

# Coordinating National Efforts of Undergraduate STEM Education Reform

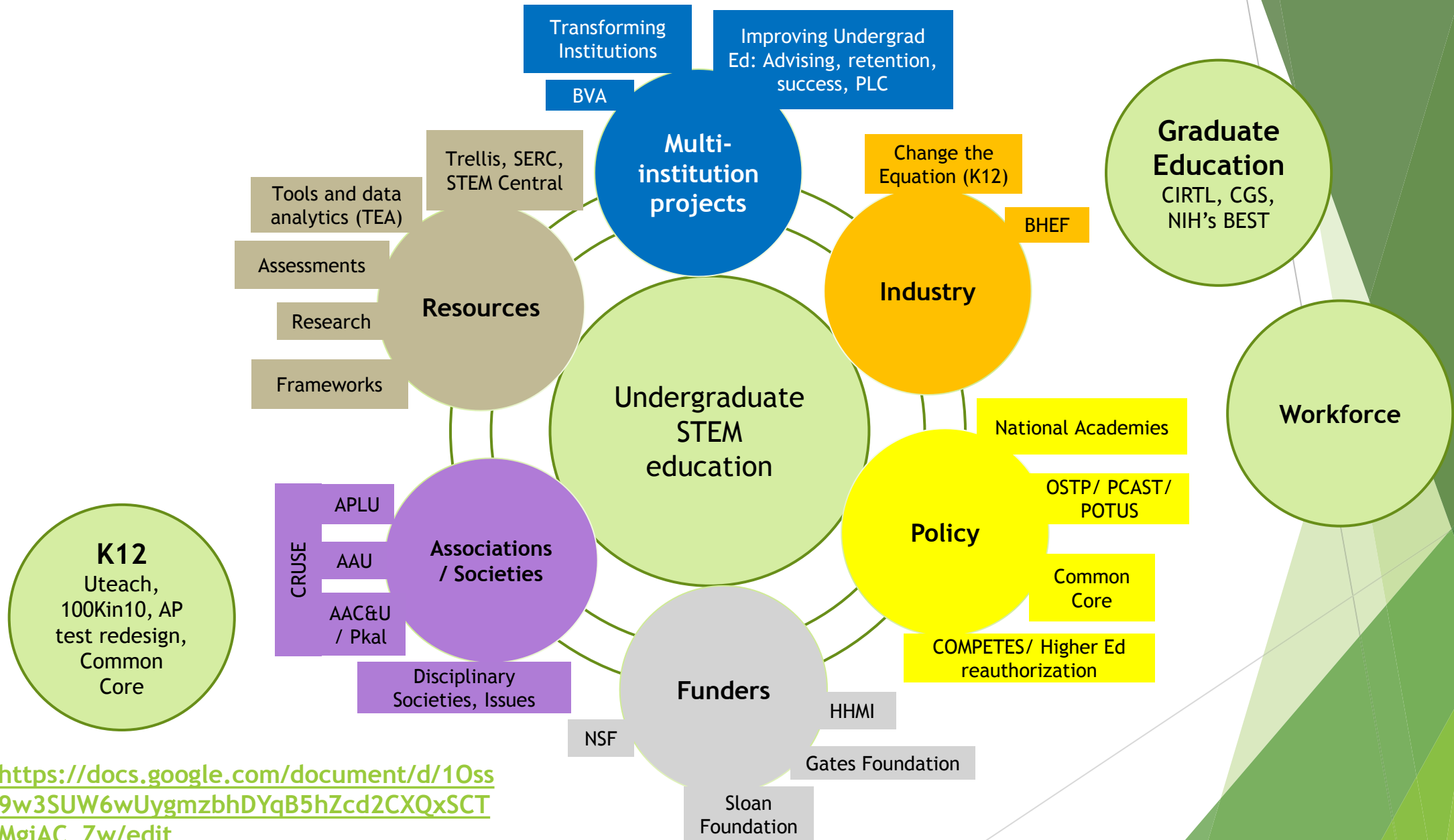
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and Land-grant Universities

