

***Enabling Radiation Test Data Sharing –
The Aerospace Corporation’s Support to the NASA
Space Environments Testing Management Office***



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***NASA Electronic Parts & Packaging Program
Electronics Technology Workshop
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Agenda

- Background & Motivation
- Space Environments Testing Management Office (SETMO)
- Aerospace Corporation SETMO Task
 - *University of CO-Boulder/Laboratory for Atmospheric and Space Physics*
- Status & Next Steps
- Conclusion

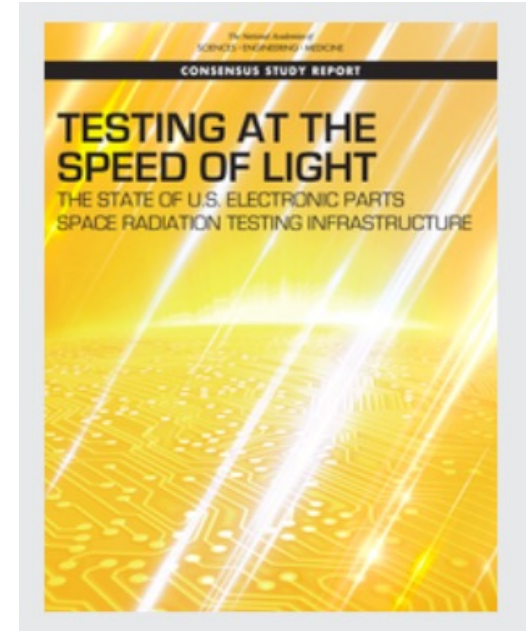
Acknowledgments

- NASA-wide Specialized Engineering, Evaluation and Test Services (NSEETS) Program
- Strategic Assessments, Studies & Projects, Civil Systems Group, The Aerospace Corporation
- Goddard Space Flight Center, Radiation Effects and Analysis Group
- NASA Electronic Parts and Packaging Program (NEPP)

Background & Motivation



- The Strategic Radiation Hardened Electronics Council (SRHEC)
- A collaboration among the Department of Defense (DoD) and other US Government stakeholders
- Established to ensure
 - Continued access to Strategic Radiation Hardened (SRH) and Radiation Hardened (RH) electronics
 - Long-term viability of domestic infrastructure critical to the Nation's security and defense
- The Aerospace Corporation is supporting NASA's Space Environments Testing Management Office (SETMO), gathering microelectronics radiation effects test data to support government-wide radiation effects testing databases, including the SRHEC database
- Informed by the findings and recommendations in the 2018 National Academies' Consensus Report, "Testing at the Speed of Light", a "whole of government" approach is well under way

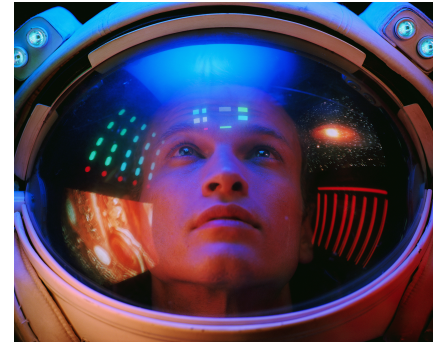


National Academies Press
<https://doi.org/10.17226/24993>

Space Environments Testing Management Office



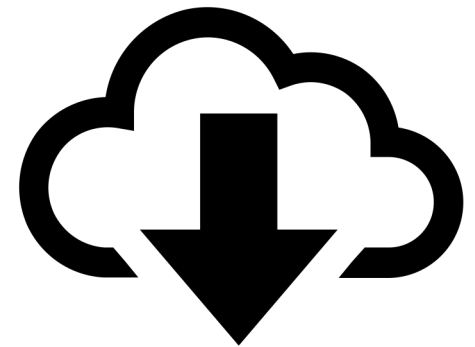
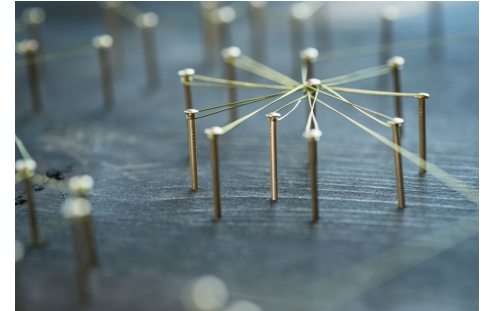
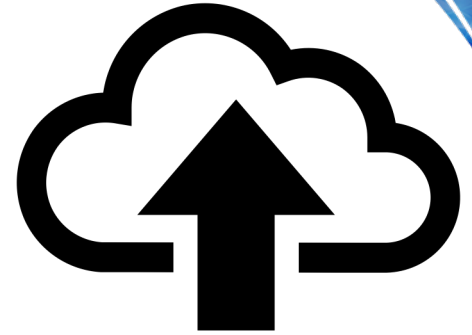
- Focus
 - Optimizing availability and performance of facilities and capabilities for reducing flight risk
- Capability Portfolio
 - Space Environments: Special purpose chambers to replicate extreme environments to certify spacecraft, structures, component and instrument performance
 - External Radiation: Research laboratories to evaluate human and machine protections against high-energy radiation.
 - *88-Inch Cyclotron/Berkeley Accelerator Space Effects (BASE) Facility*
 - High Enthalpy: Arc jet facilities for studying impact of high temperatures and velocities on rockets and spacecraft as they interact with atmospheres on Earth and other planetary bodies
 - Flight Simulation: Simulators for modeling flight handling and control characteristics for developing next-generation aircraft and spacecraft, and making improvements to current vehicles



