

# Human Factors in Suborbital Spaceflight

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## Plenary Session Summary

This Plenary Session on *Human Factors in Suborbital Spaceflight* is a research-based, comprehensive overview of what we know, or may reasonably expect, with regard to human-in-the-loop interactions, performance and well-being issues, sensory-motor and/or neuro-vestibular in nature, which may potentially affect human performance and overall experience in suborbital flight.

## Plenary Session Aims

### Identify / define human factors challenges:

1. General fitness for flight; pre-flight training
2. Movement control in altered gravity or force environment
3. Space motion sickness and symptom management
4. Spatial disorientation and sensory illusions
5. Zero-G, High G and G-transitions:
  - In parabolic flight and suborbital flight
  - Orthostatic tolerance issues
6. Artificial gravity during rotation as an analog environment for high-g training
7. Flight task performance (payload, research, crew, etc.)
8. Flight enjoyment (for space tourists and others)
9. Survival training (for launch, flight, or landing mishap)
10. Assessment of aftereffects

### Define goals to address human factors challenges:

- Develop awareness of issues through education and/or exposure
- Pre-adaptation where possible
- Mitigation of concerns where possible
- Overall training to the features of the suborbital flight environment
- Training to the task, to maximize fulfillment of reasons for flying

### Develop protocols and other documentation to achieve goals:

- Education: tutorials, reading lists on specific issues, online mini-courses
- Awareness through exposure: use of analog environments, simulations and other setups and venues, to expose prospective flight participants to flight characteristics
- Pre-adaptation to spaceflight conditions where possible
- Task performance training in analog environment setups
- Mishap / distress control protocols
- Development of checklist templates and specific checklists, including but not limited to: pre-flight, in-flight, post-flight; task performance; occupant-crew command compliance; first aid on-site at each stage of flight; other, as needed.

## Conclusions:

The Panel will identify potential human factors challenges affecting suborbital flight participants, including: physical, physiological, psychological, behavioral, and operational components. The Panel will propose development of mitigating protocols to maximize both safety and effectiveness of suborbital flight, such as: task performance in payload work and research, crew responsibilities in oversight of payloads and fliers, and flight enjoyment by space tourists and other flight participants.