Highlights of Membership and Process/Outcome Data
FY 2008-2009

IUCRC Evaluator’s Meeting
June 2, 2009

Denis Gray, Lindsey McGowen, & Sarah DeYoung
North Carolina State University
MEMBERSHIP REPORT DATA
Take Home Message

• Tracking “membership” is important because it may be the most important measure of success for centers and the IUCRC program

• But…
  – We need to be very careful in interpreting changes in membership overtime
Interpreting Membership Changes Over Time

• Changes in membership numbers over time are influenced by changes at different levels:
  – Centers: mature centers will graduate (and their members will be dropped) and new centers will be created (and their members added).
  – Sites: Generally speaking, new sites are added to existing centers.
  – Members: Individual members will leave a center and new members will be added.

• Changes in program total and average can be due to any combination of these factors.
  – Totals are particularly unstable
INDUSTRIAL MEMBERSHIPS BY YEAR

TOTAL NUMBER OF MEMBERS

AVERAGE NUMBER OF MEMBERS PER CENTER
AVERAGE MEMBERSHIP TURNOVER

Members Added this FY

Members Left this FY

Fiscal Year

Members

## Center Director Membership Summary

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total memberships</td>
<td>697</td>
<td>100%</td>
</tr>
<tr>
<td>Industry: large firms (500 + employees)</td>
<td>353</td>
<td>50.7%</td>
</tr>
<tr>
<td>Industry: small firms (&lt; 500 employees)</td>
<td>201</td>
<td>28.9%</td>
</tr>
<tr>
<td>US Government: Federal</td>
<td>84</td>
<td>12.2%</td>
</tr>
<tr>
<td>US Government: State or local</td>
<td>21</td>
<td>3.0%</td>
</tr>
<tr>
<td>Non-Profit</td>
<td>21</td>
<td>3.0%</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>2.2%</td>
</tr>
<tr>
<td>Number of organizations with memberships</td>
<td>511</td>
<td>--</td>
</tr>
</tbody>
</table>
Member Composition 2005-2009

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

^ Categories comprising Others include: non-profit, non-US government, and other organization
Member Composition 2005-2009

* Years with Advanced Forestry excluded as a small business outlier: 2008 Small = 36, 2009 Small = 49
^ Categories comprising Others include: non-profit, non-US government, and other organization
# Membership: Organizations with the Most Memberships

<table>
<thead>
<tr>
<th># of Memberships</th>
<th>Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>U.S. Army</td>
</tr>
<tr>
<td>15</td>
<td>Dept of Energy</td>
</tr>
<tr>
<td>13</td>
<td>Boeing</td>
</tr>
<tr>
<td>10</td>
<td>General Motors, Lockheed Martin, NASA</td>
</tr>
<tr>
<td>7</td>
<td>Raytheon</td>
</tr>
<tr>
<td>6</td>
<td>Intel, U.S. Navy</td>
</tr>
<tr>
<td>5</td>
<td>U.S. Air Force, GE</td>
</tr>
<tr>
<td><strong>Dropped</strong></td>
<td>Toyota, Honeywell, IBM</td>
</tr>
</tbody>
</table>
### Membership: Organizations with the Most Memberships

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>1995</th>
<th>Name</th>
<th>2000</th>
<th>Name</th>
<th>2005</th>
<th>Name</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td></td>
<td>N</td>
<td></td>
<td>N</td>
<td></td>
<td>N</td>
</tr>
<tr>
<td>19</td>
<td>DoE, Army</td>
<td>19</td>
<td>DoE</td>
<td>18</td>
<td>DoE</td>
<td>17</td>
<td>DoE</td>
<td>25</td>
</tr>
<tr>
<td>10</td>
<td>Dow Chem.</td>
<td>10</td>
<td>Army</td>
<td>14</td>
<td>Army</td>
<td>13</td>
<td>Army</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>DuPont</td>
<td>10</td>
<td>Motorola</td>
<td>8</td>
<td>Lucent Tech</td>
<td>8</td>
<td>Intel, Air Force</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>3M, Motorola, Ford</td>
<td>8</td>
<td>Boeing</td>
<td>7</td>
<td>Boeing, IBM, Honeywell</td>
<td>7</td>
<td>Raytheon, HRL Labs, DoD</td>
<td>7</td>
</tr>
<tr>
<td>7</td>
<td>General Motors</td>
<td>7</td>
<td>Boeing, IBM, Honeywell</td>
<td>6</td>
<td>Daimler Chrysler</td>
<td>6</td>
<td>Honeywell, Navy</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Amoco, Boeing, Texas Inst., DoD, EPA, Navy</td>
<td>6</td>
<td>Daimler Chrysler</td>
<td>5</td>
<td>Ford, DoD</td>
<td>5</td>
<td>Dow Chem., Siemens</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Government Members

