

<b>Fiscal Year:</b>	FY 2018	<b>Task Last Updated:</b>	FY 05/29/2018
<b>PI Name:</b>	Contractor, Noshir Ph.D.		
<b>Project Title:</b>	CREWS: Crew Recommender for Effective Work in Space		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>			
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Behavior and performance		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	<b>Yes</b>	
<b>Human Research Program Elements:</b>	(1) <b>HFBP</b> :Human Factors & Behavioral Performance (IRP Rev H)		
<b>Human Research Program Risks:</b>	(1) <b>Team</b> :Risk of Performance and Behavioral Health Decrements Due to Inadequate Cooperation, Coordination, Communication, and Psychosocial Adaptation within a Team		
<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>	60208-0834	<b>Congressional District:</b>	9
<b>Comments:</b>			
<b>Project Type:</b>	GROUND	<b>Solicitation / Funding Source:</b>	2014-15 HERO NNX14ZSA001N-Crew Health (FLAGSHIP & NSBRI)
<b>Start Date:</b>	07/01/2015	<b>End Date:</b>	06/30/2019
<b>No. of Post Docs:</b>	1	<b>No. of PhD Degrees:</b>	1
<b>No. of PhD Candidates:</b>	9	<b>No. of Master' Degrees:</b>	1
<b>No. of Master's Candidates:</b>	3	<b>No. of Bachelor's Degrees:</b>	1
<b>No. of Bachelor's Candidates:</b>	4	<b>Monitoring Center:</b>	NASA JSC
<b>Contact Monitor:</b>	Williams, Thomas	<b>Contact Phone:</b>	281-483-8773
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>	NOTE: End date shows 6/30/2019 in NSSC (Ed., 4/2/19) NOTE: End date changed to 5/17/2019 per D. Arias/HRP (Ed., 3/22/18) NOTE: Element change to Human Factors & Behavioral Performance; previously Behavioral Health & Performance (Ed., 1/17/17)		
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	Bell, Suzanne Ph.D. ( DePaul University ) DeChurch, Leslie Ph.D. ( Northwestern University )		
<b>Grant/Contract No.:</b>	NNX15AM32G		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			

<b>Task Description:</b>	<p>Team composition, the configuration of member attributes and their relationships, is a critical enabling feature of fostering effective teamwork and likely to play an important role in the effectiveness of future long-duration space exploration (LDSE). Limited research on team composition in environments analogous to LDSE exists, and currently how team composition can be used to optimize crew functioning and performance is unclear. Our research aims to: (1) identify the effects of team composition on team functioning in LDSE and the critical factors of team composition driving this effect, (2) identify particular patterns of this effect with different team compositions, (3) identify methods for composing teams for LDSE, (4) develop a predictive team composition model for use in composing teams and identify potential issues with already composed teams, and (5) provide recommendations for composing teams for LDSE. To address these critical aims, we propose a 3-year, multi-method research effort, in which we: (1) develop an agent-based model of team composition for LDSE based on empirical data linking key model inputs (e.g., individual difference variables, network relational factors, task characteristics) to team functioning (e.g., social integration, team processes, team cohesion, team conflict) in LDSE-relevant contexts; (2) conduct virtual experiments using characteristics and relationships identified in Phase I to identify the team functioning patterns that arise under different member compositions, and create a predictive model of team composition; and (3) conduct an initial validation of the model developed in Phase 2 in the Human Exploration Research Analog (HERA) and NASA Extreme Environment Mission Operations (NEEMO) analogue environments using specific manipulations of key factors (e.g., compositions; situational characteristics). Research products critical to closing Team Gap 8 will be developed including a predictive model of team composition in LDSE, evidence in support of the model, and a mockup of a proposed interface to assist in the staffing and management of LDSE crew and mission teams.</p>
<b>Rationale for HRP Directed Research:</b>	
<b>Research Impact/Earth Benefits:</b>	<p>While the primary objectives of this project are to be applied to astronaut crews in LDSE contexts, results from this research may also benefit teams on Earth in similar ICE (Isolated, Confined, and Extreme) conditions. Teams such as those sent to winter-overs in Antarctica or submarine crews that spend months underwater would be analogous environments in which the results of this research may prove useful. In a general sense, our findings could have implications for composing optimal teams that are not in ICE conditions, such as work teams at an organization, teams of students working on a project, and squadrons of military personnel, to give but a few examples.</p>
<b>Task Progress:</b>	<p>Team composition, the configuration of member attributes and their relationships, is a critical enabling feature of fostering effective teamwork and likely to play an important role in the effectiveness of future long-duration space exploration (LDSE). Limited research on team composition in environments analogous to LDSE exists, and currently how team composition can be used to optimize crew functioning and performance is unclear.</p> <p>This past year, we have made significant progress on our three research aims: (1) develop an agent-based model of team composition for LDSE based on empirical data linking key model inputs (e.g., individual difference variables, network relational factors, task characteristics) to team functioning (e.g., social integration, team processes, team cohesion, team conflict) in LDSE-relevant contexts; (2) conduct virtual experiments using characteristics and relationships identified in Phase I to identify the team functioning patterns that arise under different member compositions, and create a predictive model of team composition; and (3) conduct an initial validation of the model developed in Phase 2 in the Human Exploration Research Analog (HERA) and NASA Extreme Environment Mission Operations (NEEMO) using specific manipulations of key factors (e.g., compositions; situational characteristics).</p> <p>Research Aim #1: Our first research aim is to develop an agent-based model of team composition for LDSE based on empirical data linking key model inputs (e.g., individual difference variables, network relational factors, task characteristics) to team functioning (e.g., social integration, team processes, team cohesion, team conflict) in LDSE-relevant contexts. This year we developed a functional version of the model based on theories of team composition, team functioning, and social networks. We used data from Campaign 3 to validate the model. We also developed a prototype of a decision aid dashboard (TEAMSTAR) that runs the ABM (agent-based model) in the background and could be used by NASA personnel to make informed decisions about crew composition.</p> <p>Research Aim #2: Our second research aim is to conduct virtual experiments using characteristics and relationships identified in Phase I to identify the team functioning patterns that arise under different member compositions, and create a predictive model of team composition. This year we began testing the model for its fit with the positive-affect, negative-affect, information-sharing, and coordination networks.</p> <p>Research Aim #3: Our third research aim is to conduct an initial validation of the model developed in Phase 2 in the Human Exploration Research Analog (HERA) and NASA Extreme Environment Mission Operations (NEEMO). To support this aim, we have been collecting data on trait constructs, sociometric constructs, and team dynamics measures, with many of these constructs and measures being collected over time. As part of this effort, we developed and administered a team task battery to track team performance on multiple dimensions over time.</p>
<b>Bibliography Type:</b>	Description: (Last Updated: 03/29/2024)
<b>Abstracts for Journals and Proceedings</b>	Gomez-Zara D, Larson LE, Jones BR, DeChurch LA, Contractor NS. "Leadership and followership emergence in NASA space crews." Paper presented at the WebScience Summer School 2017, Saint Petersburg, Russia, July 1-8, 2017. WebScience Summer School 2017, Saint Petersburg, Russia, July 1-8, 2017. , Jul-2017
<b>Abstracts for Journals and Proceedings</b>	Larson LE, Gomez-Zara D, Jones BR, DeChurch LA, Contractor N. "Social identity, social identification, and intergroup leadership." In: Brown, Tara (chair), Dynamics at the boundaries is what matters. Symposium presented at Interdisciplinary Network for Group Research Annual Meeting, Saint Louis, MO, July 17-22, 2017. Interdisciplinary Network for Group Research Annual Meeting, Saint Louis, MO, July 17-22, 2017. , Jul-2017
<b>Abstracts for Journals and Proceedings</b>	Bell ST, Barrick M, Zapata C, Ryann A, Schneider B. "New directions in personality research – Where do we go now?" In: K. Ostermeier & P. Sigdyaal (Co-Chairs). Panel presented the 2017 Academy of Management Conference, Atlanta, GA, August 10-13, 2017. 2017 Academy of Management Conference, Atlanta, GA, August 10-13, 2017. , Aug-2017

