MEMORANDUM FOR

SUBJECT: The Politics and Economics of Space

1. **Issue:** The purpose of this memorandum is to explain space sustainability, and national security interests in Low Earth Orbit (LEO).

2. **Strategic Analysis:**
   - **Commercial and Governance:** There has been a shift in focus from exploiting Geostationary Earth Orbit (GEO) towards LEO, which now holds over 85% of active satellites. However, unlike GEO there is no governing authority for LEO, making it first-come first-served, leading to a rapid increase in the number of satellites in LEO creating sustainability issues.
   - **Space Traffic Management (STM):** The rapid increase of commercial launch providers & payloads paired with decades of minimal attention to debris generation has created an increasingly cluttered space environment. There are various national level agencies attempting to regulate the creation of debris and the launch of satellite constellations that generate debris but there are few consequences for ignoring this effort. This has, and will continue to lead to, disorder making it increasingly difficult to launch and sustain stable orbits.
   - **Weapons in Space:** Space has always been militarized, but it is not currently weaponized. The weaponization of space means that there is war-fighting equipment that has offensive potential. While the United Nations (UN) 1967 Outer Space Treaty bans WMD in space, it does not broadly ban space weapons. Kinetic space to space weapons pose a serious risk to the space environment. When weapons are used on other satellites to disrupt or destroy them, debris is generated. Objects in LEO travel at roughly 8 km/s, so even the smallest fleck of paint has enormous destructive potential. This poses a threat to the use of space for important military and civil purposes.
   - **Active Debris Removal (ADR):** The current status quo policy for ADR is far too decentralized and does not place responsibility on any one state, individual, or organization. As a result, states have no incentive to organize removal of their debris because other states might simply increase theirs – making freedom of maneuver, effective climate policy, and costly, measurably removal of debris untenable. No form of debris removal (active or passive) has been implemented despite the substantial threat it poses.

3. **Relevant National Interests:**
   - **Commercial and Governance:** The congestion of commercial satellites and associated debris is increasing the chance and frequency of satellite collision both on launch and in orbit, creating mass debris. This congestion of commercial satellites and debris will make it increasingly difficult to establish launch windows for states to launch new satellites or rockets to LEO and beyond. This debris can harm current infrastructure like satellite internet, radio or
communication, which impacts American day to day life. Additionally, the functioning satellites that are harmed will have negative economic impacts.

**Space Traffic Management (STM):** Maintaining access to space is a global necessity. For the U.S. to conduct its exploratory, intelligence, and other orbital operations, a policy for tracking and regulating space traffic needs to be at the forefront of policymakers’ minds. Moreover, the everyday functions of American public life such as GPS, personal communication devices, and the creation/use of other spinoff technologies could be threatened by poor STM. As the number of launch-capable actors increases, the downsides of a lack of adequate STM are becoming more apparent. The U.S. has the opportunity to be the leader for global standards for STM adopting policies similar to the Air Traffic Control efforts made in the early 20th century.

**Weapons in Space:** Space-to-space weapons pose a risk to U.S. national security interests. These weapons may be used to hinder important military and civil capabilities. The difficulty of differentiating between offensive and defensive capabilities creates a security dilemma that is driving a space arms race, which is in no one’s security interest, therefore space weaponization should be strictly regulated to mitigate the climate of suspicion. In addition, space-based capabilities provide assured missile warning, underpinning Mutually Assured Destruction (MAD). The threat of attacks on missile warning and nuclear command and control satellites erodes the principles of nuclear deterrence.

**Active Debris Removal (ADR):** The objects and debris accumulating in LEO poses a grave risk to active satellites and ongoing space missions. To mitigate risk, states must launch “through a screen door” to minimize the number of debris encountered; as detection gets better, more and more debris becomes visible to us. There are large amounts of debris over 10cm, but drastically more which are even smaller. Even small pieces of debris can cause significant, potentially fatal damage to spacecraft. Global debris is a long-term threat for Earth’s wellbeing.

4. **Strategic Options:**

**Commercial and Governance:** The U.S. should reinforce the recent FCC precedent set with the fine (150K) imposed on Dish for failure to remove dead satellites. In addition, the U.S. could increase FCC fines for repeat offenders. The nation could work alongside the ITU to manage orbital space in LEO, looking to ITO’s allocation of frequencies and positions for GEO satellites for precedent and guidance.

**Space Traffic Management (STM):** There are currently several plans to minimize the amount of waste in future space operations, however large constellations of satellites are arguably just as much of a concern as space debris as they crowd useful orbits. These Mega-constellations should be carefully managed through international cooperation. In addition, the U.S. should include in future legislation the necessary funding for the Office of Space Commerce to track and monitor all non-military orbital objects. The U.S. also needs to prioritize STM innovation contracts.

**Weapons in Space:** The U.S. should propose in the UN Security Council or the UN General Assembly a treaty aimed at limiting the use of space weapons. The objective is to create a new international governing body that has the task of monitoring space weaponization. The U.S. could also encourage an amendment to the 1967 United Nations Outer Space Treaty to address the threats that space to space weapons to LEO sustainability. This amendment should include a ban on space to space weapons that generate debris when used or tested.

**Active Debris Removal (ADR):** Actions must be taken to mitigate debris. Incentivizing debris removal can drive innovation in this area. The U.S. can provide certifications for private companies that manage space sustainability such as rewards with different levels of incentives,
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such as tax breaks, decreased licensing fees, preferential launch access, etc. The U.S. could also foster government-private sector dialogue as it relates to the risks of continuing to amass debris in the atmosphere. A possible option is moving towards the “SmartWay” certification style of management. With SmartWay, some companies use this as a guide for business operations due to the increasing importance of sustainability in today’s marketplace. Space can operate in the same fashion, with a new, altered form of this program assisting companies with a stake in space in being environmentally sustainable.

5. **Recommendation:**

**Commercial and Governance:** We recommend that the U.S. increase the use of FCC fines along with working alongside the UN to promote international management in LEO.

**Space Traffic Management (STM):** In the short term, the U.S. has the financial capabilities to offer contracts and encourage commercial competition within the commercial space sectors as well as the operational capabilities to offer incentives for non-launch capable nations. In the long term, the United States needs to better align the federal responsibilities within one department or organization to better track and regulate the space traffic of debris, manned vehicles, and satellites.

**Weapons in Space:** It is within the U.S. best interest to propose a multilateral agreement to the non-use of debris-generating space to space weaponry.

**Active Debris Removal (ADR):** We recommend that the U.S. government provide financial incentives for large commercial companies to assist in the debris removal from LEO. This action, coupled with a revitalized private-public partnership, could provide a “ripple effect” to our allies in following the same action.

6. **Implementation:**

Space Traffic Management should incorporate funding and legislation to prioritize the regulation of space traffic. Contracts and incentives will be most effective in accomplishing this goal. The U.S. will create self-regulation for objects placed in LEO and pursue international accountability and management through the UN and the ITU. In addition, the U.S. should develop and bolster a non-binding, voluntary agreement on the non-use of space-to-space weapons that generate space debris. Finally, using incentives and green certifications, the generation of space debris can be reduced ensuring the long-term stability of the space environment.

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