Agenda

- Birds Eye View of Toolkit Components
  - Common Application, Shared Applicant Pool
  - A la Carte Survey, Faculty Survey

- Outcomes

- Future
  - Alumni Tracking Tool
History of Evaluation Project

2009 Working Group Members

Guy Alain Amousou
Andy Fagg
Sanjay Madrias

Chris Aberson
Stephen Gilbert
Joan Peckham

Wendy Cooper
Manfred Huber
Eric Wong

Teresa Dahlberg
Niels Lobo
Yu-Dong Yoa

Kevin Zeng

Needs Assessment & Study

Established Common Indicators & Tools

Research Module Inclusive Terminology Shared Applicant Pool

2009
Humboldt State

2010
UNC Charlotte

2013

2014-16 Toolkit Expansion Project

New Modules Faculty Study Alumni Tracker Instructional Videos

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| Online Evaluation Toolkit | • Evaluation Toolkit: reu.uncc.edu/cise-reu-toolkit  
| | • How To videos  
| | • Evaluation materials and resources tailored to CISE REU |
| **Common Application** | • Google Form application UNIQUE to site  
| | • Standardized & customizable  
| | • Aggregate descriptive statistics across CISE directorate |
| **Shared Applicant Pool** | • Managed via Google Drive & Common Applications  
| | • Site PI “releases” unselected candidates  
| | • All PIs have access to online folder |
| **Surveys: A la Carte and Faculty** | • Student Outcomes: modulated, valid/reliable  
| | • Faculty Impact: Survey deploying summer 2016 |
| **Alumni Follow Up Tool** | • Prototype: Review and comment! |
Launching Toolkit Options

**Common Application:** Reply to email call outs: Oct, Nov, Dec, Jan, Feb

**Shared Applicant Pool:** All PIs will have access; Includes students who have not been selected and gave permission

**A la Carte Survey:** Reply to email call outs: April, May

**Faculty Survey:** Summer 2016!

**Alumni Tracker Tool:** under construction

OR: Contact audrey.roerrer@uncc.edu
Alumni Toolkit Development

Working Group Members:
- Lazaros Gallos, Rutgers
- Claire Duggan, Northeastern U.
- Bonnie Swan, U. Central Florida
- Stephen Gilbert, Iowa State
- Tiffany Reardon, Berkeley
- Huirong Fu, Oakland
- Jamie Payton, UNC Charlotte
- Raja Kushalnagar, RIT

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The Common Application
Applicants: Challenges & Solutions

Individual Sites
- Replication of human capital
- Efficiency in shared set of application items
- Provides shared applicant pool as needed

NSF-CISE Community
- Aggregate Description of candidate traits
- Site autonomy

Technical Tools
- Free = inflexible
- Customized = Expensive
- DIY = Buggy
- No Desire for Centralization

Value
- Understand Candidate Pool: Supply & Demand
- Observe Trends

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# 5 Year Trends in Common Applications

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of # Applicants</td>
<td>29-152</td>
<td>4-176</td>
<td>18-212</td>
<td>20-299</td>
<td>29-232</td>
<td>15-349</td>
</tr>
<tr>
<td>Avg Applications per Site</td>
<td>77</td>
<td>79</td>
<td>93</td>
<td>112</td>
<td>102</td>
<td>122</td>
</tr>
<tr>
<td>Largest # of Sites Applied to by Individual</td>
<td>30 (n=1)</td>
<td>6 (n=1)</td>
<td>7 (n=2)</td>
<td>18 (n=1)</td>
<td>14 (n=1)</td>
<td>16 (n=1)</td>
</tr>
</tbody>
</table>

## Unique vs Multiple Site Applicants

![Unique vs Multiple Site Applicants](image)

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Applicant Demographic Trends

Applicant Underrepresented Minority Distribution

<table>
<thead>
<tr>
<th>Year</th>
<th>White/Asian</th>
<th>URM</th>
<th>Unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>494</td>
<td>9</td>
<td>194</td>
</tr>
<tr>
<td>2011</td>
<td>557</td>
<td>6</td>
<td>288</td>
</tr>
<tr>
<td>2012</td>
<td>569</td>
<td>4</td>
<td>989</td>
</tr>
<tr>
<td>2013</td>
<td>668</td>
<td>5</td>
<td>1471</td>
</tr>
<tr>
<td>2014</td>
<td>522</td>
<td>56</td>
<td>1128</td>
</tr>
<tr>
<td>2015</td>
<td>741</td>
<td>24</td>
<td>1354</td>
</tr>
</tbody>
</table>

