



“How to Manage a Successful Planning Grant”

Lessons Learnt in Establishing ASTREC (ADVANCED SPACE TECHNOLOGIES RESEARCH & ENGINEERING CENTER)

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ASTREC

Advanced Space Technologies Research and Engineering Center

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Advanced Space Technologies Research and Engineering Center (ASTREC) – An NSF I/UCRC



ASTREC Objective

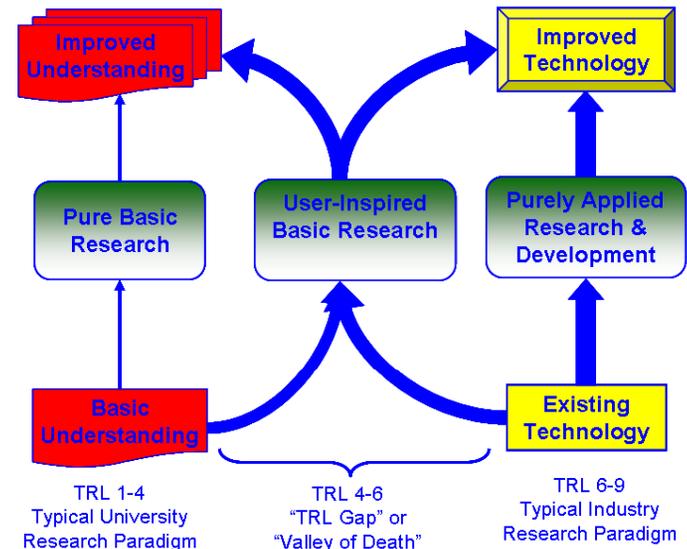
To provide industry-driven leading-edge research that produces integrated, concurrent small satellite designs, including fabrication and validation, with the objective of improvements in time to orbit, lower cost, maximum flexibility in design accommodation, and performance.

Methodology

- Utilize a SEMATECH-like approach to identify and mature the required technology
- Conduct focused research; i.e., an application driven research agenda

<http://www.sematech.org/corporate/history.htm>

ASTREC Research Approach



What is an I/UCRC?

I/UCRC - Industry/University Cooperative Research Center

- An NSF program to develop “win-win” partnerships between industry, government, and academe
- Conducts research to create new products and processes of interest to partners
- Produces an educated and experienced workforce
- Leverages NSF’s seed funding through industry and government partnerships
- In existence since 1981 with greater than 80% success rate (approximately 50 I/UCRCs currently exist)

<http://www.nsf.gov/eng/iip/iucrc/>

Schedule

- ✓ Jan 2007: Letter of Intent submitted
- ✓ Feb 2007: LOI approved
- ✓ March 2007: Planning grant proposals submitted
- ✓ Jan 2008: Planning Meeting
- ✓ March 2008: Full Center proposal submitted
- ✓ July 2008: NSF decision announced
- ✓ Nov 18-19, 2008: Initiate Center

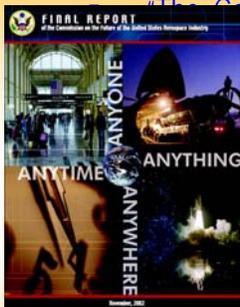
University Partners

- UF - Norman Fitz-Coy (nfc@ufl.edu)
- NCSU - William Edmonson (wwedmons@ncsu.edu)
- Others – CalPoly SLO, Univ. New Mexico, ...
- URL: <http://astrec.us>

Background: Why ASTREC?



Pre-eminence of U.S. in the industry is no longer guaranteed



"The Commission's urgent purpose is to call attention to how the critical underpinnings of this nation's aerospace industry are showing signs of faltering — and to raise the alarm."

Over the last several decades, the U.S. aerospace sector has been living off the research investments primarily for defense during the Cold War—intercontinental ballistic missiles, the Saturn V, spacebased intelligence, the global positioning system, stealth and unmanned aerial vehicles. The challenges posed by a rapidly changing world—asymmetric threats, international competition, environmental awareness, advances in technology—demand that we, like the Wright brothers 100 years ago, look at the challenges as opportunities for aerospace and turn them into reality."

