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WHERE DISCOVERIES BEGIN

The Industry/University Cooperative Research Centers (I/UCRC) Program

December 13, 2012

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I/UCRC , IIP Division
National Science Foundation

Welcome to the Industry / University Cooperative Research Centers

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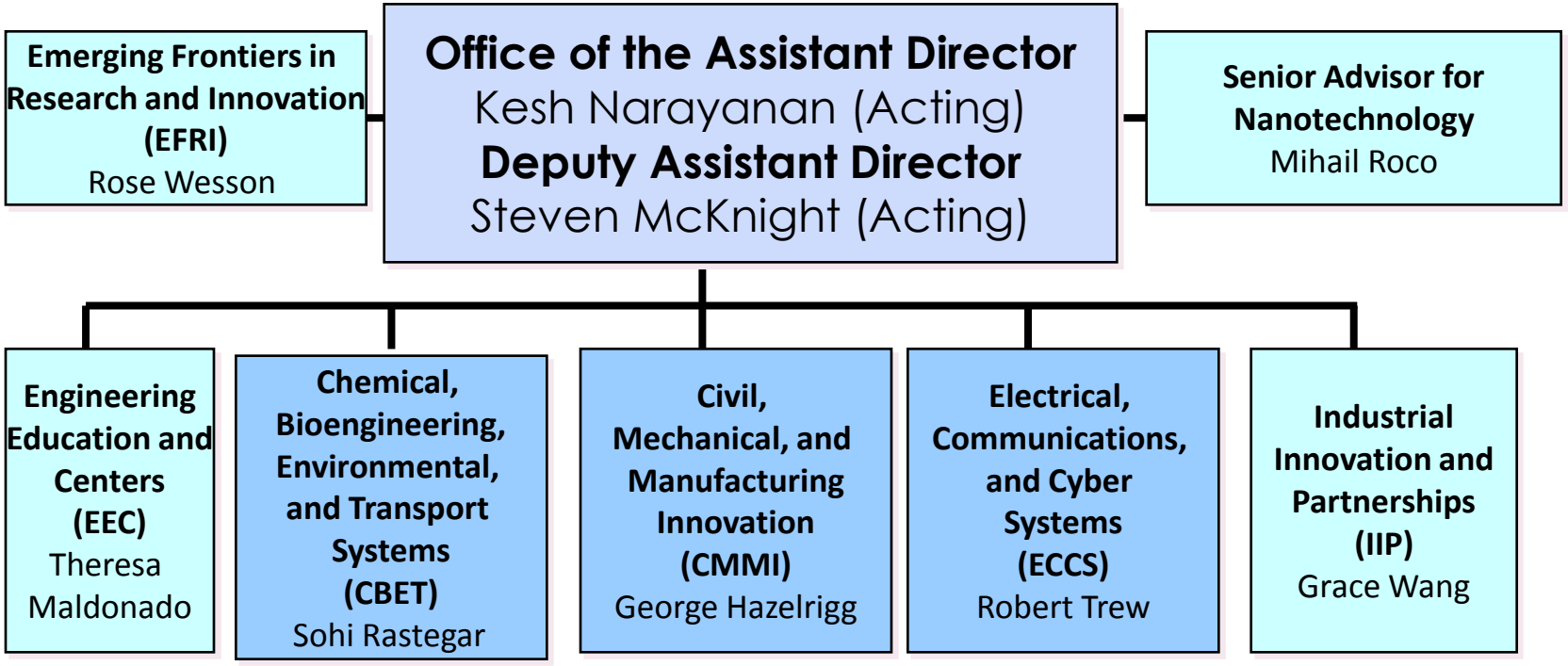
Directorate of Engineering



