

Universities Space Technology Education Program (USTEP)



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CubeSat Developers Workshop
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“The only source of knowledge is experience” - Albert Einstein

What is USTEP?

- Hands-on **Engineering Workforce Development** program concept to increase the number and diversity of undergraduates with quality **hands-on space-related technology experience**
- A **cooperative university/government/industry program** to improve student and institutional preparedness for NewSpace careers
 - Engineering
 - Science
 - Exploration
 - National Security
 - Economic Growth

Context

- Hands-on experience is essential! Paper exercises and computer simulations cannot replace **lab bench or flight hardware/software experience**
- **Opportunities have been declining** for direct hands-on student involvement on balloon, suborbital and traditional space missions
- **NewSpace is growing** and needs engineers and scientists ready to work
- There is **need and opportunity for coordination, collaboration and sharing** to optimize the university hands on learning experience and fuel the pipeline of NewSpace professionals
 - **Complement and extend existing programs for** education, science and space-related technology development
 - **Leverage hands-on experiences** to broaden student opportunities
 - **Share local expertise** more broadly with a **more diverse population**

USTEP Scope of Hands-on Projects

Relevant hands-on **space-related technology** experiences are not limited to spacecraft, and can include:

- Robotics, surface mobility platforms (e.g., rovers, crawlers), ROVs
- Airborne remote sensing instrumentation, UAVs, flight control systems
- Balloon-borne instrumentation
- Suborbital sounding rocket payloads
- Attached payloads to ISS or other spacecraft
- CubeSat and SmallSat instruments, spacecraft design, mission development
- Coordinated small spacecraft/cubesat constellations
- Satellite data receiving ground stations
- etc.



The Solution

- Create a **cooperative program** for hands-on space-related technology education that increases the number and quality of student engagement opportunities to work with space-related hardware
- Facilitate **proactive sharing and intentional interaction** among a cohort of universities, government researchers and aerospace industries
- Facilitate opportunities for **collaboration and cooperation among advanced and aspiring colleges and universities**, government and industry partners
 - Shared web-based repository of resources
 - Workshops (physical and virtual)
 - Grants to universities
 - Opportunity for government and industry in-kind contributions

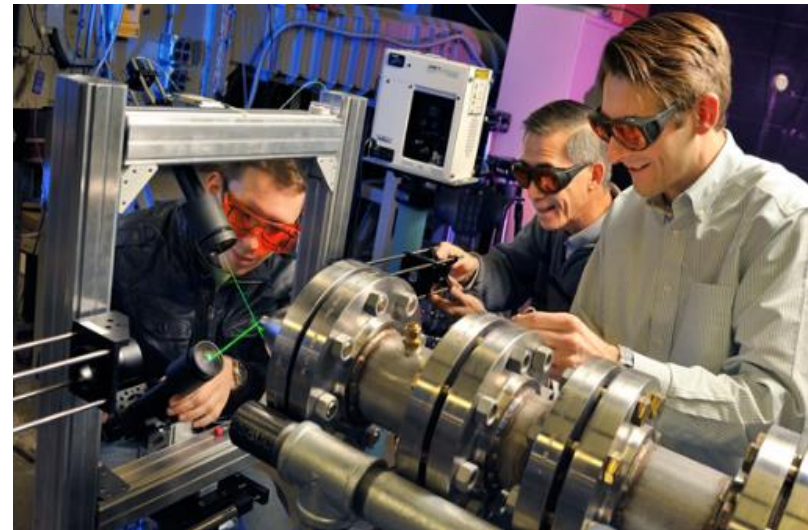
Web Repository of Shared Resources

- Relevant news from the field
- Course syllabi, content, teaching materials from participants
- Lab exercises, implementation guides
- Lessons learned
- Best practices
- Student opportunities (internships, job postings)
- Student project blogs ...
- Etc.



