

# **Selected NSF Programs in Education**

**Myles Boylan**

**Division of Undergraduate Education  
National Science Foundation**

October, 2009

# **Selected Programs in DUE**

**CCLI: NSF 09-529**

**STEP: NSF 08-569**

**S-STEM: NSF 07-524**

**NOYCE: NSF 09-513**

## **2 Other Selected Programs**

**CI-TEAM: NSF 10-xxx**

**REESE: NSF 09-601**

# CCLI

Course, Curriculum, Laboratory Improvement

**Our broadest, most innovative program**

## *Vision*

Excellent STEM education for all undergraduate students.

## *Goal*

Stimulate, disseminate, and institutionalize **innovative** developments in STEM education through the production of knowledge and the improvement of practice.



▶ ***Type 1***

\$200,000      duration: 1 to 3 years  
(+ \$50,000 with community college partner)

▶ ***Type 2***

\$600,000      duration: 2 to 4 years

▶ ***Type 3***

\$5,000,000      duration: 3 to 5 yrs (5 if max reqst)



## ➤ **Scale of the Project**

- Number of institutions, students and faculty

## ➤ **Maturity of the Project (Stage)**

- Phase 1 may lead to Phase 2, etc.
- But prior CCLI funding is not required

## ➤ **Scope of the Project**

- Defined by number of components, based on our view of the cyclic nature of educational innovation



➤ **Scope and Scale:**

- One or two program components
- Limited number of students & faculty at one institution

➤ **Expected Results:**

- Contribute to understanding of effective STEM education, typically by exploring new ideas
- Can serve as basis for Type 2 project
- Often motivated by an interest to apply for Type 2 later

- Integrate new instrumentation or equipment into undergraduate laboratories or field work
- Develop materials that use a new instructional approach embodying current understanding of how students learn
- Introduce content from new research into existing course
- Explore the practical aspects of using remote laboratories
- Develop an instrument to assess students' knowledge
- Provide courses needed for efficient, seamless transfer from 2-yr to 4-yr colleges in partnership with other instn
- Explore or pilot internet-based approaches for faculty professional development
- Develop interdisciplinary SENCER courses on public issues



## ➤ **Scale of the Project**

- Number of institutions, students and faculty

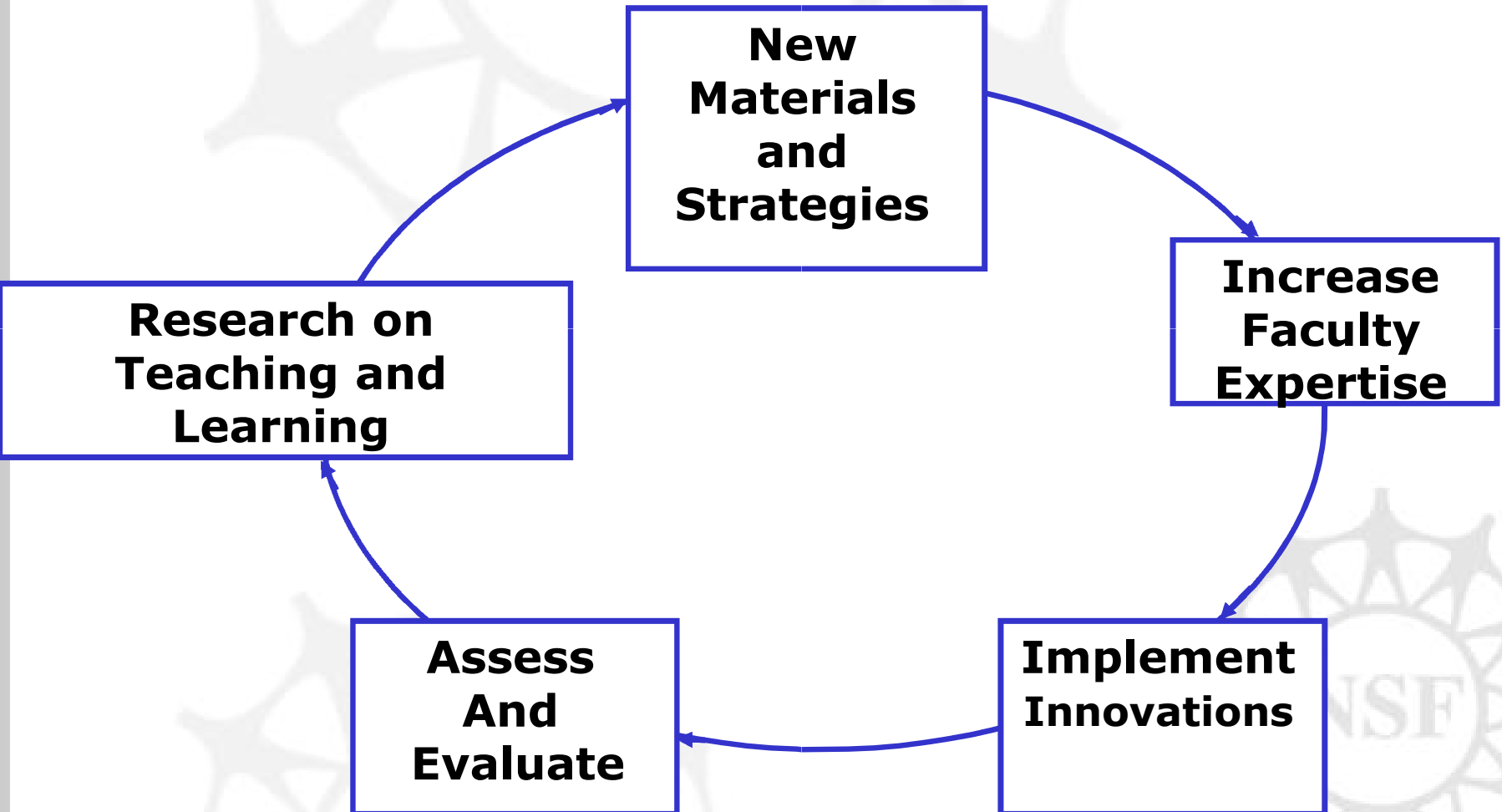
## ➤ **Maturity of the Project (Stage)**

