Fiscal Year:	FY 2015	**Task Last Updated:**	FY 01/09/2015
PI Name:	Hillenius, Steven M.S.		
Project Title:	Evaluation of Crew-Centric Onboard Mission Operations Planning and Execution Tool		
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:	Steven.R.Hillenius@nasa.gov	**Fax:**	FY
PI Organization Type:	NASA CENTER	**Phone:**	650-604-2888
Organization Name:	NASA Ames Research Center		
PI Address 1:	Mail Stop 262-4, P.O. Box 1		
PI Address 2:	Bldg. N262, Room 196		
PI Web Page:			
City:	Moffett Field	**State:**	CA
Zip Code:	94035-0001	**Congressional District:**	18
Comments:			
Project Type:	FLIGHT,GROUND	**Solicitation / Funding Source:**	Directed Research
Start Date:	12/15/2014	**End Date:**	09/30/2017
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
Contact Monitor:	Whitmore, Mihriban	**Contact Phone:**	281-244-1004
Contact Email:	mihriban.whitmore-1@nasa.gov		
Flight Program:	ISS		
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Marquez, Jessica Ph.D. (NASA Ames Research Center) Korth, David B.A. (NASA Johnson Space Center) Rosenbaum, Megan B.A. (NASA Johnson Space Center)		
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Currently, mission planning for the International Space Station (ISS) is largely affected by ground operators in mission control. The task of creating a week-long mission plan for ISS crew takes dozens of people multiple days to complete, and is often created far in advance of its execution. As such, re-planning or adapting to changing real-time constraints or emergent issues is similarly taxing. As we design for future mission operations concepts to other planets or areas with limited connectivity to Earth, more of these ground-based tasks will need to be handled autonomously by the crew onboard. The ISS Program is currently working a number of potential opportunities to assess crew-self-scheduling: the International Space Station Testbed for Analog Research (ISTAR) effort, the one-year studies, and upcoming NASA/European Space Agency (ESA) missions. The goal of a study on crew self-scheduling is to assess questions of plan and constraint complexity that can be handled on crew-side, integration of collaborative and individual crew planning, and integration of crew generated plans with plans generated by ground controllers when there is time delay. Previously, ISS Mission Operations Directorate (MOD) has tried to evaluate crew self-scheduling with two sets of planning tools (Score and the On-board Short-Term Plan Viewer, OSTPV). The assessment of Score, the tool currently used for crew activity planning by MOD, was conducted as a part of the 2011 Deep Space Habitat analog study. The assessment of OSTPV was conducted in 2014 as an MOD-directed ISTAR study. From crew feedback during self-scheduling exercises, both experiences showed that neither option was viable for meeting the objective to study crew autonomy with crewmembers on ISS due to limitations in the design of current mission planning tools. Score is designed to build plans but not execute. OSTPV is designed to execute plans as scheduled but cannot easily modify or reschedule plans. There is a need for a highly usable (including low training time) tool that enables efficient self-scheduling and execution within a single package. The ISS Program has identified Playbook as a potential option. It already has high crew acceptance as a plan viewer from previous analogs and would as an ideal candidate to support a crew self-scheduling assessment on ISS or on another mission (e.g., ESA Soyuz). The work proposed here, a collaboration between the Human Research Program and the ISS Program, will not only inform the design of systems for more autonomous crew operations, it will also provide a platform for research on crew autonomy for future deep space missions. The proposed work has four specific aims: Aim 1: Support ISS Program evaluation of crew self-scheduling and plan execution through Playbook, providing a platform for future research on crew autonomy for deep space mission operations as well as an assessment of the potential for limited crew self-scheduling in more near-term ISS operations. Aim 2: Provide Playbook as an operations tool to increase the realism and efficiency of the Human Exploration Research Analog (HERA) and NASA Extreme Environment Mission Operations (NEEMO) analogs. Aim 3: Determine the appropriate level of information (e.g., constraints, plan complexity) required for crewmembers to schedule their time autonomously with limited ground support by unobtrusively (through automated software logging) gathering and analyzing Playbook use data. Aim 4: Characterize task workload (e.g., time spent planning versus execution of plans, time on self-scheduled activities) of crewmembers completing and executing self-scheduling tasks by unobtrusively (through automated software logging) gathering and analyzing initial Playbook use data.
Rationale for HRP Directed Research:	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. Since 2003, the Scheduling & Planning Interface For exploration (SPIFe) team has been building and deploying customized planning and scheduling systems for several NASA missions, ranging from the Mars Phoenix Lander (Phoenix Science Interface), Mars Rover Curiosity (Mars Surface Lander Interface, MSLICE), the Lunar Atmosphere Dust Environment Explorer (LADEE Activity Scheduling System), to the International Space Station (ADCO Planning Exchange Tool, APEX; Power Planning Analysis Tool, PLATO; Score). Essential to successful deployment of these systems is a team of applied human-computer interaction experts who use a lean UX (user experience), user-centered design approach. This user-centered approach ensures use of the unique domain of mission operations during investigations and builds usable products that are designed and developed through an iterative agile based software development process.
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2015.
Bibliography Type:	Description: (Last Updated: 10/19/2016)