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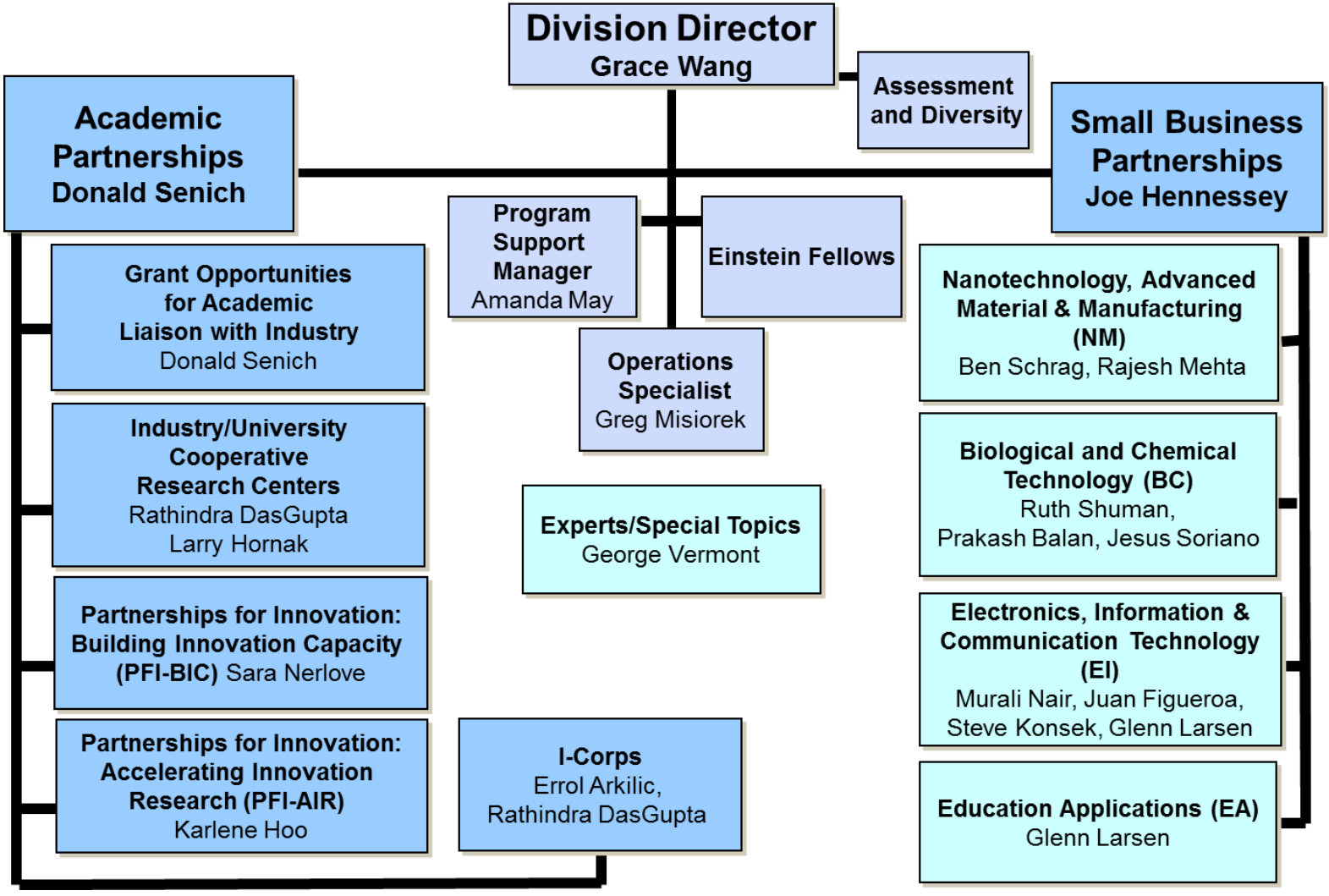
Industrial Innovation and Partnerships



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The Industry/University Cooperative Research Centers (I/UCRC) Program

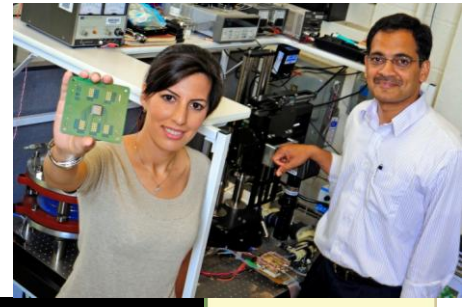
Mission:

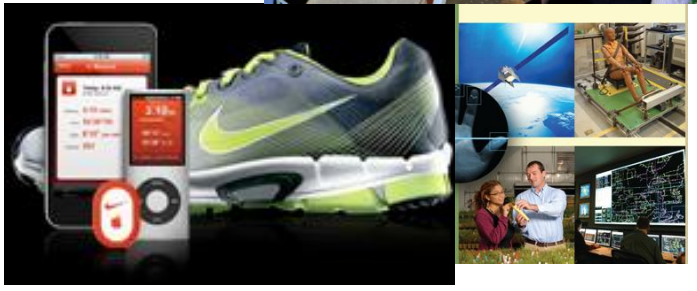
- To contribute to the nation's research infrastructure base by **developing long-term partnerships among industry, academe and government**
- To leverage NSF funds with industry to **support graduate students performing industrially relevant fundamental research**

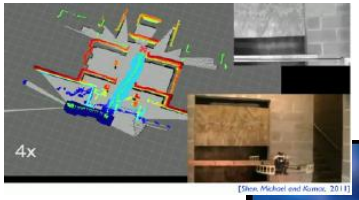
Vision:

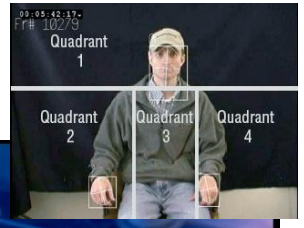
- To **expand the innovation capacity of our nation's competitive workforce** through partnerships between industries and universities

Over 30 years of fostering and growing long-term trusted relationships between Industry and academe based on shared value









