SDA TAP Lab

The SDA TAP Lab ensures space superiority missions succeed by rapidly onboarding apps to close gaps. We decompose kill chains, prioritize needs with operators, map needs to technologies, and onboard technology to existing platforms -- getting solutions into operations quickly. Additionally, the SDA TAP. The SDA TAP Lab prioritizes solutions related to:

- Direct Ascent Anti-Satellite threats to GEO assets
- Co-orbital Anti-Satellite threats to GEO assets
- Direct Ascent Anti-Satellite threats to LEO assets
- Co-orbital Anti-Satellite threats to LEO assets
- Defensive Cyber Operations

Project Apollo - Problem Statements

China and Russia have tested direct ascent anti-satellite (DA ASAT) weapons against satellites on orbit, posing a military threat and creating safety hazards from debris fields. In order for the USSF to protect satellites in geosynchronous orbit from an ASAT attack, threats must be detected, and decisions made quickly. Poor or slow decisions could mean the loss of strategic space capabilities – with severe impacts to civil, commercial, and military operations on Earth. Many of these decisions could be data-driven and are ripe for modernization. Please consider participating in Project Apollo to build and demonstrate the following capabilities:

- **Space Launch Custody**: Using unclassified novel data, fusion, and analytic techniques (seismic, ionospheric, infrasonic, GPS telemetry, RF, neutrino, other), detect space launches within seconds. Upon detection of a launch, predict the ascent trajectory, intermediate and final orbits. Provide these predictions to an SDA sensor as a "cue" to reacquire and track the launch vehicle within seconds-to-minutes. Investment in this technology is warranted as no launch detection or early "cueing" capability exists for the commercial SDA enterprise. Such a capability would enable rapid target acquisition, ID, and threat assessment of launches.

- **Object Identification (ID)**: From a set of features (orbital data, photometry, radar cross section, RF emissions, other), classify and ID space objects within seconds. Evaluate potentially mis-identified objects which may be adversary intelligence payloads or weapons. Nominate these for further investigation. Attempts to evade detection, tracking, and ID complicate defense from an attack. Examples may include covert operations or payloads, active satellites appearing dead, inactive, as debris, or otherwise plausibly deniable operations. Investment in this technology is warranted as camouflage, concealment, and deception are fundamental to warfare. Such a capability would aid hostility assessments, response options, and prevent operational surprise.

- **Decision Aids**: Given knowledge of the environment, status of assets (space, ground, links), and an evolving understanding of a threat, provide semi-automated, real-time, data-centric decision aids for an Operation C2 center. Decision aids should be simple and intuitive with little to no training needed. Decisions aids may consider many factors such as: Objectives within an "OPLAN", legal authorities, hostile act and intent criteria, engagement conditions, targeting criteria, collateral damage estimation, reporting requirements, coordination or liaison protocol with external organizations. This problem in particular is well suited for generative AI.

Additional Context

The U.S. desires a peaceful, secure, stable, and accessible space domain. Strength and security in space enables freedom of action in other warfighting domains while contributing to international security and stability[i]. However, space is being increasingly militarized. Some nations have developed, tested, and deployed counterspace weapons. China and Russia are developing new space systems to improve their military effectiveness and reduce reliance on U.S. space systems[ii]. Considering these challenges, the United States Space Force (USSF) is charged with employing military spacepower through the full spectrum of conflict and is tasked with three cornerstone responsibilities[iii]:

- Preserve freedom of action in the space domain.
- Enable joint lethality and effectiveness.
- Provide independent options to national leadership.

To achieve these cornerstone responsibilities, General Saltzman, Chief, Space Operation (CSO), outlined a Theory of Success he calls "Competitive Endurance" with the following tenets[iv]:

- Avoid Operational Surprise.
- Deny the first mover advantage.
- Responsible Counterspace Campaigning.

These are complex endeavors which call on many space disciplines. However, SDA stands above all other disciplines in priority and is a prerequisite for space superiority. On 8 March 2022, General Dickenson, Commander, USSPACECOM stated "Space Domain Awareness is the most important part of both our deterrence, and our protect and defend mission sets. And it's my #1 mission priority for USSPACECOM". Then, on 16 May 2023, Lt Gen Guetlein, Commander, Space Systems Command (SSC) directed the stand up of the SDA Tools Applications and Processing (TAP) Lab in Colorado Springs, Colorado.

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[i] https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf
[ii] https://www.dia.mil/Portals/110/Documents/News/Military_Power_Publications/Challenges_Security_Space_2022.pdfa
[iii] https://www.spaceforce.mil/Portals/1/Space%20Capstone%20Publication_10%20Aug%202020.pdf
[iv] https://www.spaceforce.mil/News/Article/3322198/saltzman-outlines-theory-of-success-guiding-space-force-in-fulfilling-its-essen/