Making Electronic Parts and Packaging Technology Viable for Flight Projects

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Example Project Life Cycle

Fall 2001
- Phase B, System Design

Spring 2002
- Preliminary Subsystem Designs [Parts selection and ordering]
- Subsystem Detailed Design
- Subsystem PDRs and Qualification Testing [Packaging Qualification complete]

Early 2003
- Subsystem Flight Build
- Subsystem CDRs and Flight Acceptance Testing [Limited changes to make play]

Early 2004
- System Test

Spring 2005
- Launch Campaign
• There are currently many different types of missions either in development or in planning
  – Earth orbiters and Deep Space probes
  – Landers and rovers
  – Technology demonstrations and Science missions

• All of these missions can have widely varying radiation, thermal and dynamics requirements that can affect both electronics parts selection and electronics packaging

• There are two requirements that are common for all missions which also affect electronic parts selection and electronic parts packaging
  – The hardware must work
  – The objectives for the mission must be met
• What does this mean for NEPP?
  – In order for technologies to be acceptable for flight use they must have
demonstrated enough maturity to represent acceptable risk to the project

  – “Acceptable risk” is hard to define as varies from project-to-project
depending on the mission objectives

  – Determine what are the important criteria that encompasses the needs of
the projects and develop a methodology to support those needs

  – Provide for higher levels of integration to reduce size and mass
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• Electronic Parts

  – Development of a database that can provide the capabilities, availability, and reliability and make it readily available to designers

  – In the case of impactors and penetrators, what are the dynamic environments and are they encompassed by the existing parts screens?

  – In the case of any surface missions, what are the thermal extremes, operating and non-operating, and will the devices meet specification/survive?

  – What are the radiation environment capabilities for new technologies?
• Electronic Packaging

  – Database of new components with footprints for packaging designs

  – In the case of impactors and penetrators, what are the dynamic environments and what packaging techniques are qualified over those levels

  – In the case of any surface missions, what are the thermal extremes, operating and non-operating, and what packaging techniques are qualified over those levels

  – Compatible with contamination control and planetary protection requirements
• Continued pressure to make the spacecraft small, reduced mass and reduced power consumption
  – For a wide variety of projects there is a need to infuse new technology to accomplish this desire
  – Technology needs to be sufficiently mature to represent acceptable risk to the project both technically and programmatically

• Technology programs need to be looking at the family of projects that are five or more years into the future to understand the spacecraft and instruments requirements