Applicant Gender Distribution

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
<th>Unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>500</td>
<td>187</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>615</td>
<td>220</td>
<td>16</td>
</tr>
<tr>
<td>2012</td>
<td>1156</td>
<td>380</td>
<td>26</td>
</tr>
<tr>
<td>2013</td>
<td>1503</td>
<td>593</td>
<td>48</td>
</tr>
<tr>
<td>2014</td>
<td>1221</td>
<td>461</td>
<td>24</td>
</tr>
<tr>
<td>2015</td>
<td>1546</td>
<td>549</td>
<td>24</td>
</tr>
</tbody>
</table>

28% 34% 36% 31% 31% 35% 27% 26% 24% 28% 27% 26%

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Common Applications: Graduate School Plans

- **Majority plan to pursue graduate degrees**
  - 79% in 2013
  - 80% in 2014
  - 84% in 2015

- **Few are first generation college students**
  - Less than 20% across all 5 years
  - 17% are first person in family to attend college (2015)
A Geographical Look

2015 Common Applications
Student Outcomes: Challenges & Solutions

**Individual Sites**
- Replication of human capital
- Budgets focused on students not evaluation
- DIY = loss of reliability and validity

**NSF-CISE Community**
- Aggregate analysis more powerful than sites
- Site autonomy

**Technical Tools**
- Customizable survey
- Packaged dataset
- Analysis is ‘Teed Up”

**Value**
- Measurement Reliability & Validity
- Augment individual site assessment

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A la Carte Student Survey

Modular, pre/post assessment of student outcomes

- **Self Efficacy**
  - I can formulate a research problem

- **Intent to attend graduate school**
  - I plan to apply to graduate school in a computing discipline

- **Attitudes towards computing**
  - I like to use computer science to solve problems

- **Help seeking/coping skills**
  - When I do poorly on an exam, typically I….skip class

- **Research Skills**
  - Formulate a research hypothesis
  - Write a research paper for publication

- **Leadership in Science**
  - I know how to be good team member
  - I know how to encourage team performance

- **Professional Identity as Scientist**
  - I feel like I belong in science

- **Mentoring Satisfaction (post-only)**
  - My mentor was helpful in providing direction and guidance on research project issues
## A la Carte 2015 Outcomes

*Significant Effects for Time (pre- and post- surveys, *(p<.05) in Self-Efficacy, Research Knowledge, and Leadership*

<table>
<thead>
<tr>
<th>Construct</th>
<th>Pre (SD) N=187</th>
<th>Post (SD) N=169</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Efficacy</td>
<td>3.87 (.64)</td>
<td>4.34 (.59)*</td>
</tr>
<tr>
<td>Intent to Grad School</td>
<td>3.86 (.79)</td>
<td>3.78 (.89)</td>
</tr>
<tr>
<td>Attitudes</td>
<td>4.33 (.55)</td>
<td>4.23 (.66)</td>
</tr>
<tr>
<td>Help-Seeking/ Coping</td>
<td>3.99 (.49)</td>
<td>4.01 (.51)</td>
</tr>
<tr>
<td>Research Knowledge</td>
<td>3.37 (.69)</td>
<td>4.04 (.61)*</td>
</tr>
<tr>
<td>Scientific Identity</td>
<td>3.62 (.88)</td>
<td>3.81 (1.06)</td>
</tr>
<tr>
<td>Leadership</td>
<td>4.24 (.57)</td>
<td>4.37 (.56)*</td>
</tr>
<tr>
<td>Mentorship</td>
<td>Not applicable</td>
<td>4.47 (.74)</td>
</tr>
</tbody>
</table>

- 38% Female
- 32% multi-ethnic minority groups
- Predominantly Rising Juniors and Seniors

Note: 5 pt Likert scale
Main effects for Gender and Minority Groups were observed *Significant differences (p<.05)

Women: Higher Help-seeking/coping

<table>
<thead>
<tr>
<th>Construct</th>
<th>Male (SD)</th>
<th>Female (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help-Seeking/Coping</td>
<td>3.92 (.52)</td>
<td>4.13 (.51)*</td>
</tr>
</tbody>
</table>

Caveat: The effect sizes were very small (<.07)

