

# Innovation Ecosystem

## NSF Role in University/Industry Partnerships



Dr. Donald Senich

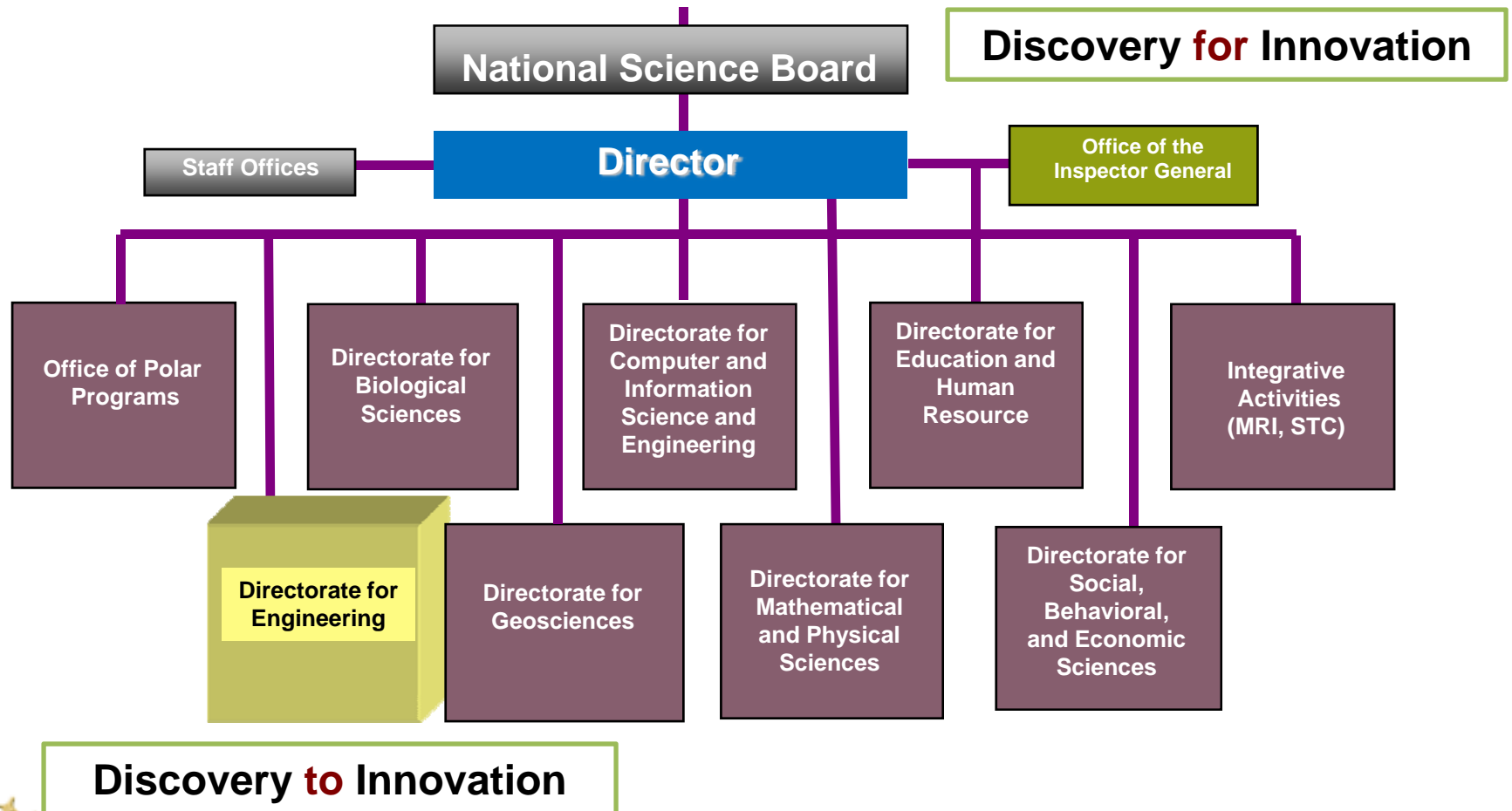
Senior Advisor

Industrial Innovation and Partnerships

National Science Foundation

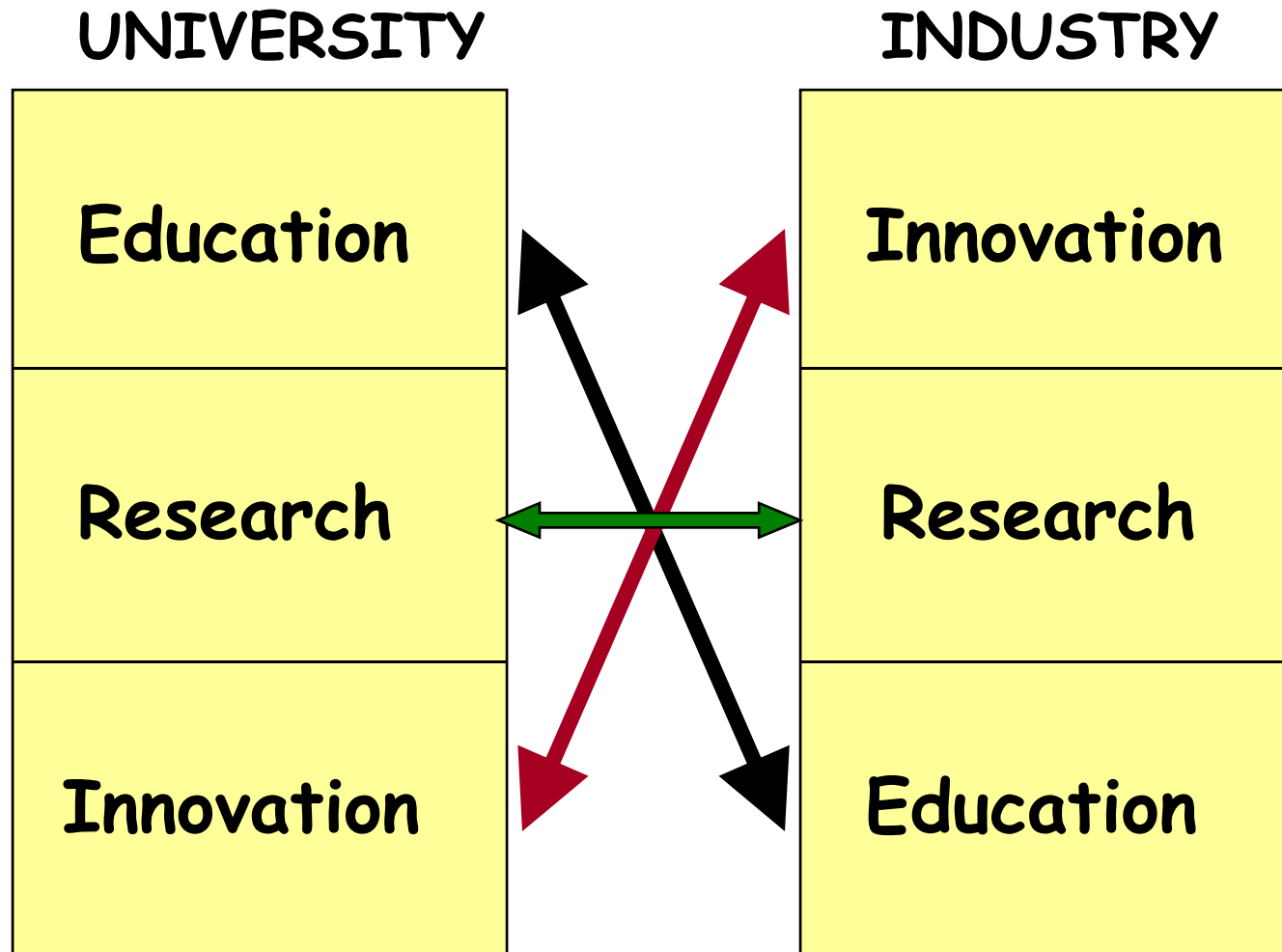


# National Science Foundation

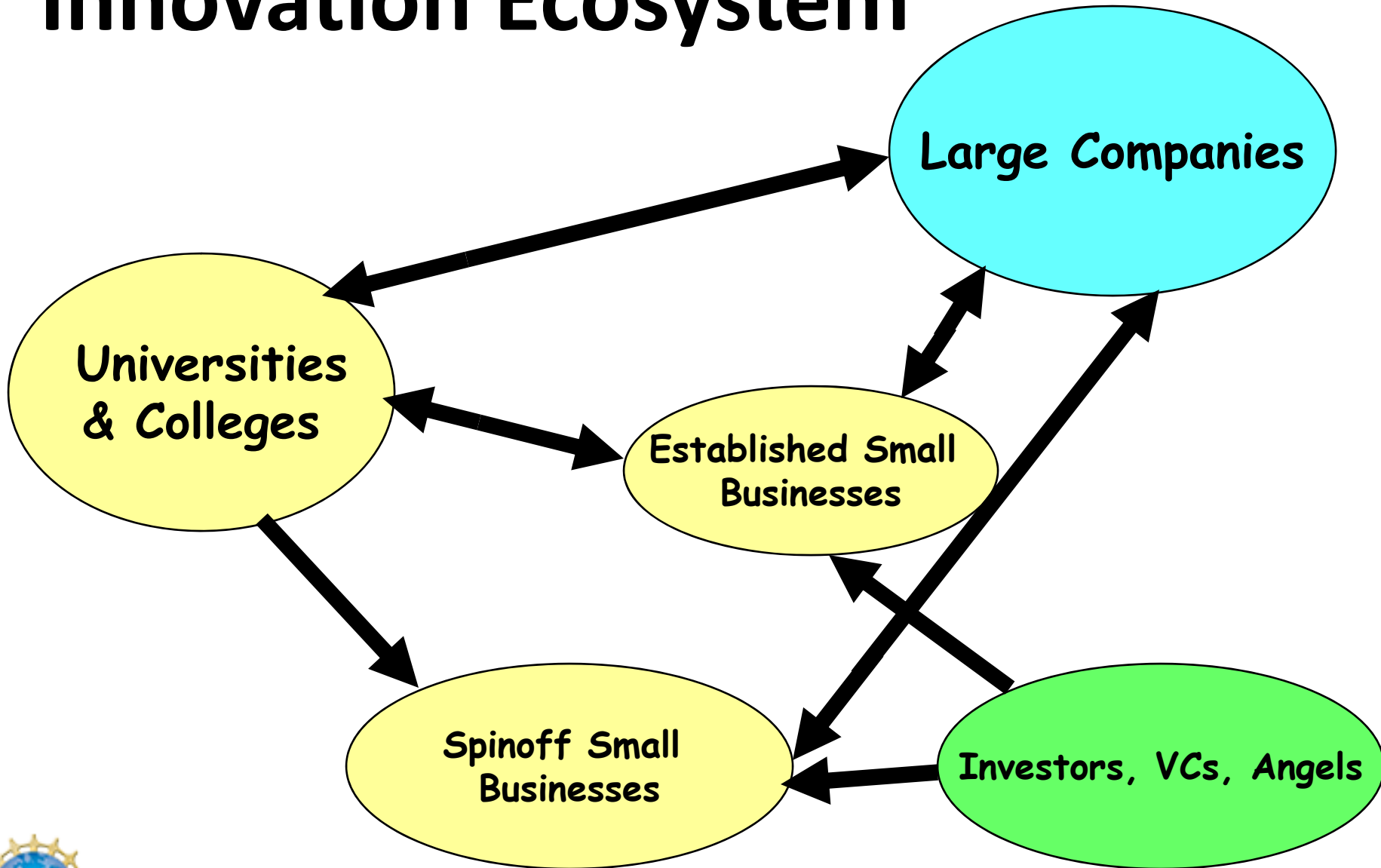




# University – Industry Priorities



# Innovation Ecosystem



# Commercialization of University Research

## Best Practices

- Leadership from the top of University
- Deep collaboration with community, industry and investors
- Culture of Entrepreneurship and Commercialization
- Investment in Innovation Infrastructure



<http://www.eda.gov/commrfi-responses>



Innovation Definition from  
'A Strategy for American Innovation'

**“Innovation is the development of novel products, services, and processes for the benefit of society”**

<http://www.whitehouse.gov/administration/eop/nec/StrategyforAmericanInnovation/>



# Role of NSF in the Innovation Ecosystem

- From Discovery to Innovation through **Translation Research**
  - research that moves an idea past the basic discovery stage
- Leads to technology platforms
- Requires the integration of multi-disciplines
- Is developed in **collaboration with industry**

