



# Space Technology Mission Directorate Science Mission Directorate

## Small Spacecraft Systems Virtual Institute (S<sup>3</sup>VI)

Bruce Yost  
Director  
March 9, 2017

# NASA is Enabling the Community's use of SmallSats to Help Answer Humanity's Big Questions

How did the universe begin?  
How is it changing?  
What is out there?



## NASA Technology:

- SSTP technology investments
- Formation Flight, Propulsion
- Communications, ACS systems

## NASA Exploration:

- Access to Space, SKGs
- CubeSat Launch Initiative
- SLS/Orion/Commercial

## NASA Science:

- SmallSats in all solicitations
- Leveraging STMD technologies
- Augmenting Larger Missions



# S<sup>3</sup>VI Charter



- NASA desires to advance clear communications, coordination, and consistent guidance regarding small spacecraft activities across the agency. To that end, S<sup>3</sup>VI shall:
  - Enhance internal integration
  - Act as single point of contact for information dissemination
  - Serve as repository for streamlined development approaches and processes
  - Provide US smallsat research community with access to mission enabling information
    - Within NASA
    - Other government agencies (OGAs)
    - Academia
    - Industry



# Year 1 Tasks



- Develop and maintain the NASA Small Spacecraft Web Portal
- Support the NASA Small Spacecraft Community of Practice (CoP)
- Support the NASA Small Spacecraft Coordination Group (STMD + SMD).
  - HEO coordination in process
- Maintain and update the the STMD Small Spacecraft Technology State of the Art (SoA) report
  - Linked into Web Portal

# Web Portal

<https://www.nasa.gov/smallsat-institute>



Topics | Missions | Galleries | NASA TV | Follow NASA | Downloads | About | NASA Audiences

Search



## S3VI

STMD

About STMD

STMD Programs

STMD Solicitations

NAC TI&E Committee

STMD Resources

Science Mission Directorate (SMD)

Small Spacecraft Systems Virtual Institute

Collaborative Tools

Upcoming Conferences

Related Topics

All Topics A-Z



### Recent SmallSat News

Japan's ancient art of paper folding has inspired the design of a potentially trailblazing "smart" radiator that a NASA technologist is now developing to remove or retain heat on small satellites.

Vivek Dwivedi, a technologist at NASA's Goddard Space Flight Center in Greenbelt, Maryland, has teamed with a couple of researchers at Brigham Young University in Utah to advance an unconventional radiator that would fold and unfold, much like the V-groove paper structures created with origami, the art of transforming a flat piece of paper into a finished sculpture.

NASA's Center Innovation Fund, or CIF, which supports potentially groundbreaking, high-risk technologies, is funding the effort.



### Small Spacecraft State of the Art



### Small Satellite Missions



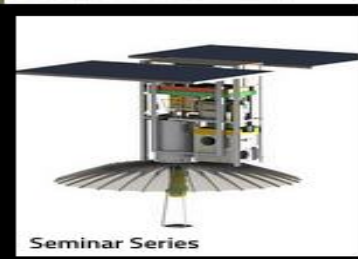
### Small Spacecraft Virtual Institute (About Us)

The Small Spacecraft Systems Virtual Institute (S3VI), hosted at NASA's Ames Research Center in Moffett Field, California, will leverage the growing small spacecraft community, promote innovation, identify emerging technology opportunities, and provide an efficient channel for communication about small spacecraft systems with industry.



### Small Spacecraft Body of Knowledge

The S3VI, as the common portal for NASA related small spacecraft activities, will host the Small Spacecraft Body of Knowledge (SSBK) as an online resource for information such as small spacecraft working group products, lessons learned library, systems test data repository, and reliability best practices.



### Seminar Series



### NASA Smallsat Opportunities

### LAUNCHPORTAL

SMALLSAT LAUNCH OPPORTUNITY TOOL

### Upcoming RideShare Opportunities



### Working Groups



### External SmallSat Community Links



# Key S<sup>3</sup>VI Web Portal Features



- Small Spacecraft Body of Knowledge (SSBoK)
  - SoA (already exists); online web access, self submittal feature
  - Lessons Learned dbs (to be developed/acquired)
  - CoP db (after transition from OSMA)
  - Other dbs (i.e., component catalogues, test libraries, etc.)
- NASA small spacecraft mission and tech funding opportunities
- Launch opportunities (including CSLI, DoD\*, commercial)
- Working Groups repositories, collaboration tool kits, proceedings
- Smallsat Seminar Series
- External links of interest to community, including upcoming smallsat workshops, conferences, events, etc.
- Virtual Collaboration Tools

*\*Some DoD launch information not for wide dissemination.*



# Working Groups Support



- Small Spacecraft Reliability WG (*up and running*)
  - Co-chaired by GSFC and JPL; NASA + OGAs membership
  - Create pathway for science and exploration quality smallsats
  - First open meeting with industry March 14-15 in Pasadena
    - S<sup>3</sup>VI proposes to collect, organize, and ingest proceedings and support future activities
- Smallsat Access to Space WG (*in formulation*)
  - Initial members: GSFC (lead), ARC, MSFC, KSC, and JPL
  - Support NASA-wide rideshare capabilities and policies development
- *Examples of other potential WGs (TBD start dates)*
  - *Smallsat propulsion*
  - *Deep space communications for smallsats*
  - *Smallsat power*
  - *Smallsat testing philosophy (may be part of Reliability WG?)*
  - *Frequency licensing for smallsats*
  - *Orbital debris*



# Top Challenges



- Ability to extract key knowledge from Centers, other sources
  - Proprietary/competitive issues
  - Rapidly changing domain
- Data management/distribution policies
  - ITAR
  - Proprietary data
  - Sensitive But Unclassified (SBU) data
  - Competition sensitive information
  - *NO CLASSIFIED MATERIALS/DATA*
    - » Developing data management plan to address various concerns; includes a tiered access plan



Forrester Research: Once a business deploys four to five collaboration tools, there is a significant improvement in benefits from the technologies



Gartner: “Hyperconnectedness will lead to a push for more work to occur in formal and informal relationships across enterprise boundaries...and that has implications for how people work and how IT augments or supports that work”