Minority Groups: Higher Help-seeking/coping, Efficacy, Leadership and Research

<table>
<thead>
<tr>
<th>Construct</th>
<th>Majority (SD)</th>
<th>URM (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Help-Seeking/Coping</td>
<td>3.93 (.50)</td>
<td>4.17 (.53)*</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>4.26 (.70)</td>
<td>4.50 (.47)*</td>
</tr>
<tr>
<td>Leadership</td>
<td>4.26 (.58)</td>
<td>4.60 (.47)*</td>
</tr>
<tr>
<td>Research Knowledge</td>
<td>3.93 (.64)</td>
<td>4.20 (.55)*</td>
</tr>
</tbody>
</table>
### Post Program Evaluation 2015

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Faculty Advisor</td>
<td>4.33</td>
<td>1.09</td>
</tr>
<tr>
<td>Your Housing arrangements (if applicable)</td>
<td>4.19</td>
<td>1.03</td>
</tr>
<tr>
<td>The program in general</td>
<td>4.31</td>
<td>0.97</td>
</tr>
<tr>
<td>Your research experience</td>
<td>4.42</td>
<td>0.87</td>
</tr>
<tr>
<td>Your interaction with project staff</td>
<td>4.37</td>
<td>0.89</td>
</tr>
<tr>
<td>Your interaction with other students</td>
<td>4.65</td>
<td>0.72</td>
</tr>
</tbody>
</table>
Most rewarding experiences:

- Connections with faculty and peers
  - “working with faculty and other students”
  - “friends + research”
- Mentoring
  - “one on one with my faculty advisor”
- Learning
  - “learning new skills”
  - “learning what grad research is like”

Most frustrated experiences:

- Lack of understanding; Time Constraints
  - “having to work on a subject I didn’t understand”
  - “the initial amount of reading to understand basic concepts”
  - “Rushing”
Take Aways

- Students are reporting statistically significant gains in **Self-Efficacy, Research Knowledge, and Leadership**

- No causal link but
  - Students are developing and exploring research skills
  - Long-term follow up needed
  - Deeper Studies!!!
Faculty Survey
Faculty Impact

- Survey in Fall 2014
  - Research Questions:
    - How do faculty administer their sites
      - Recruiting and selection practices
      - Mentoring and Collaboration practices

- Summer Fall 2016
  - NEW to address organizational structure, best practices
  - Qualitative underway - RIGHT NOW
  - Research Questions:
    - How do faculty benefit from running REUs
Faculty Survey 2014

- Snowball sample (no response rate) = 92 participants

Q22 How often did:

Answered: 82  Skipped: 10

- You meet with REU students?
  - Every day: 40%
  - 2+ times a week: 60%

- Your students collaborate?
  - Every day: 0%
  - 2+ times a week: 100%

- Have social events?
  - Every day: 0%
  - 2+ times a week: 0%

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Collaborations: Peer & Faculty

Q24 How were your students organized for their research projects?
- Small groups (how many students per group?)
- Individual 24.69% (20)

Q25 Who met most frequently with the REU students?
- Multiple mentors 29.27% (24)
- A graduate mentor 30.49% (25)
- A faculty mentor 40.24% (33)
Alumni Tracker

Implementation Fall 2016
Alumni Tracker: Challenges & Solutions

**Individual Sites**
- Replication of human capital
- Efficiency in shared set of follow up items

**NSF-CISE Community**
- Aggregate Description of Long term outcomes
- Site autonomy

**Technical Tools**
- Free = inflexible
- Customized = Expensive
- DIY = Buggy
- Desire for Centralization??

**Value**
- Understand Where Alumni Go
- Observe Trends

NSF CISE REU PI Meeting, Orlando, FL, March 2016
Alumni Toolkit Development

Working Group Members:
- Lazaros Gallos, Rutgers
- Claire Duggan, Northeastern U.
- Bonnie Swan, U. Central Florida
- Stephen Gilbert, Iowa State
- Tiffany Reardon, Berkeley
- Huirong Fu, Oakland
- Jamie Payton, UNC Charlotte
- Raja Kushalnagar, RIT

