National Aeronautics and
Space Administration

NASA ‘s Composites Portfolio

Department of Energy Workshop
Fiber Reinforced Polymer
Composites Manufacturing

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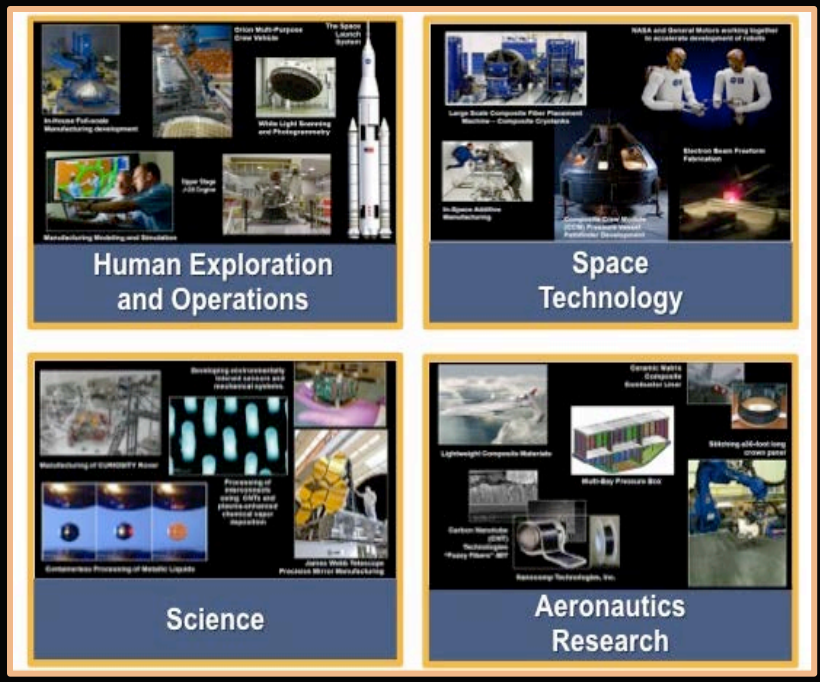
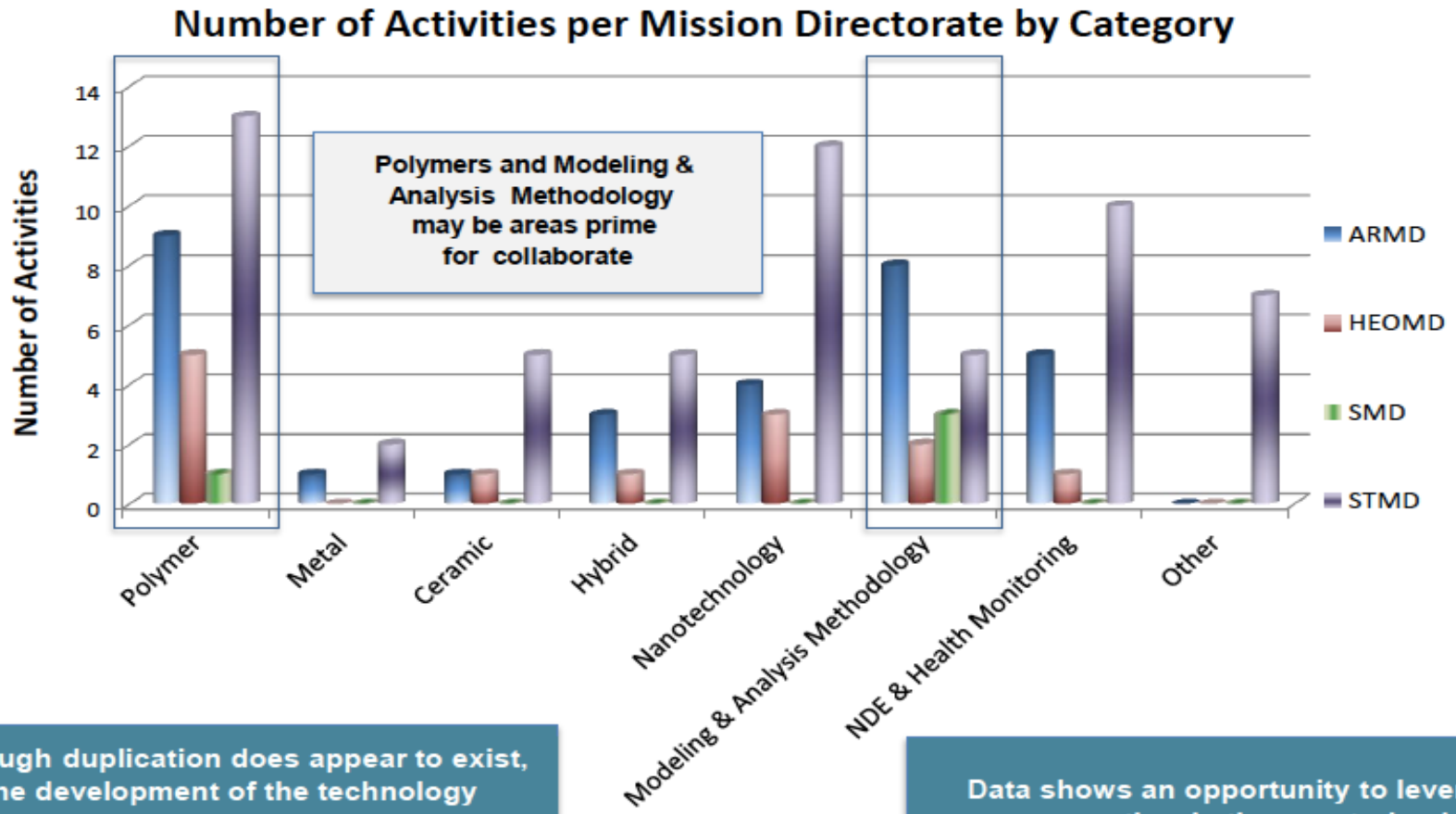
NASA Centers and Mission Areas



