Nate B's brother was here. -- *And there was much rejoicing*

Power

- Costs go up for high power budget. Keep in mind minimum purchases. If rolling own solar panels, forget about high efficiency cells. Play with cheap cells. Planetlabs for solar panels. Experiment, see what power budget we can get. Low efficiency cells might result in higher power within budget than higher cost cells.
- 18650 Li-ion cells? Cheaper.
- Glass covers over solar panels? Expensive and not really needed for short duration flight. Use glass if needed due to outgassing, don't use a mix-it-yourself polymer due to outgassing.

Communications

- Tape measure antenna

Command / Data Handling

- Need conformal coat on circuit board, or else leave off soldermask

Imaging

- Make sure video camera has no zoom capabilities - DoD and Spy Satellite concerns
- Cameras - glass optics instead of plastic. Make sure there's no zoom. Biggest issue is bandwidth for downlink. Mask off aperture, conformal coat. Vacuum bake-out in vacuum chamber prior to launch to get rid of all the outgassing stuff.
- Don't want outgassing materials condensing on glass optics while in orbit.
- Can use very very small aperture to look at earth.
- Use video iris to prevent sun burnout.
- Can use neutral density filter to reject 80% of light. Get rid of all IR and UV.
- C-mount with video iris built into camera. Might need something smaller. Voltage controlled iris. Edmund Optics. Look for iris there. Will need to have a light sensor or image processing and drive iris directly. Could get away with filters instead, not looking at anything dark. Pinhole aperture and shutter.
- Midwest Optics - good place to get filters. Industrial market, will happily cut custom parts for one or two-off. Reflecting/Absorption filters. Reflection is probably good due to not wanting to absorb all the heat. Also glass so they won't outgas as much. Might give educational discount. Tell them LEONI/ Andrew Meyer sent us.

Structures

- Can buy premade cubesat bus, they're expensive though. Can make your own. Need contact points with deployment system. Anodize the material when done. Interorbital systems for cubesat buses. Get idea from them. Square tube extrusion with holes cut in it for cubesat frame.
- Can run space safe material in 3D printers

Positioning

- Startracker - webcam, less than a second exposure time plus image processing software
- Magnetorquers are good.

Thermal

- Thermal cycling - thermal swings in orbit, -20 on dark side, 60 on sun side. Tin Lead solder still can be used, yay!
- Build it to survive thermal swings. Heatpipes are too much trouble unless you have something that is very sensitive. Large copper groundplanes on the circuit boards should be sufficient. Radiative heat transfer. Make brackets not thermally conductive as possible. Use steel instead of aluminum.

Planning/Administrative

- Easiest way to get a ride to orbit is to partner with an educational organization. Maybe talk to a High School. Don't need the facilities that a university would provide. Just need people. Highschool will get more attention, as not many high schools do this sort of thing. Have a plan to deal with administrators.
- Do not use propulsion systems - will concern launch partner as to pressurized fuel tank, will concern DoD as to potential weapon usage
- http://outgassing.nasa.gov
- Beware of using moving parts due to outgassing from lubes. Vacuum grease.
- Project management is essential. Documentation is also essential, due to team member flux.
- Coincide primary build time with fall semester? Get FIRST robotics kids to help out and learn stuff. Maybe have them build the camera servo gimbal.Also look for Science Olympiad and Engineering Olympics schools. Maybe FIRST kids in fall then SO and EO kids in spring. STEM Education, Resume padding.

Build/ 

- Portable clean room, clean tent, work bench with a constant uniform flow of clean air away from the bench. Laminar flow bench.
- Find someone with a vibration table and get vibration test profile from launch provider, verify satellite will survive.

- Satellites tend to rattle in launcher in rocket, high frequency vibration is an issue. Titan III is worst vibration profile ever. Shock specs also important.
- Need FEA for shock analysis.