April 21, 2016

# National trends in undergraduate education

- ▶ **Purpose of education**
  - ▶ Public versus private benefit;
  - ▶ Individual empowerment, societal empowerment, workforce/economic development
- ▶ **Improving the quality of education:**
  - ▶ pedagogy (active learning, flipped classes, faculty development, etc);
  - ▶ competencies;
  - ▶ curriculum mapping;
  - ▶ college readiness (teacher prep, standards, and remedial classes);
  - ▶ assessing learning;
- ▶ new staffing models (DBER, SFES, LSOEs);
- ▶ learning spaces; and
- ▶ out of classroom learning experiences (research, internships, and externships)
- ▶ **Access and Equity:**
  - ▶ articulation agreements with CCs;
  - ▶ better advising;
  - ▶ STEM pipeline for underrepresented groups from K-12 to university faculty preparation; and
  - ▶ support services (advising/mentoring, cohort programs, etc)
- ▶ **Affordability:**
  - ▶ cost of different staffing models;
  - ▶ cost of modifying practice (faculty training and learning spaces);
  - ▶ state and federal support; and
  - ▶ tuition and financial aid.
- ▶ **Research and practice intersection:**
  - ▶ interdisciplinary challenges
  - ▶ transforming institutions, transforming departments, faculty development
  - ▶ learning sciences

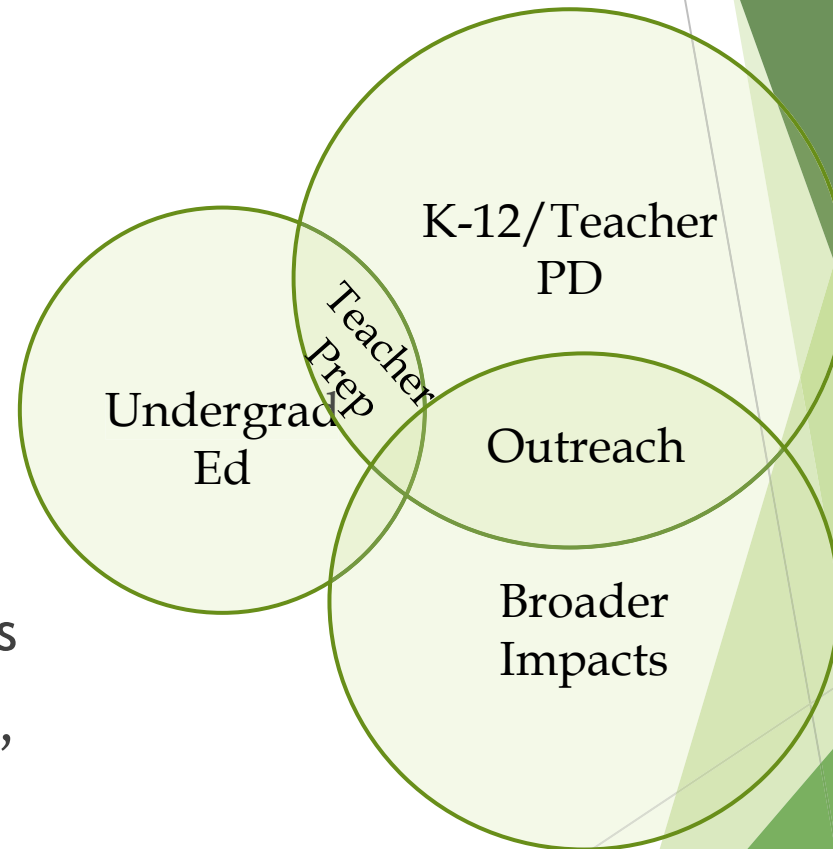
# Overview of National Efforts in STEM Ed



