Graduate Education: NSF Research Training Grants (NRTs) …..

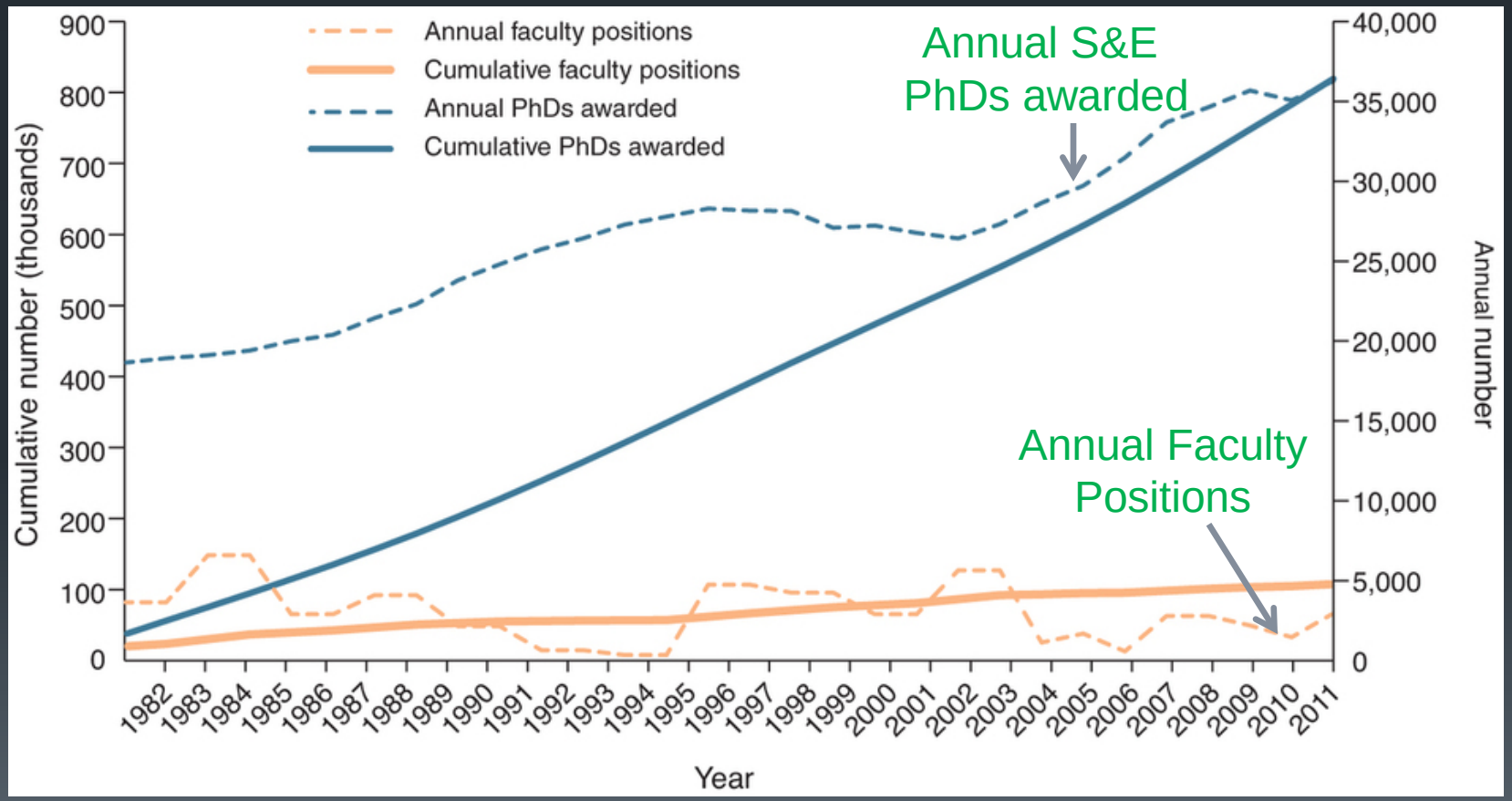
BIO AC Meeting

March 14, 2014

NSF and Graduate Student support

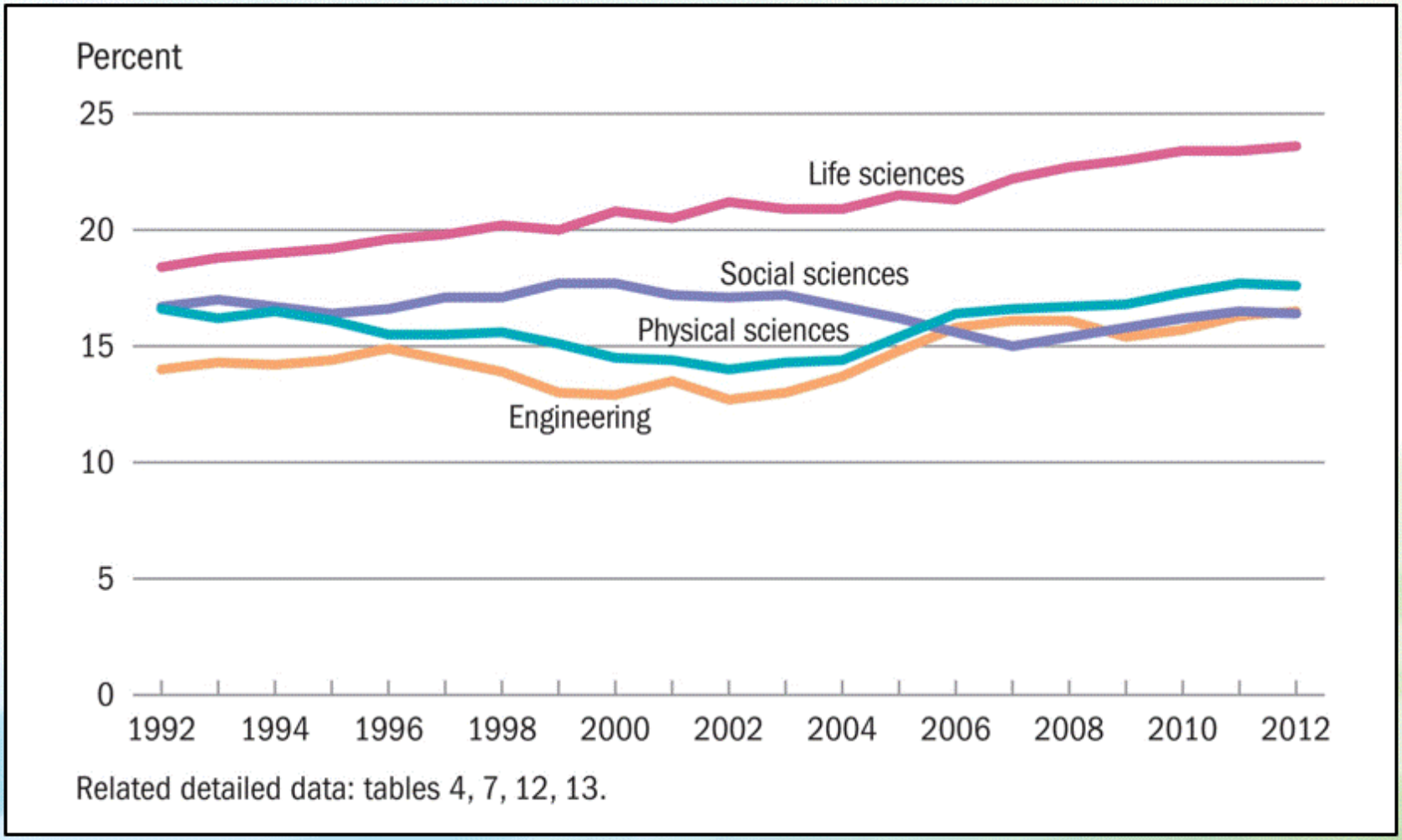
- Graduate students are a key constituency for investment by NSF
- Broad benefits of investment:
  - Train the next generation of scientists
  - Provide the workforce in technical fields of science and engineering
  - Broaden participation in science
- Challenges vary by discipline

One Issue - The U.S. awards roughly ten times as many PhDs as the number of available faculty positions annually



The missing piece to changing the university culture
Maximiliaan Schillebeeckx, Brett Maricque & Cory Lewis
Nature Biotechnology 31, 938–941 (2013)

