The Space Rescue Professional

Operationalizing Guardians for the Future

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The escalating competition in space exploration demands a dedicated space rescue capability. This article argues for the establishment of a space rescue professional (SRP) career field within the Department of Defense and the US Space Force. By harnessing existing US Air Force combat rescue expertise and partnering with the National Aeronautics and Space Administration, the Space Force can rapidly develop a robust SRP program with the warrant officer corps as its backbone. This article addresses a critical gap in national space policy to outline a cost-effective dual-service training pipeline and SRP operational roles. Such an investment safeguards astronauts, bolsters US leadership in space by operationalizing Guardians, and paves the way for a future where space exploration prioritizes human safety.

The shifting tides of technological evolution in space provide immense opportunities for governments to expand instruments of national power and capability. They also reveal their vulnerabilities in their lack of organic technical experts to enable such technologies. Amidst the rise of generative artificial intelligence (AI), the National Aeronautics and Space Administration's (NASA) ambitious human spaceflight exploration, and the emergence of the US Space Force, robust space safety assurance is paramount, demanding strategic talent management across the government. The competition for highly qualified Guardians could decide the United States' ability to champion emergent capabilities in the space domain portfolio.

Space rescue is a critical emerging mission and a pivotal integrated deterrence mechanism that demonstrates opportunities to operationalize space professionals. The March 2025 rescue of US astronauts Suni Williams and Butch Wilmore—who spent 286 days in space due to the lack of national rescue resources—serves as a stark reminder that space isolation can occur long before the Moon is reached.[1] To perform national space rescue

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1. Anna Young, "Rescued Astronauts Suni Williams, Butch Wilmore Reveal Failures on the Boeing Starliner Were Far Dire [*sic*] Than Originally Reported," *The New York Post*, 3 April 2025, https://nypost.com/.

missions in cislunar space by the late 2030s, the Department of Defense and Space Force must initiate the effort to organize, train, and equip space rescue professionals (SRP) without delay. The US Air Force and Space Force are well-positioned for this task, and they retain the operational authorities to mitigate the risk of space isolation through US Space Command (USSPACECOM). This is the call for action, the solicitation for talent, and an opportunity to shape unity of command for the most complex personnel recovery (PR) concepts.

The Space Rescue Agenda: Competing with China

China's lunar aspirations pose potential friction points for the NASA Artemis program as they share overlapping geographic interests. The Artemis schedule and China's projected lunar plans indicate both the United States and China will sustain a permanent presence in the Moon's south pole region on or around the mid-2030s.[2] Artemis contract delays affect the critical path of this plan; however, China is on a firm trajectory to succeed on the timeline.[3] This forward-leaning posture reflects China's broader strategy in its rivalry with the United States not merely to match US capabilities but also to shape the emerging global order on its own terms. As Beijing views competition with Washington through an ideological lens, space becomes more than a theater of exploration—it becomes a domain where values, norms, and influence are contested.[4]

Balancing risk and reward are a central consideration in the decision to mature a US space rescue program. The risk of isolation in space—where an individual becomes separated from their unit while participating in a mission or activity in space—should dictate the measure of crisis planning and response. While it may seem relatively early to consider the development of space search and rescue (SAR) programs, China is already setting the pace of space rescue interoperability.[5]

China hosted the first-ever international lunar search and rescue conference in 2022 and is already postured with both a dedicated rescue crew and a spacecraft capable of responding to on-orbit emergencies, a program reportedly initiated in the wake of the 2003 Columbia disaster.[6] This capability is not just symbolic; it signals a broader strategic intent. China has outlined an ambitious agenda to secure a commanding position in

2. *International Lunar Research Station (ILRS): Guide for Partnership* (China National Space Association [CNSA] and Roscosmos, June 2021), http://www.cnsa.gov.cn/.

3. Eric Berger, "China May Use an Existing Rocket to Speed Up Plans for a Human Moon Mission," *ArsTechnica*, 2 September 2021, https://arstechnica.com/.

4. Paul Charon, *Strategic Foresight in China: The Other Missing Dimension,* Foresight Series (ISS [European Union, Institute for Security Studies], March 2021), https://www.jstor.org/.

5. Andrew Jones, "China's Next Crewed Spacecraft Is Ready for Potential Space Station Rescue Mission," Space.com, 7 June 2022, https://www.space.com/.