*The innovation process is often non-linear*



# NSF Programs for Translational Research

- Science and Technology Centers (STC)
- Engineering Research Centers (ERC)
- Nanoscale Science and Engineering Center (NSEC)
- Materials Research Science and Engineering Centers (MRSEC)
- Centers for Chemical Innovations (CCI)
- Industry/University Cooperative Research Centers (I/UCRC)
- Partnerships for Innovation (PFI)
- Grant Opportunities for Academic Liaison with Industry (GOALI)
- Small Business Technology Transfer (STTR)
- Small Business Innovation Research (SBIR)



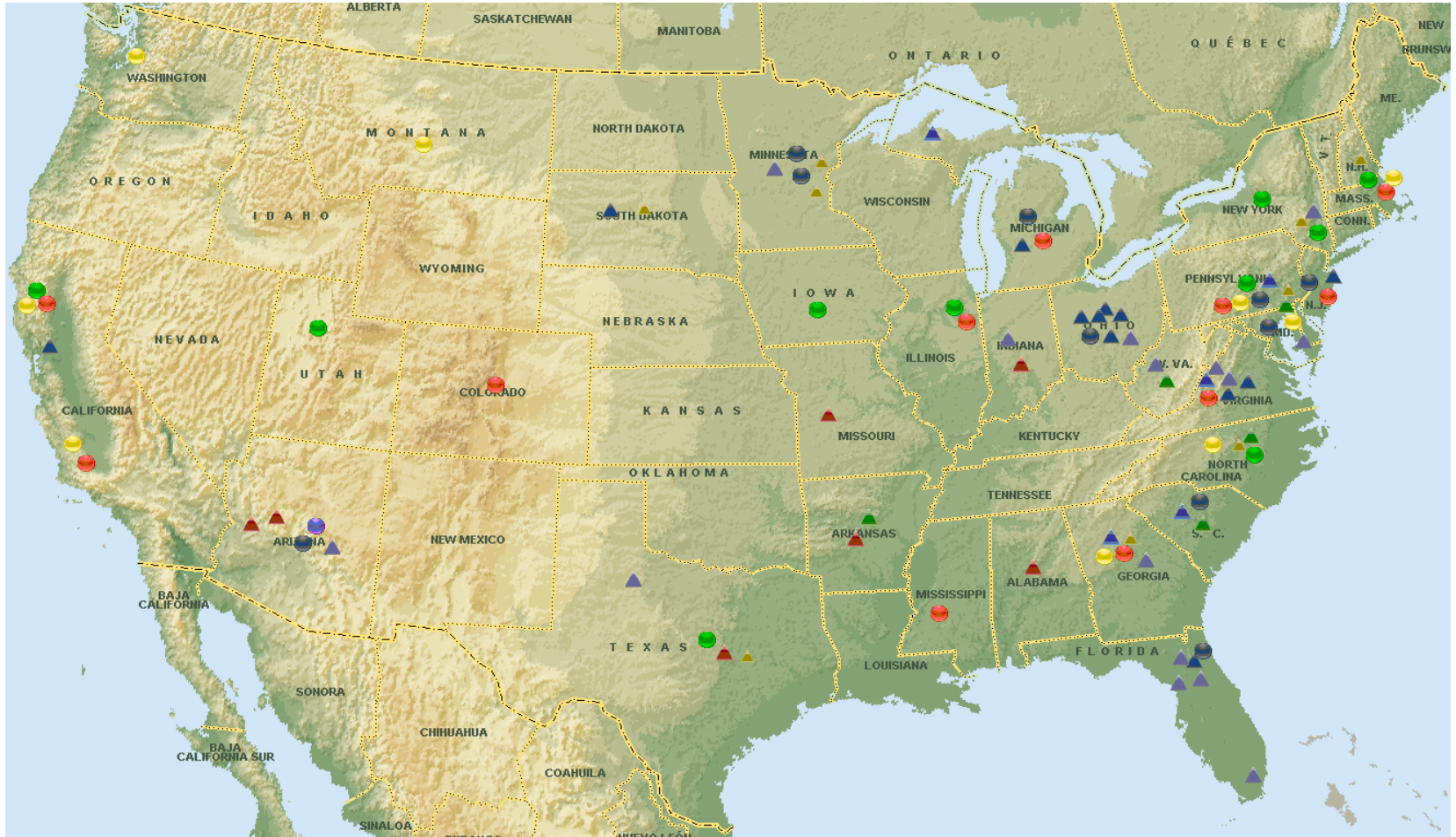
# Portfolio Technologies

1. Electronics
2. Manufacturing
3. Materials
4. Biotechnology, Healthcare and Services
5. Energy and Environment
6. Information, Communication and Computing



