

**I/UCRC**

**for the Center for Rational Catalyst Synthesis  
(CeRCaS)**

***Inaugural IAB Meeting***

*May 21-22, 2015*

**Welcome to the Industry / University  
Cooperative Research Centers**

# CeRCaS: a new I/UCRC

**University of South Carolina – Center Lead**

*Director John Regalbuto*

**Virginia Commonwealth University – Site**

*Director Frank Gupton*

**Two Institutions, Each carrying its weight,  
adding its own value**

**One Center, One Industry Advisory Board**

Center Evaluator – Don Davis

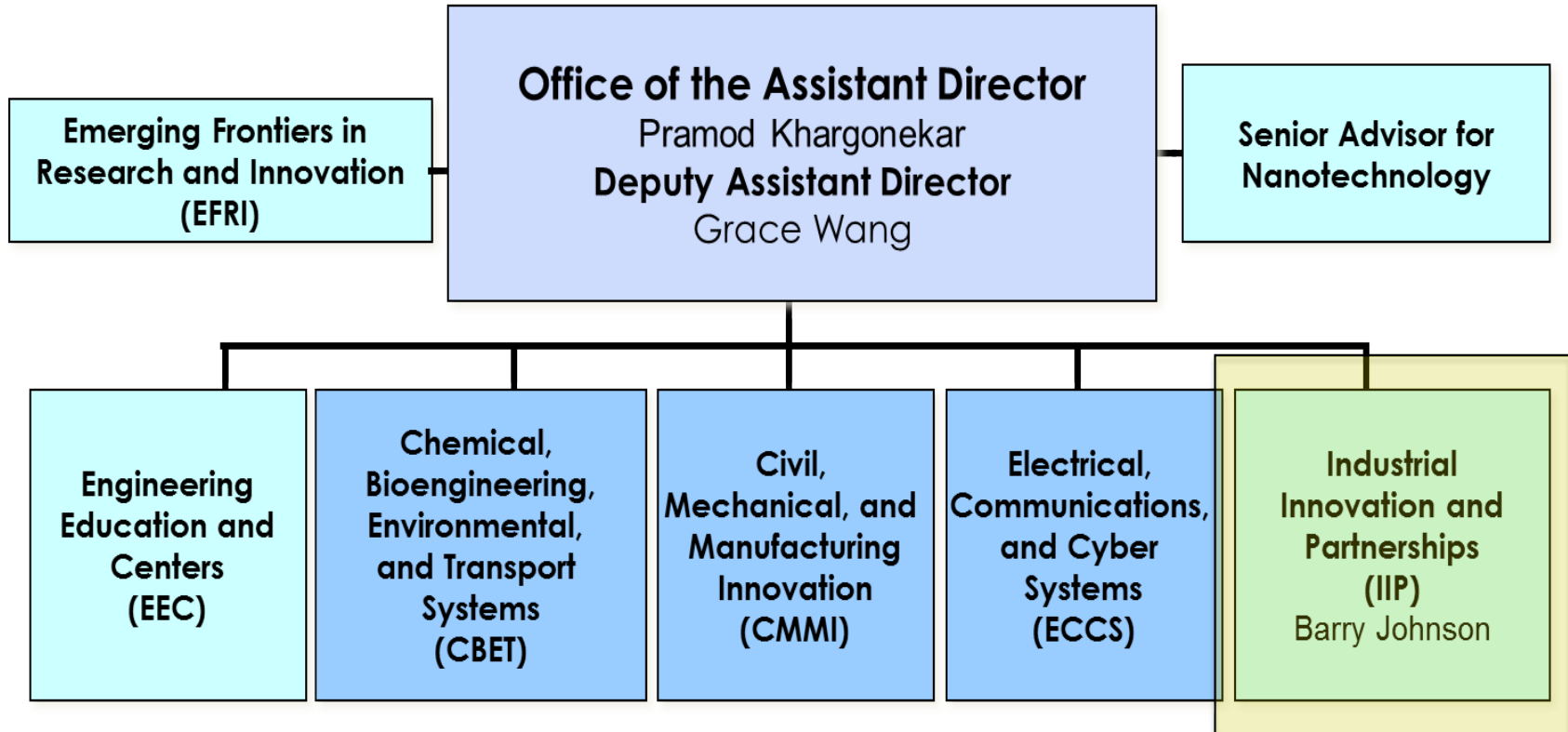
***First IAB Meeting:*** Establish a solid foundation upon which to build your center

# Presentation Outline

- I/UCRC program Update
- Building CeRCaS as an I/UCRC: the Model
  - NSF's Role
  - Characteristics
  - Outcomes
- 1<sup>st</sup> IAB Meeting: What Happens Today?
- Next steps



