



# The State of NEPP

## NASA Electronic Parts & Packaging Program

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# Mission Statement

**Provide NASA's leadership in the development and maintenance of guidance to support the reliable use of electrical, electronic, electromechanical, and electro-optical (EEEE) parts through characterization, lot acceptance, screening, and qualification testing in collaboration with academia, industry, international partners, and other government agencies.**

***NASA Electronic Parts Assurance Group (NEPAG) is a core portion of NEPP***





# NEPP Overview – Mission Statement

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# Standards, Policy Documents, Guidance, Procedures and Reports

- Developing the NASA EEE Parts Selection, Testing and Derating Standard
  - Massive effort across the Agency
  - *Trying to paint a portrait of a moving target.*
- Technical Assessment Reports
  - Sponsored by NASA Engineering & Safety Center (NESC)
    - Title: Recommendations on Use of Commercial-Off-The-Shelf (COTS) Electrical, Electronic, and Electromechanical (EEE) Parts for NASA Missions.
      - Phase I Complete - Phase II In Progress
    - Title: Avionics Radiation Hardness Assurance (RHA) Best Practices
      - NASA Radiation Hardness Assurance (RHA) Standard
- Radiation Testing Guidelines
  - Pulsed Laser Testing Guidelines
- Numerous papers and presentations
  - Approximately 100 deliverables a year
  - Posted to NEPP website

# Risk Classification for NASA Payloads NPR 8705.4A

CLASS D

CLASS C

CLASS B

CLASS A



Image credit: nasa.gov



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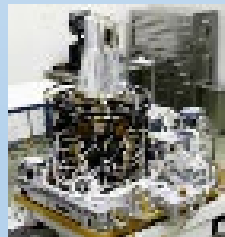


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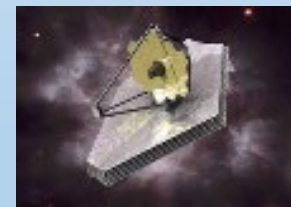


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**Quality - Robustness - Assurance - Screening - Derating - Physics of Failure**

**Mission, Environment, Application and Lifetime (MEAL)**

To be presented by P. Majewicz at the NEPP Electronics Technology Workshop (ETW), June 12-15, 2023.

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*The probability that a system ... will function as intended over a specified period of time under specified environmental conditions. (Human-Rating Requirements for Space Systems NPR 8705.2B)*

*Reliability*

*Describes the ability of a system or component to function under stated conditions for a specified period of time. (IEEE Computer Dictionary)*

