IIRW 2019 Discussion Group II: Reliability for aerospace applications

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- New space: commercial parts in space and significant commercial companies entering space arena.
- Systems are moving toward rapid technology refresh with non-space parts since *Commercial development cycle are much faster than traditional aerospace*
- Challenge: how to quickly leverage devices level reliability information into component qualification for the end users of new technology

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New space: commercial parts in space, commercial companies entering space arena (Space X, Blue Origin etc)

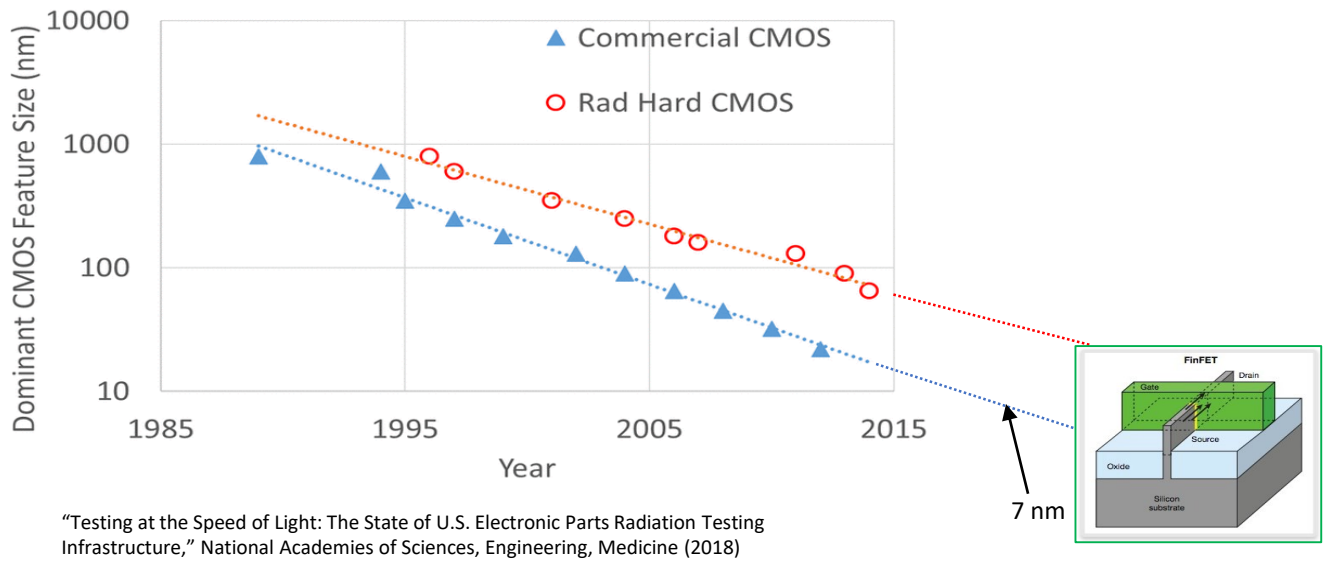
- Systems are moving toward rapid technology refresh with non-space parts
  - *Commercial development cycle much faster than NSS*
  - *Trusted and/or space-grade PMP may not even be available*

- *Commercial entities can be less risk adverse than traditional space in the adoption of new technologies*
  - *Recovery from failure is much faster with commercial entities*
  - *Commercial payloads can be insured to distribute cost risk for rebuild*
  - *while Governmental payloads tend to be one-of-a-kind*

- *Factors to Assess for Aerospace Reliability of Commercial/Industrial/Automotive Components*

- *Factors to assess for flight reliability of non-space grade parts:*
  - *Radiation*
  - *Environmental – exposures to temperature, pressure, light, etc.*
  - *Lifetime requirement – combined operational and standby*
  - *Ultra-reliability requirement-* ***<u>no repair</u>***

- What can be "borrowed" from commercial – automotive?

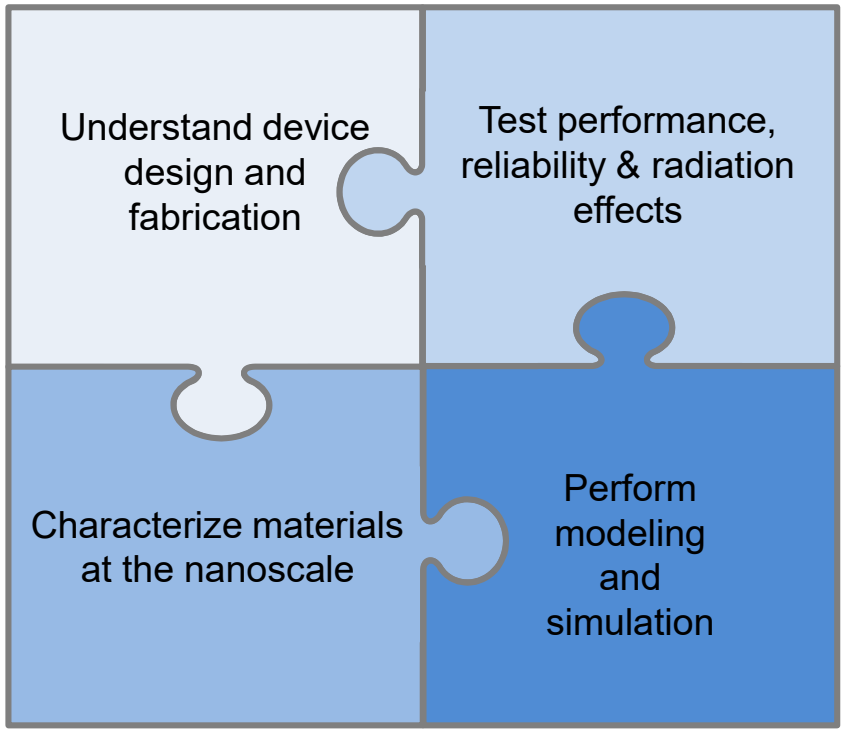


"Testing at the Speed of Light: The State of U.S. Electronic Parts Radiation Testing Infrastructure," National Academies of Sciences, Engineering, Medicine (2018)

Evaluation

Test issues to consider:

- pulse duration, frequency, temperature, …
- extract max reliable lifetime: meeting cost/mission duration needs → test close to use conditions to prevent overkilling



How:
by understanding processes and mechanisms that induce failure on the device level to predict reliability and improve product performance