and that experimental flight crews actively engage in communicating and effective problem-solving over extended time intervals without benefit of one another's physical presence. In addition, investigations of communication modality constraints have shown a high degree of interchangeability between available communication modes that acted as a countermeasure to maintain effective crew performance. Further, variations in crew configurations have shown that performance effectiveness levels are significantly reduced during missions in which crew assignment changes resulted in inexperienced crew configurations, as contrasted with highly-experienced crew configurations. Studies of positive and negative incentive conditions on crew performance effectiveness have also shown increased performance effectiveness under both positive and negative incentive conditions, but an adverse change in psychosocial adaptation. Thus incentive conditions associated with simulated spaceflight missions can significantly affect psychosocial adaptation without compromising task performance effectiveness in trained and experienced crews. Recent studies on "bounded autonomy" add experimental evidence to the empirical database by assessing crew performance effectiveness under rigid, schedule-based management of crew activities by Mission Control versus more flexible, autonomous self-managed activities. Under autonomous missions, crew performance improved and negative psychosocial adaptation self-report measures decreased; autonomous missions also produced decreased linguistic expressions of negative emotion and increased expressions of social processes and achievement. In addition, physiological stress markers were lower during autonomous missions. In a follow-up study, the psychosocial and performance effects of autonomy were robust to communications constraints despite a physiological stress reaction to the unexpected loss of audio and text-messaging abilities. Recently completed follow-up studies further support the performance and psychosocial benefits of autonomy assessed in longer-duration, 12-hour mission simulations conducted during different phases of the 24-hour circadian cycle (Early: 9am-9pm vs. Late: 9pm-9am). As with previous work, crew performance was higher and physiological stress reactivity lower under autonomous conditions; however, overnight workloads produced significant decrements in individual performances that included reaction time deficits, attentional lapses, psychosocial communication reductions, and decreases in voluntary cooperation. Importantly, despite these decrements, crew performance efficiency remained normal. Lapses in individual performances thus appeared to be compensated for in the overall crew performance, indicating the utility of multi-person crews as a countermeasure to individual performance lapses under heavy workload and circadian disruption. Nevertheless, the dramatic decrease in psychosocial communication during late missions could be an early warning sign of crew fragmentation that could hinder cohesion and adaptability to malfunctions, environmental disruptions, or schedule demands. The newly-developed Team Performance Task (TPT) has moved from initial software development into an early application phase as a simple, rapid, and objective measure of voluntary cooperative behavior as an assay of group cohesion. Extensive laboratory tests have established the basic parameters and novel behavioral economic analysis methods for TPT data, and preliminary TPT tests in intact work-groups show that the task is easily learned and remarkably sensitive to task duration, external incentives, and stable inter-crew differences. Additional larger-scale validation efforts are ongoing both domestically and with ESA-supported international partners, and reveal the TPT's ability to objectively discriminate between 3-person groups composed of friends versus groups composed of strangers. Plans for the final year of this grant cycle include completing the TPT "Familiar-Stranger" validation study, assessing the circadian rhythm of cohesion, and tracking the development of cohesion over time in newly formed PES simulation crews with embedded TPT sessions throughout training and repeated missions over several months.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	Dr. Peter Roma has taken over as PI as of August 1, 2011, following the passing of the previous PI, Dr. Joseph Brady, in July 2011. See Brady (PI) with project entitled, "Psychosocial Performance Factors in Space Dwelling Groups" for previous reports on this project.
Bibliography Type:	Description: (Last Updated: 01/20/2025)