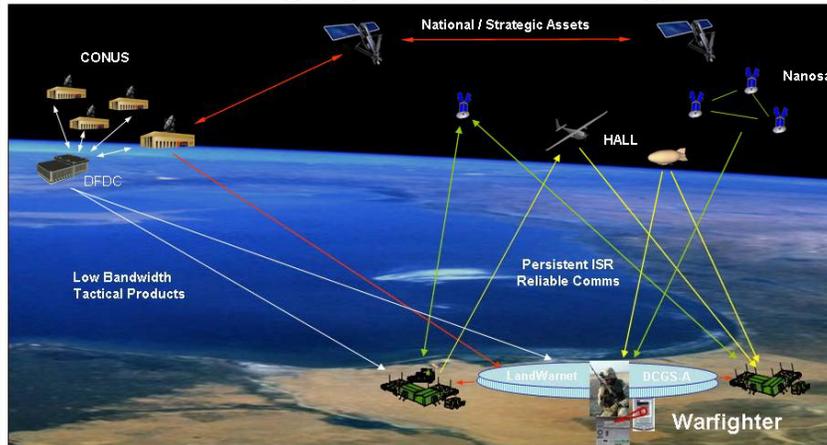
Final Report of The Commission on the Future of the United States Aerospace Industry, 2002



U.S. Army Space and Missile Defense Command/
Army Forces Strategic Command



Transitioning Capabilities to the Warfighter



Supporting the "Need-to-Share" Information With the Warfighter in a Responsive, Timely, Flexible Means

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"Secure the High Ground"

