Leveraging Funding from Industry

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ENG AdCom
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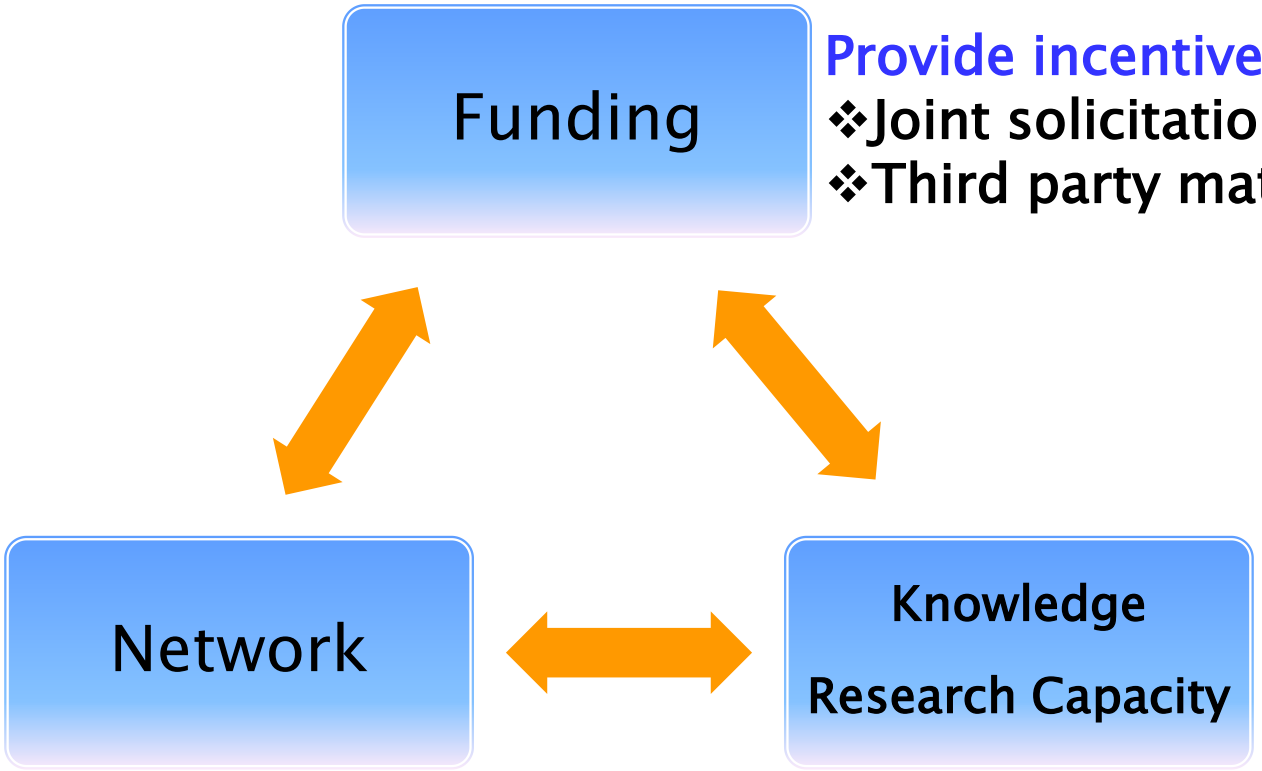
Leveraging Funding

- NSF ENG leverages funding from
  - industry, private investors
  - other NSF directorates
  - universities
  - other federal agencies
  - state/local governments

- This panel focuses on leveraging funding from industry and private investors only

Leveraging Funding from Industry



Provide incentives
- ❖Joint solicitation
- ❖Third party matching fund

Assist in fundraising
- ❖Commercialization assistance
- ❖Networking opportunities

Through centers and consortia
- ❖Pre-competitive research centers/consortia
- ❖Research facility

Through Incentives

ENG Program	Mechanism	NSF Funding	Private-Sector Funding (FY2012)
Failure Resistant Systems	Joint solicitation with SRC	$3.6 M	$2.4 M
AIR	Requests third party matching fund	$6.0 M	$6.2 M
SBIR Phase IIB	Requests third party matching fund	$18.3 M	$76.3 M

Through Centers and Consortia

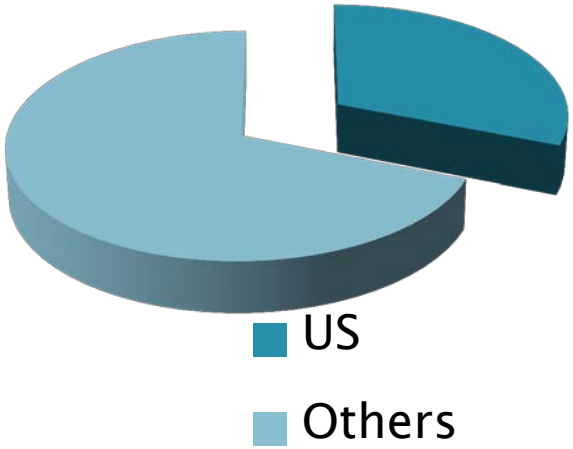
ENG Program	Collaboration Mechanism	NSF Funding	Private-Sector Funding
ERC	-Sponsored projects -Membership fee	~$61 M	~$20 M (FY2012)
I/UCRC	-Membership fee -Sponsored projects	~$16 M	~40M (FY2012)
NSECs	-Joint research projects	--	$76 M*
NNIN and NCN	-Facility user fee -In-kind contribution	--	$89 M*
National Additive Manufacturing Innovation Institute	Research consortium	$1 M ($30 M total Federal funding)	$40 M (FY2012)

