Research Updates from NCSU IUCRC Evaluation Team
Recent Evaluation Work Products

Graduated Center Case Studies

IUCRC Economic Impacts

CRCs and Technical Innovation

Supplemental study: Social and Human Capital Impacts of the IUCRC Program on Faculty Directors

- Focus: Career paths of faculty directors and the role of the IUCRC program
- Explored human and social capital benefits of the program, as well as contextual factors influencing career outcomes
- Full report available at: www.nesu.edu/iucrc

Dr. McGowen’s Sustainability Study

IUCRC Evaluation Project

Directors & Human Capital Report
Program Sustainability for Cooperative Research Centers: A Longitudinal Analysis

Lindsey McGowen, Ph.D.
North Carolina State University
June 7, 2013
Purpose

• To assess the current status of formerly funded Centers
• To identify sources of variability in Center sustainability
  – Within Center change vs. between Center differences
• To determine what factors predict program sustainability over time
Predictors in Multiple Domains

- **Environmental**
  - Social, political, and economic

- **Organizational**
  - Resource base, infrastructure, stakeholder support

- **Program**
  - Fit, adaptability, implementation, resources, staff support

- **Individual**
  - Champion, leadership, leadership transitions

Alignment across levels is key for program sustainability. Variables at each level should be tailored to the program.
New for this Study:
New DVs, New IVs, New Analyses

- Extended assessment of DVs over time
- New DVs
  - New continued activity measures
- New IVs
  - Added new psycho-social predictors in the program domain
  - Added new individual domain variables
- New analytical approach
  - MLM
  - Predict changes over time
  - Test the life cycle perspective by measuring IVs over time
    - Average level (mean) and trajectory (slope)
Design

- Descriptive & Predictive **Time-series Design**

<table>
<thead>
<tr>
<th>IVs (Mean &amp; Slope)</th>
<th>Grad</th>
<th>DVs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
<td></td>
<td>1  2  3  4...</td>
</tr>
<tr>
<td>Years</td>
<td>-2</td>
<td>-1  0</td>
</tr>
<tr>
<td>IVs</td>
<td>O</td>
<td>O  X</td>
</tr>
<tr>
<td>Status</td>
<td></td>
<td>0  0  0 0...</td>
</tr>
<tr>
<td>Other DVs</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

- Staggered cohort → Grad Year Anchored
  - Effects timing of data collection relative to years since funding ended
Sample

• Participants
  – Sampling Criteria (N = 83; new N = 14)
    • Center received an NSF I/UCRC operating grant;
    • Center no longer funded by an NSF I/UCRC operating grant;
    • Center graduated and merged with a newer Center;
    • Center has not received NSF I/UCRC money for at least 1 year
RQ1: What is the status of I/UCRCs after their grants end?

Status is changing over time. Need to test this statistically...

- 1 Year post-NSF Status: 79.50% Operating, 20.50% Not Operating
- 2009 Status: 62.90% Operating, 37.10% Not Operating
- 2012 Status: 59.10% Operating, 40.90% Not Operating
RQ3: To what extent has the Center sustained itself in terms of continued program activities, structures, and outcomes?

Table 6. Descriptive Statistics for Continued Program Activities, Structures and Outcomes for Sustained Centers Compared to Actively Funded I/UCRCs