Abstracts for Journals and Proceedings	Niler A, Gibson ZM, DeChurch, LA. "The social forces behind leadership network formation in multiteam systems." Paper presented at the 2017 Academy of Management Conference, Atlanta, GA, August 10-14, 2017. 2017 Academy of Management Conference, Atlanta, GA, August 10-13, 2017. , Aug-2017
Abstracts for Journals and Proceedings	Larson LE, Jones BR, DeChurch LA. "Language, leadership, and identity construction in multiteam systems." Paper presented at 2017 Academy of Management Conference, Atlanta, GA, August 10-13, 2017. 2017 Academy of Management Conference, Atlanta, GA, August 10-13, 2017. , Aug-2017
Abstracts for Journals and Proceedings	Schechter A, Mell J. "The antecedents and implications of information sharing processes in multiteam systems." Paper presented at the 2017 Academy of Management Conference, Atlanta, GA, August 10-13, 2017. 2017 Academy of Management Conference, Atlanta, GA, August 10-13, 2017. , Aug-2017
Abstracts for Journals and Proceedings	Gokhman I, Larson L, DeChurch L, Bell S, Contractor N. "Tracking crew performance over time." Poster presented at the 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. , Jan-2018
Abstracts for Journals and Proceedings	Contractor N, DeChurch L, Antone W, Twyman M, Gibson Z, Sawant, A, Gado H, Bell S. "Teamstar: A tool for evaluating and mitigating space team risk." Poster presented at the 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. , Jan-2018
Abstracts for Journals and Proceedings	Burns T, Antone W, Weiss J, Larson L, Bell S, DeChurch L. "Identity in isolation: How teams bond or break." Poster presented at the 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018.. 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. , Jan-2018
Abstracts for Journals and Proceedings	Antone W, Lungeanu A, Gibson Z, DeChurch L, Bell S, Contractor N. "Team dynamics: Using simulation as a tool to develop theory." Poster presented at the 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. , Jan-2018
Abstracts for Journals and Proceedings	Outland N, Brown SG, Colaneri T, Vasquez M, Weiss J, Wocjik H, Bell S. "The relationship between team composition and team effectiveness moderated by LDSE-relevant context features." Presented at the 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. 2018 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 22-25, 2018. , Jan-2018
Articles in Peer-reviewed Journals	Bell ST, Brown SG, Colaneri A, Outland N. "Team composition and the ABCs of teamwork." American Psychologist. 2018 May-Jun;73(4):349-62. <a href="http://dx.doi.org/10.1037/amp0000305">http://dx.doi.org/10.1037/amp0000305</a> ; PubMed <a href="https://pubmed.ncbi.nlm.nih.gov/29792453/">PMID: 29792453</a> , May-2018
Significant Media Coverage	Winsborough D. "In first person: Suzanne Bell. Predicting team success in outer space (Interview of Col Suzanne Bell by Dave Winsborough)." People + Strategy. 2018 Spring;41(2):62-4. <a href="http://www.nxtbook.com/ygsreprints/HRPS/hrps_41_2_2018/index.php#/64">http://www.nxtbook.com/ygsreprints/HRPS/hrps_41_2_2018/index.php#/64</a> ; accessed 6/7/18., Mar-2018