IUCRC Program Findings from The Center Structure Database

FY2015-2016
*Data collected from 68 out of 68 total active centers
Trends from Center Structure Database: 1980-2016

McGowen, L. & Leonchuk, O.
IUCRC Evaluation Project at
North Carolina State University
Overview

• Data collection methodology and timeframe
  • Slides 3-7

• Number of Centers through 2016-2017
  • Slides 8-10

• Detailed analyses through 2015-2016 (structural, outcomes)
  • Slides 11-42

• CISE and ENG breakdowns
  • Slides 43-50

• Comparison by program Phase (I, II, III)
  • Slides 51-62
Methodology

• Collection of 2015-16 structural data from centers and sites completed between November 2016 and January 2017.
  • Centers were asked to report on their most recently completed project year
  • Some variables changed last year (trends adjusted to standardize)
• Data on number of funded centers collected from NSF (through 2017)
• Reporting issues:
  • Issue of how to count centers under NCE (no cost extension) will need to be addressed in the future (e.g., between phase NCE; end-of-funding NCE)
NSF and Center Budgeting Life Cycle

NSF Fiscal Year

Oct FY1
Mar FY1
Aug FY1
Oct FY2
Mar FY2
Aug FY2

Center Project Year

First Center Project Year

IUCRC Report Completed

- Structural report includes activities for previous complete project year
- Report excludes centers less 1 year operation

Included in report
Not included in report

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IUCRC Evaluation Project
Understanding Center Counts Through 2016

FY 2016

68 NSF Funded Centers > 1 yr. (completed a project year)

5 NSF Funded Centers < 1 yr. (project year not completed)

= 73 Funded Centers

Statistics on Total and Average Activity
Slides 11-40

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IUCRC Evaluation Project
Understanding Center Counts Through 2016

FY 2016

68 NSF Funded Centers > 1 yr. (completed a project year)

+5 NSF Funded Centers < 1 yr. (project year not completed)

-4 Centers Graduated/Closed

= 69 Funded Centers Counted for 2016

Slides 8-10

4 Phase III Centers Graduated
2015-2016 Graduated & Closed Centers

• Centers dropped from the FY15-16 report.
  Phase III
  2. Friction Stir Processing: BYU, UNT, SDSMT, USC
  3. Nondestructive Evaluation: ISU
  Phase II
  4. Safety, Security, Rescue Research Center: UMN, UNCC, DU, Upenn
  5. Silicon Solar Consortium: NCSU, GIT
  Phase I
  6. Electric Vehicles: Transportation & Electricity Convergence: UTA, TXA&M
  7. Innovative Instrumentation Technology: UI
  8. Optical Wireless Applications: PSU
Center Life Cycle Through 2017*

(Current year)

(Cumulative Record)

*Data Current for FY2017
Active Centers and Sites by Year*

*Data Current for FY2017

~2.6 Sites/Center

Plus 5 Int’l Sites

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IUCRC Evaluation Project
Single & Multi-Site Centers*

*Data Current for FY2017
Total Program Funding

^Univ. & Other Cash Excluded

8 centers left and only 3 added

Millions
Average & Median Total Center Funding

Average & Median Total Center Funding

<table>
<thead>
<tr>
<th>Year</th>
<th>Average</th>
<th>Median</th>
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<tr>
<td>'16</td>
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</table>

^Univ. & Other Cash Excluded
NSF Budget by Year

![Bar chart showing NSF budget by year from 1980 to 2016. The chart includes data for different programs including ENG, CISE, and FRP Program. The chart also indicates that Other Programs co-fund too!](image-url)
NSF: Total Funding Leveraging Ratios

NSF IUCRC Program Budget Leveraging Ratio = Total Funding All Sources / NSF IUCRC Program Budget

NSF Awards Reported Leveraging Ratio = Total Funding All Sources / NSF IUCRC Awards and Supplements Reported

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IUCRC Evaluation Project
NSF : Total Funding (Excluding NSF IUCRC) Leveraging Ratios

NSF IUCRC Program Budget Leveraging Ratio = Total Funding All non-NSF-IUCRC Sources / NSF IUCRC Program Budget

NSF Awards Reported Leveraging Ratio = Total Funding All non-NSF-IUCRC Sources / NSF IUCRC Awards and Supplements Reported

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IUCRC Evaluation Project
Average NSF IUCRC Awards & Supplements per Center*

*The averages do not include centers that were on no-cost extension and received $0 from NSF during that fiscal year. The average for FY2016 excludes three centers that were on no cost extension.