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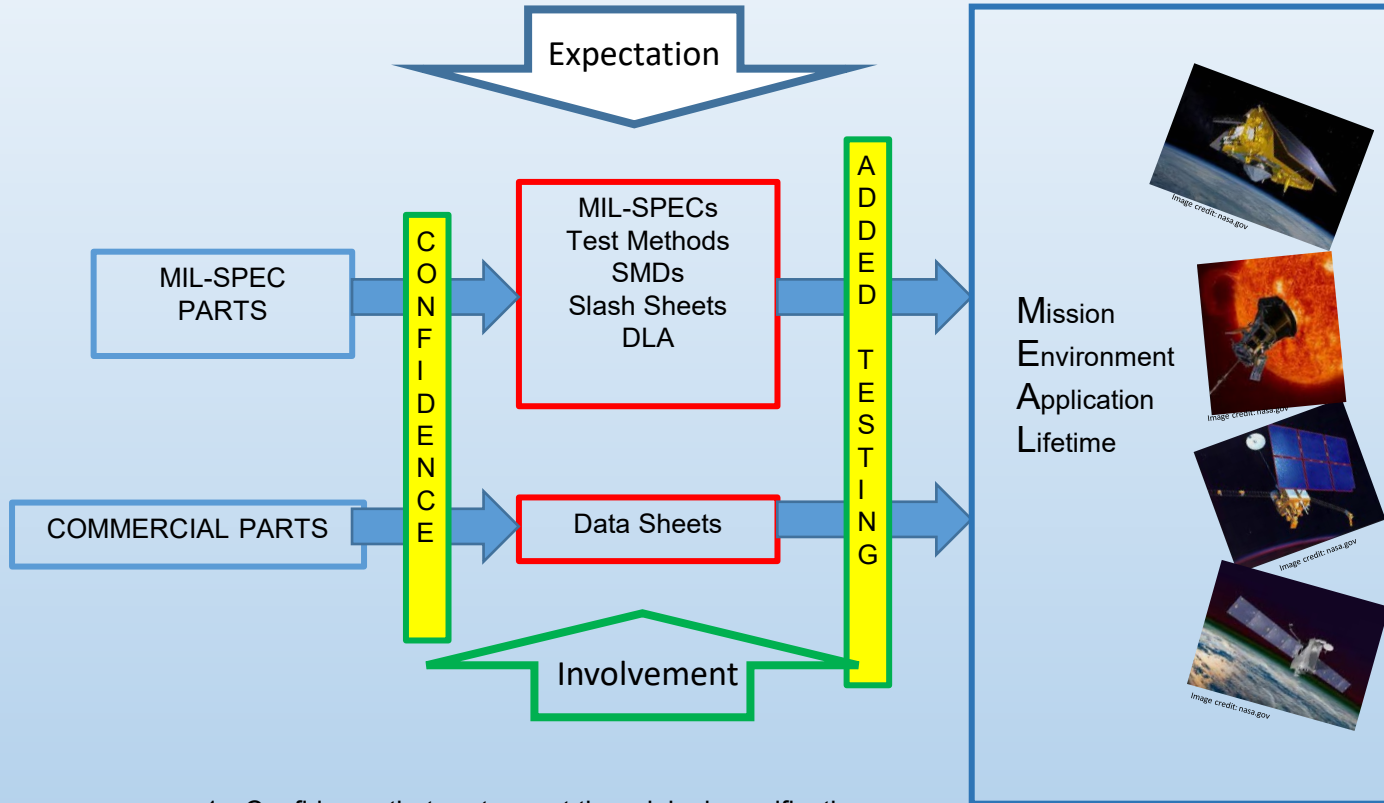


Image credit: nasa.gov



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# Concerns for Picking Parts



1. Confidence that parts meet the original specifications.
2. Analysis to ensure mission requirements are being met, especially if requirements are above data sheet/SMD limits.
3. Added testing should be done with extreme caution



# COTS UTILIZATION STEPS

- Relationship with COTS manufacturers
  - Industry Leading Parts Manufacturers (ILPM)s
  - Data sheets
  - Process control data
  - Qualification & Screening
  - Sampling
  - Change process
- Parts Evaluation & Analysis Capability
  - Initial motivation for NEPP Program's predecessor in the 70s
  - Failure rate determination
    - Failure mechanisms/Physics of Failure/Acceleration Factors
  - Environmental testing geared towards NASA missions (MEAL)
  - Not re-inventing the wheel