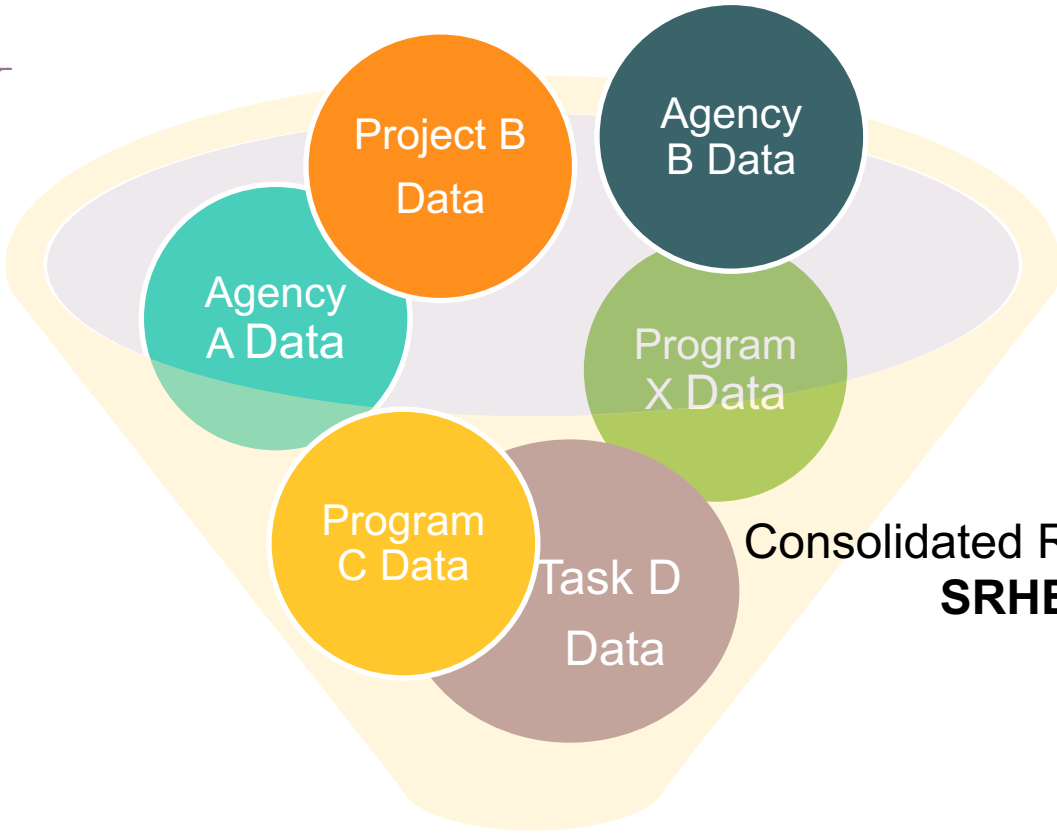
Microelectronics Radiation Test Data Sharing Concept



- Create a repository of microelectronics radiation test data to serve the needs of multiple Government agencies
 - *Eliminate duplicative or wasteful utilization of limited access at radiation test facilities*
 - *Reduce non-value-added testing and analyses*
 - *Save system development, production and sustainment costs*
 - *Deliver reliable, resilient systems more quickly*
- Repository's envisioned attributes
 - *Serve needs of multiple agencies and diverse missions and environments*
 - *Include microelectronics for spacecraft, launch vehicles, missiles, instruments*
 - *Grant user access via a vetting process*
 - *Accommodate data at multiple classification and sensitivity levels*
 - *Include Single Event Effects, Total Ionizing Dose, Displacement Damage Dose test data*
 - *Maintain consistent data record format for efficient searching and compilation*



Microelectronics Radiation Test Data Sharing Concept



Consolidated Radiation Data Repository:
SRHEC Parts Library



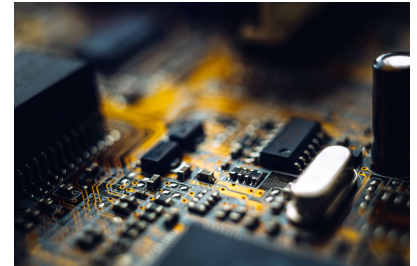
Outcome:
Project, Program & Mission Efficiencies for
National Science, Defense and Security
Priorities

Aerospace Corporation's SETMO Task



Overview: Identify and collect radiation effects test data to support the multi-agency SRHEC Parts Library and achieve efficiencies for national priorities

- *Create a catalog of microelectronics radiation effects test data sources*
 - *Collaborating with University of CO-Boulder's Laboratory for Atmospheric and Space Physics (LASP) motivated by*
 - *Prior successful collaboration on the development and deployment of the crowd-sourced, alternate-grade parts knowledge repository at <https://PMPedia.space>*
 - *Commitment to engage students for data entry and formatting, and introduce them to space radiation effects expertise and career path*
- *Assess received information for completeness and consistency with the SRHEC Parts Library standard for a data record*
 - *Accommodate information provided that is not applicable to or usable in a SRHEC data record but may still be valuable to stakeholders, e.g., construction analyses; mechanical, electrical or thermal characterizations; imaging results*
- *Successful formal kick-off in March 2022. Identified several data sources to mine for content. Currently:*
 - *Collating data fields received from two Government agencies to create a multi-purpose template*
 - *Identifying student Interns to assist with data entry and formatting*



Conclusion

- Government needs for microelectronics radiation effects test data continue to evolve rapidly
- Yet domestic testing facility infrastructure is limited, leading to high demand and contention for access
- A “whole of Government” approach to data sharing could
 - *Eliminate duplicative or wasteful utilization of limited access at radiation test facilities*
 - *Assist projects and programs in accelerating efficient, cost-effective development and fielding of reliable systems*
- If you have data and are authorized to share, please contact us
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