

1st NASA Electronic Parts and Packaging (NEPP) Program Electronic Technology Workshop (ETW)

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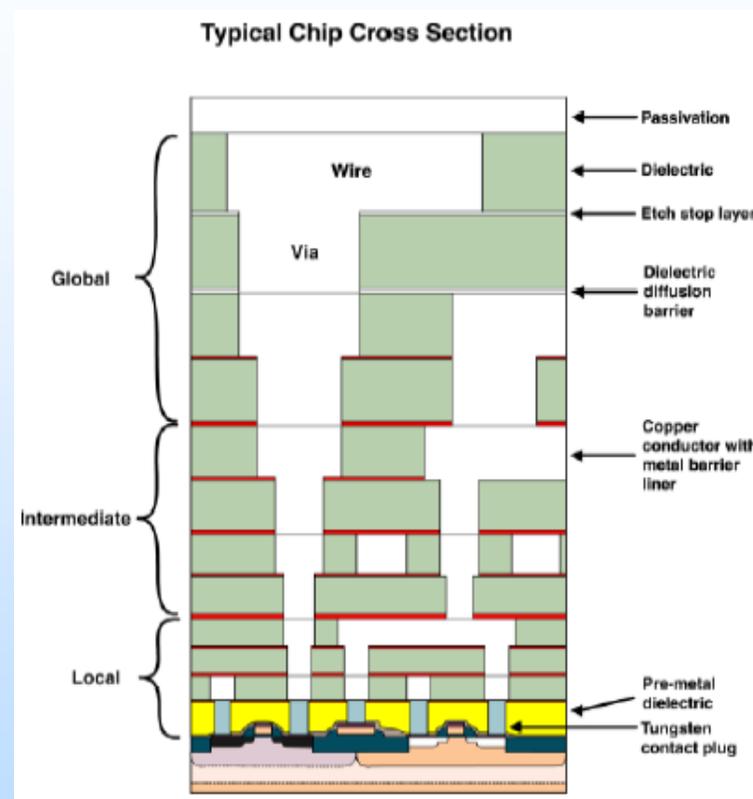
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Co- Managers NEPP Program

<http://nepp.nasa.gov>

NEPP Mission

- To provide guidance to NASA:
 - Selection and application of microelectronics technologies
 - Improved understanding of risks related to the use of these technologies in the space environment
 - Appropriate evaluations to meet NASA mission assurance needs for electronic systems
- NEPP evaluates new* and emerging** electronic parts technologies and provides assurance support for technologies in current use in NASA spaceflight systems



**New – Recently marketed, commercially available*

*** Emerging – Available in limited quantities for evaluation, on path to commercial products*



NEPP Overview

- NEPP supports all of NASA for >20 years
 - 7 NASA Centers and JPL actively participate
- The NEPP Program focuses on the reliability aspects of electronic devices
 - Three prime technical areas: *Parts (die), Packaging, and Radiation*
- Alternately, reliability may be viewed as:
 - Lifetime, inherent failure and design issues related to the electronic parts technology and packaging,
 - Effects of space radiation and the space environment on these technologies, and
 - Creation and maintenance of the assurance support infrastructure required for mission success.

