Partnerships For Innovation: Accelerating Innovation Research

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Program Director
Industrial Innovation and Partnerships Division
National Science Foundation
September 30, 2014
Mission: From the NSF Act of 1950: “...To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense....”

Vision: “A nation that creates and exploits new concepts in science and engineering and provides global leadership in research and education.”
## NSF Goals

<table>
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<tr>
<th>Strategic Goals</th>
<th>Transform the Frontiers of Science and Engineering</th>
<th>Stimulate Innovation and Address Societal Needs</th>
<th>Excel as a Federal Science Agency</th>
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</table>
| **Objectives**  | • Invest in fundamental research to ensure significant continuing advances across science, engineering, and education.  
• Integrate education and research to support development of a diverse STEM workforce with cutting-edge capabilities.  
• Provide world-class research infrastructure to enable major scientific advances.  
|                | • **Strengthen the links between fundamental research and societal needs through investments and partnerships.**  
• Build the capacity of the Nation to address societal challenges using a suite of formal, informal, and broadly available STEM educational mechanisms.  
|                | • Build an increasingly diverse, engaged, and high-performing workforce by fostering excellence in recruitment, training, leadership, and management of human capital.  
• Use effective methods and innovative solutions to achieve excellence in accomplishing the agency’s mission.  
|
Emerging Frontiers in Research and Innovation (EFRI)  
Sohi Rastegar

Assistant Director for ENG  
Pramod Khargonekar  
Deputy Assistant Director  
Grace Wang

Chemical, Bioengineering, Environmental, and Transport Systems (CBET)  
JoAnn Lighty

Civil, Mechanical, and Manufacturing Innovation (CMMI)  
George Hazelrigg (Acting)

Electrical, Communications, and Cyber Systems (ECCS)  
Samir El-Ghazaly

Industrial Innovation and Partnerships (IIP)  
Cheryl Albus (Acting)

Senior Advisor for Nanotechnology  
Mihail Roco

Engineering Education and Centers (EEC)  
Theresa Maldonado
NSF Investments

Industrial Innovation and Partnerships

Resources Invested

Public funds

Translational Research

Valley of Death

Private funds

NSF overall
ENG overall

IIP Domain

Research
Proof-of-Concept
Early Stage Prototype
Product Development
Commercialization

FY15 NSF Research Budget Request

$B

0.643
4.948
0.215

0.643

IIP
ENG minus IIP
NSF minus ENG

Industrial Innovation and Partnerships
Industrial Innovation and Partnerships

Resources Invested

Public funds

Private funds

Research
Proof-of-Concept
Early Stage Prototype
Product Development
Commercialization

IIP Domain

IIP Programs

FY15 IIP Budget Request

Note: I-Corps FY15 funding request = $25M across the NSF
PFI: Accelerating Innovation Research (AIR)

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<th>Accelerate the derivation of societal and economic benefit from new knowledge created in the discovery process</th>
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- Two types of awards for academic researchers
  - Technology Translation (14-569): Designed for single investigators
  - Research Alliance (14-612): Designed for research consortia (e.g. centers)
AIR- Technology Translation: Leveraging NSF Investments

1. Technical
   - Basic Research

AIR domain
   - Proof-of-Concept
   - Early Stage Prototype

Technology/knowledge gaps

NSF-Funded Research Result

2. Commercial
   - Preliminary understanding of market need, potential competitive advantage, IP landscape, regulatory hurdles. Strategy toward commercialization.
   - Enhanced commercial understanding, refined strategy toward commercialization

3. Educational
   - Student innovation/entrepreneurial experiences

Successful Commercialization

Leveraging NSF Investments
Two windows

<table>
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<tr>
<th>LOI required</th>
<th>Full Proposal</th>
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<tbody>
<tr>
<td>Sept. 2, 2014</td>
<td>October 2, 2104</td>
</tr>
<tr>
<td>March 13, 2015</td>
<td>April 14, 2015</td>
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PI/co-PI requirements:
- PI must be faculty member at U.S. academic institution
- Lineage: PI or co-PI must have had an NSF research award that ended no more than 6-years prior *that is the basis* for the proposed translational research work.
- There must be at least one other individual involved in the work (co-PI, Senior Personnel, or Other Personnel) with explicit business experience.
- PI/co-PI may submit only one proposal *per year*

Up to $200K for 18 months
Difference from SBIR/STTR

- PI must be faculty member at U.S. academic institution
  - Flexibility in funding partnerships
  - Flexibility in mode of commercialization

- Based on results from prior NSF merit-reviewed research awards
  - Focused on research necessary to move to the next step on the path toward commercialization

- Up to $200K & 18 months
  - (SBIR up to $150K & 6 months, STTR up to $225K & 12 months)
  - No Phase-II equivalent

