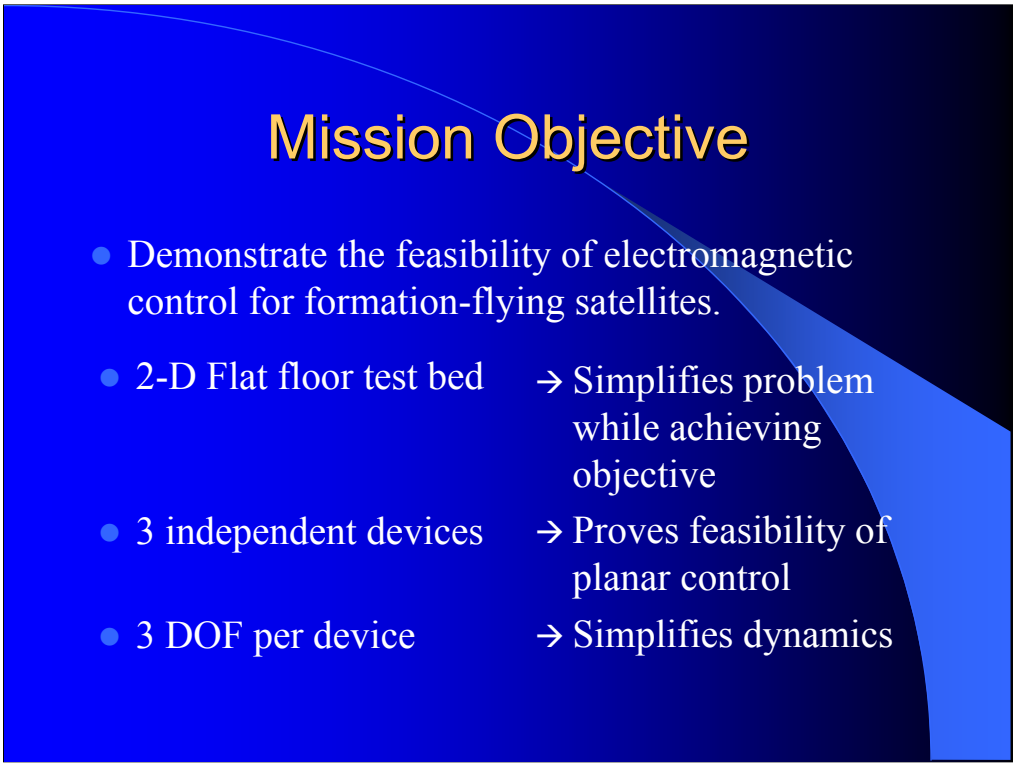
CDIO EMFF Test Bed Design Concept

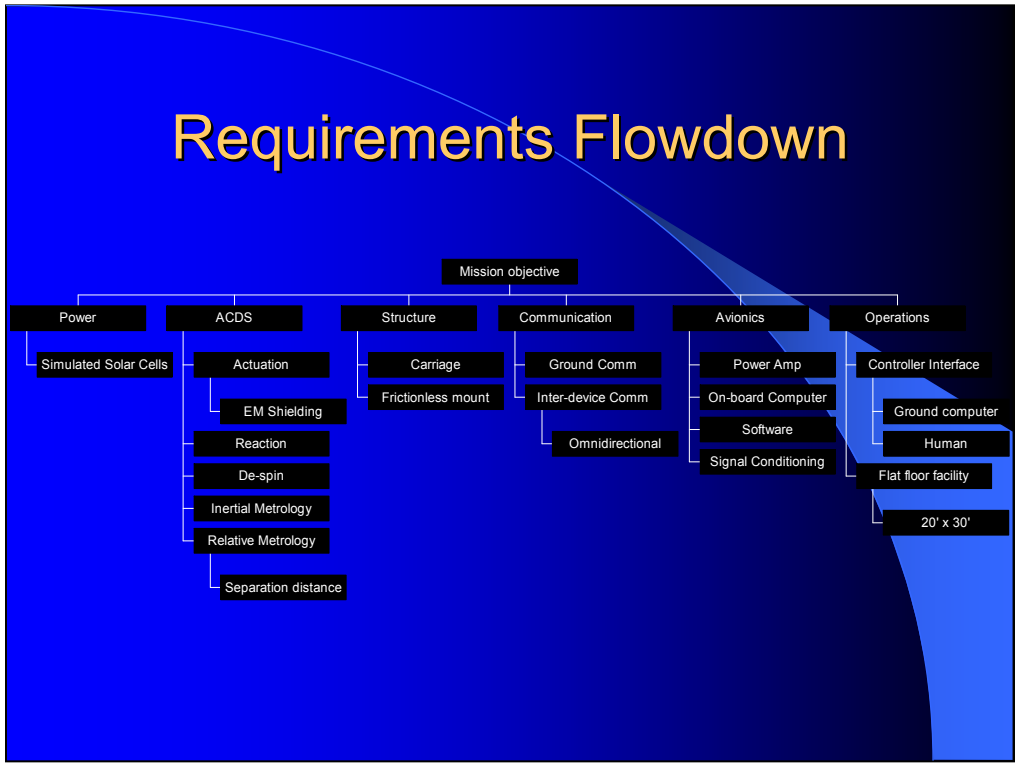
CDIO Space Systems Product Development

Databasing Team

21 February 2002