<table>
<thead>
<tr>
<th></th>
<th>Sustained Centers</th>
<th>Currently funded I/UCRCs</th>
<th>df</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td><strong>Continued Activities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>46</td>
<td>0.73</td>
<td>0.37</td>
<td>48</td>
</tr>
<tr>
<td><strong>Continued Structures</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>41</td>
<td>14.29</td>
<td>11.6</td>
<td>54</td>
</tr>
<tr>
<td>Members</td>
<td>41</td>
<td>47.2</td>
<td>185.39</td>
<td>54</td>
</tr>
<tr>
<td>Budget (in thousands)</td>
<td>40</td>
<td>3500.62</td>
<td>5575.32</td>
<td>54</td>
</tr>
<tr>
<td>% Overhead Discount</td>
<td>41</td>
<td>39.71</td>
<td>16.07</td>
<td>54</td>
</tr>
<tr>
<td><strong>Continued Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate Students</td>
<td>40</td>
<td>26.13</td>
<td>30.82</td>
<td>54</td>
</tr>
<tr>
<td>Graduate Degrees</td>
<td>39</td>
<td>41.44</td>
<td>95.5</td>
<td>54</td>
</tr>
<tr>
<td>Publications</td>
<td>40</td>
<td>80.47</td>
<td>174.34</td>
<td>54</td>
</tr>
<tr>
<td>Presentations</td>
<td>38</td>
<td>66.95</td>
<td>125.26</td>
<td>54</td>
</tr>
<tr>
<td>IP</td>
<td>40</td>
<td>6.95</td>
<td>14.95</td>
<td>54</td>
</tr>
</tbody>
</table>

*p < .05, **p < .01  Changing model; only the strong survive
Program Impacts

**Total Members**

- 2002: 1,000
- 2003: 1,500
- 2004: 2,000
- 2005: 2,500
- 2006: 3,000
- 2007: 3,500
- 2008: 4,000
- 2009: 4,500
- 2010: 5,000
- 2011: 5,500
- 2012: 6,000

**Total Budget**

- 2002: $500
- 2003: $1,000
- 2004: $1,500
- 2005: $2,000
- 2006: $2,500
- 2007: $3,000
- 2008: $3,500
- 2009: $4,000
- 2010: $4,500
- 2011: $5,000
- 2012: $5,500

**Total Students**

- 2002: 1,000
- 2003: 1,500
- 2004: 2,000
- 2005: 2,500
- 2006: 3,000
- 2007: 3,500
- 2008: 4,000
- 2009: 4,500
- 2010: 5,000
- 2011: 5,500
- 2012: 6,000
RQ4: What factors predict current Center status?

**Table 8. Logistic Regression Predicting Current Status**

<table>
<thead>
<tr>
<th></th>
<th>Exp(B)</th>
<th>Tolerance</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Individual</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centered Slope % Director time spent on other</td>
<td>1.12*</td>
<td>0.99</td>
<td>1.02</td>
</tr>
<tr>
<td><strong>Environmental Level</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centered Mean US industry spending on R&amp;D (1Bill)</td>
<td>1.02***</td>
<td>0.99</td>
<td>1.01</td>
</tr>
<tr>
<td>Centered Slope US industry spending on R&amp;D (1Bill)</td>
<td>1.08*</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Nagelkerke $R^2$: 0.29  
Model $\chi^2(3)$: 18.28***

***$p < .01$. **$p < .05$. *$p < .1$

- Full model accounted for 29% of the variance in current status
- For each additional % increase in the slope of time the director spent on other activities the odds of a Center being currently sustained increase by 12%.
- For each additional billion dollars in the average level of US industry spending on R&D the odds of a Center being currently sustained increase by 2%.
- For each additional % increase in the slope of US industry spending on R&D the odds of being sustained increase by 8%.
RQ5: What predicts Center status?

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Estimate</th>
<th>SE</th>
<th>Odds Ratio</th>
<th>LCI</th>
<th>UCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept, ( \gamma_{00} )</td>
<td>7.94</td>
<td>4.74</td>
<td>2817.58*</td>
<td>1.15</td>
<td>6904300.96</td>
</tr>
<tr>
<td>Continued Activities Level, ( \beta_0 )</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Control Variables

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>SE</th>
<th>Odds Ratio</th>
<th>LCI</th>
<th>UCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years Funded, ( \gamma_{01} )</td>
<td>0.23</td>
<td>0.27</td>
<td>1.26</td>
<td>0.81</td>
<td>1.98</td>
</tr>
<tr>
<td>Years Since Graduation, ( \gamma_{02} )</td>
<td>-0.46</td>
<td>0.36</td>
<td>0.63</td>
<td>0.35</td>
<td>1.13</td>
</tr>
</tbody>
</table>

