

Small Sat Virginia Initiative Proposal for JCOTS Nanosatellite Technology Subcommittee June 17, 2015

Background

This proposal is submitted by the Virginia Space Grant Consortium (VSGC) in response to the general charge of the JCOTS Nanosatellite Technology Subcommittee:

*To study the establishment of a **Consortium of Space Science Education** that would consist of universities, companies and other organizations in the field. The Consortium would advance research and development related to nanosatellite and cube satellites looking for possible federal partnerships, identifying any impediments to the creation of a consortium, and looking at other incentives that might foster the creation and sustainability of a consortium.*

At the November 2014 Subcommittee meeting, VSGC proposed that it lead a Small Sat initiative for the state in collaboration with VSGC members and other university, industry and federal partners. VSGC was encouraged to bring a proposal for consideration by the Subcommittee at its June 2015 meeting. This proposed approach builds upon and expands the work of the VSGC Small Sat Working Group initiated in 2011. It also uses the term, Small Sat instead of nanosatellite, to encompass a broader range of small satellite classes.

Small Sat Virginia Initiative

This proposal requests funding from the Commonwealth of Virginia to seed and provide a core level of funding for sustainability for a Small Sat Virginia Initiative. The Initiative would seek to leverage funding from other sources to build and grow the program.

Goal: Maximize Virginia engagement in Small Sat initiatives for economic development, technology development and demonstration, scientific advancement, workforce development, STEM education, and enhanced utilization of state aerospace resources and capabilities.

University Engagement: Workforce development is a key product for Small Sat Virginia. University Small Sat programs provide students with invaluable experience in real space missions providing a needed workforce pipeline to aerospace companies.

Small Sat projects contribute to research infrastructure at Virginia institutions of higher education.



Objectives:

- Foster the development of university Small Sat initiatives at individual institutions and across institutions.
- Support instrument development and science objectives best achieved with Small Sat payloads.
- Engage university, industry and NASA partners.
- In partnership with the Mid-Atlantic Regional Spaceport and NASA Wallops, seek opportunities for university as well as industry-led Small Sat launch opportunities/capabilities.
- Pursue opportunities for university-led Small Sat launches with NASA, NSF, DOD and other organizations as appropriate.
- Provide mentoring, professional development and cross training for faculty and students at Virginia universities, colleges and community colleges who wish to undertake Small Sat programs.
- Foster interest in flight projects at precollege institutions to contribute to STEM workforce pipeline.

The Initiative creates opportunities for synergy within Virginia's Aerospace Sector (annual economic output of \$12.1B) and an economic engine for growth for Virginia Small Sat capabilities:

- Langley can provide design, development, and environmental test and qualification expertise for cubesat payloads and cubesat and Small Sat flight systems as well as participation in other NASA Launch Opportunities.
- NASA Wallops can provide engineering and mission planning support services as well as participation in other NASA Launch opportunities.
- The Mid-Atlantic Regional Spaceport can potentially offer launch services.
- Ground Tracking Stations at Virginia Tech and Old Dominion University and potentially at Hampton University (in development).
- Space@VT 's end-to-end expertise and facilities to design, build, test, and fly cubesats, other Small Satellites, and space payloads.
- UVA offers research and education in space science and technology, including undergraduate flight projects.
- ODU expertise in both mechanical and electrical engineering aspects of small satellite systems, as well as systems integration. Specific strength areas include orbital mechanics (navigation, formation flying, orbital rendezvous), thermal physics and



hypersonic flow for entry/descent, communications systems and electronics, digital controls, and solar power systems.

- Virginia is fortunate to have companies such as Orbital ATK and IntelSat General with Small Sat capabilities including launch, payload and mission support services, as well as STC, which publishes an international, peer reviewed, Small Sat Journal. Other companies will be encouraged to participate.