# ERC and I/UCRC Technology Sectors

Lead Institution shown (# ERCs ● # I/UCRCs ▲)



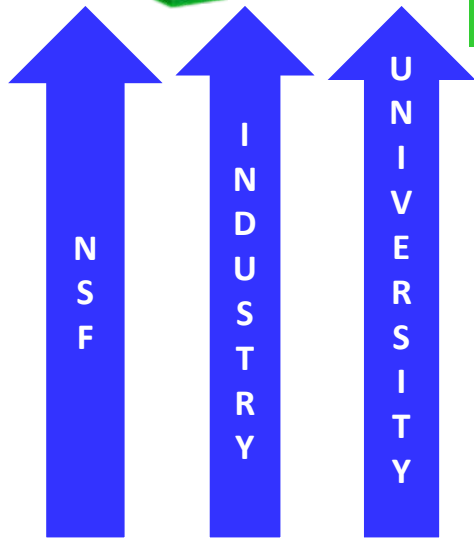
- |  |   |
|--|---|
| ● ▲ Advanced Materials (2, 5)                      | ● ▲ Biotechnology, Healthcare, and Service (10, 9)    |
| ● ▲ Advanced Electronics (11, 7)                   | ● ▲ Energy, Sustainability, and Infrastructure (9, 9) |
| ● ▲ Advanced Manufacturing and Fabrication (8, 12) | ● ▲ Information, Communication, and Computing (1, 15) |

# Center for Engineering Logistics and Distribution (CELDi)

## Supply Chain Optimization



- Logistics Systems Analysis and Design
- Supply Chain Modeling
- Material Flow Design & Improvement
- Intelligent Systems



9 universities

27 Industry Partners



# Center for Compact and Efficient Fluid Power



University of Minnesota

<http://ccefp.org/>



- **Research:** Transforming fluid power to dramatically reduce energy consumption and create whole new fields of use for fluid power technology.
- **Education & Outreach:** Training tomorrow's leaders while enhancing fluid power education and increasing public awareness.
- **Industry:** Partnering with the Fluid Power industry to help bring real-world solutions to the challenges in advancing fluid power

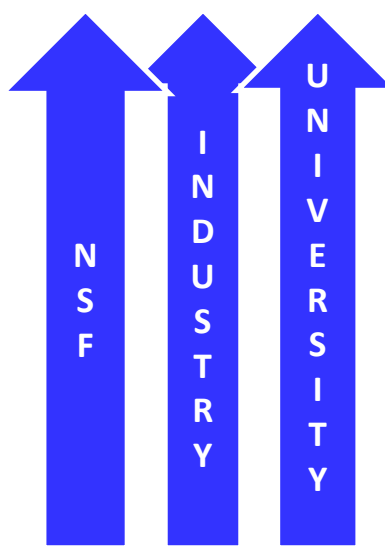
<http://www.nsf.gov/div/index.jsp?div=eec>

CATERPILLAR®

ENFIELD TECHNOLOGIES

55 Industry Partners

SUN hydraulics



7 Academic Partners

Industry

Industry



Industry



Industry



Industry

Bobcat



# Recent Collaborations

- A. Recent Innovation Partnerships **within** NSF
- B. **Industry-initiated** Partnerships with Universities
- C. Collaborations **across** Agencies





# Accelerating Innovation Research (AIR)

## Option 1

Single Investigator and Small Groups of Faculty

### Technology Translation Plan Competition

- Creates entrepreneurial small groups of faculty
- Encourages translation of fundamental discoveries into commercial reality
- Builds on prior NSF award
- Develops technology transfer plans to embark on the path **towards full business plans**
  - Solicitation NSF 10-608





# Accelerating Innovation Research (AIR)

## Option 2

### Partnerships of Large Research Groups

#### Research Alliance Competition

- Builds synergistic research alliance between NSF -funded research consortium and other institutions
  - Other partner(s): another research entity (either NSF-funded, other government agency funded, or privately funded), a small business consortium, or a local or regional innovation entity
- **Creates innovation ecosystem** that fosters entrepreneurial culture, encourages spin-offs, and builds new partnerships
  - Solicitation NSF 10-608





