



2022 ASCEND OUTCOME

DESIGNING THE SPACE RESCUE SERVICE

Micro-15 Panel Session Summary
December 2022

Decreasing launch costs and improving launch capabilities will most likely result in an increasing number of human missions to space in the coming decades. However, this also will increase the likelihood of in-space emergency situations that cannot be addressed with on-board resources. Human space exploration and colonization could benefit from a space rescue service (SRS) that can help save lives and limbs in case of mishaps and malfunctions. Before such a service is launched, foundational issues will have to be discussed and decided on, such as: Is an SRS actually needed? What should the mission of an SRS be? What type of organization should take on the SRS mission? When should an SRS be stood up and how should it be funded? What legal and policy challenges would have to be overcome? Where should SRS capabilities be based?

During this session, these issues were illuminated by panelists with expertise in space policy, spaceflight safety and regulation, and space industry:

- Scott Pace, Director of the Space Policy Institute, Elliott School of International Affairs, George Washington University
- George Nield, President of Commercial Space Technologies, LLC
- Kursten O'Neill, Vice President, Dream Chaser Crew Program, Sierra Space

The panel was moderated by Jan Osburg of The RAND Corporation and Grant Cates of The Aerospace Corporation. Panelists and moderators spoke in a personal capacity and did not necessarily represent the views of their respective current or prior employers. Key insights from the session include:

- International obligations stemming from Outer Space Treaty Article V call for the rescue and return of astronauts to their country of origin. No distinction is made as to whether or not these are military, civil, or commercial astronauts. The treaty does not actually require nations to develop capabilities, nor to work together prior to a situation in which a rescue might be needed.
- Article VI of the Outer Space Treaty requires that nongovernment entities conducting activities in space require authorization and continuing supervision. Such continuing supervision could be used to ensure that operations in space are conducted as safely as practical. However, current U.S. law and policy do not identify who, if anyone, has this responsibility with respect to commercial human spaceflight operations in space. The FAA licenses launch and reentry. The FCC licenses spectrum used by spacecraft. NOAA licenses remote sensing of the Earth by satellites. No agency is chartered to regulate and oversee human spaceflight safety during the on-orbit phases of flight...(continued on the next page)

- Indeed, the FAA is under a congressionally mandated moratorium that precludes it from making regulations meant to enhance the safety of spaceflight participants. This moratorium is set to expire in 2023, but it could be extended.
- Given limited resources, what is the best approach for enhancing spaceflight safety? A first step is to make emergencies less likely to occur. This can be achieved to some degree by having reliable spacecraft, built-in redundancies, and some inherent ability to effect self-rescue. However, at some point the resources required to make spacecraft extremely reliable and robust to outside threats such as orbital debris strikes become excessive.
- Examples for cases in which externally-provided rescue might become a more cost-effective mitigation include a spacecraft in LEO that has been severely damaged by orbital debris or whose main propulsion system has become inoperable. A more stressing scenario could involve a disabled Orion spacecraft in lunar orbit. The design of an SRS should be based on a set of accepted, relevant reference missions.
- Rescue missions do not necessarily have to involve returning a crew to Earth on board a rescue spacecraft. In some scenarios, lives also could be saved, for example, by rapidly delivering food, oxygen, medicine, a spare part, or a special tool to a spacecraft in distress.

To continue this conversation, please contact the moderators at josburg@rand.org and grant.r.cates@aero.org.