Highlights of Survey Data FY2019
IUCRC Evaluation Project

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North Carolina State University
Overview

• Response rate
  • Slides 3-4

• Industry Findings
  • Pulse Survey: Slides 5-12
  • Benefits Inventory: Slides 13-36

• Faculty Findings
  • Slides 37-42

• Student Findings
  • Slides 43-50
## FY2019 Response Rates

<table>
<thead>
<tr>
<th></th>
<th>Center Level</th>
<th>Individual Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pulse</td>
<td>Benefits</td>
</tr>
<tr>
<td>Continuing Population from CD report</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>1st Year Reporting Population from CD report</td>
<td>+1</td>
<td>+1</td>
</tr>
<tr>
<td>NCE/Retired/Defunct Centers</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>NCE/Retired/Defunct Centers Reporting[1]</td>
<td>+1</td>
<td>+2</td>
</tr>
<tr>
<td>COVID-19 Impacted Centers[2]</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Centers That Did Not Return Data [4]</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Data Received</td>
<td>47</td>
<td>41</td>
</tr>
<tr>
<td>Received / Population</td>
<td>85.65%</td>
<td>77.35%</td>
</tr>
<tr>
<td>Received / Available Population</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

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1. Retired/defunct Centers and Centers on no-cost extension (NCE) are not required to submit data, but some do. If so, those data were included in the analysis.
2. COVID-19 Impacted Centers include centers that reported inability to collect information due to rescheduled meetings, virtual formats, or center leadership decisions to postpone collection until less stressful times.
3. Population was defined as centers that were at least 1 year old, did not report COVID-19 impacts, and/or were not classified as NCE, graduated, or retired.
4. Centers were excused for reasons such as being in the midst of center restructuring, high respondent turnover, and respondent failure to complete surveys.
5. Numbers based on population minus excused and not returned counts.
Industry Response Rate Over Time

- Center Level Received/Available Population
- Center Level Received/Population
- Individual Level Received/Available Population
- Individual Level Received/Population

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Industry/University Cooperative Research Centers

= Pulse

= Benefits
Industry Pulse Survey
FY2019 Organization Type/Size

Mean Years of Membership = 4.35
IAB Member Satisfaction Over Time

Very Satisfied

Quite Satisfied

Somewhat Satisfied

Slightly Satisfied

Not Satisfied

04* 05* 06* 07* 08* 09* 10* 11* 12* 13* 14* 15* 16* 17 18 19

Center Research*  Center Administration  Center Meetings

* Previous version of the survey asked for ratings of research quality
## FY2019 IAB Identified Areas for Improvement

<table>
<thead>
<tr>
<th>Area</th>
<th>Research Plan &amp; Selection</th>
<th>Communication &amp; Tech Transfer</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan research</td>
<td>16.2%</td>
<td>8.6%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Project selection</td>
<td>21.5%</td>
<td>21.4%</td>
<td>9.7%</td>
</tr>
<tr>
<td>Project dev. &amp; mgmt.</td>
<td>20.4%</td>
<td>19.8%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Results reporting</td>
<td>27.0%</td>
<td>13.1%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Dissem. via pubs</td>
<td>21.4%</td>
<td>9.7%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Tech transfer</td>
<td>16.2%</td>
<td>13.1%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Communications</td>
<td>20.4%</td>
<td>9.7%</td>
<td>6.6%</td>
</tr>
<tr>
<td>IP mgmt.</td>
<td>27.0%</td>
<td>13.1%</td>
<td>0.8%</td>
</tr>
<tr>
<td>IAB meetings</td>
<td>21.4%</td>
<td>9.7%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Fund. &amp; recruit.</td>
<td>20.4%</td>
<td>9.7%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Center personnel</td>
<td>27.0%</td>
<td>9.7%</td>
<td>6.6%</td>
</tr>
<tr>
<td>Other</td>
<td>21.4%</td>
<td>9.7%</td>
<td>6.6%</td>
</tr>
</tbody>
</table>

**“Regular reports from the individual projects would be appreciated, so that its not just an update twice a year. Monthly progress reports would be very helpful and help identify areas of interest or where feedback could be useful before we are 50 to 100% through the project.”**

**“It would be worthwhile for new project ideas to be sent out to the IAB earlier to allow for more time to review within their respective companies. Sometimes the projects go a little off track relative to the initial proposal, and it feels that the IAB sponsors are left out of that decision making process.”**
IAB Identified Areas of Improvement Over Time

- **Research Planning & Selection**
  - Plan research
  - Project selection
  - Proj. devel. and mgmt.

- **Communication & Tech. Transfer**
  - Dissem. via pubs
  - Tech transfer
  - Communications

- **Operations**
  - IP mgmt.
  - IAB meetings
  - Tech transfer
  - Fund. & recruit.
  - Center personnel
  - Other
IAB Renewal Intentions Over Time

Definitely Yes 5

Probably Yes 4

Uncertain 3

Probably Not 2

Definitely Not 1

04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19

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FY2019 Predicting Renewal Intentions: Regression

- Wanted to determine what member perceptions were predictive of renewal intentions.
- 1\textsuperscript{st} looked at bivariate correlations to identify satisfaction and improvement metrics that were significantly correlated with renewal intentions.
- Variables that were significant at the bivariate level were included in the multiple regression.
- 11% of renewal intentions were predicted by satisfaction with center research, meetings, and administration, as well as project selection and intellectual property management $F(5, 240) = 5.842, p < .001, R^2 = .111$
- Members who are more satisfied with center research had significantly greater intentions to renew their membership.

<table>
<thead>
<tr>
<th>Renewal Intentions</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction: Center Research</td>
<td>.228</td>
<td>.074</td>
<td>.244</td>
<td>3.097</td>
<td>.002**</td>
</tr>
<tr>
<td>Satisfaction: Center Meetings</td>
<td>-.056</td>
<td>.082</td>
<td>-.056</td>
<td>-.675</td>
<td>.500</td>
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<tr>
<td>Satisfaction: Center Administration</td>
<td>.108</td>
<td>.076</td>
<td>.113</td>
<td>1.415</td>
<td>.158</td>
</tr>
<tr>
<td>Areas for Improvement: Project Selection</td>
<td>-.094</td>
<td>.109</td>
<td>-.056</td>
<td>-.863</td>
<td>.389</td>
</tr>
<tr>
<td>Areas for Improvement: IP Management</td>
<td>-.225</td>
<td>.128</td>
<td>-.109</td>
<td>-1.755</td>
<td>.081</td>
</tr>
</tbody>
</table>
FY2019 IAB Comments for NSF

- “The value of networking among IAB members and faculty have resulted in meaningful exchange of ideas and further work and product improvement.”
- “The research has helped us during bring-up and test to get through issues much faster than re-inventing the wheel ourselves.”
- “Student interns from [Center] have been excellent and have contributed to our projects.”
- “Still concerned with efforts to grow membership and diversify the kinds of end market industries involved in the Center.”
- “Some of the faculty could be more vested in the program (industry and university together) rather than projects only.”
- “Requirement for a new university to bring 5 new industry members seems heavy. Perhaps a requirement that allows the natural growth of the center to a particular size would allow a new university to join (with perhaps 1 or 2 new companies).”
Industry Benefits Inventory
FY2019 Percent of IAB Members Reporting Any Benefit: by Category

- Networking (Total N of benefits=5)
- Research & Development (Total N of benefits=4)
- Tech. Transfer (Total N of benefits=5)
- Commercial & Financial (Total N of benefits=3)
Networking Benefits Summary: Over Time

% of Members Reporting Networking Benefits

- New Connections
- New University Partnerships
- New Industry Partnerships
- Hired Students
- Other
- Any of these

1/21/2021

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“The connections with universities and professors have been great for hiring students that are prepared for work in industry. The research has potential for influence in industry, but nothing has yet directly made it into our industry work.”

“We have been able to enter completely new areas through connections with other industrial members and with students through the universities.”

“New partnership created which is resulting in the sale of one of our assets to the another IAB member.”

“Allowed more cross-collaboration between companies and to work on mechanistic models that address industry concerns using the consortium. High value add!”
Networking Benefits: Students Hired by IAB Members Over Time

Average Students Hired per Member Firm

- FY2019 Center Average = 2.14 students hired by members per center
- FY2019 Program Total = 88 students hired by members

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R&D Benefits Summary: Over Time

% of Members Reporting R&D Benefits

- Helped accelerate pace or completion of some R&D projects at your org.
- Helped org. decide against starting 1+ new R&D projects that otherwise would not have been initiated
- Triggered dev. of new R&D projects or significantly redirected pending projects within org.
- Helped advance the TRL of tech. being developed within your org.
- Any of These

2017 2018 2019

0% 20% 40% 60% 80% 100%

“[The Center] enables us to peer ‘behind the curtain’ of academic research and the research interests of our customers. This is immeasurable in most ways, though could be considered in cost terms to save us $100-200k per year of projects we did not have to run that would be dead-ends, or staff we didn't need to hire”

“Developing experienced students, grad students, and professors as potential resources, future hires, or research partners - $500K”

“Primary benefit has been access to and collaboration with experts in our domain. We expect this to result in a new product line to be offered for sale in 2021 by our company.”

“The time and capital equipment saved through this project has been significant. Time saved: 2 weeks. Capital equipment savings - too large to quantify.”
FY2019 R&D Benefits: Research Relevance for the Average Member

For an Average Member, 73% of Center research projects are relevant.

- **Not Relevant Research**: $25.29\%$ projects that are probably not relevant to your organization's current or future needs.
- **Adjacent Research**: $28.88\%$ projects potentially relevant to your org's current or future needs, but in area outside your org's current focus.
- **Core Research**: $28.97\%$ projects so relevant to your org's needs that your org. would almost certainly have conducted/contracted out similar project within next couple years.
- **Transformational Research**: $15.06\%$ projects potentially relevant to your org's current or future needs, but too risky/blue sky for internal investment.

For an Average Member, 73% of Center research projects are relevant.
Defining Research Efficiency Measures

- Research Cost Avoidance (slides 21-24)
- Research Cost Savings (slides 25-28)
- Stimulated R&D (follow-on funding) (slide 29)

Member Research

- Proposed Project
- Project Activity
- Project Results

Center Research

- Project Activity
- Future Project Activity
- New Project Activity
Research Cost Avoidance (RCA)

• Definition: Research cost avoidance is savings a firm obtains by having “necessary” research projects performed by a center rather than performing them internally.

• Example: If a firm reports that a particular “necessary” project would cost $100,000 to carry out internally (counterfactual estimate) but that project was actually carried out by a center to which they pay a $50,000 membership fee that firm has avoided $50,000 of R&D costs.

• RCA = $\text{N of Proj. Avoid } \times \text{ Scien. Months } \times \$\text{/Scien. Months}$ (Gray & Steenhuis, 2003)
  • N of Proj. Avoid = N of Center projects (CD report) X % Core projects (Benefits Inventory)
  • N Scientist months = 5 year median
R&D Benefits: Research Cost Avoidance (in thousands)

- Sample: N of respondents = 357, N of centers = 54

### Calculation: \( (N \text{ of Core Projects} \times 12 \text{ months} \times \text{Average cost per scientist month}) - \text{Primary Membership Fee} \)

<table>
<thead>
<tr>
<th>Score Type</th>
<th>Mean</th>
<th>Median</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Member Level Scores</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Average dollar value of avoided projects per respondent organization</td>
<td>$744.13</td>
<td>$554.52</td>
<td>777.77*</td>
</tr>
<tr>
<td><strong>Center Level Scores</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Average dollar value of avoided projects per respondent organization</td>
<td>$5,357.76</td>
<td>$3,085.75</td>
<td>$6,703.55</td>
</tr>
<tr>
<td><strong>Program Level Scores</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Total dollar value of avoided projects by respondent organizations RCA program = Sum of member level RCA</td>
<td>$214,310,563</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*31 members (11%) have negative RCA that results in large standard deviation.
RCA Over Time: Member Level Average (in thousands)

IUCRC Evaluation Project at NCSU
RCA Over Time: Program Level Total (in thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total (in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>$153,091</td>
</tr>
<tr>
<td>13</td>
<td>$219,902</td>
</tr>
<tr>
<td>14</td>
<td>$237,449</td>
</tr>
<tr>
<td>15</td>
<td>$278,502</td>
</tr>
<tr>
<td>16</td>
<td>$187,586</td>
</tr>
<tr>
<td>17</td>
<td>$184,699</td>
</tr>
<tr>
<td>18</td>
<td>$269,978</td>
</tr>
<tr>
<td>19</td>
<td>$214,310</td>
</tr>
</tbody>
</table>

N: Number of projects
R&D Benefits: Research Cost Savings

Research Cost Savings – estimated dollar value of research dollars saved

• Taking into account personnel, facility and related costs, how much would you estimate your organization saved by shortening project completion-time, reducing costs and/or by choosing not to start new research?

<table>
<thead>
<tr>
<th>Level of Analysis</th>
<th>Dollar Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Member Level Average</td>
<td>$102,980</td>
</tr>
<tr>
<td>Center Level Average</td>
<td>$509,470</td>
</tr>
<tr>
<td>Program Total Reported</td>
<td>$19,360,000</td>
</tr>
</tbody>
</table>
Research Cost Savings Over Time: Member Level Average (in thousands)

Taking into account personnel, facility and related costs how much would you estimate your organization saved by shortening project completion-time, reducing costs and/or by choosing not to start new research?

*For FY2018, the dollar value questions were administered to only a sample of 12 centers as part of the experiment to test their effect on the Benefits Inventory’s response rate. Metric not collected in FY2017.
Research Cost Savings Over Time: Center Level Average (in thousands)

Taking into account personnel, facility and related costs how much would you estimate your organization saved by shortening project completion-time, reducing costs and/or by choosing not to start new research?

*For FY2018, the dollar value questions were administered to only a sample of 12 centers as part of the experiment to test their effect on the Benefits survey’s response rate. Metric not collected in FY2017.
Research Cost Savings Over Time: Program Level Total (in thousands)

Taking into account personnel, facility and related costs how much would you estimate your organization saved by shortening project completion-time, reducing costs and/or by choosing not to start new research?

*For FY2018, the dollar value questions were administered to only a sample of 12 centers as part of the experiment to test their effect on the Benefits survey’s response rate. Metric not collected for FY2017.
Follow-on Funding Over Time: Program Total (in thousands)

Dollar value of new R&D projects, or significantly redirected pending projects within your organization

*For FY2018, the dollar value questions were administered to only a sample of 12 centers as part of an experiment to test their effect on the Benefits survey’s response rate. Metric not collected for FY2017.
R&D Impacts: Trend Over Time

- Helped accelerate the pace and/or completion of some R&D projects now underway at (or contracted by) your organization
- Helped your organization decide against starting one or more new R&D projects that otherwise would have been initiated
- Triggered development of new R&D projects, or significantly redirected pending projects within your organization
Technology Translation Benefits Summary: Over Time

% of Members Reporting Technology Translation Benefits

- Accessed capabilities and insights to which your firm would not otherwise have access
- Licensed center’s IP
- Produce your own IP related to research at the center
- Helped your org. identify new applications for technology trying to develop
- Helped your org. anticipate or address some regulatory issues in your industry
- Any of These

“A reduction in the unknowns and a better understanding of the challenges associated with the approach being researched. Economic value is in terms of a reduction in the time until the approach might be commercially realizable.”

“From the technology we've adopted from [Center] research, it has given us 140x faster time to a solution with higher accuracy.”
Commercial & Financial Benefits Summary: Over Time

% of Members Reporting Commercial Benefits

We learn how our tools are/can be used in different and new applications - we also benefit by transferring knowledge and training the students to use our software. The next generation of students graduate knowing the benefit of our tools, and that can translate to sales for us down the road, and the use of our tools for R&D in other organizations helps them save time and money.
FY2019 Center Contribution to Commercial Outcomes

Would these commercial or financial benefits have been realized in the absence of the center?

- No, the center played a critical role in realizing these benefits: 14%
- Yes, but the benefits would have been delayed without the center’s involvement: 18%
- Yes, the center had only limited influence on our ability to realize these benefits: 65%
- Not applicable: 4%
Wanted to know if there is any relationship between time as a member and the types of benefits realized.

Ran a bivariate correlation to identify benefits that were correlated with years as a member. Benefits that were significantly correlated at the bivariate level were included in a multiple regression.

Members years significantly predicted number of Technology Translation benefits $F(2, 259) = 4.565, p = .011$. Members with more years of participation reported realizing a higher number of technology translation benefits during the reporting period.

Specifically, members with more years of membership were more likely to report that they licensed Center’s IP (technology translation benefit) during the reporting period, $F(1, 259) = 11.646, p = .001$

<table>
<thead>
<tr>
<th>Member Years</th>
<th>B</th>
<th>SE</th>
<th>$\beta$</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Technology Translation Benefits</td>
<td>.043</td>
<td>.014</td>
<td>.185</td>
<td>3.021</td>
<td>.003**</td>
</tr>
<tr>
<td>Tech. Transfer: Licensed Center’s IP</td>
<td>.011</td>
<td>.003</td>
<td>.208</td>
<td>3.413</td>
<td>.001**</td>
</tr>
</tbody>
</table>

*Note. $^*p<.05$, $^**p<.01$*
FY2019 Examining Benefits by Organization Type

• Wanted to know if there are differences in benefits experienced by members based on organization type. Computed a sum of benefits score for each benefits category.

• Ran a bivariate correlation to identify clusters of benefits that were correlated with organizational type. The number of Research Benefits was significantly correlated at the bivariate level and were included in an ANOVA (due to the categorical nature of the organization type)

• There is a significant difference in the average number of research benefits realized by members from different organizational types, $F(4, 265) = 5.956, p = .000$. 
FY2019 Examining Benefits by Organization Type

Mean N of Research Benefits by Organization Type

Post-hoc analysis indicates that government members reported realizing a significantly larger number of research benefits than did other member types.
FY2019 Understanding Government Research Benefits

• We wanted to know which research benefits specifically showed a significant difference for Government members compared to other member types.

• Ran a multivariate analysis of variance (MANOVA) to identify which specific research benefits differed across member organization types. Results from this analysis revealed a significant main effect of organizational type for research benefits, $F(4, 261) = 1.836, p<.05$. Follow-up univariate ANOVA’s revealed a significant difference in the reported benefit “Helped accelerate the pace and/or completion of some R&D projects now underway at (or contracted by) your organization”; called research cost savings.

• Specifically, post-hoc analyses showed that Government members reported research cost savings significantly more than Large For-Profit Members and Micro For-Profit members.

• Notably, Government members demonstrated an observed average higher than each organization type for each research benefit item, despite not reaching significant levels.
Faculty Questionnaire

Select Results
## FY2019 Faculty Long and Short Forms

<table>
<thead>
<tr>
<th></th>
<th>Long Form</th>
<th>Short Form</th>
</tr>
</thead>
<tbody>
<tr>
<td># of items</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td># of questions in common</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td># of unique questions</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td># of centers using form</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Sample size</td>
<td>113</td>
<td>79</td>
</tr>
</tbody>
</table>
Faculty Satisfaction Over Time

- Very Satisfied
- Quite Satisfied
- Somewhat Satisfied
- Slightly Satisfied
- Not Satisfied

Research Quality
Research Relevance
Center Administration
Faculty Benefits Over Time (Long version only)

- The feeling of accomplishment I get from the research I do
- Opportunities for research contracts/grants
- Recognition I receive for the work I do
- Access to useful equipment
- Ability to support graduate students
- Ability to publish my work in quality proceedings and journals
Faculty Commitment Over Time

Next year I will submit my best research ideas in a center funded proposal

<table>
<thead>
<tr>
<th>Year</th>
<th>Definitely Yes</th>
<th>Probably Yes</th>
<th>Uncertain</th>
<th>Probably Not</th>
<th>Definitely Not</th>
</tr>
</thead>
<tbody>
<tr>
<td>07</td>
<td>3.87</td>
<td>4.01</td>
<td>4.07</td>
<td>4.12</td>
<td>4.22</td>
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<tr>
<td>08</td>
<td>4.05</td>
<td>4.01</td>
<td>4.06</td>
<td>4.01</td>
<td>3.95</td>
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<tr>
<td>09</td>
<td>4.13</td>
<td>4.22</td>
<td>4.33</td>
<td>4.22</td>
<td>4.11</td>
</tr>
</tbody>
</table>

IUCRC Evaluation Project at NCSU
FY2019 Faculty Areas for Improvement

“More collaboration across sites. Selection of focus areas. More collaboration would allow for pooling of limited funds and a have greater overall impact.”

“We can do a better job of cajoling our industry partners in the development of new proposals. We can meet more frequently for group project meetings between the Project Updates to the IAB.”

“The interaction between students and industry partners is absolutely critical to the graduate experience and understanding real world problems.”
Student Questionnaire
FY2019 Training Opportunities: Indicate whether your Center experience has included the following opportunities

Please indicate whether your Center experience has included the following opportunities: Available and did participate

- Work on innovative or leading-edge research projects: 84%
- Pursue research questions that address “real-world” problems: 89%
- Engage in experiential “hands-on” learning: 86%
- Access to scientific data, tools, techniques, other resources: 81%
- Collaborate with government or industry scientists: 63%
- Collaborate with faculty or students from other institutions: 56%
- Work with people from different demographic or disciplinary backgrounds: 79%
- Stay informed about Center projects related to your research interests: 79%
- Attend Center IAB meetings: 79%
- Present research at Center IAB meetings: 72%
- Participate in other professional development opportunities: 38%
FY2019 Impact on Trainee Knowledge and Skills

Mean student satisfaction with experience participating in the Center = 4.25/5.00 ~ Very Satisfied
FY2019 Career Outcomes

Has your career goal changed as a result of your Center participation?

- Yes: 24%
- No: 75%
- Unsure: 1%

[If starting own company] Will your company be based on an idea from your Center research?

- Yes: 29%
- No: 29%
- Unsure: 43%
FY2019 Trainee Characteristics

How long have you been involved with the Center?

- Less than 6 months: 17%
- 1 year: 23%
- 2 years: 25%
- 3 years: 21%
- 4 years: 10%
- 5 or more years: 5%

Have you been funded by the Center with which you are affiliated?

- No, not funded: 3%
- No, fully funded by other sources: 7%
- Yes, partially funded: 25%
- Yes, fully funded: 60%
- Other: 5%

What degree/training are you currently pursuing?

- Bachelor's: 7%
- Master's: 26%
- Doctorate: 62%
- Postdoc: 3%
- Other: 3%
FY2019 Trainee Characteristics

What is your gender?

- Male: 73%
- Female: 26%
- Another gender identity: 2%

What is your citizenship status?

- US citizen/permanent resident: 62%
- International student/postdoc: 37%
- Other: 1%
FY2019 Understanding Knowledge/Skill Development

• On average, students’ were very satisfied with their experience participating in the Center = (Mean = 4.29/5.00)

• We wanted to better understand the relationship between the types of training students received and the skills the developed.

• Conducted a bivariate correlation to identify which training opportunities were associated with the development of which skills.

• Significant correlations presented in the table on next slide.
## FY2019 Understanding Knowledge/Skill Development

### Correlations between participation in training opportunities and skills development

<table>
<thead>
<tr>
<th>a. Technical knowledge and skills</th>
<th>b. Oral communication skills</th>
<th>c. Written communication skills</th>
<th>d. Project management skills</th>
<th>e. Teamwork skills</th>
<th>f. Ability to publish</th>
<th>g. Understanding of how research applies to &quot;real-world&quot; problems</th>
<th>h. Understanding of industry research</th>
<th>i. Awareness of industry career paths</th>
<th>j. Awareness of member internships/job openings</th>
<th>k. Participate in other Center professional development opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>.222**</td>
<td>.207*</td>
<td>.177*</td>
<td>.216**</td>
<td>.244**</td>
<td>.195*</td>
<td>.205*</td>
<td>.167*</td>
<td>.336**</td>
<td>.336**</td>
<td>.205*</td>
</tr>
<tr>
<td>.179*</td>
<td></td>
<td>.225**</td>
<td>.238**</td>
<td>.185*</td>
<td>.291**</td>
<td>.294**</td>
<td>.227**</td>
<td>.677**</td>
<td>.677**</td>
<td>.280**</td>
</tr>
<tr>
<td>.330**</td>
<td></td>
<td>.188*</td>
<td>.267**</td>
<td>.253**</td>
<td>.184*</td>
<td>.275**</td>
<td>.266**</td>
<td>.677**</td>
<td>.677**</td>
<td>.351**</td>
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<tr>
<td></td>
<td></td>
<td>.306**</td>
<td>.175*</td>
<td>.255**</td>
<td>.225**</td>
<td>.185*</td>
<td>.351**</td>
<td>.677**</td>
<td>.677**</td>
<td>.401**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.199*</td>
<td>.255**</td>
<td>.190*</td>
<td>.199*</td>
<td>.351**</td>
<td>.677**</td>
<td>.677**</td>
<td>.241**</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.189*</td>
<td>.164*</td>
<td>.295**</td>
<td>.241**</td>
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<td>.241**</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>.208*</td>
<td></td>
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<td>.328**</td>
<td></td>
<td>.230**</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>N of significant skills developed</strong></td>
<td>5 3 1 6 8 6 6 5 3 2 9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note.** *p<.05, **p<.01
FY2019 Understanding Student Satisfaction

- To better understand overall satisfaction ratings, we looked for correlations between skills developed and overall satisfaction. Significantly correlated skills were included in a multiple regression.

- The 10 assessed skills explain 47% of the variance in student satisfaction $F(10, 135) = 11.175, p<.001$

- Students who reported a more positive impact on their technical knowledge and oral communication skills were significantly more satisfied. And those who reported a less positive impact on their teamwork skills were also more satisfied. Not clear why the teamwork correlation is negative. Perhaps students found teamwork to be so challenging that it limited their satisfaction.

<table>
<thead>
<tr>
<th>Student Satisfaction</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Knowledge</td>
<td>.338</td>
<td>.098</td>
<td>.297</td>
<td>3.441</td>
<td>.001**</td>
</tr>
<tr>
<td>Oral Communication</td>
<td>.192</td>
<td>.080</td>
<td>.237</td>
<td>2.406</td>
<td>.018*</td>
</tr>
<tr>
<td>Teamwork</td>
<td>-.169</td>
<td>.078</td>
<td>-.233</td>
<td>-2.151</td>
<td>.033*</td>
</tr>
<tr>
<td>Understanding Industry Research Trends &amp; Needs</td>
<td>.145</td>
<td>.072</td>
<td>.211</td>
<td>2.008</td>
<td>.047*</td>
</tr>
</tbody>
</table>

Note. *$p<.05$, **$p<.01$
FY2019 Understanding Student Satisfaction

• Overall, students that reported their Center experience having a higher impact on their technical knowledge, oral communication, and understanding of industry research trends and needs were more likely to be satisfied.

• Despite not being a formal path analysis, results provide preliminary evidence of alignment with the High-Performance Cycle (Locke & Latham, 1990)
  • Such that results support the notion that behaviors $\rightarrow$ outcomes $\rightarrow$ satisfaction.
  • More specifically, participation in Center training opportunities $\rightarrow$ new knowledge and skill development $\rightarrow$ satisfaction
How Should These Survey Results be Used?

• Trends are probably much more interpretable at local center level
  • Director leaves; research direction changes; move from one-on-one to consortial center
• Benchmark center against previous year and national norms
  • By comparing means and standard deviations, evaluators can see how their centers compare to national “norms”
• Informative for understanding program trends

Questions?
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