Boot Camp for I/UCRC Planning Grantees

Shashank Priya, Bryony Bonning, Linda Caudill & Denis Gray
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Renaissance Arlington Capital View
Arlington, VA

The Industry / University Cooperative Research Centers Program
Agenda

Boot Camp for I/UCRC Planning Grantees

2:00 – 2:30  Overview of Planning Process, Shashank Priya, NSF
2:30 – 2:40  The Planning Meeting: Going All Out, Bryony Bonning, CAMTech
2:40 – 2:45  The I/UCRC Operations Role, Linda Caudill, WBC
2:45 – 3:00  Evaluation Overview & Lessons Learned, Denis Gray, NCSU
3:00 – 3:15  Q&A and Set up the Breakout tables
3:15 – 3:30  Coffee Break
3:30 – 4:10  Breakout tables (Concurrent to IMD Logic Modeling Debriefing)
4:10 – 5:00  Report Out from breakouts
I/UCRC Planning Process Fundamentals

Purpose: Maximize the potential for a successful Center Proposal.

LOI

Planning Grant Proposal

Awarded

Planning Grant Meeting with University Partners, Students, Center Evaluator, Prospective Members and NSF I/UCRC Program Directors

1.5 Day Meeting

Events Pre Meeting

Events Occurring at the Meeting

Day 1

Day 2

Events Post Meeting

If Successful Proposal, 1st IAB Meeting

LOI, Planning Grant Pending or Awarded, what now?

Planning Meeting Approaching...

Getting the proposal ready to go!
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

Over 30 years of fostering and growing long-term trusted relationships between Industry and academe based on shared value
As of FY 2013 – 68 centers and 193 sites

Center Focus Areas

1. **Advanced Electronics, Photonics Fabrication and Processing:** 7
2. **Advanced Manufacturing:** 7
3. **Biotechnology, Health & Safety:** 8
4. **Advanced Materials:** 8
5. **Civil Infrastructure Systems:** 4
6. **Energy & Environment:** 10
7. **System Design & Simulation:** 4
8. **Information Communication & Computing:** 20

46 ENG Funded Centers
22 CISE Funded Centers
Strategic partnership that strengthens education, and research outcomes.
I/UCRC Fast Facts – FY12 Snapshot

Centers Nationally:
- **67 Centers with 191 Sites**
- **Over 760 Members** representing over 500 distinct organizations holding 1080 Memberships

Program Funding
- $16.4M in Program Funding (ENG, CISE)
- $120M in Total Center Funding,
- **~8:1 Leveraging of NSF funds**
- 58% Large Business, 21% SB, 14% Federal Members

Students
- **2000 students engaged**
- **1000 graduated in 2011, over 30% hired by members**
- 285 PhDs, 322 MS & 213 UGs graduated last yr, trained in Center research

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

- Collaborative Research Between I/UCRCs (CORBI)
- Fundamental Research Program (FRP)
- Accelerating Innovation Research (AIR)
- Innovation Managing Director (IMD)
- I/UCRC Innovation Fellows (IIF)
- Research Experience for Undergraduates (REU)
- Research Experience for Teachers (RET)
- Veterans Research Supplement (VRS)
- SBIR / STTR Phase II
Over the last 2 solicitations:

Phase I base funding increased by $10K

Phase II base funding increased by $5K

Added Geosciences Directorate
Potential Funding Scenario

Example – Center with TWO sites, International Site added in Year 3 and more than $300K in membership fees per site.

Total 5 yr NSF Funding Potential – $2.03 M

Total 10 yr NSF Funding Potential – $4.11 M + IDC on evaluator cost

Total 15 yr NSF Funding Potential – $5.64 M + IDC on evaluator cost

These numbers do not include the University contribution.
A Few I/UCRC Success Stories

• Accelerating Innovation Research (AIR) Awards
  - 3 of 8 awards in FY 2012 made to I/UCRCs
    - Center for Biophotonic Sensors and Systems (CBSS): Boston University
    - Center for Advanced Knowledge Enablement (CAKE): Florida International
    - Wireless Internet Center for Advanced Technology (WICAT): NY Poly

• Innovation Corps Awards; FY 2012
  - Safety, Security & Robotics (SSRC): Univ. of Minnesota
  - Intelligent Maintenance Systems (IMS): University of Cincinnatti
  - Laser and Plasma for Advanced Manufacturing (LPAM): University of Virginia
  - Connection One (C1): Rensselaer Polytechnic Institute