* Cumulative through the life of all centers till Dec. 2011

ENG leveraged funding from industry

A conservative estimate of $145 to 160 million in FY2012

Global Perspective



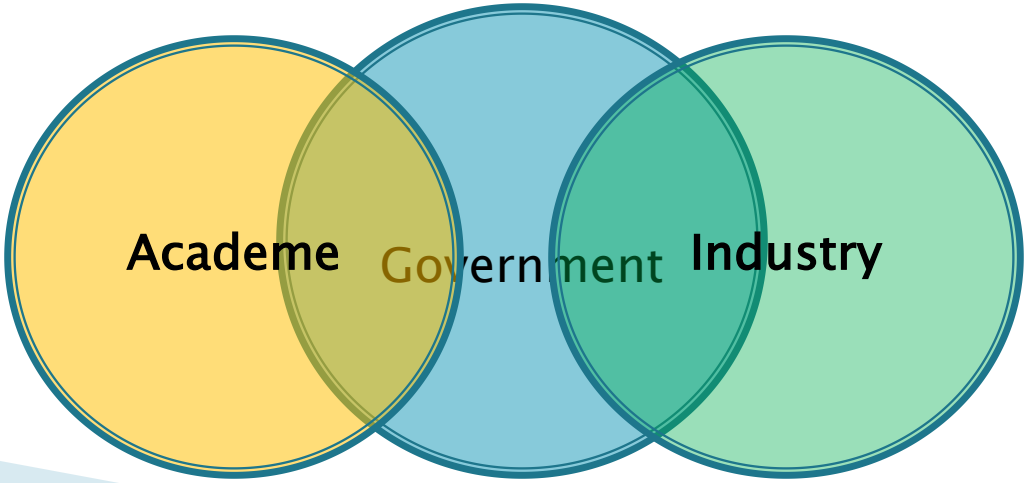
Increasing global competition
-In 2009, U.S. R&D was 31% of global R&D
-Down from 38% a decade ago

Historical Perspective

1950s-1970s

- Federal government as the primary R&D funding source

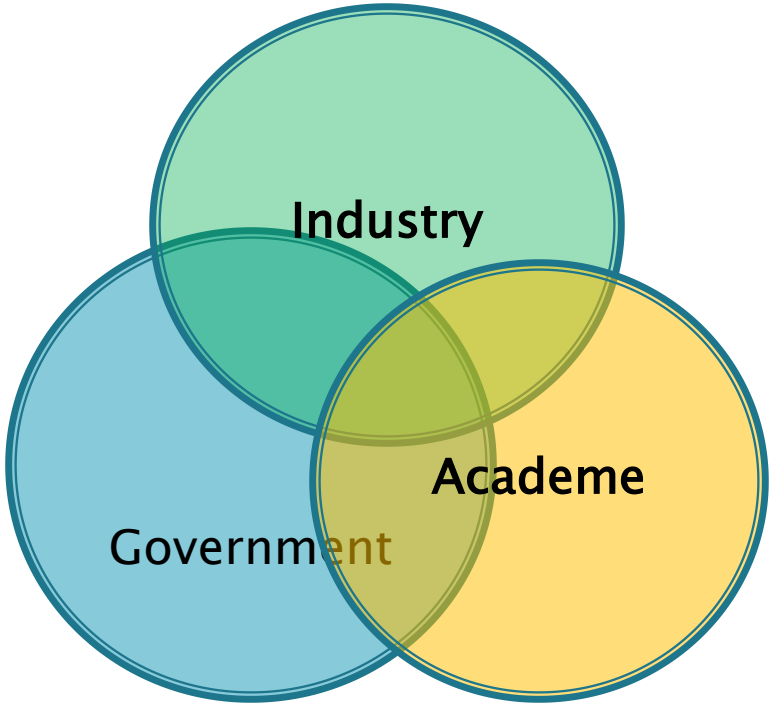
- Industry
  - Closed innovation model
  - Corporate research labs



Historical Perspective

Starting 1980s

- Industry as the primary R&D funding source
- Industry: Open innovation
- Universities play a key role in R&D
- More connected world



Henry Etzkowitz, Loet Leydesdorff, etc.