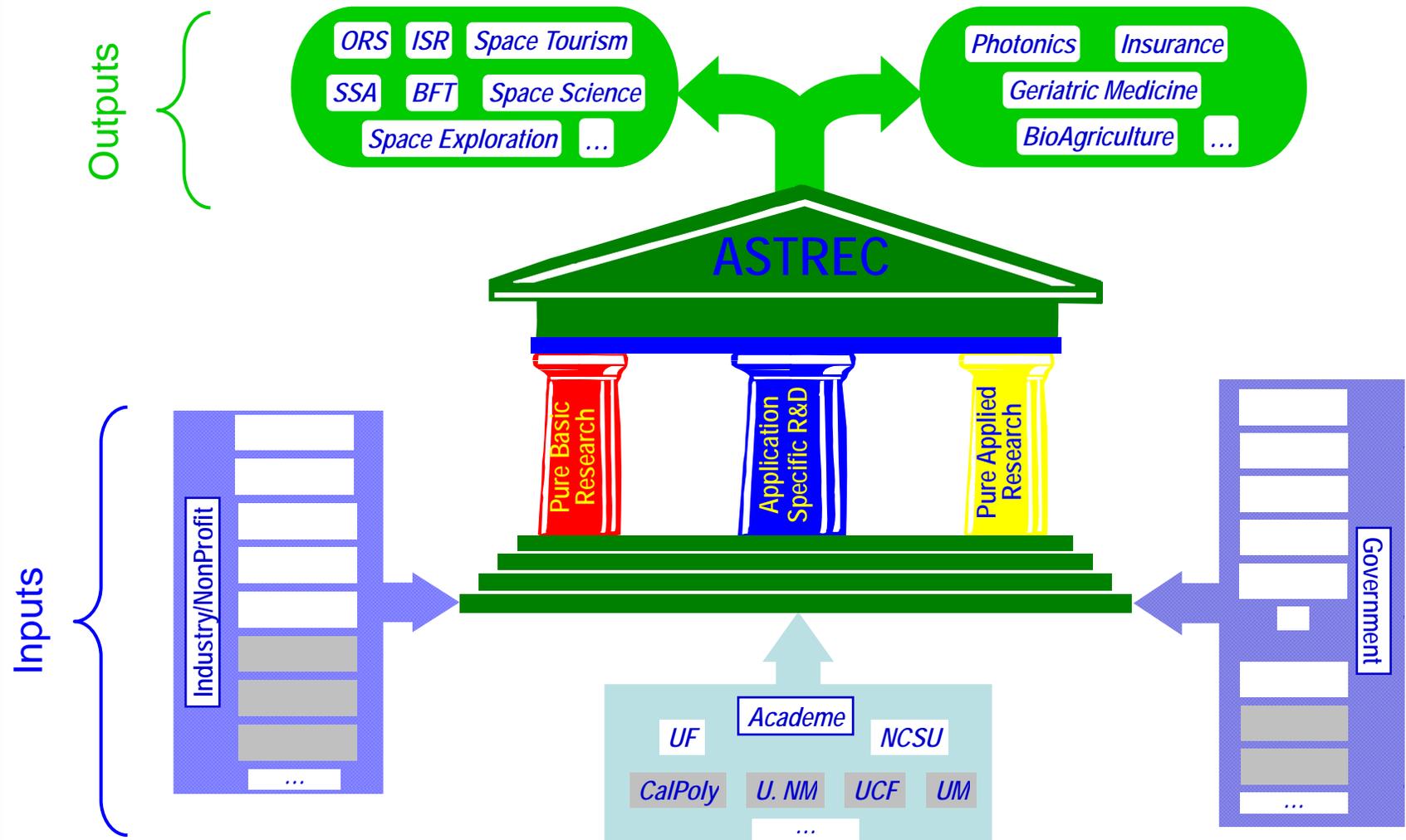


"Strengthen the nation's traditional long-term basic research that has been transformational to maintain the standards that fuel the economy, provide the quality of life."

Energizing and Employing the Nation's Traditional Basic Research for Economic Future

Excerpted from "Responsive Space for the Army" by Dr. Rodney Robertson, Director, SMDC at the RS6 Conference

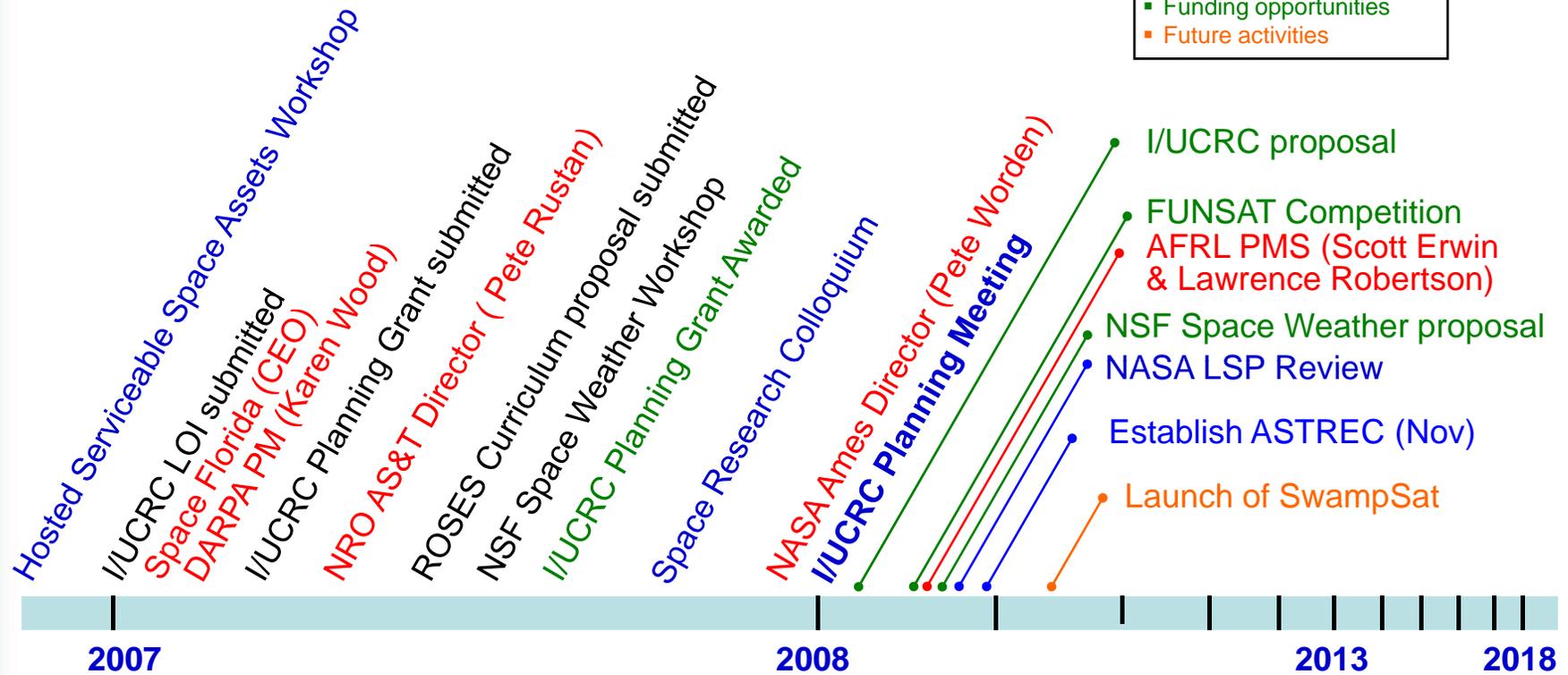
Background: Partnerships and Outcomes



Background: ASTREC's Timeline of Activities



- Workshops, briefings, etc
- Planning activities
- Campus visitors
- Funding opportunities
- Future activities