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IUCRC Evaluation Project
Average NSF IUCRC Funding per Site*

*The averages do not include sites that were on no-cost extension and received $0 from NSF during that fiscal year. The average for FY2016 excludes 5 sites of three centers that were on no cost extension, five international sites and two additional sites that did not receive NSF IUCRC support.
Total Funding by Source in Dollars

- NON-FED
- FED
- STATE
- OTHER INDUSTRY
- INDUST. MEM. FEES
- OTHER NSF
- IUCRC

^Univ. & Other Cash Excluded
Total Funding by Source in Percentages

^Univ. & Other Cash Excluded
Industry/University Cooperative Research Centers

Industrial Memberships

**Total Number of Memberships**

**Average Number of Memberships**

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IUCRC Evaluation Project

Complex changes:

2011-2014: Massive growth in new centers established (N = 31), decreasing average

2016: Termination of 4 struggling centers, increasing the average
Average Membership Turn Over

- Members Added this FY
- Members Left this FY

[Graph showing trends from '89 to '16]
Member Turnover Rate

Turnover % = Members terminated in “year X+1” / Total members in “year X”
Member Composition 2005-2016*

^ Categories comprising Others include: non-profit, non-US gov’t, and other org.
Member Composition 2005-2016

^ Categories comprising Others include: non-profit, non-US gov’t, and other org.
Average Number of Researchers per Center

Faculty & Post Doc Researchers

<table>
<thead>
<tr>
<th>Year</th>
<th>Researchers</th>
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<tbody>
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<tr>
<td>'88</td>
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### Total Funding per Researcher

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^-Univ. & Other Cash Excluded
Total Intellectual Property & Commercialization Events 05-16

*** Patents Granted Outliers: 2016: BSAC = 6, DDA = 11.
Average Intellectual Property & Commercialization Events 05-16


*** Patents Granted Outliers: 2016: BSAC = 6, DDA = 11.
Total Students Trained

* For 2001 and 2002, the data on PhD and Master’s students were collected together.
Average Students Trained
Total Students Graduated

- PhD (2016 Mean = 3.88)
- Masters (2016 Mean = 4.53)
- BS (2016 Mean = 3.10)

5/12/2017 IUCRC Evaluation Project
Average Students Graduated

- PhD
- Masters
- BS

IUCRC Evaluation Project

5/12/2017
Total Graduates Hired by Industry & Government Members

PhD (2016 Mean = .93)  Masters (2016 Mean = .93)  BS (2016 Mean = .53)
Average Graduates Hired by Industry & Government Members

PhD  Masters  BS

![Graph showing average graduates hired by Industry & Government Members from 2004 to 2016 for PhD, Masters, and BS degrees. The graph peaks in 2011 and 2012 for PhD and Masters, respectively.](image-url)

5/12/2017  IUCRC Evaluation Project
IUCRC Alumni Career Outcomes: Total FY2016 Graduates Hired

- **Industry**: 283 graduates hired
  - Continuing Edu.: 138
  - Non-Member Org.: 151
- **Government**: 24 graduates hired
  - Postdoc: 15
  - Member Org.: 31
  - Faculty: 27
- **Academia**: 104 graduates hired
- **Unknown**: 0 graduates hired

5/12/2017

IUCRC Evaluation Project
Industry/University Cooperative Research Centers

IUCRC Alumni Career Outcomes: Percent of FY2016 Graduates Hired

<table>
<thead>
<tr>
<th>Industry</th>
<th>Govt</th>
<th>Academia</th>
<th>Not Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.9%</td>
<td>5%</td>
<td>21%</td>
<td>19.5%</td>
</tr>
</tbody>
</table>