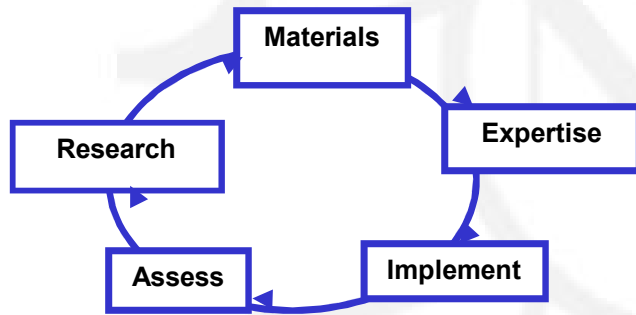
- Type 1 may lead to Phase 2, etc.
- But prior CCLI funding is not required

## ➤ **Scope of the Project**

- Defined by number of components, based on our view of the cyclic nature of educational innovation

# Cyclic Model for Creating Knowledge and Improving Practices in STEM Education

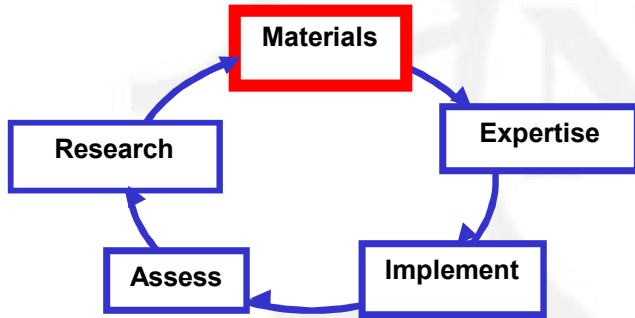




# Five Components from the Cyclic Model

Include one or more of these components

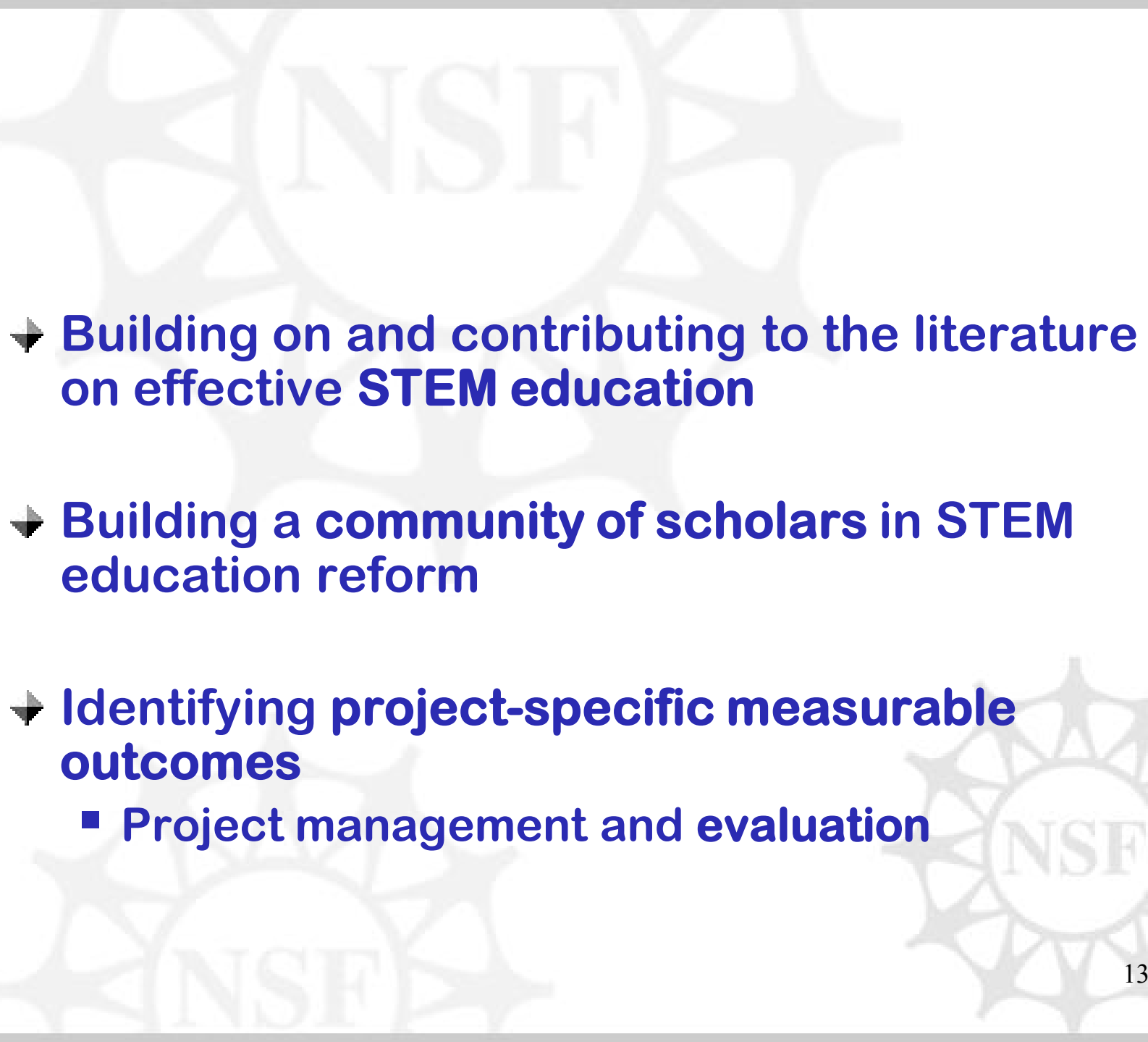
- Create learning materials and teaching strategies
- Develop faculty expertise
- Implement educational innovations (not adoption)
- Assess learning and evaluate innovation
- Conduct research on STEM teaching and learning



# Component 1

## *Create Learning Materials and Teaching Strategies*

- New materials and tools
- New methods and strategies
- Revised materials and strategies
- Adapt and implement

- 
- The background of the slide features a large, faint watermark of the NSF logo, which consists of a gear-like circular pattern with the letters 'NSF' in the center. This watermark is repeated across the slide, with a larger, more prominent version on the right side.
- **Building on and contributing to the literature on effective STEM education**
  - **Building a community of scholars in STEM education reform**
  - **Identifying project-specific measurable outcomes**
    - **Project management and evaluation**



➤ **Deadline For Type 1**

- **May 21, 22, 2010 (check website for days)**

➤ **Deadline For Type 2 and 3**

- **January 13, 2009**

## Cyber-infrastructure Training, Education, Advancement, and Mentoring for Our 21st Century Workforce

- Prepare current and future generations of scientists, engineers, and educators to design and develop as well as adopt and deploy, cyber-based tools and environments for research and learning, both formal and informal.
- Expand and enhance participation in cyber-infrastructure science and engineering activities of diverse groups of people and organizations, with particular emphasis on the inclusion of traditionally underrepresented individuals, institutions, and communities as both creators and users of cyber-infrastructure.