← AFRL, NRO, SMDC DARPA, Boeing, NGST, Leicester, SSTL... →

Establish/demonstrate Capabilities

Sustainable Operations



2004-2005

- EAS 4530: 11 students – ACS, science, MEMS
- Visited GSFC and met with colleagues who were NOT excited by CubeSats; referred to then as space debris!
- Inflate-A-Brake (passive deorbiter was born)
- Students were finalist in 2005 AIAA/Utah State Small Satellite Conference

I/UCRC Annual Meeting



ASTREC Applied Technologies Research and Engineering Center



“Receding Horizon” Planning

ASTREC’s R&D activities are **application specific**; i.e., our applied and fundamental research are relevant to the needs of the space industry and address improvements in cost, schedule and/or performance

Short Term (1-5 yrs)

(Establish and demonstrate ASTREC’s credibility)

- Conduct fundamental and applied research
- Validate the research outcomes on pico- and nano-class of satellites

SwampSat (*scheduled for spring '09 launch*)

Mid Term (5-10 yrs)

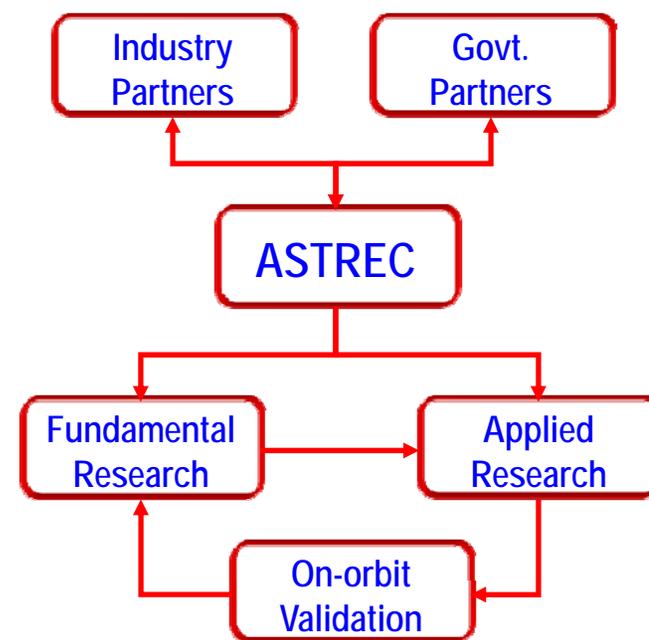
(Leverage s/c expertise into sustainable portfolio)

- Further develop missions and satellite through
 - Lesson learned
 - Technology growth
 - Infused research outcome
- Demonstrate Responsive Space capabilities