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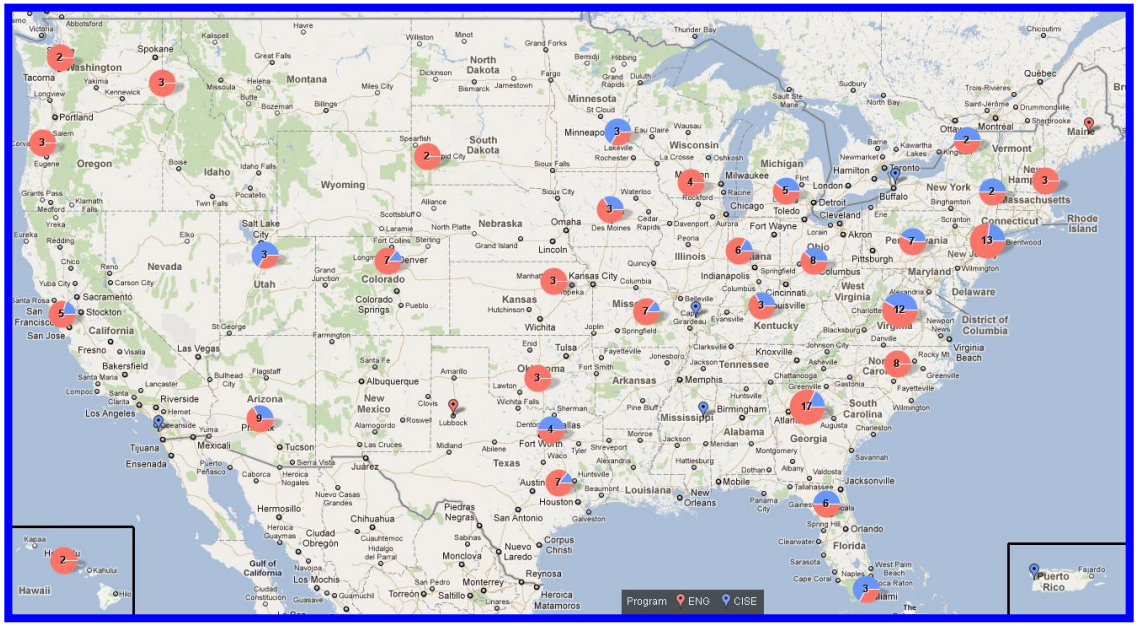
I/UCRC Fast Facts – FY11 Snapshot



National Scope of I/UCRCs

ENG – Engineering

CISE – Computer and Info. Sci and Eng.

Program Funding

- $15M in Program Funding (ENG, CISE)
- $118M in Total Center Funding,
- **Nearly 8:1 Leveraging of NSF funds**.

Centers Nationally:

- **61 Centers with 178 Sites**
- **Over 760 Members** representing over 500 distinct organizations holding over 1000 Memberships
- 55% Large Business, 23% SB, 15% Federal Members

Students

- **600 graduated in 2010, over 30% hired by members**
- 225 PhDs, 249 MS & 128 UGs graduated in 2010, trained in Center research

Sustainability

- 44 Graduated I/UCRCs remain in operation in 2010 true to model

DISCOVERY TO INNOVATION

Industry/University Cooperative Research Centers

See Directory at www.nsf.gov/eng/iip/iucrc

Advanced Electronics Fabrication and Processing

Berkeley Sensor & Actuator Center – UC-Berkeley, UC-Davis

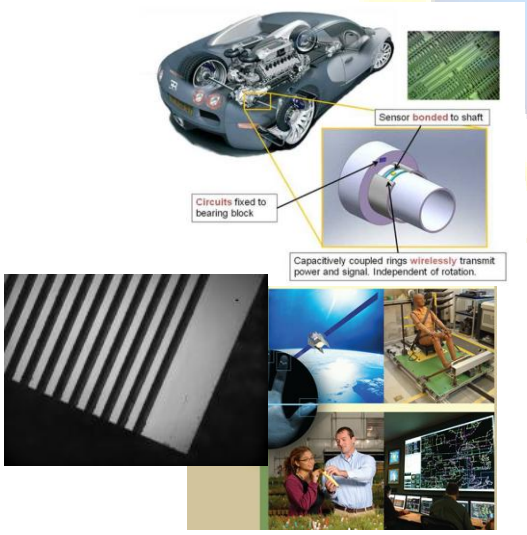
Center for Advanced Vehicle and Extreme Environment Electronics – Auburn

Center for Design of Analog Digital Integrated Circuits – WSU, OSU

Center for Dielectric Studies – PSU

Center for Electromagnetic Compatibility – MUST, Clemson, Oklahoma, Houston,

Cooling Technologies Research Center - Purdue



Advanced Manufacturing

Center for Friction Stir Processing – BYU, MUST, South Carolina , SDSMT, Wichita State

Center for Particulate and Surfactant Systems – UF, Columbia

Laser and Plasma for Advanced Manufacturing – UVA, Michigan , SMU, Illinois

Membrane Science, Engineering and Technology Center – NJIT, Colorado

Intelligent Maintenance Systems – Cincinnati, Michigan, MUST

Smart Vehicles Concepts – Ohio State, Texas A&M

Biotechnology, Health & Safety

Center for Agricultural, Biomedical, and Pharmaceutical Nanotechnology – Illinois

Center for Biophotonic Sensors and Systems – Boston University, UC-Davis

Center for Pharmaceutical Development – Georgia Tech, UK

Bio Energy Research and Development – SDSMT, Hawaii-Manoa , NCSU, Stony Brook

Center for Health Organization Transformation – Texas A&M, Northeastern, PSU, Georgia Tech

Child Injury Prevention Studies – UPENN, Ohio State

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Industry/University Cooperative Research Centers