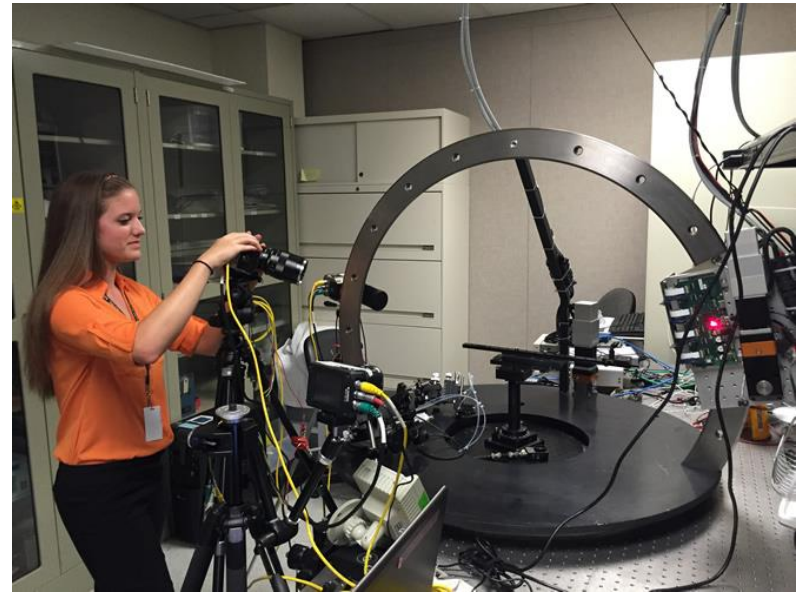
Workshops, Seminars

- Technical topics, management skills
- Subject Matter Expert lectures from the field
- Industry or government standard documentation
- Standard processes, procedures, practical advice
- Regulatory guidance, export control
- Proposal writing skills
- Teaching, learning methodologies, assessments
- Senior capstone presentations, etc.



Sub-grants to Universities (to broaden student participation)