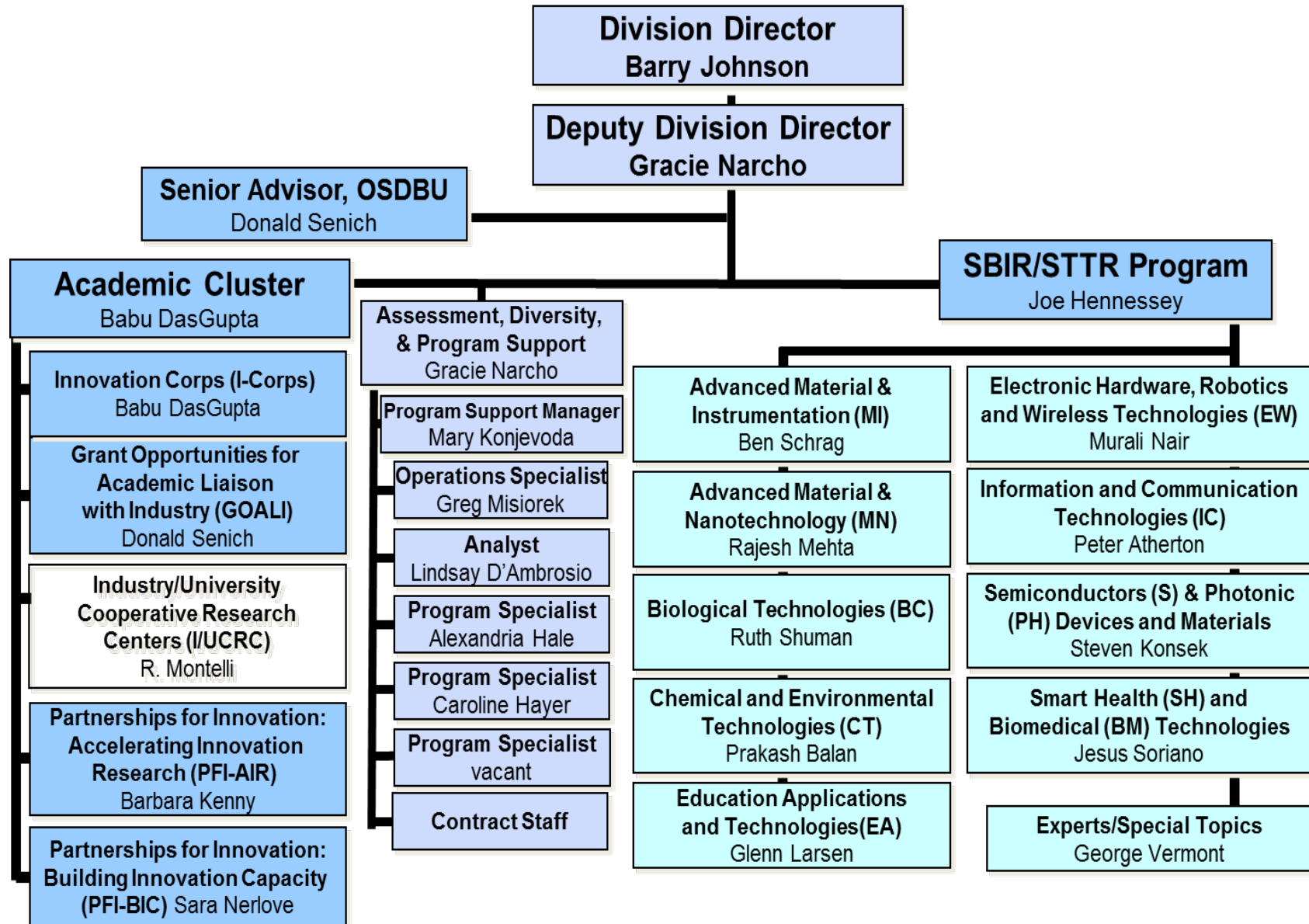
# ENG Organization



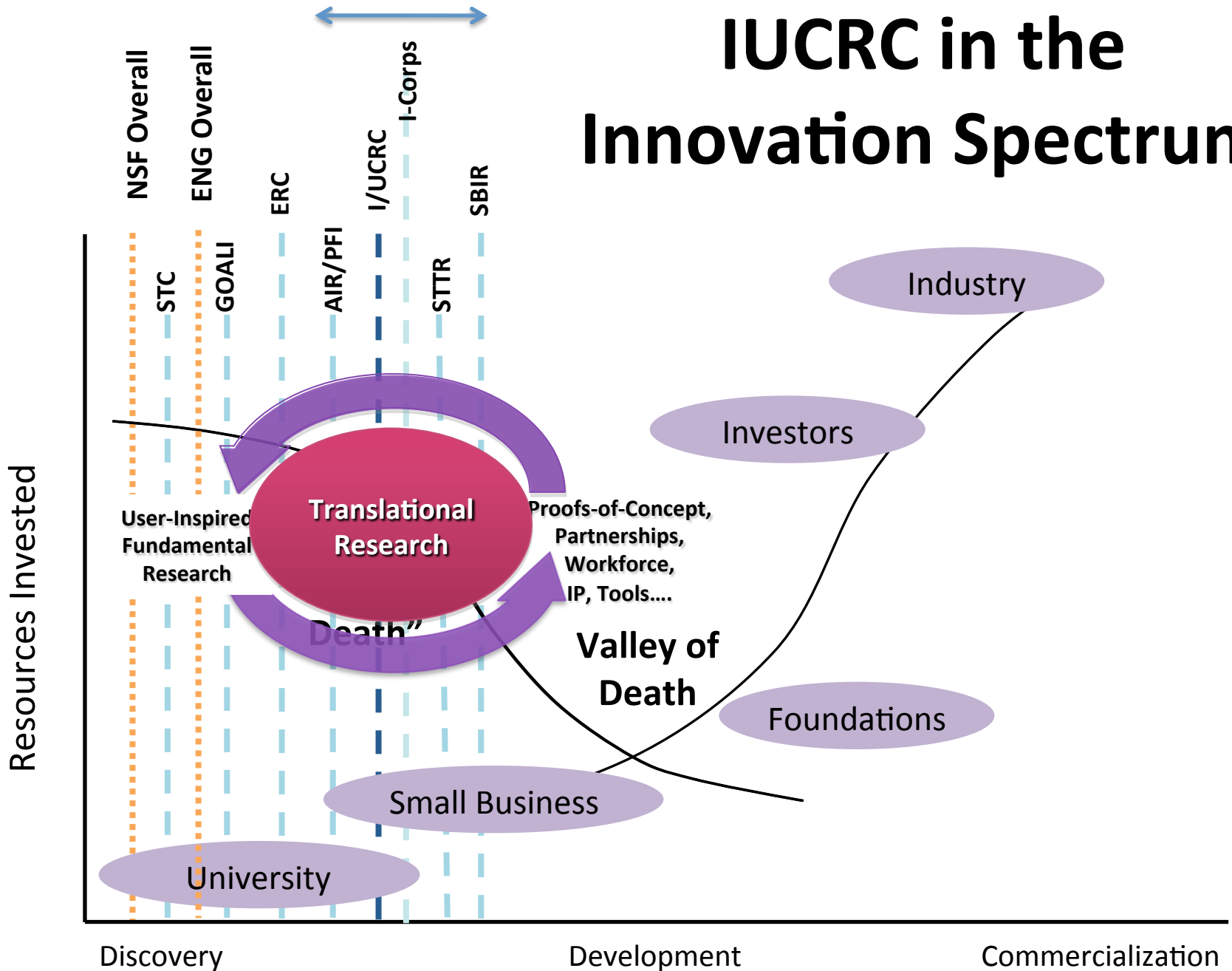
# Industrial Innovation and Partnerships(IIP)