*Electrical overstress failure
in a commercial electronic device*



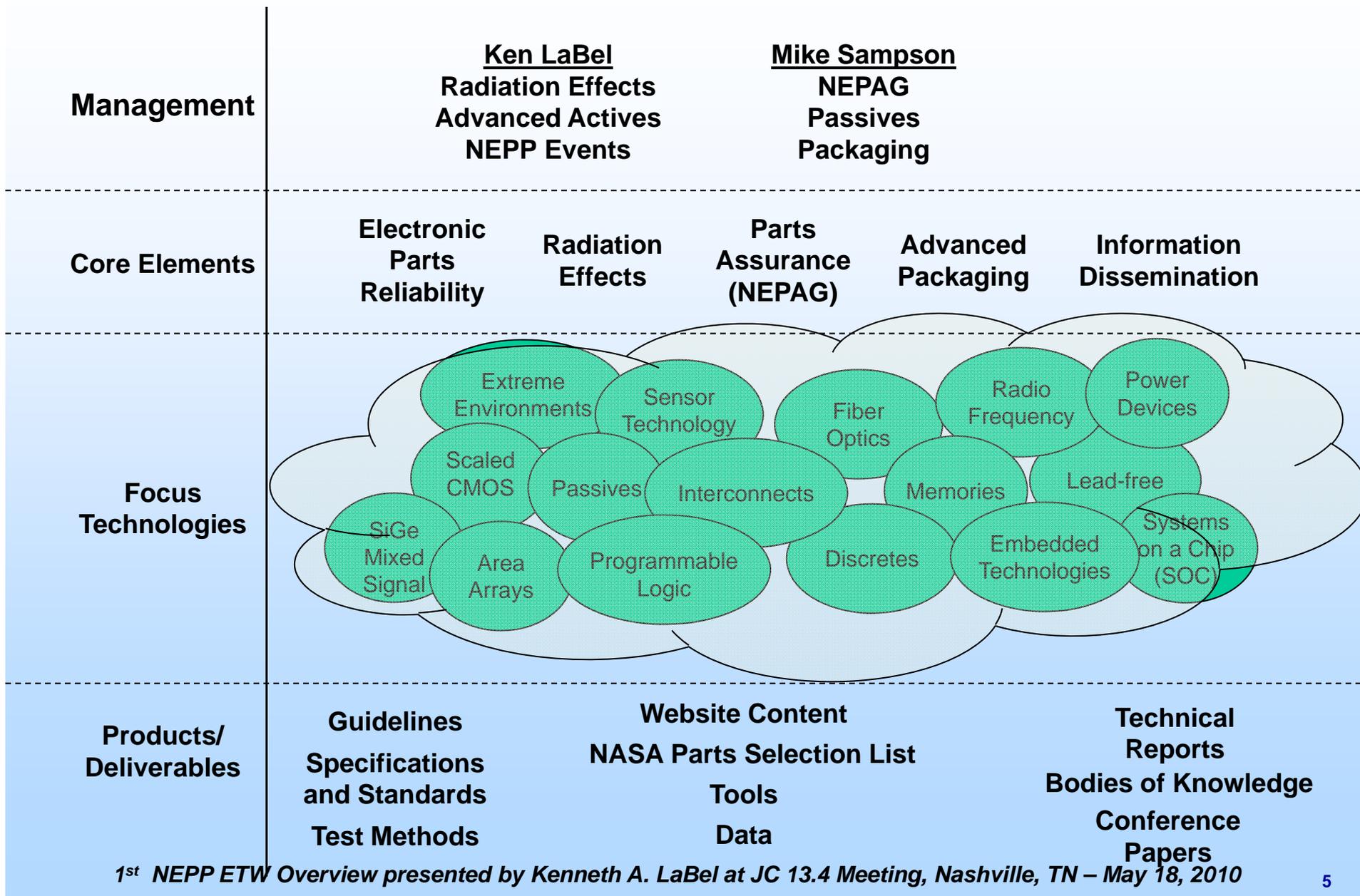


NEPP Works Two Sides of the Equation

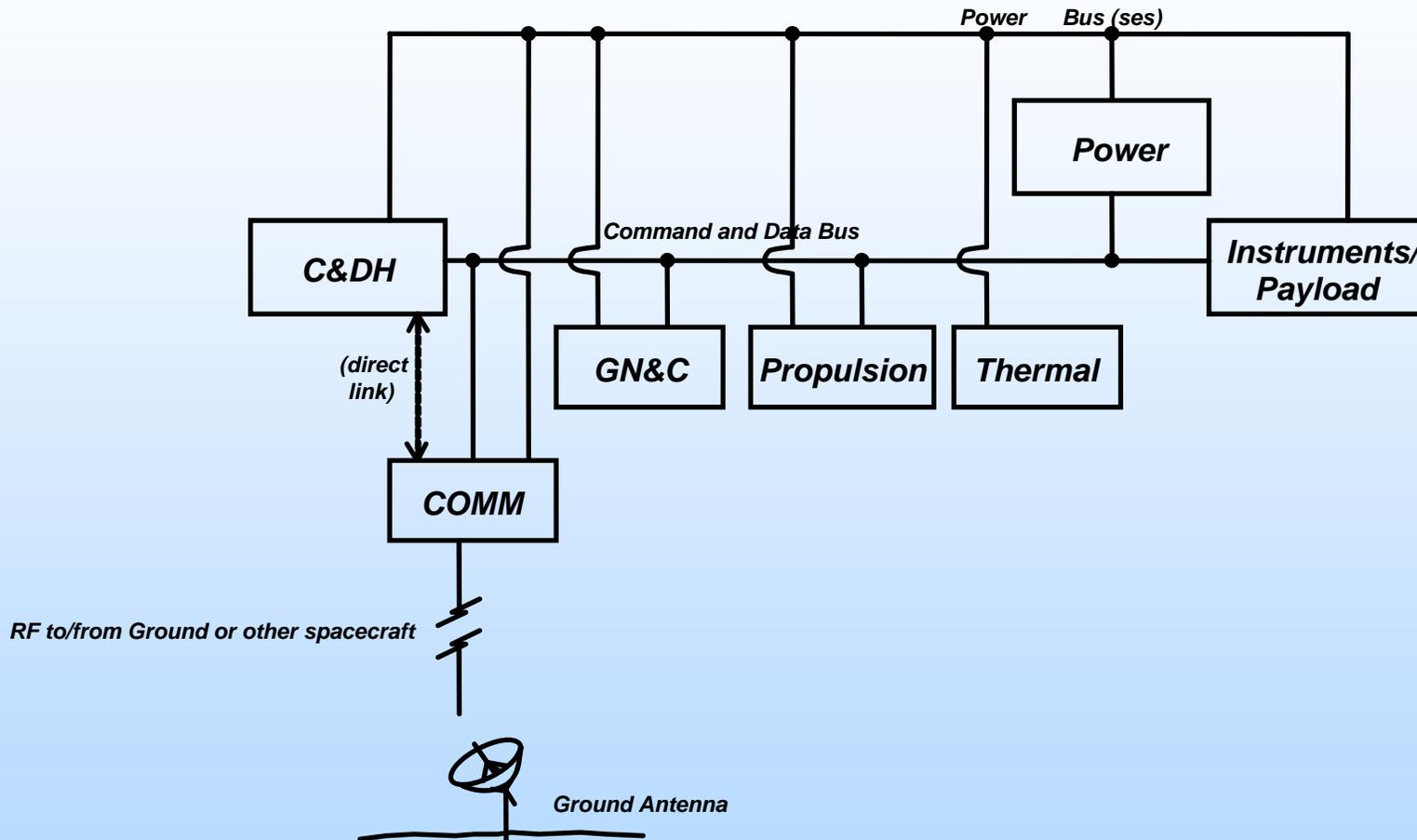
- **Assurance**
 - *Issues that are applicable to space systems being designed and built (i.e., currently available technologies)*
 - **Examples**
 - Cracked capacitors
 - DC-DC converter reliability
 - Enhanced Low Dose Rate Sensitivity (ELDRS)
 - **Communication infrastructure via website and working groups**
 - **NASA Electronic Parts Assurance Group (NEPAG)**
 - **Audit and review support**
- **New electronics technology**
 - *Issues that are applicable to the next generation of space systems in conceptualization or preliminary design*
 - **Examples**
 - 45-90 nm CMOS
 - SiGe
 - State-of-the-art FPGAs
 - **Collaboration with manufacturers and government programs for test, evaluation, and modeling**
 - **Development of new predictive performance tools**



