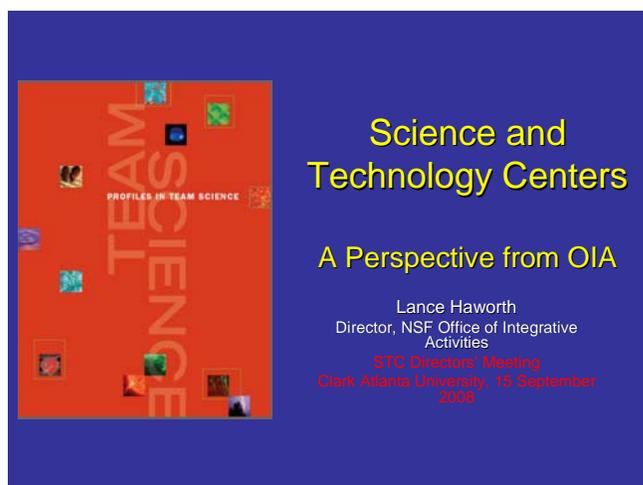


# A Perspective on the NSF Science and Technology Centers

**W. Lance Haworth**  
**Director, NSF Office of Integrative Activities**

**STC Directors' Annual Meeting**  
**Clark-Atlanta University**  
**15 September 2008**

## Slide 1



Good afternoon. My sincere thanks to the organizers for inviting me to meet with you today. It's a great pleasure to be here at Clark Atlanta University, and a great opportunity for me to learn more about your activities in the Science and Technology Centers and the issues that concern you.

I want to begin by recognizing the real experts on STCs in my office –STC coordination team members Randy Phelps, Dragana Brzakovic and Connie Della-Piana who are all here today, and Margaret Tolbert and Joan Frye who are 'virtually' present through our videoconference link with NSF. And I'd like to thank James Wyche from NSF's Education and Human Resources Directorate for joining us here. Of course the STC technical coordinators from the NSF Directorates and Offices who are responsible for each of your Centers are the true technical and scientific experts in each case – but I can't emphasize too much that I am personally excited about the science you are doing, and that goes for my OIA colleagues too!

A few words about myself. I'm a recovering materials scientist. I have been Director of the Office of Integrative activities since January. Before that I served the Division of Materials Research at NSF as program director for Materials Research Centers, as Executive Officer and then Acting Division Director. And before coming to NSF I was a faculty member in metallurgy and materials science at Wayne State University.

I do have some 'historical' familiarity with the STCs – I was DMR's technical coordinator for several STCs early on (in quantum electronic structures; liquid crystals; polymers; cement-based materials) so in a way I feel I'm "coming home". Of course the STC program has evolved rapidly over the years – so I have been attempting to understand today's STCs better by attending some of the NSF site visits. This has been exciting stuff so far – and I hope to continue to visit and see more at first hand over the coming months.

What's the current outlook for the NSF budget? It isn't all that rosy; a continuing resolution seems likely for the new fiscal year, and it may last well into 2009. That means a flat budget and probably the deferral of some decisions for a while; a continuing resolution will also mean no *new* NSF programs, although we will proceed with the upcoming STC competition. There will be a transition to a new administration, of course, no matter who wins the election in November. NSF will be ready for the transition, but it's impossible at this stage to say what the budget outcome will be. In the coming weeks and months we need all your help to focus on the case for the importance of fundamental science and engineering research and education.

In the longer term I am more optimistic. Science and science education have been getting national attention, both on the Hill and by the wider public – Rising Above the Gathering Storm, climate change, Tom Friedman, the need for international competitiveness - are all in the news – nevertheless, this attention hasn't produced much in the way of tangible funding so far.

## Slide 2

**STC Program Goal - 1989**

***“NSF established the STC Program to help maintain US pre-eminence in science and technology, and ensure the requisite pool of scientists with the quality and breadth of experience required to meet the changing needs of science and society – ingredients essential to successful economic competitiveness.”***

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Coming back to the Science and Technology Centers, and the OIA role with respect to the STCs: *OIA was built around STCs from the start.* This program is our flagship. Your Centers are critical for the future of science and engineering in the US. They are highly visible both within NSF and beyond. Here are the important components of an STC from my perspective:

- Taking on major challenges, doing outstanding science, addressing complex problems – making an impact!