Program Domain

<table>
<thead>
<tr>
<th>Centered Mean Graduates Hired by Members, ( \gamma_{05} )</th>
<th>Estimate</th>
<th>SE</th>
<th>Odds Ratio</th>
<th>LCI</th>
<th>UCI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.2</td>
<td>1.28</td>
<td>9.07*</td>
<td>1.11</td>
<td>74.04</td>
</tr>
</tbody>
</table>

Random Effects: Center Level, \( \tau_{00} \)

| Deviance | 36.57*** |

Random Effects: Time Level, \( \sigma^2 \)

| Deviance | 0.10*** |

| Deviance | 60.19    |

***\( p < .01 \). **\( p < .05 \). *\( p < .1 \)

- For each additional student hired by a member firm, Centers are **9.07 times** more likely to continue operating on average.
- Model accounted for **66.73%** of the within Center change and **78.38%** of the between Center differences in the odds of continuing to operate on average.
RQ5: What predicts change in Center status over time and between Center differences in change?

Table 10. Logistic MLM Predicting Change in Center Status Over Time, Controlling for Yrs Funded and Yrs Since Grad.

<table>
<thead>
<tr>
<th>Fixed Effects</th>
<th>Estimate</th>
<th>SE</th>
<th>Odds Ratio</th>
<th>LCI</th>
<th>UCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continued Activities Level, β^0</td>
<td>0.21</td>
<td>27.31</td>
<td>1.23</td>
<td>0.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Intercept, γ^00</td>
<td>0.21</td>
<td>27.31</td>
<td>1.23</td>
<td>0.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Control Variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years Funded, γ^02</td>
<td>1.49</td>
<td>0.67</td>
<td><strong>4.42</strong></td>
<td>1.47</td>
<td>13.31</td>
</tr>
<tr>
<td>Years Since Graduation, γ^03</td>
<td>1.65</td>
<td>2.33</td>
<td>5.22</td>
<td>0.11</td>
<td>241.2</td>
</tr>
<tr>
<td>Individual Domain</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Centered Director Turnover, γ^04</td>
<td>-6.85</td>
<td>2.83</td>
<td><strong>0.001</strong></td>
<td>0.00</td>
<td>0.11</td>
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<tr>
<td>Program Domain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centered Mean Members, γ^05</td>
<td>1.69</td>
<td>0.91</td>
<td><strong>5.41</strong></td>
<td>1.21</td>
<td>24.19</td>
</tr>
<tr>
<td>Environmental Domain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Centered Slope US Industry Spending on R&amp;D ($1Bill), γ^06</td>
<td>0.74</td>
<td>0.38</td>
<td><strong>2.10</strong></td>
<td>1.13</td>
<td>3.9</td>
</tr>
<tr>
<td>Change Slope β^1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept (Time), γ^10</td>
<td>-4.36</td>
<td>0.03</td>
<td><strong>0.01</strong>*</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Random Effects: Center Level, τ^00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random Effects: Time Level, σ^2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deviance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Random Effects: Center Level, τ^00 530.86***
Random Effects: Time Level, σ^2 0.003***

The odds of a center continuing to operate over time are higher for those
- With more years of I/UCRC funding
- With more members
- Graduating when US industry spending on R&D is increasing

The odds of continuing to operate over time are lower for those with more director turnover

**p < .01.  ***p < .05.  *p < .1
Discussion: Overview

• Study extends state of knowledge about program sustainability
  – Extends theory to CRCs
  – Examines change over time using MLM
  – Tests a lifecycle framework
• Descriptive results show that 60% of Centers are still operating
  – Only a small decrease in N of Centers operating since 2009
• Continued activity, structure, and outcome measures reflect different levels of sustainability \( \rightarrow \) multidimensional construct
• Predictive analyses were able to account for significant within and between Center variance
  – New variables measuring stakeholder support and leadership characteristics were significant predictors of various sustainability outcomes
  – Supports a levels of analysis framework \( \rightarrow \) significant predictors in each domain
Take home message: Predicting Status