- Entrepreneurial / Innovation experience/knowledge for students
**Program Statistics**

- **AIR-TT: Technology Translation**
  - 103 awards made to date
  - Lineage to 154 research awards
    - 25 with lineage to I-Corps
  - $18.9M funding to date
  - 7 Final Reports

**Technology Areas**

- Biological Systems: 27
- Optical Systems: 14
- Energy Systems: 11
- Materials: 16
- Computer Systems: 12
- Robotics, Electronics & acoustics: 14
- Mechanical & civil Systems: 11
- Wireless systems: 12

**Lineage of awards**

- GEO: 16
- BIO: 21
- SBE: 111
- OIA: 0
- EHR: 0
- MPS: 0
- MPS: 0
- ENG: 0
Partnership

Does the partnership enable innovation that neither party could do as well or rapidly alone?

Does the partnership leverage research and technology of the research consortium to accelerate innovation?

Does the partnership impact the development of an innovation ecosystem?

Partner/Collaboration Entities

Research Consortium

Research partner(s): e.g. University, Small Businesses, Others

Third Party Investor(s): Up to $800K from NSF, contingent on 1:1 match

Expected Accomplishments

Accelerates transfer of research results into existing businesses or start-ups

Develops network of connections

Develops/enhances an academic-based innovation ecosystem

Students prepared to be entrepreneurially competitive

Measures success

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504973
Key Facts 14-612

- One window

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<td>January 12, 2015</td>
<td>February 18, 2015</td>
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- PI must be faculty member active within an NSF-funded Research Consortium
- Technology to be translated must leverage the research of the underlying consortium
- At least one third party investor is required
  - 1:1 match, up to 25% can be in-kind
- At least one research partner is required
- Maximum award is up to $800K, 3 years
Program Statistics

- **AIR-RA: Research Alliance**
  - 25 awards made to date
  - Lineage to 6 consortium types
  - $20.7M NSF funding
  - $19.9M 3rd party match
  - $3.7M in-kind match
  - 3 Final Reports

**Technology Areas**

- Biological Systems: 5
- Optical Systems: 2
- Energy Systems: 4
- Materials: 5
- Computer Systems: 6
- Robotics, Electronics & acoustics: 3
- Mechanical & civil Systems: 1
- Wireless systems: 1
## PFI: Accelerating Innovation Research (AIR)

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Examples...
Industrial Innovation and Partnerships


MIT Technology Review Selects PI as Top 35 Innovator Under 35

Jesus Velazquez, Ph.D. '12
National Academies Ford Foundation Fellow

Luisa Whittaker-Brooks, Ph.D. '11
L’Oreal Fellow
Assistant Professor, University of Utah

IIP: 1311837 AIR Option 1: Technology Translation: Smart Windows for the Improved Energy Efficiency of Buildings

IIP: 1333405: I-Corps: Dynamic Glazing Technology Based on Nanostructured Vanadium Oxides

Launch of diMien LLC.

New York State TAF invests $50,000 to de-risk technology

diMien secures SBIR Phase I Funding to develop window films

Quanex invests $77,500 for scale-up + first royalty payments
IIP: AIR 1127786, 2011 – Water Technology Innovation Ecosystem (WaterTIE)
Third party Investor: PA Dept. of Community and Economic Development
Technology Commercialization Partner: BenFranklin Technology Partners, PA

IIP IUCRC: Water and Environmental Technology (WET) Center
Industry/University Cooperative Research Center
IIP: 0855881 Phase I, 2009; IIP: 1361498 Phase II, 2014
Temple Univ. (lead), Univ. of Arizona, Arizona State Univ.
Director: Rominder Suri, PhD, Temple Univ.

AIR Technologies for Water Treatment:
1. Novel Adsorbent Filter
2. Novel Ion Exchange Resin
3. Ultrasound for pollutant destruction
4. Advanced Oxidation Processes

Research training to 40 graduate + 30 undergraduate students

$40 Million revenue in 5 yrs estimated by Industry partners

35+ Industry Members, including DoD

Student Awards:
Candice Johnson, PhD by SETAC-HDC
Gangadhar Andaluri, PhD by PA WEA

4 patents Filed
40+ Publications
120+ Presentations
Connect with PFI: AIR

Funding and webinar announcements, news, and success stories

Online: 
nsf.gov/eng/iip/pfi/air-ra.jsp
nsf.gov/eng/iip/pfi/air-tt.jsp

Academe and Industry @ NSF Listserv: 
Visit the PFI: AIR website to sign up

Twitter: @NSFInnovateSBIR

Channel: NSFInnovationIIP
Thank you!

Questions?

Additional questions, please contact Barbara Kenny at bkenny@nsf.gov

Thank you for your interest!