National Science Foundation

WHERE DISCOVERIES BEGIN



# IUCRC in the Innovation Spectrum



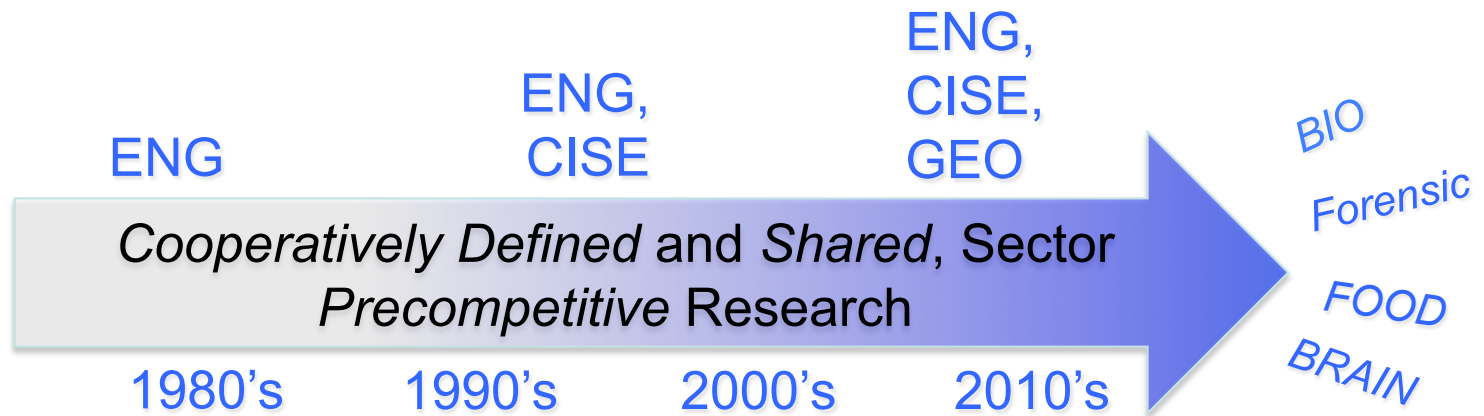
# The Industry/University Cooperative Research Centers (I/UCRC) Program

## 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 research**

## Vision:

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



**40 years of fostering and growing long-term partnerships among industry and academe based on shared value**





# I/UCRC Fast Facts – FY14 Snapshot

## 52 ENG Funded Centers 25 CISE Funded Centers



6 International Sites:  
Belgium, China,  
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

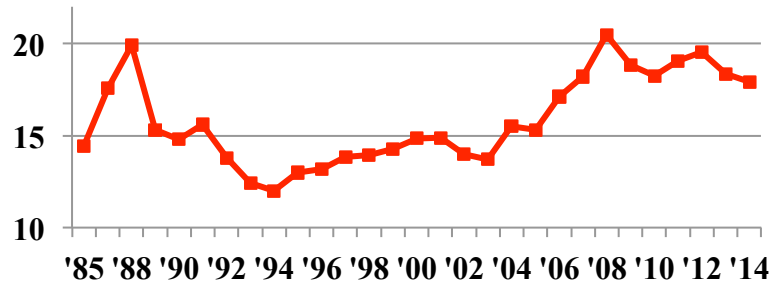


# I/UCRCs Fast Facts (FY14)

## Members:

18 on Average per Center

Average Number of Memberships



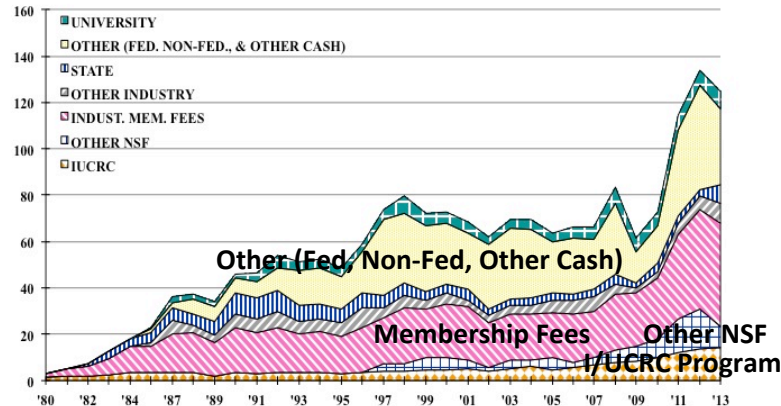
## Centers Nationally:

- 77 Centers with 216 Sites
- **Over 1100 Members:** 60% Large Business, 20% SB, 10% Federal Members, ~10% (State + Others)

## Total Funding:

6:1 Leveraging of Program funds

47:1 Leveraging of each membership



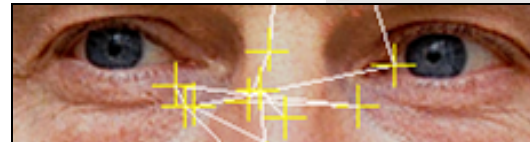
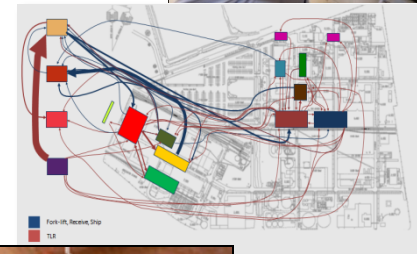
**Average Number of faculty and researcher involved per center: 18**



# Center Focus Areas

1. *Advanced Electronics, Photonics Fabrication and Processing:* 4
2. *Advanced Manufacturing:* 9
3. *Biotechnology, Health & Safety:* 8
4. *Advanced Materials:* 10
5. *Civil Infrastructure Systems:* 2
6. *Energy & Environment:* 11
7. *Health & Safety* 3
8. *System Design & Simulation:* 5
9. *Information Communication & Computing:* 25

**52 ENG Funded Centers**  
**25 CISE Funded Centers**



# CeRCaS: NSF's Role

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

- **Cooperative Agreement & Operational Framework**
- **Provide historical best practices**
- **Franchise of centers for collaboration**
- **Provide networking opportunities**
- **NSF Award – Seed Funding Opportunities**



