



Connecting people and resources
to accelerate discovery by empowering
the science gateway community

Workforce Development NITRD Middleware and Grid Interagency Coordination Team (MAGIC)

**Linda Bailey Hayden
Science Gateways Community Institute
Director of Workforce Development
LBHAYDEN@ECSU.EDU**

sciencegateways.org

Award Number
ACI-1547611





Success is in the Numbers

- The 23 NITRD member agencies invest approximately \$6.5 billion annually in R&D programs that identify, develop, and transition to practical use the advanced networking and IT capabilities needed by the Federal Government and the Nation.
- With this size investment it is critical that not only the advanced networking and IT capabilities produce outstanding outcomes but the workforce development outcomes are equally impressive.

Success is in the Numbers

Success is in The Numbers

African American Women

Excel in Math Ph.D. Program

by Kathleen Kennedy Manzo

Pages 40-43

Black Issues In Higher Education Magazine

May 19, 1994



Dr. Nina Roscher Chemistry Professor, American University (Deceased) NSF PAESMEM1998

Dr. Mary Gray, Distinguished Professor of Mathematics and Statistics, American University, NSF PAESMEM 2001

Dr. Linda Bailey Hayden, Professor Emeritus, Elizabeth City State University, NSF PAESMEM 2003

**Presidential Awards for Excellence in Science,
Mathematics and Engineering Mentoring**



Success is in the Numbers

- Cyberinfrastructure for remote sensing of ice sheets

DR LINDA HAYDEN

Building capacity in polar sciences

Working with cyberinfrastructure in remote locations has offered **Dr Linda Hayden** the opportunity to support a wide range of students to develop research interests in Polar Regions

How does your approach for remote sensing of ice sheets differ from previous studies?

The Polar Grid project deploys innovative technology to Greenland and Antarctica to aid polar science research on our changing planet. Our current cyberinfrastructure activities include support of field expeditions that build on previous Polar Grid work. There is increasing activity in the provision of offline data analysis, and initial progress is being made in preliminary Matlab processing, visualisation and presentation of data products from the Center for Remote Sensing of Ice Sheets (CReSIS) and related activities to support the interpretation of radar data. Cloud and advanced visualisation technologies are also being exploited in this work.

Field cyberinfrastructure consisted of field servers to process data in real-time and drivers to back up data collected during each mission. One seven-hour P-3 flight and two four-hour Twin Otter flights have generated close to two terabytes of data. This data is first copied onto the disc drives and verified. The copied data is processed with unfocused synthetic aperture radar (SAR) algorithms using a field server. The processed data is used to generate radar echograms. Data archival, processing and echogram generation is normally completed within 24 hours after completion of a mission; the data is then posted on the ftp server in order to check quality and re-plan any flight lines. During the 2010 field season, most of the data collected as a part of the NASA Operation Icebridge project over Antarctica was processed and posted on the website within 24 hours. We expect to follow a similar procedure during the spring deployment of the Twin Otter and P-3 aircraft in Greenland.

Could you describe some of the research training and professional activities that you provide?

Students are offered opportunities to attend workshops and seminars that enhance their content knowledge, to work with our international partners to provide opportunities for students to study and research abroad, as well as internship opportunities with industry, at national laboratories and internationally. Finally, we engage with K-12 students, parents and educators through a combination of informal education activities, classroom engagement events and a more broad public awareness campaign.

How has this initiative built on the successes of previous partnerships and projects?

Indiana University, Elizabeth City State University and the Association of Computer and Information Sciences and Engineering Departments at Minority Institutions (ADMI) have all collaborated on cyberinfrastructure and educational projects. This was prior to having Indiana University and ADMI join the CReSIS partnership during the second phase, which commenced in 2010. Dr Geoffrey Fox at Indiana University was a distinguished lecturer at Elizabeth City State University in 2006 and had worked with other ADMI institutions, specifically Jackson State University, in curriculum-related projects. In 2001, Charles Luther, former President of the Geoscience and Remote Sensing Society, introduced me to Dr Prasad Gogineni, now the Director of CReSIS, at the Institute of Electric and Electronics Engineers Geoscience and Remote Sensing Conference in Australia. At that time we agreed to join efforts and did so for the development of the CReSIS Science and Technology Center proposal.

What have been the greatest successes of your studies so far?

We have had many successes and points of pride for the CReSIS and Polar Grid projects within both the research and education arenas. Regarding research, we have developed technologies and techniques to provide in some instances rapid changes. With regards to educational successes, hundreds of students have been engaged; and one team of students led by Dr Malcolm LeCompte (ECSU) and Dr Robert Bindschadler (NASA Goddard) produced results that were recognised in the recommendation and approval of the Advisory Committee on Antarctic Names (ACAN) to the US Board on Geographic Names to designate a bay in the West Antarctic as The Elizabeth City State University Bay.



