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| <b>Fiscal Year:</b>                               | FY 2022                                                                                                                                                                                                                                                                                                                                                                      | <b>Task Last Updated:</b> FY 08/18/2021 |                                                                                                                                      |
| <b>PI Name:</b>                                   | Tannenbaum, Scott Ph.D.                                                                                                                                                                                                                                                                                                                                                      |                                         |                                                                                                                                      |
| <b>Project Title:</b>                             | A Multi-faceted Approach to Examine Team Adaptation & Resilience within Isolated, Confined, and Extreme Environments                                                                                                                                                                                                                                                         |                                         |                                                                                                                                      |
| <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>                                                                                                                                                                                                                                                                                                                                                             | No                                      |                                                                                                                                      |
| <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>BMed</b> : Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders<br>(2) <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                                                                                                                                                                                                                                                                                                                                                                         |                                         |                                                                                                                                      |
| <b>PI Email:</b>                                  | <a href="mailto:scott.tannenbaum@groupoe.com">scott.tannenbaum@groupoe.com</a>                                                                                                                                                                                                                                                                                               | <b>Fax:</b>                             | FY                                                                                                                                   |
| <b>PI Organization Type:</b>                      | INDUSTRY                                                                                                                                                                                                                                                                                                                                                                     | <b>Phone:</b>                           | 518-456-7738                                                                                                                         |
| <b>Organization Name:</b>                         | The Group for Organizational Effectiveness, Inc.                                                                                                                                                                                                                                                                                                                             |                                         |                                                                                                                                      |
| <b>PI Address 1:</b>                              | 727 Waldens Pond Road                                                                                                                                                                                                                                                                                                                                                        |                                         |                                                                                                                                      |
| <b>PI Address 2:</b>                              |                                                                                                                                                                                                                                                                                                                                                                              |                                         |                                                                                                                                      |
| <b>PI Web Page:</b>                               |                                                                                                                                                                                                                                                                                                                                                                              |                                         |                                                                                                                                      |
| <b>City:</b>                                      | Albany                                                                                                                                                                                                                                                                                                                                                                       | <b>State:</b>                           | NY                                                                                                                                   |
| <b>Zip Code:</b>                                  | 12203-6006                                                                                                                                                                                                                                                                                                                                                                   | <b>Congressional District:</b>          | 20                                                                                                                                   |
| <b>Comments:</b>                                  |                                                                                                                                                                                                                                                                                                                                                                              |                                         |                                                                                                                                      |
| <b>Project Type:</b>                              | GROUND                                                                                                                                                                                                                                                                                                                                                                       | <b>Solicitation / Funding Source:</b>   | 2015-16 HERO<br>NNJ15ZSA001N-Crew Health (FLAGSHIP, NSBRI, OMNIBUS).<br>Appendix A-Crew Health, Appendix B-NSBRI, Appendix C-Omnibus |
| <b>Start Date:</b>                                | 10/23/2017                                                                                                                                                                                                                                                                                                                                                                   | <b>End Date:</b>                        | 03/22/2023                                                                                                                           |
| <b>No. of Post Docs:</b>                          | 0                                                                                                                                                                                                                                                                                                                                                                            | <b>No. of PhD Degrees:</b>              | 0                                                                                                                                    |
| <b>No. of PhD Candidates:</b>                     | 1                                                                                                                                                                                                                                                                                                                                                                            | <b>No. of Master' Degrees:</b>          | 0                                                                                                                                    |
| <b>No. of Master's Candidates:</b>                | 0                                                                                                                                                                                                                                                                                                                                                                            | <b>No. of Bachelor's Degrees:</b>       | 0                                                                                                                                    |
