TIM-3 Small Group Discussions Summary
May 3, 2018

*What topics areas are the most important to your organization?*

- Spacecraft charging
- Hardware design & getting around limitations (system engineering)
- Parts testing (EEE)
- Peer reviews
- High value processes to find system issues
- What SoPs should be applied
- EM and Qual Models
- Functional testing, test procedures – all testing (good test practices)
- Knowledge of vendor quality
- Analysis areas that cannot be done by testing
- Infant mortality
- Mission level reliability (repository with common failure modes, failure categories, susceptibility of components to space environments)
- Radiation effects
- Cost vs reliability trade-offs (Trades - test vs model). Add cost/ROI for each section
- ESS Standards

*What do you consider makes a high-reliability component, subsystem, bus, or mission?*

- Robust flight software patch capability
- Breakout by orbits/lifetime
- Prioritize/tailor up guidance
- Longer functional life
- Simulation
- Derating
- Resiliency (flexible configurations, failsafe, redundancy, graceful degradation, self-diagnostics/BIT, fault tolerance/recovery, manual work arounds, GND contingencies
- Testing – qualitative data that shows capability is key
- Be more open source
- Proven flight heritage
- Confidence in vendor
- Designed with margin
- Does it work?

*What design practices are key to mission reliability?*

- Functional and system level testing (test early & often)
- Lifetime and ROI effect design practices
- Define high value processes
- Flatsat
- Root cause analysis of failures
- Program/customer feedback

- Volume production
- Derating
- Design with significant margin
- Minimize moving parts and deployables
- Design for repair
- Launch vehicle considerations
- Flight software recoverability/fault contingency
- Telemetry
- ESS
- Parts selection
- Pointers to correct guidance and relevant documents

*What sections/elements of reliability would you want to learn more about?*

- Low cost/low impact methods
- Automated testing
- Non-traditional verification methods
- Redundancy practices
- Process verification
- Automotive industry – processes and components
- Parts selection
- Parts testing, dbs, sharing
- Ground Systems
- Requirements prioritization
- Derating
- Radiation Analysis
- Testing best practices
- Software reliability
- Fault detection, isolation, and recovery

*What are the key questions that you would ask, or not ask, for the flowchart model?*

Not ask:
- PRA
- WCA
- Limited redundancy

Ask:
- Mission success criteria level
- Levels of payoff from expert opinions
- More inclusion of lessons learned from CubeSats/Small Sats
- Risk probability
- Cost of topics/schedule
- More mission candidates

*Do you find value in the flowchart model or should it just be search?*

- Search engine more valuable than menu driven
- New developers – flowchart model useful, experts – search
- Flowchart will require more maintenance to stay useful – keep at a high level

*General comments:*

- Industry does not get feedback that their "stuff" does or does not work. Industry would like more customer feedback
- Organize with companies for a pay and publish system – test systems/parts for reliability and share data
- Get more parts test data from NASA centers