Overview of the AeroCube Program and Applicability to Capacity Building

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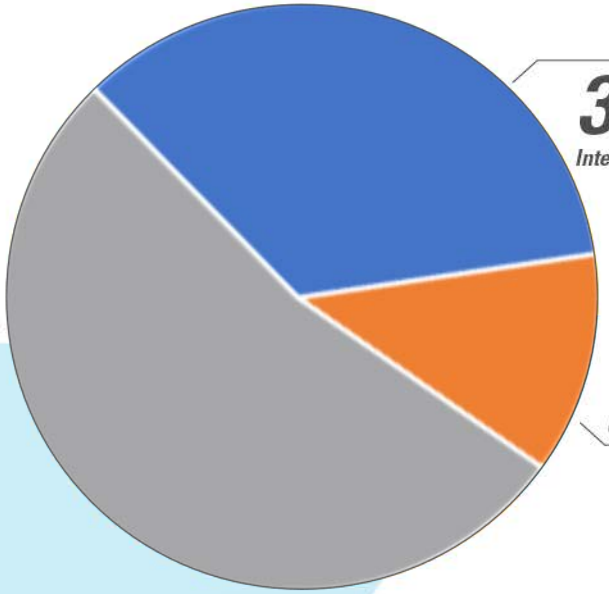
AEROSPACE BY THE NUMBERS

