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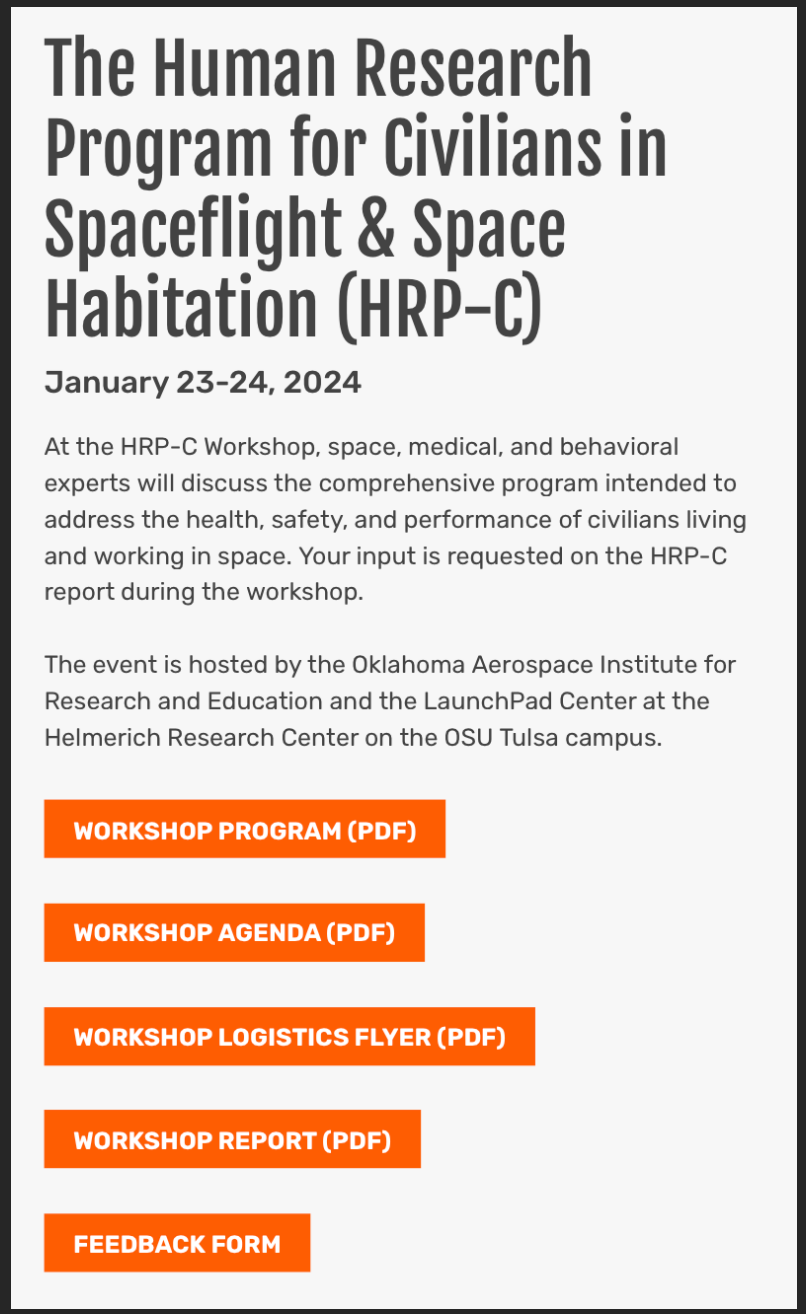
Human Research Program for Civilians in Spaceflight and Space Habitation



The Human Research Program for Civilians in Spaceflight & Space Habitation (HRP-C)

January 23-24, 2024

At the HRP-C Workshop, space, medical, and behavioral experts will discuss the comprehensive program intended to address the health, safety, and performance of civilians living and working in space. Your input is requested on the HRP-C report during the workshop.

The event is hosted by the Oklahoma Aerospace Institute for Research and Education and the LaunchPad Center at the Helmerich Research Center on the OSU Tulsa campus.