The NEPP Program



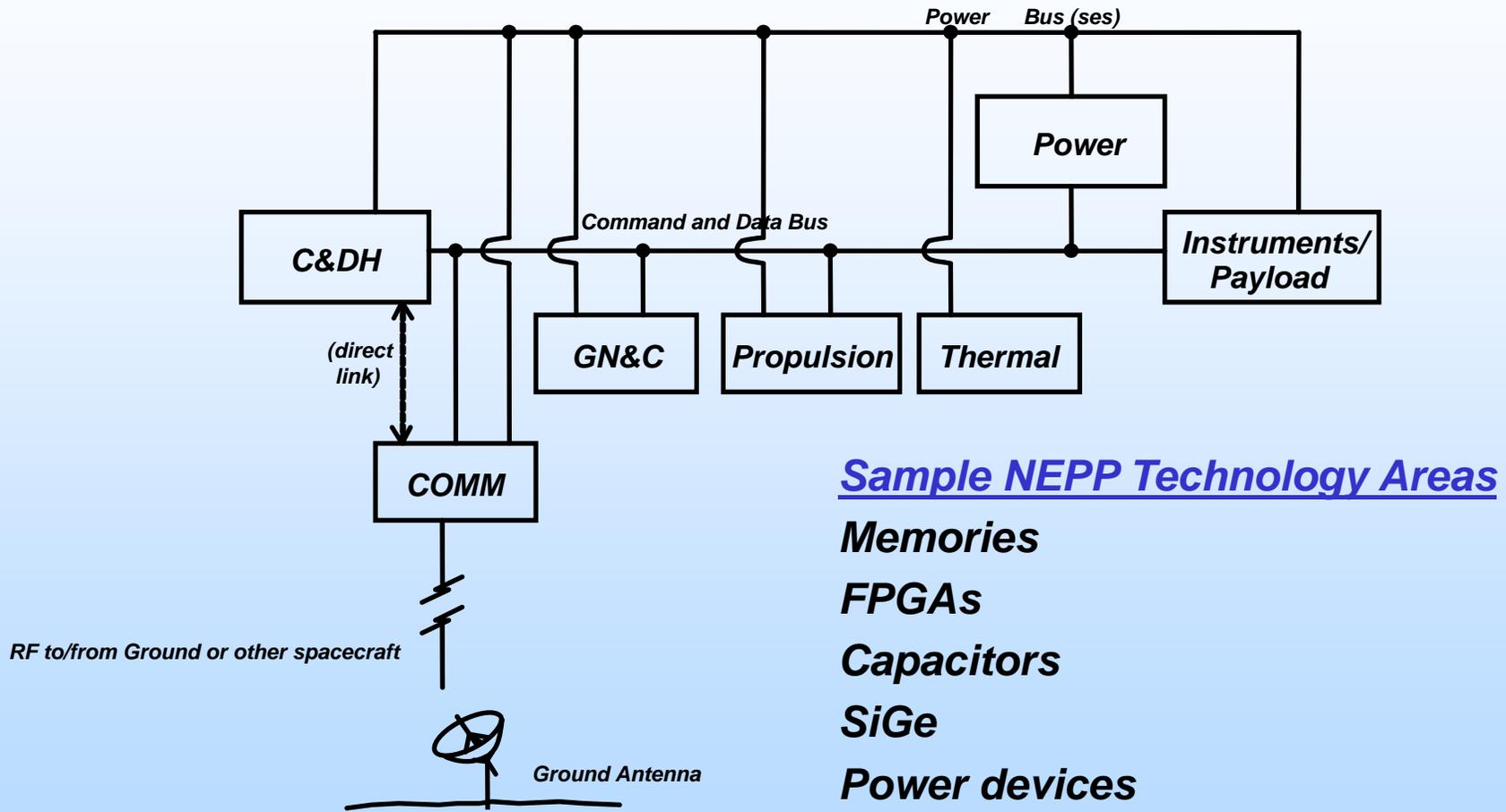
Typical Spacecraft Electrical Architecture



