

# Crossing the Chasm: Leveraging University and Industry Partnerships for Success

Tricia Hevers  
August 2014

# Presentation Overview

BDS | PhantomWorks

## ■ Background

### ■ Cornell University Satellite (CUSat)

- Launched September 29, 2013
- Program Manager and ACS Lead

### ■ Boeing Space & Intelligence Systems

- Joined August 17, 2012
- GN&C and Systems Engineering
- Program Manager of Boeing's Nanosat University Engagement Project



## ■ Goal: Introduce the Nanosat Project

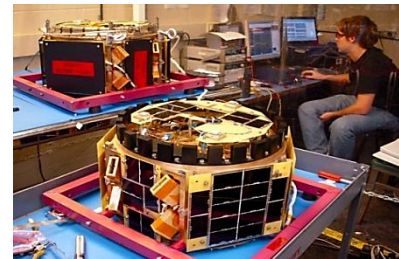
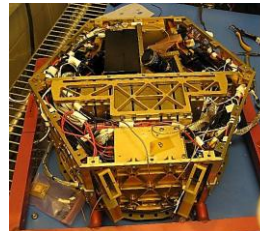
- Bridge the Innovation Chasm
- Engage with top universities
- Launch new university partnerships



# University Programs: Day-In-The-Life Experience

BDS | PhantomWorks

- **University satellite programs with real launch opportunities:**
  - AFRL University Nanosat Program (UNP)
  - NASA's Educational Launch of Nanosatellites (ELaNa) program
- **Students design, build, and fly innovative mission**
  - Cutting edge technologies
  - Extremely agile timeframe
- **Student leaders gain exposure to common, industry challenges:**
  - Customer interactions
  - Project management
  - Mentoring



**University satellites offer innovative missions and technologies**

# Growing Need for Change: No Man is an Island

BDS | PhantomWorks

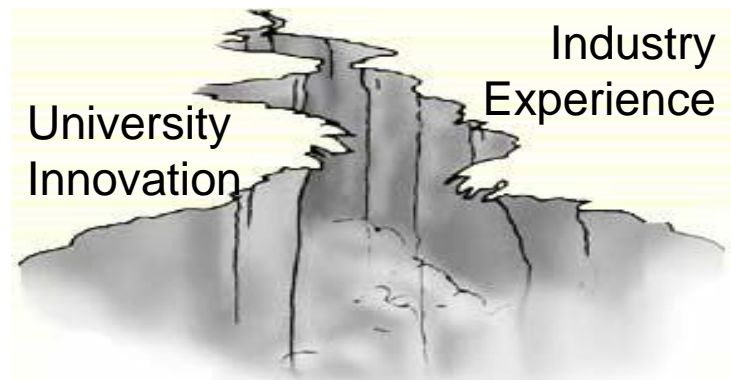
- **Satellite market and funding avenues are changing**

- Sequestration: “Do more with less”
- Increasing demand for small satellite solutions
  - Low cost electronics enable quicker time to market



- **Universities and Industry have made distinct contributions**

- **Universities are hotbeds of innovation**
  - Demonstrating novel technology
  - Executing with extreme agility
- **Industry creates marketable products**
  - Vast mission and tradecraft knowledge
  - Customer and mission intimacy



**Crossing the chasm between university innovation and industry experience requires collaboration.**

# **Phase 1: How does a big company think small?**

# How Does a Big Company Think Small?

BDS | PhantomWorks

- **Boeing's Advanced Space & Intelligence Systems (AS&IS) established a university partnership program in 2013**
- **Competitively select and fund a nanosatellite payload**
  - What can you do with \$25k?
  - Solicited proposals from top 15 universities
  - Demonstrated highest likelihood of transition
- **Selected St. Louis University**
  - Executing a \$25k contract
  - Delivering:
    - Rendezvous, Proximity Operations (RPO) payload
    - Propulsion system
  - Candidate payload for future SLU launch opportunity



SAINT LOUIS UNIVERSITY

**First Phase: Demonstrate successful hardware delivery.**

# Return on Investment

BDS | PhantomWorks

- **Developing customer driven solutions**
  - Offer new, innovative payloads
  - Market to potential customers
- **Deliverables**
  - Elements of a 2-satellite system:
    - 1.5 U RPO payload
    - RPO target spacecraft
  - 6 DOF cold gas propulsion system
  - Payload and mission documentation
- **Training the next generation**
  - Significant industry insight
  - 2 program managers, 20 students

Done?	Milestone
✓	Program Kickoff
✓	Mission Concept Review
✓	Design Freeze
✓	Hardware Ordered
✓	Dynamics/Mission Ops. Review
	Mission Ops. Update
	I&T Unit Testing Results
	I&T System Level Testing
	Pre-Ship Review
	Final Documentation Delivery
	Ship Hardware
	Delivery at Huntington Beach



