UNM SCHOOL of ENGINEERING

VentureSpace
Small Spacecraft / Small Business Incubator

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"[E]fforts to attract small, medium and large space industries to establish here … have met with limited success … the main obstacle is the lack of workforce available to the relocated industry through the local universities as well as the lack of aerospace education programs necessary to continually develop and maintain their workforce."

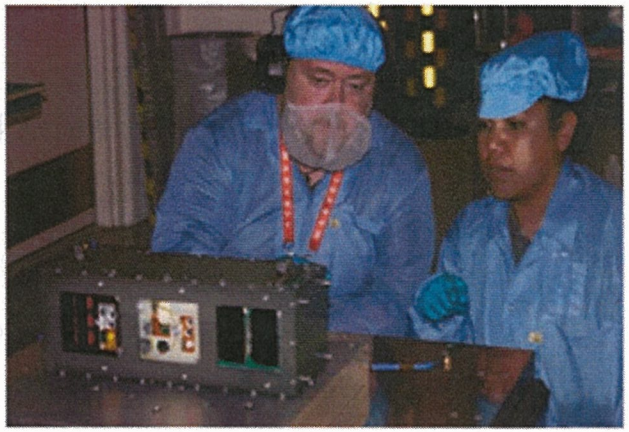
-- New Mexico Science and Technology Plan (2009)

The State of Space Exploration and Technology

- NASA retired the Space Shuttle program in 2011.
- NASA space exploration is alive and well.
- Focuses more on actual missions, rather than on the operation of a fairly expensive launch vehicle.
- Major transition under way to advance more cost-effective commercial enterprises in space exploration.
  - For example, the cost of one shuttle launch was about $500M.
  - SpaceX spent about $1B (~two shuttle launches) in its first 10 years (2002-2012), developing two new rockets, three new rocket engines, and a new space capsule.
  - By end of 2012, SpaceX had nearly 50 launches in its portfolio with about $4B in revenue.
  - SpaceX will begin testing its new "Grasshopper" launch vehicle at Spaceport America in the next few months.

Spacecraft Paradigm Shift

- Some large spacecraft are being replaced by smaller spacecraft.
- Dozens of "CubeSats" have been launched, with many more in development.
- Many CubeSat programs are at Universities with government and industry sponsorship.



UNM's Trailblazer CubeSat will be launched in 2013 on the Operationally Responsive Space(ORS) ORS-3 launch from Wallops Island in Virginia.

VentureSpace Background

- More than 60% of ~$900M in Air Force Research Laboratory Space Vehicles Directorate funding for space systems R&D goes out of state.
- VentureSpace will attract funding by connecting three space-related constituencies within the state of New Mexico:
  - the University engineering and science research community,
  - the small business community,
  - government labs and other organizations engaged in space research and operations.
- VentureSpace is initially a partnership between the UNM School of Engineering and USAF Phillips Technology Institute.
- Uses State seed funding as leverage to pursue significant R&D funding from existing federal programs.
- Provides resources and technical advice to help entrepreneurs create new businesses through existing federal and state SBIR and STTR opportunities.
- Builds on the Air Force Research Lab - UNM Educational Partnership Agreement (there are also “EPAs” with NMSU and NMT).

Space Companies Working with AFRL

- Of nearly 400 companies working with Space Vehicles Directorate
  - 28% are in California
  - 11% are in Massachusetts
  - 9% are in Colorado
  - 7% are in New Mexico (25 companies)

- We have identified more than 60 potential partner organizations to work with VentureSpace, e.g.,
  - FAA COE Commercial Space Transportation
  - NM Aerospace and Aviation Association
  - NM Economic Development Department
  - Professional Aerospace Contractors Association

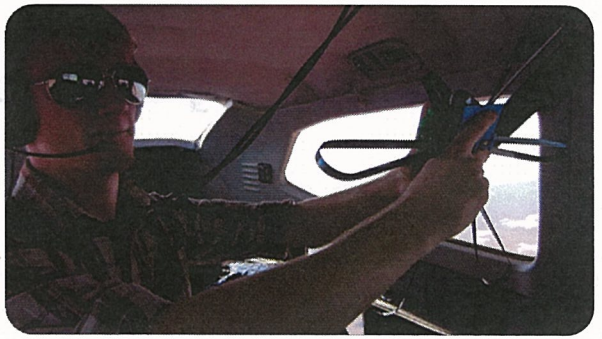
VentureSpace Activities

- Evaluate commercial relevance of new technologies proposed by small space companies.
- Assist entrepreneurial space companies using incubator resources, including access to AFRL test facilities.
- Administer aerospace pipeline program leading to an expanded workforce.
- Fund and mentor five UNM Engineering graduate students and two undergraduate project teams.
- Team with NMSU and NMT to establish regional collaborative space business related opportunities.
- Participate with and support other national entrepreneurial aerospace programs furthering the development of the small space industry in New Mexico.