Advanced Materials

- Advanced Processing and Packaging Studies – Ohio State, UC Davis, NCSU
- Center for Advanced Non-Ferrous Structural Alloys – CSM, North Texas
- Center for Energy Harvesting Materials and Systems – Virginia Tech, UT-Dallas
- Center for Integrative Materials Joining Science for Energy Applications – Ohio State, Lehigh, Wisconsin - Madison , CSM
- Center for Metamaterials – CUNY, Western Carolina, UNCC, Clarkson
- Computational Materials Design – PSU, Georgia Tech.
- Center for Nondestructive Evaluation – Iowa State
- Ceramics, Composites and Optical Materials Center – Clemson, Rutgers
- Wood-Based Composites Center – Virginia Tech, OSU

Civil Infrastructure Systems

- Center for Electric Vehicles - Transportation and Electricity Convergence – UT-Austin, Texas A&M
- Center for the Integration of Composites into Infrastructure - WVU, Rutgers, NCSU, Miami
- Grid-Connected Advanced Power Electronic Arkansas-Fayetteville, South Carolina

Energy & Environment

- Center for Advanced Forestry Systems – NCSU, Georgia , Idaho , Maine , Washington, Virginia Tech , OSU, Purdue, Florida
- Center for Fuel Cells (CFC) – South Carolina, Connecticut
- Center for Resource Recovery and Recycling – WPI, CSM, Katholieke Universiteit Leuven
- Energy-Efficient Electronic Systems Center – Binghamton, UT-Arlington, Villanova
- Next Generation Photovoltaics – UT-Austin, Colorado State
- Power Systems Engineering Research Center – Arizona State, UC-Berkeley , CMU, CSU, Cornell, Georgia Tech, Howard, Illinois, Iowa State, Texas A&M, Washington State, Wichita State, Wisconsin
- Silicon Solar Consortium – NCSU, Georgia Tech
- Water and Environmental Technology – Temple, U. of Arizona, Arizona State
- Water Equipment & Policy – Wisconsin-Milwaukee , Marquette

DISCOVERY TO INNOVATION

Industry/University Cooperative Research Centers

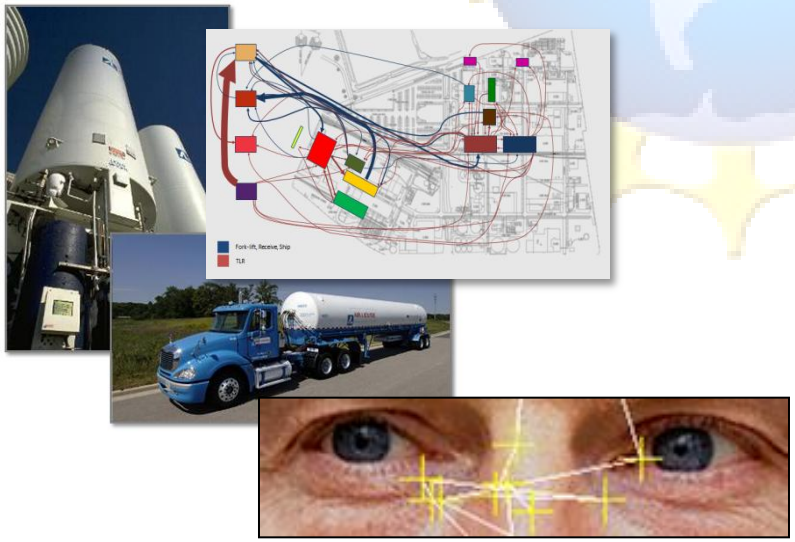
System Design & Simulation

Advanced Space Technologies Research & Engineering Center – Florida , NC A&T State

Center for e-Design – Virginia Tech, Iowa State,Massachusetts-Amherst , Central Florida, CMU, SUNY Buffalo, BYU, Puerto Rico-Mayaguez , Wayne State

Center for Excellence in Logistics and Distribution – Arkansas , Oklahoma, Oklahoma State, Clemson, Missouri , Virginia Tech, Arizona State, UC-Berkeley

Telecommunications (Connection One) – Arizona State, Ohio State, Hawaii, Rensselaer, Arizona



Information, Communication & Computing

Advanced Knowledge Enablement – Florida Intl, Florida Atlantic, Dubna Intl

Autonomic and Cloud Computing – Florida , Mississippi State, Arizona, Rutgers

Center for Identification Technology Research – Clarkson, Arizona, WVU

Center for Research in Intelligent Storage – Minnesota, UC-Santa Cruz,

Center for Surveillance Research – Ohio State, Wright State

Center on Optical Wireless – PSU, Georgia Tech

Embedded Systems – Arizona State, Southern Illinois-Carbondale

Experimental Research in Computer Systems – Georgia Tech, Ohio State

Hybrid Multicore Productivity Research - UMBC, UC-San Diego, Georgia Tech

Net-Centrics System and Software – North Texas , UT-Dallas , Southern Methodist, Arizona State, MUST

Center for High-Performance Reconfigurable Computing – Florida , BYU, GW, Virginia Tech

Safety, Security, Rescue Research – Minnesota, Denver, UPenn

Visual and Decision Informatics – Louisiana-Lafayette, Drexel,

Wireless Internet Center for Advanced Technology Polytechnic Inst of NYU, UVa, Virginia Tech, Auburn, UT-Austin