Typical Spacecraft Electrical Architecture



The 90/90 Goal

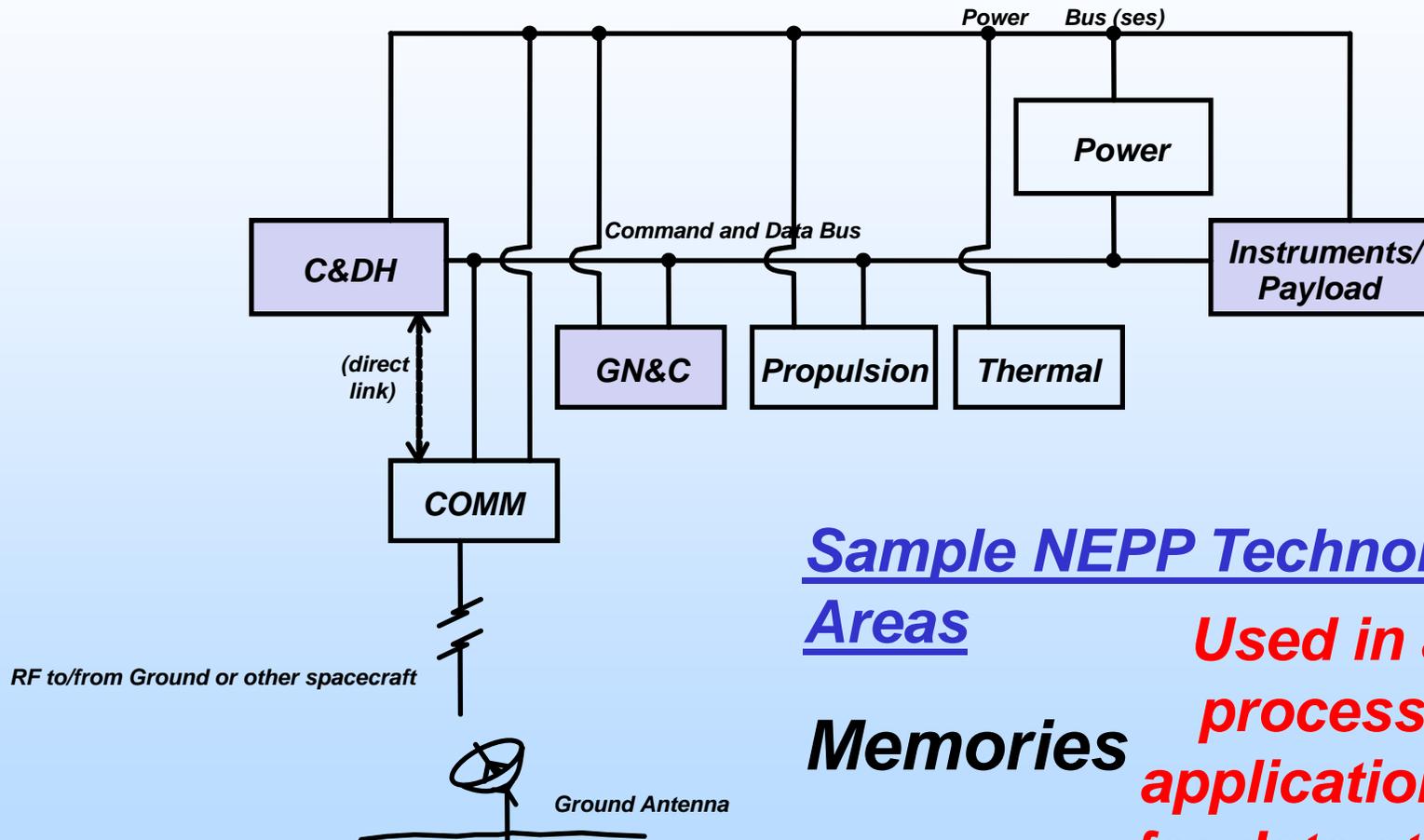


**90% of NEPP efforts should support
90% of NASA flight missions**

Typical Spacecraft Electrical Architecture



The 90/90 Goal - Example



Sample NEPP Technology Areas

Memories

Used in any processing application and for data storage on a spacecraft.



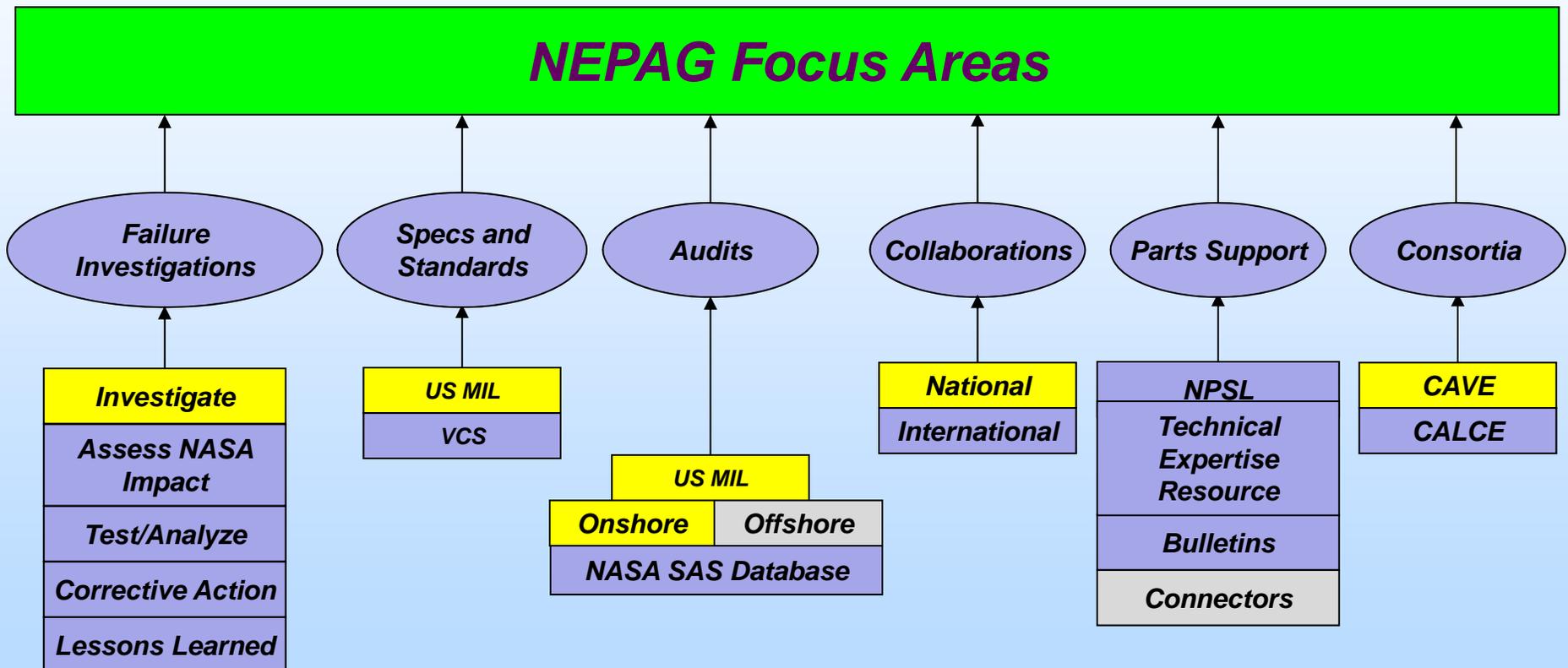
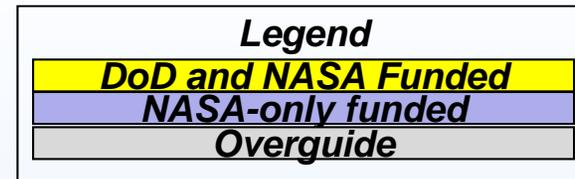
NEPP Has a Wide Range of Efforts