6. Jones, "Crewed Spacecraft"; and Benjamin J. Johnis and Peter Garretson, "Strategic Implications of China Winning the Space Rescue Race," Cislunar Security Conference, Johns Hopkins University Applied Physics Laboratory, Laurel, MD, December 2023.

cislunar space by establishing the China-Russia International Lunar Research Station, aiming to reap what it views as the strategic value and immense potential of the future space-based economy.[7] This proactive stance demonstrates that China not only possesses the will but also the operational capacity to lead in space rescue operations.

Both China and the United States bear significant risks of space isolation in their future endeavors, yet there are strategic consequences of a Chinese taikonaut or even a Russian cosmonaut successfully rescuing a distressed astronaut in space. The lack of US policy and minimal capacity to achieve a space recovery reveals a leadership vulnerability China is postured to exploit. A successful Chinese-led space rescue, therefore, would not just be a technical achievement but a powerful demonstration of leadership aligned with the Chinese Communist Party's vision of a "community of common destiny for mankind."[8] Such a possibility should serve as a wake-up call for the United States.

As outlined in the *National Security Strategy*, American interests lie in preserving leadership in space, yet current US space policy remains nascent and neglects to address the challenge of space isolation head on.[9] Furthermore, failing to competently respond to a crisis in space, especially one that leads to the loss of national space explorers, would severely undermine public support and cast doubt on the viability of future space endeavors.

At first glance, the most economical approach might seem to be assuming the risk of inaction, effectively shifting the burden and cost of developing space rescue capabilities onto competitors. Yet this strategy carries serious consequences, as it could ultimately leave US astronauts dependent on China for rescue, conceding both capability and leadership in a critical domain. China's growing rescue capabilities could also enable the use of "gray space," or gray-zone tactics in space—an operational frontier that thrives below the threshold of armed conflict yet holds enormous geopolitical consequences—subtly pressuring the United States and its partners without breaching the threshold of armed conflict. As with its actions in the South China Sea, a seemingly humanitarian space rescue mission could be strategically leveraged to showcase China's dominance, reshape global norms, or extract political concessions. In both terrestrial and space domains, China can operate in a way that blurs the line between cooperation and coercion, advancing its interests while avoiding direct confrontation, all while testing the resolve of its competitors and redefining the status quo.[10]

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7. *International Lunar Research Station.*

8. Charon, *Strategic Foresight*; and Jen Rae Wang, "New Space Policy Directive Calls for Human Expansion Across Solar System," National Aeronautics and Space Administration, news release, 11 December 2017, https://www.nasa.gov/.

9. Joseph R. Biden Jr., *National Security Strategy* (The White House, 2022), https://bidenwhitehouse.archives.gov/.

10. Bonny Lin et al., *A New Framework for Understanding and Countering China's Gray Zone Tactics*, RBA591-1 (RAND Corporation, 30 March 2022), https://www.rand.org/.

Numerous researchers across government and private institutions have highlighted the risk of space isolation.[11] Yet federal collaboration to conduct in-space rescue is lacking, and executive ownership of the national system concept remains undeclared. While China has shown a clear determination to develop space rescue capabilities, the race for dominance in this critical domain is still wide open—and the stakes have never been higher. Fortunately, the US National Search and Rescue Committee (NSARC) is identifying requirements to integrate space rescue into the national framework.

The Need for a National Space Search and Rescue System

The NSARC is comprised of eight government entities to ensure seamless collaboration during a crisis: this includes the Departments of Homeland Security, Defense, State, Transportation, Commerce, and Interior as well as NASA and the Federal Communications Commission. In September 2024, the committee presented the NSARC Space SAR Working Group recommendations concerning the establishment, organization, and implementation of a space search and rescue system, framing the problem set by aligning national and international demand signals messaging for a collaborative system.[12]

The NSARC cites the White House *National Cislunar Science and Technology Strategy* as a foundational document that provides specific guidance on advancing technologies such as communications and positioning, navigation, and timing services to achieve astronaut SAR success.[13] In its findings, the working group identified 10 key focus areas that describe essential tasks to achieve a space SAR system by the 2030s (table 1). Yet while the NSARC recommendations define what the mission is, the *who* is yet to be determined.

The question of who owns the national responsibility for space rescue is not merely bureaucratic—it is also strategic and likely requires a decision at the presidential level. The NSARC is taking a leading role in shaping that future, with its Space SAR Working Group actively developing a position paper to guide a whole-of-government approach to space safety and astronaut recovery. This foundational work sets the stage for a national space rescue system. The National Space Council, which advises the president on space policy, is uniquely positioned to champion this initiative and elevate space rescue as a matter of national priority. Meanwhile, the Department of Defense is investing in analytical efforts to define its role in future space crises, with the Space Force and USSPACECOM serving as key operational stakeholders.