• 25th Anniversaries celebrated by I/UCRCs
  - Berkeley Sensor & Actuator Center (BSAC)
  - Security and Software Engineering Research Center (S²ERC)
  - Center for Non-Destructive Evaluation (CNDE)

*Graduated STC, now an I/UCRC
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)

<table>
<thead>
<tr>
<th>IUCRC investments &amp; Impacts</th>
<th>TOTAL</th>
<th>IMS</th>
<th>BSAC</th>
<th>CPaSS</th>
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<tr>
<td>Estimated impacts (present value)</td>
<td>$1267.1M</td>
<td>$846,738,946</td>
<td>$410,727,849</td>
<td>$9,638,633</td>
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<td>Total investments (present value)</td>
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<td>$3,133,857</td>
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<td>Benefit:Cost Ratio</td>
<td>64.7:1</td>
<td>270.2:1</td>
<td>31.2:1</td>
<td>3.0:1</td>
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<td>Net Present Value</td>
<td>$1247.5M</td>
<td>$843,605,090</td>
<td>$397,477,137</td>
<td>$6,435,577</td>
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- 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.)
Member Composition 2005-2012

* Years with Advanced Forestry excluded as a small business outlier: '08 Small = 36, '09 Small = 49, '10 Small = 57, '11 Small = 66, '12 = 71.

^ Categories comprising Others include: non-profit, non-US gov't, and other org.
Career Opportunities

Since beginning your role as IUCRC director, what positions were you recruited for or offered, and what positions did you accept?
I/UCRC Approach

The NSF provides the framework for industry to realize early and ongoing value from university fundamental research.

- FUNDING PROFILE
  - Industry, Agency $
  - University
  - NSF $

- RESEARCH PORTFOLIO
  - Cooperatively Defined, Sector Relevant Fundamental Research
    - Industry & Universities shape precompetitive research portfolio
    - Uniform cooperative agreements in all centers

- EVOLUTION
  - Academic sites, members may evolve in time

NSF seeds center activity.

Centers succeed based on the value they provide to industry and faculty and the depth of the trusted relationships that result.
The I/UCRC Model

- Builds trusted long-term relationships for effective industry linkage to university fundamental research

I/UCRC:
- collective ownership
- collective decision-making

Industrial Affiliates:
- collective ownership
- one-on-one decision-making

Shared, Cooperatively Defined Portfolio

Disadvantages of Affiliates Model:
- sub-critical mass projects
- no sense of community

Advantages of the IUCRC Cooperative:
- Conversation validates shared community needs
- Research needs identified that are sector-precompetitive
- Research shaped by shared member and academic value

Much more than collective ownership: Collective Value
I/UCRC Nucleus: A Cooperatively Defined, Funded & Shared Research Portfolio

- Cooperatively defined, selected
- Governed by NSF I/UCRC Agreement
  - Royalty free nonexclusive access to IP by members

Requires trust be built in the model, and between all partners in the center.
The I/UCRC Model: Linking Industry to Fundamental Research

I-U Cooperative Research Domain

Academic Fundamental Research
- NSF, Agency Foundation, Funded

Sector Pre-Competitive Research
- Ideas, People
- Pasteur Quadrant
- Jointly Funded
- Non-exclusive IP access
- Trusted relationships based on delivery of value

Industry Sector-Competitive Research
- Ideas, People
- Contract Research
- Master Agreements

I/UCRC Domain
- Trusted relationships based on delivery of value
I/UCRC Planning Process

Purpose: Maximize the potential for a successful Center Proposal.

Events Pre Meeting
- Cultivate interest in the Center among prospective members
- Solidify center concept and proposed projects
- Secure adequate prospect attendance for meeting
- Organize an effective meeting

1.5 Day Meeting

Events Occuring at the Meeting
- Day 1
- Day 2

Successful Proposal & 1st IAB Meeting
Events Planning Pre Meeting

Cultivate prospective member participation to support a successful planning meeting.

• It is essential to craft an effective message re your center that resonates with prospective members

• The message should convey the value of your center to prospective members in your sector.
  • Value of your center in terms meaningful to a prospective member – Your Center’s unique technical and human capital
  • Value to prospective members of your center forming as an I/UCRC – The I/UCRC Franchise

Questions will be varied and many!
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)**

• Must sign the membership agreement form
• ONE center, and ONE membership agreement form
Additional Options in Membership Agreement

Option 2: Open Source Software. *Sample Membership Agreement* (below) with copyright Clause I replaced with the following Language: All software created under this Agreement will be released as open source under the Apache X.Y license ("Center Software"). The parties agree that they will not pursue patent protection for such software. 