- **Tasks vary extensively in the technologies of interest**
 - Building blocks like capacitors
 - Standard products like DC-DC Converters, linear bipolar devices, and A-to-D Converters
 - New commercial devices such as FPGAs and memories
 - Test structures on emerging commercial or radiation hardened technologies
 - Specialized electronics such as IR arrays and fiber optics
 - New assurance methods and investigations
- **NEPP ETW provides forum to present recent results, as well as current and future plans**
- **Currently in FY11 planning cycle**
 - ***PRELIMINARY PLANS FOLLOW***

NASA Electronic Parts Assurance Group (NEPAG)



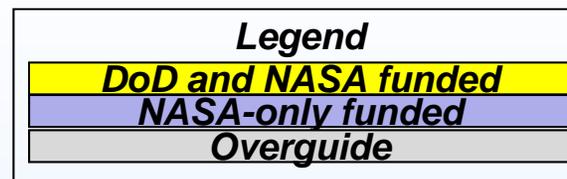
Core Areas are Bubbles;
Boxes underneath are elements in each core



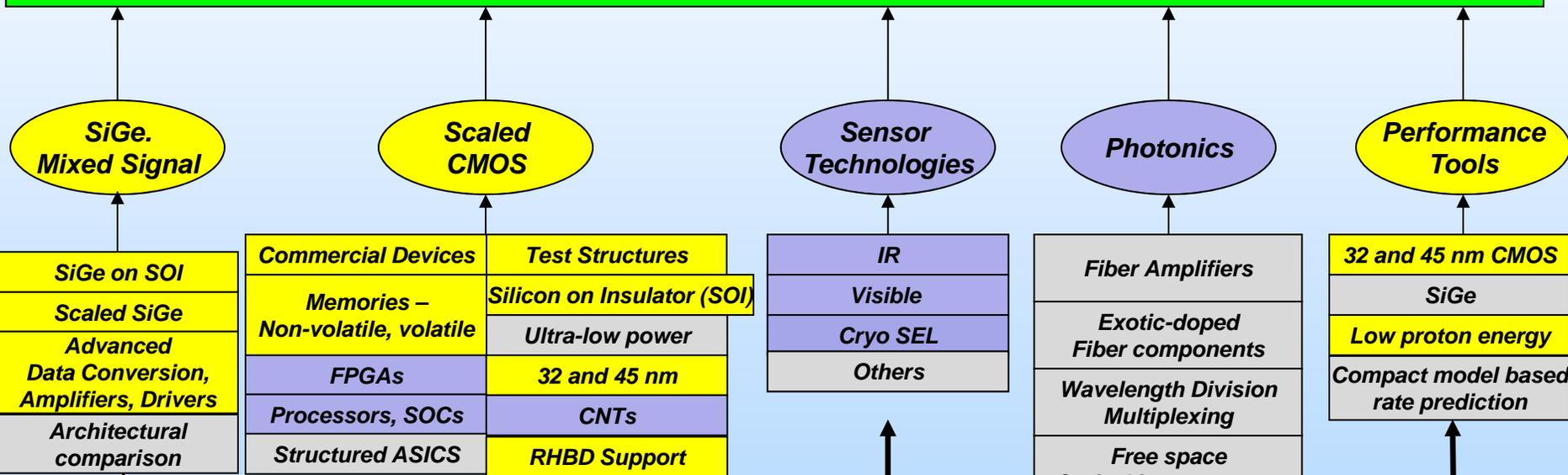


FY11 Radiation Plans for NEPP Core (1)