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11. B. J. Johnis, "Lunar Search and Rescue: The Next Step for Human Spaceflight Recovery" (master's thesis, Air Force Institute of Technology, 2023), https://scholar.afit.edu/.

12. Rick Button, "Space Search and Rescue [SAR]," paper presented at the 10th International Search and Rescue Conference, Kuala Lumpur, Malaysia, 9 September 2024.

13. Cislunar Technology Strategy Interagency Working Group, *National Cislunar Science and Technology Strategy* (National Science and Technology Council, November 2022), https://bidenwhitehouse.archives.gov/.

Table 1. Recommendations for a space search and rescue system[14]

#	Space SAR System Recommendations
1	The United States should study what existing or novel international body could provide the coordinating framework for space SAR, comparable to the International Civil Aviation Organization (ICAO) and International Maritime Organization (IMO), which provides the international framework for their respective aeronautical and maritime global SAR systems.
2	In alignment with the IMO's SAR Convention and the ICAO's Chicago Convention – Annex 12 (Search and Rescue), the United States should explore the gaps within the international legal framework for space activities and consider novel mechanisms to align global space SAR capabilities.
3	In alignment with the US National Space Council, determine if, when, and which federal agency should assume responsibility as federal space SAR coordinator.
4	If a federal space SAR coordinator is established, then revise the National Search and Rescue Plan to address the global and US space SAR system-related engagement, organization, and administration.
5	The United States should establish the space SAR regions, defined as space above the Earth's airspace. Promote this understanding with other international space authorities and SAR services.
6	The United States and international space authorities and SAR services should adopt the use of spacecraft flight segments in establishing policy, requirements, and guidance for the organization, coordination, and conduct of space SAR.
7	The United States should adopt and promote international SAR emergency phases (uncertainty, alert, and distress) for a spacecraft and the personnel onboard the spacecraft requiring SAR assistance.
8	NSARC should continue to support and promote the US position concerning the definition of outer space.
9	Space SAR must be considered a federal government function. Effective coordination and cooperation between aeronautical, maritime, and space SAR coordinators need to be established.
10	Global and US space SAR system coordination and operations should be funded by the participants, who shall not seek reimbursement from those who received those services.

The space rescue concept as a Space Force service task was formally presented to the chief of space operations for strategy, plans, programs, and requirements at the 2024 Space Force Futures Concept Summit.[15] Additionally, USSPACECOM is scheduled to host a lunar SAR exercise—Apollo Watchtower—in fall 2025. Meanwhile, defense researchers continue to sound the alarm on the growing personnel recovery gap in the space domain, shaping national discourse and urging senior leaders to act.

Presuming Space Force and USSPACECOM adopt the space rescue mission in support of the national space program, the authors argue that human infrastructure will remain a significant long-term challenge. While the satellites and associated services can be outsourced, space rescue professionals must be bred within the Defense Department to provide expertise across the executive branch.

14. Button, "Space SAR."

15. Benjamin Johnis and Tyler Bates, "Space Search & Rescue Personnel Recovery Functional Concept," presentation, US Space Force Futures Concept Summit, Colorado Springs, CO, June 2024.

The Space Rescue Professional: Human Infrastructure

Organizing a new community with human infrastructure and resources is an exhaustive process. The DOD personnel recovery system enjoys a rich history of expertise and rescue-specific hardware spanning back to the earliest conflicts in the nation. Space rescue is an element of PR in the space domain and should evolve from the community of terrestrial experts who mitigate the risk of isolation in their respective domains.

