CubeSat Applications (Part II)

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> Technoweek 2019 Barcelona

MISSION DEVELOPMENT







Main Design Discussions



Main Design Discussions









CubeSat Friendly Characteristics Acceptable to modify initial mission requirements Is 80-70% Solution OK? **Consider Multiple Spacecraft Options** Provide Reliability & Capability Maintain Simple Spacecraft High risk tolerance Economically Feasible Mission



Education Specific Characteristics **Institution Characteristics Provide Additional Constraints** Education level (MS, PhD, High School, . . .) Areas of expertise/focus (RF, ADC, . . .) Experience level New Players Require Simple Projects

Infrastructure and skillset development

Funding levels

CubeSat Process

Flexible Mission Requirements

Spacecraft Mission Requirement Options

CubeSat Process Guided by Feasibility Studies

Flexible Mission Requirements

Spacecraft Mission Requirements Feasibility Studies CubeSat Constraints

Institution Constrains

Requirement Modification Example





Requirement – Camera shall always point at the Earth



Cal Poly | CubeSat Training Course | CubeSat Mission Selection

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Program

Program

PROGRAM

SATELLITE

Program Beyond a Single Spacecraft

Initial Infrastructure development is Important:
▶ Training Local Personnel
▶ Facilities

Simple First Satellite
Higher Probability of success

Continually Improve Capability



Team

Small Core Team Schedule Cost **Highly Integrated System Minimum Management Layers Multidisciplinary Composition & Attitude** Willing to Learn

Overall System Understanding



Spacecraft

Complexity Kills (KISS applies)
 Develop Simplest Spacecraft to Fulfill Mission
 Limit In-Vehicle Redundancy (Use Redundant Vehicles)

Allow Creative/Innovative Solutions
Question Traditional Spacecraft Approaches

Understand True CubeSat Capabilities
Commercial components
Experience

Complexity Growth



Increased Complexity and Failure Modes
Experience and Cost Required

Conclusions

Traditional Space doesn't always apply to **CubeSats Mission "Requirements" Flexibility** Build a program, not just a CubeSat Start simple, add complexity with experience Use uniqueness to your advantage

Be creative!!!

Thank You

Questions?