Prototype 1
- Review

Prototype 2
- Revisions

Feedback: Breakout Session Today @ 2

Working Group
- Jan 2016

NSF CISE REU PI Meeting, Orlando, FL, March 2016
Launching Toolkit Options

**Common Application:** Reply to email call
outs: Oct, Nov, Dec, Jan, Feb

**Shared Applicant Pool:** All PIs will have
access; Includes students who have not been
selected and gave permission

**A la Carte Survey:** Reply to email call
outs: April, May

**Alumni Tracker Tool:** Reply to email call
outs: Sept, Dec, Feb

**Faculty Survey:** Summer 2016!

OR:
Contact
audrey.rorrer@uncc.edu
Thank you

audrey.rorrer@uncc.edu
### Toolkit Expansion Project

**Expanded Initiatives**

- Add student survey modules
  - Leadership, Mentoring, Professional Development
- New Tool for Alumni Tracking
- 3 Studies
  - Faculty Career Impact
  - Comparative longitudinal study of alumni vs applicants
  - Student outcomes related to site characteristics

**Research Questions**

- What do students gain through REUs?
- Where do they go?
- How do faculty engage in REU sites, and how are they impacted?
- How do REU Applicants compare to Participants over time?
- What site characteristics contribute to student success?
## Participating Sites

<table>
<thead>
<tr>
<th>Year</th>
<th>Common Application</th>
<th>A la Carte Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>23</td>
<td>28</td>
</tr>
<tr>
<td>2014</td>
<td>25</td>
<td>22</td>
</tr>
<tr>
<td>2013</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>2012</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>2011</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>2010</td>
<td>13</td>
<td>20</td>
</tr>
</tbody>
</table>
Survey Instruments Available

- SURE- Survey of Undergraduate Research Experiences
  - D. Lapatto at Washington University

- URSSA- Undergraduate Research Student Self Assessment
  - University of Colorado Boulder, NSF

- Both are free for research programs and courses
- Adaptation made for the A la Carte
Origin of A la Carte Construct Scales

SURE & URSSA adaptation

- Self-Efficacy: based on Bandura’s work; adapted from Arizona State University
- Graduate School Intent
- Computing Attitudes
- Help-Seeking/Coping
- Research Skills

Additional Instrument Adaptations

- Mentoring: Mentorship Effectiveness Scale, originally developed by Johns Hopkins University
- Leadership and Scientific Identity: Chemers, Zurbriggen, Syen, Goza, and Bearman (2011)
**A la Carte Methodology**

- **Items**
  - 4 point Likert type scale, 4 being positive in 2010/2011
  - Converted to 5 point scale in 2012
  - Some items were reverse scored
  - Collapsed into construct means representing 4 variables
  - Ethnicity collapsed into URM status

- **Reliability**
  - Coefficient alphas above .547

- **2015 results presented to CISE REU PI meeting**
  - To test hypothesis that there would be differences between means based on time, gender, URM status:
    - T Test on means scores on TIME (pre/post)
  - gender, URM status
    - ANOVA on interactions
# A la Carte Student Survey Participation

<table>
<thead>
<tr>
<th>Summer (# of Sites Using)</th>
<th>Pre Survey</th>
<th>Post Survey</th>
<th>Response Rate*</th>
<th>% Female</th>
<th>% URM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015 (28)</td>
<td>180</td>
<td>169</td>
<td>60%</td>
<td>38%</td>
<td>32%</td>
</tr>
<tr>
<td>2014 (22)</td>
<td>226</td>
<td>149</td>
<td>66%</td>
<td>42%</td>
<td>23%</td>
</tr>
<tr>
<td>2013 (30)</td>
<td>217</td>
<td>209</td>
<td>70%</td>
<td>38%</td>
<td>22%</td>
</tr>
<tr>
<td>2012 (23)</td>
<td>167</td>
<td>151</td>
<td>66%</td>
<td>37%</td>
<td>25%</td>
</tr>
<tr>
<td>2011 (18)</td>
<td>199</td>
<td>137</td>
<td>76%</td>
<td>37%</td>
<td>31%</td>
</tr>
<tr>
<td>2010 (20)</td>
<td>196</td>
<td>144</td>
<td>72%</td>
<td>30%</td>
<td>31%</td>
</tr>
</tbody>
</table>

*Calculated from Post Survey responses; estimates based upon 10 students per site (e.g., 2010: 200 students; 2011: 180 students; 2012: 230 students; 2013: 300 students; 2014: 220 students; 2015: 280 students)
Considerations for Alumni Tracker

Site Administered

✓ Higher response rate from alumni
✓ Stronger sense of community
✓ PI controlled timeline
✓ Immediate access
✧ Lack of aggregate information

Toolkit Administered

✧ Lack of connection to the alumni; low response likely
✓ Routine and systematic
✓ Aggregate information
✓ Provide service to PIs already burdened with administrative responsibilities