The joint force offers several PR-capable elements, but few are groomed as PR experts from cradle to grave like Guardian Angel Weapon System (GAWS) members. Since 2000, GAWS has played a vital role in ensuring the safety of human spaceflight operations. Unlike a traditional weapon system, GAWS is not composed of machines but highly skilled personnel. These include combat rescue officers (CROs), pararescuemen (PJs), and survival, evasion, resistance, and escape (SERE) specialists. Their mission transcends combat zones as they support the full spectrum of national PR missions.[16]

GAWS operates under a powerful motto: "So that others may live . . . To return with honor." This commitment persists not only in wartime but also in peacetime emergencies. The dedication of GAWS personnel is evident in their impressive record. They have not only directed over 12,000 lifesaving combat missions but also spearheaded the rescue of more than 5,000 civilians during natural disasters and humanitarian crises.[17]

The Guardian Angel talent pool provides adequate technical expertise for an Air Force-Space Force transitional period required to shape the space rescue professional career field. This transitional partnership presents benefits and challenges. The war in Afghanistan is over, and the deployment tasks have been reduced across the world. The 66th Rescue Squadron was inactivated on 1 June 2023, and the 58th was inactivated on 18 June 2025, integrating forces into units at Davis-Monthan Air Force Base, Arizona.[18] Despite the reduction in deployments, Guardian Angels strive to retain talent, compensating its career fields with reenlistment bonuses and incentive pay for special-duty qualifications. Still, retention shortfalls and the high cost of retraining new members can cripple the ranks of special warfare Airmen. To achieve buy-in from enlisted Guardian Angel members, the Air Force and Space Force must entertain creative strategies.

Reoptimize for Great Power Competition

At the Air and Space Forces Association's 2024 Warfare Symposium, then-Secretary of the Air Force Frank Kendall announced his plan to reintroduce warrant officers into the Air Force—a plan made in conjunction with the Department of the Air Force's aims

16. "Air Force Special Warfare," US Air Force [USAF, website], accessed 1 April 2025, https://www.af.mil/.
17. "Combat Rescue Officer 13DXA," USAF, accessed 31 March 2025, https://www.af.mil/.
18. 355th Wing Public Affairs, "66 RSQ Inactivates June 1," Nellis Air Force Base, 1 June 2023, https://www.nellis.af.mil/; and David Wichner, "Davis-Monthan to Lose A-10s but Gain Rescue Units in Air Force Plan," tucson.com, updated 6 August 2022, https://tucson.com/; and Devlin Bishop, "58th Rescue Squadron Inactivation," Davis-Monthan Air Force Base, 24 June 2025, https://www.dm.af.mil/.

to reoptimize for great power competition. Secretary Kendall stated that the department "needs operational units with all the capabilities they need to deter and compete with our pacing challenges and ready to enter a conflict on short or no notice," and that "in those units we need the right mix of skills necessary for high-end combat and to ensure technological superiority, particularly in information technology and cyber."[19]

Nearly 60 years after its sunset of the warrant officer corps due to budgetary constraints and its 1958 introduction of enlisted grades E-8 and E-9, the Air Force has revived the model with two new specialties: 17W (Warfighter Communications & IT Systems Operations) and 17Y (Cyber Effects & Warfare Operations). Unlike their Cold War-era predecessors, these new warrant officer roles are explicitly shaped by national security imperatives and talent management needs in an era of great power competition.[20]

Chief of Space Operations General B. Chance Saltzman echoed this strategic shift, aligning with Secretary Kendall's call to stand up a Space Futures Command, one that prepares "joint-minded warfighters who understand the battlefield context of the space domain and are fully equipped to act within it."[21]

In this context, space rescue emerges as a quintessential gray-zone mission, which special operations-peculiar human capital is required to execute. Highly trained, technically proficient rescue professionals can outcompete near-peer adversaries not through mass but through agility, precision, and readiness. As China continues to refine its gray-zone playbook with integrated military, paramilitary, and information operations, the United States must respond with similarly agile, adaptive capabilities.

Developing a dedicated cadre of SRPs as a warrant officer field offers precisely this counterweight: an altruistic, values-driven capability that projects resolve, preserves life, and signals domain mastery. In an era where China may seek to exploit space emergencies for strategic advantage, rescue emerges as a soft power delivering high-visibility operations for narrative shaping. The SRP career field equips the United States with the organic capability to contest that space, both literally and figuratively. Through this lens, space rescue is a strategic instrument of integrated deterrence and a subtle yet potent signal of American leadership in the domain.

The Space Rescue Professional Warrant Officer

The space rescue professional will carry the burden of responsibilities across tactical, operational, and strategic levels of impact. To recruit and retain a professional operating at this level, the Space Force should offer a warrant officer Air Force Specialty Code to all 7-level enlisted craftsman SERE and pararescueman applicants. This core of enlisted

19. Secretary of the Air Force Public Affairs (SAF/PA), "Air Force to Begin Accepting Warrant Officer Applications," USAF, 25 April 2024, https://www.af.mil/.