Composites support all of the NASA Mission Areas

The NASA Composites Portfolio



Although duplication does appear to exist, the development of the technology is most likely for different applications (e.g. aircraft, launch vehicles, spacecraft)

Data shows an opportunity to leverage expertise in the constrained fiscal environment

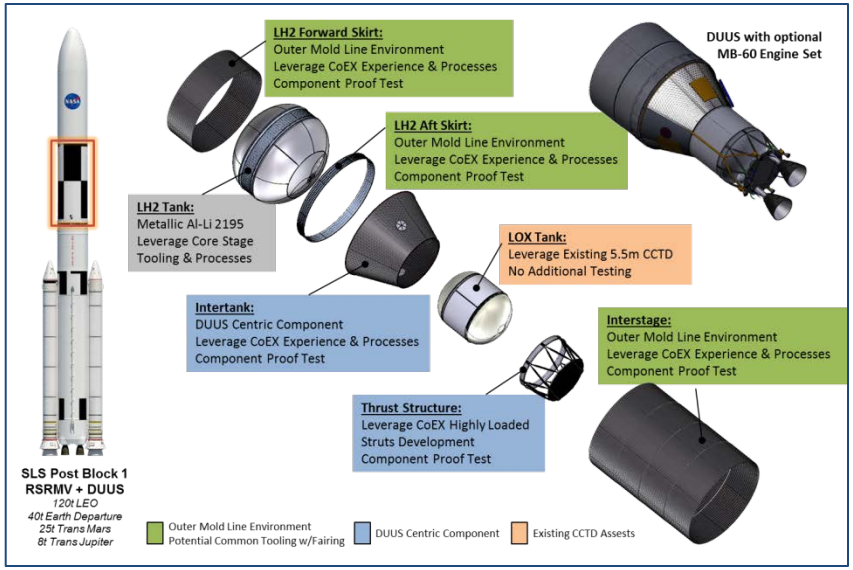
The Problem – The Solution

Table 7.3 Top 5 Polymer Matrix Composite Technology TRLs		
Technology Gap	**Current TRL**	**Expected TRL in 2 years***
Develop out-of-autoclave processes to dramatically reduce costs	4	5/6
Develop a low-mass, cost-effective composite joint design development approach for fracture-critical applications	4	N/A
Develop damage prediction of composite structure	2	3
Develop modeling and simulation of manufacturing processes	3	6
Develop digitally integrated, science-based materials, design, manufacturing, and certification	3	4
Develop in-situ NDI/NDE technology for integrated systems, reduced testing, and cost reductions	3	N/A
Develop composite sensors	4/5	N/A
Develop continuously tow-steered composites for optimized structures	4	N/A
Develop improved structural certification for composite structures	2	3
Develop and infuse new low-cost, high-performance materials	3	5
Develop and characterize passive thermal control materials	3	N/A
Develop in-space repair of damaged composite structures	2	5
Develop rapid/efficient material property development of composites	2	4
Develop composite materials information management	5	N/A
Develop adhesives for cryogenic applications with high G1C/K1C	3	5
Develop hybrid and multifunctional structures for thermal, radiation, impact, and lightweight structural applications	3	5

Develop technologies and capabilities that make missions more affordable, more capable and more reliable **Value to NASA - Value to the Nation**

Significant Projects

Composite Cryotank



James Webb Space Telescope
Primary Mirror Backplane Structure

Advanced Composites Project

- **Reduce timeline to develop and certify composite materials and structures**
- **Boost American industry and help maintain a U.S. global leadership in the field of composite materials**
- **Infuse next-generation, physics-based tools and streamlined processes to accelerate the development and regulatory acceptance of advanced composite structures for aeronautics vehicles manufactured from qualified or industry standard composite materials**

Polymer Matrix Composites Community

- **The establishment of a core team; which represents the NASA centers, directorates, and requisite disciplines.**
- **The creation of a Sub-Community Engineering Network that integrates across requisite fundamental disciplines; such as Materials, Manufacturing, NDE, and Structures.**
- **The development of a foundation for agency-wide collaboration and discipline advancement.**
- **Develop a strategy to address NASA Technical Challenges**
  - Manufacturing
  - Certification / Modeling / Excessive Reliance on Testing
  - Material Property Characteristics
  - Foster Confidence/Familiarity in Use of Composites
  - Address Discipline Unique Challenges
  - Develop/Sponsor composite design, analysis, manufacturing training classes
  - Develop Composite Structures Design guidelines
  - Standards