## Research & Evaluation on Education in Sci and Eng program

REESE seeks to advance research at the frontiers of STEM learning, education, and evaluation, and to provide the foundational knowledge necessary to improve STEM teaching and learning at all educational levels and in all settings. This solicitation calls for four types of proposals—Pathways, Knowledge Diffusion, Empirical Research, and Large Empirical Research.

- Catalyze discovery and innovation at the frontiers of STEM learning, education, and evaluation;
- Coordinate and transform advances in education, learning research, and evaluation.

# REESE (NSF09-601)

30 to 50 awards for the competition in FY 2010:

Approximately 5-10 Pathways, 5-10 Knowledge Diffusion,  
10-15 Empirical, and 5-10 Large Empirical awards

Expected: \$27,000,000 for awards in FY 2010;

the award size ceiling is:

- \$250K for pathway and diffusion studies
- \$1,500 for empirical studies
- \$2,500 for large empirical studies

Proposal deadline = Nov 12, 2009

**STEP**

# STEM Talent Expansion Program

[STEM = Science, Technology,  
Engineering, and Mathematics]

## **STEP** Basic Goals

- Increase the number of students (U.S. citizens or permanent residents) in STEM
- Increase associate's / bachelor's degs → (established or emerging STEM fields)
- Community colleges get credit for transfers to 4-year STEM programs

NSF 08-569, Letter of Intent due August 18, 2009  
Full Proposal September 29, 2009



## ***Maximum Support Levels – Enrollment based***

- \$500 K for 5 years for 1- 5,000 FTE undergrads
- \$1.0 M for 5 years for 5,001-15,000 undergrads
- \$2.0 M for 5 years for >15,000 undergrads

- ***One proposal per institution***  
(can be a partner on only **one** proposal)

## ***STEP Budget***

- \$28 million expected in FY 2010
- 20-24 awards expected

- 
- Focus on Recruitment and Retention
    - Set up numerical targets for each; pipeline model
  - Usually more than one STEM discipline included
    - avoid reducing majors in other STEM majors
  - STEM Faculty are PIs
  - Strong administrative support **plus** buy-in from key departments.
- 

# STEP

*Successful projects might provide:*

- Bridge programs that enable additional preparation for students from HS or community colleges
- Programs to improve the quality of student learning
  - Peer tutoring, learning communities
  - new pedagogical approaches (e.g. mastery learning, active learning, SENCER courses)
- Programs to encourage undergraduate research
- Student support mechanisms

# STEP

## *Outcomes expected:*

- ✓ Description of activities that will be institutionalized from the project
- ✓ Plan for continuing efforts to increase number of STEM students & graduates
- ✓ Formative assessment of progress towards goals
- ✓ Dissemination of project results to broader community