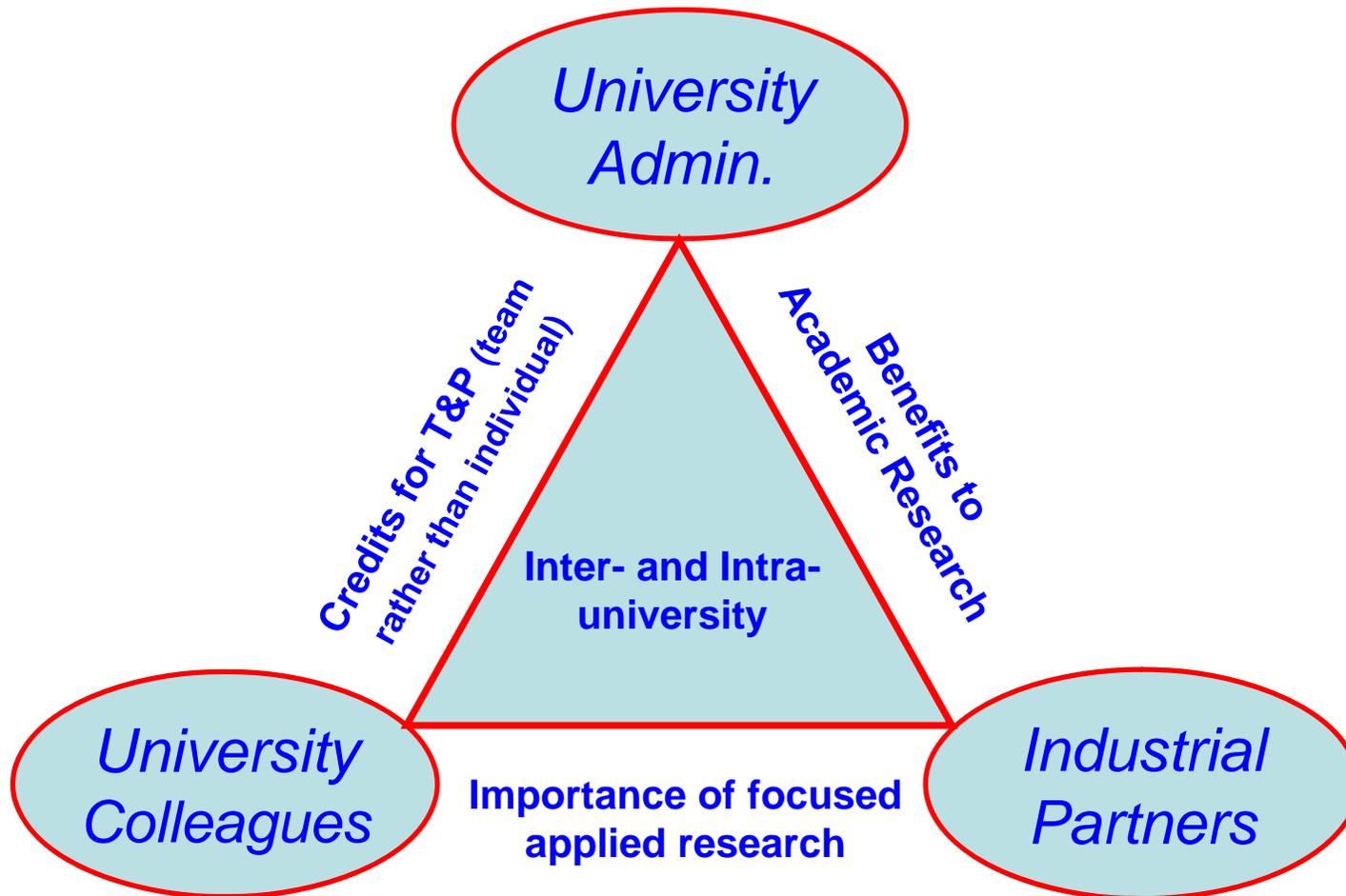
Long Term (>10 yrs)

(Create economic impact locally and statewide)

- Center will be self sufficient and self sustaining
- Technology transfer from research



Challenges: Coordination of Partners

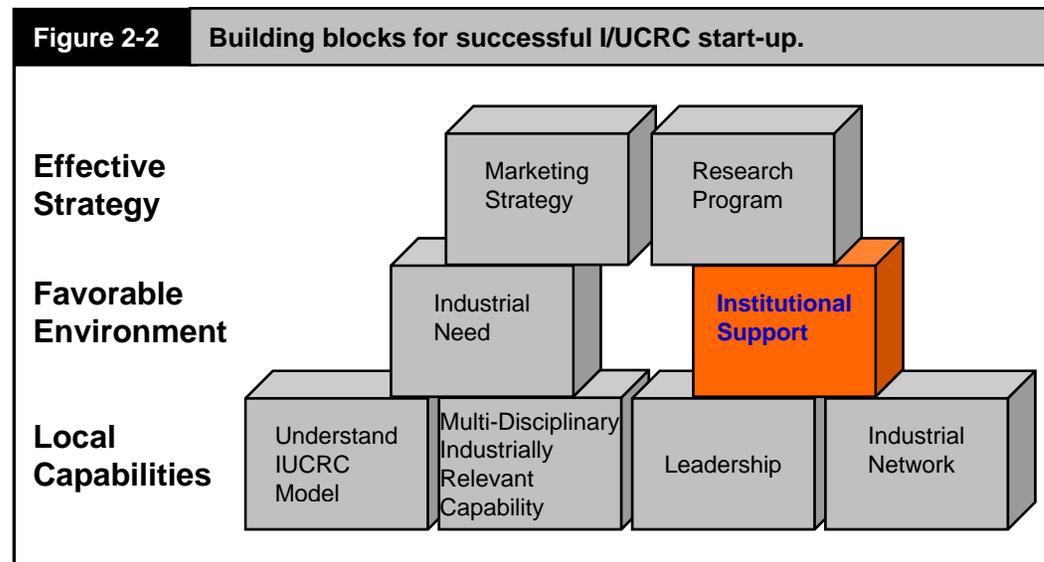


High Level Executive Support



Strong **institutional support** from academic administrators, the university president, deans, and department chairs is vital in attracting cross-disciplinary research teams of quality faculty members and students. Issues of tenure, funding allocation, overhead reimbursement or waiver, space assignment, access to equipment, and course development and credit may hamper an I/UCRC if key administrators are not supportive.”