WORKSHOP PROGRAM (PDF)

WORKSHOP AGENDA (PDF)

WORKSHOP LOGISTICS FLYER (PDF)

WORKSHOP REPORT (PDF)

FEEDBACK FORM

https://go.okstate.edu/aerospace/iaass.html

or google

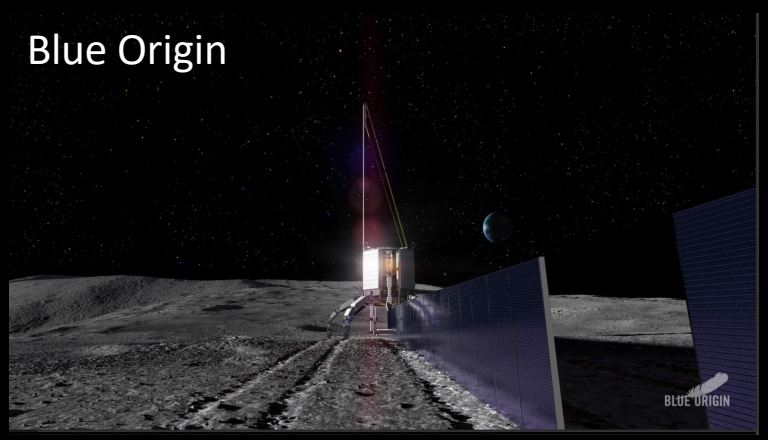
IAASS workshop

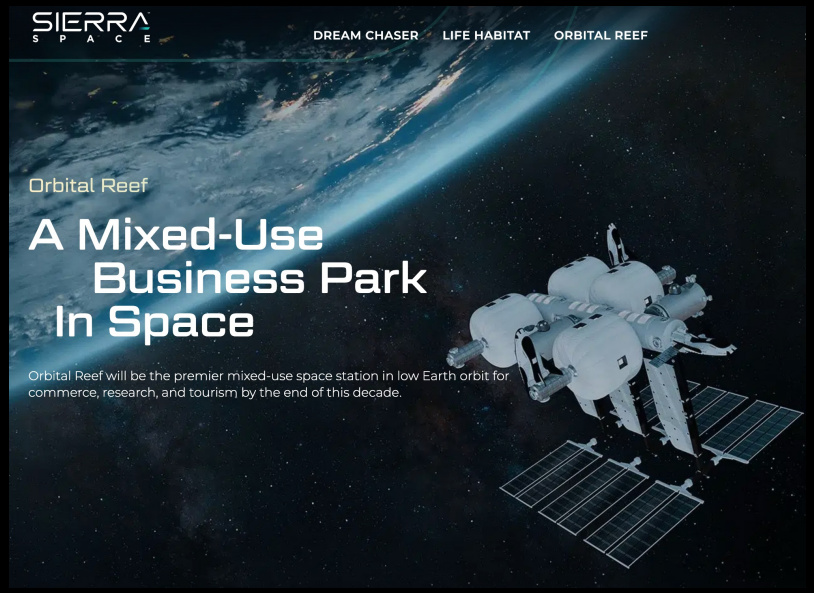
Australia
Brazil
Canada
Columbia
France
Germany
India
Italy
Japan
Netherlands
New Zealand
Nigeria
Philippines
Russia
United Kingdom
United States

Living & Working in Space

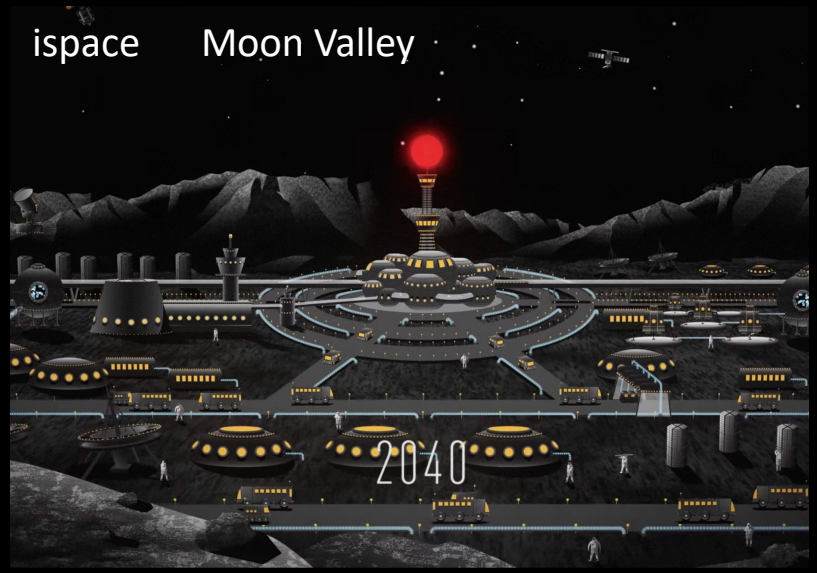
Above Prometheus

Blue Origin





ispace Moon Valley



RECENT COMMERCIAL ASTRONAUTS

Wally Funk
Age 82

William Shatner
Age 90

Haley Arceneaux
Childhood Cancer Survivor

Jon Goodwin
Age 80 Diagnosed with Parkinson’s

5 Lunar Hazards and Associated Risks

https://humanresearchroadmap.nasa.gov/

Closed Environment

Toxic exposure
Celestial dust exposure
Hypoxia
Carbon dioxide exposure
Altered immune response
Decompression sickness
Reduced EVA performance
Electrical shock
Sleep loss
Hearing loss
Injury from dynamic loads