Organizational Structure

- Led by Virginia Space Grant Consortium – VSGC will staff and manage the initiative.
- Advisory Committee -- VSGC Director and VSGC Program Manager, key folks from Universities with current active cubesat projects plus MARS, NASA Langley, NASA Wallops/GSFC, industry representatives and representatives from Technology, Transportation, Education and Commerce Secretariats.
- Participants:
 - Universities: UVA, Virginia Tech, Old Dominion University, William and Mary, Hampton University plus other Virginia Universities with Small Sat Interests
 - Other Organizations: Mid-Atlantic Regional Space Port (MARS), National Institute of Aerospace, NASA Langley Research Center and NASA Wallops Flight Facility, National Institute of Aerospace.
 - Companies: OrbitalATK (Small Sat services, potential launch opportunities with MARS TBD), IntelSat General (potential ride share, launch and early operations support), STC (Publish International Peer-Reviewed Small Sat journal), plus other industry participants TBD.
 - Collaborators: Could include non-Virginia-based organizations that can support Virginia's Small Sat interests such as Kentucky Space, Student Spaceflight Experiments Program (Jeff Goldstein). LaRC Small Sat Mid-Atlantic Community Working Group.

Commonwealth funding could be set aside to support Small Satellite activities over a wide range of opportunities:

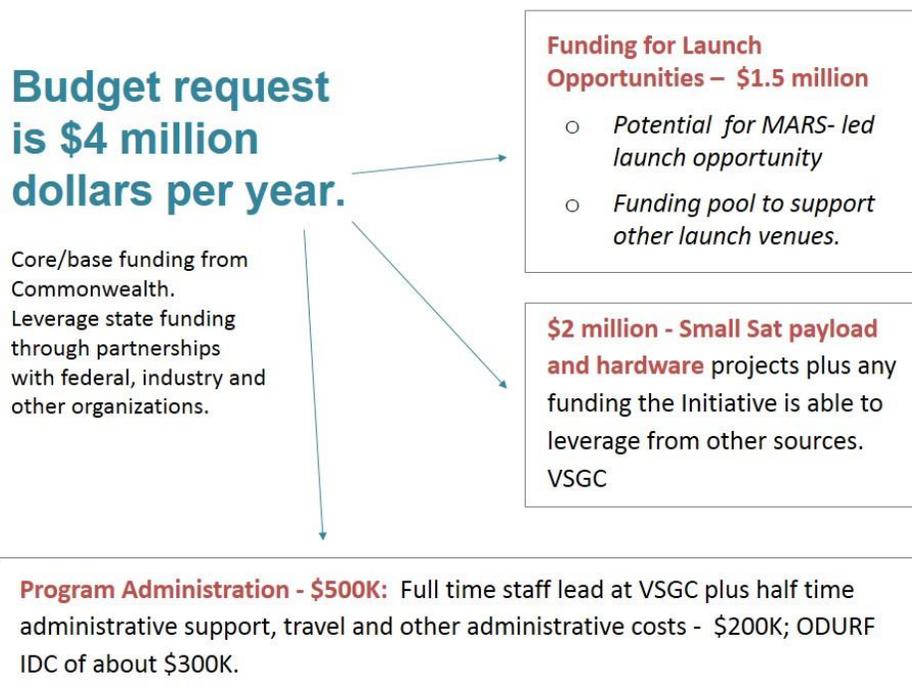
- Opportunities that can be created through the Mid Atlantic Regional Spaceport (MARS).
- NSF, NASA and DOD funded cubesat flight opportunities as well as commercial venues.
- Continued collaboration with NASA Langley and NASA Wallops for flight programs and exploring potential launch opportunities at NASA Wallops.
- Potential Virginia Small Sat Project –open to statewide collaboration.
- Foster pipelining activities with K-12 projects and with graduate and undergraduate students providing K-12 mentoring and outreach.



- Supporting and facilitating partnerships for industry Small Sats.
- International Space Station (ISS) opportunities.
- Synergistic opportunities like the current VSGC OGMS-SA collaboration with French partners.
- Workshops/professional development/cross training opportunities for faculty and students across institutions.
- Matching funding for federal awards that provide flight opportunities only or funding limited to development. This would support efforts already deemed worthy by federal agencies based on a competitive process. (Like VT DUSTIE)

Meetings: Quarterly with virtual meetings as needed between formal meetings. Opportunity announcements and funding opportunities will be widely distributed to interested parties.

Budget request:



A large portion of funding would be allocated through a streamlined RFP process with varying amounts available through different types and levels of awards. A portion of the funds would be set aside for emerging opportunities and be allocated on a case by case basis. Some funding should be discretionary for smaller requests, such as precollege initiatives. VSGC has a state budget line item under the State Council of Higher Education for Virginia.