3,900 Employees

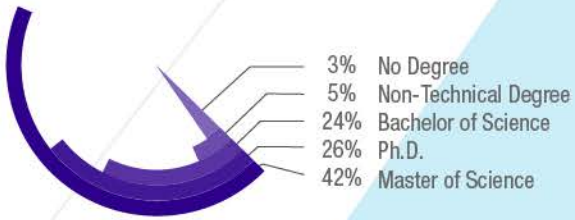
73% TECH STAFF

Over 750 Ph.D.'s

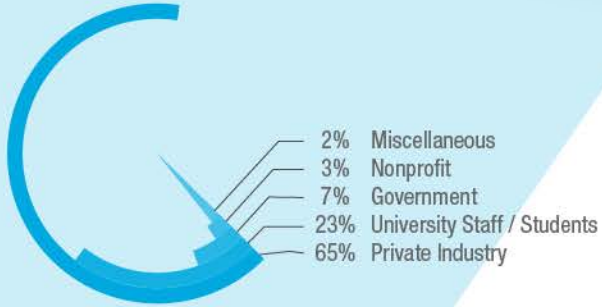


TECHNICAL STAFF DETAILS

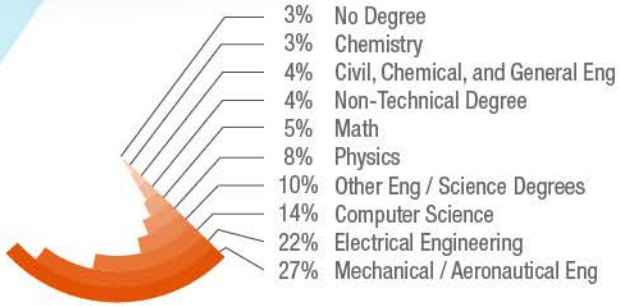
DEGREES OF TECHNICAL STAFF



PREVIOUS AFFILIATIONS OF TECHNICAL STAFF



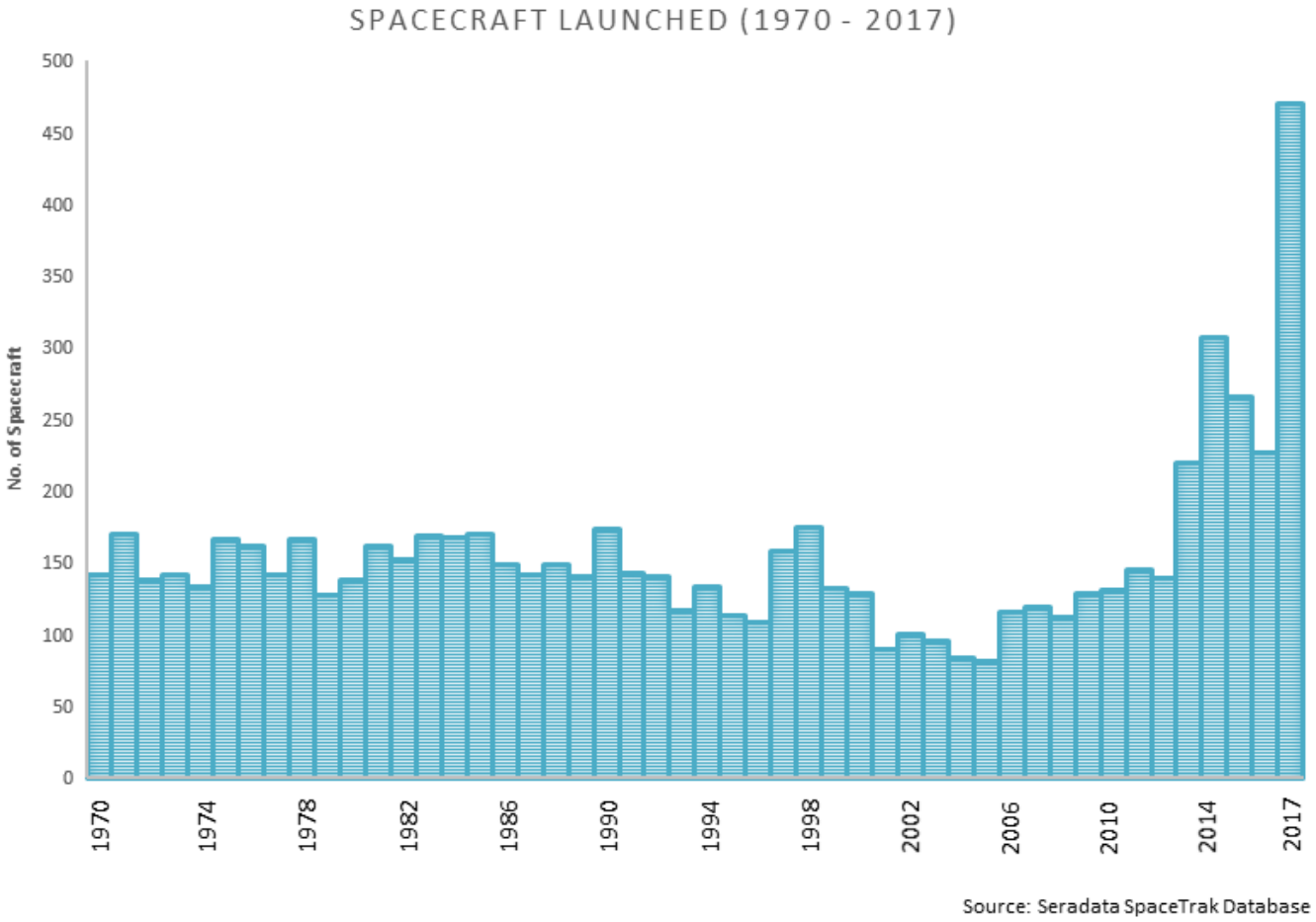
DISCIPLINES OF TECHNICAL STAFF



Aerospace was created in 1960 as a California Non-Profit Corporation

Growth in satellite launches

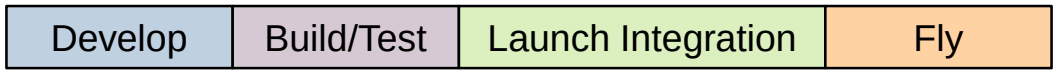
Last five years of activity show exciting growth



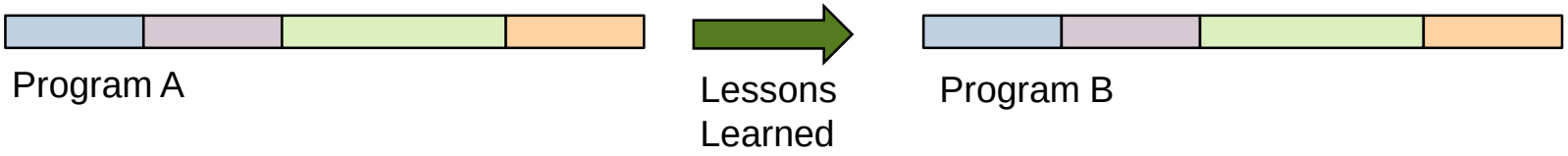
Boom in launches in 2017 shows the beginning of a new era of space activities

CubeSat Paradigm

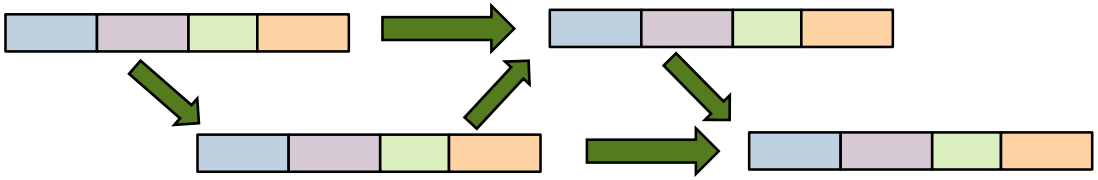
CubeSat Paradigm enables rapid technology development



Traditional Satellite Model



CubeSat Paradigm



Source: Welle, Richard. The CubeSat Paradigm: An Evolutionary Approach to Satellite Design. 32nd Space Symposium.