Gravitational Adaptations

Sensorimotor alterations
Cardiovascular adaptations
Crew egress
Bone fracture
Reduced muscle size
Cardiac rhythm problems
Renal stone formation
Host-microorganism interactions
Orthostatic intolerance
Spaceflight-associated neuro-ocular syndrome
Reduce aerobic capacity
Urinary retention

Radiation Exposure

Non-Ionizing radiation
Radiation carcinogenesis

- High LxC
- Mid LxC
- Low LxC

Isolation & Confinement

Inadequate psychosocial team adaptation
Adverse cognitive or behavioral conditions

Distance from Earth

Inadequate human-system integration architecture
Inadequate food and nutrition
In-flight medical conditions
Ineffective or toxic medications

RIDGE, where R stands for radiation, I is for isolation and confinement, D is for distance from Earth. G is for gravity fields, and E is for environments

Mars Hazards and Risks

Closed Environment
Toxic exposure
Celestial dust exposure
Hypoxia
Carbon dioxide exposure
Altered immune response
Decompression sickness
Reduced EVA performance
Electrical shock
Sleep loss
Hearing loss
Injury from dynamic loads

Gravitational Adaptations
Sensorimotor alterations
Cardiovascular adaptations
Crew egress
Bone fracture
Reduced muscle size
Cardiac rhythm problems
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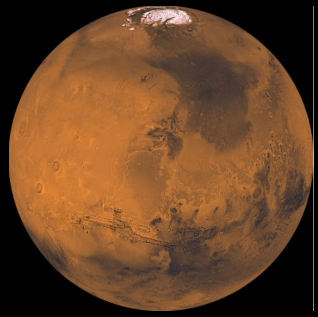
Orthostatic intolerance
Spaceflight-associated neuro-ocular syndrome
Reduce aerobic capacity
Urinary retention

Radiation Exposure
Non-Ionizing radiation
Radiation carcinogenesis



Isolation & Confinement
Inadequate psychosocial team adaptation
Adverse cognitive or behavioral conditions

Distance from Earth
Inadequate human-system integration architecture
Inadequate food and nutrition
In-flight medical conditions
Ineffective or toxic medications

loss of performance, loss of the mission itself, loss of crew life, potential evacuation, and/or long-term health conditions

Average Civilians

https://www.cdc.gov
U.S. statistics

6 in 10 adults have a chronic disease

4 in 10 adults have 2+ chronic diseases

- heart disease
- cancer
- chronic lung disease
- stroke
- Alzheimer’s
- diabetes
- chronic kidney disease

1 in 4 adults have some type of disability

- mobility
- cognition
- hearing
- vision

Our Challenge (and Opportunity)

Future flyers on commercial space flights will be a wider age range with a variety of existing health conditions

The HRP-C Mission

"Our mission is to do our best to make it possible for everyone who wishes to enter space to realize that dream through advanced science."

Planning & Scope

Planning Committee Leadership (32 International Members)

- Bettina L Beard, PhD (NASA Ames) Chair
- Michael Marge, EdD (SUNY Upstate Medical University), Vice Chair