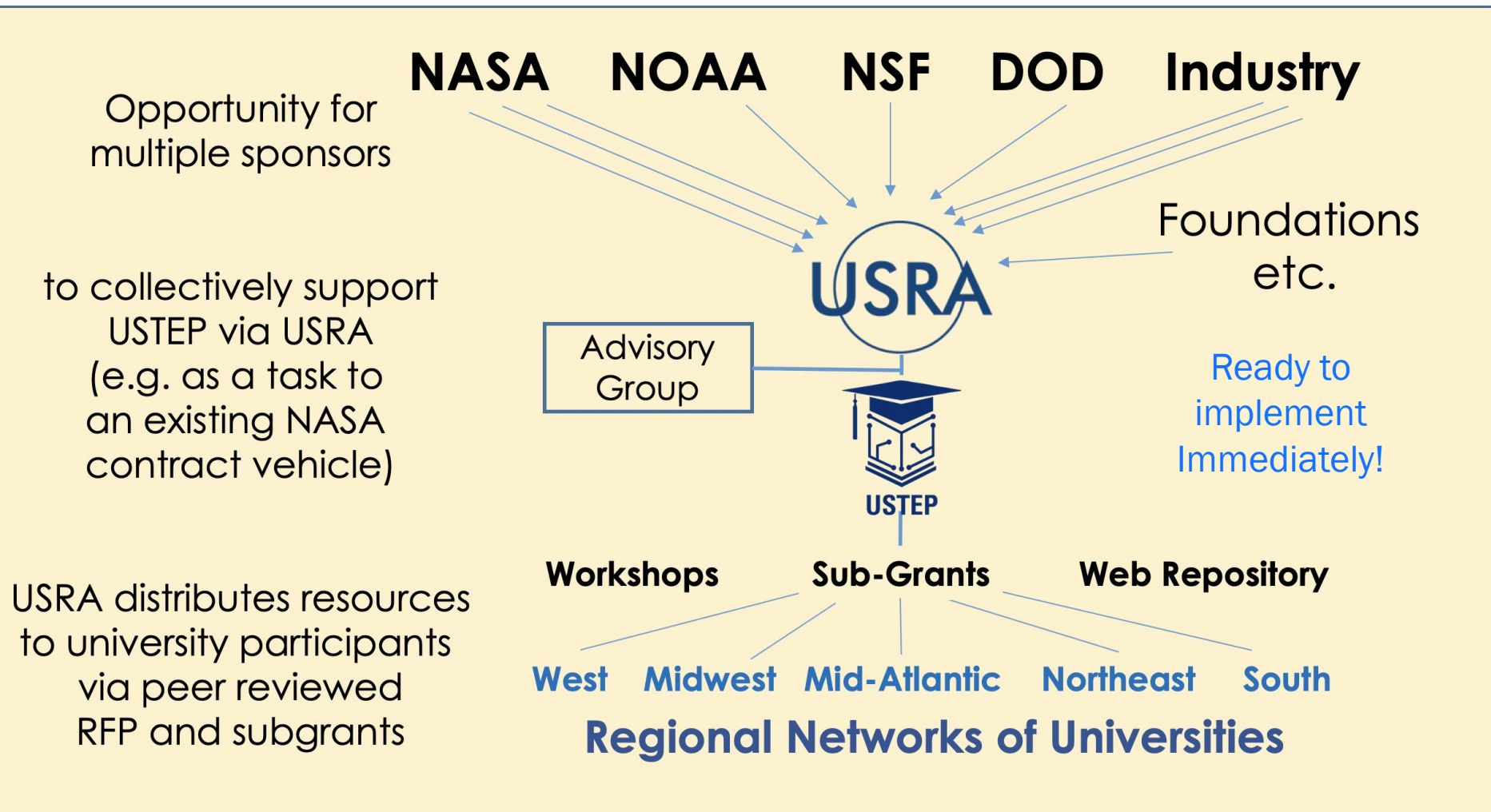
- Teaching lab equipment, lab upgrades to broaden participation
- Course and curriculum development
- Learning module development
- TA support for courses and labs
- Student travel support
 - To workshops, conferences
 - Between and among universities
 - To NASA sites or other locations
- etc.
- But NOT to develop a specific space mission, flight hardware or develop specific technologies



How will USTEP do these things?

- Seek Program **support from government and industry sponsors** who have an interest in NewSpace workforce development and diversity
- Manage the portfolio of resulting support to **offer subgrants and services to the university community** to implement a program
- Provide **coordination and organization** management services to run the program and identify sponsors, broker opportunities, etc.

Opportunities for Participation



Anticipated Results

- **Inspiration, motivation and improved retention** of qualified STEM graduates in NewSpace career fields who are “workforce ready”
- **Increased employability**/management skills of graduates entering the workforce who **experience “the humility of touching hardware”**
- **Increased diversity** among graduates with hands-on experience
- **Meaningful, direct experiences** and exposure to concepts such as concurrent design processes, requirements specifications, etc
- **Improved familiarity with industry standards** and NewSpace processes, procedures, best practices
- **Increased sophistication and competitive advantage** of science and technology proposals from participating institutions

Director, Center for Space Science and Engineering Research, Virginia Tech

CEO, Blue Canyon Technologies

Office of the Chief Technologist, NASA

Chief Technical Officer, Blue Canyon Technologies

Program Manager, Laboratory for Atmospheric and Space Physics

Electrical engineer, NGO lead, lawyer

Director, Government Affairs, Audi

HIGH HOPES: CU students will design and build an atmosphere-sampling satellite for launch in March 1997. From left, they are Spencer Reeder, Pete Withnell, Scott Bailey, George Stafford, Erica Rodgers, Steve Steg and Darren O'Connor.

The Denver Post / Helen K. Davis

Thank You!

**For more information
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