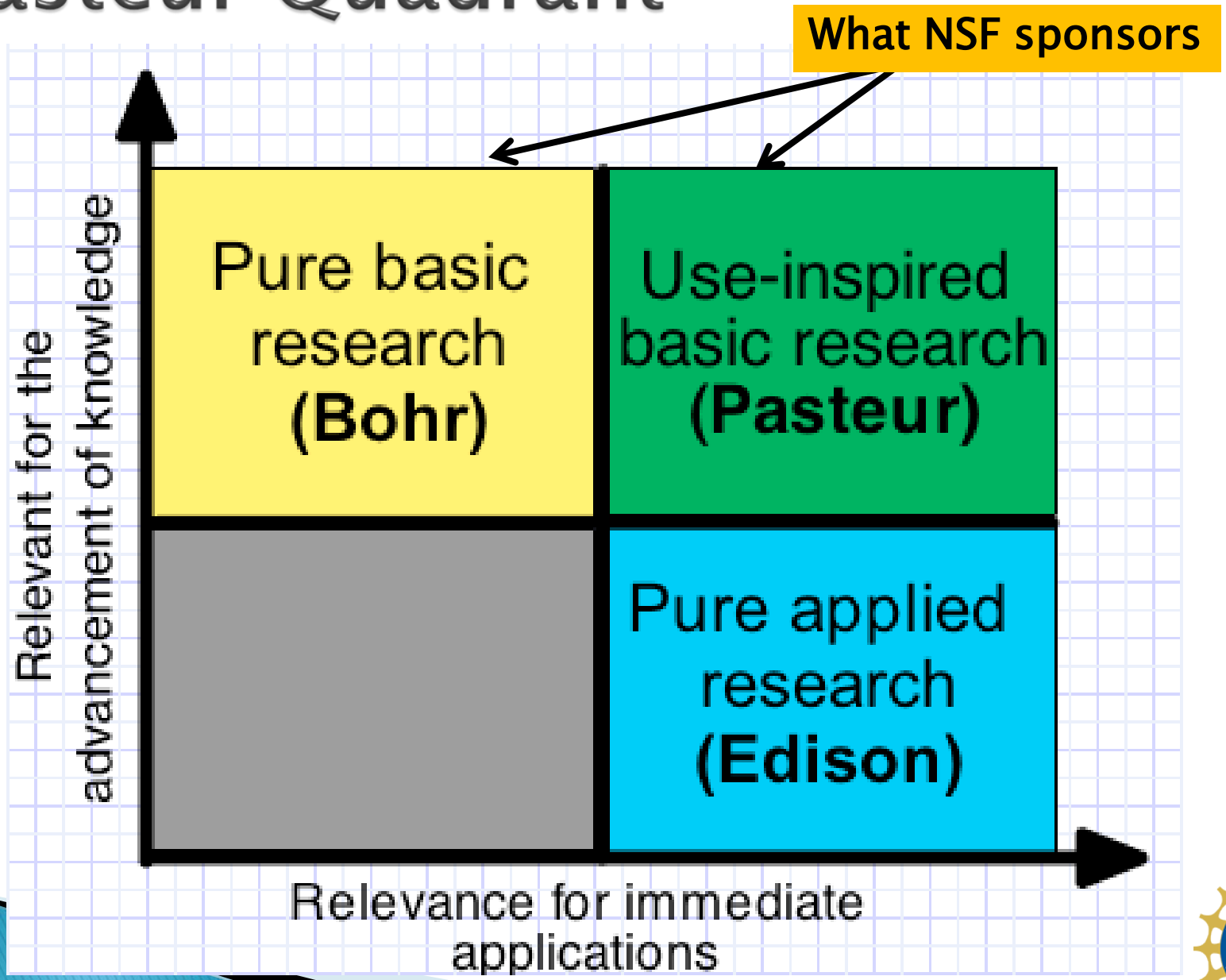
Timing…

#1 Concern of Industry R&D Managers in 2012

- Balancing short-term and long-term R&D goals (47%)
- Attracting, developing and retaining talents (16%)
- Building, maintaining an innovative culture (7%)