# S-STEM NSF Scholarships in Science, Technology, Engineering, & Math

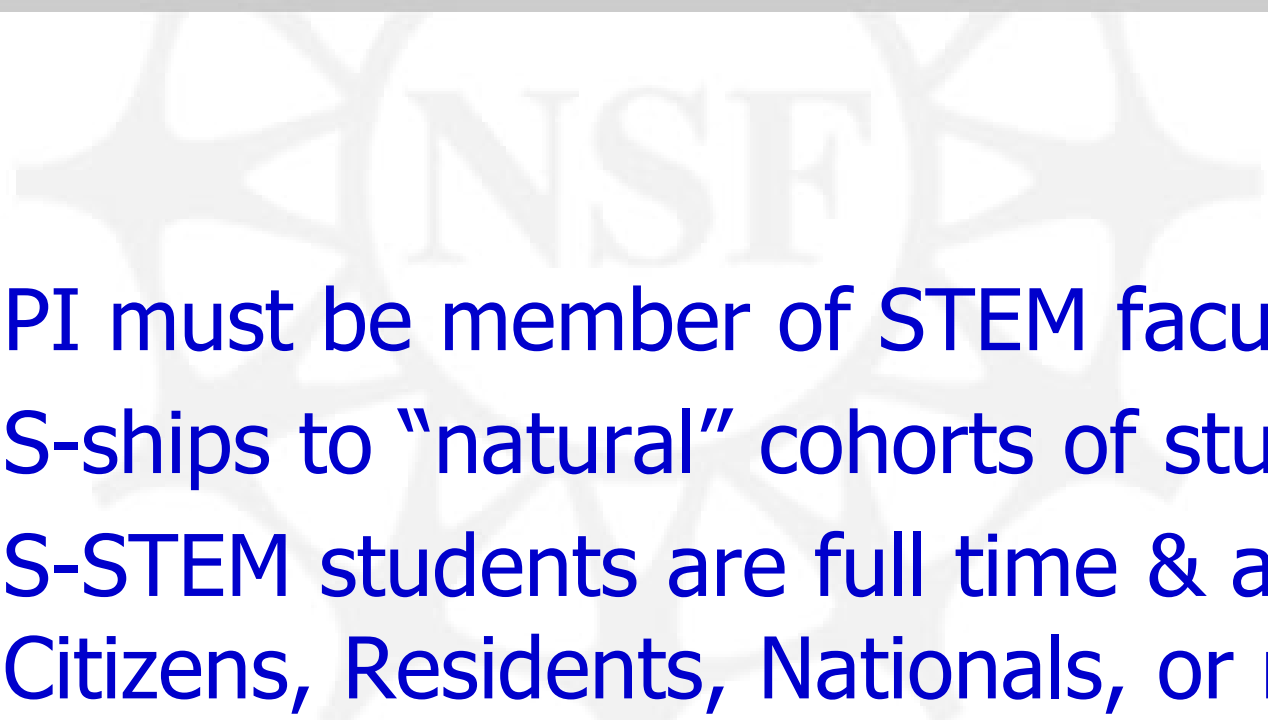

- **Goal:** Provides funds to institutions to provide scholarships to academically talented, but financially needy, students
- Students can be pursuing associate, baccalaureate, or graduate degrees
- Scholarships can be up to \$10,000/yr - up to 4 yrs within the limits of students official level of need. (They can be less than \$10K and less than 4 yrs)

