Fiscal Year:	FY 2011	**Task Last Updated:**	FY 12/20/2011
PI Name:	Keeton, Kathryn Ph.D.		
Project Title:	Assessing Team Performance in Autonomous Environments		
Division Name:	Human Research		
Program/Discipline:	HUMAN RESEARCH		
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Behavior and performance		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **BHP**:Behavioral Health & Performance (archival in 2017)		
Human Research Program Risks:	(1) **BMed**:Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders (2) **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		
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Zip Code:	77058	**Congressional District:**	22
Comments:			
Project Type:	Ground	**Solicitation / Funding Source:**	Directed Research
Start Date:	03/01/2010	**End Date:**	10/31/2010
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:	0	**No. of Bachelor's Degrees:**	0
No. of Bachelor's Candidates:	0	**Monitoring Center:**	NASA JSC
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Reagan, Marcum (NASA Johnson Space Center)		
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			
	For future exploration missions, we anticipate a change in the current model of interaction, procedural functioning, and communication between crew members and ground control. Due to the nature of future missions (i.e., missions to the moon and to Mars), there are expected to be communication delays and associated technical difficulties that are currently not experienced. These communication delays and other difficulties will require the crew to work semi-autonomously. Generally, autonomy is defined as the level of discretion and freedom an individual or team is given to perform tasks, including decision making and problem solving, as well as other general duties. It encompasses much more than the freedom to create one's schedule and outcomes of an autonomous environment are highly inter-dependent among team members. In the context of spaceflight, autonomy refers to the extent to which the crew will act independently from mission control to complete objectives and/or respond to complications/emergency situations		

Task Description:	when needed due to environmental conditions (i.e., distance), as well as the extent to which the crew will prioritize mission objectives and schedule activities. In a recent workshop held by the Behavioral Health & Performance Research Element, subject matter experts consented to a definition of autonomous operations related to the environmental conditions of long duration missions, hereafter referred to as bounded autonomy. This term involves the conditions, constraints, and limits that influence the degree of discretion by the individual and [crew/team] over their choices, actions and support in accord with standard operating procedures. Based on the novel demands experienced on long-duration missions (e.g., psychosocial adaptation, chronic stress, strain, communication delays, social tension), studying the concept of bounded autonomy is a necessary step in understanding what challenges astronauts may face in these autonomous environments. Although extensive ground research indicates that team autonomy has many positive effects on valued outcomes including team cohesion, team performance, and well-being of the employees, it is unclear how the effects of autonomy on workplace outcomes may be different in spaceflight. The aforementioned studies were all conducted in organizations, which provide an environment very different from that of a long-duration mission. Past research has not been based on the same level of autonomy as that expected to be experienced by astronauts on long duration missions. Indeed, rather than examining how teams perform in autonomous environments, past research focuses on role- and task- related autonomy. Thus, although autonomy likely affects performance, team cohesion, and interaction between crew and ground on long-duration missions, the relationships between these variables may differ from those observed in terrestrial populations. For example, time delays experienced in long-duration missions would prohibit mission control from providing critical information to the crew. Therefore, the crew must perform independently to achieve certain mission objectives and address possible issues, including accomplishing some tasks in which the crew has received no prior training. It is therefore essential to consider the constraints of a Mars-like condition (i.e., time delays) and conduct research that will investigate the effect of autonomy on team outcomes in isolated, constrained, and extreme environments. In addition, the extent to which bounded autonomy poses a risk within the Behavioral Health & Performance Research Element needs to be quantified. In order to adequately quantify and reduce risk associated with behavioral health and performance-related issues for long duration missions, it is essential to determine what impact increased autonomy for future crews will have on completing mission objectives and achieving mission success. Currently, Team Gap6 addresses issues related to autonomy, however, future research that is needed in order to sufficiently close this gap has yet to be determined.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	This task is complete; the initial analyses as well as the analyses included in the addendum demonstrate the need to further examine the impact of autonomy as well as identify and test specific countermeasures that may alleviate and mitigate the issues raised by increased autonomy (e.g., training, selection and composition strategies, technologies and other psychological support devices). These future research efforts will not only increase understanding of how and to what extent autonomy may impact aspects of a long duration mission for the crew, but provide the needed information in order to adequately mitigate the risks associated with autonomy in this context.
Bibliography Type:	Description: (Last Updated:)