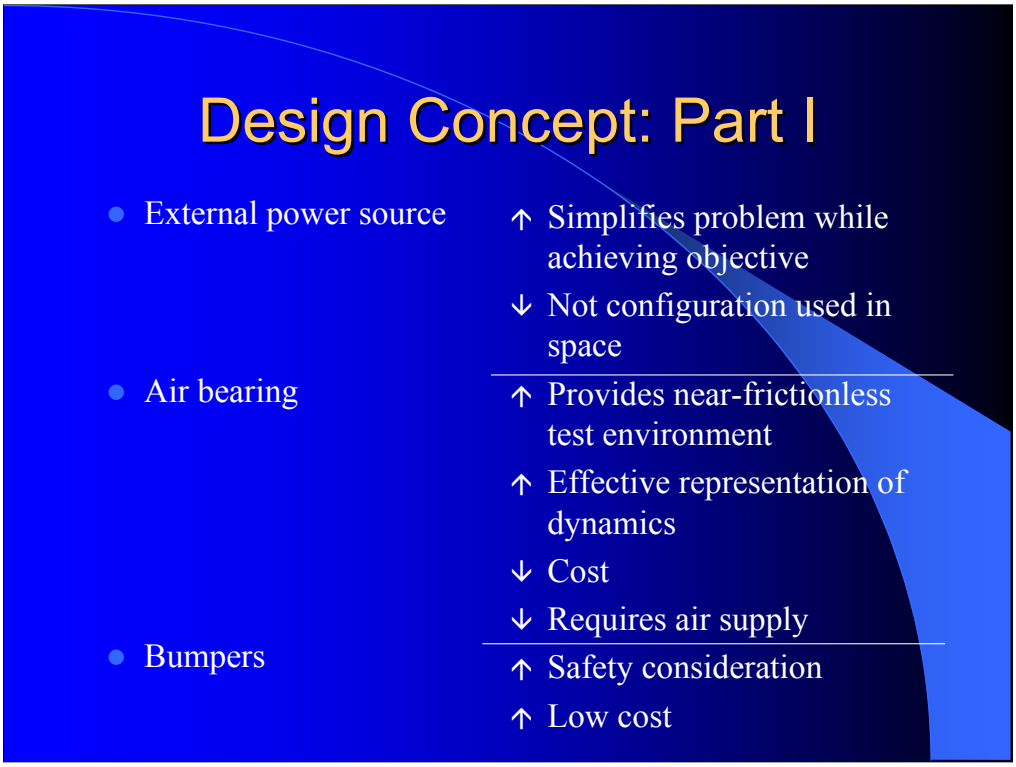
Planar control vs. linear control… it takes 3 points to make a plane. Plus, if we can prove controllability for 3 devices, adding more should be… trivial…