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

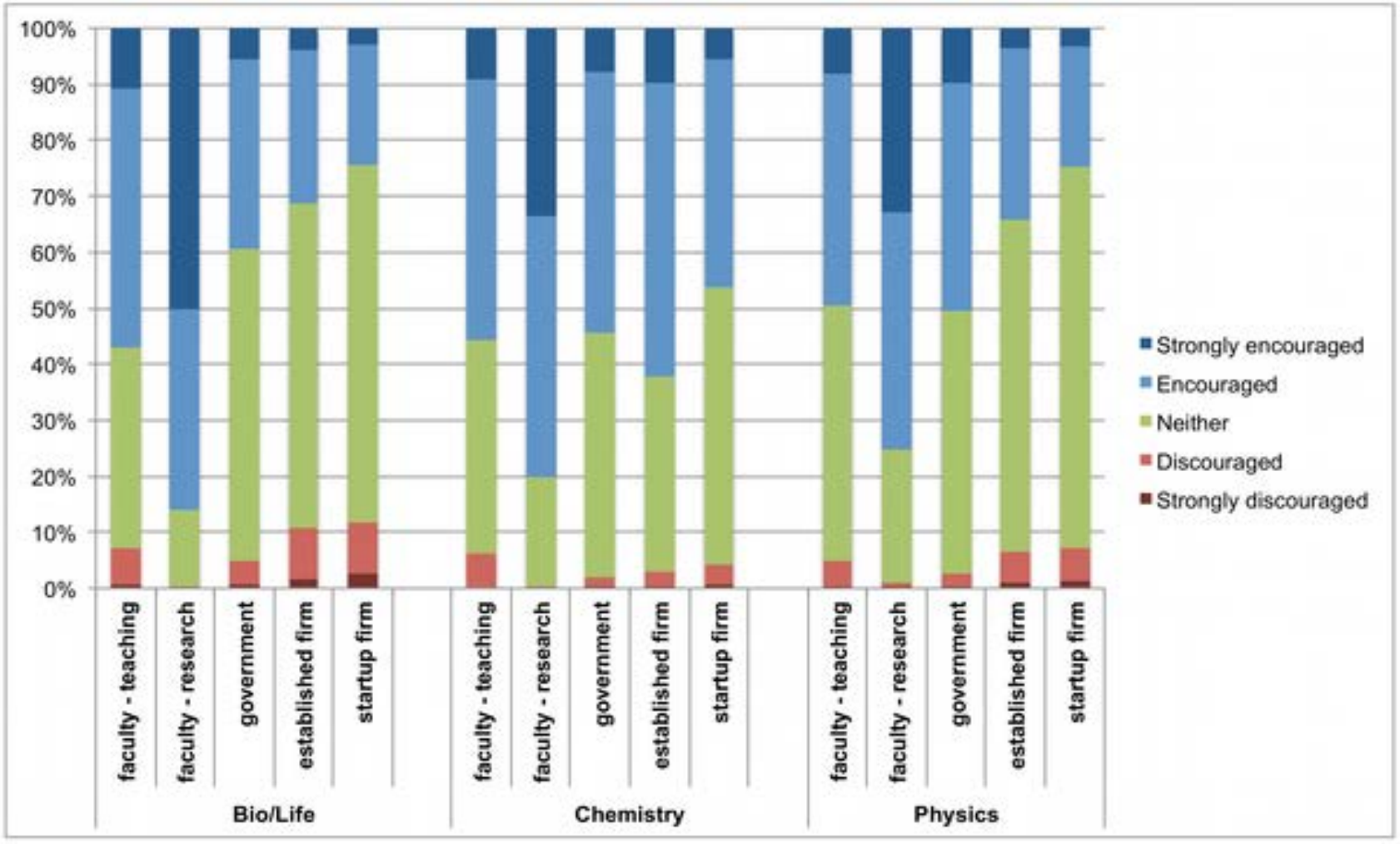


Related detailed data: tables 4, 7, 12, 13.

Doctorate Recipients from U.S. Universities 2012; www.nsf.gov/statistics/sed/

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.



