Fiscal Year:	FY 2016	**Task Last Updated:**	FY 12/14/2016
PI Name:	McLaughlin, Anne Ph.D.		
Project Title:	Creating a Taxonomy of Variables Affecting Cognitive Aid Design via an Investigation of Hybrid Aids		
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 (2) **Medical Conditions**:Risk of Adverse Health Outcomes and Decrements in Performance Due to Medical Conditions that occur in Mission, as well as Long Term Health Outcomes Due to Mission Exposures		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2015-16 HERO NNJ15ZSA001N-Crew Health (FLAGSHIP, NSBRI, OMNIBUS). Appendix A-Crew Health, Appendix B-NSBRI, Appendix C-Omnibus
Start Date:	08/09/2016	**End Date:**	08/08/2018
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: Element change to Human Factors & Behavioral Performance; previously Space Human Factors & Habitability (Ed., 1/19/17)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Sandor, Aniko Ph.D. (Lockheed-Martin/NASA Johnson Space Center)		
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Task Description:	This proposal addresses the NASA Research Announcement for Human Exploration Research Opportunities (HERO), NNJ15ZSA001N-FLAGSHIP Appendix A, Interactive Cognitive Aids. Onboard crewmembers, similarly to operators from other industries, complain about using current checklist-like procedures. Issues include procedures having too much or too little detail and poor usability. Due to these, mistakes still occur and time to accomplish procedures is misestimated. NASA crew presently use static paper or electronic “cue cards” (PDFs) and procedures that provide guidance on both nominal and off-nominal tasks. Existing tools may not account for the lack of recent training, may not be optimized for the task, may not be optimized for the number of users, and may not be resilient to resumption after interruption. A more interactive cognitive aid can overcome the limitations of these cue cards and procedures by matching task, individual, team structure, and environment. This proposal addresses the Risk of Inadequate Critical Task Design of the Human Research Program (HRP), specifically the SHFE-TASK-02 gap: What model-based HF Tools can assist with the design and evaluation of spacecraft systems and task procedures. A toolkit is needed to support dynamic task design, particularly for design by non-programmers who would be making the procedures. There exists no taxonomy of cognitive aid design and task type nor standards for interactive cognitive aids to drive development. A cognitive aid should provide guidance to support efficiency and success while minimizing cognitive workload, but it is not yet clear what attributes, such as adaptability, the aid should contain. The proposal also addresses the HRP’s Risk of Performance Errors Due to Training Deficiencies, specifically the TRAIN-03 gap: We need to develop guidelines for effective onboard training systems that provide training traditionally assumed for pre-flight. (Previously: SHFE-TRAIN-03 - How can onboard training systems be designed to address Just in Time (JIT) and recurrent training needs for nominal and off nominal scenarios?). To contribute to the closure of this gap, the research proposed will investigate cognitive aids for non-expert operators. Our goals in this proposal are two-fold: The first goal is to investigate a new form of cognitive aid that incorporates the beneficial attributes of static, adaptable, adaptive, and dynamic aids into a hybrid aid. We see the benefit of this hybrid aid to be: 1. a technology able to be immediately deployed (unlike augmented reality or other heavily technology-dependent advances), 2. a technology able to be used by non-programmers as they design aids for crewmembers (the audiences would be procedure designers and scientists creating procedures for in-flight experiments), 3. a form of aid that offers the beneficial attributes of a dynamic aid that responds to each step in a procedure with the security of a static or adaptable aid that does not require functioning sensors for performance. We will iteratively design a prototype of a hybrid aid for medical equipment maintenance tasks, while at the same time building a library of tools to create similar aids for other procedures. Second, we will develop a taxonomy of cognitive aid design that considers the most important variables affecting performance with aids: user knowledge and experience, resources demanded by the task and sub-tasks, time pressure on performance, and the number of operators expected to interact with the aid.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2016.
Bibliography Type:	Description: (Last Updated: 07/10/2023)