# Partnerships for Innovation (PFI)

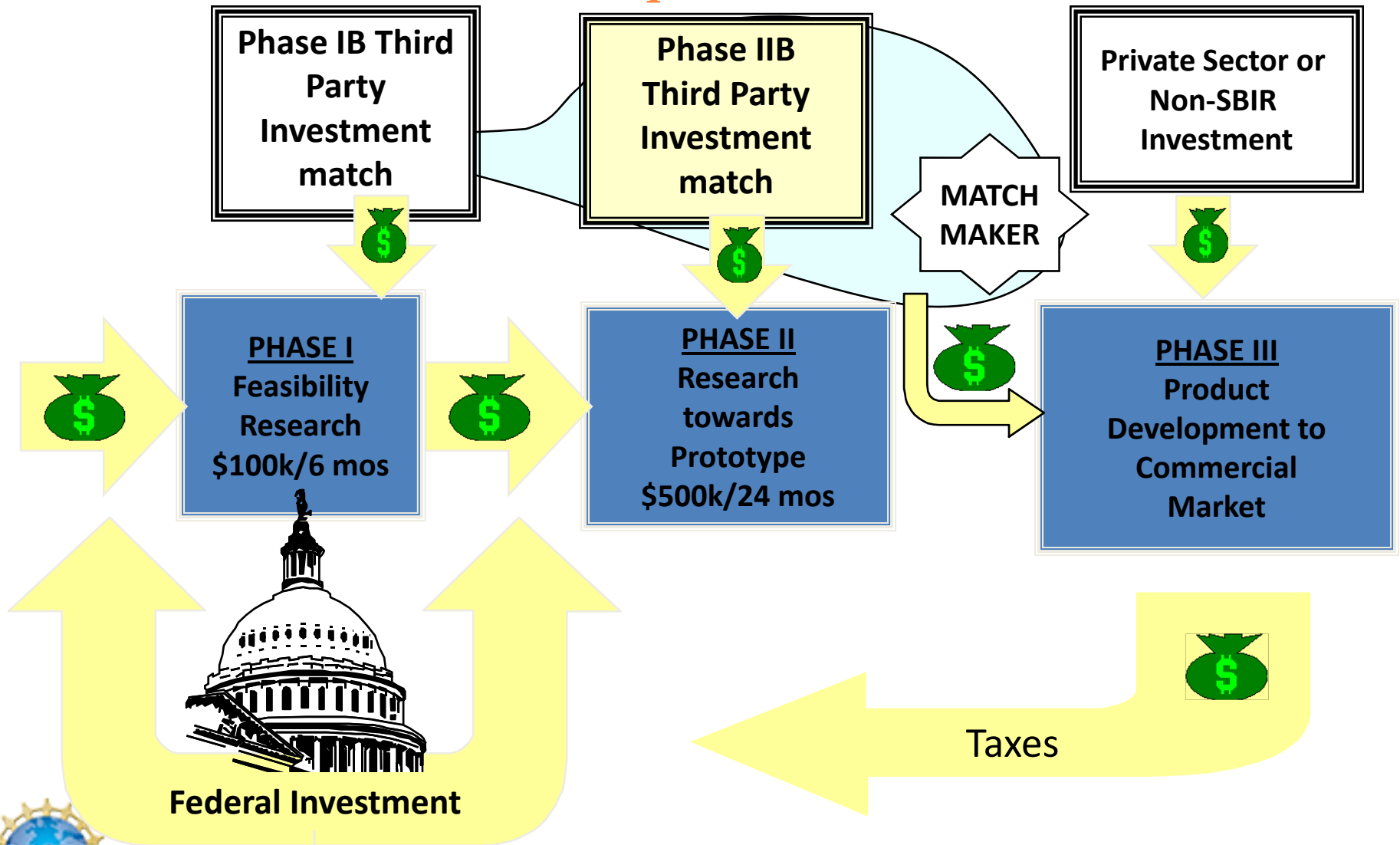
## Single Investigator and Small Groups of Faculty

- Requires **partnership with small businesses**
- Creates a novel technology platform
  - Potential for multiple markets
- Builds innovation capacity through partnerships
  - Solicitation NSF 0-581



# NSF SBIR/STTR Innovation Model

*Unique to NSF*



Federal Investment

Taxes



# Clear-It

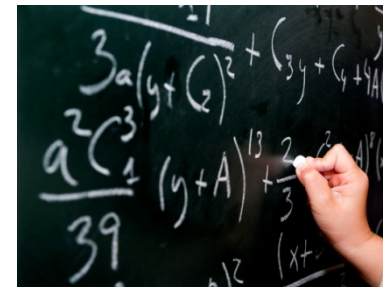
## Anti-Fog Coatings for Lenses, Windshields

