Graduate Education: NSF Research Training Grants (NRTs) .....
NSF and Graduate Student support

- Graduate students are a key constituency for investment by NSF
- Broad benefits of investment:
  - Train the next generation of scientists
  - Provide the workforce in technical fields of science and engineering
  - Broaden participation in science
- Challenges vary by discipline
One Issue - The U.S. awards roughly ten times as many PhDs as the number of available faculty positions annually.
Life Sciences account for ~25% of PhDs awarded.

Doctorates awarded in science and engineering fields of study: 1992–2012

Related detailed data: tables 4, 7, 12, 13.

A second issue – The culture of graduate programs discourages alternative careers
Figure 4. Share of students reporting that particular careers are encouraged/discouraged in their lab or department.

http://www.plosone.org/article/info:doi/10.1371/journal.pone.0036307
## Current Mechanisms/Models of Graduate Student Training

<table>
<thead>
<tr>
<th>Goals</th>
<th>Research Assistants</th>
<th>Traineeship</th>
<th>Fellowship</th>
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</thead>
<tbody>
<tr>
<td>Conduct NSF Funded Research</td>
<td>+</td>
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<tr>
<td>Develop STEM Workforce and Global Competencies</td>
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<td>Broaden Participation in STEM Fields</td>
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<td>Develop Researchers in Priority Areas</td>
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<tr>
<td>Foster Research/Innovation in Graduate Education</td>
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<tr>
<td>Other ??</td>
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</tbody>
</table>

Percentages of students Funded (~42,000 Total):
- Research Assistants: ~80%
- Traineeship: 6-8%
- Fellowship: 10-15%
NSF Research Training Grants (NRT)

Proposed NRT Goals

- **RESEARCH**: Interdisciplinary research that advances the scientific agenda of the research emphasis areas.

- **TRAINING**: Training that provides the technical and other skills needed for success in academic and non-academic careers. Include masters as well as PHD students; international students.

- **IMPACT**: Models and knowledge that inform development of effective approaches in graduate education for dissemination and institutionalization. Increased participation of underrepresented groups.
Proposed NRT Research Emphasis Areas

- Data-Enabled Science and Engineering
- Any other crosscutting, interdisciplinary theme
Additional Qualities Sought for NRTs

- **scalable** models for STEM graduate training that ensure that graduate students develop the skills, knowledge, and competencies needed to pursue a range of STEM careers

- **alignment of project research themes with national research priorities**

- **evidence-based, sustainable** approaches and practices that substantially improve graduate education broadly at an institution

- **strategic collaborations** with NGOs, government, industry, etc.
Pathways Through Graduate School and Into Careers
Additional Concerns With Graduate Education

Non-academic employers indicate that recent PhD students often lack skills related to:

- Working in a team environment
- Business acumen (ability to deliver outcomes on schedule and on budget)
- Project management
- Ability to discuss technical issues with nontechnical individuals

Pathways Through Graduate School and into Careers
ETS and CGS report 2012  http://pathwaysreport.org/
Some Recommendations to Better Align Graduate Training with Non-academic Career Paths

- Establish Traineeship Program – like NRT
- Broaden focus of Graduate Education to include Professional Development
- Track Graduate Students into their Careers
- Provide Internship Opportunities
- Provide Career Counseling for Graduate Students
- Innovative/Research Masters Programs
- Provide opportunities for Faculty to engage with industry, government and other sectors

Pathways Through Graduate School and into Careers
RCN-UBE Solicitation – modify to include graduate education? How?

Research Coordination Networks (RCN)

PROGRAM SOLICITATION
NSF 13-520

REPLACES DOCUMENT(S):
NSF 11-531

National Science Foundation
Directorate for Biological Sciences
Directorate for Education & Human Resources
Directorate for Engineering
Directorate for Geosciences
Division of Polar Programs
Directorate for Mathematical & Physical Sciences
Directorate for Social, Behavioral & Economic Sciences
Directorate for Computer & Information Science & Engineering
Division of Advanced Cyberinfrastructure
Office of International and Integrative Activities

Full Proposal Deadline(s) (due by 5 p.m. proposer’s local time):

March 04, 2013
RCN SEES Track
June 14, 2013
RCN UBE & UBE incubator Track
Questions/Ideas/Discussion