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WHERE DISCOVERIES BEGIN

I/UCRC

Program Overview and Update

(Jointly managed by ENG and CISE)

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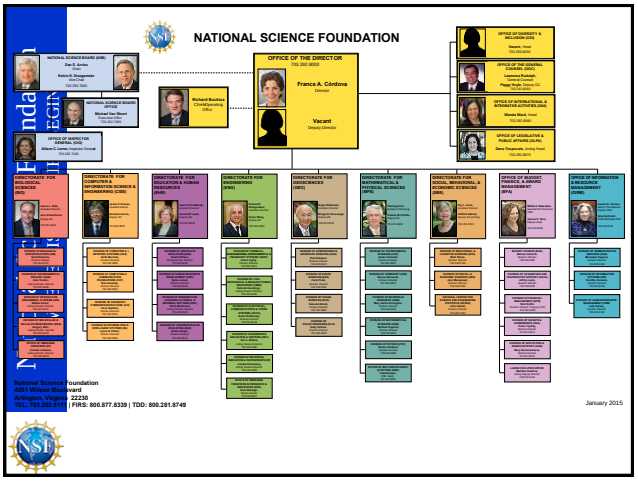
Welcome to the Industry / University Cooperative Research Centers



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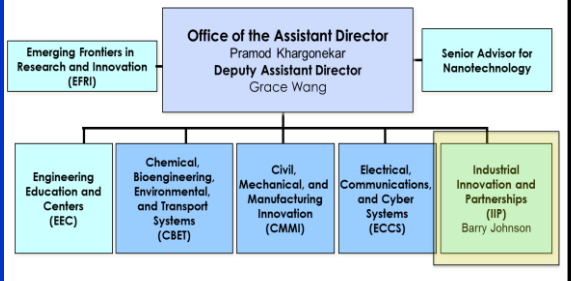
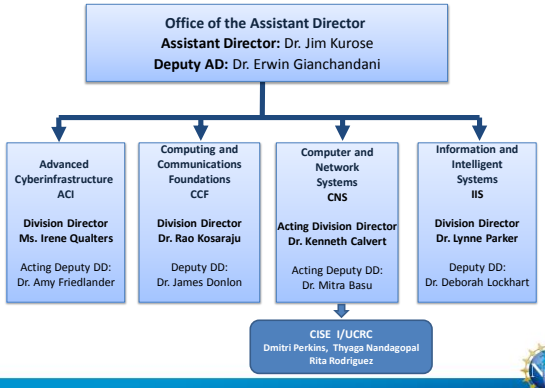
ENG Organization



CISE Organization



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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, academic institutions, and government**
- To leverage NSF funds with industry to **support graduate students performing industrially relevant research**

Vision:

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

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I/UCRC Research History in NSF

1972	Presidential Initiatives; e.g. Industrial Affiliates, Industrial R&D Incentive Program
1976	NSF Small Business Innovation Research Program (SBIR) established
1978	Industry/University Cooperative Research Centers program started; President's domestic policy review of industrial innovation
1980	Stevenson-Wydler Innovation Act of 1980 Uniform Federal Patent Policy Act of 1980 Justice Department's Anti Trust Guide
1982	Small Business Innovation Development Act of 1982
1984	Engineering Research Centers Program established
1985	National Cooperative Research Act of 1985
1988	Science and Technology Centers program established
2006	I/UCRC program has grown to about 40 centers and over 100 universities

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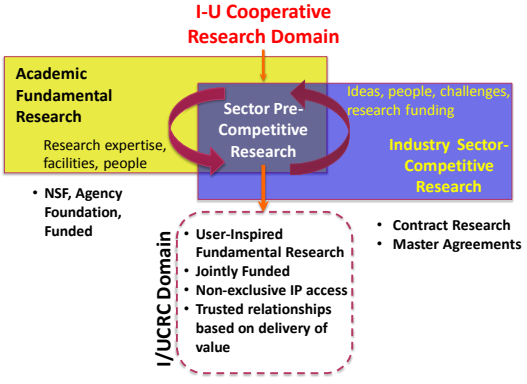
The I/UCRC Model: Linking Industry to Fundamental Research



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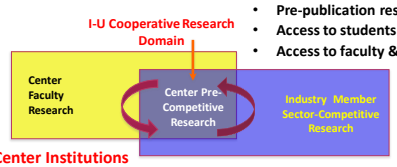
What Value does an I/UCRC Offer?