- New nanotechnology-derived anti-fog coatings developed by InnoSense LLC and University of Missouri-Columbia
- Abrasion-resistant coatings are being developed for cockpit windows for Boeing, car windshields to prevent accidents
- Superhydrophobic coatings have already been shown to last over 30,000 windshield wiper cycles

<b>Military</b>		
		
Protective Mask	All Terrain Vehicle	Periscope Windows
<b>Commercial</b>		
		
Aircraft	Solar Panels	Automobiles
<b>Personal Protective Eyegear</b>		
		
Swimming Goggles	Motorcycle Visors	Ski Goggles



Industry



University



University of  
Missouri



# Academic Partnerships with Small Businesses

---

- Engineering Research Center (ERC)
  - Supports **translational research with small firms**
  - Encourage Spin-offs participation in NSF SBIR/STTR
  - **Collaborative research** with NSF SBIR/STTR
- Industry University Cooperative Research Center (I/UCRC)
  - NSF SBIR/STTR **memberships** in I/UCRC with equal status as large industry partners



# Grant Opportunities for Academic Liaison with Industry (GOALI)

## The Mechanisms

- Faculty and Students in industry
- Industry Scientists and Engineers in Academe
- Industry-University Collaborative Research Projects



# GOAL: Collaborative Research Projects

- Industry co-PI; must present a real industry commitment
- Detailed plan for industry-university collaboration, w/division of research tasks
- Industry cost-sharing and technological relevance are essential evaluation criteria
- Proprietary issues - agreement on intellectual property is required
- Dissemination Plan



# For a GOALI Proposal Answer

- What is impact/relevance if research is successful?
- Who will be industrial Co-PI?
- Has industry committed time/effort of Co-PI?
- How much time and money is required for effort?
- What resources has industry committed to effort?
- What about intellectual property?



**NOW CONTACT THE PROGRAM OFFICER**



# GOALI Award Rates

	DIVISION	GOALI Awarded	GOALI Funding Rate
2007-9	CBET	97	36%
	CMMI	179	42%
	ECCS	72	36%
2007-9	TOTAL	348	39%