I/UCRC: A Few Success Stories

- **Edison Welding Institute:**
  - Years funded: 1979-1990. Now an independent research entity; self-sustaining for 19 years
  - EWI fuels *manufacturing technology advancement* for companies throughout Ohio

- **Center for Electromagnetics Research (now called CenSSIS)**
  - Years funded: 1985-1998, Primary site at Northeastern University
  - Received an ERC award in year 2000 and became Center for Subsurface Sensing and Imaging Systems

- **Center for Non-Destructive Evaluation (Phase III)**
  - NDE Technologies, Inc founded in 1997 (licensed from the center)
  - Suite of NDE software programs

- **Center for High Performance Reconfigurable Computing**
  - Supercomputer Novo-G (the most powerful reconfigurable computer that can rearrange its internal circuitry to suit the task at hand) developed at the University of Florida

- **Center for Autonomic Computing**
  - Spin-off company (Avirtek, Inc)
  - Pioneering innovative autonomic management solutions

See the IUCRC Compendium at www.nsf.gov/eng/iip/iucrc/tech_breakthroughs.jsp

Sam's Club and Univ. of Arkansas CELDi

Retail Logistics Project

Project Goal: Maintain or improve in-stock performance at clubs while reducing club inventory

With the use of a custom-built simulation model of the Sam's Club supplier replenishment process, the University of Arkansas team was able to determine improved supplier reordering points to improve logistics.

Project Outcomes:

- System wide deployment
- Significant inventory reduction
- Improved in-stock performance
- Estimated as a $60M annual impact
- Students: 1 M.S.

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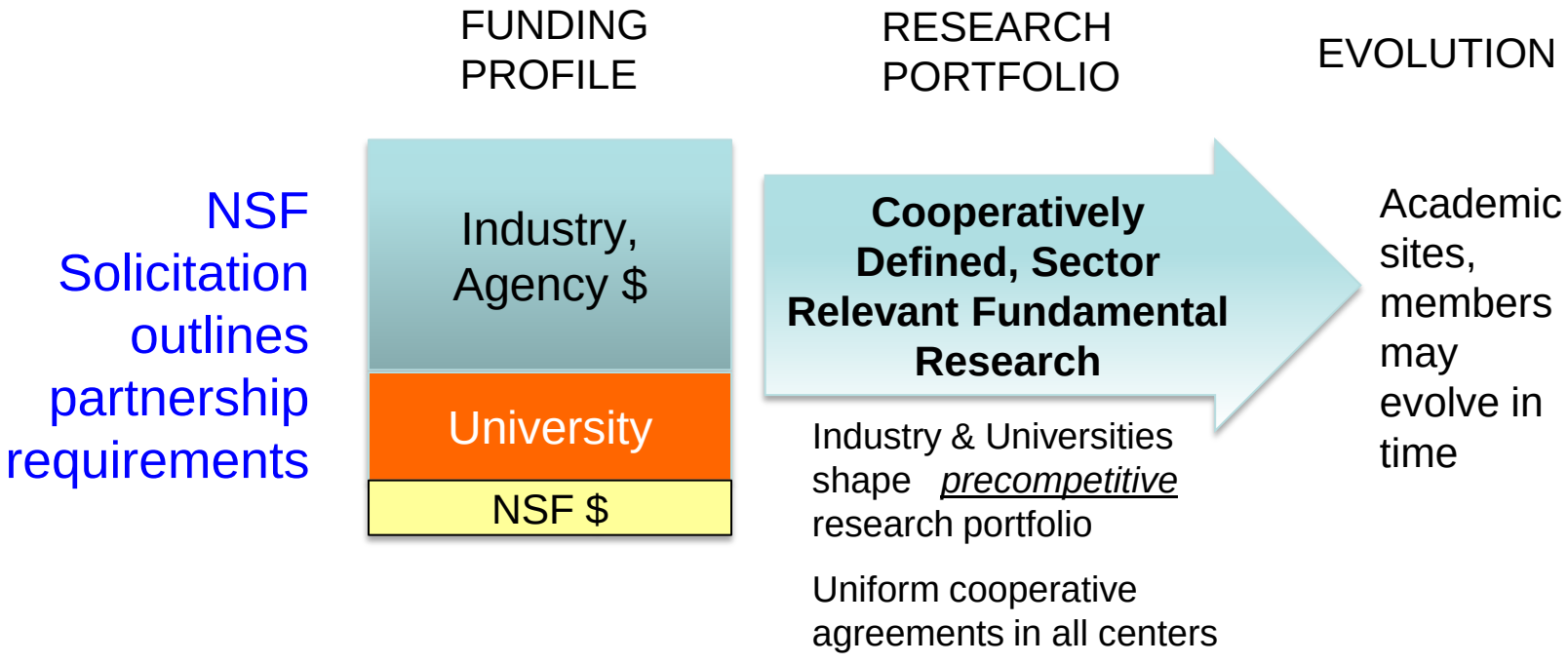
I/UCRC Approach

The NSF provides the framework for industry to realize early and ongoing value from university fundamental research



NSF seeds center activity.

Centers succeed based on the value they provide to industry and faculty and the depth of the trusted relationships that result.

