Fiscal Year:	FY 2018	**Task Last Updated:**	FY 08/10/2018
PI Name:	Stuster, Jack W. Ph.D.		
Project Title:	Generalizable Skills and Knowledge for Exploration Missions		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Space Human Factors Engineering		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HFBP**:Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) **HSIA**:Risk of Adverse Outcomes Due to Inadequate Human Systems Integration Architecture		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	jstuster@anacapasciences.com	**Fax:**	FY
PI Organization Type:	INDUSTRY	**Phone:**	805-680-1315
Organization Name:	Anacapa Sciences, Inc.		
PI Address 1:	1516 Marquard Terrace		
PI Address 2:			
PI Web Page:	http://www.anacapasciences.com		
City:	Santa Barbara	**State:**	CA
Zip Code:	93101-4967	**Congressional District:**	24
Comments:	New address per PI (12/2012); previous address--301 East Carrillo Street, Santa Barbara, CA		
Project Type:	GROUND	**Solicitation / Funding Source:**	2014-15 HERO NNJ14ZSA001N-Crew Health (FLAGSHIP & NSBRI)
Start Date:	09/10/2015	**End Date:**	08/09/2019
No. of Post Docs:	0	**No. of PhD Degrees:**	0
No. of PhD Candidates:	0	**No. of Master' Degrees:**	0
No. of Master's Candidates:	1	**No. of Bachelor's Degrees:**	0
No. of Bachelor's Candidates:	0	**Monitoring Center:**	NASA JSC
Contact Monitor:	Williams, Thomas	**Contact Phone:**	281-483-8773
Contact Email:	thomas.j.will1@nasa.gov		
Flight Program:			
Flight Assignment:	NOTE: Change in grant number to 80NSSC18K0042 per NSSC information (Ed., 6/12/18) NOTE: Change in grant number to NNX16AQ86G by NSSC and grant extended to 8/09/2019, per D. Risin/JSC (Ed., 6/21/17) NOTE: Element change to Human Factors & Behavioral Performance; previously Space Human Factors & Habitability (Ed., 1/19/17)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Adolf, Jurine Ph.D. (NASA Johnson Space Center) Byrne, Vicky M.S. (Lockheed Martin/NASA Johnson Space Center)		
Grant/Contract No.:	80NSSC18K0042 ; NNX16AQ86G ; NNX15AW34G		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	This research is using a proven method to identify the abilities and skills necessary to perform the work expected of exploration crews and to develop recommendations for optimum training and crew selection. The process began by developing a comprehensive inventory of tasks based on a review of existing mission planning documents and interviews with astronauts and other experts. The inventory is composed of more than 1,100 tasks listed in 12 mission phases. A quantitative analysis of the tasks was performed during Year 2 in conjunction with a systematic assessment of physical, cognitive, and social abilities required to perform the expedition tasks (using Fleischman definitions augmented with job-specific abilities when needed). The task and ability analyses were conducted with the assistance of astronauts, mission planners, training experts and others and resulted in a data-driven understanding of the knowledge, skills, and abilities necessary to perform the tasks expected for exploration-class space missions. The key skills and abilities identified by the process were assessed for generalizability and then optimum strategies for ensuring that those skills and abilities are possessed by expedition crew members when needed were developed. Study results will provide the information necessary to close the target research gaps; in addition, results of the task and ability analyses will be useful to the designers of missions, procedures, software, equipment, and habitats, and to those responsible for crew composition. All work will be completed within the specified three-year period of performance by an experienced team of human factors and training specialists. NOTE: Change in grant number to 80NSSC18K0042 per NSSC information (Ed., 6/12/18) NOTE: Change in grant number to NNX16AQ86G by NSSC and grant extended to 8/09/2019, per D. Risin/JSC (Ed., 6/21/17)
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	The method that was developed for this project to identify and analyze expected tasks during a three-year expedition to Mars could serve as a model for future human factors research concerning large-scale systems. The number of tasks identified is an order of magnitude larger than that of a typical HF (human factors) analysis, and the complexity of the systems involved and the duration of the expedition render the effort unique.
Task Progress:	SEPTEMBER 2017 - AUGUST 2018 The project began by developing a comprehensive inventory of 1,125 tasks that are likely to be performed during the 12 phases of the first human expedition to Mars, from launch to landing 30 months later. More than 60 subject matter experts (SMEs) rated major categories of expedition tasks in terms of (likely) frequency, difficulty to learn, and importance to mission success; a fourth metric was derived by combining the mean ratings of the three dimensions. SMEs also placed the physical, cognitive, and social abilities necessary for performance of the tasks in order of importance for specialist domains identified by the task analysis. The research team then identified, 1) Abilities, skills, and knowledge that can be retained and generalized across tasks; 2) Optimum training strategies; and 3) Implications for crew size and composition. Study results also led to recommendations concerning equipment, habitats, and procedures for exploration-class space missions. A final report is currently being prepared that describes why the study was conducted, documents the research tasks performed, presents study results, and concludes with a discussion of operational implications and recommendations based on those results. The report includes the Mars expedition task lists and tasks lists for Gateway missions (formerly known as Deep Space Gateway and Lunar Orbital Platform missions).
Bibliography Type:	Description: (Last Updated: 11/13/2019)