• A strong industrial environment facilitates center sustainability
  – Consistent with McGowen (2010) and theoretically relevant
  – Lends quantitative support to qualitative data on the impact of economic hard times on Centers
  – It’s easier to carry on when there are ample resources available

• Highlights the importance of human capital benefits to industry
  – Access to students trained in industrially relevant research is one of the main benefits for members participating in I/UCRCs.
  – May keep both members and students engaged...
  – Policy implications for NSF, importance of students
Take home message: Predicting Status

• Establishing viable centers takes time
  – Centers receiving longer support from NSF were more sustainable
  – Consistent with effect of grad. status found by McGowen (2010)
  – NSF finds ways to continue to fund the best and the brightest
    • Cause or effect?

• Importance of building a solid membership base
  – Centers rely on members for funding and guidance so ability to attract
    and retain members is an indication of Center viability

• More CD turnover leads to lower odds of continuing to operate over time
  – Consistent with Gray et al.’s (2011) cascading failures findings
Conclusions

• Empirically showed that there is change in program sustainability over time and successfully accounted for some of that variability.

• Centers continued to produce benefits long after NSF is gone

• Predicted sustainability and related measures
  – program sustainability is related to leadership, funding, economic factors in the environment, and stakeholder involvement and support.
Conclusions

• Results can be used by the NSF and directors of actively funded I/UCRCs to prepare for self-sustainability.
  – Indirect sustainability impacts could double NSF leveraging
    • Economic impacts, human capital
  – Policy implications
    • Fund Centers longer
    • Emphasize the importance of students
    • Establish safety-net funding for Centers graduating in times of economic hardship
    • Plan for and minimize Center director transitions
    • Increase minimum threshold for N of members as Centers age
    • Emphasize the importance of industry impact
    • Directors may need to consider a hybrid model which includes both consortial and contract research
Future Directions

• Fidelity vs. Transformation
• Plan for sustainability evaluation
• More qualitative
• Tremendous need for more precise theoretical model to guide selection of predictors
Research Center Sustainability and Survival: Case Studies of Fidelity, Reinvention and Leadership of Industry/University Cooperative Research Centers

Gray, Tornatzky, McGowen with Sundstrom

- **I/UCRC Program and the Path to Self-Sufficiency**
- **When TH Unravels**
- **Reinventing the I/UCRC Model**
- **Success Through Fidelity to the I/UCRC Model**
- **Transformation of a Small University I/UCRC**
- **IUCRC as Capacity Building Strategy for State-based Economic Development**
Case Studies of Fidelity, Reinvention and Leadership of Industry/University Cooperative Research Centers

- **Objective:** understand why and how some centers achieve sustainability and others do not

- **Methodology**
  - Multiple case study

- **Research Question 1**
  - Why do successful centers “unravel”?
  - Approach
    - Compare successful IUCRC with four I/UCRCs that “unraveled” either early or later in their program history: archival data
    - Published paper Gray, Sundstrom, McGowen & Tornatzky (2012)
  - Findings: leadership issues, transitions, withdrawn institutional support, cascading problems.
Case Studies

• **Research Question 2**
  – How do “successful” centers achieve sustainability?

• **Selection Criteria**
  – the Centers exhibited a high level of success on various sustained activities, structural and outcome indicators;
  – they appeared likely to exhibit a relatively diverse set of sustainability strategies and organizational end-states;
  – Center informants were willing to commit the time necessary for extended interviews and feedback on draft cases

• **Approach**
  – Telephone interviews with director; archival data
Success Through Fidelity to the I/UCRC Model: Advanced Steel Processing and Products Research Center at Colorado School of Mines (ASPPRC).

• Began transition to self-sustainability at a time when the steel industry was going through a major restructuring that led to a much more globalized industry.