**Developing payloads and training the next generation.**

**Phase 2:  
Where is the project going?  
How can I be involved?**



# Strategic Vision

BDS | PhantomWorks

- **Leverage academic partnerships to strengthen customer relationships by developing innovative technology**
  - AFRL University Nanosat Program (UNP)
  - NASA's ELaNa program
- **Recruit top talent**
  - Train new engineers
  - Retain talent through engagement
- **Rapidly respond to evolving customer needs**
  - Offer customer-driven solutions with enhanced mission success
    - Satisfy existing customer missions
    - Creating new market areas



**Phase 2: Influence customer outreach programs, recruit top talent, and address new customer needs.**

# Strategic Vision: Focus on Mutual Success

BDS | PhantomWorks

## ■ Build a portfolio of top schools

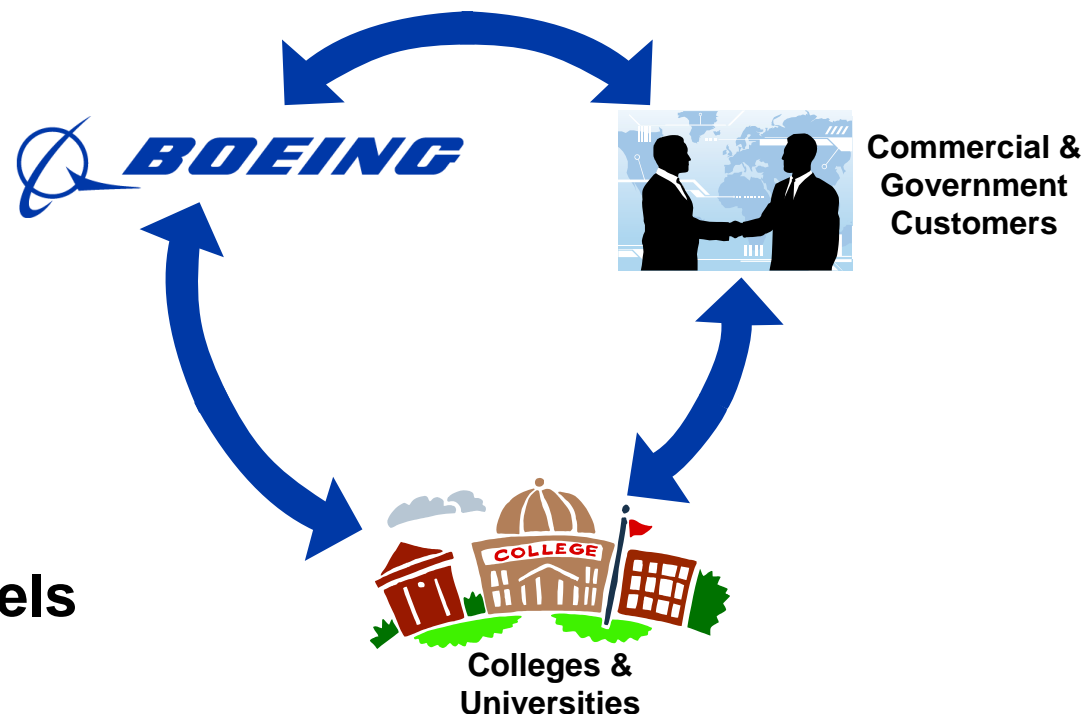
- Proposal partners
- Collaborative research
- Mentoring relationships

## ■ Breadth of missions

- Communications
- Earth observation & monitoring
- Space Situational Awareness
- Planetary sciences

## ■ Innovative business models

- Novel, low cost solutions
  - “Build it better”
- Non-traditional funding schemes



**Collaborating to create a “Portfolio of Success.”**

# Value Proposition for Partnerships

BDS | PhantomWorks

- **Provide specific, high level mission value**
  - Focus on mission utility applications
- **Be realistic**
  - Specify clear deliverables
  - Realistic schedule
- **Address risks**
  - “Go ugly, early”
  - Don’t include open-ended requirements
- **Demonstrate university support**
  - Responsiveness of contracts office
  - Willingness to negotiate terms



**Realism and openness enable successful partnerships.**

# The Reward of Innovation

BDS | PhantomWorks

- **Establishes a test-bed for innovative technology by yielding marketable benefits today**
- **Bridges the Innovation Chasm by connecting**
  - The right people
  - Innovative technology
  - Strong customer relationships
  - Synergy with top researchers
- **Positions us to address future opportunities by**
  - Investing in Boeing's product lines
  - Leveraging innovative technology investments
  - Pursuing mentoring relationships with top universities



**Partnering to create the next “big” thing  
in Low Earth Orbit and beyond.**

# Thank You

BDS | PhantomWorks

**I would like to thank the following people for their help and support:**

Dr. Michael Swartwout, Denana Vehab, Tom Moline, Bryan Welsch, Greg Berg, Erik Daehler, Bob Friend, Gary Henry, Tom Robles, Brad Hudson, Jeannette Martinez, Victor Cabias, Andrew Robertson, Alex Wilson, Julia Jimenez, Margaret Ryan, Amelia Flood, David Klemes, Rich Milford, Kenny Chong, Cheryl Sampson, Joshua Kennedy, Phantom Phoenix Team, the AFRL's University Nanosat Program (UNP), NASA's ELaNa Program, Space Systems Research Laboratory, Saint Louis University: Parks College of Engineering, Aviation and Technology, and the Rascal Team