Option 3: Public Domain Operation. *Sample Agreement* (below) with Clauses G, H, I, and J removed and Clause F replaced with the following clause:

F. Activity of the center funded all or in part by center membership fees will be in the public domain upon completion and publication review by members.
The Planning Meeting: Planning 6-12 months before

- Begin establishing common membership agreement:
  www.nsf.gov/eng/iip/iucrc/sample_agreement_form.jsp
- Establish website, Center Fact Sheet:
  www.nsf.gov/eng/iip/iucrc/directory/instructions.jsp
- Set meeting date, contract space and food service
  - Confirm dates with NSF and Evaluator first
  - Ensure internet access and power strips in meeting room
- Publish marketing materials, press release, email distribution
- “Save the Date” announcement to prospective members and faculty
- Follow Program requirements for Planning Meeting (refer to congratulatory email from Program Director)
The Planning Meeting: Planning
3-6 months before

- Finalize common membership agreement, gain concurrence at all university sites
- Ongoing recruiting and marketing
- Update website with developing details, announcements
- Develop list of faculty (or student) speakers; share presentation details and deadlines for submission: [www.nsf.gov/eng/iip/iucrc/pgrant_first_meeting_slide.ppt](http://www.nsf.gov/eng/iip/iucrc/pgrant_first_meeting_slide.ppt)
- Begin developing meeting agenda: [www.nsf.gov/eng/iip/iucrc/planningGrantAgenda.jsp](http://www.nsf.gov/eng/iip/iucrc/planningGrantAgenda.jsp)
- Provide Executive Summary template to each speaker, set deadline for submission (each proposal will have a presentation and Executive Summary): [www.nsf.gov/eng/iip/iucrc/exec_summary_portfolios.jsp](http://www.nsf.gov/eng/iip/iucrc/exec_summary_portfolios.jsp)
### Executive Summary Form

#### EXECUTIVE SUMMARY

**PROJECT OVERVIEW**

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<th>PROJECT NAME:</th>
<th>PROPOSAL:</th>
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<th>DESCRIPTION:</th>
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#### EXPERIMENTAL PLAN:

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<th>RELATED WORK ELSEWHERE:</th>
<th>HOW OURS IS DIFFERENT:</th>
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<tr>
<th>RELATED WORK WITHIN THE CENTER:</th>
<th>MILESTONES:</th>
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<th>DELIVERABLES:</th>
<th>BUDGET:</th>
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<th>POTENTIAL MEMBER COMPANY BENEFITS:</th>
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- I/UCRC tools help guide industrial relevant research
- Centers provide industry with the right information to guide project selection including:
  - Project description
  - Research analysis
  - Project duration
  - Project cost
  - 1st Year Deliverables
  - Milestones
The Planning Meeting: Planning 2 months before

• Obtain NSF final approval of common membership agreement
  “One Center, therefore, one membership agreement.”
• Receive final NSF approval of Agenda, then finalize and distribute to industry, faculty
• Update website (e.g., with agenda, agreement)
• Remind speakers of expectations, deadlines
• Confirm meeting participation by industry, send reminders as necessary
The Planning Meeting: Planning 1-3 weeks before

- Distribute final details, agenda and participant list to all meeting attendees; remind all to bring laptops with them
- Finalize food service, other contracts
- Prepare meeting packets, to include:
  - Agenda and participant list, membership agreement
  - Instructions for logging onto the internet
  - Mission and Vision statements
  - Executive Summaries and presentations
  - Paper copies of LIFE forms
- Receive presentations and Executive Summaries from speakers by the deadline
- Work with Evaluator to get on-line LIFE Forms prepared: www.nsf.gov/eng/iip/iucrc/operational_tools.jsp
The Planning Meeting: Executing the day of

- Have a meeting packet and nametag for all participants
- Confirm all technology is working ahead of time
  - Internet access
  - Meeting computer and projector
  - Preload all presentations; verify
  - On-line LIFE Forms
  - Conference phone lines, microphones
- Ask participants to log onto the internet prior to the start of the meeting
- **Stick to the schedule**
- Promote discussion and feedback

“It’s all in the details – be detail oriented”
The Planning Meeting: Day One

**Recommended Agenda**

**Day One**

- Registration & Breakfast
- Welcome *(Center Directors, University Administrators)*
- Center Vision *(Center Director and Site Director(s))*
  - Mission, sector need that center will address
  - Capabilities of academic sites
  - Value proposition
- NSF I/UCRC Program *(NSF Program Director)*
- Center Evaluation *(Center Evaluator)*
- Project Presentations: First set, 5 projects max *(Center Faculty)*
  - Remember – one center, multiple sites
  - Organize by thrust area, not school
  - LIFE form completed after each
- Lunch
- Project Presentations: Second set, 5 projects max *(Center Faculty)*
- Industry Workshop: *(NSF Program Director)* What have prospective members not heard in the projects?
- Social & Poster Session, Dinner
The Planning Meeting: Day Two