Gray, D.O. and Walters, S. G., *Managing the Industry/University Cooperative Research Center: A Guide for Directors and Other Stakeholders*, Battelle Press, Columbus OH, 1998, pp.27



Suggestions: Hosting the Workshop



- Utilize resources
 - If possible, attend an I/UCRC workshop (experience is invaluable)
 - Mimic other centers; e.g., CHREC (Alan George at UF), MemFAST (Behnam Pourdeyhimi at NCSU)
 - Communicate with NSF I/UCRC PM (Babu, Alex)
 - External Evaluators
- Secure venue (with sufficient lead time)
 - Arrange parking (especially if on-campus)
 - Ensure wireless network is available
- Notify industrial participants early
 - Send “Hold Date Notice” well in advance
 - Send agenda and other presentation materials prior to meeting
 - Do NOT overwhelm with emails
- Secure additional funding (if necessary)
- Collect registration info from ALL attendees (online or otherwise)
 - Name preference for badges – indicate sponsor/faculty/admin
 - Meal preference
 - Audio/visual needs (for presenters)
- Ensure presentations are loaded and operate properly prior to meeting

Suggestions: Hosting the Workshop (contd)



- Engage faculty in the planning activity
 - Get input on potential dates, agenda, etc.
 - Faculty are verbose – be sure they understand the time constraints
 - Content development (build in sufficient lead time to meet deadlines)
 - Do NOT allow last minute changes to presentation material
- Bind presentation materials and distribute to ALL participants
- Meeting Assistants
 - Moderator – to keep meeting on schedule (someone other than PI)
 - Scribe – note taker for each Industry Feedback session
- Involve graduate students in the activity
 - Develop/host research posters
 - Assist with LIFE forms (create online and collect/enter data)
 - Presentation
 - Photographer, check-in host, etc.
- Follow-up with workshop participants immediately after meeting
 - Send thank you letters to everyone involved (including students)
 - Address action items from meeting
- Listen to input from the industrial participants
 - Use input to refine research agenda

Suggestion: ASTREC Planning Meeting (sample)



Wednesday January 16, 2008 (Meetings in Century B & C)

7:00 – 8:00 am	Registration (Century B & C) and Breakfast (Break Pavilion)
8:00 – 8:30 am	Welcome – Win Phillips (VP of Research, UF) & Chris Brown (Assistant VC of Research, NCSU)
8:30 – 9:00 am	Vision and Capabilities – Norman Fitz-Coy
9:00 – 10:00 am	NSF I/UCRC Presentation – Alex Schwarczopf & Babu DasGupta
10:10 – 10:15 am	ASTREC Programmatic Overview - William Edmonson
10:15 – 10:30 am	Break (Break Pavilion)
10:30 – 12:10 noon	Project Presentations I – Discuss missions to be pursued (use LIFE forms) 10:30-10:50 Space Observations 10:50-11:00 NSF Atmospheric Sciences 11:00-11:30 NRO 11:30-11:50 Space/Earth Science 11:50-12:10 Astrobiology
12:10 – 1:15 pm	Lunch
1:15 – 3:15 pm	Project Presentations II – Discuss technology areas/projects (use LIFE forms) 1:15-1:20 Programmatic/subsystem overview 1:20-1:40 Communications/Telemetry 1:40-2:00 Power 2:00-2:20 Propulsion 2:20-2:40 C&DH 2:40-3:00 GNC 3:00-3:15 Cost Overview
3:15 – 3:30 pm	Break (Break Pavilion)
3:30 – 5:00 pm	Industry Workshop
6:00 – 9:00 pm	Reception and Dinner – Poster viewing



Suggestion: ASTREC Planning Meeting (sample)



Thursday January 17, 2008 (Meetings in Century B & C)