Aerospace Corporation has been building CubeSats for over 15 years

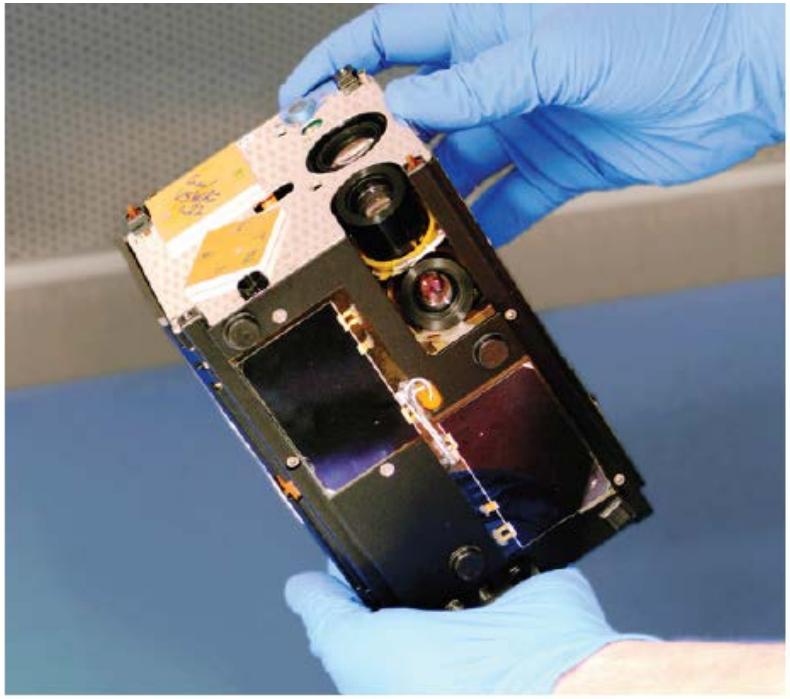
Aerospace Corp history with SmallSats/CubeSats

AeroCube Program

- 28 small satellites constructed and launched by Aerospace
- 12 orbiting CubeSats currently operating
- 7 CubeSats currently in development
- Ground System and operations
  - *Three ground sites*
  - *Automated satellite operations*

Example Mission:

- Optical Communication and Sensor Demonstration (OCSD) is a demonstration mission for laser communications, proximity operations and a steam thruster