Example UNM+NMSU+NMT Project

- Summer project at UNM's Configurable Space Microsystems Innovations and Applications Center (COSMIAC)
- Several students are working on a CubeSat mission design, with a sub-team working on a deployable antenna.

- The sub-team is comprised of three students, with one each from UNM, NMSU, and NMT.
- The team has conducted limited "zero-gravity" flight testing of the deployable antenna.
- I met with the students to propose that they continue the project in the coming year and submit a proposal to NASA's Reduced-Gravity Flight Opportunities program.
- This project is an excellent opportunity to develop lasting relationships between the three universities and AFRL, as well as with small companies, while advancing small spacecraft technology.



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VentureSpace Request

- The planned request is for $250,000 per year for up to 5 years to support the establishment of VentureSpace.
- The funds will support some faculty and staff salary, but will primarily be used to fund student design-build-test projects.
- Projects will be selected based on these criteria:
  - Viable and novel spacecraft technology
  - Potential for industry interaction
  - Potential for product commercialization
  - Potential as response to SBIR* or STTR* Call for Proposals
- First year will focus on UNM, but transition to UNM-NMSU-NMT student teams will occur in subsequent years.
- Intention is for VentureSpace to become fully supported by indirect charges in R&D proposals within 5 years.

* SBIR = Small Business Innovation Research
* STTR = Small Business Technology Transfer

UNM

2013 State Legislative Priority

VentureSpace Small Business Incubator

RPSP REQUEST FOR 2013 $250,000

REQUEST

This RPSP request of $250,000 funds faculty and students who will provide technical support for small companies pursuing space ventures in the VentureSpace Small Business Incubator.

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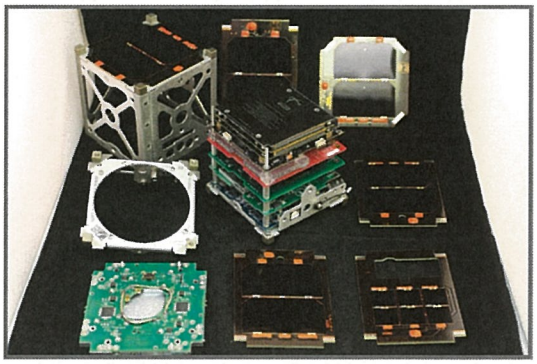
BACKGROUND

More than 60% of the ~$900M in annual AFRL funding that comes to New Mexico for space systems R&D goes out of state. The VentureSpace Small Business Incubator seeks to attract more of this funding by connecting three space-related constituencies within the state of New Mexico: the University engineering and science research community, the small business community, and government labs and other organizations engaged in space research and operations. VentureSpace is a partnership between the UNM School of Engineering and the USAF Phillips Technology Institute, and it uses State seed funding as leverage to pursue significant R&D funding from existing federal programs.



Small "CubeSats" provide a new standard platform for developing and demonstrating small spacecraft technologies.

The Incubator connects small businesses engaged in spacecraft development with information and contacts to enable development of marketable space systems products. It is organized as an element of COSMIAC, a federally supported research center at UNM, and an existing base of expertise in space systems technology and applications. Through the AFRL-UNM Educational Partnership Agreement, COSMIAC has valuable access to unique laboratory facilities at AFRL's Space Vehicles Directorate, and the Incubator will provide access to COSMIAC's client entrepreneurs.

JUSTIFICATION

- This RPSP request leverages COSMIAC facilities and staff to help small space company entrepreneurs create new businesses through existing federal and state SBIR and STTR opportunities, leading to long-term product development.
- Evaluate commercial relevance of new technologies proposed by small space companies.
- Assist entrepreneurial space companies using incubator resources, including access to AFRL test facilities.
- Provide technical service support to five companies (start ups) selected as participants in the incubator.
- Fund and mentor five UNM Engineering graduate students and two undergraduate project teams.
- Team with NMSU and NM Tech to establish regional collaborative space business related opportunities.
- Participate with and support other national entrepreneurial aerospace programs furthering the development of the small space industry in New Mexico.

NEW MEXICO NEED

Three federal research laboratories in New Mexico have strong space-related research and development missions: Air Force Research Laboratory, Los Alamos National Laboratory, and Sandia National Laboratory. NASA's Columbia Scientific Balloon Facility and the White Sands Missile Range lead in testing space technologies with high-altitude balloon and sounding rocket payloads. SpacePort America is a highly visible element of the commercial spaceflight industry. VentureSpace will connect educational activities throughout the state with these national laboratories, operational sites, and industry.

NATIONAL NEED

The U.S. Space community requires small, innovative private-sector space entrepreneurs to maintain leadership in the space industry. Continual innovation is essential for the Department of Defense as well as the commercial sector to remain competitive in the space arena. There is significant concern within industry and government that there will not be adequate development and growth of innovative small companies to support the space sector. Small innovative space companies provide great benefit through increased numbers of challenging, rewarding, and high-paying jobs.