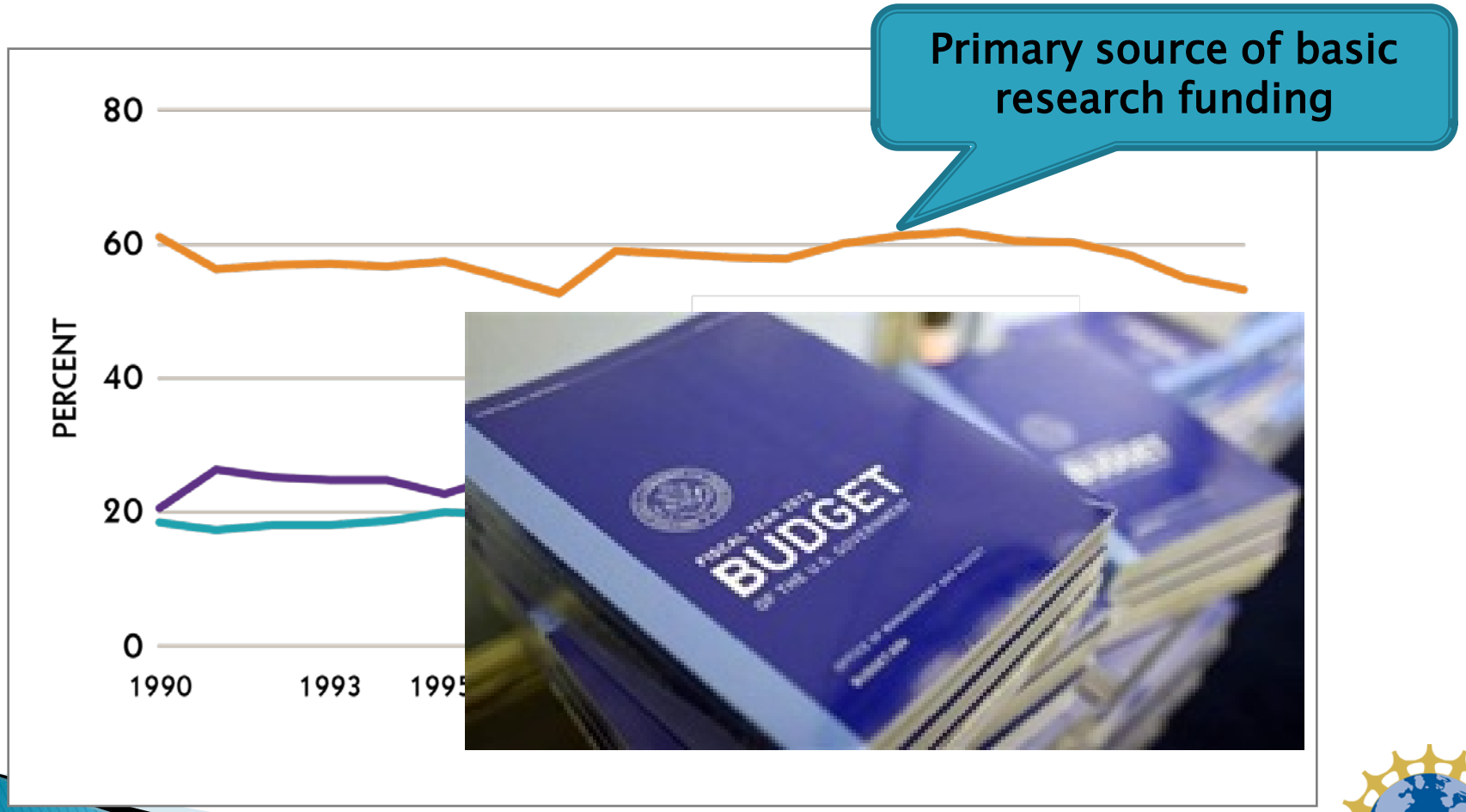
2012 R&D Trend Forecast, IRI

Pasteur Quadrant



Limited Budget

Funding Sources for U.S. Basic Research



Science and Engineering Indicators Digest 2012

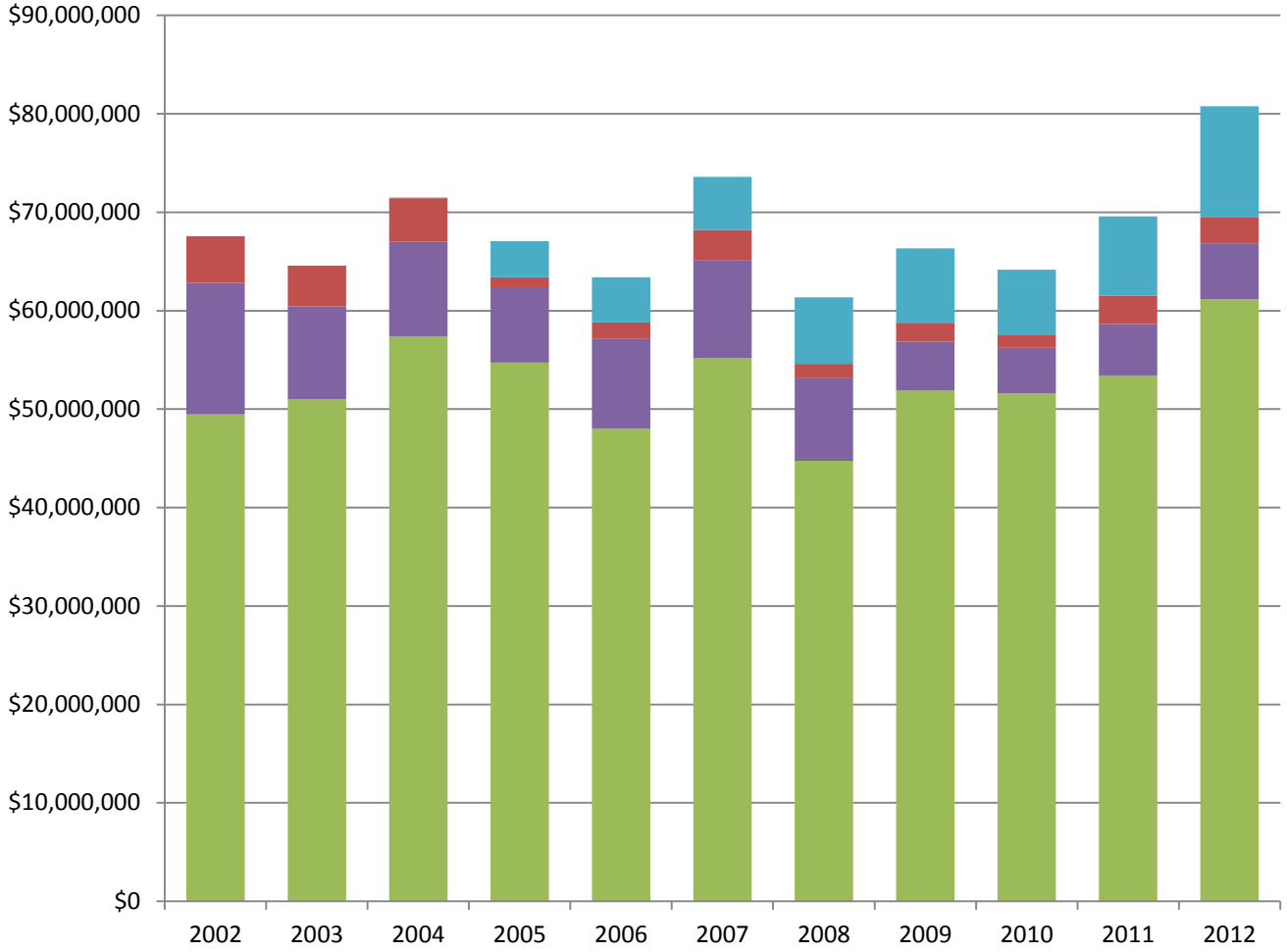
What role can NSF/ENG play to further stimulate academic-industrial partnerships and leverage funding from industry?