Recommended Agenda

Day Two

- **LIFE Form Review and Discussion** *(Center Evaluator)*
- **Center Response to Feedback from industry session** *(Center Leadership)*
  - Center leadership presents plans to better align proposed centers projects to prospective member needs
  - Based on prospective member feedback, plan includes
    - Adaptation of projects that were presented
    - Crafting of new projects
- **NSF Closed Door Session** *(Prospective Members and NSF Program Director)*
  - Answer remaining questions
  - Gauge interest
  - Determine what they need in hand to garner support for membership
- **Next Steps/Action Items**
  - Set schedule for providing materials to prospective members
    - Modified/new project Executive Summaries & ranking sheet
    - Marketing materials
    - Other materials requested to support organizational decision for membership
- **Closing & Boxed Lunches to Go**

**OUTCOMES For Prospective Members:**
- **Build confidence** that the Center will provide value
- Provide content to **justify membership commitment**
Based on industry feedback, the center is able to:

- Better align its focus with industry sector needs
- Adapt existing project plans
- Identify new projects
- Establish a timeline for prospective members to rank projects based on their interests
- Establish a marketing packet to support industry membership commitment
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**.
The Planning Meeting is Over… Now What?

- FOLLOW through ON SCHEDULE with the ACTION ITEMS from the end of the planning meeting

- STAY engaged with NSF & PROSPECTIVE MEMBERS

- PREPARE for a FULL CENTER PROPOSAL:
  - Recruit members (meet the minimum criteria as per the solicitation)
  - Obtain unambiguous and unqualified commitment letters (language!)
  - Compile the top 5 vetted projects from the planning meeting (adjusted based on which industries commit to join) and include in the full center proposal (executive summaries preferred).
  - Make sure the membership agreement is agreed to by all institutions and the NSF.

PREPARE PROPOSAL PER SOLICITATION!

If a center is awarded, the vetted research projects make up the nucleus of projects presented at the 1st IAB Meeting. From these, the IAB votes and selects the center’s first cooperatively defined research portfolio.
Questions?

NSF I/UCRC Planning and Operation Resources

- I/UCRC Evaluation Project Home Page
  - NCSU http://www.ncsu.edu/iucrc/
  - The purple book: *Managing the I/UCRC*, Gray and Walters
  - CFSP: *Case Study for Managing a Multi-Site I/UCRC*

- NSF I/UCRC Home Page
  - Compendium of Technology Breakthroughs
  - Membership agreement
  - Links for industry members

- Other Centers
Placeholder: Bonning Slides
Your Approach to Operation Support

*First ask yourself*

- What are your goals for your I/UCRC?
- Do you have the time required to achieve your goals?
- Do you have resources in place to support your Center’s operational needs?
- If not, how can you afford to hire someone to do this?
- What are the ideal characteristics of an I/UCRC operations support person for your center?
The “Operations Bucket List”

I/UCRC OPERATIONS

EVENT PLANNING
- short courses/workshops
- research review meetings
- guest lectures/seminars
- IAB meetings

COMMUNICATIONS
- NSF/evaluator coordination
- faculty communications
- website management
- university relations
- student relations
- IAB relations
- press releases
- mediation training

ADMINISTRATIVE
- member agreement/renewals
- managing voting procedures
- IP disclosure management
- document management
- support for proposals
- operations scheduling
- project management
- distributing reports
- task management
- site coordination
- clerical support
- data collection

FINANCIAL
- member fee invoicing
- grants management
- financial planning
- budgeting

REPORTING
- university reporting
- NSF reporting
- IAB reporting

MARKETING
- conference participation
- promotional materials
- market to university
- market to students
- online marketing
- surveying IAB
- awareness
- advocacy
- branding
- liaison

STRATEGIC PLANNING
- technology roadmap creation
- supplemental funding
- vision creation
- goal setting

RECRUITING
- IAB meeting guests
- pitch meetings
- prospecting
- site visits

Source: 2012 I/UCRC Annual Mtg. Operations Session
One Approach to Operations Management

The Wood-Based Composites Center (WBC) Model:

- Single Managing Director (MD) serves both sites, presents a united front
- Documentation and reporting is standardized across universities
- Lead Site invoices the other for expenses, as necessary
- Sites share in cost of supporting MD (salary and benefits)

Thank you.