Separation distance: O(10cm)-O(1m)

Design Trades

- Mass
- Cost ($)
- Time
- Control accuracy
- Control precision
- Electrical power (current, voltage, resistivity)
- Feasibility
- B-field

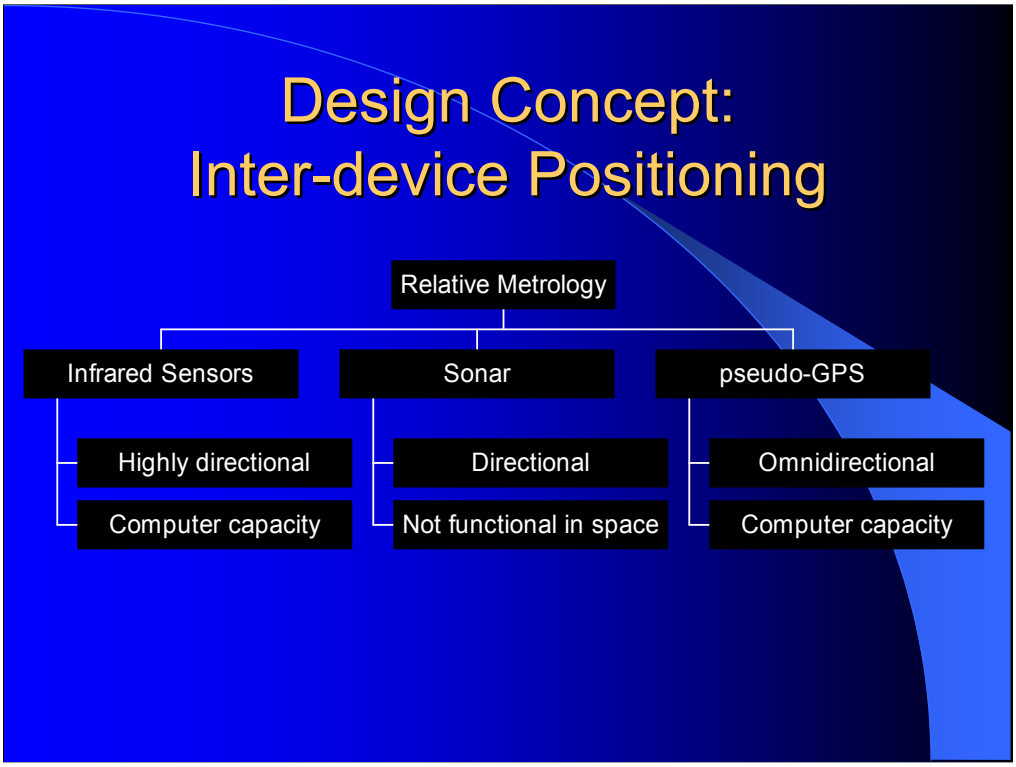


Power: Also, can take more data at various power levels.

