



Small Spacecraft Reliability Knowledge Sharing: OSMA Perspective

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Small Spacecraft Safety and Mission Assurance Challenges

- Small spacecraft projects usually have the following features:
 - Standardized interfaces (i.e. EELV Secondary Payload Adapter (ESPA) (rings), standard form (cubesats) and containerization (i.e. P-PODS) for rideshare launches
 - “Build and test” versus extensive analysis of design
 - Greater use of commercial off-the-shelf parts
 - Lower cost
 - Rapid development
 - Higher risk tolerance
 - Lower barrier-to-entry for space missions (university and small business researchers, etc.)
 - Possibility for unique applications
- These features pose potential safety and mission assurance challenges and risks
- Deployment of small satellites that are too small to be detected by the Space Surveillance Network also poses a potential collision risk to other spacecraft.
- Deployment of large constellations of small satellites could potentially worsen the orbital debris problem. For large constellations, the reliability of the design and fabrication of the spacecraft and the reliability that the spacecraft can accomplish the post-mission disposal are of particular interest from the perspective of keeping the orbital environment safe. A design or fabrication flaw can potentially lead to malfunction or even explosion of many spacecraft during the deployment or mission operations of the constellation. Likewise, clearing an operational orbit of non-operating spacecraft becomes more important when applied to a large constellation.



Small Spacecraft Community of Practice

- OSMA initiated a Small Spacecraft Community of Practice (CoP) on the NASA Engineering Network (NEN) in December 2013 and co-leads this CoP along with the Small Spacecraft Technology Program Executive in Space Technology Mission Directorates.
- The CoP serves as forum for representatives from NASA Flight Projects, Engineering, Safety and Mission Assurance, Science, Space Technology, and Human Exploration and Operations Directorates to share challenges, approaches, and lessons learned for development of small spacecraft projects, including the implementation of safety, mission assurance, design, and test guidelines and requirements.
- Subtopics established in the CoP including:
 - Safety and Mission Assurance: To provide access to expertise in the following areas: Workmanship, Software Assurance, Reliability, Quality Assurance, EEE Parts. Links to OSMA and ODPO websites
 - Communications: To inform the community about key issues (e.g., spectrum licensing, availability of network support, availability of spaceflight hardware, etc.) and to identify action areas (e.g., standardizing and establishing global space network services, R&D topics for small spacecraft communications, etc.).
- Link to Small Satellite Community of Practice: <https://nen.nasa.gov/web/small-spacecraft>



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Lessons Learned

Links

Suggestions



Cube Quest Challenge Spotlight: Team Miles

Submitted by NASA
Engineering Network on May
23, 2017

For Team Miles and their
CubeSat entry, it's about
propelling citizen science to the
moon...and beyond.

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Welcome

The Small Spacecraft
CoP will provide
information resources,
access to peer
expertise, and
opportunities for
knowledge sharing and
collaboration in sound
management,
engineering,
manufacturing, and verification practices
for development of small spacecraft
projects... [+](#)



Leads

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Ask an Expert

Ask and find questions from
Small Spacecraft, Risk Class
D. and CubeSats experts



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Suggestions

Have an idea or suggestion for
the community? We want to
hear it!