Value to Industry Members

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



Value to Center Institutions

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

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

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Why do firms join?

Strategic Research Relevance

- ✓ **Impact on R&D: Member Follow on Funding**
  Center products trigger internal R&D projects. $100M/year program wide estimates of follow-on funding over the past four years.
- ✓ **Impact on R&D: Efficiency**
  Amplify and streamline internal research efforts by sharing risks.
- ✓ **Impact on Intellectual Property (IP)**
  IP events reported in FY14: **163 invention disclosures; 61 patent applications; 22 patents granted; 12 license agreements; 30 copyright granted and 7 Royalties Realized.** Over the years, many of these inventions have been licensed to firms, including start-ups and spin outs, and resulted in commercialized products and processes.
- ✓ **Impact on Commercialization**
  Over the years, hundreds of firms have reported commercializing products, processes and/or services based on research conducted by the IUCRCs.
- ✓ **Impact on Human Capital**
  Vehicle for accessing (and contributing to the training of) the next generation of scientists and engineers.

Innovation through Partnerships

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I/UCRCs: The NSF's Role

Facilitate a Center environment in which long-term relationships between industry and academia can thrive.

- **Cooperative Operational Framework, Agreement**
- **Franchise of centers for collaboration**
- **Best practices based on decades of evaluation**
- **NSF Award – Base Funding + More Opportunities**

Tailored specifically for centers

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I/UCRC Membership Agreement

- **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

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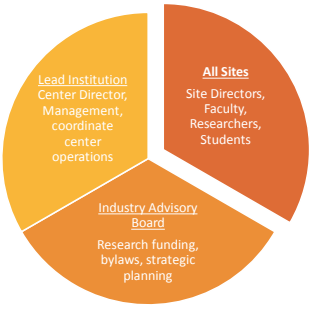
Typical Center Oganization

Center for Successful Innovation

NSF operating funds, Membership agreement, best practices

University Policy Committee



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I/UCRC Fast Facts – FY15 Snapshot

54 ENG Funded Centers 23 CISE Funded Centers

5 International Sites: Belgium, Finland, Germany, India, Russia

Program Funding
- $20M in Program Funding (ENG, CISE)
- **6:1 Leveraging of NSF funds**

Students
- **Over 2000 students engaged**
- **649 graduated in 2014, nearly 30% hired by members**

Sustainability
- Over 40 Graduated I/UCRCs remain in operation true to model

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I/UCRC Member Profile

Of the 760 unique members in FY'13:
- 24 Companies in Fortune-50
  - 38 Companies in Fortune-100
  - 64 Companies in Fortune-250
- 87 Companies in Fortune-500
  - (with 280 memberships – average 3 per company)
- 286 Small Businesses (and 208 unknown)
- 66 Government Agencies – federal, state, municipal
- 24 non-profits

International Dimension
- 22 non-US Companies in the Global 500

Same IUCRC Membership Agreement

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Impact of I/UCRC Centers

Center for Child Injury Prevention Studies (CChIPS): a Phase III IUCRC

To advance the safety of children, adolescents and young adults through research

RESEARCH → *ACTION* → *IMPACT*

- Injury risk in seat belt restrained occupants
- Knee Air Bag Injury Risk Assessment for Children
- Design of an emotionally realistic driving simulator
- Development of premature infant Anthropomorphic Test Device (ATD)
- Factors Associated with Driving in Teens with Autism Spectrum Disorders

Over 50 projects since 2005

Industrial Advisory Board
6 member companies in 2005
26 member companies in 2012

Insurance companies
Small businesses
Automotive industry
Federal agencies
REU Student Site
Child Restraint industry

AIR Award: Innovation Ecosystem for Online Health & Wellness
- **Partners:** University City Science Center (UCSC) in Phil., industry, investors
- **I/UCRC Team:** CChIPS & Univ of Florida Center for Autonomic Computing (CAC)

Advances in Child Injury Prevention Conference
12th Annual Conf. Hosted by CChIPS
Goal: Latest research in safety for children and adolescents to stakeholders who can effect change
-**Participants:** ~100 attendees from industry, government and research orgs
-**Results:** Research influences product design & test, new members, research.