Panelists

- Olivier Cadet
  - Director, Logistics Excellence, Air Liquide Industrial US
  - Industrial Advisory Board Chair, Center for Excellence in Logistics Distribution (CELDi), an NSF I/UCRC
- Claire Gmachl
  - Director of the NSF ERC on Mid-InfraRed Technologies for Health and the Environment (MIRTHE), Princeton University
- Terri Lomax
  - Vice Chancellor for Research, Innovation and Economic Development, North Carolina State University
- J. Christopher Ramming
  - Director, University Collaboration Office, Intel Labs

Backup

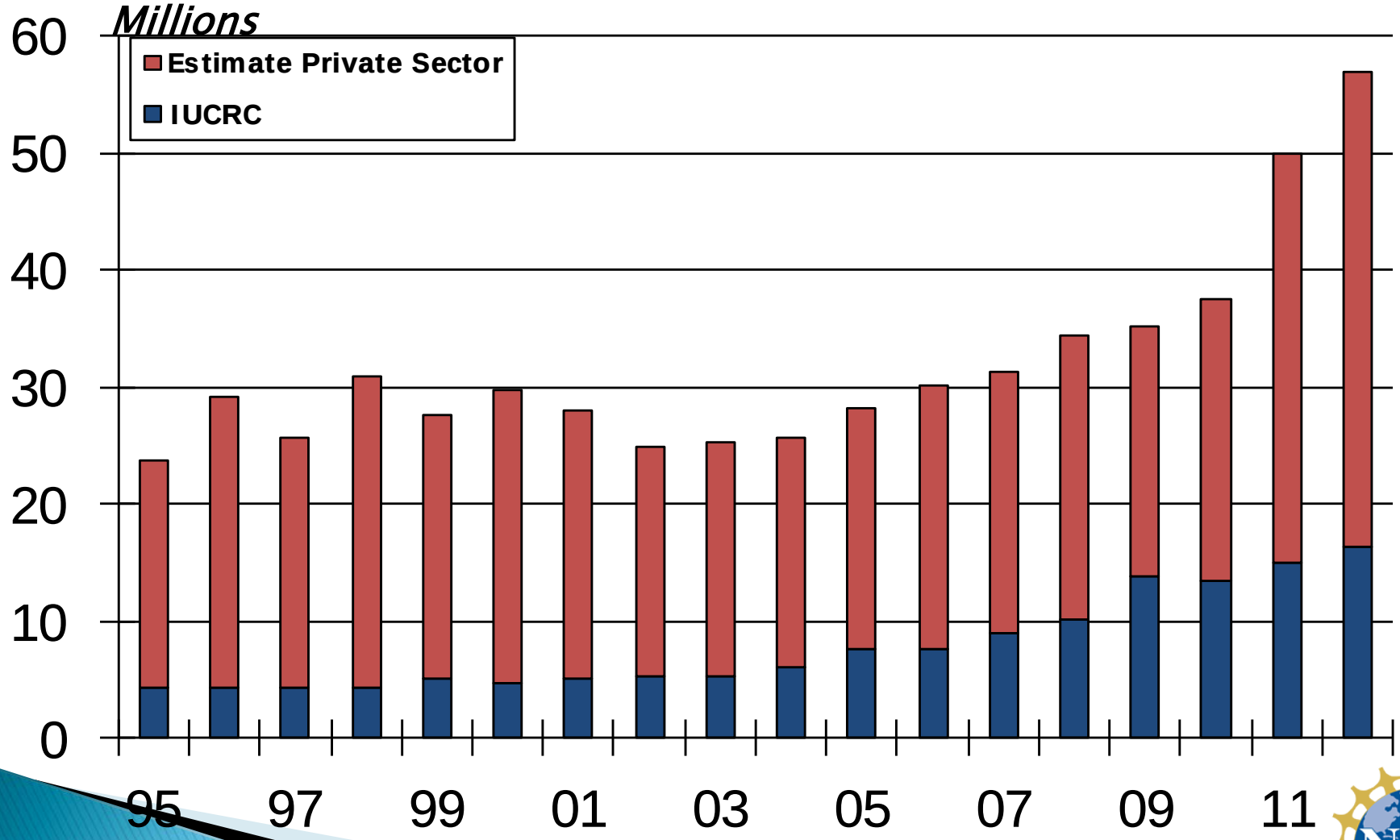
ERC and Industry Funding



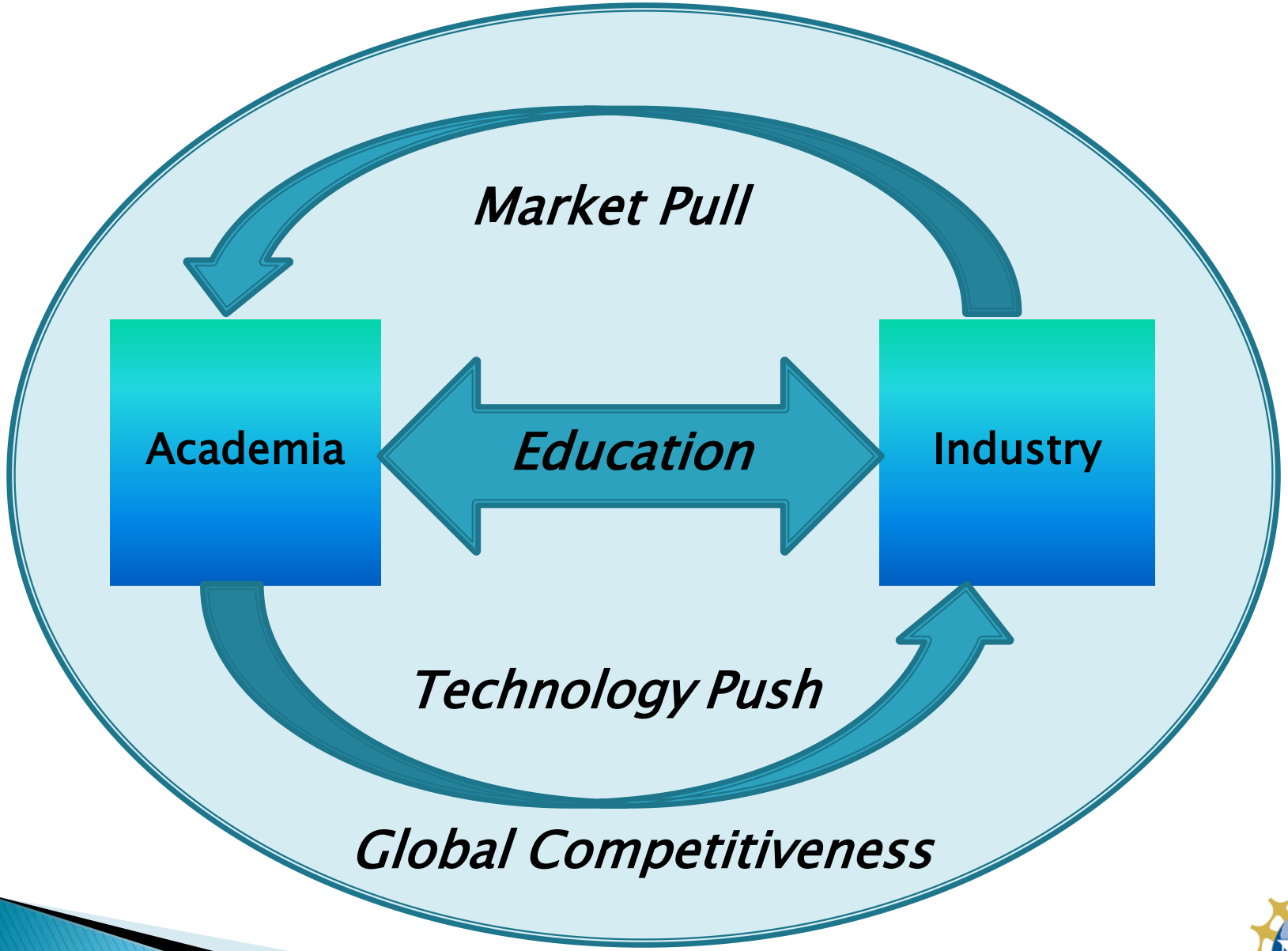
Notes:

* Does not include centers from the Earthquake Technology Sector
* FY-2012, support data is the sum of (received support + promised support) since some ERCs have not yet entered actual amounts for 2012.
* The Industry sector includes Industry (Domestic and Foreign) and Industrial Associations industry types.
*Under the Industry sector, the organization types included are Industrial/Practitioner Members, Funders of Associated Projects, Funders of Sponsored Projects, and Contributing Organizations.

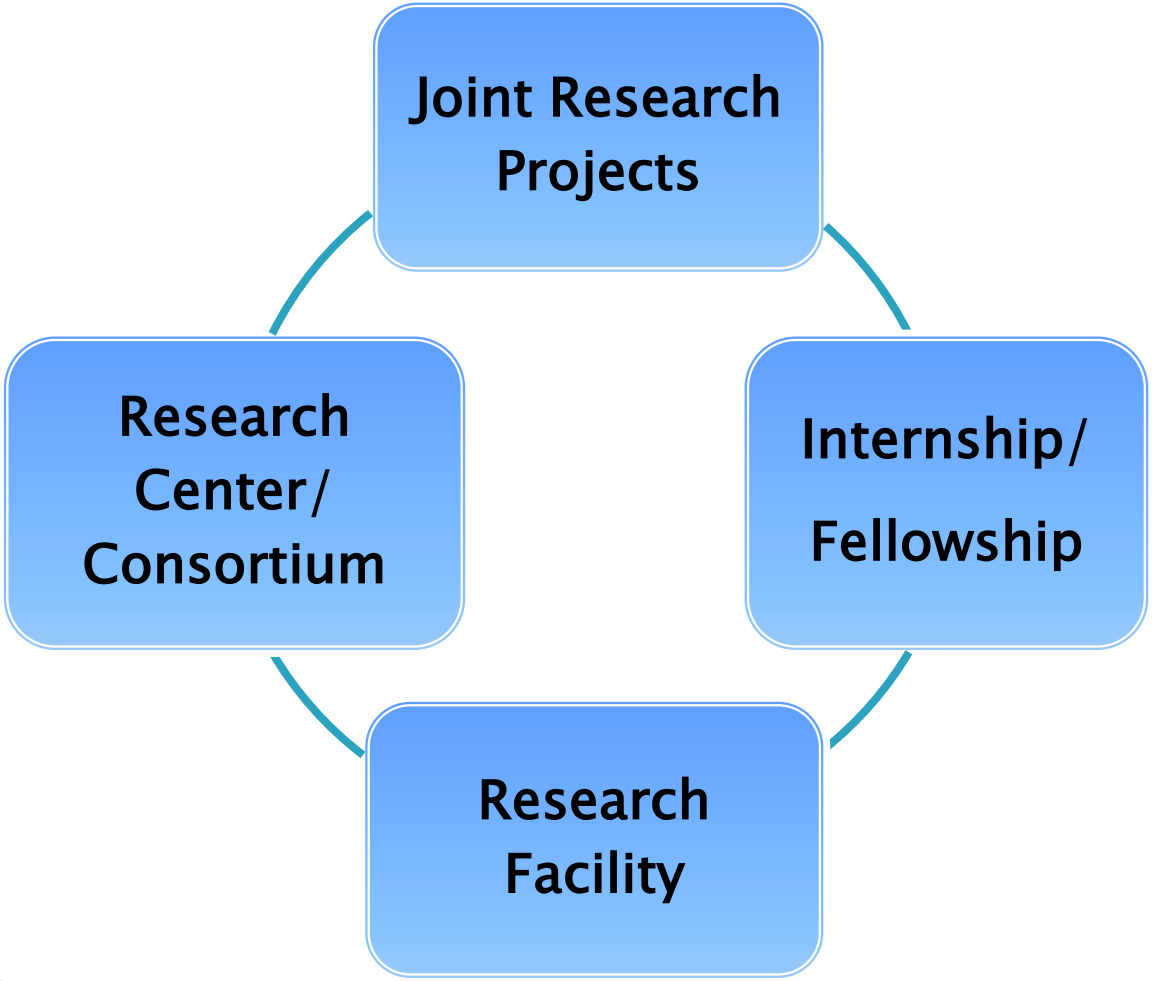
I/UCRC and Estimated Private Sector Funding