7:00 - 8:00 am	Breakfast (Break Pavilion)
8:00 - 9:00 am	Feedback from Industry Workshop - Industry moderated
9:00 - 10:30 am	LIFE form Review and Discussion
10:30-11:00 am	NSF Closed Session with Industry - NSF moderated
11:00 - 11:30 am	Closing Remarks by Site Directors - Norman Fitz-Coy & William Edmonson
11:30 - 12:00 noon	Closing Remarks - Pramod Khargonekar (Dean, College of Engineering, UF)
12:00 - 12:30 pm	Adjourn/Lunch (box lunch)



Suggestion: Marketing Your Center



Status Quo

"Over the last several decades, the U.S. aerospace sector has been living off the research investments made primarily for defense during the Cold War — intercontinental ballistic missiles, the Saturn V, spacebased reconnaissance, the global positioning system, stealth and unmanned aerial vehicles. The challenges posed by our rapidly changing world — asymmetric threats, international competition, environmental awareness, advances in technology — demand that we, like the Wright brothers 100 years ago, look at the challenges as opportunities for aerospace and turn them into reality."

"The Commission's urgent purpose is to call attention to how the critical underpinnings of this nation's aerospace industry are showing signs of faltering — and to raise the alarm."

— Final Report of The Commission on the Future of the United States Aerospace Industry, 2002

"The committee recommends that representatives from relevant government agencies, the aerospace industry, including the emerging private sector, and the academic community work together to develop a coordinated national strategy to ensure an effective aerospace workforce ecosystem."

— Building a Better NASA Workforce: Meeting the Workforce Needs for the National Vision for Space Exploration, The National Academies Press, 2007

"The universities, faculties, and students whose research is supported by U.S. government funds are an indispensable base for motivating young, well-educated individuals to pursue careers in defense technology and Air Force laboratories. The relationship between universities and the Air Force is symbiotic. Universities need S&T funds from the Air Force, and the Air Force needs both the results of S&T and new technical personnel. If the Air Force wants a healthy relationship it must cultivate and establish long term partnerships with universities."

— Review of the Future of the U.S. Aerospace Infrastructure and Aerospace Engineering Disciplines to Meet the Needs of the Air Force and the Department of Defense, The National Academies Press

ASTREC Partners

ASTREC is currently accepting industry and government partners. For more information, contact the program directors:

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Transforming Space Through Innovation

Desiderata

The U.S. Space Industry was once a world leader in technology development. Over the past few decades, however, the Industry has lost its innovative edge and is becoming known for its long delivery times with numerous delays and high cost over-runs.

The Advanced Space Technologies Research & Education Center (ASTREC) breaks this status quo, offering the space-industry a risk-tolerant rather than risk-averse paradigm. Using nearly the same design-build-fly philosophy practiced by the unmanned vehicle community, the ASTREC incorporates technological innovations and evaluates them in their true operational environment.

Rather than spending billions of dollars with decades-long delivery time, the ASTREC will utilize innovative satellite systems to provide incremental growth in capability at significantly lower costs with much shorter delivery time. Economics based technology — that's innovation!

Objective

Transform the culture of the Space Industry from Risk Averse to Risk Tolerant. Through this transformation, the ASTREC will offer the Industry a responsive, cost effective approach to space exploration and utilization.

The ASTREC offers an alternative to the current industry paradigm

ASTREC is an I/UCRC

An I/UCRC (Industry/University Cooperative Research Center) is a National Science Foundation program to develop a long-term partnership between academia, industry, and government.

- Founded in 1981 with over 50 centers nationwide
- NSF's funds leveraged through partnerships with industry and government
- I/UCRCs have greater than 80% success rates

For more information, visit the NSF's website www.nsf.gov/eng/lip/iucrc



Develop

- Brochure
- Website
- Prospectus
- Other ...

ASTREC - Advance Space Technologies Research & Education Center

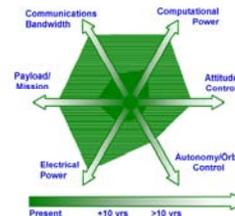
Methodology

Utilize innovative satellite systems to provide an alternative to the traditional Space Industry by developing and demonstrating low-cost satellites within timeframes of less than five years from idea to launch.