• Strong and continuous leadership and proactive recruiting, ASPPRC was able to weather this challenging period, continue to deliver technical value

• Eventually expanded its operations all while remaining faithful to the prototypical I/UCRC mode of operation.
Reinventing the I/UCRC Model: Center for University of Massachusetts/Industry Research on Polymers (CUMIRP)

- CUMIRP was beginning to decline in terms of membership, overall financial support and industrial commitment.
- It chose to reinvent (but not reject) the I/UCRC model by creating a set of mini-consortia under the umbrella of CUMIRP, allowing firms to join or not join topical clusters based on their particular interest.
- Members responded positively to these changes, and eventually the CUMIRP prospered financially and technically. More recently, the “CUMIRP model” has been adopted on a broader basis across the whole university.
CAC was experiencing a decline in membership, financial support and industrial commitment as it approached graduation. Founding director passed away around this time.

Successor director was able to build support for the center within the university while converting it to a more contractual one-on-one research operation.

Strategy was very successful for CAC which continues to attract several million dollars of research support each year and established a doctoral program.

Works closely with the local economic development agencies and serves as a highly respected training lab within the university.
IUCRC as Capacity Building Strategy for State-based Economic Development, Ohio State’s Center for Welding Research/Edison Welding Institute (EWI)

• OSU CWR, with strong leadership, morphed into the not-for-profit state institute Edison Welding Institute (EWI) very early in its development

• EWI evolved into one of the world’s pre-eminent welding research institutes, conducting approximately $25 million of research each year, contributed significantly to the economic vitality of the mid-west region

• EWI’s university connections are coming full circle since it currently provides membership support to three I/UCRCs housed at Ohio State University.

— Motivation: Need well-trained students
Overview

• Most but not all IUCRCs survive and achieve sustainability by maintaining fidelity to the IUCRC model

• There are at least three other paths to sustainability
  – Significant modification of IUCRC
    • Mini-clusters by sector
  – Contract research model
  – Not-for-profit state center of excellence

• Case study lessons may be instructive to current directors trying to achieve sustainability
Social and Human Capital Impacts of the I/UCRC Program on Faculty Directors:

Success Indicators and University benefits

Drew Rivers, Ph.D.

Psychology in the Public Interest Program
North Carolina State University
Overview

• Quick refresher
• S&T HC framework
• Strategic HR models
• Assessing faculty and university readiness
• Benefits to Universities
Study Goal

To determine the professional trajectory and achievements of CRC directors and extent to which these outcomes can be attributed to their CRC experience and training.

Methods

• Archival data (I/UCRC, Internet)
• CV analysis
• Focus group
• Interviews
• Web survey
S&T Human Capital

Human capital theory

INPUTS
- Education
- Training

TRANSFORMATION
- Knowledge creation, innovation, and application

OUTPUTS
- Productivity
- Earnings
- Economic growth

The “black box”

Social capital
- the norms and networks that enable people to act collectively (Woolcock & Narayan (2000))

Note: Process adapted from Bozeman et al (1999)
SHRM models

Employee Lifecycle

- Recruiting & Selection
- Orientation & On-boarding
- Transition
- Performance management
- Retention

Resource-based view

- Rare
- Not Rare
- Valuable
- Not valuable

June 6-7, 2013
Indicators of good fit: Faculty level

**Human Capital**

- Tenured professor
- Industrial experience
- Entrepreneurial / Intrapreneurial experience
- Business management/ leadership

**Social Capital**

- Industrial networks
- Intra-university networks
- Inter-university networks

**Motivation & Inherent talent**
Indicators of good fit: University level

Structural
- Reporting structure (up to Dean or higher)
- Release time
- Administrative support
- Other CRCs / partnership programs

Cultural
- Mission (economic development, transdisciplinary research, partnerships)
- Values
- Rewards
- Behaviors
## STHC Benefits to Universities

<table>
<thead>
<tr>
<th>Satisfaction and engagement</th>
<th>STHC development</th>
<th>Social technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Alternative career path</td>
<td>• Leader</td>
<td>• Framework for</td>
</tr>
<tr>
<td>• Problem-focused research</td>
<td>identification &amp;</td>
<td>engaging with</td>
</tr>
<tr>
<td>• Industry exposure</td>
<td>development</td>
<td>industry</td>
</tr>
<tr>
<td></td>
<td>• Transdisciplinary capabilities</td>
<td>• Economic development outcomes</td>
</tr>
<tr>
<td></td>
<td>• Use-inspired orientation</td>
<td>• Capability to catalyze technology networks</td>
</tr>
<tr>
<td></td>
<td>• Uniquely trained students</td>
<td></td>
</tr>
</tbody>
</table>