- Integrating research and education is part of the fabric
- Defining new directions, potentially transformative
- Taking risks!
- ***Embracing and fostering diversity – more on this topic in a minute***
- And, catalyzing and building the partnerships needed to accomplish your goals – even a major research University can't “go it alone”.

OIA's role is not the ‘science management’ directly – we provide guidance on review and post-award management, and we ensure a common NSF approach and fairness across the system; we encourage best practices – but we *are* hooked on the excitement of what you do!

I probably don't need to remind you that a new competition for STCs will be under way very soon – we look forward to a deluge of pre-proposals on October 14, followed by 18 months of hard work as we review proposals for great science – up to 7 new Centers in 2010.

### Slide 3



## Perspective from OIA

- **Some thoughts on *your* meeting**
- Diversity
- An external review of the STC program

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I was asked for my perspective on your STC Directors' meeting. I see the overall purpose as the stimulation of collaboration and networking among STCs, not for its own sake but *for your own benefit*. What can you learn from each other? What works and what doesn't? The science you each do is often different (*but sometimes related!*). Are there areas where networking and collaboration may be fruitful? Consider some possibilities:

- Networking in areas of complementary science activities; joint workshops that we may support
- Education, undergraduate research, research experience for teachers, ethical issues
- Outreach – pre-college students and programs, museums, and your outreach to the public
- Internal – STC management, your advisory committees,

- Building all kinds of partnerships – at all levels - government, private sector, local, state, national...
- Cyberinfrastructure and shared facilities
- International collaborations and educational experiences
- Added value – what does it mean, how do you demonstrate this?
- Publicity, visibility and communication – and *we* need *your* help here – tell us about your achievements!!
- “Legacy” and life after NSF

Above all, these are your meetings – I want to encourage you to make them productive!

#### Slide 4



### Perspective from OIA

- Some thoughts on *your* meeting
- **Diversity**
- An external review of the STC program

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Your meeting today focuses on diversity. But what does that mean? Gender diversity, ethnic diversity, geographical, institutional, educational, income level diversity, “other”, “all of the above”? One example is the EPSCoR program – one of my office’s responsibilities – catalyzing increased competitiveness for researchers and institutions in states and jurisdictions that have been relatively less successful in obtaining NSF support.

#### Slide 5

### STCs and Diversity

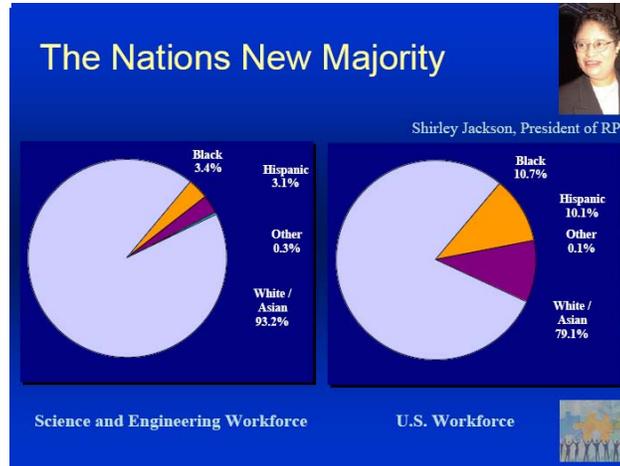
NSF expects STCs to demonstrate leadership in the involvement of groups traditionally underrepresented in science and engineering, at all levels within the Center...

...STCs are strongly encouraged to form meaningful, substantive and long-term partnerships with minority-serving institutions, women’s colleges and institutions that primarily serve students with disabilities...