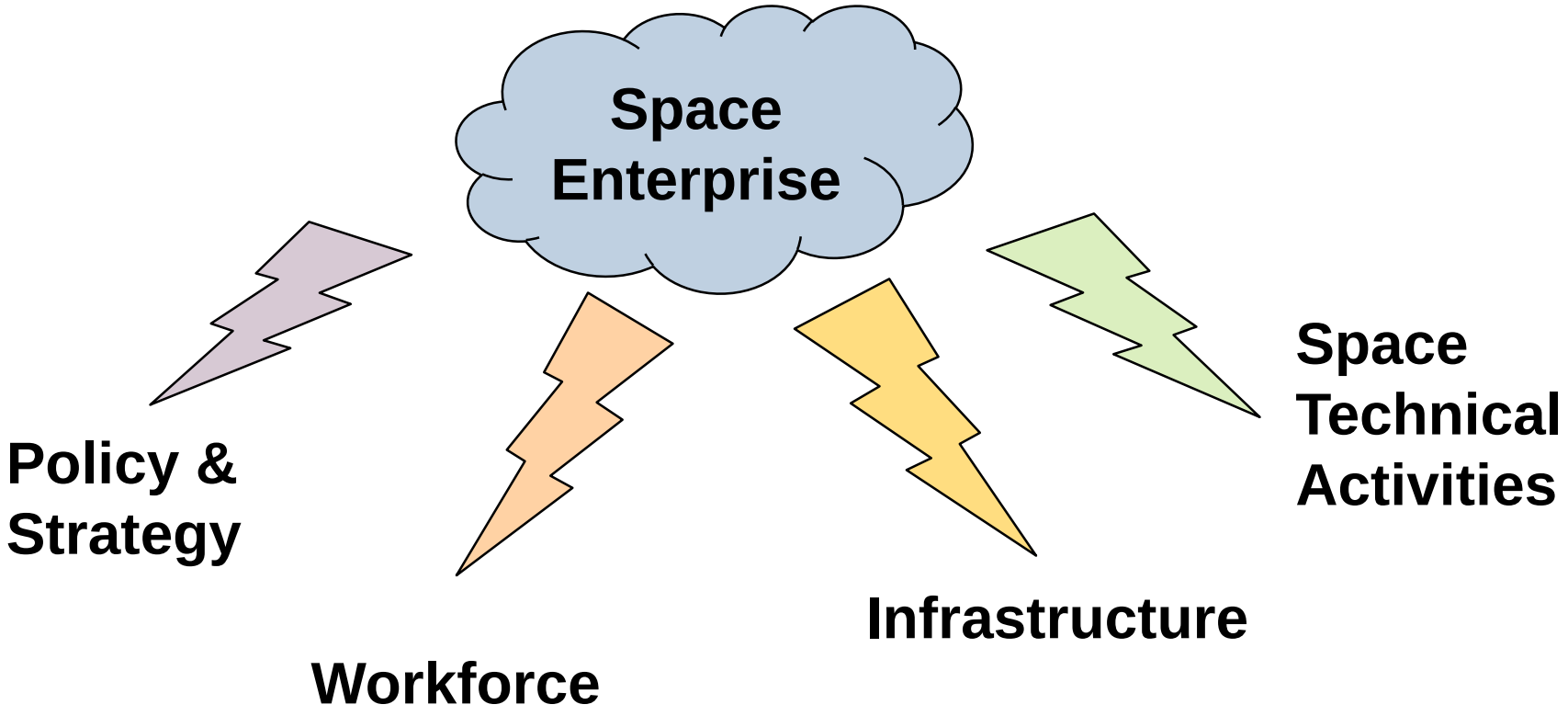


The NASA-supported Optical Communication and Sensor Demonstration (OCSD), launched in September 2015, and demonstrates laser downlinks from LEO to ground at up to 200 Mb/s, an improvement of a factor of 10 to 100 over existing CubeSat-scale communication systems.

AeroCube program leverages the CubeSat paradigm for rapid technology development

Capacity Building Around A New Paradigm

Long-term foundational planning for sustainable development



Plan for Growth, Speed, and Evolution!

Policy & Strategy

Policy & Strategy

International

Partnerships & Agreements

Knowledge Sharing
Cost Sharing
Expertise Access
Foreign Investment

Treaty Participation

Confidence Building
Representation
Influence

Treaty Compliance

Confidence Building
Best Practices

National

Regulatory Framework

Treaty Compliance
Clear Structure
Foreign Investment

Objectives & Interests

Messaging
Coordination
Partnerships

Directives & Approach

Industrial Base
Efficiency
Budget Planning

Policy and Strategy should anticipate future growth

Workforce

Workforce

Education

Professional Development

Early Development

Literacy
STEM Education
Initial Interest
Sustained Engagement

University Program

Foundational Knowledge
Specialized Knowledge
R&D
Technology Development
Knowledge Generation

Specialized Training

Space Environment
Orbital Dynamics
Systems Engineering
Space Law & Policy

Direct Experience

Formulation
Manufacturing
Testing
Analysis
Programming
Operations
Management

Space sector sustainability is driven by an educated and experienced workforce

Infrastructure

Infrastructure

Development

Manufacturing Facilities

Ground Stations
Spacecraft
Payloads
Launch Systems
Integration
Software
Computing Resources

Testing Facilities

Nominal Operations
Environmental
Reliability
Lifetime
Survivability
Shock/Impact
Vibration

Launch & Operations

Launch Facilities

Integration Facility
Fueling Facility
Launch Pad
Range Control
Command & Control

Operations Facilities

Ground Stations
Communications
Command & Control
Telemetry Analysis
Data Pipeline
Software

It's more than just satellites!

Space Technical Activities

Space Technical Activities

Program Definition & Development

Application Selection

Scientific
Exploration
Telecommunication
Earth Observation
Technology Demo
Emerging Applications

Technical Implementation

Program Architecture
Systems Engineering
Constellation Design
Ground Network Design
Manufacturing
Testing
Software Development

Launch & Operations

Launch Operations

Launch Vehicle
Mass to Orbit
Orbit Selection

Satellite Operations

Operations Concept
Mission Control
Post-Launch Check
Collision Avoidance
Performance Tracking
Anomaly Correction
End of Life
De-Orbit

These are the activities that make the headlines and inspire the imagination!

Capacity Building for Sustainable Development

Start small but keep the big picture in mind

- There are many affordable entry points to space activities
  - *Data analysis and interpretation*
  - *Mission Collaborations*
  - *CubeSats*
  - *Ground Stations*
- Small steps can lead to big accomplishments
  - *A national space strategy will guide space activities toward national long-term goals*
  - *This ensures that each small investment advances long-term sustainable growth*
- Persistence and commitment is essential
  - *Space is hard!*
  - *There will be failures and setbacks, but these are learning opportunities*
  - *Keep the long-term strategy in mind when faced with these setbacks*
- Be adaptable
  - *The space sector is rapidly changing*
  - *Future developments cannot always be predicted but should be leveraged*

Plan for Growth, Speed, and Evolution!

Thank you
Obrigada
Gracias

Questions?

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