Funding Rate for GOALI significantly higher than that for ENG Base



# Industry-inspired Fundamental Research (IFR)

IRI (Industrial Research Institute) in  
collaboration with NSF

1. Renewable Chemical Feedstock

Conversion of Lignin to Aromatic Compounds

2. The Materials interfaces

Fundamentals of Adhesion and Predictive Capability

One Award/Topic made in September 2010

IIP Grant-0946275





# Collaboration with Commerce

## i6 Challenge

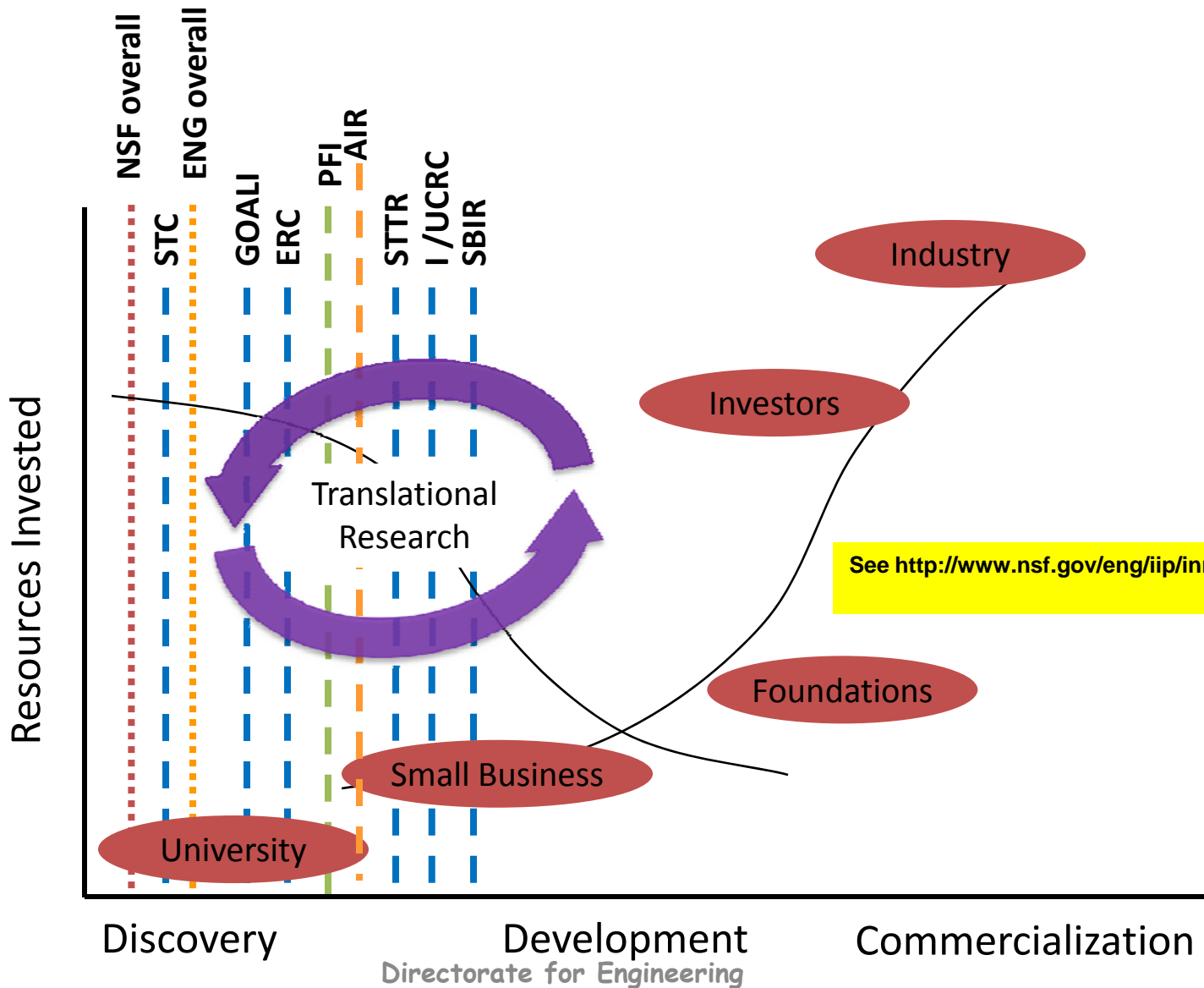
### Regional innovation infrastructure competition

- Led by Economic Development Administration (EDA) of Commerce in partnerships with NSF and NIH
- To encourage collaboration amongst various stakeholders, ...
- 6 regional winners announced in September 2010 by Commerce
  - NSF and NIH partnerships through **SBIR supplements to join regional centers**

<http://www.eda.gov/i6>



# NSF Innovation Investments





# Links to NSF Programs

<http://www.nsf.gov/index.jsp>

- Science and Technology Centers (STC)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5541&org=NSF&sel\\_org=NSF&from=fund](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5541&org=NSF&sel_org=NSF&from=fund)
- Engineering Research Centers (ERC)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5502](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5502)
- Nanoscale Science and Engineering Center (NSEC)  
<http://nsecnetworks.org/>
- Materials Research Science and Engineering Centers (MRSEC)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5295](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5295)
- Centers for Chemical Innovations (CCI)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=13635&org=NSF&sel\\_org=NSF&from=fund](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13635&org=NSF&sel_org=NSF&from=fund)
- Industry/University Cooperative Research Centers (I/UCRC)  
<http://www.nsf.gov/eng/iip/iucrc/>
- Partnerships for Innovation (PFI)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5261&org=NSF&sel\\_org=NSF&from=fund](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5261&org=NSF&sel_org=NSF&from=fund)
- Grant Opportunities for Academic Liaison with Industry (GOALI)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=13706&org=NSF&sel\\_org=NSF&from=fund](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13706&org=NSF&sel_org=NSF&from=fund)
- Small Business Technology Transfer (STTR)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5527](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5527)
- Small Business Innovation Research (SBIR)  
[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=503361&org=NSF&sel\\_org=NSF&from=fund](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503361&org=NSF&sel_org=NSF&from=fund)



# Innovation Ecosystem



Dr. Don Senich  
Contact Information  
Kevin Simmons  
Einstein Fellow  
703-292-2692  
[kesimmons@nsf.gov](mailto:kesimmons@nsf.gov)