109 memberships, 42 organizations (15.4% of all memberships)

- Arizona Department of Transportation
- Arizona Game & Fish Department
- Center for Advance Technology in Telecom
- City of Chandler
- City of Glendale
- City of Phoenix
- City of Scottsdale
- City of Tempe
- CODESIN
- Florida High Tech Center
- Florida Space Grant Consortium
- Industrial Technology Research Institute
- Maine Bureau of Parks and Lands
- Minnesota Department of Transportation
- North Carolina DOT
- Oklahoma Department of Transportation
- Oregon Dept. of Forestry
- Pima County Regional Wastewater Reclamation Dept
- Port of Guaymas/State of Sonora
- Queensland Dept. of Mines and Energy
- Space Engineering Institute
- Space Florida
- Tucson Water
- Virginia Department of Forestry
- Washington Dept. of Nat'l Resources
- Air Force Research Laboratory
- Argonne National Laboratories
- Army
- Bureau of Land Management, Eugene District Office
- Counterintelligence Field Activity
- Department of the Interior
- DHS
- DoD
- DoE
- Federal Bureau of Investigation
- NASA
- National Highway Traffic Safety Administration
- National Reconnaissance Office
- National Security Agency
- Navy
- North Carolina Division of Forest Resources
- USDA Forest Service
## Single vs. Multi-Site Members

<table>
<thead>
<tr>
<th></th>
<th>Single</th>
<th>Multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count of Centers</td>
<td>10</td>
<td>27</td>
</tr>
<tr>
<td>Count of Sites</td>
<td>10</td>
<td>88 (~3.26 per center)</td>
</tr>
<tr>
<td>Members</td>
<td>105</td>
<td>592</td>
</tr>
<tr>
<td><strong>Avg per Center</strong></td>
<td>10.5</td>
<td>21.9</td>
</tr>
<tr>
<td><strong>Avg per Site</strong></td>
<td>--</td>
<td>6.7</td>
</tr>
<tr>
<td>Lost members 2009</td>
<td>20</td>
<td>105</td>
</tr>
<tr>
<td><strong>Avg per Center</strong></td>
<td>2</td>
<td>3.9</td>
</tr>
<tr>
<td><strong>Avg per Site</strong></td>
<td>--</td>
<td>1.2</td>
</tr>
<tr>
<td>Recruited members 2009</td>
<td>13</td>
<td>109</td>
</tr>
<tr>
<td><strong>Avg per Center</strong></td>
<td>1.3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Avg per Site</strong></td>
<td>--</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Conclusion and a caution …

- Membership looks pretty healthy but…
- All our analyses of membership changes over time need to be interpreted cautiously because
  - There is a one-year lag in data, so we may not be seeing effect of current economic downturn
  - Because membership is affected by factors operating at multiple levels of analysis
- NCSU group attempted change the data collection method starting this year in order to accurately capture all these change mechanisms.
  - We asked centers to report members by site, but this option was not widely used…
- NSF might be going back to a centralized data collection process with a contractor
  - Stay tuned
Conclusion

• Good news:
  – Program level membership is relatively flat

• Bad news:
  – Average membership/center is down
  – Typical recession indicator: Members added vs. Members left crossing

• Change is happening
  – Small business membership has doubled over last four years
    » 2004: 14%; 2009: 29%
    » Without outlier: 14% to 25%
  – Multiple memberships
    » 1995/2000: large R&D intensive firms
    » 2005/10: defense, government and military contractors
Questions?
PROCESS – OUTCOME DATA
## Process/Outcome
### 2008-2009 Response Rates

<table>
<thead>
<tr>
<th></th>
<th>Center level</th>
<th>Individual level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response frequencies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population from CD report</td>
<td>34</td>
<td>624</td>
</tr>
<tr>
<td>1st Year Reporting Population from CD report</td>
<td>+2</td>
<td>+8</td>
</tr>
<tr>
<td>Retired/Defunct Centers</td>
<td>3</td>
<td>73</td>
</tr>
<tr>
<td>Retired/Defunct Centers Reporting</td>
<td>+2</td>
<td>+4</td>
</tr>
<tr>
<td>Population</td>
<td>38</td>
<td>636</td>
</tr>
<tr>
<td>Centers Excused from Evaluation</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Centers that did not return data</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>Available Population</td>
<td>34</td>
<td>588</td>
</tr>
<tr>
<td>Data Received</td>
<td>34</td>
<td>234</td>
</tr>
<tr>
<td><strong>Response Rates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received / Population</td>
<td>89.5%</td>
<td>36.8%</td>
</tr>
<tr>
<td>Received / Available Population</td>
<td>100%</td>
<td>39.8%</td>
</tr>
</tbody>
</table>
Industry Response Rate

Note: 2000-2001 & 2002-2003 data not included
Industry Questionnaire

Select Results
What percentage of Center research projects do you take an active interest in?

*percentage values on y-axis represent midpoint of response range*
What percentage of Center research projects do you take an active interest in?
During the past year, how satisfied were you with the capabilities of the researchers and quality of the research program?*

* Prior to 2006-2007, this question asked about capabilities of faculty and graduate students.
During the past year, how satisfied were you with the Center’s breadth of research topics covered?
During the past year, how satisfied were you with the Center’s focus of the research?

During the past year, how satisfied were you with the Center’s relevance of the research to my organizations needs?*

* Prior to 2006-2007, respondents reported on both long and short term needs.
During the past year, to what extent has participation in the Center contributed to the following benefits for your organization?

Research and Development

<table>
<thead>
<tr>
<th>Year</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-2005</td>
<td>3.22</td>
</tr>
<tr>
<td>2005-2006</td>
<td>3.42</td>
</tr>
<tr>
<td>2006-2007</td>
<td>3.18</td>
</tr>
<tr>
<td>2007-2008</td>
<td>2.94</td>
</tr>
<tr>
<td>2008-2009</td>
<td>3.12</td>
</tr>
</tbody>
</table>
During the past year, to what extent has participation in the Center contributed to the following benefits for your organization?

Commercialization

- 2004-2005: 2.14
- 2005-2006: 2.32
- 2006-2007: 2.27
- 2007-2008: 2.03
- 2008-2009: 2.14
During the past year, to what extent has participation in the Center contributed to the following benefits for your organization?

**Professional Networking**

- 2004-2005: 3.47
- 2005-2006: 3.64
- 2006-2007: 3.53
- 2007-2008: 3.37
- 2008-2009: 3.39
During the past year, how satisfied were you with center administrative operations?
Outcomes: Value of Center-Stimulated Projects
14 Year Trend – New Research Projects (reported median)

2008-2009
Total Sample, M = 2.99
1+ Projects, M = 4.09

Note: 2002-2003 data not included
14 Year Trend - Total Dollar Value of Projects (reported median)

Note: 2002-2003 data not included
**5 Year Trend - Total Dollar Value of Projects**

*(reported mean)*

*Data collected by forced choice format beginning 2006-7*
Value of Center-Stimulated Projects: FY 2008-2009
Estimating IUCRC-Wide Center-Stimulated Funding

- Program-wide center-stimulated funding for 08-09 is $84 million
- There is a fundamental problem estimating both center and program-wide value of center stimulated projects
  - Response rate is running at ~37% of total population
- Our reported value is a VERY conservative estimate
  - Assumes none of the 64% non-responders invested in center stimulated projects
- Need to find a defensible approach to estimating
  - Non-responders
    » mean
    » median
    » 50% of median
Estimating IUCRC-Wide Follow-on Funding

2007-8 (in Millions of Dollars)

- Reported (N=234)
- Estimated (N=636) Based on Mean
- Estimated (N=636) Based on Median
- Estimated (N=636) Based on 50% Median
Students Hired
During the past year, how many students trained in the Center projects were hired by your organization?

Note: 2002-2003 data based on subset of Centers
Will your organization renew its membership?
Industry Summary

• Satisfaction and benefits appear relatively stable
  – Some indication that breadth of interest (% projects) is narrowing

• Follow-on projects and funding continues to be very volatile
  – Investments still being made
  – Median investment is down
  – Mean affected by outlier ($50M)

• Student hiring taking a hit
Faculty Questionnaire

Select Results
# 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>19</td>
<td>13</td>
</tr>
<tr>
<td>Sample size</td>
<td>105</td>
<td>107</td>
</tr>
</tbody>
</table>
Compared to the research projects that you typically conduct outside the Center, would you describe your Center-funded research as:

![Graph showing the comparison of research types over years]

- Much more basic
- More applied


Scores: 3.43, 3.56, 3.3, 3.5, 3.5, 3.57
During the past year, how satisfied were you with the quality of center-supported research program?

![Graph showing satisfaction over years]

- 2004-2005: 3.76
- 2005-2006: 3.76
- 2007-2008: 4.29
- 2008-2009: 4.29
During the past year, how satisfied were you with the relevance of the Center’s research program to my professional goals?
During the past year, what impact has participation in the Center had for YOU in the following areas?

The feeling of accomplishment I get from the research I do

- 2004-2005: 3.62
- 2005-2006: 3.46
- 2006-2007: 3.58
- 2007-2008: 3.67
- 2008-2009: 4
During the past year, what impact has participation in the Center had for YOU in the following areas?

Opportunities for research contracts/grants

- 3.32 (2005-2006)
- 3.75 (2006-2007)
- 3.65 (2007-2008)
- 3.74 (2008-2009)
During the past year, what impact has participation in the Center had for YOU in the following areas?

Recognition I receive for the work I do

- 2004-2005: 3.38
- 2005-2006: 3.25
- 2006-2007: 3.13
- 2007-2008: 3.49
- 2008-2009: 3.63
During the past year, what impact has participation in the Center had for YOU in the following areas?

Access to useful equipment

- 2004-2005: 3.12
- 2005-2006: 2.79
- 2006-2007: 2.95
- 2007-2008: 3.03
- 2008-2009: 3.28
During the past year, what impact has participation in the Center had for YOU in the following areas?

Ability to support graduate students

<table>
<thead>
<tr>
<th>Year</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-2005</td>
<td>3.58</td>
</tr>
<tr>
<td>2005-2006</td>
<td>3.24</td>
</tr>
<tr>
<td>2006-2007</td>
<td>3.62</td>
</tr>
<tr>
<td>2007-2008</td>
<td>3.32</td>
</tr>
<tr>
<td>2008-2009</td>
<td>3.65</td>
</tr>
</tbody>
</table>
During the past year, what impact has participation in the Center had for YOU in the following areas?

Ability to publish my work in quality proceedings and journals

Prior to 2006-2007 faculty were asked to report the number of publications rather than a rating of ability to publish.
During the past year, how satisfied were you with center administrative operations?
Faculty Summary

- Variety of indictors more positive
  - Satisfaction with quality of research, relevance to faculty research, sense of accomplishment, etc.
  - Benefits: recognition; ability to publish

Interpretation?:
- Real change, faculty getting better outcomes from centers
  » Recession effect: didn’t lose my job
- Cohort effect, fewer mature (jaded) and more new (enthusiastic) faculty
- Response bias, questionnaires returned by more positive faculty
How Should These Process/Outcome Results be Used?

- By comparing means, medians, and standard deviations, evaluators can see how their centers compare to national “norms”
- Insert national data into industry software tools for this year/last year comparisons with your center
- Move current center means to previous year in e-mail software package
- **Caution:**
  - Deteriorating response rate undermines the validity and usefulness of feedback
    - Need to reinvent our methods
    - Cautiously considered interpretation