- Continuing Edu.
- Postdoc
- Faculty
- Non-Member Org.
- Member Org.
IUCRC Alumni Career Outcomes: Mean FY2016 Graduates Hired per Center

<table>
<thead>
<tr>
<th>Industry</th>
<th>Govt</th>
<th>Academia</th>
<th>Not Reported</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.83</td>
<td>0.07</td>
<td>0.39</td>
<td>2.22</td>
</tr>
</tbody>
</table>

- Industry: 1.13
- Govt: 0.3
- Academia: 1.53
- Not Reported: 0.03

Bar chart showing the distribution of alumni career outcomes across different sectors.
IUCRC Alumni Career Outcomes: Total Graduates Hired over time

- Industry Mem.
- Industry Non-Mem
- Govt Mem
- Govt Non-Mem
- Faculty
- Postdoc
- Cont Edu

5/12/2017
IUCRC Evaluation Project
## IUCRC Alumni Career Outcomes:
### Total FY2016 Graduates Hired by Degree Level

<table>
<thead>
<tr>
<th>Category</th>
<th>BS</th>
<th>MS</th>
<th>PhD</th>
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<tbody>
<tr>
<td>Industry Member</td>
<td>28</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Industry Non-Member</td>
<td>74</td>
<td>123</td>
<td>86</td>
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<tr>
<td>Gov't Member</td>
<td>8</td>
<td>13</td>
<td>3</td>
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<tr>
<td>Gov't Non-Member</td>
<td>1</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Faculty</td>
<td>NA</td>
<td>2</td>
<td>29</td>
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<tr>
<td>Postdoc</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>Continuing Education</td>
<td>56</td>
<td>48</td>
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<tr>
<td>Not Reported</td>
<td>37</td>
<td>68</td>
<td>46</td>
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*5/12/2017*

IUCRC Evaluation Project
IUCRC Alumni Career Outcomes: Percent of FY2016 Graduates Hired by Degree Level

<table>
<thead>
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<th>Degree Level</th>
<th>BS</th>
<th>MS</th>
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<tr>
<td>Industry Mem.</td>
<td>14%</td>
<td>16%</td>
<td>22%</td>
</tr>
<tr>
<td>Industry Non-Mem</td>
<td>36%</td>
<td>40%</td>
<td>32%</td>
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<tr>
<td>Govt Mem</td>
<td>4%</td>
<td>4%</td>
<td>1%</td>
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<td>4%</td>
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<tr>
<td>Faculty</td>
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<td>1%</td>
<td>11%</td>
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<tr>
<td>Postdoc</td>
<td>NA</td>
<td>NA</td>
<td>13%</td>
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<tr>
<td>Cont Edu</td>
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<td>16%</td>
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<td>18%</td>
<td>22%</td>
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5/12/2017 IUCRC Evaluation Project
### IUCRC Alumni Career Outcomes: Average FY2016 Graduates Hired per Center by Degree Level

<table>
<thead>
<tr>
<th>Role</th>
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<th>MS</th>
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<tr>
<td>Industry Mem.</td>
<td>0.54</td>
<td>0.74</td>
<td>0.88</td>
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*5/12/2017*  
*IUCRC Evaluation Project*
CISE & ENG Partnership

Some Comparisons and Recent Trends
Growth in N of CISE & ENG Centers over time

- Percentage
- N CISE
- N ENG

5/12/2017
IUCRC Evaluation Project
2016 CISE & ENG: Funding by Source

Total Dollars

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<th>ENG</th>
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<tr>
<td>NSF Other</td>
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<tr>
<td>Fed</td>
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<td>$0</td>
</tr>
<tr>
<td>Non-Fed</td>
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<tr>
<td>State</td>
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Average Dollars