Core Areas are Bubbles;
Boxes underneath are variable tasks in each core



NEPP Research Categories – Active Electronics



Develops students at Georgia Tech, Vanderbilt, Auburn

Partners include: AFRL, Cypress, Ball DoD, IBM, TI, Intel, Boeing, Actel, Atmel, Xilinx, Altera, Cypress

Partners at:

Develops students at Vanderbilt

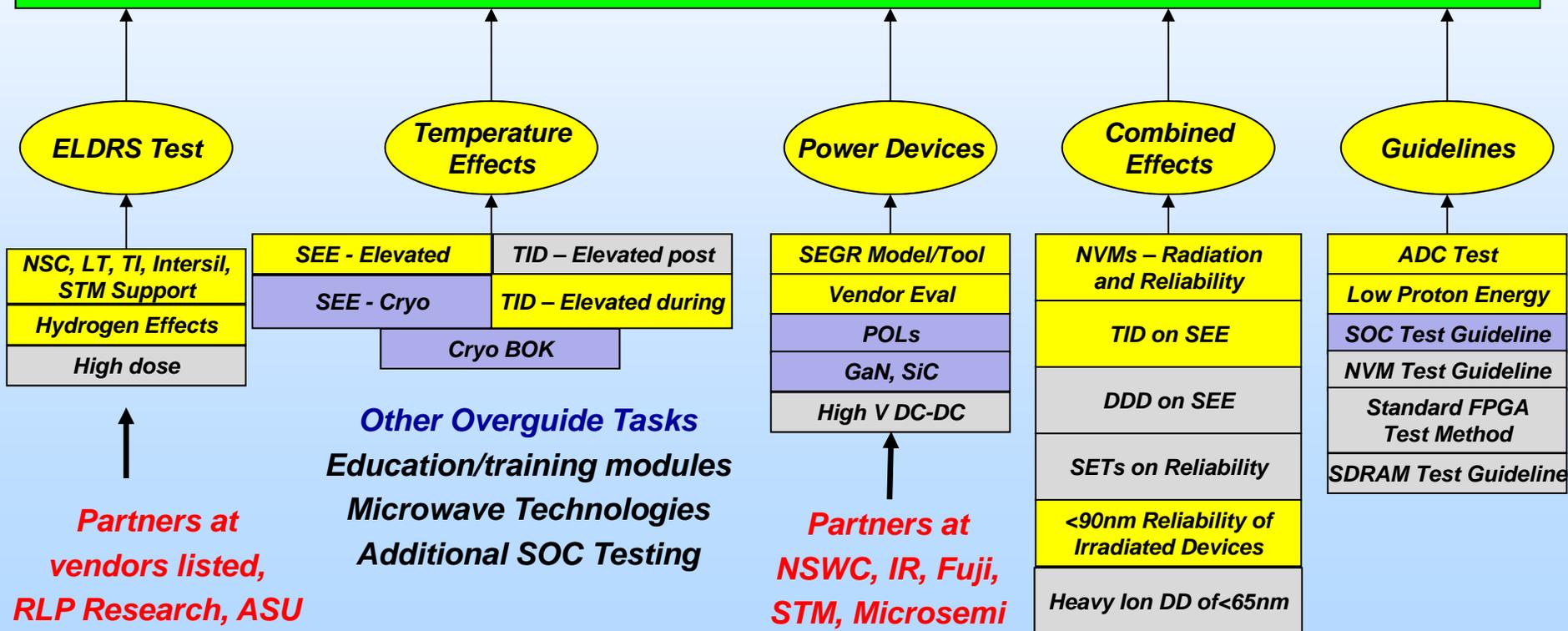


FY11 Radiation Plans for NEPP Core (2)

Core Areas are Bubbles;
Boxes underneath are variable tasks in each core

Legend	
	DoD and NASA funded
	NASA-only funded
	Overguide

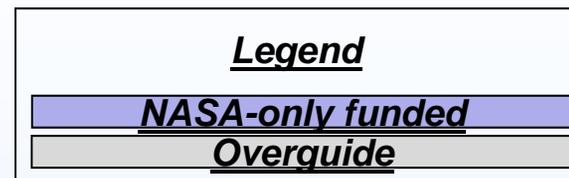
NEPP Research Categories – Hardness Assurance