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June 2013

June 6-7, 2013

IUCRC Evaluation Project
Social and Human Capital Impacts of the I/UCRC Program on Faculty Directors:

Budgets and Funding

_Denis O. Gray, Ph.D._  
_Psychology in the Public Interest Program_  
_North Carolina State University_

IUCRC Semi-annual Evaluators’ Meeting, Arlington, VA, June 6-7, 2013
STHC: Concerns about funding and workload

- Some directors reported dissatisfaction with the adequacy of the funding they received and how it affected their workload

  - Running an I/UCRC involves a tremendous amount of "donated" time as the budget for administration from NSF is very small. I have had to give up many personal research opportunities in order to keep the Center running. On the whole, it has been mostly a sacrifice rather than a help with my career.

  - I/UCRC program is very good, but I’m not sure that it carries much weight when you’re telling them [university] that you’re going to give them $50,000 to establish the center. You lose all the credibility—I think if NSF was to do anything, they are to be looking at the I/UCRC and tripling or quadrupling their budget.

  - … we did all the marketing. We are not professional marketers, okay, so I think that’s where the problems are. We ended up doing everything. That’s why I would say, you know, NSF needs to be more realistic in terms of what they expect us to do when they say go out and market. Where is the money? Where are resources?
### Table 19: Center funding: I/UCRCs and benchmark programs

<table>
<thead>
<tr>
<th>Type of Benchmark</th>
<th>NSF Annual Funding Levels (estimates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current I/UCRC Funding (2 sites)</td>
<td>$170,000</td>
</tr>
<tr>
<td>Original I/UCRC Funding Corrected for Inflation</td>
<td>$733,000</td>
</tr>
<tr>
<td>Minimum Funding Required by NSF to be Considered a “Center Program”</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Funding Provided to ERCs</td>
<td>$3,500,000</td>
</tr>
<tr>
<td>Funding Provided to STCs</td>
<td>$5,000,000</td>
</tr>
<tr>
<td>Funding Provided to MRSECS</td>
<td>$2,000,000-$5,000,000</td>
</tr>
</tbody>
</table>
## Hypothetical Budget Benchmarks

<table>
<thead>
<tr>
<th>Budget Item</th>
<th>Basic Operations</th>
<th>Basic plus FT Manager</th>
<th>Basic, FT Manager plus Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead director salary release (2 months)</td>
<td>$31,111</td>
<td>$31,111</td>
<td>$31,111</td>
</tr>
<tr>
<td>Site director salary release (1 month)</td>
<td>$15,555</td>
<td>$15,555</td>
<td>$15,555</td>
</tr>
<tr>
<td>Managing director</td>
<td></td>
<td>$107,526</td>
<td>$107,526</td>
</tr>
<tr>
<td>Lead site administrator (1/2-time)</td>
<td>$30,000</td>
<td>$30,000</td>
<td>$30,000</td>
</tr>
<tr>
<td>Site administrator (1/2-time)</td>
<td>$30,000</td>
<td>$30,000</td>
<td>$30,000</td>
</tr>
<tr>
<td>Site administrator (1/4-time)</td>
<td>$15,000</td>
<td>$15,000</td>
<td>$15,000</td>
</tr>
<tr>
<td>Fringe on all salary</td>
<td>$22,000</td>
<td>$47,806</td>
<td>$47,806</td>
</tr>
<tr>
<td>Salary and Fringe Total</td>
<td><strong>$113,666</strong></td>
<td><strong>$246,998</strong></td>
<td><strong>$246,998</strong></td>
</tr>
<tr>
<td>Supplemental Research Support</td>
<td></td>
<td></td>
<td><strong>$133,333</strong></td>
</tr>
<tr>
<td>Recruitment Travel</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>IAB Meetings</td>
<td>$10,000</td>
<td>$10,000</td>
<td>$10,000</td>
</tr>
<tr>
<td>Web Design Assistance</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>General office expenses</td>
<td>$5,000</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td>Total Direct Expenses</td>
<td><strong>$143,666</strong></td>
<td><strong>$276,998</strong></td>
<td><strong>$410,331</strong></td>
</tr>
<tr>
<td>Indirect</td>
<td>$71,833</td>
<td>$138,499</td>
<td>$205,166</td>
</tr>
<tr>
<td>Total Budget</td>
<td><strong>$215,499</strong></td>
<td><strong>$415,497</strong></td>
<td><strong>$615,497</strong></td>
</tr>
</tbody>
</table>