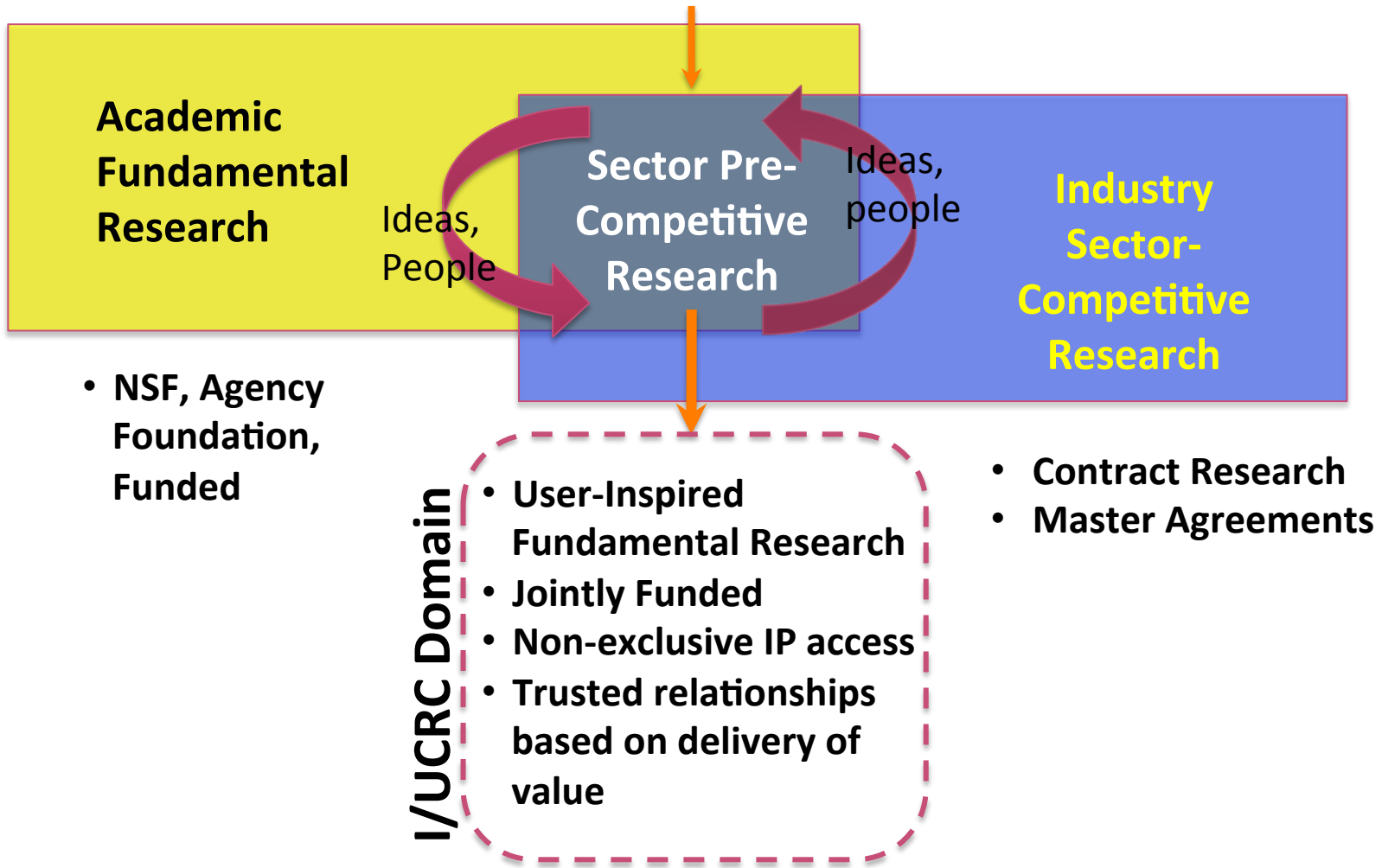
National Science Foundation

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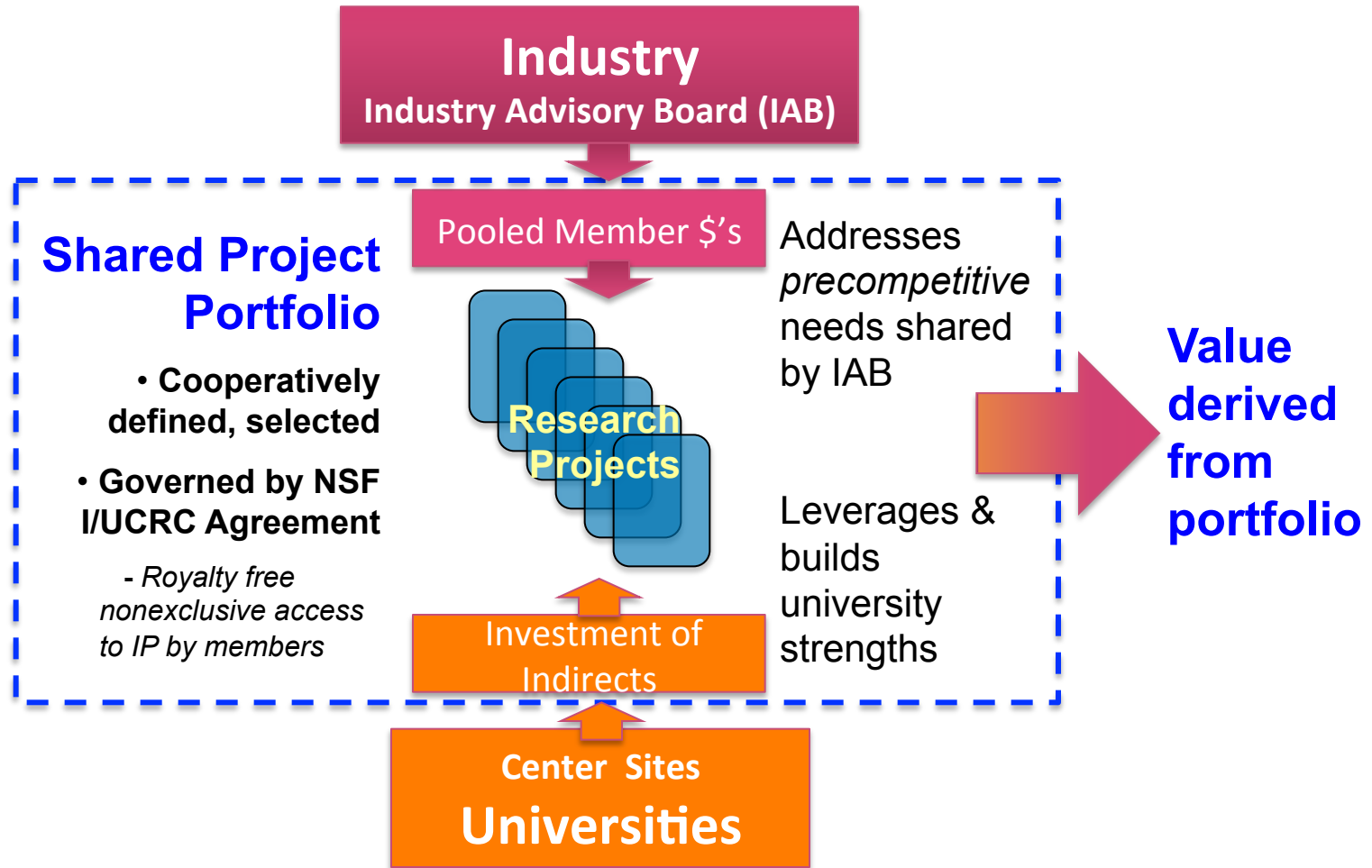
***Industry University Cooperative Research  
Center (I/UCRC) – the Model***

# The I/UCRC Model: Linking Industry to Fundamental Research

## I-U Cooperative Research Domain



# CeRCaS's I/UCRC Nucleus: A Cooperatively Defined & Funded Shared Research Portfolio



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





# Additional Funding Opportunities for I/UCRCs

National Science Foundation

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## Base Funding

### Supplements

~~Collaborative Research Between I/UCRCs (CORBI)~~

I/UCRC Innovation Fellows (IIF)

Research Experience for Undergraduates (REU)

Research Experience for Teachers (RET)

Veterans Research Supplement (VRS)

Innovation Managing Director (IMD)

SBIR / STTR Phase II (memberships)

Fundamental Research Program (FRP)

Federal Government Interagency Exchange of Funds (IAA)/  
Military Interdepartmental Purchase Requests (MIPR)





# Additional Funding Opportunities for I/UCRCs

National Science Foundation

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## Base Funding

Supplements

I/UCRC Clusters for Grand Challenges

I/UCRC Innovation Fellows (IIF)

Research Experience for Undergraduates (REU)

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*New!*



....and more

Accelerating Innovation Research – Research Alliance (AIR-RA)

Accelerating Innovation Research – Technology Translation (AIR-TT)

Grant Opportunity for Academic Liaison with Industry (GOALI)

Building Innovation Capacity (BIC)

Innovation Corps (I-Corps)

SBIR/STTR

Moving research ideas past the basic discovery stage towards and through the proof-of concepts while preparing the next generation of innovators.