Sauermann H, Roach M (2012) Science PhD Career Preferences: Levels, Changes, and Advisor Encouragement. PLoS ONE 7(5): e36307. doi:10.1371/journal.pone.0036307
http://www.plosone.org/article/info:doi/10.1371/journal.pone.0036307

PLOS | ONE

Current Mechanisms/Models of Graduate Student Training

Goals	Research Assistants	Traineeship	Fellowship
Conduct NSF Funded Research	+	+	+
Develop STEM Workforce and Global Competencies	+	+	+
Broaden Participation in STEM Fields	+	+	+
Develop Researchers in Priority Areas	+	+	+
Foster Research/Innovation in Graduate Education	+	+	+
Other ??			
Percentages of students Funded (~42,000 Total)	~80%	6-8%	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**

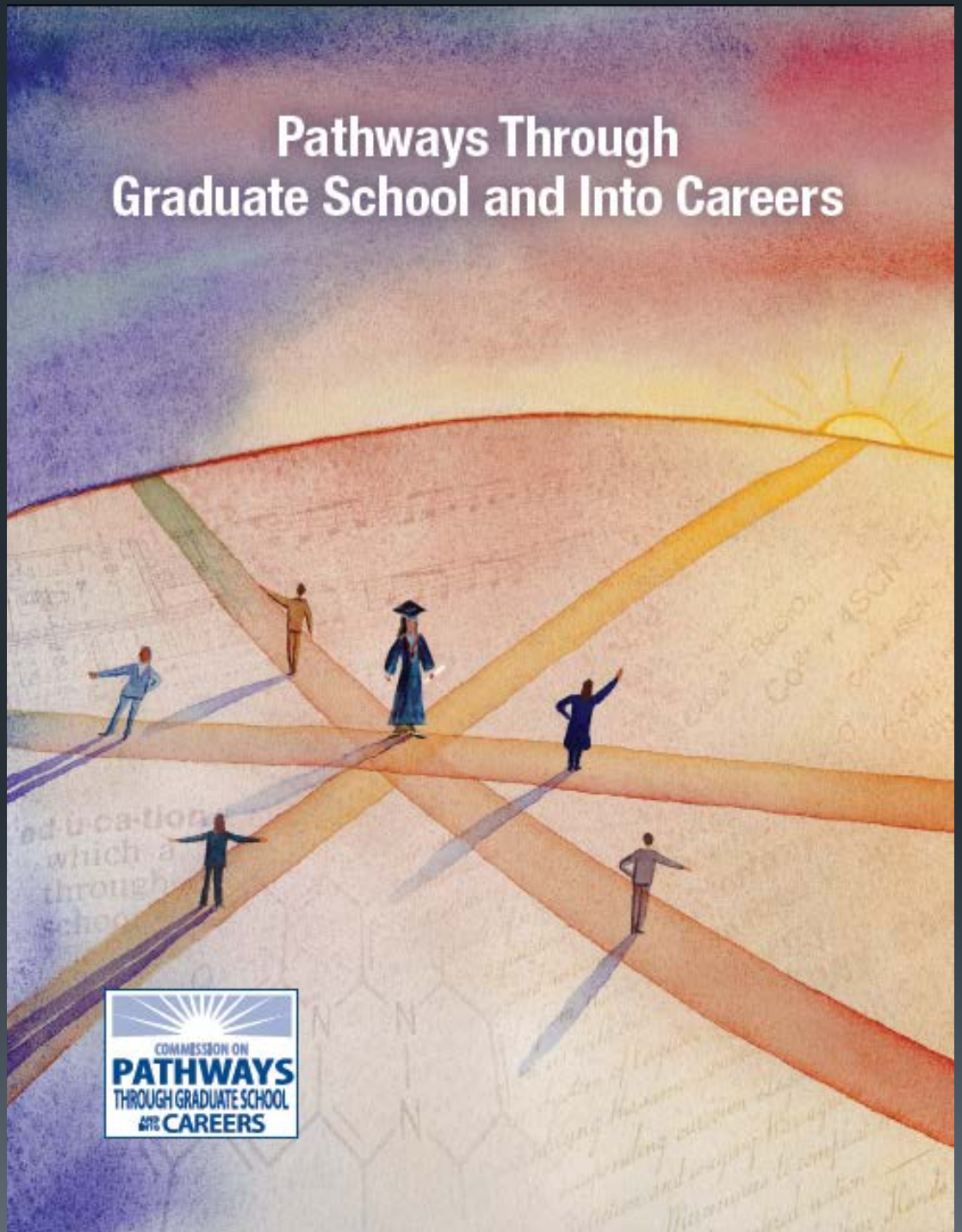
Additional Qualities Sought for NRTs

- ***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
COMMISSION ON
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
ETS and CGS report 2012 http://pathwaysreport.org/

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