

NSF University-Industry Collaborative Research Centers (I/UCRC's)

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Industry-University Collaborations Possible models

NSF specific programs

GOALI – support a faculty/students to spend extended periods at an industry
or an industry employee spend extended time at a university

Partnerships for Innovation: Accelerating Innovation Research

Partnership between existing NSF sponsored research centers
and industrial partners

Requires funding from industrial partners along with NSF funds

[One specific research project](#)

Building Innovation Capacity

Translate an innovation into a commercial product
with a small business

Innovation Corps – very small scale

[Help a researcher or a student to market ideas](#)

Industry/University Cooperative Research Centers (I/UCRC)

Mission:

- To contribute to the nation's research infrastructure base by **developing long-term partnerships** among industry, academe and government
 - Each center focuses on one specific area of research
- To **leverage NSF funds with industry** to support graduate students performing industrially relevant research
 - Most of the research is supported with industrial memberships

Vision:

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

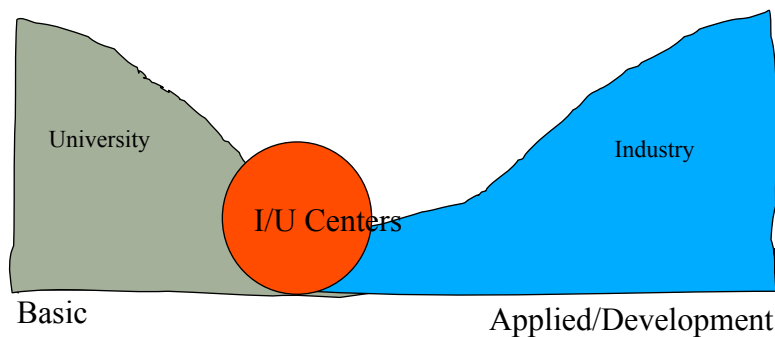
I/UCRC Bedrock: Trusted, long-term relationships between industry and academia based on shared value

A 40 year history of success

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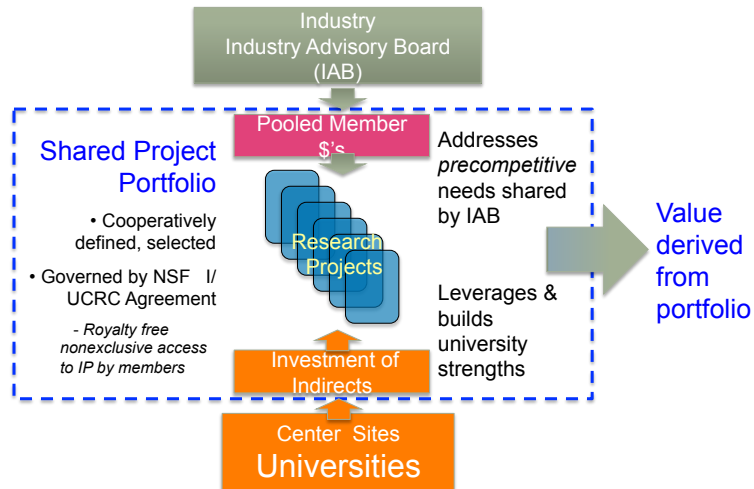
I/UCRC: Mission and Vision

Research Interaction



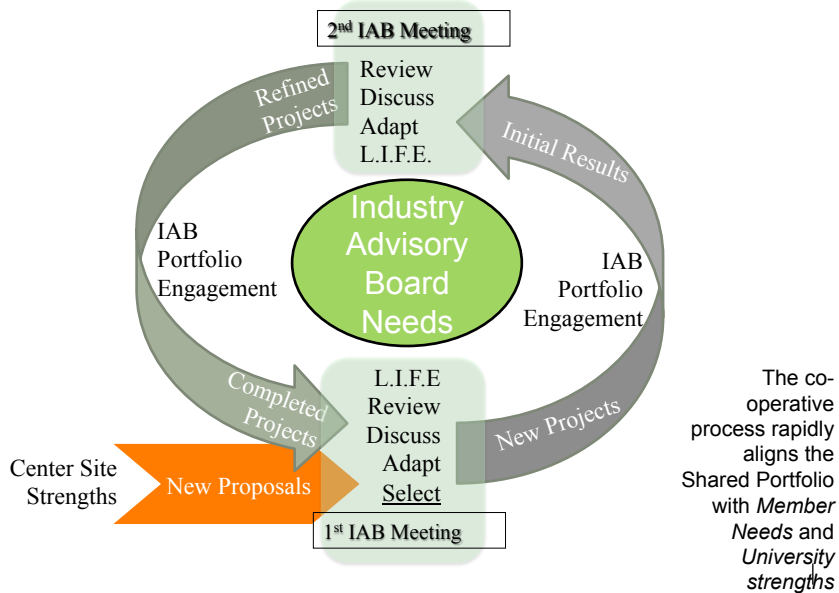
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I/UCRC Nucleus: A Cooperatively Defined, Funded & Shared Research Portfolio