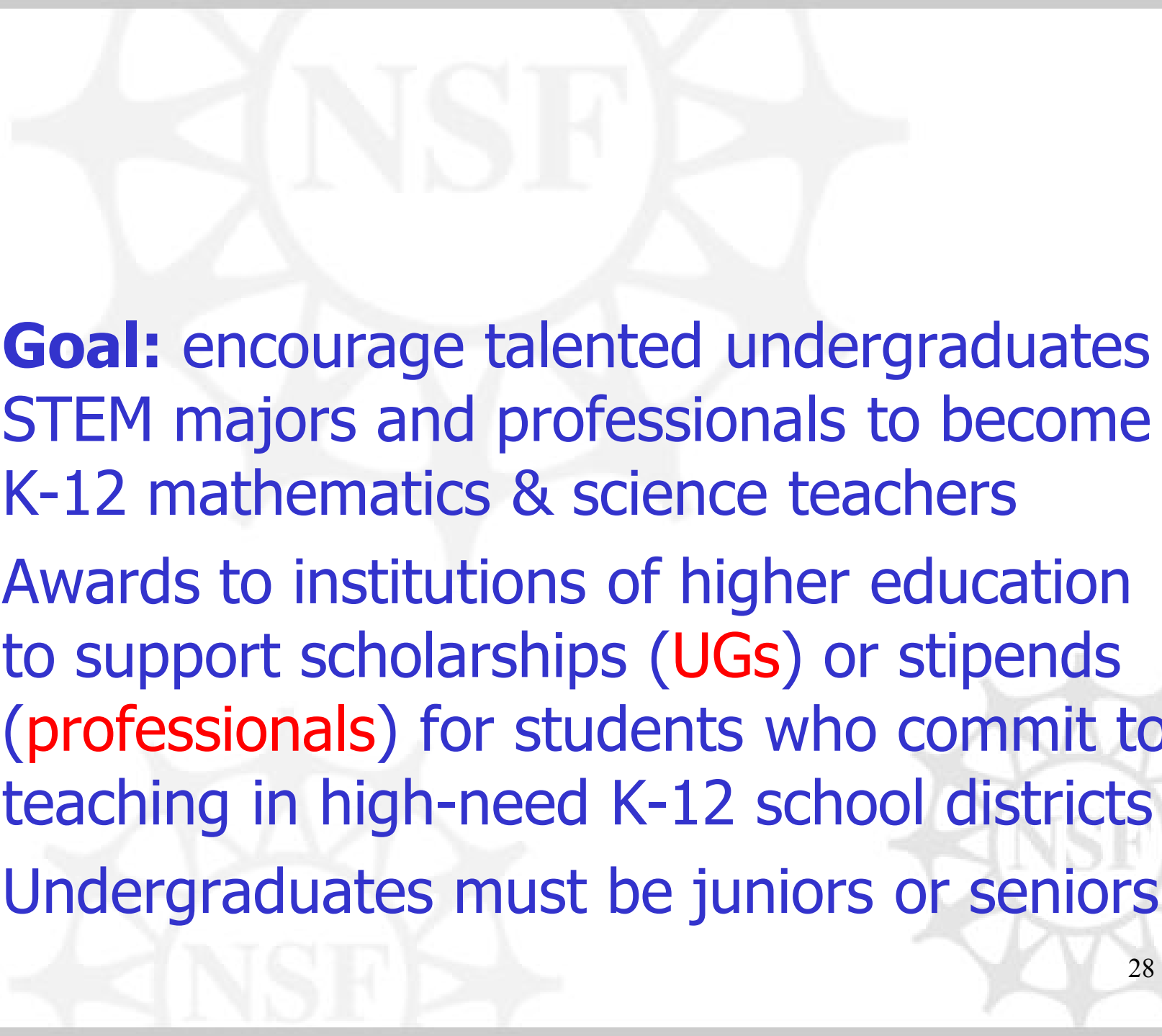
## **S-STEM** Deadlines

- ❖ Optional Letter of Intent: Aug 11, 2009
- ❖ Proposal Deadline: Sept 14, 2009
- Letter of Intent Deadline Date: July 14, 2010(for the August 12, 2010, competition)

