# Mars Mission Social Sciences Workshop

## FINAL SCHEDULE/AGENDA:

<table>
<thead>
<tr>
<th>TIME</th>
<th>EVENT</th>
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</thead>
<tbody>
<tr>
<td><strong>Tuesday, May 30, 2017 (8:30am – 4:00pm)</strong></td>
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<tr>
<td>08:00AM</td>
<td>Breakfast available</td>
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<tr>
<td>08:30AM</td>
<td>Dr. Andrew Aldrin presents the BASI mission and vision</td>
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<tr>
<td>09:00AM</td>
<td>Exploring the Mars Mission Context hybrid session</td>
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<tr>
<td>10:15AM</td>
<td>Coffee break</td>
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<tr>
<td>10:30AM</td>
<td>Individual Health in Space presentations</td>
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<tr>
<td>12:00PM</td>
<td>Lunch: BBQ Buffet</td>
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<tr>
<td>01:00PM</td>
<td>Team Health in Space presentations</td>
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<tr>
<td>02:15PM</td>
<td>Coffee break</td>
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<tr>
<td>02:30PM</td>
<td>Intersections of the Social Sciences panel</td>
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<tr>
<td>03:45PM</td>
<td>End of day wrap-up and announcements</td>
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<tr>
<td>04:00PM</td>
<td>Social networking reception</td>
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<tr>
<td>07:00PM</td>
<td>Optional small group dine-around-town dinners, sign-up available until 1PM</td>
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<tr>
<td><strong>Wednesday, May 31, 2017 (8:00am – 3:00pm)</strong></td>
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<tr>
<td>07:30AM</td>
<td>Breakfast available</td>
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<tr>
<td>08:00AM</td>
<td>Working group pre-brief</td>
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<tr>
<td>08:30AM</td>
<td>Working group breakout #1</td>
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<tr>
<td>10:15AM</td>
<td>Coffee break</td>
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<tr>
<td>10:30AM</td>
<td>Working group breakout #2</td>
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<tr>
<td>12:00PM</td>
<td>Lunch: “Chop Sticks” Chinese Buffet</td>
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<tr>
<td>01:00PM</td>
<td>Working group brief-backs &amp; integrated discussion</td>
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<tr>
<td>02:30PM</td>
<td>Workshop wrap-up and next steps</td>
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SESSION 1: EXPLORING THE MARS MISSION CONTEXT
9:00AM-10:15AM

Extremely Stressed and Extremely Bored:
Team Self-Maintenance in Long Duration Space Exploration
Jessica L. Wildman¹, Deborah DiazGranados², & Michael T. Curtis³
¹Florida Institute of Technology, ²Virginia Commonwealth University, ³Bonsai Institute
Beneath the extreme characteristics surrounding a Mars mission are the mundane team functions that will ultimately impact team performance and mission success. This presentation will introduce the construct of team self-maintenance, a construct rooted in the unique context of long duration spaceflight, including the day-to-day effort to sustain psychological well-being and overall performance of a team.

Humans and Robots on Mars:
Optimal Ways to Form “Hybrid” Teams for Extreme Environments
Jason Kring, Embry Riddle Aeronautical University
This presentation explores the science of robot-human teams in the context of a mission to Mars. Forming these “hybrid” teams will require more autonomous robots, natural language interactions between team members, and high levels of trust and cohesion. Recommendations, limitations, and a roadmap for future research will be presented.

Mars Mission: The Ultimate Global Virtual Teams
Vas Taras, University of North Carolina at Greensboro
The Mars mission, including both the smaller crew on Mars and the huge globally dispersed support crowd on Earth, is a Global Virtual Team (GVT) taken to an extreme along at least four dimensions. First, ultimate dispersion and virtuality: the spatial separation and virtual nature of the communication among the people involved in the Mission will be much greater than anything observed before in corporate GVTs. Second, ultimate interdependence: the members of the crew will more interdependent than any corporate team on Earth, which can greatly affect the team dynamics. Third, ultimate responsibility: the cost of an error will be greater than in any “earthly” project. Fourth, ultimate support base: given the very high profile of the mission, it will likely be able to attract an unprecedented support crowd of volunteers, citizen scientists, and problem solvers. These extremes will greatly amplify both the challenges as well as the opportunities for the Mission.

Human-Centered Design for Potential Mars Missions
Guy Boy, Florida Institute of Technology
Human-Centered Design (HCD) is about concurrently considering technology, organizations and people from the beginning of design and along the life cycle of a project and program. This is made possible using modeling and simulation, organization design and management, complexity analysis, advanced interaction media and cognitive engineering. I will explain HCD potential assets to be used in the design and development of future Mars missions. This talk will be based on research and operational experience in the aerospace domain, as well as on the development and use of human-in-the-loop simulation capabilities at FIT's Human-Centered Design Institute (HCDi) and other places.
SESSION 2: INDIVIDUAL “HEALTH” IN SPACE
10:30AM-12:00PM

Psychological and Psychiatric Issues in Space
Nick Kanas, University of California, San Francisco
Crewmembers on a mission to Mars will experience a number of psychological and psychiatric stressors. Taking what we know from on-orbit and Mars simulation research, the potential consequences of these stressors will be discussed, with the goal of developing strategies to make a Mars expedition safer and more productive.