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

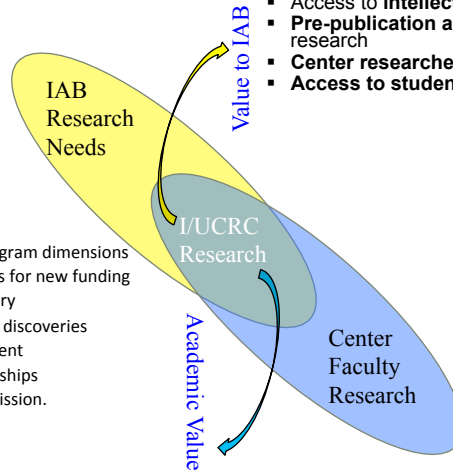
Best Practice: The IUCRC Shared Portfolio Cycle



What value does an I/UCRC offer?

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

- New research and education program dimensions
- Leverage proof of concept 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.



- 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

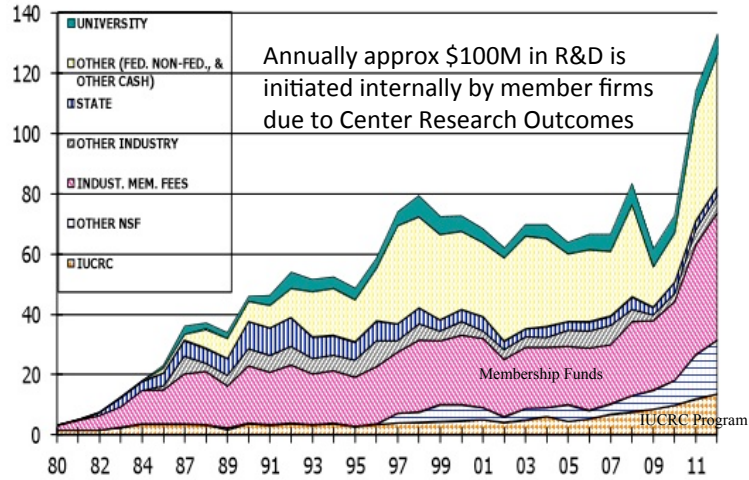
Industry/University Cooperative Research Centers

Center Research Focus Areas

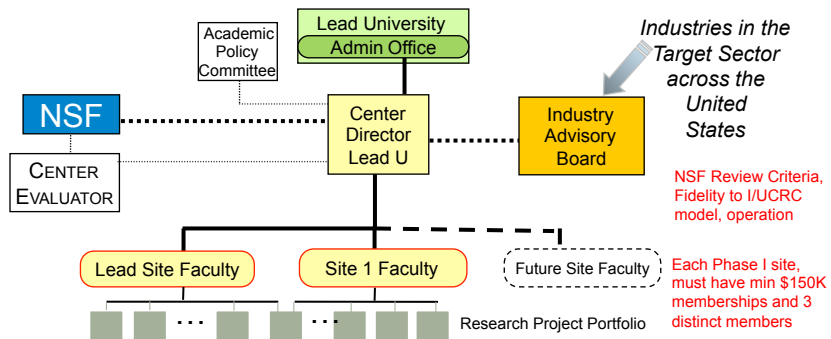
1. *Advanced Electronics, Photonics Fabrication and Processing*
 - 6 Centers
2. *Advanced Manufacturing*
 - 7 Centers
3. *Biotechnology, Health & Safety*
 - 6 Centers
4. *Advanced Materials*
 - 9 Centers
5. *Civil Infrastructure Systems*
 - 4 Centers
6. *Energy & Environment*
 - 9 Centers
7. *System Design & Simulation*
 - 5 Centers
8. *Information, Communication & Computing*
 - 15 Centers



Building Innovation Capacity: FY12 ALL-CENTER TOTAL FUNDING BY SOURCE BY YEAR IN \$M DOLLARS



Typical I/UCRC Organization, Profile (based on 2011-12 Structural Data)



International Partnerships and Projects

An I/UCRC may submit a supplement request for collaborative work with an international research entity constituting formation of an international site of the I/UCRC. International site supplemental requests must include a:

- Plan to interact with the international research site;
- Description of the proposed research projects;
- Description of the infrastructure that is in place to enable collaboration;
- Evidence that the international research entity has adequate partner funding in place to support the proposed projects;
- Formal agreement between the foreign and U.S.-based site that replicates the provisions for IP, copyrights, publication
- delays, and similar issues identified in the I/UCRC membership agreement; and
- Letter from the I/UCRC Industry Advisory Board (IAB) that endorses the international collaboration and proposed research projects.

Each I/UCRC is limited to one supplement per country to support an international site.

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International Academic Research Sits

- To advance I/UCRC goals within the global context, an I/UCRC may receive a \$25,000 supplement annually for an international site or collaboration.
- These funds are to be used for expenses related to the international activity including site director(s) and evaluator international travel, and support for research visits by U. S. students and junior researchers.
- No NSF funds are to be used by non U.S. participants.
- The same policies and guidelines also apply for international sites

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National Science Foundation (NSF) Industry/University Cooperative Research Center on Net-Centric Software and Systems (Net-Centric I/UCRC)

Krishna Kavi
Director



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Center Overview

▪ Mission

- A primary source for fundamental research for the modeling, analysis, design, implementation, verification and validation, testing, deployment, and evolution of **Cloud-based and net-centric software and systems**.

▪ Creation

- NCSS I/UCRC formally established in early 2009
- Current Academic Partners
 - University of North Texas (UNT)
 - *Southern Methodist University (SMU)*
 - University of Texas at Dallas (UTD)
 - *Arizona State University (ASU)*
 - Missouri University of Science and Technology (MUST)
 - **Purdue University (to join in 2014)**



– Industrial Partners

- Each partner contributes \$35K annual membership (a different membership for small businesses)
 - Multiple memberships permitted
 - At least 5 memberships required for each university
 - At least 2 universities required to form an I/UCRC
- Current and past partners include: AMD, Boeing, CISCO, EDS/HP, Lockheed Martin, NTT Data, Raytheon, Tektronix, Texas Instruments, Intel, LG, Sprint and several small businesses

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Current Membership

Large Organizations

Air Force Research Laboratory
Advance Micro Devices (AMD)
Boeing
EDS/HP
Intel
LG Electronics
Lockheed Martin
NTT Data
Raytheon
Sprint
Tektronics
Texas Instruments

Small Organizations

Ashum Corp
CloudMatrice
Cloupea
Endometrics
IQ Engines
JHPA
Streber-Tech
Unique*Soft

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Accomplishments By Numbers

Combined totals for all sites between 2009-2013 (through march and not including MST)

Total Industrial Memberships raised	\$1,660,000
Other funds leveraged	\$2,363,000
Total publications	37
Patents filed or received	3
Total number of students that participated	67
Number of underrepresented students involved	8
Total number of graduates	35
Graduates employed by member companies	13
Total number of faculty involved	19
Number of women faculty involved	5

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Honors and Awards

The center received 2012 DFW Metroplex Technology Business Council's **Tech Titans of the Future** award on August 2012.

Three faculty researcher of the center, one at UTD, one at ASU and one at MST have received the prestigious **NSF CAREER** awards which provide research funding for 5 years to junior faculty members.