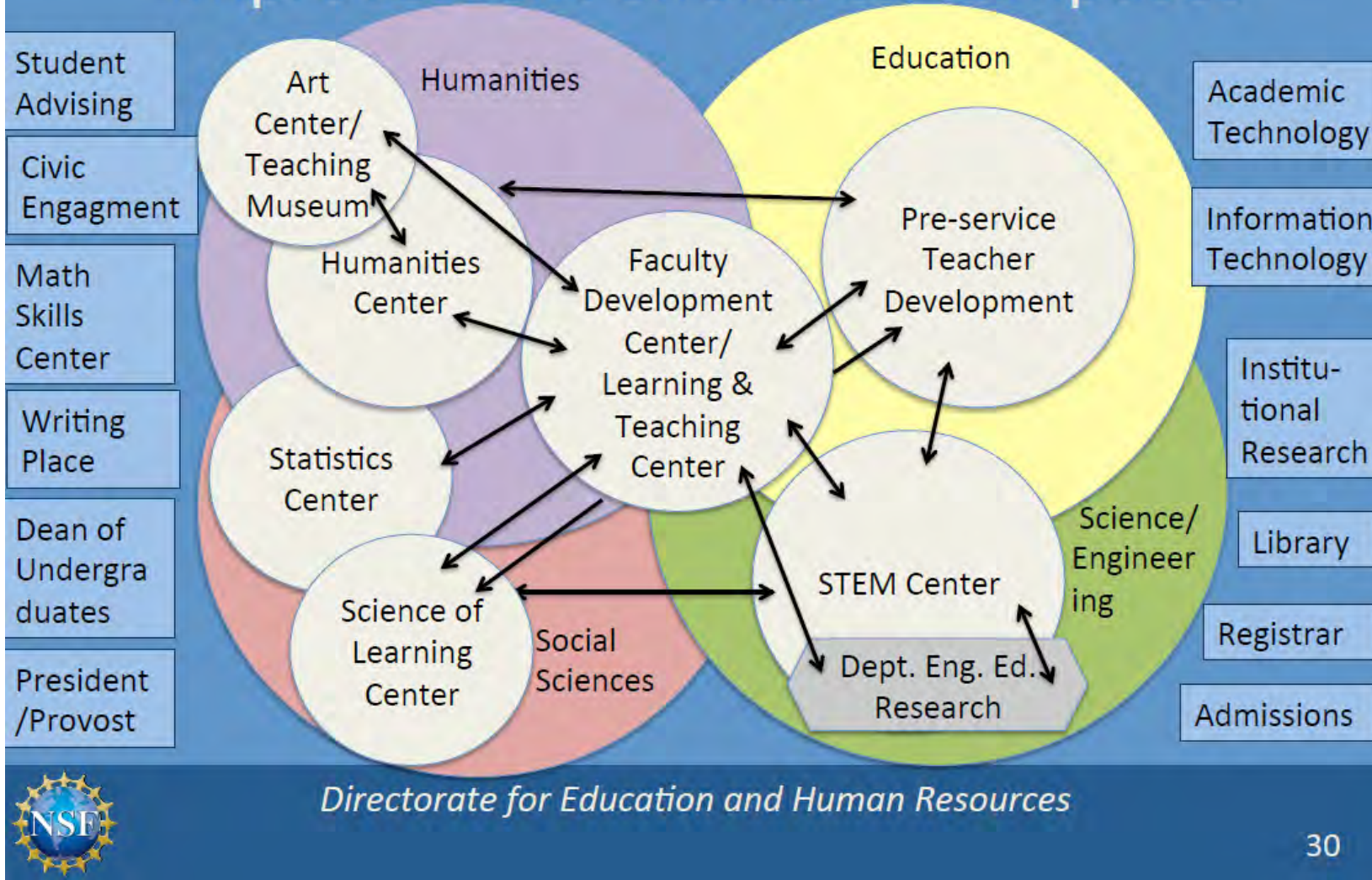
[https://docs.google.com/document/d/1Oss9w3SUW6wUygmzbhDYqB5hZcd2CXQxSCTMgiAC\\_Zw/edit](https://docs.google.com/document/d/1Oss9w3SUW6wUygmzbhDYqB5hZcd2CXQxSCTMgiAC_Zw/edit)