Brain Health and Restoration of Function in Space
Alexander Ring, Newport Brain Research Laboratory
Extended space travel and isolation brings physiological and psychological stressors. These stressors impact behavior and ultimately, neurological function and cognition. Restoration of brain function with noninvasive neuromodulation in populations with similar stressors has improved cognition, quality of life, and sleep. Guided neuromodulation may stabilize and support brain health in space.

Adaptability, Resilience, and the Colonization of Mars
Mindy Shoss, University of Central Florida
Travel to Mars and Mars colonization is likely to be fraught with unknown and novel circumstances to which individuals and groups will need to readily and successfully adapt. This presentation reviews research on individual adaptive performance and resilience to stressors, highlighting relevant insights and important knowledge gaps.

Predicting Individual Resilience for Long Duration Spaceflight
Meredith Carroll1 & Brent Winslow2
1Florida Institute of Technology, 2Design Interactive, Inc.
To ensure mission success and astronaut health and wellness, it is critical that astronauts are carefully selected to perform under stress. Preliminary research suggests it may be possible to predict an individual’s resilience to stress based solely on baseline, non-stressed physiological/psychological assessments. Research findings, gaps and recommendations will be presented.

The Built Environment and Optimal Decision Making
Piers Steel, University of Calgary
Our present built environment is constructed with considerable design, including features that can coax maladaptive behaviors, particularly overconsumption. A Mars colony provides a challenge and an opportunity to design an environment to encourage a more adaptive set of behaviors, addressing not just ergonomic issues but also motivational and decision-making ones.
Preparing for a Mars Mission: The Critical Importance of Analogs

Wendy L. Bedwell, PACE Consulting Solutions, LLC

Dr. Bedwell will discuss analog usage as it relates to understanding how teams operate in isolated, confined, extreme environments over time. She will describe one such analog (HI-SEAS), as well as her research regarding cohesion, conflict, and composition across mixed-gender, international crews of 8 and 12 months mission duration.

Leveraging Research on Virtual Teams to Understand LDSF Communication

Joseph Keebler, Embry Riddle Aeronautical University

This talk will focus on contemporary work on virtual teams as a potential proxy for LDSF teams. Dr. Keebler will speak about virtual teamwork, communication technology, and the effects of lag on teamwork with potential remedial strategies. Finally, he will discuss one of his student's dissertations that is investigating the use of tele-present robotic systems in team communication.

Team Dynamics in the Context of Spaceflight

Shawn Burke, University of Central Florida

The last twenty years has taught us much about team dynamics; however, most of this work has been done outside the context of teams operating in isolated, confined environments. I will highlight a subset of results from NASA funded efforts to better understand team dynamics in the context of spaceflight.

Shared Cognitive Architecture for Long Term Exploration

Leslie DeChurch, Northwestern University

Long distance space exploration requires the crew and mission control to maintain shared mental models. We are developing semantic, unobtrusive indicators of shared cognition within the crew and linking the crew and mission control. This talk illustrates how the technique can be used to index shared cognition using Skylab.

Team Conflict, Virtual Communication, and Behavior in Emergencies

Thomas O’Neill, University of Calgary

My specialization is in conflict and conflict management, virtual teamwork and leadership, and medical resuscitation teams. I will provide a brief overview of the key findings from my research on each of these topics that may be of relevance to the permanent Mars colonization. Conflict could be critical as conflict prevention, management, and de-escalation could be critical for a small colony. Lessons from virtual teamwork and leadership may apply to communications between Earth and the Mars colony. The pertinent research on resuscitation teams involves maintaining situation awareness during distractions and obedience by subordinates when an authority figure provides an incorrect order.
SESSION 4: INTERSECTIONS OF THE SOCIAL SCIENCES PANEL
2:30PM-3:45PM

Guy Boy, Florida Institute of Technology
Dr. Boy is a University Professor at the Florida Institute of Technology where he is the Dean of the School of Human-Centered Design, Innovation and Art, which he founded. Dr. Boy’s research is focused on cognitive engineering, usability, human-centered automation and design, data visualization, safety-critical systems, operational documentation and knowledge management. He developed various methods and techniques that include the Group Elicitation Method (GEM), Cognitive Function Analysis (CFA) and the Orchestra model. He has applied this research and methods to cockpit and control room analysis, design and evaluation. He worked on the analysis, design and evaluation of the early glass cockpits of commercial aircraft and the following concepts until today with the interactive cockpits, as well as space shuttle cockpit systems and other space systems including the Lunar Electric Rover virtual camera system.