The Children's Hospital of Philadelphia® | Penn | Ohio State Medical Center

Center Impact: CChIPS Efforts/Impact on Traumatic Brain Injury

Testimony before the **Subcommittee on Health Energy and Commerce Committee** entitled "A Review of Efforts to Prevent and Treat Traumatic Brain Injury (TBI)"

The Children's Hospital of Philadelphia® | Penn | Ohio State Medical Center

Industry-Spawning Applications from NSF-Funded University Technologies

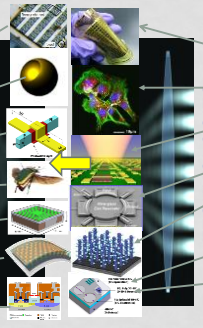
Berkeley Sensor & Actuator Center BSAC (UC Berkeley & UC Davis)

100+ Industry Members spanning 25 years of Innovation Research
5 Current 20+ year members
30 Start-up Companies
Multi-$Billion Impact

Applications

- *Healthcare*
- *Plasmonics*
- *Integrated Optics*
- *Wireless Communications*
- *Energy Harvest/Monitor*
- *Conformal Electronics*
- *Processes & Packaging*

APPLICATIONS



TECHNOLOGIES

Technologies

- *Nanotechnology*
- *BioFluidics*
- *Optophotonics*
- *Wireless*
- *MicroEnergy*
- *Sensing & Actuation*
- *Materials/Process*

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BSAC

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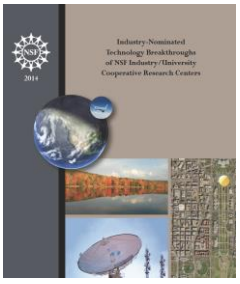
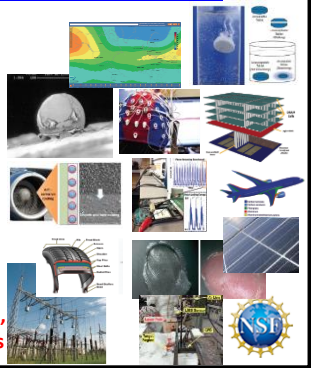
2014 Compendium of Industry-Nominated I/UCRC Technology Breakthroughs

What will be the center's Impact Stories ?





Over 1400 Publications in '13, 248 co-authored w/Members

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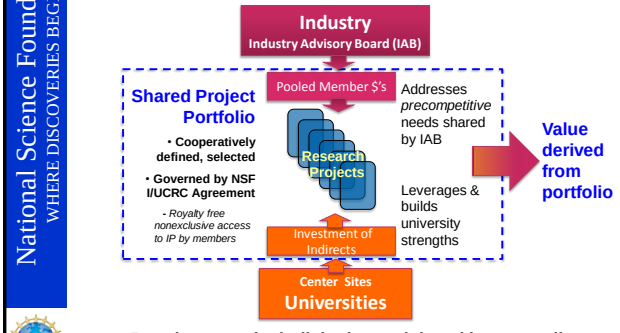
I/UCRC Nucleus: A Cooperatively Defined, Funded & Shared Research Portfolio



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

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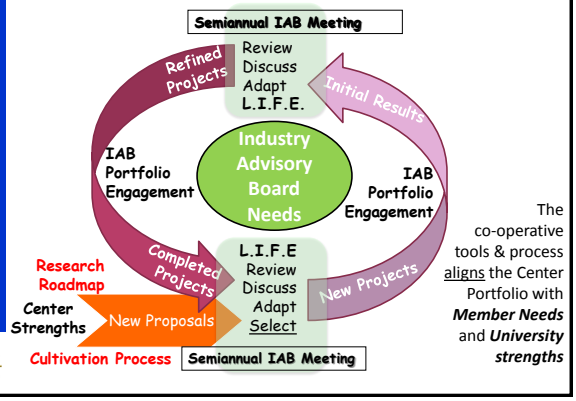
The I/UCRC Portfolio Cycle: Maximizing Value while Building Trust



The co-operative tools & process aligns the Center Portfolio with ***Member Needs*** and ***University strengths***

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I/UCRC Clusters for Grand Challenges

Catalyzing technologies breakthrough and advancing national priorities via cross-center clusters, highly cross-disciplinary and cross-sector strategically formed research teams and bold and creative research ideas

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I/UCRC Clusters for Grand Challenges

I/UCRC Clusters for Grand Challenges

A national priority and clear industry-driven complex scientific and engineering challenges

I/UCRC Clusters for Grand Challenges

I/UCRC Clusters for Grand Challenges

An I/UCRC cluster and additional research partners specifically selected to add complementary skill sets

Measurable industry collaboration and involvement in the design and implementation of the research projects

Bold unusually creative high risk/high-reward interdisciplinary research ideas that combine concepts/methods in new, surprising ways from multiple fields at the interfaces of the I/UCRCs involved and of their disciplines

Clear and convincing articulation of the potential to promote sustainable economic growth, enhance U.S. global competitiveness and to prepare a strong workforce

Clear indication of the expected outcomes, i.e. of the short-term and long-term impact on the advancement of the specific national priority

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I/UCRC Clusters for Grand Challenges

Strategic Team

Additional academic partners (with key complementary expertise)

I/UCRC 1
I/UCRC 2
.....