NSF-I/UCRC Center Structure Database


Market Pull
Academia
Education
Industry
Technology Push
Global Competitiveness

Academic–Industry Partnership Models

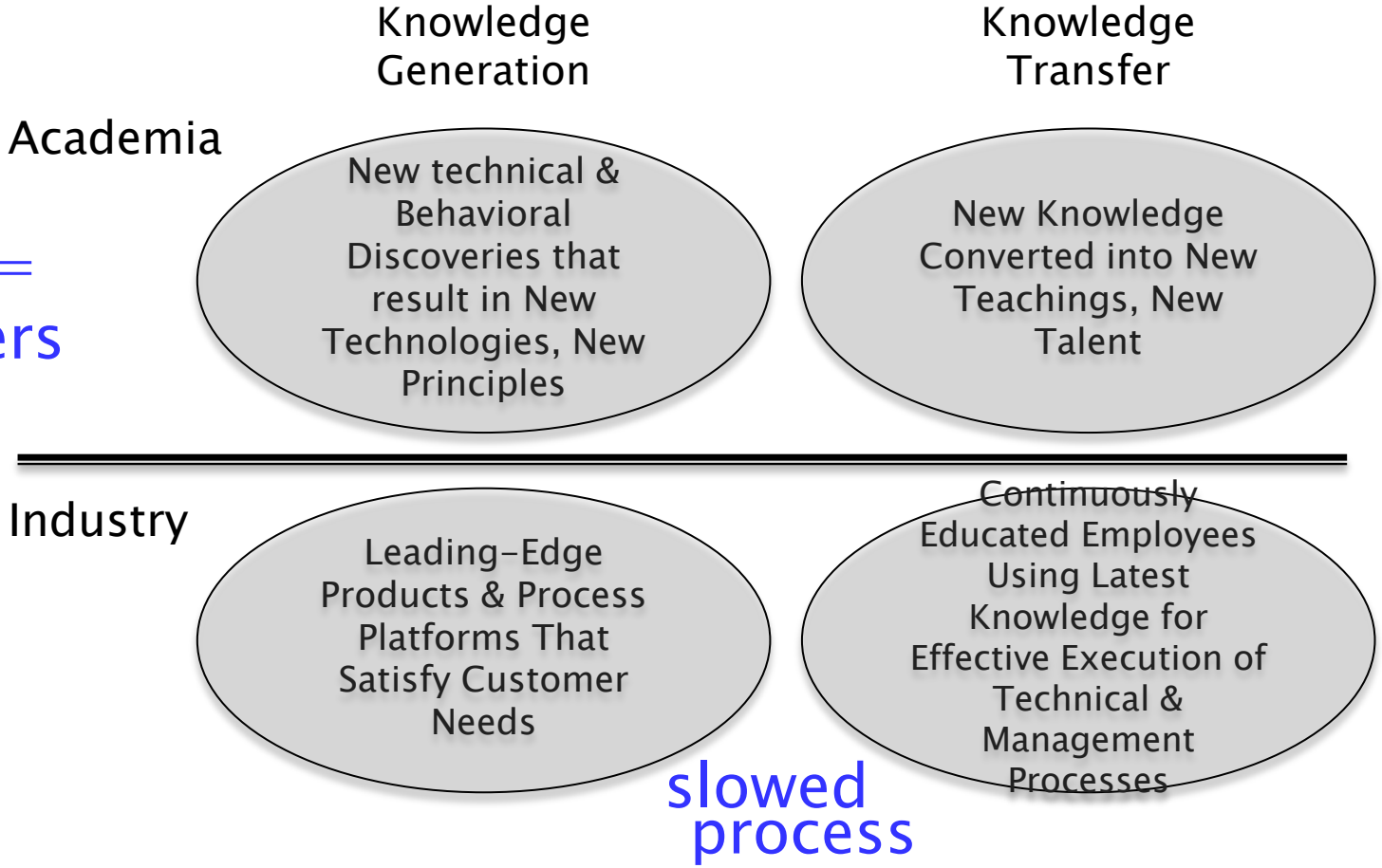


Major Challenges and Opportunities in Academic-Industry Partnerships

- Unclear understanding of problems
- Different timelines
  - Sense of urgency vs. urge to perfection
- Focusing on projects instead of people
- Assuming IP is overwhelmingly important
- Different measures of successes
  - publication vs. feasibility demonstration
- Basic research taking lower priority in most CEOs' minds

COLLABORATIVE LINK CONCEPTS

"the lack of relationships represents institutional and and cultural barriers to effectiveness" – Hanson