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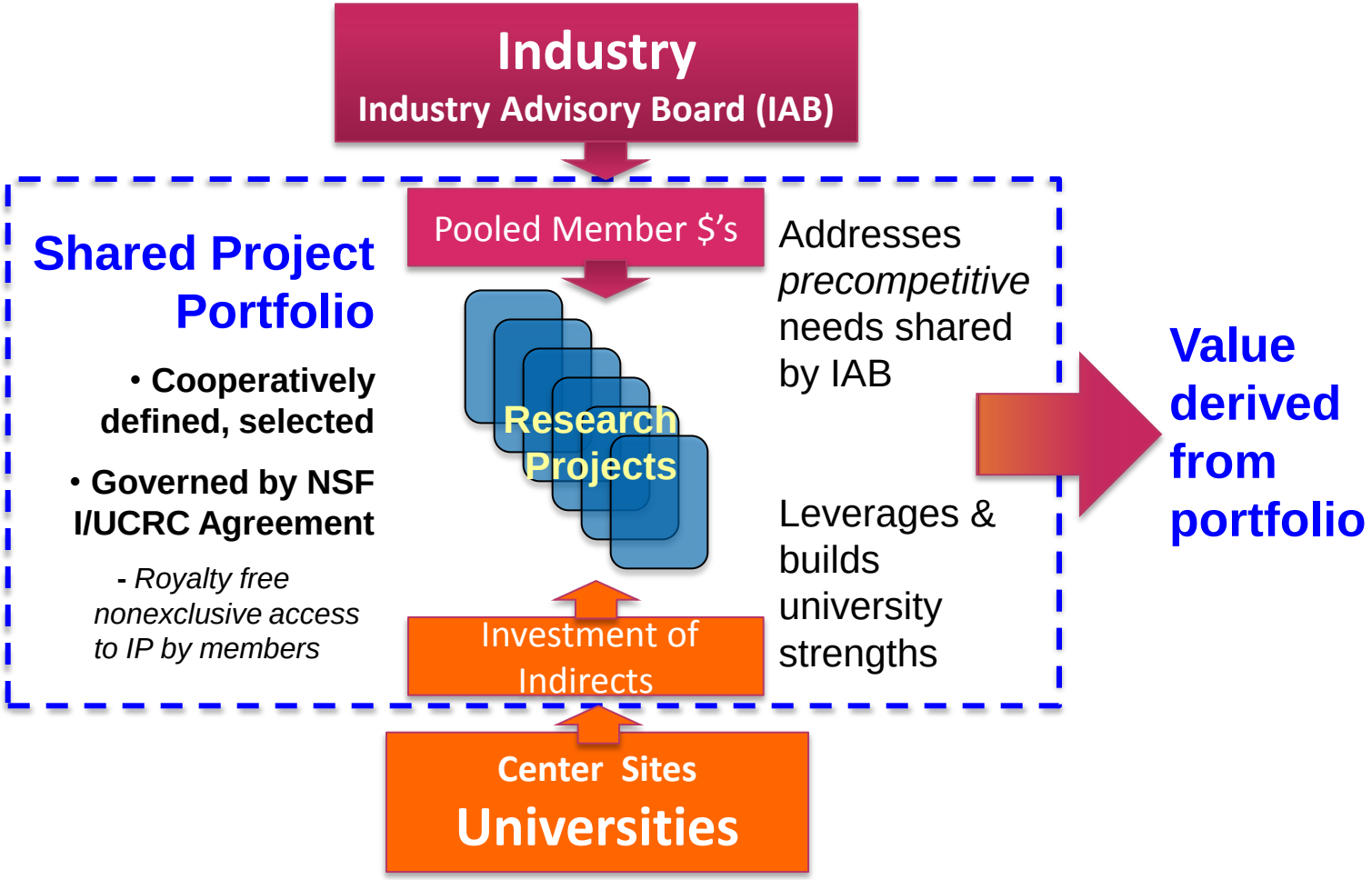
I/UCRC Nucleus: A Cooperatively Defined, Funded & Shared Research Portfolio



Requires trust be built in the model, and between all partners in the center.