Industrial R&D reps (from IABs and beyond) and FFRDCs researchers

Planning Workshop

The Whats, the Whys and the Hows:

- With the input of your IABs and beyond Identify priorities
- Define a couple of research projects with clear milestones

The Whos:

- Identify the combination of expertise needed/projects staffing
- Form strategic team (faculties, industry R&D, and FFRDCs)

Budget and Duration (up to $1.5M for two years):
$750k per year for each cluster with up to $150k per year per I/UCRC
NSF supports only Academic Institutions, their faculties and students

Eligibility: I/UCRCs meeting minimum membership requirements for three years in a row (and one in kind only)

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Dear Colleague Letter: I/UCRC Clusters for Grand Challenges

Potential precompetitive research topics that are of particular interest include but are not limited to:

- **Advanced sensing, controls, and platforms for manufacturing**
- **Visualization, informatics & digital manufacturing**
- **Advanced materials manufacturing (AMM)**

I/UCRC clusters addressing **any precompetitive research areas identified among the science and technology priorities for the nation** are welcome and will be fully considered.

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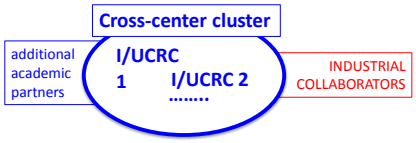
Dear Colleague Letter: I/UCRC Clusters for Grand Challenges



Form a strategic team to tackle a **cross-disciplinary, cross-sector portfolio of research projects that hold the potential to catalyze technology breakthroughs and advance national priorities**, particularly in advanced manufacturing.

The active participation of industry in the design and implementation of cluster research efforts is expected.

Budget and Duration (1.5M for two years):
$750k per year for each cluster with up to $150k per year per I/UCRC

Eligibility: I/UCRCs meeting minimum membership requirements for three years in a row (and with one in kind only)

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The New Solicitation

NSF 16-504

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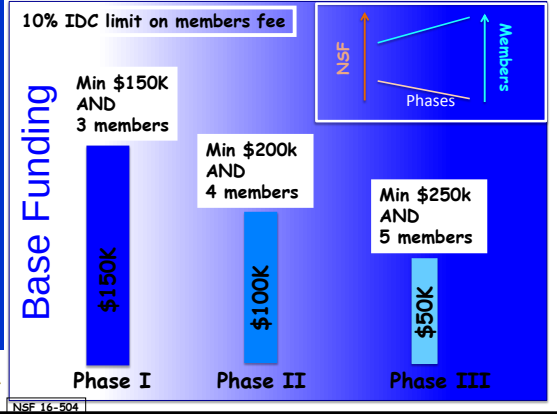
NSF Base Funding: seeds funding to launch and operate your Center



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Increasing your base funding in Phase II and III

- Who is eligible?
  - Phase I and Phase II Sites exceeding minimum membership requirements (over a 5-year period).
- How much?
  - Equivalent to half the total in-cash membership fees exceeding required minimum during the current Phase, not to exceed $250,000.

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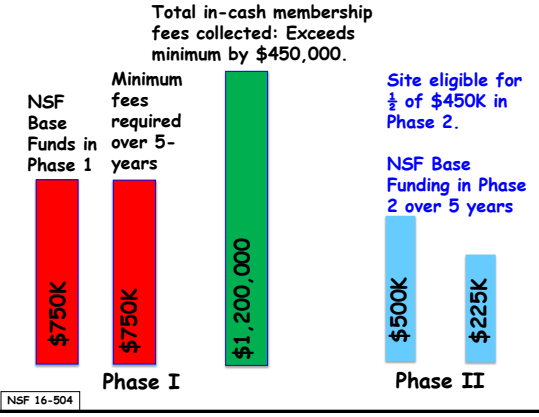
Example: A Phase I Site transitioning to Phase II



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National Science Foundation I/UCRC Contacts

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

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