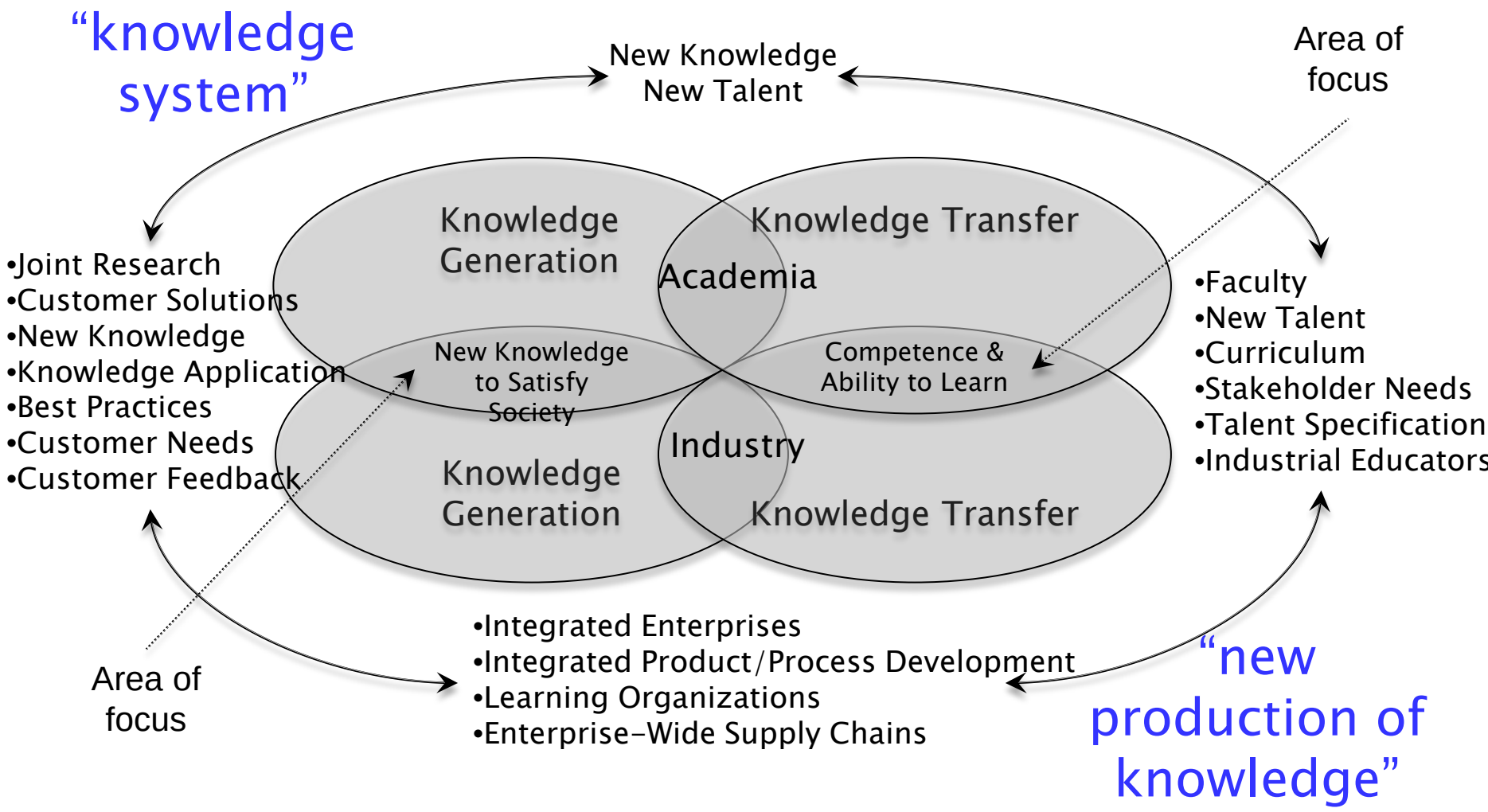
silos = barriers

slowed process

(Hanson, 1997, p.161)

COLLABORATIVE LINK CONCEPTS

INTEGRATED KNOWLEDGE SUPPLY CHAIN



(Hanson, 1997, p.162)

Leverage Network

Challenges/Opportunities

- Large and complex network
- Communities
  - Academia, industry, startups, investors, non-profits and trade associations
- More connected world
  - By 2014, Gartner forecasts that social network will become the main form of business communication for 20% of employees worldwide

Leverage Network
Current and Future Efforts

Virtual network

- Revamping IIP website
  - ✓ New SBIR website launched
- Utilizing webinars
  - ✓ 19 webinars convened
- Using social media
  - ✓ More than 200 followers

Targeted network

- Focus on non-profits and trade associations with large networks (ACA, CEA, ISTE, BIO etc.)
- Create regional networks

Data

- Overall R&D performed in U.S. in 2009: ~$400 billion
- The business sector performed 71% or ~$282 billion
- The academic sector performed 14% or $54 billion in 2009
- In 2008, U.S. MNC parent companies and their majority-owned foreign affiliates performed $236.1 billion in R&D worldwide
  - $37.0 billion by their majority-owned foreign affiliates.

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)	$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

- **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.**

IUCRC Evaluation Team (D. Gray, et al.)

Figure 4-14
Global R&D expenditures by region: 2009

U.S. PPP dollars (billions)

PPP = purchasing power parity

NOTES: Foreign currencies converted to U.S. dollars through purchasing power parities. Some country figures are estimated. Countries are grouped according to the regions described by *The World Factbook*, www.cia.gov/library/publications/the-world-factbook/index.html

SOURCES: National Science Foundation, National Center for Science and Engineering Statistics, estimates, July 2011. Based on data from Organisation for Economic Co-operation and Development, Main Science and Technology Indicators (2011/1); and United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, http://stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx, table 25, accessed 13 July 2011.

Closed vs. Open Innovation

Closed Innovation Principles	Open Innovation Principles
The smart people in the field work for us.	Not all the smart people in the field work for us. We need to work with smart people inside and outside the company.
To profit from R&D, we must discover it, develop it, and ship it ourselves.	External R&D can create significant value: internal R&D is needed to claim some portion of that value.
If we discover it ourselves, we will get it to the market first.	We don't have to originate the research to profit from it.
If we create the most and the best ideas in the industry, we will win.	If we make the best use of internal and external ideas, we will win.
We should control our IP, so that our competitors don't profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our business model.