# A variety of STEM Education Centers (SECs)

- ▶ Hubs of campus efforts leading transformation of undergraduate STEM education, including STEM learning experience for students, broadening participation, understanding teaching and learning, broadening the impact of campus research, and supporting national and regional scale improvement in STEM education
- ▶ Include SECs and CTLs w/STEM-focused programs
- ▶ Large variety in the structure and identity of SECs
- ▶ Overlapping goals of improving undergraduate ed, teacher prep, and broader impacts
- ▶ Often housed within CoS or under Provost



# Challenge of disaggregated improvement efforts on campuses



Slide from a presentation by Susan Singer, Division Director, Undergraduate Education, NSF. Presented at the APLU SMTI and STEM Education Centers Meeting - June 4, 2015 -

<https://drive.google.com/file/d/0ByGfi4XyGr5gUWNwcndUak1icnM/view?usp=sharing>

# Network of STEM Education Centers (NSEC): *The network for supporting the transformation of undergraduate STEM education*

- ▶ National network of centers that focuses on undergraduate STEM education transformation within colleges and universities.
- ▶ Four year project (NSF #1524832). Original seed funding from the Alfred P. Sloan Foundation with support from APLU.
- ▶ Addresses calls from the White House (Olson & Riordan, 2012) and National Academies (Singer et al., 2012) for such multi-institutional / nation-wide approaches.
- ▶ Network currently links 135 STEM Education Centers (SEC) at 114 institutions (from 226 SECs at 169 institutions identified to date)

# What Can a Network do for ...?

## Centers

### Institutionalization

- Evidence of center impacts
- Resources for communication strategies
- Legitimize efforts as part of NSEC

### Funding streams

- Providing access to broader network of funders
- Ability to engage in collaborative proposals

### Supporting Transformation

- Expert site visits
- Sharing strategies and best practices
- Sharing resources (tool kits; programs; modules; assessments; communicating success, etc.)
- Sharing disciplinary-based education research; how students learn STEM
- Fostering cross-disciplinary learning

### Finding community

### Prof. Dvmt

### National Platform/ Discussion

- Directory of experts; Cross institutional work/ research action clusters/ working groups

## Funders/ Policymakers

### To solve big, hard, national challenges

- NSEC can help shape and advise current national discussion in STEM education transformation and what is the next generation transformation
- NSEC can help shape/ advise funding priorities for these challenges

### Dissemination, adoption, and adaptation (scalability) within an institution and across institutions.

- NSEC provides the network to implement what works across disciplines/departments within an institution and across institutions.

### One-stop shop. Access to knowledge hubs within a campus and across institutions

- NSEC provides this through its directory of people and practices

### What works in cross institutional efforts, how to scale, and how networks form

- NSEC provides this through research projects

## University Administrators

### Institutional Recognition

- Showcasing of individual campuses at NSEC sites / events
- Campuses point to membership as commitment to quality

### Capacity Building for Student Success

- NSEC provides access to a knowledge network; how interventions are working or not working in multiple institutional contexts, and across disciplines and departments

### Funding

- Access funding for centers
- Models from other centers for new revenue streams/ models

### Data / Evidence on Outcomes

- Resources for documenting impacts of transformations
- Models/ Tools for campus-wide analytics (e.g. Helmsley funded TEA project; AAU STEM Education initiative, etc.)

Quick Links: [Campus Centers](#) • [The Network](#) • [Get Involved](#) • [Workshops](#) • [Center Profiles](#) • [News and Jobs](#)

## Welcome



### Campus Centers in STEM Education

STEM education centers and related offices are the hub of campus-based efforts leading the transformation of undergraduate STEM education at their institutions and beyond. While there is large variety in the structure and identity of STEM education efforts, they all have common functions and goals.