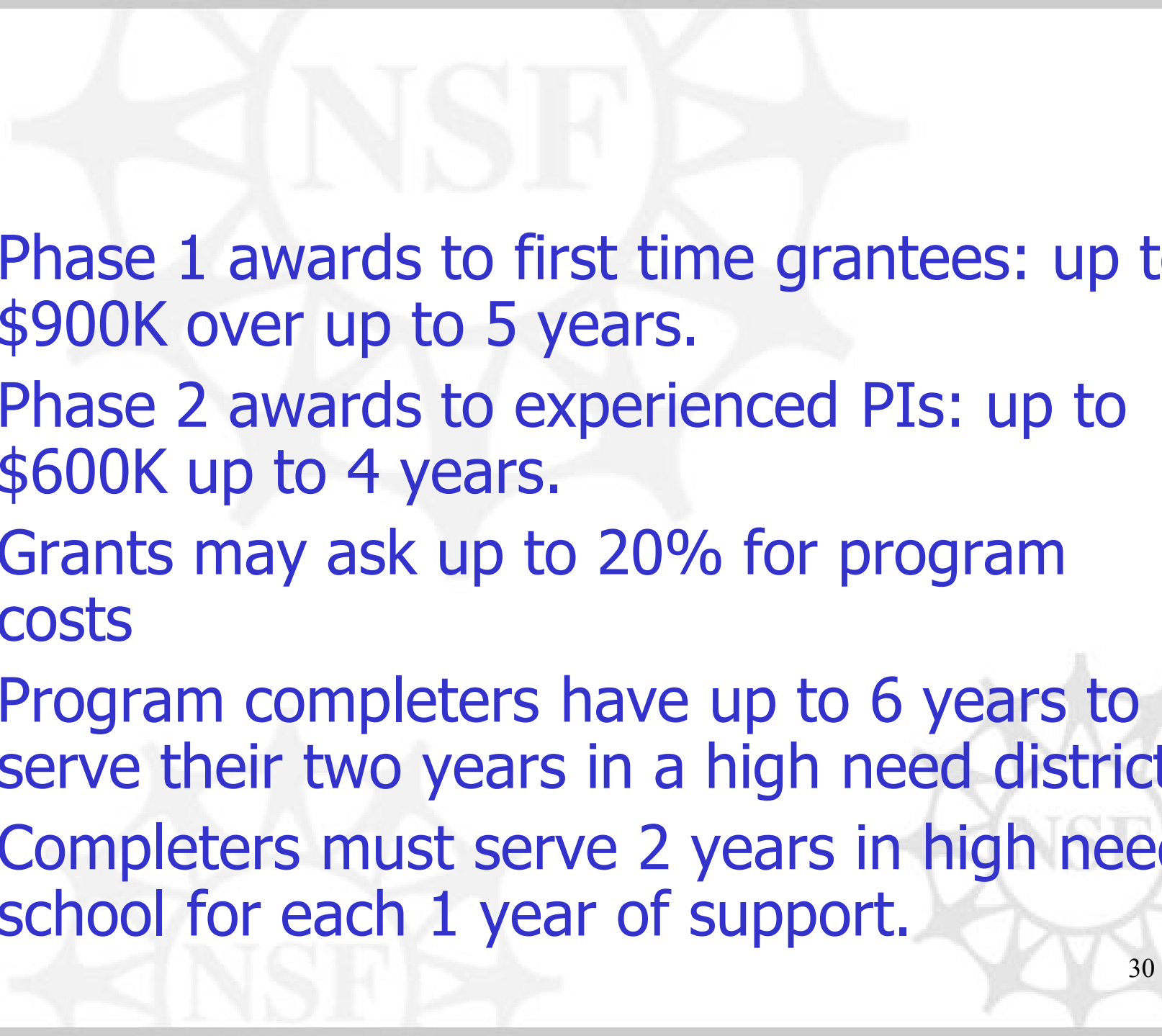
# S-STEM Major Features of Program

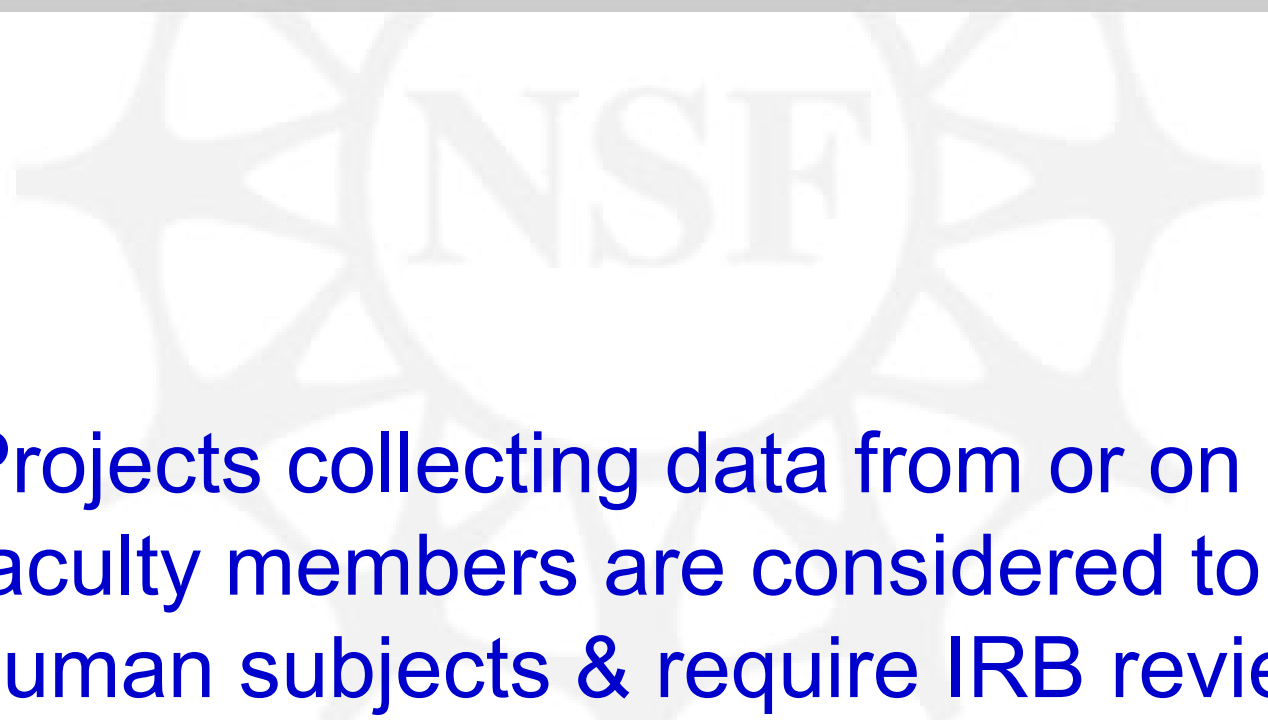
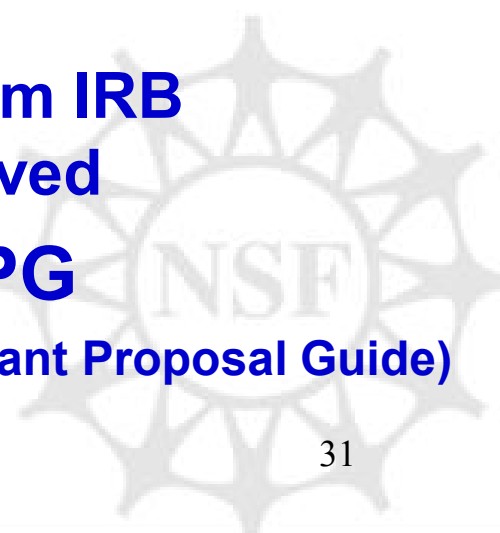
- Most STEM disciplines are eligible - except Social & Behavioral sciences
- Grant size - max \$600,000 (4 s-ship yrs), (up to 7% can be spent for admin costs and up to 8% for student support services)
- One proposal per constituent school or college that awards STEM degrees (e.g. school of eng, college of arts & sciences)
- Est: \$50 to \$70 million available in FY'09