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# KEY FOCUS POINTS



## TELECONFERENCES

### NEPAG

- Weekly Domestic
- Monthly International

### Government Working Group

- Biweekly

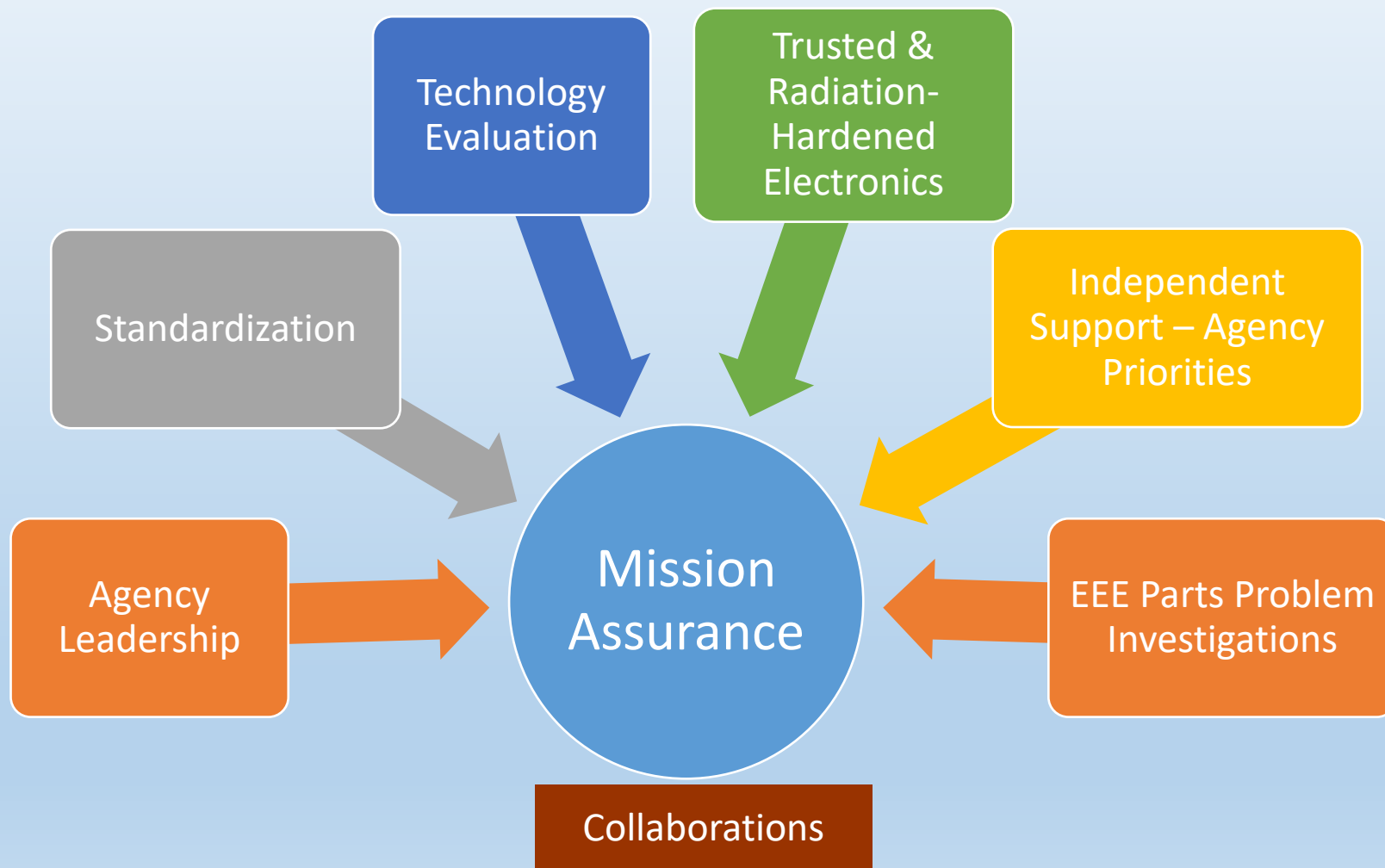
### Other specialty areas

- Hybrids
- 2.5 & 3D Packaging