# Dear Colleague Letter: I/UCRC Clusters for Grand Challenges

Two or more existing  
I/UCRCs

leverage each other's expertise, research results, resources and existing networks and partnerships to establish a **cross-center cluster**

and **team up** with Engineering Research Centers (ERCs), Science and Technology Centers (STCs), industrial collaborators and additional academic

to tackle a **cross-disciplinary, cross-sector portfolio of research projects that hold the potential to catalyze technology breakthroughs and advance national priorities.**

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



# 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.

## Budget:

\$750k per year for a cluster with up to \$150k per year per I/UCRC

## Duration:

Up to 2 years

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



*I/UCRC Growth's potential – a Phase II example*



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

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

RESEARCH

ACTION

IMPACT

Injury risk in seat belt restrained occupants

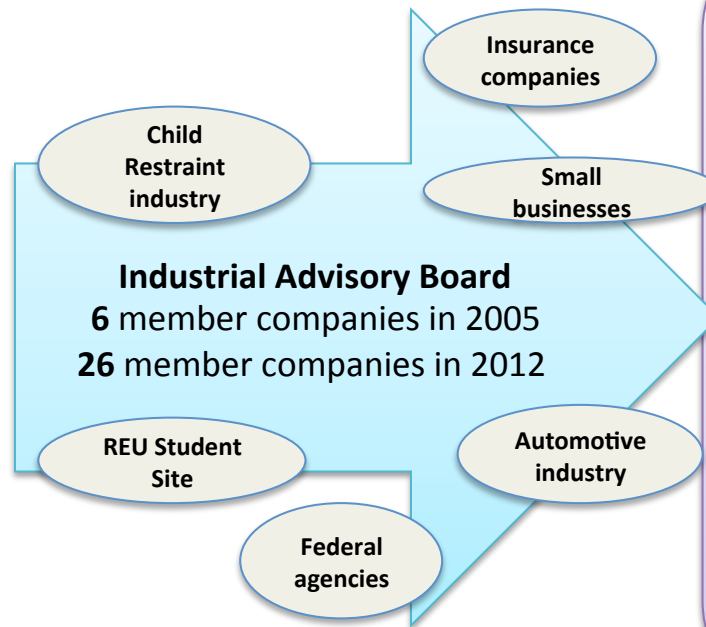
Knee Air Bag Injury Risk Assessment for Children

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



## 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

### 12<sup>th</sup> 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.



# 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)”



# Impact vs. Investment: 3 Centers

## Industry Sector Impacts, NSF IUCRC Investments since center inception

**IMS:** Intelligent Maintenance Systems (2001)

**CPaSS:** Center for Particulates & Surfactants (1998)

**BSAC:** Berkeley Sensors and Actuators Center (1986)

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

- Realized impacts with a net present value of \$1.25B.
- Each dollar invested by NSF-I/UCRC generated an estimated 64.7 dollars in impacts.

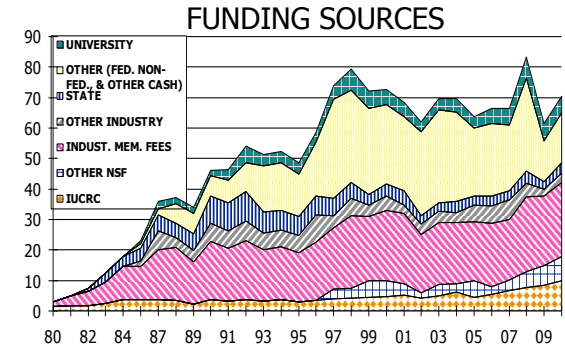
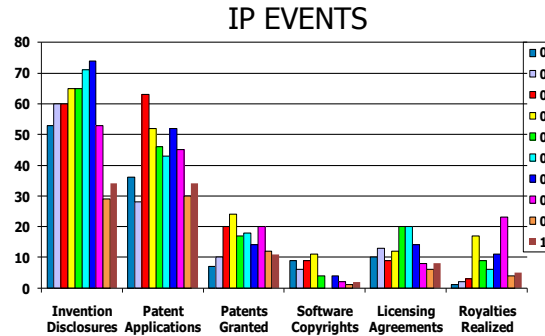
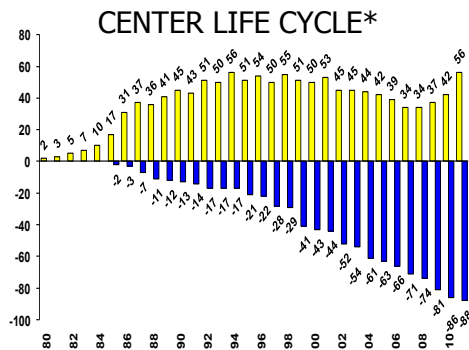




# I/UCRC Evaluation & Assessment

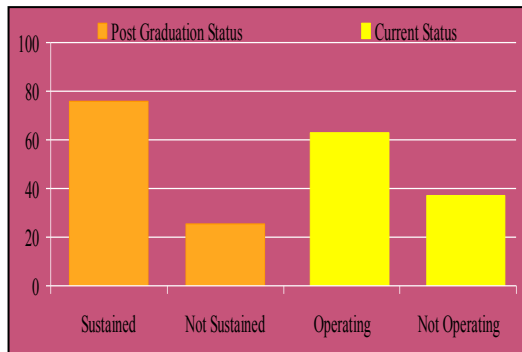
35 + year commitment to integrating evaluation with program planning, implementation and operation . *Local Evaluation – Global Assessment*