20. SAF/PA, "Air Force."

21. SAF/PA, "Saltzman Outlines Plan to Reoptimize Space Force for Great Power Competition," USAF, 13 February 2024, https://www.spaceforce.mil/.

professionals is critical to drafting the foundational policy and guidance for a budding career field. The inception of a warrant officer rank compensates the candidates financially and provides a narrowly focused path to cultivate a highly specialized duty that will define the future of crisis response in space.

Unlike commissioned officers, warrant officers maintain their technical specialty, unconcerned with traditional paths outside their field, seeking trajectories to command. The priority is to excel at the specialty, not leading people or assuming additional duties. This is precisely the focus and scope of talent required to succeed in creating the first-ever space SAR system as described by the NSARC.

The transition from enlisted Airman to warrant officer Guardian is not arbitrary. For clarity, no such pathway exists currently. Yet as the Space Force functionally resides under the Department of the Air Force, it therefore reaps the benefits of department support. Since the Air Force designed a pathway from enlisted to warrant officer, the Space Force enjoys the ease of transition by extension. Currently, Airmen can be directly assigned to the Space Force, supporting the chief of space operations in areas where the service lacks expertise as the new service is still growing. Therefore, in the early stages of SRP development, there is less concern over what service tapes are sewn on the uniform as long as the shoulder patches align with the Space Force mission. Given a cadre of space rescue professional warrant officers grown from PJs and SERE specialists, commanded by SRP officers filled by CROs, rescue pilots, and special warfare officers, the Space Force is prepared to operationalize Guardians in space.

Space Rescue Professional Development

Academic and government researchers are fully engaged in space rescue matters. Crucial turning points—from the setting of national direction and priorities in the *Cislunar Science and Technology Strategy* to China's hosting of the 2022 International Lunar SAR Conference to the upcoming Apollo Watchtower game series—make it abundantly clear: the skills and knowledge required for SRPs are in high demand. The government must grow this capability organically to answer the nation's call.

The transition from counter-terror to great power competition drives the need to outperform China and Russia in new domains. Coalitions, treaties, and international consortiums are vital elements of integrated deterrence strategies against competitors. The Guardian Angel Weapon System matured during the Global War on Terror, shaping personnel recovery support packages for counter-terror missions across Southeast Asia. Combat rescue officers have spent their entire existence operationally focused on countering terror by executing tactical maneuvers.

In sharp contrast, the SRP is asked to be proficient in tactical execution but keen on strategic effects, such that each mission carries the risk of an international incident. Just before the attack on 11 September 2001, the combat rescue officer career field was conceived by senior leaders in the PJ and SERE career fields. There was a growth phase that required a blended approach of insights and expertise from the enlisted fields they would represent.

Over the years, CROs morphed from the product of conceptualization into thought leaders that helped shape Air Force Special Warfare.

There are many parallels to draw between the CRO and SRP. While the former is asked to operate at the tactical level, their failures also can have strategic effects. This becomes even more significant for an SRP who cannot execute any mission without the world's attention. They must think tactically and strategically at every turn. They must understand the institutional challenges and legal constraints of the Defense Department, NASA, and allied and partner nations. Combat rescue officers gained inspiration and mentorship from PJs and SERE. The space rescue professional is an obvious first cousin to the GAWS family. The communities share overlapping training requirements, providing a financially advantageous pipeline for the new career field. The special warfare training program sets the right conditions for candidates, with less emphasis on combat and more focus on the true enemy of an astronaut: natural threats of the space domain. Figure 1 contextualizes a cost-effective solution to producing a nascent SRP capability by similarly sharing resources as demonstrated in the dual-service Officer Candidate School.

Building a robust space rescue capability does not require starting from scratch. As highlighted earlier, academia and government are actively defining the skillset needed for SRPs. Fortunately, existing PJ and select SERE specialists have already completed the baseline training and advanced skills portion of their training. This strong foundation allows a focus on additional training on space-specific areas such as space medicine and technical familiarity with astronaut equipment.

The First Air Force (Air Forces Space) Detachment Three (Det 3) coordinates DOD contingency support for US human space flight programs.[22] Det 3 possesses the expertise to manage a comprehensive training program for SRPs. This includes both advanced training and on-the-job experience for recruits. The proposed training pipeline demonstrates that leveraging Det 3 capabilities is significantly more cost-effective than building a new force within NASA and less risky than outsourcing the mission (fig. 1).