<table>
<thead>
<tr>
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<th>ENG</th>
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<tbody>
<tr>
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<td>NSF Other</td>
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<tr>
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<td>$0</td>
</tr>
<tr>
<td>State</td>
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</tr>
</tbody>
</table>
CISE & ENG: Average Students Trained

**CISE**

- PhD
- Masters
- BS

**ENG**

- PhD
- Masters
- BS

5/12/2017

IUCRC Evaluation Project
CISE & ENG: Average Students Graduated

**CISE**

- PhD
- Masters
- BS

**ENG**

- PhD
- Masters
- BS
CISE & ENG: Average Students Hired by Members

![Graph showing average students hired by members in CISE and ENG from 2006 to 2016.](image)

- **CISE**
  - PhD
  - Masters
  - BS

- **ENG**
  - PhD
  - Masters
  - BS

IUCRC Evaluation Project

5/12/2017
CISE & ENG: Total Intellectual Property & Commercialization Events 06-16


5/12/2017  IUCRC Evaluation Project
CISE & ENG: Average Intellectual Property & Commercialization Events 06-16

2016 Phase-based comparison
N of Centers by Phase

- Phase 1
- Phase 2
- Phase 3

- 2012
- 2013
- 2014
- 2015
- 2016

- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40
- 45

5/12/2017
IUCRC Evaluation Project
Total Program Funding

- Phase 1: $25,217,498
- Phase 2: $56,279,098
- Phase 3: $30,715,763

5/12/2017  IUCRC Evaluation Project
Average & Median Total Center Funding

Centers get larger over time

Phase 1 (N=26)
- Average: $969,903.76
- Median: $840,679.50

Phase 2 (N=33)
- Average: $1,705,427.21
- Median: $1,031,819.00

Phase 3 (N=12)
- Average: $2,559,646.91
- Median: $1,715,773.50

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IUCRC Evaluation Project
Average NSF IUCRC Awards & Supplements

- Phase 1: $268,773
- Phase 2: $273,796
- Phase 3: $273,982
Total Funding by Source in Percentages

- **Mem. Fees**: 49%
- **Addl Industry**: 1%
- **NSF IUCRC**: 28%
- **NSF Other**: 4%
- **Fed**: 7%
- **Non-Fed**: 7%
- **State**: 5%

- **Phase 1**
  - **Mem. Fees**: 49%
  - **Addl Industry**: 1%
  - **NSF IUCRC**: 28%
  - **NSF Other**: 4%
  - **Fed**: 7%
  - **Non-Fed**: 7%
  - **State**: 5%

- **Phase 2**
  - **Mem. Fees**: 44%
  - **Addl Industry**: 4%
  - **NSF IUCRC**: 16%
  - **NSF Other**: 16%
  - **Fed**: 6%
  - **Non-Fed**: 1%
  - **State**: 12%

- **Phase 3**
  - **Mem. Fees**: 45%
  - **Addl Industry**: 4%
  - **NSF IUCRC**: 10%
  - **NSF Other**: 7%
  - **Fed**: 29%
  - **Non-Fed**: 4%
  - **State**: 1%
Industrial Memberships

Total Number of Memberships

Average Number of Memberships

5/12/2017 IUCRC Evaluation Project
Average Membership Turn Over

Phase 1
Phase 2
Phase 3

Members Added this FY
Members Left this FY

*Newly funded Centers’ members are not counted as Members Added
Member Turnover Rate

Turnover % = Members terminated in “year X+1” / Total members in “year X”
### Average Number of Intellectual Property & Commercialization Events

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spinoff Companies Formed</td>
<td>0.23</td>
<td>0.18</td>
<td>0.17</td>
</tr>
<tr>
<td>Royalties Realized</td>
<td>0.00</td>
<td>0.00</td>
<td>0.50</td>
</tr>
<tr>
<td>Licensing Agreements</td>
<td>0.12</td>
<td>0.21</td>
<td>0.17</td>
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IUCRC Evaluation Project
Average Students Graduated

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## Average Students Hired by Members

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Questions?
iucrc@ncsu.edu