NSS Position Statement

The National Orbital Debris Implementation Plan

In July 2022, the U.S. Government issued its National Orbital Debris Implementation Plan (Debris Plan) to further address orbital debris challenges. The National Space Society (NSS) applauds the U.S. Government's leadership in orbital debris management and reiterates its support of the findings in the Space Policy Directive-3 and the associated 2020 Space Traffic Management Report by the National Academy of Public Administration.

The Debris Plan acknowledges the U.S.'s responsibility to promote a safe and sustainable space environment for future generations. The Debris Plan identifies 44 specific actions across three of the five orbital debris management pillars: mitigation, space situational awareness (SSA) (e.g. tracking and characterizing debris), and remediation. These actions inform the U.S. policy development process and promote interagency coordination.

Under the **mitigation** pillar, the Debris Plan addresses three critical items that need further emphasis.

1. Action 1.7 details reevaluating the deorbit guidelines of the U.S. Government Orbital Debris Mitigation Standard Practices (ODMSP). NSS supports updating the U.S. Post-Mission Disposal (PMD) regime. It urges the U.S. Government to shorten the 25-year PMD requirement. A better alternative would be to cut the disposal timeline to, at most, the spacecraft's operational life plus five years. It also supports the U.S. Government conducting studies on deorbit guidelines. These studies should aim to reassess the adequacy of current deorbiting and "graveyarding" measures.

2. Action 1.8 details the prioritization of safe in-space operations through shared rules. NSS views these types of rules as part of the Space Traffic Management (STM) pillar of orbital debris management. It urges the U.S. Government to develop STM guidelines and then mandatory shared rules for in-space operations covering deconfliction, safety, right-of-way, and collision avoidance. It is crucial that the U.S. Government creates unified and codified STM rules.

3. Action 1.11 details add-on devices for improved tracking, maneuvering, and in-space servicing. NSS also views these satellite standardization requirements as a part of the STM pillar of orbital debris management. It urges the U.S. Government to develop FCC-based satellite design standardization rules for demisability, maneuverability, and tracking. Specifically, such rules should include: (a) propulsion maneuverability requirements above 400km and "design for demise" requirements below 400km; (b) unique telemetry or tracking marker requirements for all satellites (e.g. broadcast beacons, radio-frequency transponder tags, corner reflectors, dipoles, on-board GPS receivers, visual fiducials, etc.), which is already standard in maritime and aviation; and

(c) pre-installed capture interfaces requirements for all satellites, such as docking plates or grapple fixtures.

Under the **remediation** pillar, the Debris Plan addresses three critical items that need further emphasis.

1. The Debris Plan includes recycling within the pillar of remediation. NSS, however, strongly believes that **On-Orbit Recycling** should be its own, separate pillar of orbital debris management. On-orbit recycling is the ideal form of PMD and Active Debris Removal (ADR). It is critical to the long-term sustainability of the space environment. The future of the space industry will be shaped by a culture of in-space servicing, assembly, and manufacturing that mirrors the automobile industry where about 95% of today's cars are recycled. An example of an existing capability is Astroscale, Nanoracks, CisLunar Industries, and Neumann Space working together to turn debris into metal rods and then into ion thrusters capable of electric propulsion.

2. Action 3.4.1 details studying the effects (e.g. long-term sustainability) of the remediation of acute debris events. This would include assessing the priority and difficulty of ADR associated with each debris object. NSS supports using such comprehensive trade studies for debris remediation to guide investments and research and development. It urges the U.S. Government to use these studies to create a debris index that characterizes risk to supplement the cost-benefit analysis in remediation efforts. The index of claimed and registered orbital debris would be ranked based on relevant factors, such as the mission risk, cost, complexity, and profitability; the debris mass and tumbling properties; and the benefits to the stability of the orbital environment. Large derelict satellites and rocket bodies should be prioritized in ADR and thus in the future debris index for remediation.

3. Action 3.7.1 details further research on international legal issues relating to the Outer Space Treaty (OST). NSS supports the U.S. Government clarifying its approach with respect to issues of ownership where possible and appropriate. A major legal issue arises from Article VIII of the OST, under which "a State Party to the Treaty [OST] on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object" indefinitely. This means that all orbital debris is owned by nation states and that salvage is illegal without permission from the relevant country. It is important to note that all ADR and on-orbit recycling involves "salvaging" orbital debris. The problem is exacerbated by the fact that most orbital debris is unclaimed and the owner, operator, and launching state cannot be determined. According to the Secure World Foundation, of the 500,000 pieces of orbital debris that are 1 cm or larger, we only know the country ownership for about 16,000 of them and less than 8,000 of these were actually registered with the United Nations. The doctrine of Due Regard should be applied here. A clearer legal framework for debris ownership, and how the law of finds or the law of salvage applies, will increase the efficiency of future remediation and on-orbit recycling.

NSS envisions an orbital environment founded upon long-term sustainability. Efforts to address the issue of orbital debris have been a focus of our policy and advocacy work. Orbital debris

jeopardizes the safety of spacecraft and crew, the functioning of space systems, and the viability of human activity in Earth's orbit. The space sector is critical infrastructure and satellites are crucial to everyday life. Orbital debris has already reached critical mass. Collisional cascading (i.e. the Kessler Syndrome) will eventually happen even if no more objects are launched into orbit. Creating a sustainable orbital environment requires a comprehensive approach that effectively uses SSA, STM (i.e. norms of responsible behavior), Mitigation, Remediation, and On-Orbit Recycling.

The U.S. Government should continue to increase interagency collaboration in its orbital debris management. It should act in a leadership role, coordinating and directing the commercial sector's efforts in SSA, mitigation, remediation, and recycling. Likewise, it should outsource research and development, operations, and other space-related activity to the commercial sector where possible. It is also important to foster innovation by providing funding and other resources to these companies and projects. NGOs, including NSS, can further help with technical research, policy development, cost-benefit analysis, and the creation of standards and best practices.

To learn more about NSS's orbital debris policy program and advocacy, please check out the NSS Orbital Debris Policy Program Summary or browse our Orbital Debris Landing Page.

NSS looks forward to working with both the White House Office of Science and Technology Policy and the Orbital Debris Interagency Working Group of the National Science and Technology Council on orbital debris management. We hope this next year brings us a step closer to a sustainable space environment.

This statement was written by NSS Orbital Debris Policy Program Manager Adam Brodkin and approved by the NSS Policy Committee.