**and the many others who have helped along the way.**

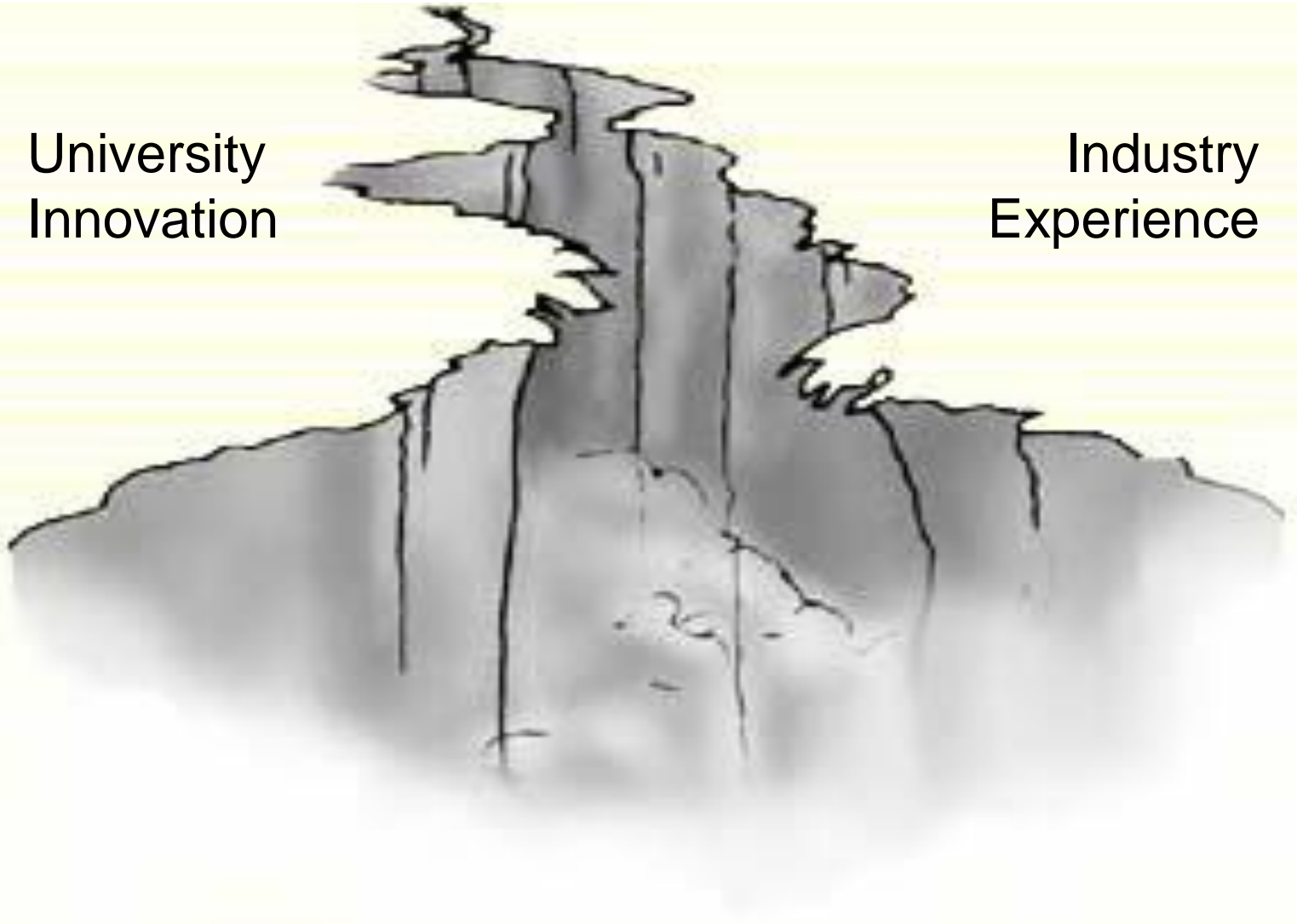


# Questions?

BDS | PhantomWorks

University  
Innovation

Industry  
Experience



# References:

BDS | PhantomWorks

- Hevers, T., Daehler, E., Peck, M. 2013. “Applying University Small Satellite Program Lessons to a Career in the Aerospace Industry,” Proceedings of the AIAA/USU Conference on Small Satellites, Technical Session IX: Standards and Education, SSC13-IX-6.  
<http://digitalcommons.usu.edu/smallsat/2013/all2013/112/>
- John Donne: Meditation XVII
- SpaceX Falcon 9V1.1 launch from Vandenberg AFB (Gene Blevins/ LA Daily News):  
<http://world-defence-review.blogspot.com/2013/09/photos-spacex-falcon-9-v11-launch-from.html>
- SLU and Rascal:  
<http://astrolab.slu.edu/AstroLab/Main.html>  
<http://parks.slu.edu/research/centers-labs-facilities/ssrl/>

# PhantomWorks