- Small Mission Success

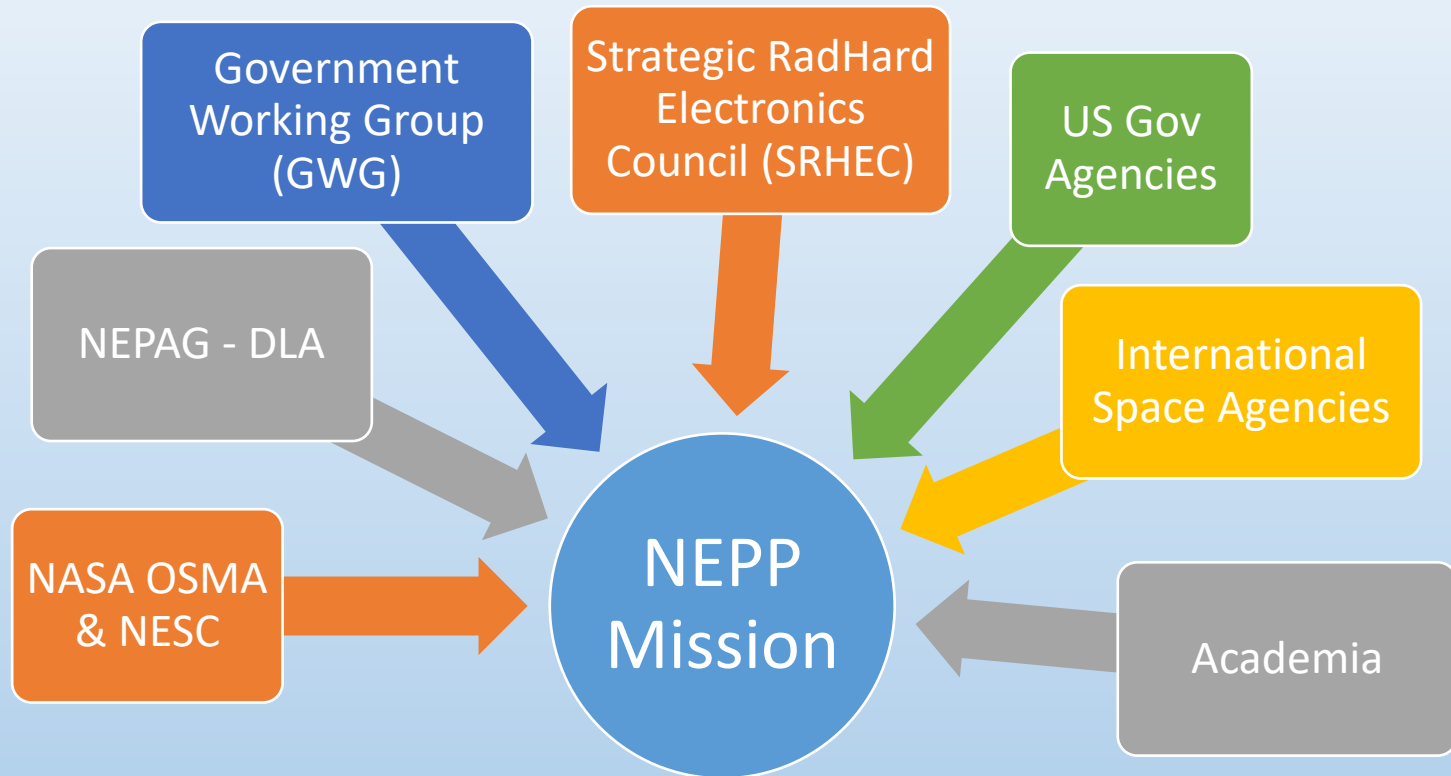
## SUPPORT DEFENSE STANDARDIZATION PROGRAM / DEFENSE LOGISTICS AGENCY (DLA)

- DLA audits
- Review MILSPEC Changes
- Attend JEDEC and SAE WG meetings
  - Class Y, PEMS, PEDS incorporation into MIL SPECS

