Breakout Session 1.
Small Space Craft

Concern: Could you elaborate on what is needed for space communication and navigation for deep space?
Response: Industry could help define structural efficiency and the designs that can be manufactured in space. Major constraints are around launching loads, building, and assembling in space. Mixing materials, building your items with as little mass as possible.

Concern: What are you looking for in aviation and control, docking for small satellites and nanosats?
Response: Miniaturization of existing navigation mechanics. The smaller you can make the components the better.

Concern: Micro media and orbital debris. Power systems and measurement systems. What are the considerations for small satellites protection from orbital debris?
Response: Not much of a call for space debris at this time, but we can certainly include it in another subtopic (propulsion or detection/tracking). Guidelines called for space crafts to demonstrate the capability to dispose of space craft debris. You should be rigorous in your study of orbital lifetime and power to actually get past the lifetime of a useful mission. Radiation effects should be a bigger priority.

Concern: What are some of the features, general capabilities and parameters, and environmental tolerance capabilities you are looking for?
Response: Power density, environmental restrictions. Whether they will remain the same over the performance of its lifetime. Technical readiness should be shown. Vibration, shock, acoustic, electromagnetic, vacuum environmental tests are also done and should be considered.

Concern: Communication between smallsats on ground and between satellites. Expand on the problems and what types of challenges you are having with them.
Response: Pointing and power. Then also bandwidth that can be communicated.

Concern: We make design software for complex systems. What are the design needs for smallsats.
Response: Modularity, testing quickly and distribution, standards.

Concern: What needs and opportunities are available for new materials for small space crafts.
Response: Subtopic description is looking for nothing specific, just very general. Always looking for improvements.

Concern: In space power/propulsion, is NASA interested in electrodynamic tethers for power? Can NASA centers assist in testing for deep space?
Response: Yes, there is an interest. NASA can provide help if it's feasible as long as you state it in the proposal.

Concern: Communications systems, high gain antennas and receivers, is there interest in enhancement systems for these technologies? And taking smallsats out into deep space. Would diagnostic prognostic technologies also fall under reliability?
Response: Yes, there is. Second question is also yes. We are always interested in the diagnostics of the smallsats.

Concern: Integrating electrical components - would you need integrated mounting points? Would you be interested in technologies that could be launching loads items?
Response: Yes to integrated mounting points. We need a structure that could also perform multifunctions. And yes, we would be interested in thermo weld items.

Concern: Does NASA have any documentation of reliability requirements for 3-D printing?
Response: This is a rather new area for us. Needs to be stiff enough, cannot change much. Everything should meet the mission needs.

Concern: Does NASA have interest in the length scale of thermo management?
Response: Depends on the scale of the source and how to manage that.

Concern: Power and thermo systems in smallsats and what are the main challenges you are trying to overcome?
Response: No specific technologies, but as you put more and more into these smallsats, heat rejection becomes a problem. Packing more and more in, also means heat becomes a problem. Looking for radiators and ways to dissipate it.

Concern: Smallsat Rendezvous tech. Could you elaborate more on what main technology advance you need?
Response: Scale, destination, size, and number. Inspection, rendezvous, and moving debris. Being able to approach safely. Lidar, RF, mono, stereo.

Concern: Is there interest in smallsats for close formations?
Response: Yes.

Concern: Payload size, if you're below one unit, what's the timeline for getting your technology up in space?
Response: Architecture goes all over the map. Depends on what they do as a function. Also the challenge of coordinating with the other missions. Phase I is six months and Phase II is 2 years. For NASA, it could be months or delayed. 6 months is not uncommon.