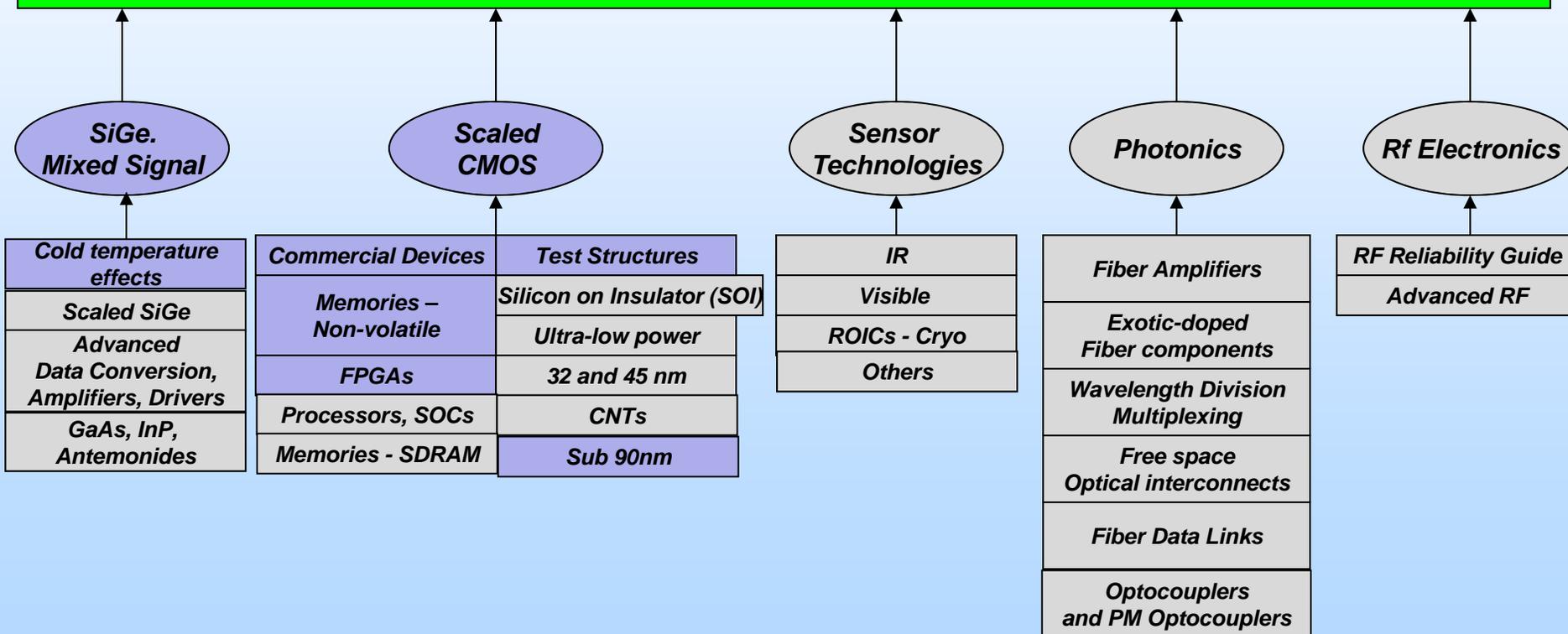


FY11 Parts Plans for NEPP Core (1)

Core Areas are Bubbles;
Boxes underneath are variable tasks in each core



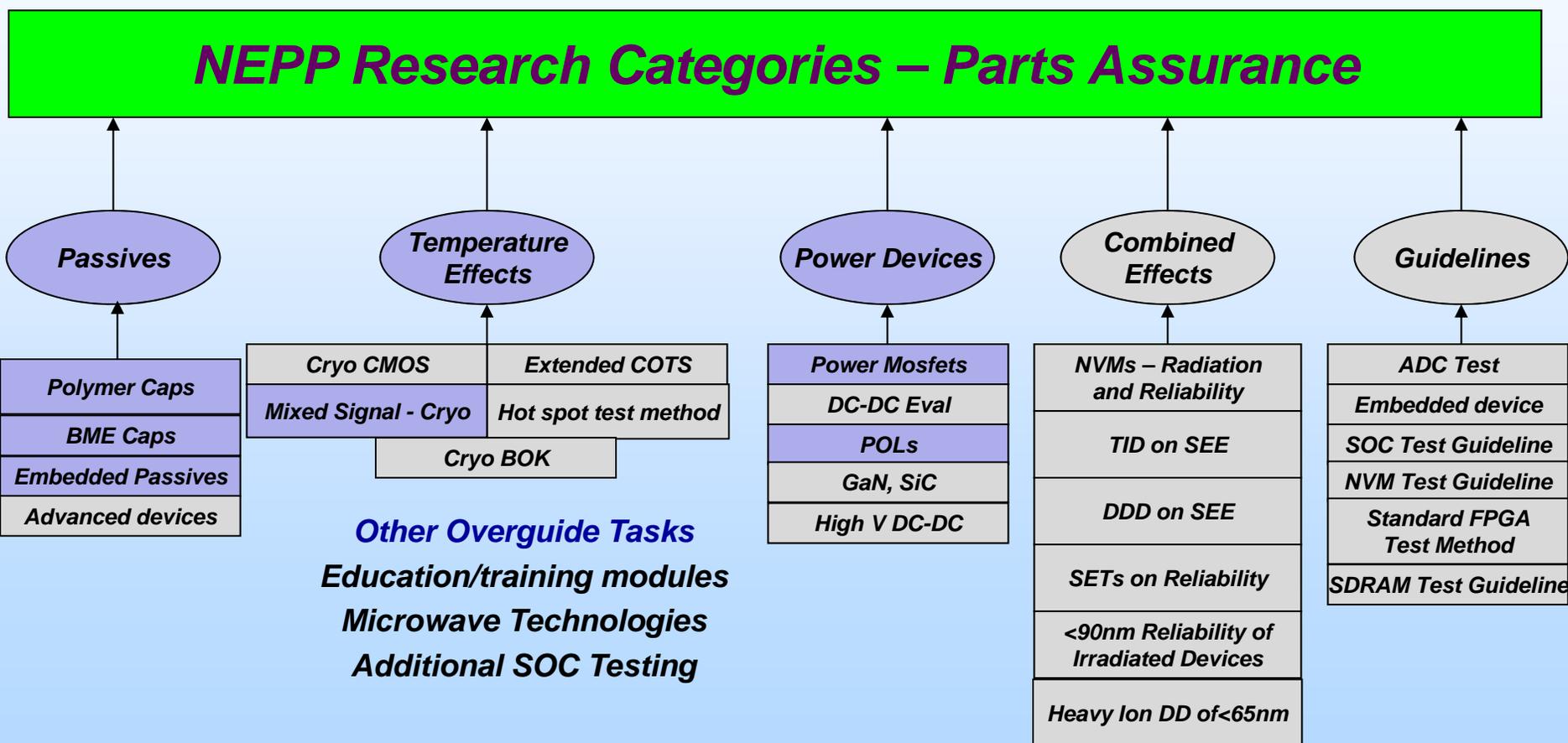
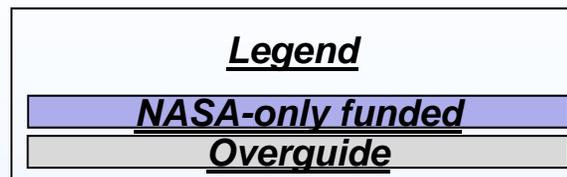
NEPP Research Categories – Parts Assurance





