

Small Satellite Reliability: A Public Private Initiative Technical Interchange Meeting-3

Context

At present, CubeSat components and buses are generally not appropriate for missions where significant or indeterminate risk of failure are unacceptable. This has precluded their use where their attributes could otherwise enable or enhance mission objectives or provide other meaningful benefits—e.g., lower cost, increased coverage (spatial, temporal, spectral), agility, resiliency, etc. Historically, this has not been an issue since it was understood and accepted that "high risk" and "CubeSat" were largely synonymous; expectations were set accordingly. However, in the future we anticipate CubeSats or SmallSats—small satellites that deviate from CubeSat form factors but incorporate CubeSat components and subsystems—will be used for Earth-observing missions requiring 1-3 years of reliable operation, and even longer for Planetary, Heliophysics, and Astrophysics missions. This growing potential utility is driving an interagency effort to improve and quantify CubeSat, and more generally, small satellite mission confidence.

The Small Satellite Reliability Initiative has been targeting this challenge. The collaborative team comprised of persons from the public and private sectors has made significant progress towards defining and documenting the full range of best practices and design/development guidelines—from those aligned with "do no harm" missions, to those whose failure would result in loss or delay of key national objectives. The recommendations target a range of SmallSat communities—from system developers to mission architects and persons acquiring SmallSat-based systems and missions and is intently focused on maintaining to the extent practical, cost efficiencies associated with small satellite missions.

TIM-3 Objectives

TIM discussions will be highly-interactive and build on SSRI working group recommendations. The objective is to mature responses to the following questions-

- Lessons Learned- What should we learn from SmallSat missions that have flown and from missions in development to inform the success of future missions?
- Best Practices and Design/Development Guidelines- What design/development guidance and best practices are consistent with confidence levels ranging from "do no harm" missions to those whose failure would result in loss or delay of key national objectives?
- Model-based Approaches to Mission Confidence- What is the status of model-based approaches to mission confidence? What challenges must be addressed? What is the path forward?
- Knowledge Sharing- The pace of SmallSat mission capabilities advancement will be informed by how broadly the community shares knowledge. What is the status of knowledge sharing activities? What information and resources should the SmallSat community exchange to increase mission success and reduce overall development costs?

We look forward to your participation and to hearing your perspectives on how to address this important topic.

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Day 1: May 3, 2018		
8:30 AM	Check-in, continental breakfast	
9:00	Welcome, Logistics	Ryan Nugent/Cal Poly, Michael Johnson/ NASA GSFC
9:10	Why are we here? Ground rules. TIM objectives and success criteria. Results from previous TIMs	Michael Johnson/NASA GSFC, Pat Beauchamp, Harald Schone/JPL
Lessons Learned from SmallSat Missions		Pat Beauchamp, facilitator
9:30	Lessons Learned Overview- Michael Swartwout (St. Louis University)	
10:00	Dellingr- Larry Kepko (NASA Goddard Space Flight Center)	
10:20	MIT Lincoln Laboratory CubeSats- William Blackwell (MIT-LL)	
10:40	AeroCubes- Richard Welle (The Aerospace Corporation)	
11:00	Keystrel Eye- David Weeks (US Army Space and Missile Defense Command/Army Forces Strategic Command (Radiance Technologies/SETA))	
11:20	The Lunar Polar Hydrogen Mapper: LunaH-Map: Mission and Systems-Level Status—Craig Hardgrove (Arizona State Univ)	
11:40	ISARA- Dorothy Lewis (Jet Propulsion Laboratory)	
12 noon	Working Lunch	
Best Practices and Design/Development Guidelines		Catherine Venturini, Lee Jasper
12:30 P	Overview	
1:30	Small group discussions	Small teams
2:50	Break	
3:00	Small group report outs	Small team leads
3:30	Full group best practices and design/development discussion	
4:00	Full Group Day 1 Discussion, Actions, Day 2 Objectives	
5:00	Adjourn	
7:30	Full Group Dinner: <i>Mama's Meatballs</i>	

Day 2: May 4, 2018		
8:30 AM	Continental breakfast	Overview
Day 1 Recap		Catherine and Michael, facilitators
9:00 AM	Day 1 Recap, Findings, Questions, Issues, Day 2 Plans	
Model Based Approaches		Harald Schone, facilitator
9:15	Model Based Approaches- Status and Next Steps	
Knowledge Sharing		Bruce Yost, facilitator
10:00	Knowledge Sharing, Communication Plans	
11:00	End of TIM Findings Summary, Open Issues, Next Steps, Actions	
12 noon	Adjourn	