| <b>No. of Bachelor's Candidates:</b>              | 0                                                                                                                                                                                                                                                                                                                                                                            | <b>Monitoring Center:</b>               | NASA JSC                                                                                                                             |
| <b>Contact Monitor:</b>                           | Whitmire, Alexandra                                                                                                                                                                                                                                                                                                                                                          | <b>Contact Phone:</b>                   |                                                                                                                                      |
| <b>Contact Email:</b>                             | <a href="mailto:alexandra.m.whitmire@nasa.gov">alexandra.m.whitmire@nasa.gov</a>                                                                                                                                                                                                                                                                                             |                                         |                                                                                                                                      |
| <b>Flight Program:</b>                            |                                                                                                                                                                                                                                                                                                                                                                              |                                         |                                                                                                                                      |
| <b>Flight Assignment:</b>                         | NOTE: End date changed to 03/22/2023 per A. Beitman/HFBP (Ed., 2/21/22)<br>NOTE: End date changed to 3/22/2022 per NSSC information (Ed., 3/9/21)<br>NOTE: End date changed to 3/12/2021 per L. Juliette/HRP (Ed., 2/19/2020)<br>NOTE: Change in period of performance and grant number per J. Garrett/JSC HRP (previous 10/1/2016-9/30/2019, grant NNX16AM17G)--Ed., 7/5/18 |                                         |                                                                                                                                      |
| <b>Key Personnel Changes/Previous PI:</b>         | N/A                                                                                                                                                                                                                                                                                                                                                                          |                                         |                                                                                                                                      |
| <b>COI Name (Institution):</b>                    | Mathieu, John Ph.D. ( The Group for Organizational Effectiveness, Inc. )<br>Maynard, Michael Ph.D. ( Safer Healthcare Partners, LLC )                                                                                                                                                                                                                                        |                                         |                                                                                                                                      |

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| <b>Grant/Contract No.:</b>                  | 80NSSC18K0092                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Performance Goal No.:</b>                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Performance Goal Text:</b>               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Task Description:</b>                    | <p>The success of future long duration exploration missions (LDEM) is likely to be contingent on the crew's ability to adjust in response to environment demands. There has been recent interest in team adaptation and resilience in the scientific community, but researchers have noted the need to clarify those constructs. We propose a program of research to: a) clarify and better understand these constructs, in particular with how they operate in isolated, confined, and extreme (ICE) environments and b) based on that enhanced understanding, develop and test targeted countermeasures designed to boost the adaptability and resilience of LDEM crews.</p> <p>Work conducted by Maynard and colleagues (2015), supplemented by the team resilience work of Alliger et al. (2015) – all members of our research team – provides a “road map” for the proposed research. We plan to examine the impact of different environmental triggers on team adaptation, incorporating an event taxonomy and categorization schema with which to assess experiences and trigger events. This will allow us to index the types of challenges that LDEM crews will confront. We will test a series of related hypotheses using archival data we collected in prior research in the Human Exploration Research Analog (HERA) habitat.</p> <p>We will then examine antecedents and outcomes of adaptation, gathering data in two analog environments. Finally, based on the theoretical and preliminary empirical work, we will develop a team countermeasure designed to promote constructive team adaptation and team resilience, and test those countermeasures in an analog environment.</p> <p><b>References</b></p> <p>Alliger, G.M., Cerasoli, C.P., Tannenbaum, S.I., &amp; Vessey, W.B. (2015). Team resilience: How teams flourish under pressure. <i>Organizational Dynamics</i>, 44, 176-184.</p> <p>Maynard, M. T., Kennedy, D. M., &amp; Sommer, S. A. (2015). Team adaptation: A fifteen-year synthesis (1998–2013) and framework for how this literature needs to “adapt” going forward. <i>European Journal of Work and Organizational Psychology</i>, 24, 652-677.</p> <p>Maynard, M. T., Kennedy, D. M., Sommer, S. A., &amp; Passos, A. M. (2015). Team Cohesion: A theoretical consideration of its reciprocal relationships within the team adaptation nomological network. In: E. Salas, <i>Research on Managing Groups and Teams</i>, 17, 83-111.</p> |
| <b>Rationale for HRP Directed Research:</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Research Impact/Earth Benefits:</b>      | <p>There is a need for LDEM crews to adapt and sustain their resilience as a team. Researchers have traditionally examined adaptation and resilience from an individual perspective, but to ensure that Long Duration Exploration Mission (LDEM) crews are ready for the challenges they will face, there is a need to better understand how adaption and resilience operate at the team level. Doing so will allow for the development of validated countermeasures that can be deployed prior to and at appropriate times during a mission, increasing a LDEM crew's ability to handle the stressors associated with ICE environments and enabling them to adjust when unexpected challenges emerge. It addresses the need to learn more about team adaptation and resilience, as well as the need to develop and test potential countermeasures.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Task Progress:</b>                       | <p>We have developed research protocols and measurement tools for conducting studies in two analog environments, the Hawai'i Space Exploration Analog and Simulation (HI-SEAS) and NASA™ HERA environment, as well as for one field environment, Deep Sea Saturation Dive (SAT) teams. The contextualized surveys developed for each environment are designed to collect data about key adaptation factors, including for example trigger events, challenges encountered, adaptation responses, performance data as well as overall perceptions of the mission.</p> <p>We analyzed weekly data from a HI-SEAS crew over an 8-month long mission. We also collected daily data from 20 SAT dive teams during their 28-day undersea missions that described 460 unique team and taskwork related challenges and related adjustments. We content analyzed the data and had 750 unique events for the response focus (e.g., individual, dyad, collective, full team in chamber, external team) and the response action (e.g., troubleshooting, changed roles/positions, discussed interpersonal relationships, sought/received assistance from others). We collected data in the HERA C5 mission and are conducting the same content analysis of the 445 responses for 313 events.</p> <p>We drafted a countermeasure for use with SAT dive teams and a version of that countermeasure for use in HERA 6. We will implement these studies when HERA 6 begins in September 2021.</p> <p>In addition, we have begun analyzing archival data we previously collected during the HERA 1 mission, commenced coding the data collected in the HI-SEAS and SAT dive team studies, and have developed promising countermeasures that will be used in the HERA C6 missions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Bibliography Type:</b>                   | Description: (Last Updated: 02/02/2024)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Books/Book Chapters</b>                  | <p>Maynard MT, Kennedy DM, Tannenbaum SI, Mathieu JE, Levy JH. "Team adaptation and resilience: Where the literature currently stands and how it applies to long-duration isolated, confined, and extreme contexts." in "Psychology and Human Performance in Space Programs: Research at the Frontier." Ed. L.B. Landon, K.J. Slack, E. Salas. Boca Raton, FL: CRC Press, 2020. p. 151-170. ISBN: 9781138339866. Book doi: <a href="https://doi.org/10.1201/9780429440878">https://doi.org/10.1201/9780429440878</a> , Oct-2020</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Papers from Meeting Proceedings</b>      | <p>Tannenbaum SI, Maynard MT, Mathieu JE, Kennedy DM, Levy J, Beard R. "Environmental challenges and adaptivity in different LDSE analogs." 2021 NASA Human Research Program Investigators' Workshop, Virtual, February 1-4, 2021.</p> <p>Abstracts. 2021 NASA Human Research Program Investigators' Workshop, Virtual, February 1-4, 2021. , Feb-2021</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |