I/UCRC for Biophotonic Sensors and Systems (CBSS)
IAB Meeting
December 2, 2011

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I/UCRC , IIP Division
Teri Behrens, Center Evaluator
National Science Foundation

*Welcome to the Industry / University
Cooperative Research Centers*

CBSS: An I/UCRC in its 1ˢᵗ Year

Your Center is in its critical and exciting formative stage

CBSS Status:

- **Boston University – Phase I**
  - Center Lead Site Award in 2011 under NSF 10-595
- **UC - Davis – Phase I**
  - Site Award in 2011 under NSF 10-595
- **Center Evaluator – Teri Behrens**

1st Year of Center Operation

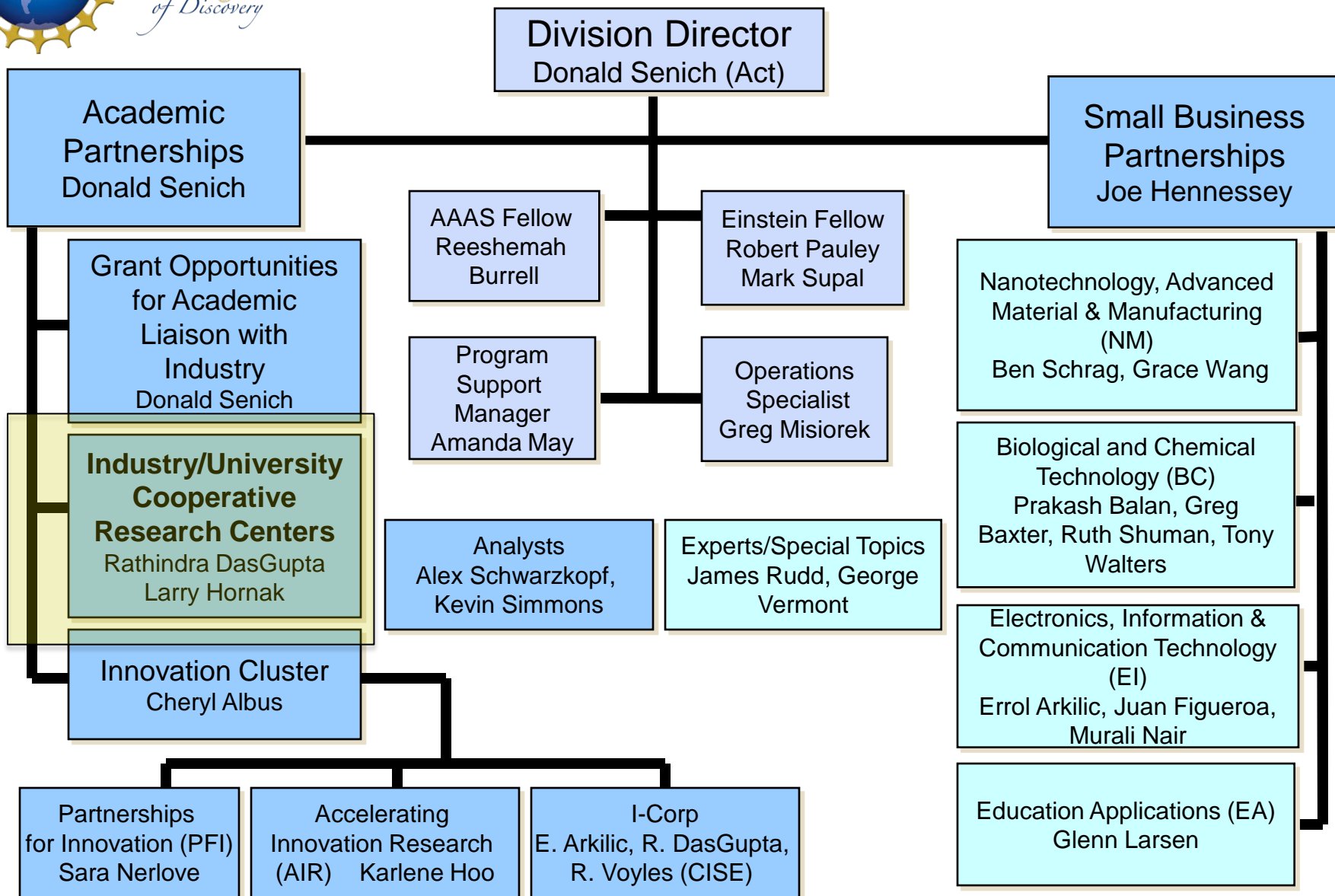Establish a solid foundation upon which to build

Outline:

- **The I/UCRC Program**
  - The Cooperative Model
  - NSF's Role

- **Successful I/UCRCs**
  - Outcomes

- **CBSS in Phase I**
  - Best Practices

Industrial Innovation and Partnerships

Division Director
Donald Senich (Act)

Academic Partnerships
Donald Senich

Small Business Partnerships
Joe Hennessey

Grant Opportunities for Academic Liaison with Industry
Donald Senich

Industry/University Cooperative Research Centers
Rathindra DasGupta
Larry Hornak

Innovation Cluster
Cheryl Albus

AAAS Fellow
Reeshemah Burrell

Einstein Fellow
Robert Pauley
Mark Supal

Program Support Manager
Amanda May

Operations Specialist
Greg Misiorek

Analysts
Alex Schwarzkopf,
Kevin Simmons

Experts/Special Topics
James Rudd, George Vermont

Nanotechnology, Advanced Material & Manufacturing (NM)
Ben Schrag, Grace Wang

Biological and Chemical Technology (BC)
Prakash Balan, Greg Baxter, Ruth Shuman, Tony Walters

Electronics, Information & Communication Technology (EI)
Errol Arkilic, Juan Figueroa, Murali Nair

Education Applications (EA)
Glenn Larsen

Partnerships for Innovation (PFI)
Sara Nerlove

Accelerating Innovation Research (AIR)   Karlene Hoo

I-Corp
E. Arkilic, R. DasGupta, R. Voyles (CISE)

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I/UCRC: Mission and Vision

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 research

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*

Industry/University Cooperative Research Centers: National Scope, Impact

Academic-Industry partnerships meeting industry sector research needs

ENG   CISE
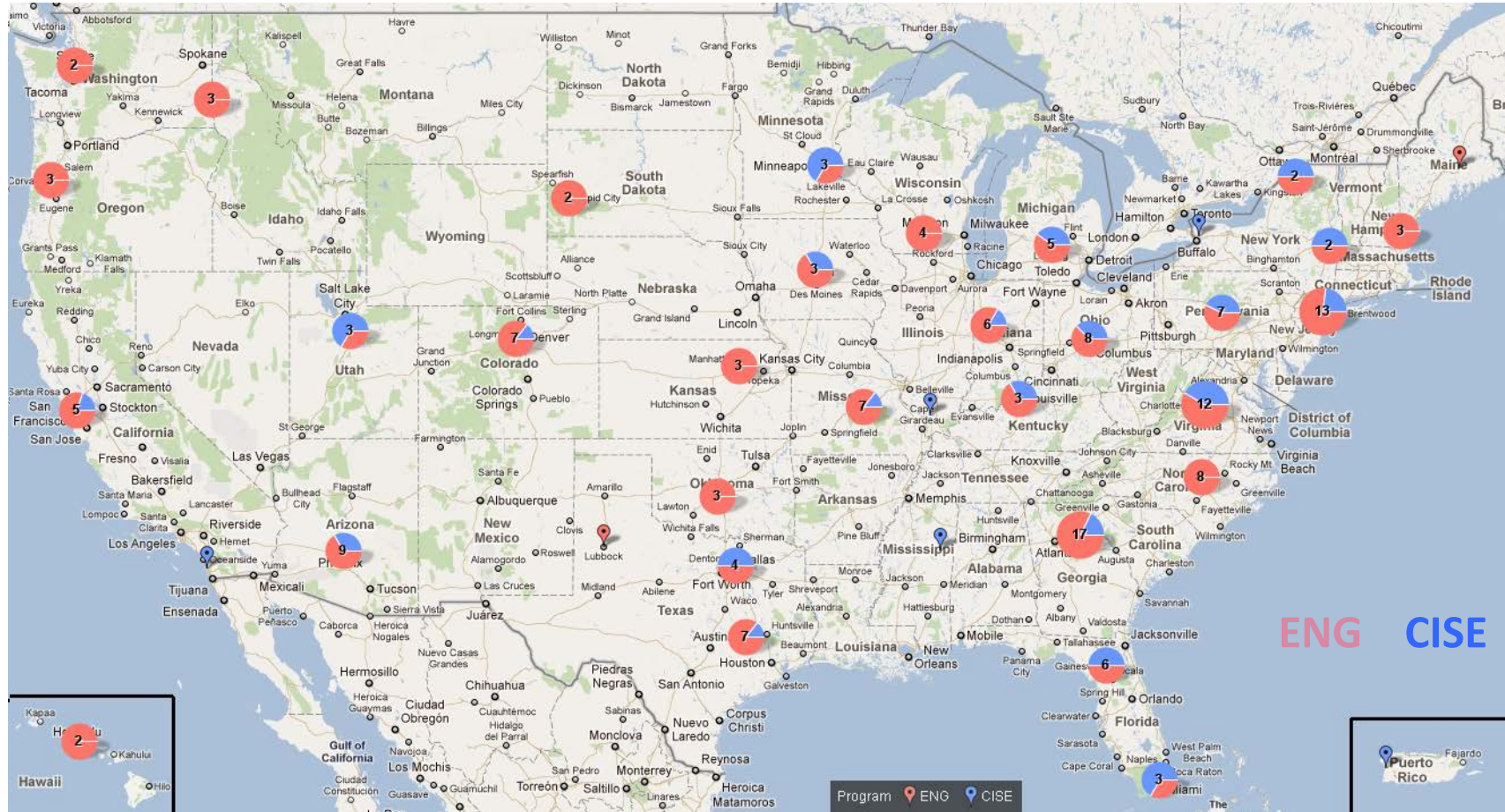
61 Centers
168 I/UCRC Sites

Plus Participating
International Sites

Over 760 Member
Organizations (2010)

Active I/UCRCs and Sites by Year

Over 760 Members
(2010 Survey)
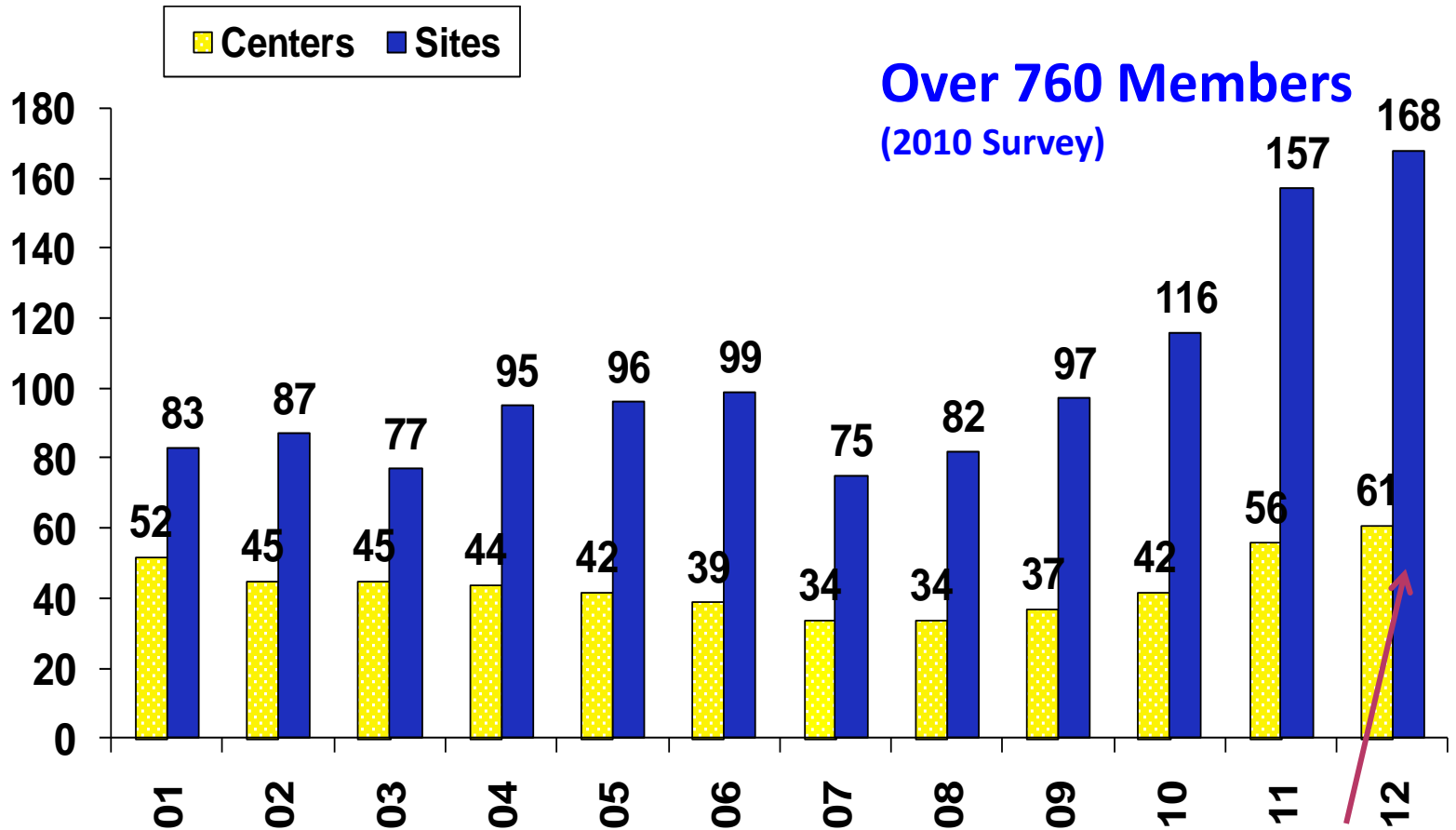
INCREASE IN CENTERS AND SITES

45 ENG
16 CISE

Industry/University Cooperative Research Centers

ENG Multi-University Centers

1. Advanced Forestry
2. Advanced Packaging and Processing (III)
3. Bio Energy R & D
4. Composites Infrastructure
5. Ceramics Composites Optical Materials Center
6. Computational Materials Design
7. Design of Analog Digital Integrated Circuits (III)
8. Dielectrics
9. Electromagnetic Compatibility
10. Energy Harvesting
11. Friction Stir Processing
12. Fuel Cells
13. Grid-Connected Adv Power Elec
14. Health Org. & Transformation
15. Integrative Joining of Materials for Energy Applications
16. Laser and Plasma for Adv. Mfg.
17. Logistics and Distribution
18. Membrane Science, Engineering & Technology
19. Minimally Invasive Diagnostics
20. Next Generation Photovoltaics
21. Particulate and Surfactants
22. Pharmaceutical Development

45 ACTIVE ENG CENTERS

ENG Multi -University Centers

23. Plug-In Hybrid Electric Vehicles
24. Precision Forming
25. Power Systems Engineering Research Center (III)
26. Resource Recovery & Recycling
27. Sensors and Actuators (III)
28. Smart Vehicles Concepts
29. Silicon Solar
30. Advanced Space Technologies
31. Connection One
32. Water and Environmental Technology
33. Water and Equipment Policy
34. Wood Based Composites
35. Metamaterials
36. Biophotonic Sensors and Systems
37. Advanced Non-Ferrous Structural Alloys
38. Energy Efficient Systems
39. Child Injury Studies

ENG Single-University Centers

40. Agricultural, Biomedical, and Pharmaceutical Nanotechnology
41. Advanced Cutting Tools
42. Advanced Vehicle Electronics (III)
    Biomolecular Interaction
44. Electronic Micro-Cooling
45. Non-Destructive Evaluation (III)

Industry/University Cooperative Research Centers

CISE Multi-University Centers

1. **Advanced Knowledge Enablement**
2. **Autonomic Computing**
3. **Dynamic Data Analysis**
4. **e-Design**
5. **Embedded Systems**
6. **Experimental Computer Systems**
7. **Hybrid Multicore Productivity**
8. **Identification Technology**
9. **Intelligent Maintenance**
10. **Intelligent Storage**
11. **Net-Centrics Systems**
12. **Reconfigurable Computers**
13. **Search & Rescue Robots**
14. **Security and Software Engineering Research Center**
15. **Surveillance Theory**
16. **Wireless Internet**

16 ACTIVE COMPUTER AND INFORMATION SCIENCE AND ENGINEERING (CISE) CENTERS

The NSF's Role in I/UCRCs

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

- **Cooperative Agreement & Operational Framework**
- **Franchise of centers for collaboration**
- **Best practices based on decades of evaluation**
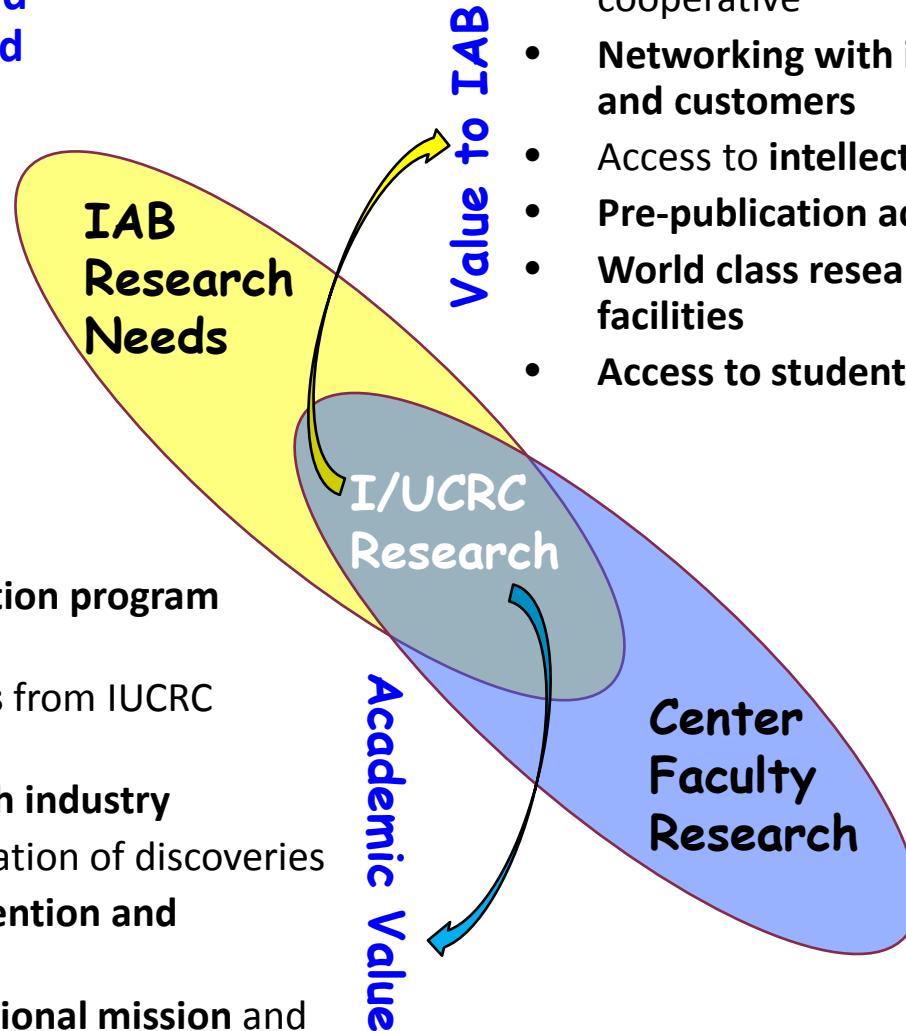- **Funding Opportunities available to I/UCRCs**

What *value* does an I/UCRC offer?

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

Value to IAB

- Industry driven **research projects**
- **Investment leveraging** via cooperative
- **Networking with industry peers and customers**
- Access to **intellectual property**
- **Pre-publication access** to research
- **World class researchers & facilities**
- **Access to students**

IAB Research Needs

I/UCRC Research

Center Faculty Research

Academic Value

- **New research and education program dimensions**
- **Leveraging of POC results** from IUCRC projects
- **Trusted relationships with industry**
- **Ready partners** for translation of discoveries
- **Student recruitment, retention and placement**
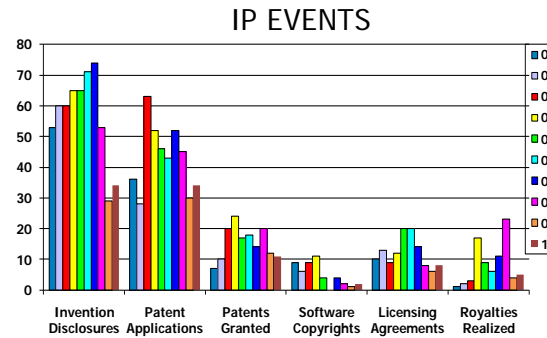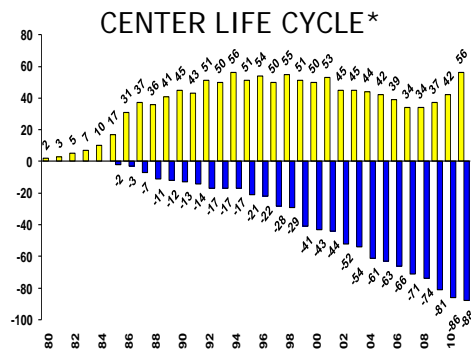- Means to **achieve institutional mission** and **meet constituency expectations**.

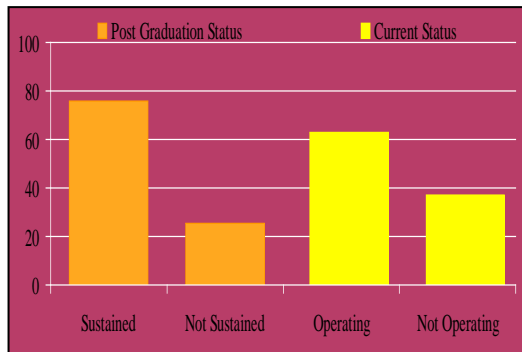# I/UCRC Evaluation & Assessment

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

CENTER INPUTS AND OUTPUTS ASSESSMENTS

CENTER LIFE CYCLE*
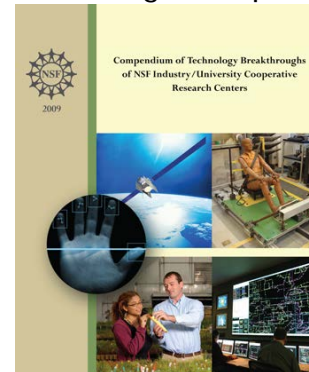

IP EVENTS

FUNDING SOURCES
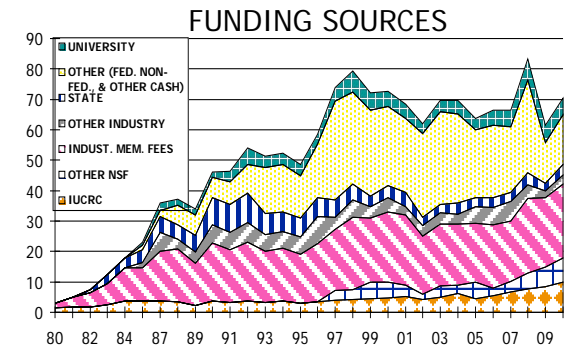
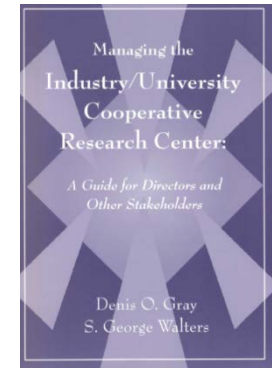### TARGETED ASSESSMENTS AND RELATED WORK PRODUCTS

IUCRC GRADUATION STATUS

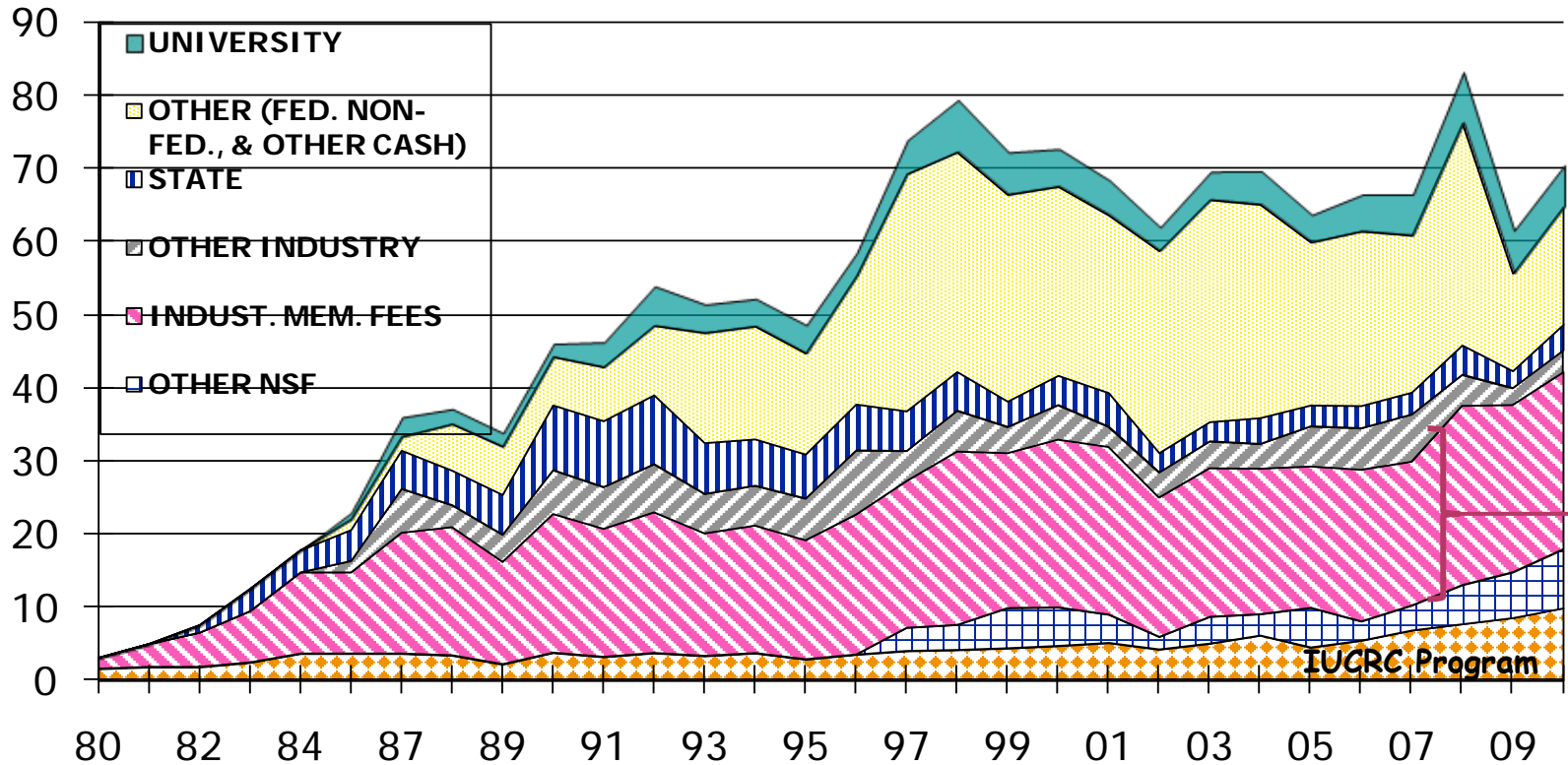Breakthrough Compendium

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*

Building Innovation Capacity

TOTAL FUNDING BY SOURCE BY YEAR IN DOLLARS

$ Millions

Legend:
- UNIVERSITY
- OTHER (FED. NON-FED., & OTHER CASH)
- STATE
- OTHER INDUSTRY
- INDUST. MEM. FEES
- OTHER NSF

IUCRC Program

Spurred Approx $100M in Member Internal R&D (07-08)

National Science Foundation

WHERE DISCOVERIES BEGIN

Aggregate Cases: 3 Centers

National Science Foundation
WHERE DISCOVERIES BEGIN

- Realized impacts total nearly $1.27B, with a net present value of $1.25B.

- Each dollar invested by NSF-I/UCRC generated an estimated 64.7 dollars in impacts.

IUCRC investments & Impacts	TOTAL	IMS	BSAC	IUCS
Estimated impacts (present value)	**$1267.1M**	$846,738,946	$410,727,849	$9,638,633
Total investments (present value)	**$19.6M**	$3,133,857	$13,250,712	$3,203,057
Benefit:Cost Ratio	**64.7:1**	270.2:1	31.2:1	3.0:1
Net Present Value	**$1247.5M**	$843,605,090	$397,477,137	$6,435,577

IMS: Intelligent Maintenance Systems
BSAC: Berkeley Sensors and Actuators Center
IUCS: Industry-University Center for Surfactants

Accelerating Innovation Research (NSF 10-608)

Option 2 Goals

- The Research Alliance [Option 2] competition - a **collaborative effort** between an **NSF-funded innovation research alliance** (including consortia such as ERC, I/UCRC, PFI, STC, NSEC, MRSEC grantees) and at least **one partner entity** to form a **synergistic relationship** that will accelerate the innovation of a product, a process or system.

- The ideal partnership would be one that ultimately leverages the collaborative relationship developed under the grant to strengthen the innovation ecosystem. (**how the partnership will enable innovation that neither party could do as well or rapidly alone**)

- The collaboration would link multiple entities such that **research results are more rapidly moved into marketable products through the creation of new start-up businesses or partnerships with existing businesses.**

OUTCOME of 2010 Pilot:

- **Panels Held and Awards Announced: 7 Awards Made**
  - **4 I/UCRCs (one center recently formed from graduated STC)**
  - **3 PFI Awardees**

New Solicitation now posted!

NSF I/UCRC Funding Opportunities

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

- **Fundamental Research Program** – New RFP Posted
  - Due February 1, 2012, Up to $200K for 2 years
  - Portfolio Expanding Project, defined and executed with IAB
  - Letter from IAB Chair, commitment to effort

- **MIPR** - Federal Gov Interagency Exchange of Funds

- **Supplementary Funding** (Contact NSF)
  - **Research Experiences for Undergraduates** (REU)**, Teachers** (RET)**, and Veterans** (REV)
  - **SBIR/STTR Phase II Grantee Membership**
  - **CORBI Projects** – Between I/UCRC Centers (NSF matching!) – New Dear Colleague Letter
  - **International Collaboration/Projects**

NSF Innovation-Corps

Content

- A public-private partnership connecting NSF-funded scientific research with the technological, entrepreneurial and business communities to help create a stronger national ecosystem for innovation that couples scientific discovery with technology development and societal needs.

- The NSF I-Corps program will identify NSF-funded researchers to receive additional support - in the form of mentoring and funding - to accelerate the translation of knowledge derived from fundamental research into emerging products and services that can attract subsequent third-party funding.

- I-Corps team: Entrepreneurial lead, I-Corps mentor, Principal Investigator
- Desired Outcomes:
  - 1) a clear go/no go decision regarding commercial viability of the effort;
  - 2) should the decision be to move the technology forward to market, a transition plan to do so; and
  - 3) a technology demonstration for potential partners.

SEE NSF WEBSITE FOR SOLICITATION AND INFORMATION

CBSS in Phase I

Establish CBSS's I/UCRC Processes, Rhythm

- **Establish Effective, Consistent Center Operations**
  - Meetings, financials, cooperative portfolio selection, communications
  - Member recruitment and retention
  - IAB Operation, Bylaws
- **Implement a Strategic Research Roadmap**
- **Build Project Lifecycle Processes that Maximize Value**
  - New proposal cultivation process consistent with strategic roadmap
  - Project Meetings/Reporting that maximizes input, engagement at and between center meetings
  - Project final reporting
- **Hone Center's Value Proposition**
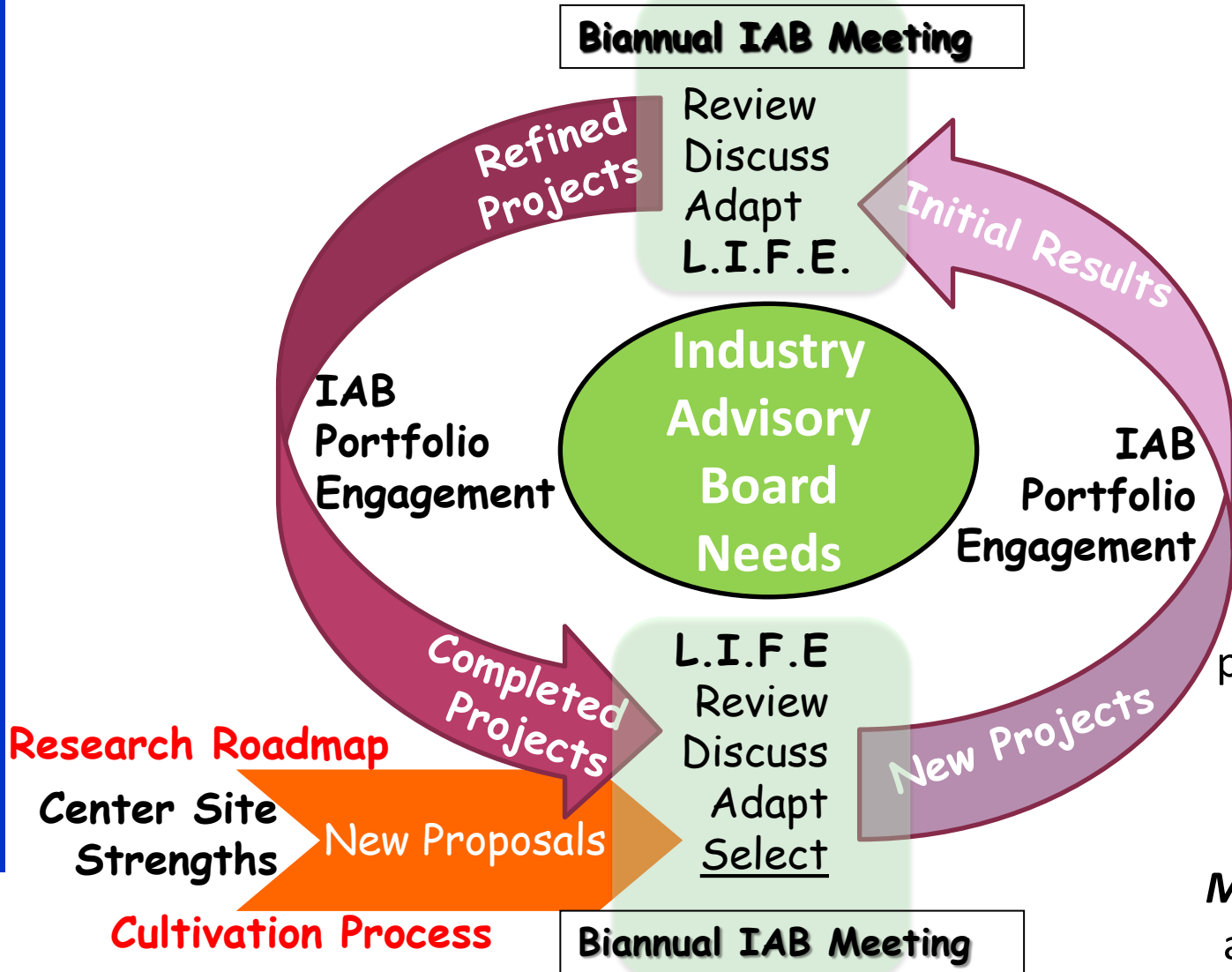
I/UCRC Process: Maximizing Value

Evaluation, IAB engagement & center operation grounded in good project management principles can yield value >> membership fee

Example LIFE Results
(# of Members *Very Interested* or *Interested / Interested with Change*)

Inaugural Project Set

	Spring Mtg (Awarded)	Incorporate Comments, Adapt projects, Work with IAB, Mentors	Fall Mtg (Progress)	Incorporate Comments, Adapt projects, Work with IAB, Mentors	Spring Mtg (Final Rpt)
Project 1	1		1		2
Project 2	2		2/1		4
Project 3	1/2		3		4
Project 4	1		2/1		3
Project 5	1/1		2		2

2nd Selected Project Set

	(Awarded)	Incorporate Comments, Adapt projects, Work with IAB, Mentors
Project 6	3/1	
Project 7	2/2	
Project 8	3/2	
Project 9	4/1	

Center Research Roadmap

Program wide, members are Very Interested or Interested in 40-50% of the projects in their Center

National Science Foundation I/UCRC Contacts

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Denise Hundley, Program Assistant, dhundley@nsf.gov

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

IAB Topics

- All materials marked as "CBSS Proprietary, NDA Terms Apply"
- Project 1 – Is the IP footing understood?
  - Make sure all such IP is declared prior to project start and reiterated at each presentation
- Project 2 – has the IAB received the publication draft?
  - Establish and publicize publication vetting process.
- Establish and promulgate IUCRC Branding
  - Uniform slide template – CBSS I/UCRC is primary With logo on all slides
- Do you have the value from these presentations adequate to renew memberships? Advocate others joining?
  - When asked of members, this was in question. Projects must concisely and precisely convey value to members
- ALWAYS use/include executive summary form from NSF
- Adopt a Uniform Project Presentation Template
  - Quad chart Summary, Budget summary, purpose of work (why important to members), LIFE comments from last meeting impacting project.
  - Timeline/milestones (where the project is in the timeline), deliverables from last 6 months, next 6 months.
  - Start from standard NSF template, add these elements above, send draft to IAB for their input.
- Are there mentors for each project? If not begin practice. List them
- Per IAB request, implement monthly telecons/webinars on projects
  - Use good Project Management principles - Suggest use of an abbreviated version of the above template. – Again, get IAB input.
- Have all materials to members before the meeting to prepare, distribute and get comments within member organizations.
- Web site with all content associated with each project
  - Executive summary, proposal, updates, interim reports telecon action items, etc.
  - Email members when website updated
- Work with IAB to establish a project definition process to be implemented in advance of the spring 2012 meeting
- Facilitate the IAB in its efforts to meet and make decisions between meetings.

Bylaws

- Membership - NSF Solicitation
  - Certification of memberships requires uniform membership levels
  - At most two voting memberships per organization
  - Can have multiple memberships from distinct divisions of same company
- In-Kind Memberships – IAB approval needed annually
- Cooperative funding and selection of projects
  - Make sure members fully understand your stated need for "new member projects"
  - Make sure it is clear there will be pooling of all such memberships after 1st year
  - Strike clause 8.6 unclear/redundant. Faculty recommend budgets, IAB approves funding level.
- Clause 3.2.2 Membership proration?? Strike per our discussion
- What is an "affiliate" university? Define.
- Publication: Change wording to reflect you will distribute prepublication manuscripts, IP action notices as required by center membership agreement
- Clause 8.5 Project selection process – tighten/specify based on process defined by members over the coming months
- Clause 8.7: Director's unallocated account – membership funds must be used in consultation with IAB as well, not just center leadership.

In summary, important to get IAB input and buy in, not rush bylaws process. Build relationship and trust by virtue of their definition.