Developing a mature SRP community requires time and collaboration. Initially, Det 3's training program can be adapted to create a space rescue apprentice course that seamlessly integrates civilian, contractor, and military personnel. This combined approach allows the SRP community to mature while ensuring it can regularly meet mission requirements. The Department of Defense already offers approximately 91 percent of the necessary training required for an SRP. Furthermore, Det 3 maintains and provides all mission-critical equipment to perform terrestrial astronaut recovery, from parachutes to jet skis, eliminating the need for significant additional investment.

22. "Detachment 3," CONR-1AF (AFNORTH & AFSPACE), accessed 3 April 2025, https://www.1afa.acc.af.mil/.

Figure 1. Space rescue professional training pipeline

The proposed SRP model prioritizes a long-term investment that will ultimately reduce transaction costs for the entire US government. As the capability matures, the SRP will need to expand technical expertise into uncharted territories, but the core skills are earned in terrestrial rescue operations.

Employment of the Force

Terrestrial Rescue

The SRP is neither a pararescueman nor a SERE specialist, but they do share a similar mindset and a core set of skills. The unique talents of an in-space rescue operator are

unknown to the world, but the only way to mature the role is by constant exposure to the problem. SRP operators will gain the most experience through the terrestrial rescue of astronauts. Det 3 requires rescue professionals to support every astronaut recovery mission, but capability is limited. The Guardian Angel Weapon System has sourced the astronaut recovery bill since the Gemini program.

The SRP will provide much-needed relief to GAWS and allow a non-combat career field to focus narrowly on risk mitigation for the NASA commercial crew program. Under Det 3, space rescue professionals will coordinate, command, and control DOD forces during nominal and contingency rescue, recovery, and retrieval operations for human spaceflight programs. The current force laydown offers expertise and capability at both Patrick Space Force Base (SFB), Florida, and the Johnson Space Center in Houston, Texas. Det 3 mans the Support Operations Center at Patrick SFB, to synchronize coordination efforts with NASA and the Combined Space Operations Center at Vandenberg SFB, Colorado. The mission calls for asset staging and rescue team delivery after the capsule splashes down. The reentry often occurs on the eastern coastline of America, but it can vary based on the return vehicle or the supporting nation.

During the execution phase, SRPs would operate under the USSPACECOM commander potentially under a personnel recovery task force, designed to employ a joint team of rescue experts organized, trained, and equipped by the services to meet the geographic combatant command requirements. A personnel recovery task force inherently directs humans, hardware, and support personnel dedicated to the mission set. Unity of command is a critical aspect of a PR mission, but who commands the mission for in-space rescue? The White House makes it clear that NASA is the supported executive agency in human spaceflight exploration, but crisis response has always remained a shared responsibility between the State Department and the Defense Department. The PR task force construct, led by SRPs, allows for joint-interagency and international collaboration. As space law and executive policy evolve, the space rescue professional will rise to the occasion, offering solutions to the geographic combatant commander and the nation writ large.

In-Space Rescue

Assuming American space policy does not take any dramatic shifts, the US government will invest in a commercial space station in low Earth orbit, and NASA astronauts will have a permanent presence on the lunar surface. A commander owns the risk-to-force decisions in DOD missions. Given the great national implications of humans in space, Artemis risk decisions are delegated to NASA leadership. With minimal personnel in space, the risks are manageable yet high, nonetheless. SRP capabilities buy down the risk through blended experiences of DOD operations and space expertise. Early missions can be mitigated using autonomous spacecraft or early return vehicles.

There are some cases where astronauts may need immediate support in space, in orbit. Once an SRP meets craftsman-skill level requirements, they are well suited to enter astronaut training with a focus on crisis response, to rapidly treat patients suffering medical or

trauma-based injuries. Medical evacuations from space will eventually occur. Contemporary crewed space vehicles are not optimized for medical evacuation, nor do they offer operating space for medical professionals to treat patients en route from a station through reentry and back to definitive medical care. A crewed lifting body spacecraft offers the SRP room for a supine patient workstation, minimal g-forces on reentry, and a smooth autonomous landing at a runway with medical facilities.[23]

Since the retirement of the Space Shuttle, the Sierra Space Dream Chaser is the only lifting body in operation, albeit a crewed version does not exist yet.[24] SRPs and emergency crew vehicles can be stationed in orbit or placed on alert status from Earth.