## CENTER INPUTS AND OUTPUTS ASSESSMENTS

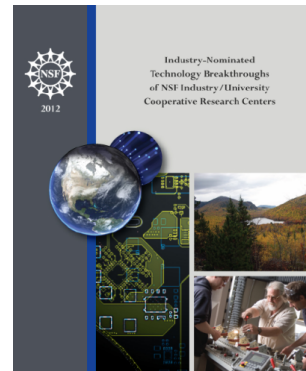


## TARGETED ASSESSMENTS AND RELATED WORK PRODUCTS

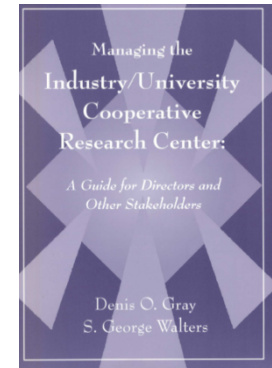
### IUCRC GRADUATION STATUS



### 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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*Industry University Cooperative Research  
Center (I/UCRC) – the keys to success*

# Center Leadership – What it Takes: Academia and Industry

## Typical characteristics of the directors of successful centers include:

- Experienced academic leader with senior rank
- Respected in her/his discipline
- Strongly value industry, agency interaction
- Can articulate the value of center activities to all constituencies
- Understand the reward systems of both academia and industry
- Excellent organizational skills
- Excellent communication and listening skills
- Excellent people skills - good judge of human nature
- Thick skinned, perseverant, and resourceful



# Center Leadership – What it Takes: Academia and Industry

## Typical characteristics of the Industry Advisory Board (IAB) of a successful center include:

- Members are key decision makers and thought leaders in their organizations
- Strongly values faculty and student interaction
- Derives value from the center and articulates this value within their organizations
- Continuously dialogs with center re needs, expectations
- Works effectively with center to establish an operational mode and processes that maximize value
- Strongly engaged with the center and its projects both at meetings and between meetings
- Works effectively as a unified, single board for the center



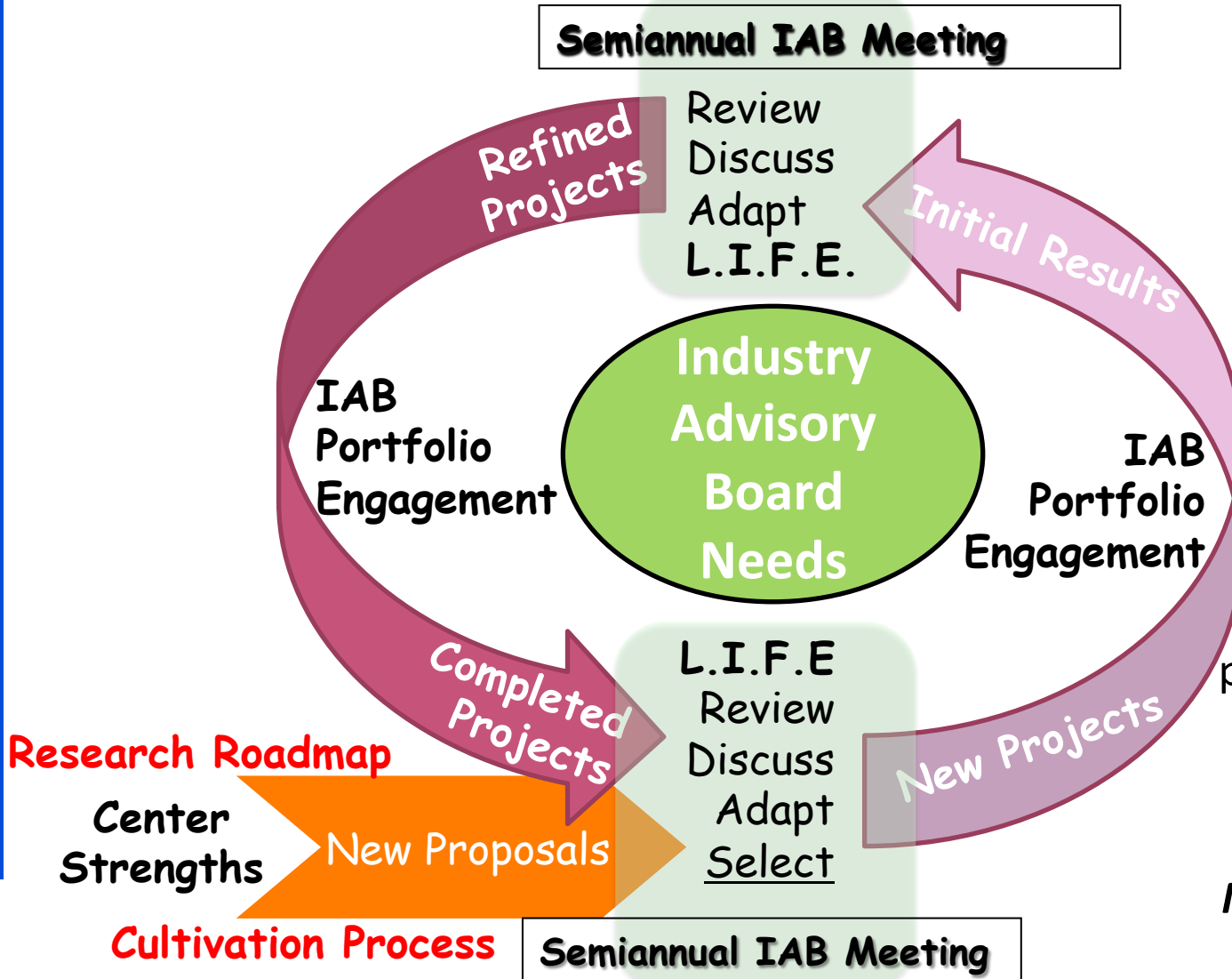
# CERCAS's 1<sup>st</sup> IAB Meeting: Outcomes