[read more »](#)



### The Network

NSEC is an organization of campus-based centers and offices that serve as catalysts for educational transformation in STEM. The network allows center leadership, university and college administrators, and state and national policymakers to have a central hub for their communal efforts.

[read more »](#)



### Get Involved

There are a number of ways to get involved with the network, from submitting a profile of your center or joining the discussion list to taking part in [workshops](#) and [conferences](#).

[read more »](#)

**CONNECT**  
with your colleagues & collaborators

[Get Involved](#)  
..

[Profile Your STEM Center](#)  
..

[Workshops & Conferences](#)

## News & Jobs

### [The Collaborating for Change initiative has a suite of tools for transforming institutions](#)

The Collaborating for Change initiative at APLU and USU has a new suite of tools for transforming institutions funded by the Bill and Melinda Gates Foundation.

### [Designing Educational Innovations for Sustained Adoption](#)

New book from Charles Henderson and colleagues. It is a how-to-guide for designing and sustaining educational innovations.

### [Online Education: A Catalyst for Higher Education Reforms](#)

The [report](#) of Massachusetts Institute of Technology's [Online Education Policy Initiative](#) is a new study that looks at the challenge of how institutions can best...

[Learn More About the NSEC Project »](#)

## 2016 SMTI/NSEC National Conference

**Theme:** Center Roles in Improving Undergraduate STEM Education  
**Dates:** June 8-9, 2016 (With [follow-on workshop](#), June 9-10)  
**Location:** [Hotel Contessa in San Antonio](#)

This year's conference will focus on centers engaged specifically in improving undergraduate STEM education, and/or involved in STEM teacher preparation and connection of the undergraduate experience with community efforts and broader impacts in STEM.



<b>Network of STEM Education Centers</b>
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Conferences
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2015 SMTI National Conference
Center Profiles
For Team Members
News and Jobs
About NSEC

# 2016 SMTI/NSEC National Conference

**Theme:** Center Roles in Improving Undergraduate STEM Education  
**Dates:** June 8-9, 2016. There is a [follow-on workshop](#) June 9-10.  
**Start time:** 8:00 am CT on June 8, 2016  
**End time:** 4:00 pm CT on June 9, 2016  
**Location:** [Hotel Contessa in San Antonio](#)

[Registration for the conference is here.](#)

Discounted price if registered by Wednesday, April 20, 2016: \$335.

Registration includes breakfast and lunch on June 8 and June 9.

[Link for the conference rate for the hotel is here.](#) Room rates are available 6/7/2016 - 6/11/2016. The rates per night are: Single -\$155, Double=\$155, Triple=\$180, and Quad=\$208.

## Keynote Speaker

**Shirley Malcom, Head of Education and Human Resources Programs (EHR), American Association for the Advancement of Science (AAAS)**