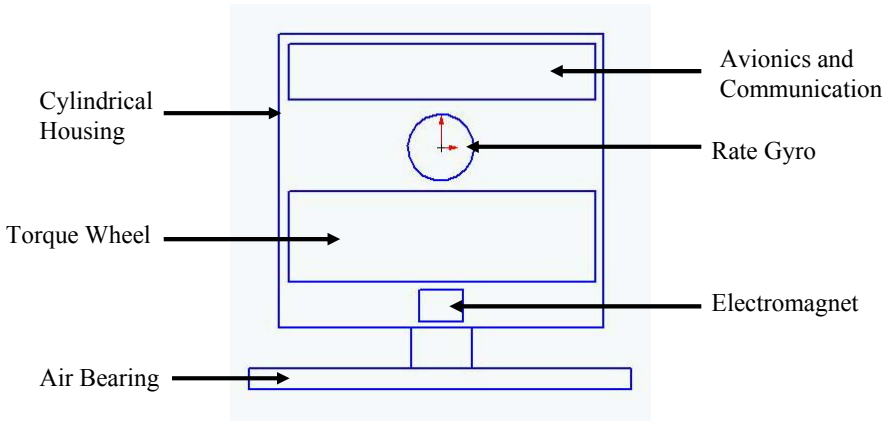
Design Concept: Part II

• One electromagnet, reaction wheel assembly per device	↑ Permits full range of motion ↑ Simplified dynamics ↑ Less mass ↓ Need more for control of more DOF
• All circuitry oriented to move with EM package (aligned with field)	↑ Reduces magnetic interference with circuits ↑ Reduces need for shielding
• Shielding using high-permeability materials	↑ Prevents magnetic interference ↓ Mass vs. cost tradeoff

Design Concept: Inter-device Positioning

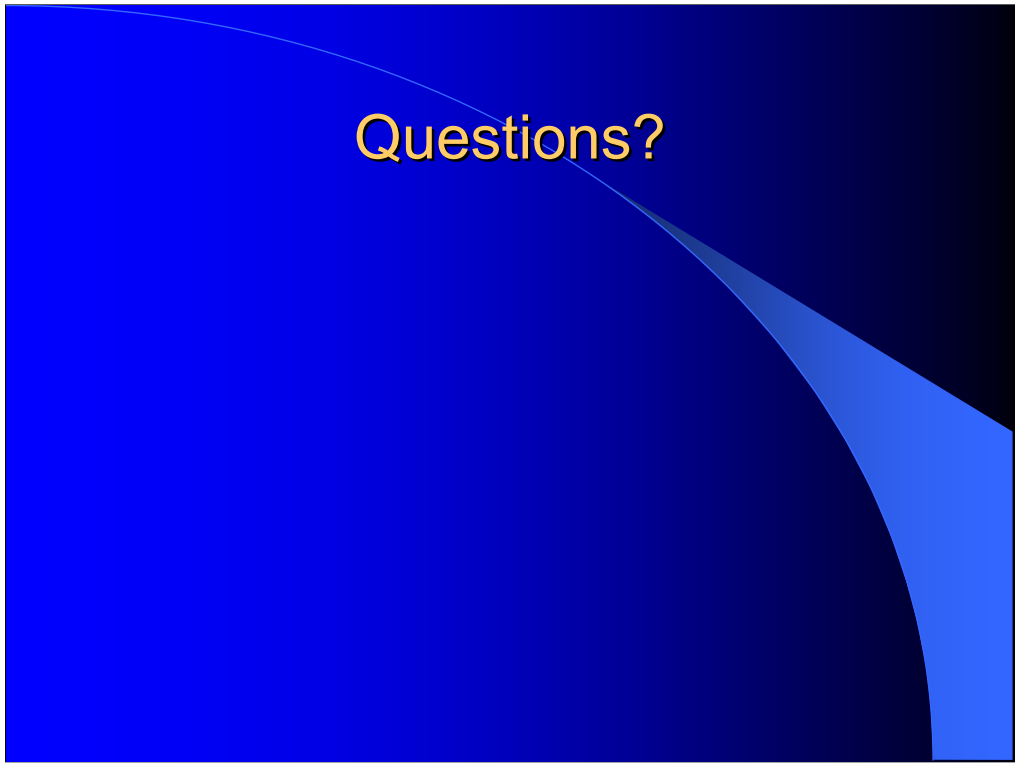


Design Concept



Operations Concept

- Human interface via laptop computer
  - ↑ Familiar to users
  - ↑ Portable
  - ↑ Supports adequate software packages
  - ↓ Not used in actual space mission
- Ground/device communication via RF wireless modem
  - ↑ Applicable to actual operational situation
  - ↑ Fast
- Disturbance rejection autonomous; no input required
  - ↑ Simulates actual operational situation
  - ↓ More complicated avionics


Questions?