- **Review the Initial State – Director's Update**
  - Organization, operation, fiscal position, opportunities
- **Select Inaugural Project Portfolio**
  - Updated proposal set vetted through planning process.
  - Proposal presentation, feedback via LIFE process
  - Voting process for project selection
- **Begin to Scope the Center's Research Roadmap**
  - Process for Future Project Cultivation
- **Begin to Organize the IAB - Operation, Bylaws**
  - Establish mechanisms for robust, continuous interaction, value
  - Who else would you like to see on the IAB to enhance value?

Establish a solid foundation upon which to build  
your center



# CeRCaS's I/UCRC Portfolio Cycle: Maximizing Value while Building Trust



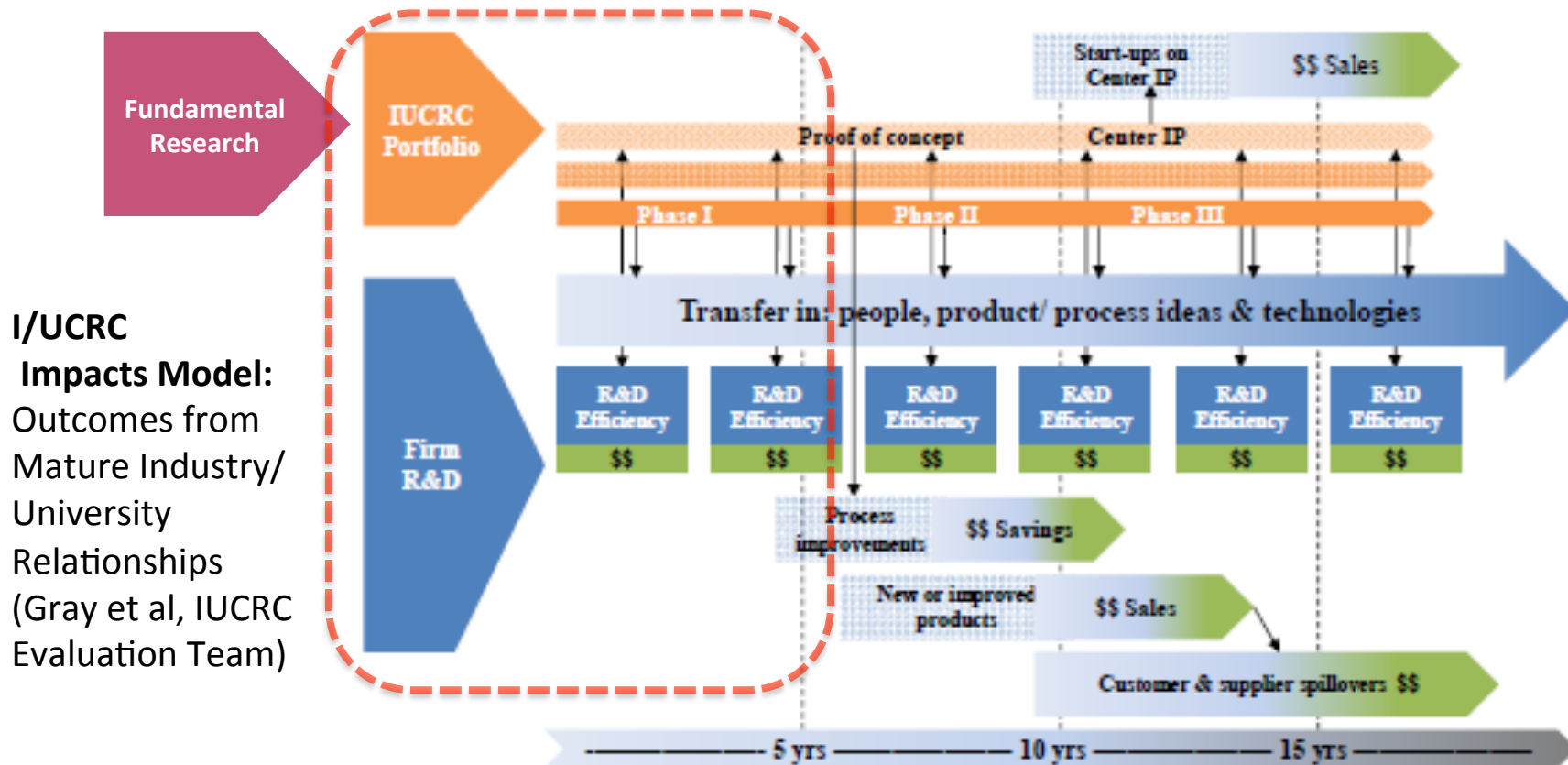
The co-operative process focuses & aligns the Shared Portfolio with **Member Needs** and **University strengths**



# CeRCaS Phase I Foundation

I/UCRCs, through their trusted Industry/University relationships

- 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



# 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.  
Many are on the road frequently**

