

Fiscal Year:	FY 2014	Task Last Updated:	FY 08/12/2013
PI Name:	Roma, Peter Ph.D.		
Project Title:	Development of an Objective Behavioral Assay of Cohesion to Enhance Composition, Task Performance, and Psychosocial Adaptation in Long-Term Work Groups		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Behavior and performance		
Joint Agency Name:	TechPort:	Yes	
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		
PI Email:	pete.roma@nasa.gov	Fax:	FY
PI Organization Type:	NASA CENTER	Phone:	
Organization Name:	KBR/NASA Johnson Space Center		
PI Address 1:	Behavioral Health & Performance Laboratory		
PI Address 2:	2101 NASA Parkway		
PI Web Page:			
City:	Houston	State:	TX
Zip Code:	77058	Congressional District:	36
Comments:			
Project Type:	Ground	Solicitation / Funding Source:	2011 Crew Health NNJ11ZSA002NA
Start Date:	10/10/2012	End Date:	10/09/2015
No. of Post Docs:	No. of PhD Degrees:		
No. of PhD Candidates:	No. of Master' Degrees:		
No. of Master's Candidates:	1	No. of Bachelor's Degrees:	3
No. of Bachelor's Candidates:	1	Monitoring Center:	NASA JSC
Contact Monitor:	Leveton, Lauren	Contact Phone:	
Contact Email:	lauren.b.leveton@nasa.gov		
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Hursh, Steven (Institute for Behavior Resources, Inc.)		
Grant/Contract No.:	NNX13AB39G		
Performance Goal No.:			
Performance Goal Text:			
Task Description:	<p>The long-term goal of the proposed research is to deliver a software tool (currently referred to by its working title of "Team Performance Task" or "Price of Cooperation," TPT/PoC) that will allow long-duration exploration crews to autonomously derive objective, standardized, and quantifiable measures on social dynamics while serving as a decision-aid tool in astronaut selection and multinational crew composition. The TPT/PoC is a unique tool because it is simple, rapid, and operationally feasible like a questionnaire, but is entirely objective, is innovative in that it requires a group-level demonstration of social dynamics rather than relying on individual opinions, and is language-independent, thus making it suitable for cross-cultural applications. Such an empirically validated and operationally feasible software deliverable will contribute to an overall risk mitigation strategy comprised of quantitative, qualitative, objective, and subjective assessment technologies.</p> <p>To accomplish this, we have been conducting ground-based experiments to systematically investigate the effects of group composition (gender and personality) on voluntary cooperative propensity in 3-person groups. We are also assessing the predictive validity of pre-mission TPT/PoC "social personality profiles" and the effects of group composition on performance, task cohesion, social cohesion, and biopsychosocial adaptation in mixed-gender "crews" participating in a long-term simulated space exploration task. We are also developing next-generation TPT/PoC software to advance the technology beyond our current prototype used for proof-of-concept/validation research into a broadly applicable tool with cross-platform networking and connectivity, enhanced usability/human factors features, extensive parameter manipulation/flexibility to maximize sensitivity, and integrated data collection, archiving, and visualization capabilities.</p> <p>The proposed project will elucidate the influences of personality, gender, behavior, and neurobiology at the individual and group levels while yielding powerful experimental insights on the relationships between group composition, mission performance, task cohesion, social cohesion, and psychosocial adaptation in long-term work groups. The work will provide a scientifically validated TPT/PoC concept translated into a flexible and operationally acceptable software tool suitable for field studies of predictive validity and/or countermeasure potential in mission-oriented analog populations and/or high-risk operational and long-duration space analog environments. This work will contribute to the empirical knowledge base used to inform the processes of crew selection, composition, training, monitoring, and maintenance, and will ultimately yield a broadly applicable software tool to help mitigate risks and maximize behavioral health and performance for long-duration space exploration.</p>		
Rationale for HRP Directed Research:			
Research Impact/Earth Benefits:	<p>The project will elucidate the interacting influences of personality, gender, behavior, and neurobiology at the individual and group levels while yielding powerful experimental insights on the relationships between group composition, task cohesion, social cohesion, and biopsychosocial adaptation in long-term work groups. The broad knowledge-base and software tools derived from this work are relevant to social relationships, business, and education, as well as military, healthcare, commercial transportation, and other settings involving high-risk/high-performance teamwork.</p>		