The ASTREC will implement **D-B-F** philosophy
Design — Technology R & D
Build — Technology maturation
Fly — Technology demonstration (on orbit)

Provision for the most technologically relevant satellites at lower cost in shorter time

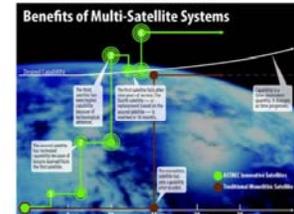
Technology Research Focus



Approach

- Develop innovative satellite systems
- Simplify individual satellites and distribute tasks across multiple satellite platforms to retain multi-sensor functionality
 - Emphasize pico- and nano-class platforms
 - Rapid access to space via piggyback launch opportunities
 - Mass, volume, and power constraints are technology drivers
 - Leverage technology innovations from other industries

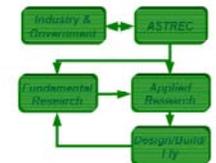
Transition technology to other satellite classes — micro, mini and beyond



ASTREC Partnership Advantages

- Provides a technology clearing house
 - Access to leading-edge research
 - On-orbit validation of technology
- Provides synergistic solutions
 - Multidisciplinary/interdisciplinary researchers and assistants
 - Thematic approach rather than individualized research
- Cost-effective solutions
 - Partner funds used directly to support research
 - Administrative support provided by NSF
- Serves as a basis for recruitment
 - Students are cognizant of industry needs

Reassert the U.S. leadership in space technology innovations





Advanced Space Technologies Research and Engineering Center (ASTREC) -- An NSF IUCRC



Reasons to Join ASTREC

Mission: To provide leading-edge research that is industry-driven to produce integrated, concurrent small satellite design including fabrication and validation with the objective of improvements in time to orbit, lower cost, maximum flexibility in design accommodation, and performance.

1. ASTREC Provides Synergistic Solutions to Relevant Satellite Design Problems Through

- Access to Multidisciplinary/interdisciplinary researchers and assistants
- Thematic approach rather than individualized research
- Applied and fundamental research geared toward an objective of improving space systems and processes
- An Industry Advisory Board (IAB) that identifies specific problems that are of vital interest to the industry (all members are represented on the IAB and have voting rights)

2. Access to Trained Students

- ASTREC serves as a basis for industry recruitment of experienced students
- Students working on industry problems and solutions are cognizant of industry needs and processes

3. NSF Accredited National Research Center

- Access to leading-edge research
- Access to a larger university community
- Access to all IP developed within the center

4. Research Amplification -- ASTREC leverages funds to maximize impact of the funded research

- Member funds are used only for specific research as defined by the IAB
- Membership fees are not subject to university overhead (typically 48%)
- Administrative costs to operate ASTREC are covered by NSF and universities contributions (i.e., the universities are true partners in this activity -- the NSF award requires university support)
- Member funds are leveraged with other members to provide critical levels of funding for the research projects as identified by the IAB

5. Technology Clearing House

- On-orbit validation of technology
- As an academic research center, ASTREC risks can be higher thus enabling the development and verification of more challenging technologies
- Experienced technology transfer specialists are available to assist as necessary

Additional info available at:

<http://www.nsf.gov/eng/tip/iucrc/>

<http://www.advancedspacotech.org/>



Other Insights and Helpful Tips

- ❑ Develop and maintain a common vision across the center
- ❑ Be patient (but forceful) with your sponsored research office, eventually it will be their idea
 - Membership Agreements, Bylaws, operational protocols, etc.
- ❑ Develop a “Things to Do” list and revise shortly after the meeting
- ❑ Need both “big picture” and “details” personnel on the planning team
- ❑ Invite sponsors other than those who have committed
 - Uncommitted may be influenced to join
- ❑ Plan sufficient well to minimize changes/modification to meeting agenda
 - Avoid constantly emailing changes
- ❑ Don’t “swim upstream” too often
 - Paradigm shifts are inherently against the flow so try to avoid additional confrontational activities
- ❑ First impressions are lasting – use time with sponsors wisely
 - Know the limitations of the meeting venue (e.g., electronic media not allowed in secure areas)
 - Develop “elevator speech” to get to point quickly
 - Have an answer for “How does this benefit us?”
 - Be knowledgeable of the various funding options/avenues that can be used

Closing Observations



ASTREC's Tenets

"We can't solve problems by using the same kind of thinking we used when we created them."

("No problem can be solved from the same level of consciousness that created it.")

- Albert Einstein

"People are very open-minded about new things - as long as they're exactly like the old ones."

- Charles Kettering

"Those who do not learn from history are doomed to repeat it."

- George Santayana