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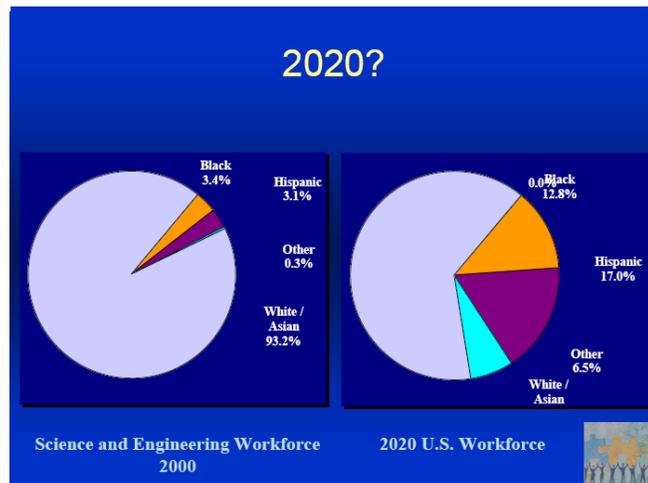
Today I want to focus on gender and ethnic diversity and the potential and responsibility of the STCs. Here's what we expect of you.

**Slide 6**



Shirley Ann Jackson, President of RPI, has drawn attention to the “Under-represented Majority” in science and engineering in the US – the women and ethnic minorities who together constitute a substantial majority of the US population. Today, women and minorities are woefully under-represented in the science and engineering workforce.

**Slide 7**



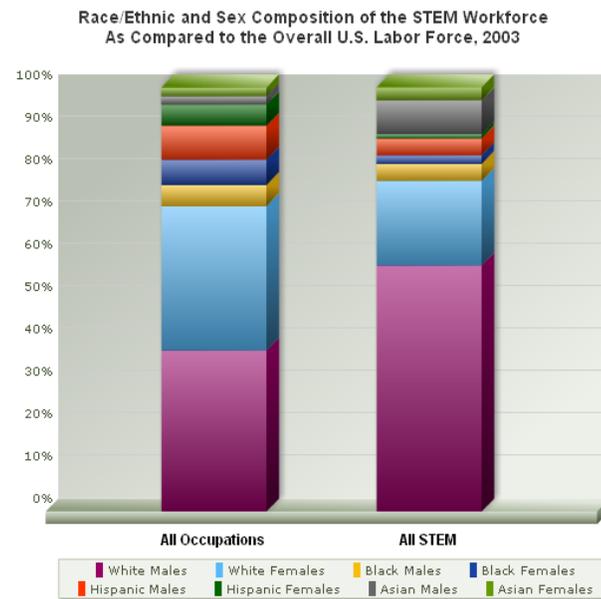
How will that look a dozen years from now? This is a huge challenge for education at all levels, and surely a challenge for higher education. How effective are your STC efforts at broadening participation? How will you know if those efforts are working?

**Slide 8**



A recent project may be helpful in developing strategies to diversify faculty in science and engineering departments. It was supported by NSF’s Education and Human Resources Directorate and involves seven US universities and colleges. Several of the next few slides area taken from this brochure – it’s available on the web.

**Slide 9**



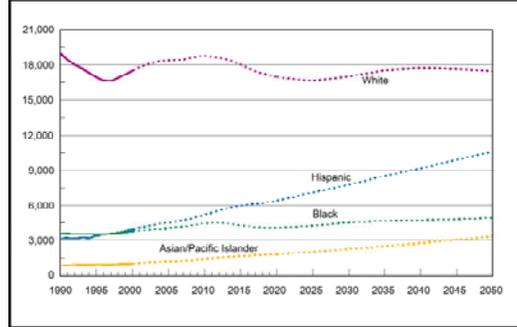
Source: Bureau of Labor Statistics (annualized merged data from monthly Current Population Surveys)

Here’s another comparison of diversity in the STEM workforce and the overall US labor force. It shows there are significant differences between the two sets of data for men and women in each ethnic category. Except for Asian-Americans, women and ethnic minorities are dramatically under-represented in STEM occupations generally.