Note: These figures are based on the following cost estimates: director 9-month salary=$140,000; administrator salary=$60000; fringe=24%; indirect rate=50%.
Conclusion

- Feelings of funding frustration, excessive workload and the need to neglect/borrow from other duties one negative spot for directors
- The perception appears to have some basis in other funding formulas
- Several alternative funding benchmarks offered for consideration by NSF
Acknowledgement: The authors acknowledge support provided by the National Science Foundation Industry/University Cooperative Research Centers Program (EEC-0631414) in preparing this paper.

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QUESTIONS?
Thesis Prospectus

S&T Students’ acquisition of Social Capital and Networks: Traditional Education vs. IUCRC, Domestic vs. International
IUCRC Evaluator’s Meeting
June 7, 2013

Olena Leonchuk
North Carolina State University
Purpose

• Social Capital and Networks of professionals facilitate knowledge creation and knowledge transfer (Bozeman)

• Study investigates if Social Capital and Networks are more likely to be acquired by young scientists in Triple Helix research centers vs. traditional university settings (focus on STEM scientists whose knowledge is more specific and less concentrated on ‘soft’ skills)

• International students’ experiences, social adaptation and decision to stay in the US (50% of graduate students in research centers & STEM degrees are international)

• Gender differences in acquired social capital and networks in the predominately male-dominated STEM disciplines
Theory

1. Students experiences at CRCs
   • I/UCRC as a case study
   • Exposure to industry & work in teams

2. Human Capital and Social Networks

   “S&T human capital further includes the social capital that scientists continually draw upon in creating knowledge – for knowledge creation is neither a solitary nor singular event. In sum, it is this expanded notion of human capital when paired with a productive social capital network that enables researchers to create and transform knowledge and ideas in ways that would not be possible without these resources.”

3. International Students
   • Unique challenges such as language barrier and cultural shock
   • Communication and networking in the U.S. universities
   • Impact of the students on the U.S.

4. Gender and professional Networking
   • Representation and experiences of women in STEM degrees
Hypothesis

• Graduate students in IUCRCs gain more social capital, exposure to industry and receive more job offers than graduate students in the traditional university settings.

• More international students at I/UCRCs’ than in traditional settings intend to stay in the US after completion of their studies.
Design

IV
• Training experiences at I/UCRCs vs. Traditional (departmental):
• Demographics

DV
• US and International:
  o Perceived Acquisition of Social Capital and exposure to industry
  o Number of Internships/Job offers
  o Decision to be in industry or academia
• International:
  o Intentions to stay in the US
Measurement

- Individual Social Capital
  1. Social networks
  2. Norms and beliefs

- Decision to stay in the U.S. for international students
  - Intentions during different stages
Method

• Population and Sample
  o IUCRC (N=100) and traditional (N=100) grad students in the same departments and universities
  o Equal sample N for US and international students in both groups
  o International students and defense research
• Procedure
  o Identification: contact IUCRC directors and evaluators and S&T departments at universities with largest N of I/UCRCs
    1. North Carolina State University
    2. University of Florida
    3. Virginia Tech
    4. Ohio State University
    5. University of Arizona
    6. Texas A&M
  o Data Collection:
    1. electronic questionnaire
    2. one-week and two-week electronic follow-up; three-week phone call
  o Motivation:
    a. authority (NSF)
    b. reward (a chance to win one of 4 $50 gift card)
• Analysis: multiple regression and/or path analysis
SBIR/STTR Membership Assessment Plans