Questions?
Improving Through Evaluation
Evaluation Goals, Roles and Tasks

Goals
1. To help NSF and local centers objectively evaluate their impact by documenting IUCRC outcomes and accomplishments.
2. To promote continuous improvement by giving actionable, timely, data-based (formally collected and observational) feedback, analysis and advice to NSF and local centers;
3. To identify and communicate information about I/UCRC best practices to NSF and local centers.

Evaluator’s Role
- Member of Center Team
- Collect Outcome and Process Data & Provide Feedback
- Serve as an advisor on operations and strategy

Activities
- Facilitate Project Level Feedback: LIFE Forms
- Facilitate Center Level Feedback: Process/Outcome Questionnaires
- Prepare Evaluation Report: Submitted with Annual Renewal
I/UCRC Evaluation & Assessment

25+ 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**

**I/UCRC 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
I/UCRC Planning Process

Purpose: Maximize the potential for a successful Center Proposal.

Events Pre Meeting
- Cultivate interest in the Center among prospective members
- Solidify center concept and proposed projects
- Secure adequate prospect attendance for meeting
- Organize an effective meeting

Events Occurring at the Meeting

Day 1
- Effective Marketing

Day 2
- Commitments for membership
- Final vetted project set for proposal

What is the value of your center to a prospective member??
Recruiting

Challenge
- IUCRC recruiting presents unique marketing situation
  - Join a “research club”
  - Defined by emergent research agenda
  - Club includes your competitors
  - Will have partial influence
- **Almost** no knowledge base

Resources
- Other directors: tacit knowledge
- Purple book (See Chapter 4)
- Evaluator research on IUCRC
  - What experienced directors think
  - What firms tell us
Director’s Perspective on Recruiting

• **Identifying new members**
  – Personal contacts, current members, meetings/conferences, all-of-above!
    • Effective but little used: Trade shows and ads

• **Reasons for joining/not joining**
  – **Joining**: research relevance; high probability of future knowledge and technology transfer benefits
  – **Not joining**: little relevance; IP concerns
Member Lifecycles: Prospects, Late Prospects, Members, Ex-Members
Recruiting Success Rates

• **Lead generation**
  – On average, centers generate about 11 new leads over a 12 month period.
  – About 7 in every 10 new leads for membership emerge from existing relationships.

• **New member commitments**
  – On average, for every 10 firms actively pursued by centers:
    • 3 will join
    • 2 will decline
    • 5 will be undecided

“Not now” is an invitation to pursue later.
Member Turnover Rate

Lessons:

- Members leave (4.5 years)
- Consortial stay longer
- Need to replace them
- Ex-members can be re-recruited
Member’s Perspective on Recruiting: Risk or Reward?

• Membership decision involves a **risk** vs. **reward** analysis
  – Risk: $, Opportunity Costs, IP non-exclusivity
  – Reward: Portfolio of possible benefits

• Membership decision typically involves a **champion** (who you have contact with) and managers, lawyers & **antagonists** (who you rarely have contact with)
  – Positive decision more likely during budget making time of year (fall)
What benefits do members want?

• IUCRCs present a diverse portfolio of benefits
  – Relevance of various benefits can vary widely from firm to firm
    • Firm A join for benefit X – research
    • Firm B join for benefit Y – facilities
    • Firm C join for benefit Z – access to students
  – No one mentioned corporate goodwill or charity
Why do firms join/not join CRCs?

• **Strategic Research Relevance** (or lack thereof)
  
  – Research related to firm’s **core competency**
    • Strategic fundamental research (non-duplicative) that supports firm’s technology road map.
      • Nearer-term research that provides “cost avoidance” or research leveraging
  
  – Research related to **emerging or disruptive technologies**
    • Provides an efficient means for monitoring and exploring promising new technological avenues
Pasteur’s Quadrant*

Research Inspired by

Quest for Fundamental Understanding

Considerations of use

No

Yes

Pure Basic (Bohr)

Use-inspired Basic (Pasteur)

Pure Applied research (Edison)

Yes

No

*Donald Stokes, 1997
Bottom Line

• Recruiting is the key to a successful planning grant
  – No members = no center

• Selling a center membership is challenging but do-able (ask current directors!!)

• Evaluation-based lessons
  – Build on personal relationships
  – Be persistent (“No” often means “Not now”)
  – Trust the model (consortium)
  – Market portfolio of benefits but ultimately “strategic research relevance” is the central