Slide 10

### Student Population Projected to be 50% URM's by 2050

U.S. Population 18-24 Years Old, by Race/Ethnicity: July 1990-99 and Projections to 2050

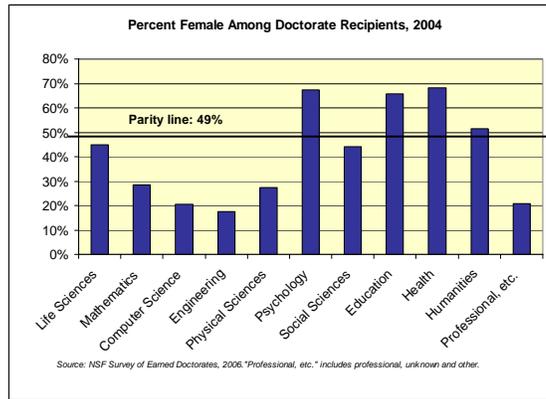


Source: National Science Foundation, *Women, Minorities and Persons with Disabilities in Science and Engineering, 2004*.  
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And of course if we look to the future, the talent pool we are missing will only get bigger. By 2050, current demographic projections show that our future students will constitute a “majority of minorities” – a huge challenge for higher education.

Slide 11

### Faculty Diversity

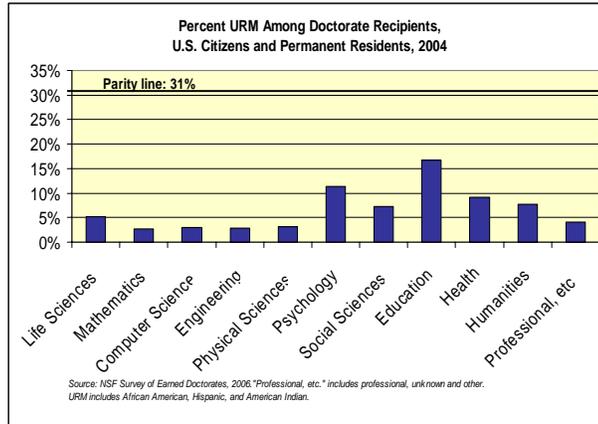


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Of course the diversity of today’s faculty and students varies a great deal by discipline. For example, in 2004, women doctoral recipients were a clear majority in psychology, health fields and education and close to parity in the humanities, social sciences and life sciences. But women still earn a disproportionately small fraction of PhDs in math, computer science, engineering and the physical sciences.

Slide 12

# Faculty Diversity

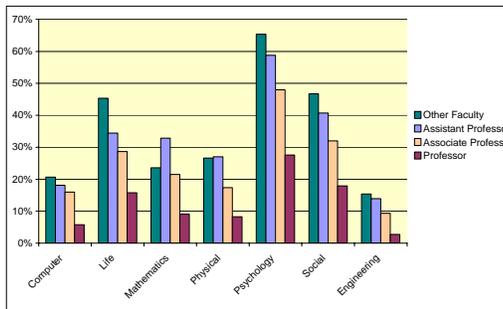


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And the numbers for doctoral recipients among under-represented minorities are much worse – well below five percent in many cases.

Slide 13

## Women as a Percent of Ph.D.s Employed in Universities & 4-Year Colleges by STEM Field and Rank, 2001



Analysis of original data from: National Science Foundation. *Women, Minorities and Persons with Disabilities in Science and Engineering, 2004.*

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The picture gets worse as we consider faculty rank. For example the proportion of women faculty in universities and four-year colleges falls in every one of the fields shown here as we move from assistant to associate to full professor. In 2001 women were all but invisible at the senior faculty level in computer science, mathematics, physical sciences and engineering. The numbers may be improving, but only very, very slowly.

## Slide 14

### **Top Ten Rationalizations Participants Have Heard for Not Hiring Women and URM**

- #10 Women and URM are not interested in academic careers.
- #9 There are no "qualified" women and URM.
- #8 Women with children are not serious academics.
- #7 Women and URM do not apply.
- #6 We can't compete for them.
- #5 Women and URM are too expensive to hire.
- #4 We can't find women or URM that fit our special needs.
- #3 Why should we spend more time getting these applicants?
- #2 It's too expensive to advertise more widely.
- #1 **If it ain't broke, why fix it?**

### **Strategies for Effective Hiring and Retention**

<http://www.cpst.org/diverse.cfm>

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So what do the folks already in the world of academic faculty have to say about the reasons women and minorities aren't getting hired or promoted? Here's what the study survey found.