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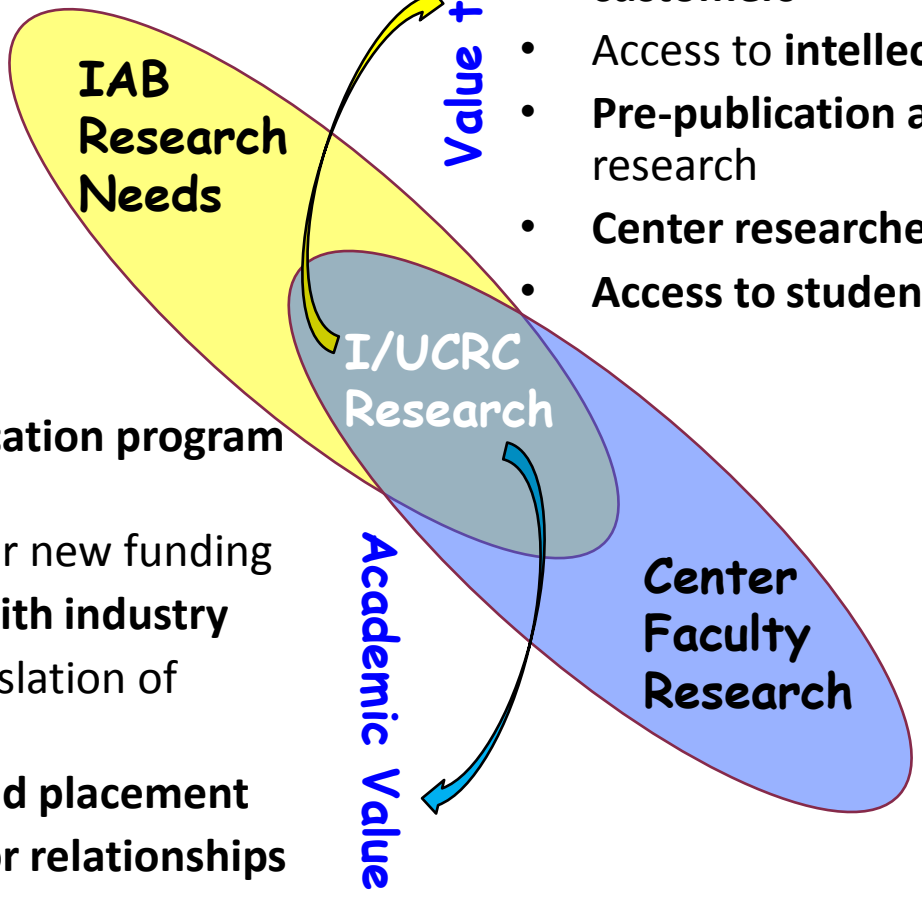
What *value* does an I/UCRC offer?

Outcomes from a cooperatively defined and managed, portfolio of industry-precompetitive fundamental research.



- High value **research projects**
- **Investment leveraging**
- **Sector networking, learning from industry peers and customers**
- Access to **intellectual property**
- **Pre-publication access** to research
- **Center researchers & facilities**
- **Access to students**

- **New research and education program dimensions**
- **Leverage POC results** for new funding
- **Trusted relationships with industry**
- **Ready partners** for translation of discoveries
- **Student recruitment and placement**
- **Organize industry sector relationships**
- Means to **achieve institutional mission**.

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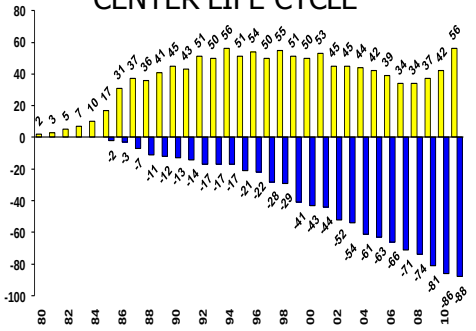
I/UCRC Evaluation & Assessment

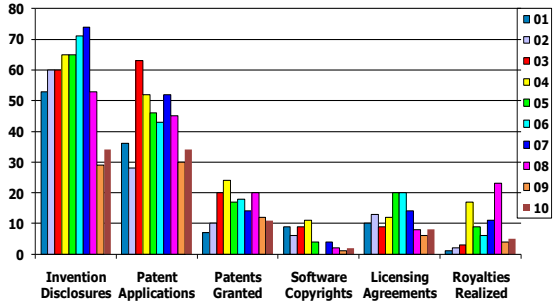
30+ year commitment to integrating evaluation with program planning, implementation and operation . *Local Evaluation – Global Assessment*

CENTER INPUTS AND OUTPUTS ASSESSMENTS

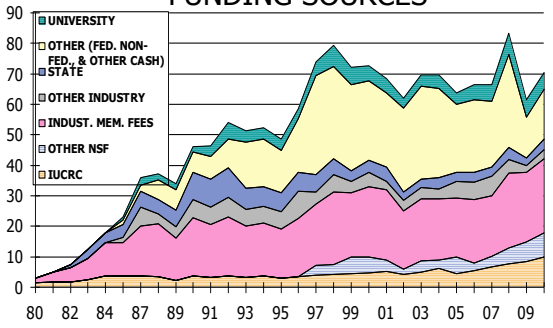
CENTER LIFE CYCLE*



IP EVENTS

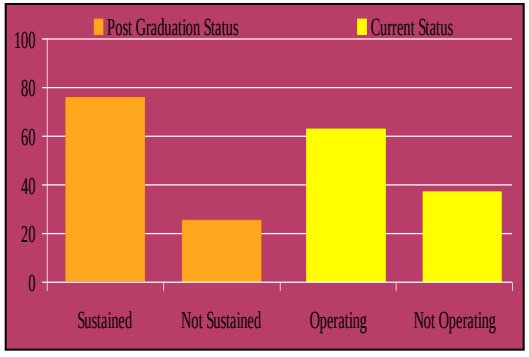


FUNDING SOURCES



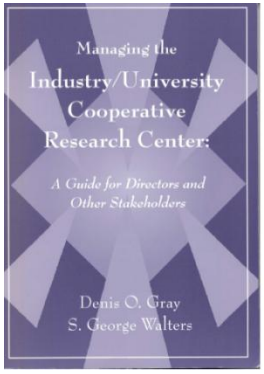
TARGETED ASSESSMENTS AND RELATED WORK PRODUCTS

IUCRC GRADUATION STATUS



Breakthrough Compendium

Gray & Walters Director's Guide



Plus publication in open literature: > 80 publications in journals, national & international conferences: *Research Policy*; *AAAS*; *Journal of Technology Transfer*; *Sc. Public Policy; New Directions in Evaluation*