FY11 Parts Plans for NEPP Core (2)

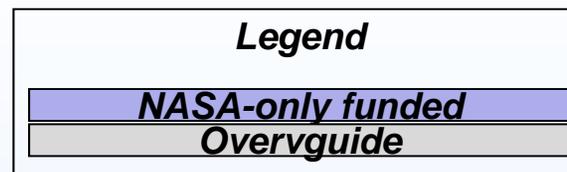
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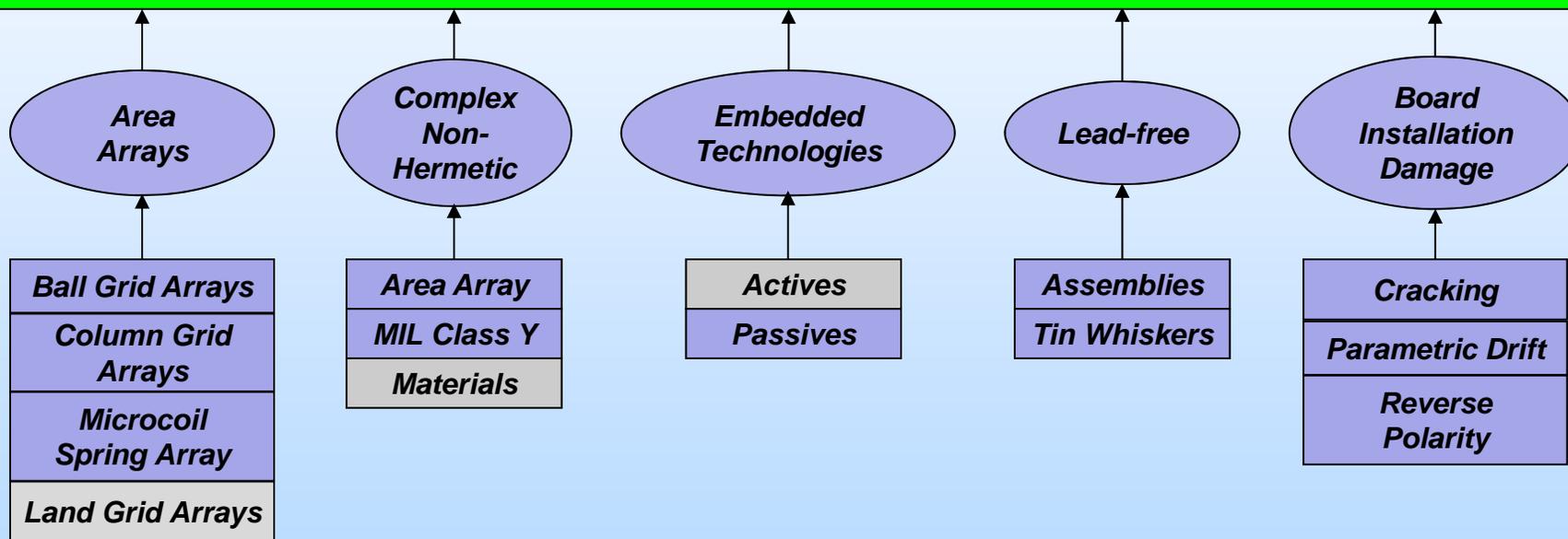


Core Element - Packaging

Core Areas are Bubbles;
Boxes underneath are
variable tasks in each core



-NEPP Research Categories - Advanced Packaging





1st NEPP ETW

This meeting will focus on the presentation of the work being performed under the NEPP Program for the betterment of NASA and the greater aerospace community. This meeting will describe NEPP tasks that provide critical guidance, qualification methodologies, risk trades, and technology insertion information for current and new electronic technologies. This meeting will be of specific interest to flight project managers, system and design engineers, technologists, parts, packaging, and radiation specialists.

The meeting will be held at NASA/GSFC in Greenbelt, MD on June 22-24, 2010 and open to all US citizens from NASA, other government agencies, industry, and academia. Pre-registration is required. We are currently taking people for an overflow waiting list.

[Details can be found at http://nepp.nasa.gov](http://nepp.nasa.gov)



ETW Format

- **2.5 days of presentations**
 - Invited talks on NASA and technology, power system architectures, FPGA studies, counterfeit electronics, workmanship, and more
 - Oral and poster presentations from task and area leads
 - Topical: Ex., Dealing with next generation of device complexity
 - Task specific: Ex., On-Going Radiation Effects on FPGAs - Lessons Learned and Plans
 - Preliminary program at NEPP website
- **Breakout sessions on the last day**
 - Talk to the experts
 - We will have ~ 4 breakout meetings to discuss issues and challenges in specific topic areas
 - This should be set shortly



QUESTIONS?