## Slide 15



### **Department Chair Workshops on Gender Equity**

**"Presenters repeatedly stressed that more than an issue of fairness, gender equity is in the nation's self-interest, since attracting the best minds to science promotes national security and the U.S. position in the global economy."**



- **Chemistry**
  - January 29-31 2006, Arlington, VA (NSF, NIH, DOE)
  - Co-chairs Ken Houk (UCLA), Cynthia Friend (Harvard)
  - <http://www.chem.harvard.edu/groups/friend/GenderEquityWorkshop/>
- **Physics**
  - May 6-8 2007, College Park, MD (NSF, DOE)
  - Co-chairs Nora Berrah (WMU), Arthur Bienenstock (Stanford)
  - <http://www.aps.org/programs/women/workshops/gender-equity.cfm>
- **Materials Science and Engineering**
  - May 18-20 2008, College Park, MD (NSF, DOE)
  - 6 member organizing committee of the University Materials Council
  - <http://www.msa.uiuc.edu/gender/index.htm> (program, presentations & links)

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In 2006 the National Academies' Committee on Maximizing the Potential of Women in Academic Science and Engineering organized a workshop on "Beyond Bias and Barriers" partly in response to questions raised by (then) Harvard president Larry Summers about the scientific capabilities of women in particular. At least 3 NSF Gender Equity Workshops have followed up since then in an effort to address the issues of gender equity in higher education – in Chemistry, Physics, and Materials Science and Engineering departments. How effective are your STC efforts towards gender equity? And again, how do you evaluate them?

## Slide 16

# Data Resources

- Various reports on science and engineering education and labor force are available from the Commission on Professionals in Science and Engineering: <http://www.cpst.org/>
- Data on the gender and ethnicity of faculty at the top fifty departments in various fields of science and engineering "The Nelson Diversity Surveys" by Nelson, D. J.: Norman, OK, <http://cheminfo.chem.ou.edu/faculty/djn/diversity/top50.html>
- Availability data are computed by the University of California, Office of the President and made available online at: <http://www.ucop.edu/acadadv/datamgmt/welcome.html>
- The National Science Foundation publishes data on doctoral recipients every two years. The most current data are available at: <http://www.nsf.gov/statistics/nsf06308/>
- Other data from the National Science Foundation can be obtained from the Division of Science Resource Statistics website: <http://www.nsf.gov/statistics/>
- **NSF's most recent Science and Engineering Indicators report is available:** <http://www.nsf.gov/statistics/seind08/>

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For the record here are some data resources on workforce and diversity—or lack of diversity—in STEM. If you're not familiar with it, the NSF Science and Engineering Indicators Reports, published every two years, is a gold-mine of information.

In closing, I have a few comments about the STC Program External Review that we are planning for the coming year.

## Slide 17



### Perspective from OIA

- Some thoughts on *your* meeting
- Diversity
- **External review of the STC program**

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The National Science Board mandated a review of the STC program when the second phase of the program was approved by them back in 1997. So it's certainly time for us to step forward and ask some questions. Is this a successful program? What are its accomplishments and outcomes? What impact is it having? We are still working out the details of how best to approach and accomplish this review, but I can summarize a few key points for you here:

- The focus will be on outcomes and impact, not on the review process or program management as such
- All current STC cohorts will be included – and since you are at various stages of the life of the Center, this may complicate matters...
- We plan to start the review early in FY09, and hope to have a report within about one year

- The report will help guide future direction for the program
- We plan to have the National Academies administer the process, for example through the Committee on Science, Engineering and Public Policy which would convene a distinguished panel of experts to conduct the review itself and prepare a final report. Data and data analysis from Abt Associates will help inform the reviewers. OIA will make every effort to minimize the burden on you (the STCs), but we will need your active cooperation to obtain accurate and useful information. The external panel will probably want to meet with STC Directors and may want to visit selected Centers.

I want to say unequivocally that this will be a program-level review, not a review of individual Centers! But obviously your outcomes, impact & major achievements will be a primary focus. And that's a nice segue into our next session this afternoon.

### Slide 18



Thank you for listening! And now I hope you have some questions for me...