Task Progress:	<p>Along with hardware, software, and equipment upgrades and completion of various administrative procedures (e.g., IRB and CITI approvals), the first quarter of the project was largely devoted to implementing a formal reorganization of the PI's research Unit. This was marked primarily by the careful selection and intense training of a full-time Master's-level Research Coordinator and a part-time Bachelor's-level Research Assistant team. With updated infrastructure, refined procedures, and high-quality personnel stabilized, data collection began in earnest in the second quarter.</p> <p>As described above, the scientific core of the project is ground-based research comprised of a "Short-Term" (ST) study involving a single laboratory session measuring implicit cooperation, productivity, and fairness behaviors via the TPT/PoC assay in 3-person teams. More important is the complementary "Long-Term" (LT) study investigating the development and maintenance of task cohesion, social cohesion, and biopsychosocial adaptation over time in similarly composed 3-person teams across 12 separate "missions" using our laboratory's Planetary Exploration Simulation (PES), an interdependent computer-based geological survey. Interested participants are eligible for the LT study following completion of the ST study, with the ST effectively serving as a "feeder" study for the much more demanding and comprehensive LT experiment. The LT study includes Training, Development, and Challenge/Recovery phases.</p> <p>Recruitment per se has been robust, with over 1200 individuals volunteering to participate since the project launch. However, selection and group assignment have been challenging given the variety of inclusion and exclusion criteria we employ, as well as the generally lower probability of volunteering among individuals below the 50th percentile in Agreeableness. That said, the primary challenge has been participant reliability once selected, assigned, and scheduled for a session. Specifically, nearly 50% of all scheduled ST study sessions must be cancelled or rescheduled due to at least one participant failing to arrive as scheduled. Fortunately, the LT Crews are generally more reliable, and with their regularly scheduled mission times, data collection is much more consistent.</p>		

	<p>Despite these challenges, overall data collection has been progressing remarkably well. As of August 12, 2012, the Short-Term study is 46% complete (37 of the minimum 80 planned sessions) and the Long-Term study is 17% complete (67 of 384 planned sessions). However, since considerable effort is required for recruitment, selection, assignment, and scheduling, once a team of 3 is formed into a Crew for the LT study, it is literally just a matter of time before they complete all 12 sessions. Considering all Crews that have either completed or are currently in progress, then the LT study stands at 22% complete (7 of 32 planned Crews). Total data collection complete or in progress stands at 39% (44 of 112 groups to run or launch).</p> <p>A final aim of the project is to develop next-generation TPT/PoC software. Our partners at Aptima recommend a continuous 1-year process in accordance with the budget allocated to the task. The PI is currently working with the software firm, institutional business development staff, and NASA Administrators to design, fund, and implement a formal subcontract, with the goal of beginning software development by January 2014.</p>
Bibliography Type:	Description: (Last Updated: 01/20/2025)
Abstracts for Journals and Proceedings	<p>Roma PG, Hursh SR, Hienz RD, Brady JV. "The Price of Cooperation: A novel behavioral economic task as a simple, rapid, and objective group-level assay of altruism, effort, and fairness." Society for Neuroscience 2012, New Orleans, LA, October 13-17, 2012.</p> <p>Society for Neuroscience 2012, New Orleans, LA, October 13-17, 2012. Program#/Poster#: 629.05. Abstract available at: <a 17.="" 2012="" 2013="" <a="" a="" across="" appl="" case="" data="" disciplines."="" epub="" eur="" expanding="" for="" from="" href="http://dx.doi.org/10.1007/s00421-012-2507-5" information="" integration="" j="" jul;113(7):1645-54.="" maximizing="" oct="" physiol.="" research="" resources:="" space="">http://dx.doi.org/10.1007/s00421-012-2507-5 ; PubMed PMID- 23073848 , Jul-2013</p>
Articles in Peer-reviewed Journals	Hursh SR, Roma PG. "Behavioral economics and empirical public policy." J Exp Anal Behav. 2013 Jan;99(1):98-124. http://dx.doi.org/10.1002/jexp.7 ; PubMed PMID- 23344991 , Jan-2013
Articles in Peer-reviewed Journals	Goswami N, Roma PG, De Boever P, Clément G, Hargens AR, Loeppky JA, Evans JM, Stein TP, Blaber AP, Van Loon JJ, Mano T, Iwase S, Reitz G, Hinghofer-Szalkay HG. "Using the Moon as a high-fidelity analogue environment to study biological and behavioral effects of long-duration space exploration. " Planetary and Space Science. 2012 Dec;74(1):111-20. http://dx.doi.org/10.1016/j.pss.2012.07.030 , Dec-2012
Books/Book Chapters	<p>Roma PG, Hursh SR, Hienz RD, Brinson ZS, Gasior ED, Brady JV. "Effects of autonomous mission management on crew performance, behavior, and physiology: Insights from ground-based experiments. Chapter 13." in "On Orbit and Beyond: Psychological Perspectives on Human Spaceflight." Ed. D. A. Vakoch. New York : Springer, 2013. Space Technology Library Series; v. 29., p. 245-266. http://dx.doi.org/10.1007/978-3-642-30583-2_13 , Jan-2013</p>
Papers from Meeting Proceedings	<p>Roma PG, Hursh SR, Hienz RD, Brinson ZS, Gasior ED, Brady JV. "Interactive effects of autonomous operations and circadian factors on crew performance, behavior, and physiology." IAC 63: 63rd International Astronautical Congress, Naples, Italy, October 1-5, 2012.</p> <p>IAC 63: 63rd International Astronautical Congress, Naples, Italy, October 1-5, 2012. , Oct-2012</p>