A. Human Health and Performance Subcommittee

- Michael A. Schmidt, PhD (Sovaris Aerospace), Chair

B. DRM Subcommittee

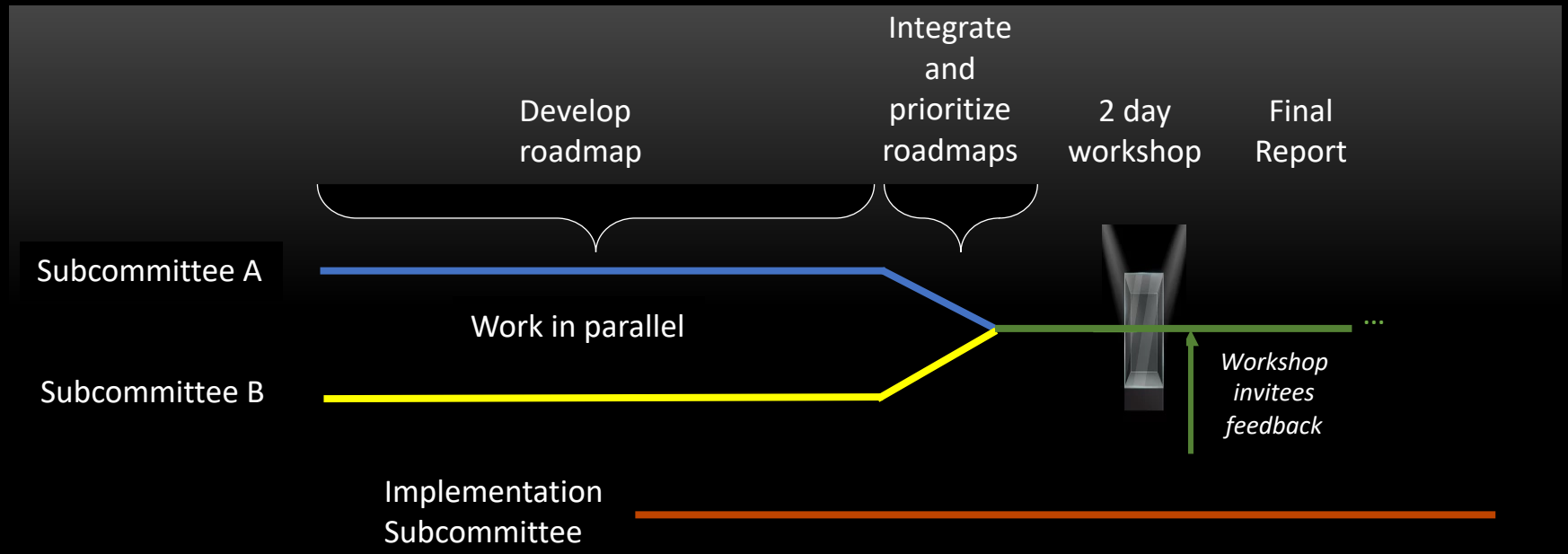
- Angie Buckley, PhD (The Aerospace Corporation), Co-Chair
- Sarah E. Georgin, PhD (The Aerospace Corporation), Co-Chair

Implementation Subcommittee

- George Nield, PhD (Global Spaceport Alliance), Chair

Objectives

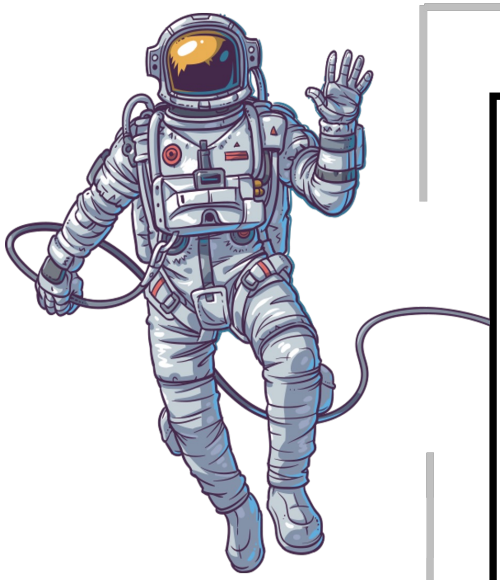
- Continuous data collection
- Harmonized data collection
- Accelerate discovery
- Rigorous scientific methods
- Provide clinical solutions with performance applications
- Self-contained framework



Primary Stakeholders

1. Civilian space travelers
2. Spaceflight providers and private sector enterprises
3. Scientific and medical research community
4. Governments and private funding enterprises

HRP-C Structure



Research Track 1

Comprehensive Measures & Monitoring

- Space Health Reporting System (SHRS)
- Human Specimen Biorepository
- Human Spaceflight Data Repository
- Human System Risk Board for Civilians (HSRB-C)
- IRB for Civilian Spaceflight (IRB-C)

Research Track 2

Spaceflight Risks & Targeted Research

- Physician Continuing Education
- Civilian Training

Track 3

Operations, Programs,

- AI and Predictive Modeling
- Precision Medicine
- Countermeasure Development
- Terrestrial Applications Program
- Preparation and Contingencies
- Food, Nutrition, and Metabolism

Implementation Recommendations

- Establish the HRP-C as a nonprofit Non-Governmental Organization [501(c)(3)]
- HRP-C Basic Principles:
  - All interested parties from government, industry, and academia are welcome (and encouraged) to participate
  - Focused on research and data sharing, not regulations
  - Collaborative in nature
  - International in scope

The Human Research Program for
Civilians in Spaceflight & Space Habitation (HRP-C)

Your input is requested on the
HRP-C draft report

https://go.okstate.edu/aerospace/iaass.html
or google
IAASS workshop