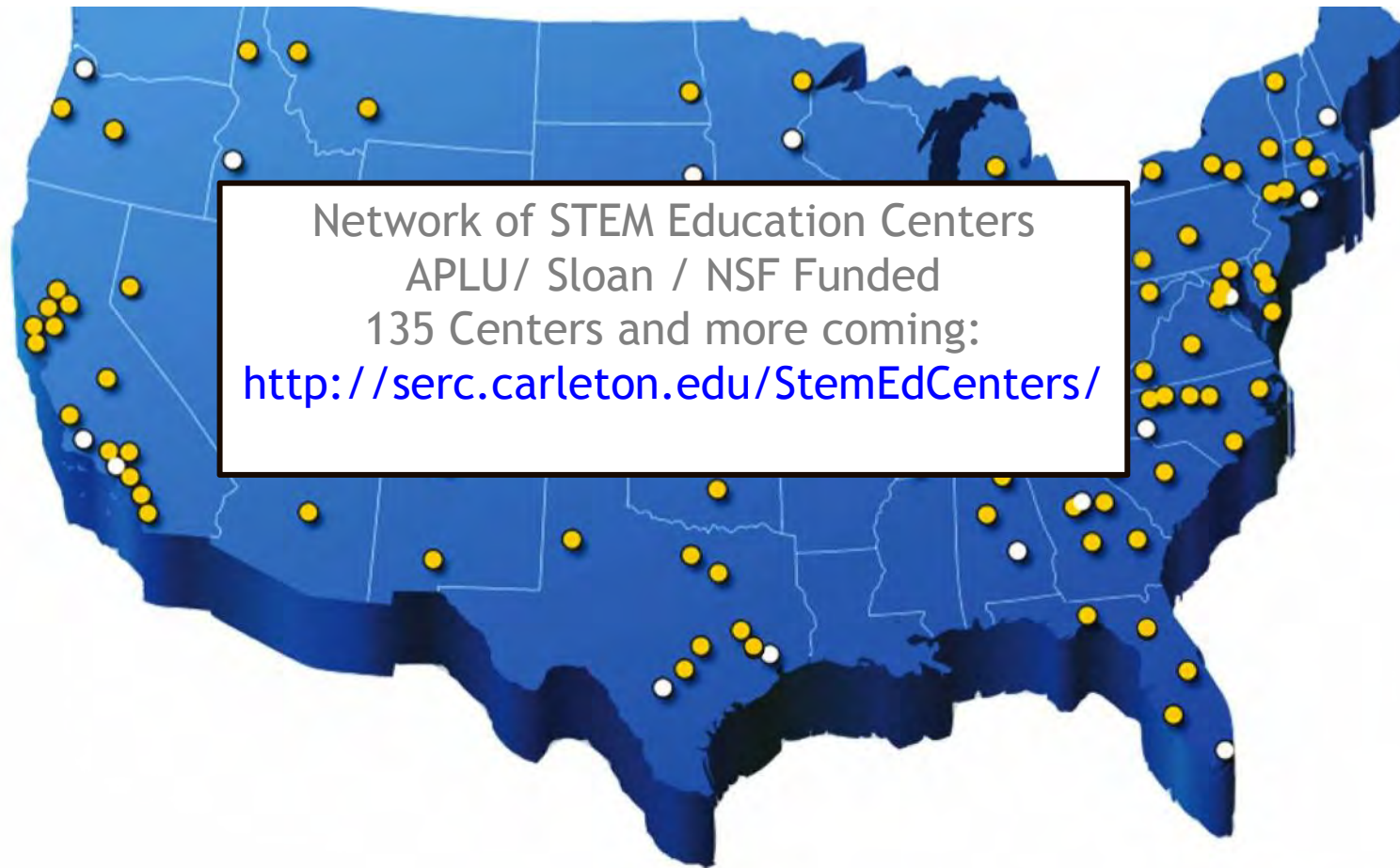
### Plenary Speakers

- **Nancy S. Shapiro**, Associate Vice-Chancellor for Academic Affairs & Special Assistant to Chancellor, University System of Maryland
- **MJ Bishop**, Director of the Center for Academic Innovation, University System of Maryland

# Research Questions

- ▶ How do SECs and CTLs operate on their campuses?
- ▶ What research or programmatic challenges in STEM education do these centers currently address? What evidence is there that these centers are effectively doing this?
- ▶ What research challenges in STEM education are these centers uniquely (or strongly) capable of addressing? How can they function as levers of cultural change at the institutional level? Lead researchers on center impacts are Gabriela Weaver and Deborah Carlisle.
- ▶ How can we effectively design and evaluate a STEM education network? Lead researcher Bruce Goldstein.

# A Network of Regional Centers



# Leadership of NSEC

## Management Team

Kacy Redd (PI and NSEC co-director)

Noah Finkelstein (co-PI and NSEC co-director)

Gabriela C. Weaver (co-PI)

Bruce Goldstein (co-PI)

## Key Staff

Deborah Carlisle

## Steering Committee

Steven Case

Stanley Deetz

Laird Kramer

Marco Molinaro

Cailin Huyck Orr

Martin Storksdieck



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## Evaluator

Nancy Shapiro