- 
- 
- PI must be member of STEM faculty
  - S-ships to “natural” cohorts of students
  - S-STEM students are full time & are US Citizens, Residents, Nationals, or refugees
  - Institution must provide some student support structures
  - Optional enhancements: research opportunities, tutoring, internships, etc.

- 
- The background of the slide features a large, faint watermark of the National Science Foundation (NSF) logo, which consists of a gear-like circular emblem with the letters 'NSF' in the center. This watermark is repeated across the slide in a light gray color.
- **Goal:** encourage talented undergraduates STEM majors and professionals to become K-12 mathematics & science teachers
  - Awards to institutions of higher education to support scholarships (**UGs**) or stipends (**professionals**) for students who commit to teaching in high-need K-12 school districts
  - Undergraduates must be juniors or seniors

- Optional letter of intent due: Feb 10, 2009
- Full proposals deadline: March 10, 2009
- At least \$10K per student per year (but not to exceed the cost of education)
- Max period: 2 years for UGs; 1 year for Post baccalaureate students
- \$55 million in FY09! Maybe a lot more in FY 2010; A new program dimension added
- New: Creating master teachers with salary supplements of at least \$10,000 per year

- 
- The background of the slide features a large, faint watermark of the National Science Foundation (NSF) logo, which consists of a stylized gear or star shape with the letters 'NSF' in the center. The watermark is repeated across the slide in a light gray color.
- ◆ Phase 1 awards to first time grantees: up to \$900K over up to 5 years.
  - ◆ Phase 2 awards to experienced PIs: up to \$600K up to 4 years.
  - ◆ Grants may ask up to 20% for program costs
  - ◆ Program completers have up to 6 years to serve their two years in a high need district.
  - ◆ Completers must serve 2 years in high need school for each 1 year of support.

- 
- 
- **Projects collecting data from or on students or faculty members are considered to involve human subjects & require IRB review!!**
  - **Proposal should indicate IRB status on cover**
    - **Exempt, Approved, Pending**
    - **Grants will require official statement from IRB declaring the research exempt or approved**
  - **See “Human Subjects” section in GPG**  
**(NSF Grant Proposal Guide)**