In recent history, an SRP crew on alert may have saved astronaut's lives. In December 2022, a suspected micrometeoroid struck the Soyuz MS-22 crew capsule docked with the International Space Station (ISS) and sprang a radiator coolant leak. NASA and the Russian Space Agency solicited SpaceX to prepare for rescue options with its autonomous Crew Dragon.[25] In June 2024, NASA astronauts Wilmore and Williams launched aboard Boeing's Starliner for what was intended to be a routine crew flight test to the ISS. The Starliner experienced significant mechanical frustrations on its inaugural flight but eventually docked with the orbiting outpost. Because of ongoing thruster and valve issues, however, NASA and Boeing decided against flying Starliner back to Earth. Instead, the astronauts returned on a separate SpaceX Crew Dragon vehicle, which safely brought them home after spending nine months in space.[26]

The probability of an off-nominal mission or mechanical failure is difficult to assess, but the risk only increases as astronauts travel beyond Earth's orbit, venturing to the Moon and deeper space. This danger is further amplified by the emergence of new spacefaring nations attempting human spaceflight without prior operational experience. Although only three countries—Russia, the United States, and China—currently possess independent human launch capabilities, the global push toward space exploration has led more countries to contribute spacecraft, systems, and technology to space missions.[27] These components, often experimental or first-of-their-kind, are stitched together into missions where failure in a single system can have cascading and fatal consequences.

Historically, NASA's space program served as the backbone of crewed exploration, but today, human spaceflight is increasingly a multinational and commercial endeavor

23. Johnis, "Lunar Search."

24. "Revolutionizing Space: Dream Chaser®," Sierra Space [website], accessed 3 April 2025, https://www.sierraspace.com/.

25. Agence France-Presse, "Russia Confirms Rescue of Stranded Cosmonauts with a Replacement Mission," Science Alert, 12 January 2023, https://www.sciencealert.com/.

26. Eric Berger, "Starliner's Flight to the Space Station Was Far Wilder Than Most of Us Thought," *Ars Technica*, 1 April 2025, https://arstechnica.com/.

27. Wessel Wessels, "The Only Countries Capable Of Human Spaceflight – and the Rockets They Use," Headed for Space, accessed 17 April 2025, https://headedforspace.com/.

where hardware from multiple nations with young space programs must function in harsh environments. These realities set the conditions for SRP alert crews, standing by to respond to any spaceborne national crisis.

Lunar Surface Search and Rescue

The NASA Artemis campaign aims to place humans back on the Moon with the intent to launch a Moon-to-Mars initiative using the lessons learned from lunar surface missions. The *National Cislunar Science and Technology Strategy* and the Defense Advanced Research Projects Agency's (DARPA) 10-year lunar architecture study are prime indications that astronauts will travel beyond low Earth orbit indefinitely.[28] With US sights on the nearest body of mass, astronauts are at risk of isolation with no reasonable access to rescue capability.

NASA is empowered to assume this level of risk, but the loss of a single astronaut due to neglect could lead to irreversible policy shifts. The risk can be mitigated through tiers of support and preparation. The first objective is and always will be self-recovery, to avoid the potential for further loss of life. An SRP may be the best tool for the job, but space is limited on the Artemis Base Camp. As astronauts venture further into the lunar landscape, they will require a staging of autonomous vehicle partners, ready to deliver aid and resources. Space rescue mission operators must be proficient in AI integration for space operations. This includes utilizing AI decision-making for complex, time-sensitive rescues, and guiding machine learning-driven autonomous navigation systems for rapid response and hazard avoidance.[29]

Similar to the Guardian Angel Weapon System, SRPs are tailored advisers for the USSPACECOM commander. They should staff the theater Joint Personnel Recovery Center (JPRC) during all extravehicular activities, where astronauts are operating in their suits outside of a controlled atmosphere or habitat. Given the proper contracts, the JPRC staff will be trained and equipped to assume custody of surface vehicles supporting any crisis on the surface. As space medicine and crisis response experts, the SRP will have rehearsed various scenarios in exercises alongside NASA and international partners to prepare for the worst. SRPs are a force multiplier to support NASA, ensuring the national space mission does not end in tragedy due to a lack of manpower and expertise in emergencies. Eventually, lunar operations will grow in scale and emergency services will be necessary for the number of humans operating on the surface. There will be an inflection point, perhaps in the 2040s when NASA sustains a permanent presence on the Moon. To properly mitigate risk, SRPs should be forward-staged on the surface, prepared to conduct a tactical response for lunar contingencies.