# NEPP Program

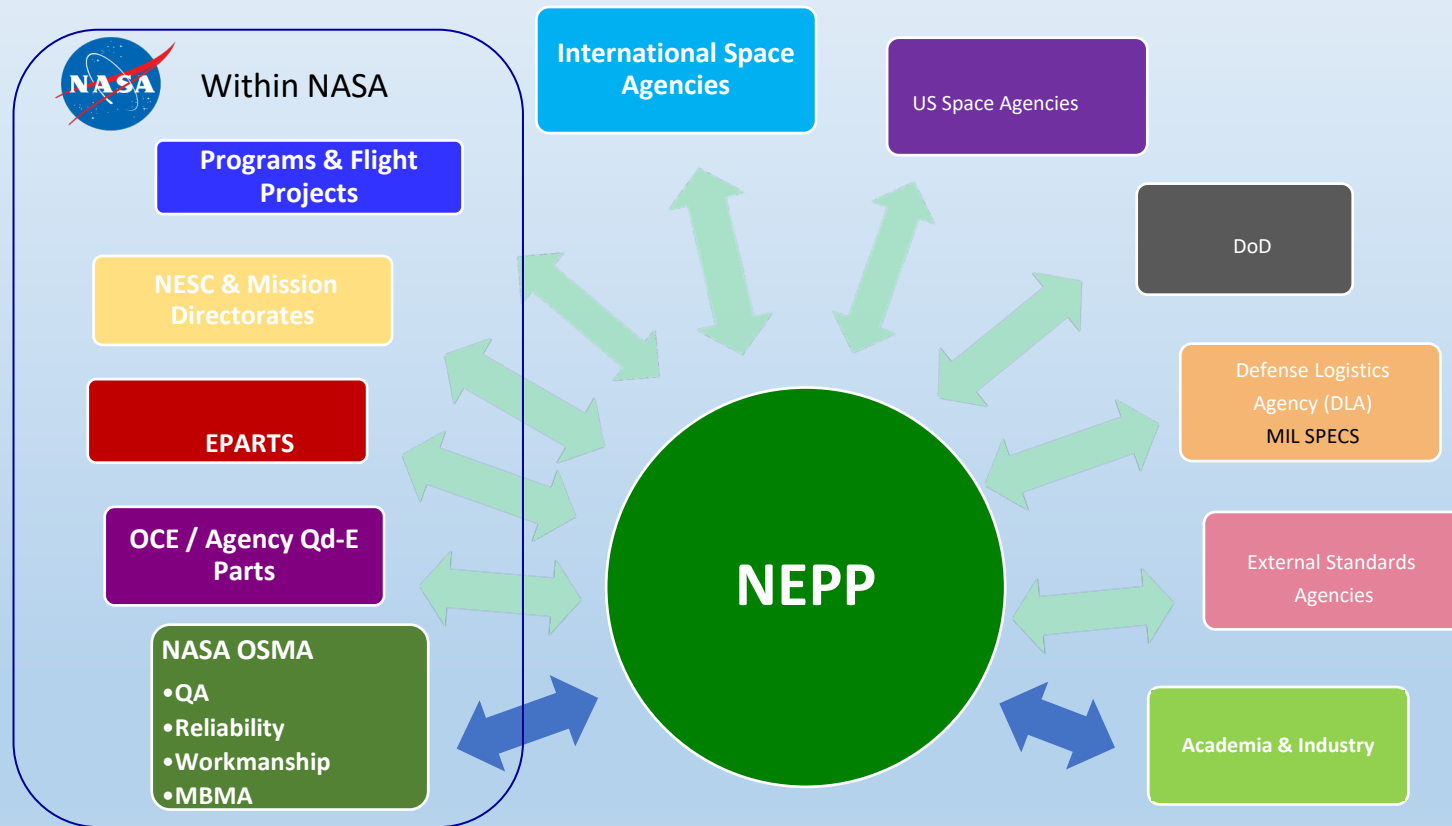


# NEPP Collaborations



*Air Force – SMC/The Aerospace Corporation; Air Force – Wright-Patterson; Army; MDA; NASA Centers; Navy – NSWC Crane Division; NRO/The Aerospace Corporation Air Force Research Laboratory; Naval Research Laboratory; Joint Forces Assurance C; Sandia National Laboratories*

# NEPP Collaborations / Interfaces



# *STATE of NEPP*

- These have been challenging times!!!
  - Starting up DLA Audits
  - Supply Chain Issues
  - Radiation Testing Limits
  - Shifting Paradigm Regarding COTS
- These are exciting times!!!
  - The Artemis Program
  - Mars: Perseverance – Ingenuity – Sample Return
  - Advances in Electronics
- STATE of NEPP
  - Strong support from NASA leadership
  - Fulfilling the goals of our mission statement
  - Collaborations
  - Most importantly...the PEOPLE



Questions?