Denis Gray
Drew Rivers
Lindsey McGowen
Objectives

1. Assess level of SBIR participation in IUCRC
2. Understand SBIR Recruiting “Best Practices” and director perspective on pros and cons of these members
3. Assess SBIR membership expectations, outcomes and impacts
4. Recommendations for improving SBIR membership
Assessment Objectives

1. SBIR Participation in IUCRC
   - How effective has the SBIR/STTR IUCRC Membership Program been in attracting new SB members to centers?
   - Specifically, to what extent is the increased SB participation observed over the past four years attributable to SBIR/STTR IUCRC Membership Program?
   - Are any center structural factors associated with increased SBIR participation including: type of center; program year; SBIR vs. STTR support; center’s membership structure, etc.?
   - Source of money (SBIR or IUCRC)

- Sample: All SBIR/STTR member organizations
- Archival data: NSF
Membership trends (not real data; demo only)
Member Composition 2005-2012: Small & SBIR/STTR Only

Categories comprising Others include: non-profit, non-US government, and other organization
Assessment Objectives

2. Member Recruiting Strategies
   - How have center directors attempted to identify firms that are eligible for a supplement and convince them to join their center?
   - What member targeting and marketing strategies appear to have been the most successful?
     - Ones that didn’t join.
   - What barriers do directors see in finding and recruiting SBIR awardees?
   - Director perception of value of obtaining SBIRs
     - Why some IUCRCs wildly successful: BSAC, MAST, CELDI
   - Sample: IUCRC Directors with SBIRs
   - CD web survey (very short)
     - How did you identify the prospects
     - Sales/what convinced (old survey)
     - Pros and cons
SBIR Membership Logic Model

- Type SBIR
- Expectations
- Type IUCRC

- Assess Center Operations
- Assess Center Research
- Assessment Fit

- Renewal Decision
- Other Center Interactions
- Outcomes/Impacts
Assessment Objectives

3. Membership Expectations, Outcomes and Impacts
- What were SBIR expectations?
- How do SBIR members assess center operations and research?
- How many SBIR/IUCRC participants renew/intend to renew their membership after their subsidized membership expires?
- Do SBIRs plan to continue their involvement with IUCRC faculty and/or firms via a more informal arrangement?
  - Money personnel
- What benefits and/or risks do they perceive based on their participation?
- What factors appear to predict a positive/negative renewal decision?
- What recommendations do SBIR offer for improving the program?
- Sample: SBIR members since start; 4 cohorts; key IAB rep (N=?)
- SBIR Telephone Interview
Possible Outcome Targets Suggested

- Continued membership at lower level
- Membership in another center
- Networking benefits with other members and faculty
- Differentiate SBIR/STTR
  - Understand the funding differences between the two
- Operate more like ERC
- Survival of firm
- Conducting contractual research; working with students
- Understanding of the time horizon for payoff
- Attendance at meetings
- Commercialization progress
- Size (other G. Vermont measures)
- Cash flow
- IUCRC spinouts
Study Cohorts

Cohort A
- Highly retrospective
- Decision already made to stay/leave

Cohort B
- Recent decision to stay/leave
- More attuned to expectations, benefits, and decision

Cohort C and D
- Upcoming decision to stay/leave
- Most attune to expectations, current benefits and long-term intentions

June 2013

6/14/2013
Assessment Objectives

4. Recommendations for Improving Program

- What recommendations do SBIR offer for improving the program?
- SBIR Telephone Interview
- Inferences from other data
Timeline

• SBIR membership list
  – (start)
• Objective 1 Participant Rate
  + 1 month
• Objective 2 CD Feedback
  + 2 months
• Objective 3 Outcome and Impact Assessment
  + 3-5 months
• Objective 4 Recommendations
  + 5-6 months