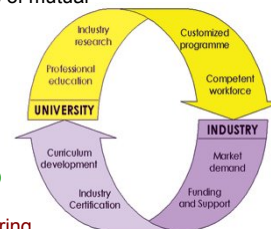
UTD and ASU projects received 2012 **Google App Engine Research** awards.



Direct Industry Participation



- **Shape direction** of projects that seek to develop tools and techniques for rapidly creating highly dependable and adaptable Cloud and net-centric systems for safety- and/or mission-critical applications
- Explore potential **cross-company collaboration** on research topics of mutual interest
 - One-company projects may spinoff which can be protected as proprietary
- **Support of university/student activities** related to the net-centric research themes of the Center
 - NSF Research Experiences for Undergraduates (REU) at UTD
 - MRI award for UTD, UNT and SMU (\$1M)
 - 2012 International Conference on Software Reliability Engineering (ISSRE) in Dallas
 - Two NSF FRP awards – one for UNT/UTD, one for ASU/UNT (\$400K)
 - One CORBI award
- Bi-Monthly half-day meetings to status projects;
- Additional interactions with faculty and students based on interest



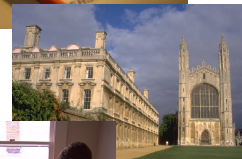
What Do Companies Gain from Membership?

- **Influence IUCRC Research Directions**
 - Opportunities for constructive collaboration and directed efforts with team of customers, partners, suppliers, and competitors on basic and applied research of key mutual benefit
 - Opportunities for focused incubation of technologies, directed by a business partner or partners and targeted to specific product line enhancements
- **Joint Research with Universities, Industries, and Customers (e.g., DoD, NSF, DARPA, DoE, others)**
 - Consortium resources can augment potential CRAD and/or IRAD proposals and projects by providing evidence of and access to collective consortium capabilities, skilled personnel, and past research project performance
- **Technology Transfer**
 - Novel concepts emerging from collaborative industry, customer, and academic research provide opportunities to move ideas from theory to practical application
- **Partnering with Industry on Key Research Interests**
 - Opportunities for collaboration, consulting, and independent peer review with academic, customer, and industry practitioners



Other Benefits?

- **Access to University Research**
 - A “force multiplier” for generating new business opportunities, growing existing competencies, and filling technical gaps
- **Training and Education of Employees**
 - Academic curricula of member institutions targets key net-centric enabling technologies providing potential future employees with focused skill sets and minimal learning curves
- **Access to Students as Interns and Potential Employees**
 - A relevant, desirable, and domain-specific resource pool
 - A lower risk, affordable alternative to recruiting from institutions without net-centric training elements
- **Diverse Faculty and Student Population**
 - Culturally aware, multi-lingual pool of potential consultants for businesses turning their attention to international pursuits, customers, and competitors
- **IRAD/CRAD Partnerships**
 - Consortium resources can augment potential CRAD and/or IRAD proposals and projects
 - Provides evidence of capabilities, access to skilled personnel, and past research project performance



Overall Competencies

Faculty at the four universities have broad capabilities in Computer Science and Engineering related disciplines needed for Net-Centric Systems

- **Computer Systems, High-Performance Computing, Cloud Computing**
 - Resource allocation, scheduling and load balancing, fault tolerance
 - Emerging technologies such as multicore, 3-D RAM, PCM and compiler optimizations
 - Cloud computing security
- **Software Engineering and SoA**
 - Software Architecture, Software Testing, Software Safety
 - Service Discovery and Composition
 - QoS and Service Level Agreements
- **Computer Networking, Security, Sensor Networks**
 - Wired and Wireless
 - Security and authenticity of data
 - Signal Processing
 - Sensor Networks, Cyber Physical Systems

How it Works

- The Center is funded by Industrial Memberships and NSF
- NSF funding offsets administrative project costs so every membership dollar goes into research
- Projects are proposed by both industrial members and university faculty
- The Industrial Advisory Board is composed of a representative from each of the industrial member companies and meets semi-annually
- The IAB exclusively selects projects performed by the Center
- Projects may leverage additional government funding sources
- \$35K annual industrial membership fee
 - Different membership level for Small Businesses available



The End



Questions?

More information and papers at
<http://csrl.cse.unt.edu/~kavi>