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28. Defense Advanced Research Projects Agency, *10-Year Lunar Architecture (LunA-10) Capability Study*, presolicitation, SAM.gov, updated 5 September 2023, https://sam.gov/.

29. Jam Canda, "The Future of AI in Space Exploration and Research," *Medium*, 6 April 2024, https://medium.com/.

The proposed Lunar Gateway is a space station orbiting the Moon. Early Artemis missions detail a four-person crew, with two staged on the Gateway, and two descending onto the lunar surface for the remainder of the mission. The surface crew will utilize a lander that can perform elevators to and from the Gateway with the option to return to Earth on the same vehicle they arrived in.[30] The Gateway is another ideal staging base for an SRP. It is optimal to sustain emergency return vehicles that provide redundant capability in lunar orbit. If there is a failure of systems, a replacement may not arrive in time. SRPs paired with a lifting body crew return vehicle provide astronauts with the greatest chance of survival in an emergency.

The SRP Lifecycle

To better understand the unique rhythm and demands of this career field, imagine the journey of a single SRP operator from their arrival at Patrick SFB to the culmination of a career marked by deployments across the solar system. This hypothetical narrative captures the professional development and mission tempo of an SRP through cycles of training and space deployment, highlighting the deep institutional knowledge that shapes the individual behind this newly formed title. A fresh recruit in the pipeline completes a series of challenges alongside their PJ and SERE peers, culminating in a capstone opportunity at Patrick SFB, where they begin space rescue training.

Their cadre of instructors will have just recovered from space deployment. A space-hardened SRP with institutional and practical knowledge is the ideal instructor for the next generation of Guardian operators. The first duty station is at one of the key locations required to perform the terrestrial rescue mission: Patrick SFB; Pearl Harbor-Hickam AFB, Hawaii; or Joint Base Charleston, South Carolina. Here, they will learn and operate as a tactician, perfecting their craft of technical space rescue while earning upgrade training with commercial and government space organizations.

The next duty station in the career path is to manage the relationships with the customer base. Here, their tactical experiences prepare them to coordinate terrestrial recovery missions at the operational level. This mission is performed with commercial crew program participants dependent on their force structure, such as the SpaceX Hawthorne Mission Control Center, California.

Space rescue professionals selected for deployment are eligible to enter the NASA astronaut program, preparing for temporary duty on one of three stations: Low Earth Orbit Space Station, the Lunar Gateway, and the Artemis Base Camp on the Moon. SRPs can practice and research space medicine and validate the crisis response tactics, techniques, and procedures to ensure a well-functioning program. Upon completion of the Air Force-Space Force SRP transition and subsequent deployment of SRPs to space, the operators will achieve a sustainable deployment-dwell period that fosters continued growth of the career field and reduces

30. Tracy Gill, "NASA's Lunar Orbital Platform-Gateway," paper presented at the 45th Space Conference, Cape Canaveral, FL, 28 February 2018, https://commons.erau.edu/.

the exposure to radiation over the lifespan or career. Post-deployment the SRP is ready to man the Joint Personnel Recovery Center at Johnson Space Center, return to the schoolhouse as cadre, or lead a terrestrial space rescue unit. The deployment-dwell periods are based on radiation exposure and mission demand. This cyclical rotation between training, terrestrial rescue, space deployment, and leadership positions ensures a well-rounded, experienced force prepared to face any space rescue challenge.

Conclusions

The urgency for a dedicated space rescue capability is undeniable. China's lunar ambitions and the recent near misses on the International Space Station highlight the potential dangers astronauts face. Fortunately, the groundwork for space rescue is already underway. The 2024 US National Search and Rescue Committee recommendations establish a clear path for a US-led space search and rescue system. Academic meetings like the Cislunar Security Conference and ASCEND [Accelerating Space Commerce, Exploration, and New Discovery] Conference showcase the growing interest in space rescue solutions.

With a timeline established by the White House and NASA and momentum building in academic circles, the Space Force has a unique opportunity to leverage existing expertise from the Air Force Guardian Angel Weapon Systems to create a world-class warrant officer corps and space rescue professional program. This investment will not only safeguard American astronauts but also solidify US leadership in space. The future of space exploration hinges on the United States' ability to ensure the safe return of its bravest explorers. It must act swiftly and establish an SRP program to usher in a new era of space exploration with human safety at its core by operationalizing Guardians and ensuring the continued success of American space endeavors.