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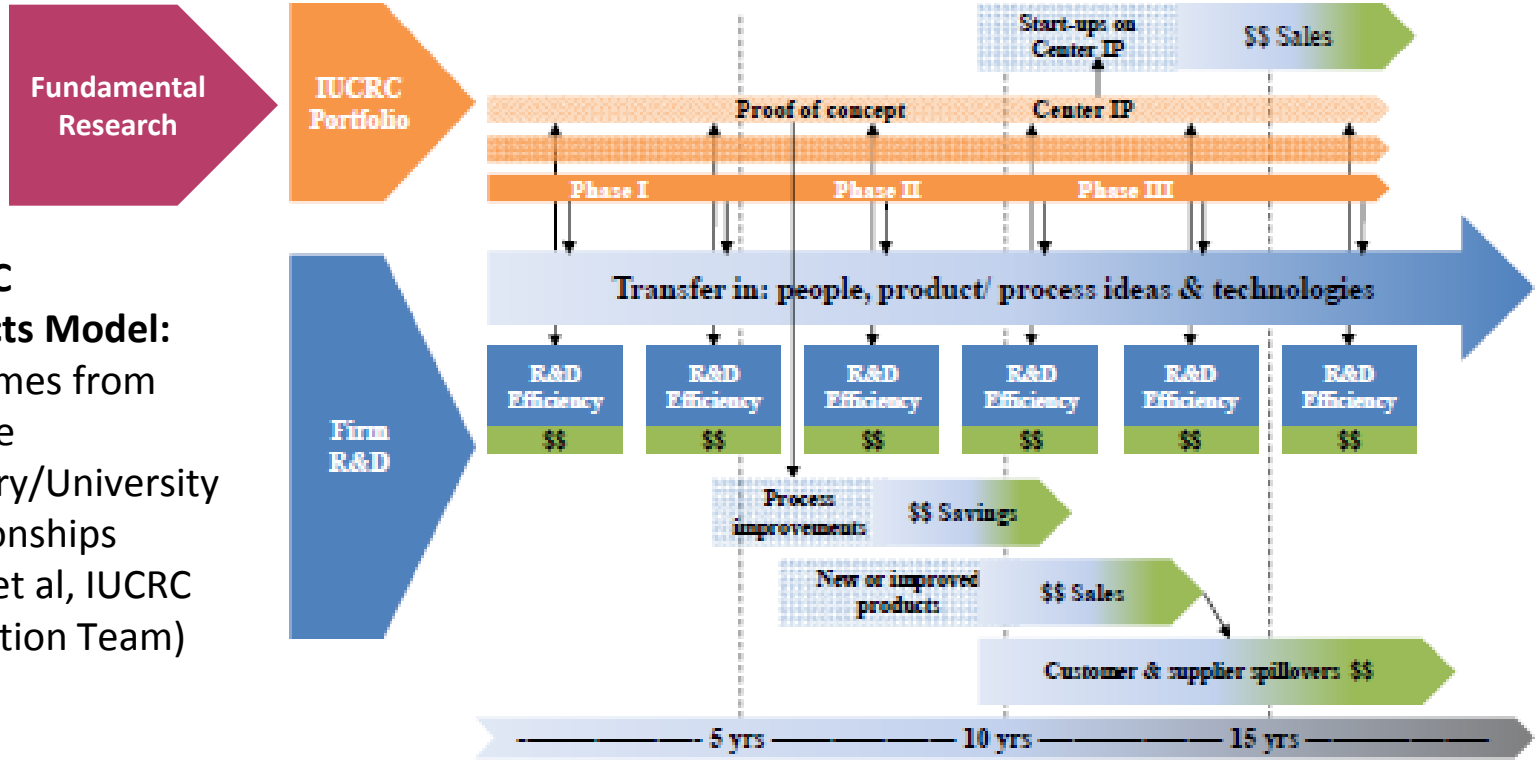
Summary

Through their trusted Industry/University relationships, I/UCRCs

- Continuously translate research advances to industry;
- Train students as industry's next generation of innovators;
- Provide value to all partners – universities & industry; and
- Grow US Innovation capacity

I/UCRC Impacts Model: Outcomes from Mature Industry/University Relationships (Gray et al, IUCRC Evaluation Team)



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For more information: http://www.nsf.gov
and: http://www.nsf.gov/eng/iip/iucrc

Program phone: (703) 292-8383

Note: The best way to contact us is via e-mail. Many are on the road frequently

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I/UCRC Membership Agreement

see www.nsf.gov/eng/iip/iucrc/sample_agreement_form.jsp

- **Parties to Agreement, University and Center**
- **Annual membership fee structure**
- Patent rights held by university, with royalty free, non-exclusive rights to center members
- Companies wishing to exercise rights to a royalty-free license pay for the costs of patent application
- If only one company seeks a license, that company may obtain an exclusive fee-bearing license
- March-in Rights
- Publication delay policy
- Industrial Advisory Board – one representative from each company per membership
- **Indemnification clause(s)**

• All Members sign the agreement upon Center Award
• ONE center, and ONE membership agreement form