

<b>Fiscal Year:</b>	FY 2012	<b>Task Last Updated:</b>	FY 08/08/2012
<b>PI Name:</b>	Feary, Michael Ph.D.		
<b>Project Title:</b>	Needs Assessment and Work Allocation Tools for Mission Operations and Procedures		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>	HUMAN RESEARCH		
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Space Human Factors Engineering		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>SHFH</b> :Space Human Factors & Habitability (archival in 2017)		
<b>Human Research Program Risks:</b>	(1) <b>HSIA</b> :Risk of Adverse Outcomes Due to Inadequate Human Systems Integration Architecture		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
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<b>Zip Code:</b>	94035	<b>Congressional District:</b>	18
<b>Comments:</b>			
<b>Project Type:</b>	GROUND	<b>Solicitation / Funding Source:</b>	Directed Research
<b>Start Date:</b>	07/24/2012	<b>End Date:</b>	09/30/2014
<b>No. of Post Docs:</b>	<b>No. of PhD Degrees:</b>		
<b>No. of PhD Candidates:</b>	<b>No. of Master' Degrees:</b>		
<b>No. of Master's Candidates:</b>	<b>No. of Bachelor's Degrees:</b>		
<b>No. of Bachelor's Candidates:</b>	<b>Monitoring Center:</b> NASA JSC		
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>	NOTE: End date changed to 9/30/2014 (from 7/31/2016) per M. Whitmore/JSC (Ed., 3/24/14)		
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	Billman, Dorrit ( San Jose State University Foundation at NASA Ames )		
<b>Grant/Contract No.:</b>	Directed Research		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>	<p>Increased system automation is critical for enabling more independent operation on long-duration and farther-distance space missions. Effective integration of human and automation elements is critical to success; this is demonstrated by the widespread involvement of poor Human-Automation Integration (HAI) design as a contributor to accidents and incidents in the sister application domain of aviation, where more data are available. While much is known about HAI design from research in aviation, long-duration space flight adds demands for robustness that are not well understood. HAI designs must be robust in supporting a variety of tasks playing out in circumstances that were impossible to fully anticipate, executed long after any training on these functions, by operators who must be competent in many types of work rather than specialists in any one.</p> <p>The proposed research has an analytic and empirical strand. The purpose of the analytic strand is to provide methods and</p>		

<b>Task Description:</b>	tools for measuring automation-to-work (ATW) alignment, for use guiding development and evaluation of HAI designs. The purpose of the empirical strand is to assess whether measured ATW alignment of HAI designs predicts the learnability of those designs, an important aspect of robustness. By ATW alignment we mean the correspondence between the elements and structure of interaction with the elements and structure of the work. Needs analysis identifies elements and structure of the work. In the analytic strand we will develop a scoring method for measuring alignment. Our approach draws on and integrates a wide set of observations and proposals in HAI, Human Computer Interaction (HCI), Work Domain Analysis (WDA), and related disciplines. In the empirical strand we test the prediction that HAI designs that align with work more strongly will be easier to learn, particularly, easier to master using the automation for novel problem solving. We test this hypothesis by identifying and measuring designs that differ in ATW alignment and then comparing the designs with high versus low scores for how easily they are learned, how well retained, and how flexibly they can be used.
<b>Rationale for HRP Directed Research:</b>	This research is directed because it contains highly constrained research, which requires focused and constrained data gathering and analysis that is more appropriately obtained through a non-competitive proposal.
<b>Research Impact/Earth Benefits:</b>	
<b>Task Progress:</b>	New project for FY2012.
<b>Bibliography Type:</b>	Description: (Last Updated: 07/22/2015)