William Gabrenya, Florida Institute of Technology
William Gabrenya received his Ph.D. in Social Psychology in the joint Psychology-Sociology program at the University of Missouri-Columbia. His exposure to sociological approaches to social psychology led to his move into the then-new field of cross-cultural psychology during his postdoctoral fellowship at Ohio State University, where he conducted early cross-cultural research in the group performance paradigm termed “social loafing.” Prof. Gabrenya has had experience living and working outside the United States in East Asia (Taiwan) and Europe (Germany). In addition to teaching in these two countries, he has taught workshops in China and has lectured at universities in Taiwan, Germany, China, and New Zealand. In the mid-1990s, Prof. Gabrenya assumed the editorship of the Cross-Cultural Psychology Bulletin, the magazine-newsletter of the International Association for Cross-Cultural Psychology (IACCP). He was appointed to two four-year terms as chair of the IACCP Communication and Publications Committee through 2008. He subsequently served as Secretary-General of IACCP from 2008 to 2016. He is currently the IACCP Information Technology Officer. He is Webmaster for IACCP and a Brevard County progressive political organization. Prof. Gabrenya’s research has been focused primarily on social and personality topics within cross-cultural psychology. He is the leader of the Culture Research Group in the Florida Tech Industrial/Organizational psychology program. Current research topics include culture competence, expatriate/repatriate adjustment and readjustment; training for overseas work, modernity/modernization processes, and social class.

Richard Griffith, Institute for Cross Cultural Management
Richard Griffith, Ph.D. is a Professor of Industrial Organizational Psychology and the Executive Director of The Institute for Cross Cultural Management at the Florida Institute of Technology. Dr. Griffith is an expert in the development and validation of non-cognitive assessments, cross cultural competence, and global leadership. He is the author of over 100 publications, presentations, and chapters in the area of selection and is the coeditor of the book A Closer Examination of Applicant Faking Behavior. Dr. Griffith provides coaching in global leadership and executive presentations, specializing in presentations conducted abroad. He is the co-editor of Internationalizing the Organizational Psychology Curriculum,
Leading Global Teams and the upcoming book *Critical Issues in Cross Cultural Management*. He has conducted funded research for the Department of Defense examining the assessment and development of cross-cultural competence, and currently serves as a technical advisor to the Educational Testing Service on an Army Research Institute contract to develop an operational assessment of cross cultural competence. His work has been featured in Time magazine and The Wall Street Journal.

Peter Hancock, University of Central Florida

Peter A. Hancock, D.Sc., Ph.D. is Provost Distinguished Research Professor in the Department of Psychology and the Institute for Simulation and Training, as well as at the Department of Civil and Environmental Engineering and the Department of Industrial Engineering and Management Systems at the University of Central Florida (UCF). He directs the MIT2 Research Laboratories and Associate Director of the Center for Applied Human Factors in Aviation (CAHFA). Professor Hancock is the author of over seven hundred refereed scientific articles and publications as well as writing and editing fifteen books including: Human Performance and Ergonomics in the Handbook of Perception and Cognition series, published by Academic Press in 1999. Stress, Workload, and Fatigue, published in 2001 by Lawrence Erlbaum and Performance under Stress published in 2008 by Ashgate. He is the author of the 1997 book, Essays on the Future of Human-Machine Systems and the 2009 text, Mind, Machine and Morality also from Ashgate Publishers. He has been continuously funded by extramural sources for every one of the twenty-nine years of his professional career, including support from NASA, NSF, NIH, NIA, FAA, FHWA, DARPA, the US Navy, Army and Air Force as well as numerous State and Industrial agencies.

Ty Matejowsky, University of Central Florida

Dr. Matejowsky is an associate professor who specializes in cultural anthropology. He received his Ph.D. in 2001 from Texas A&M University. His research interests include fast food, economic anthropology, globalization, urbanization, culture change and development, disaster studies. Dr. Matejowsky currently conducts his research in Southeast Asia, particularly the Philippines. Recent publications include “The Incredible, Edible Balut: Ethnographic Perspectives on the Philippines’ Favorite Liminal Food” (Food, Culture and Society) and “Like a “Whopper Virgin”: Anthropological Reflections on Burger King’s Controversial Ad Campaign” (Studies in Popular Culture). He joined the faculty at UCF in 2002 and teaches Peoples of the World, Magic, Ritual & Belief, and Anthropological Perspectives on Fast Food.

Eduardo Salas, Rice University

Eduardo Salas is Trustee Chair and Pegasus Professor of Psychology at the University of Central Florida. Dr. Salas earned a Ph.D. in industrial/organizational psychology at Old Dominion University, and has since coauthored over 300 journal articles and book chapters on topics such as teamwork, team training, and performance assessment. Salas focuses on understanding and facilitating teamwork, optimizing environments for learning and development, and performing simulation-based training.