Linking real-time research data through Polar Grid

DR LINDA HAYDEN

By using innovative cyber-based information systems, the **Center for Remote Sensing of Ice Sheets** is delivering technological solutions that connect data and people working in Antarctica and Greenland

THE TERM CYBERINFRASTRUCTURE has been used since the late 1990s to help describe a whole range of internet-based technologies that link research institutions, computers and data with the researchers themselves. It includes data tools such as storage, management, integration, visualisation and mining, as well as processing services. The benefit of cyberinfrastructure is that it supports research beyond the level that a single institution would generally be capable of, and often in sites that are remote and inherently difficult to access. One of the scientific fields that has most certainly benefited from the development of cyberinfrastructure is Polar research. In 2005, the National Science Foundation (NSF) helped to establish the Center of cyberinfrastructure solutions that help to realise an improved knowledge of the mass balance of polar ice sheets.

BUILDING MUTUALLY BENEFICIAL ALLIANCES

One of the latest projects supported by the CReSIS collaboration is known as Polar Grid, which involves the construction of a large-scale distributed computing system that is specifically designed to assist with administering and managing any data that has been gathered by polar studies. Polar Grid is supported by a consortium of research institutes that are advancing these cyberinfrastructure tools. The lead institution of CReSIS is the University of Kansas, and they are collaborating with ECSU, IU, the University of Washington, The Pennsylvania State University, Los Alamos National Laboratory, and the Association of Computer and Information Science Engineering Departments at Minority Institutions (ADMI). They also work closely with a number of international partners, both academic and industrial.

Hayden, who is leading the ECSU's involvement in Polar Grid, explains that ECSU, through their **Enabling Academic Computing**

Building Capacity in Polar Science, International Innovations: Disseminating Science Research and Technology, North America edition August 2012. P 32-35.

Guest Editor, Kelly Faulkner, NSF Polar Science, Director of the National Science Foundation's Office of Polar Programs



CyberInfrastructure for Remote Sensing of Ice Sheets

Demographics for the REU students are given in the chart below; women made up 42% to 63% and minorities made up 66% to 89%.

	2010 Number	2010 Percent	2011 Number	2011 Percent	2012 Number	2012 Percent	2013 Number	2013 Percent
Women	11	42%	22	63%	12	55%	13	50%
White	5	19%	12	34%	4	18%	3	11.5%
Black	20	77%	21	60%	17	77%	21	80.8%
Hispanic	1	4%	1	3%	0	0%	0	0
Asian	0	0%	1	3%	0	0%	0	0
Native American	0	0%	0	0%	1	5%	2	7.7%
Total	26		35		22		26	



Over all CReSIS WD programs

- 55% being female students and 80% minority students (African American, Hispanic and Native American).
- 44% of the participants who provided information regarding their socio-economic status shared they were from single-parent households with an annual income of less than \$45,000.
- Discovery of a new world feature: Elizabeth City State University Bay in Antarctica. Malcolm LeCompte, Robert Bindschadler, Linda B. Hayden, *Temporal Reduction and Loss of an Ice Shelf in Pine Island Bay, Antarctica: 1972 – 2003*, IEEE-GRSS Journal of Selected Topics in Applied Earth Observations and Remote Sensing (GRSS-JSTARS) GRSL-00258-2012, IEEE- JSTARS-2012-00405.R1



• **Thousands of K-16 and Graduate Students were impacted.**



SGCI WD Connects Students to Gateway Experts and Technology





SGCI Workforce Development Impact

- Internships





SGCI Workforce Development Impact

- Internships
- Supercomputing Hackathon





SGCI Workforce Development Impact

- Internships
- Supercomputing Hackathon
- PEARC Hackathon



SGCI Workforce Development Impact

- Internships
- Supercomputing Hackathon
- PEARC Hackathon
- ADMI Professional Development Seminar





SGCI Workforce Development Impact

- Internships
- Supercomputing Hackathon
- PEARC Hackathon
- ADMI Professional Development Seminar
- Young Professional Awardees





SGCI Workforce Development Impact

- Internships
- Supercomputing Hackathon
- PEARC Hackathon
- ADMI Professional Development Seminar
- Young Professional Awardees
- Coding Institute





SGCI Workforce Development Impact

- Internships
- Supercomputing Hackathon
- PEARC Hackathon
- ADMI Professional Development Seminar
- Young Professional Awardees
- Coding Institute
- Academic Year Workshop





SGCI Workforce Development Impact

- Internships
- Supercomputing Hackathon
- PEARC Hackathon
- ADMI Professional Development Seminar
- Young Professional Awardees
- Coding Institute
- Academic Year Workshop
- Gateway Conference





SGCI Internships by the Numbers

Year	# Interns	# Male	# Female	# Minority	% Minority	% Women	% Clients Paid
2017	4	3	1	2	50%	25%	39%
2018	6	5	1	3	50%	17%	75%
2019	8	4	4	4	50%	50%	69%
2020	15	11	5	8	53%	33%	53%
Totals	33	23	11	17	52%	33%	59%

Women made up 33% of the participants and 52% were minority.



SGCI Mentoring Model

Building a community of mentors

- Partner with NSF REU community through NCAR led by Valerie Sloan, Director of the NCAR|UCAR GEO REU Network
- Mentoring in a virtual environment webinar
- 81 mentors to date for hackathons, interns and conference
- Mentoring resource toolkit

Provide Mentoring Opportunities

- Gateway conference mentoring
- Internship and coding institute mentoring



SGCI Community Mentors	Number
2020 Internship Mentors	10
2019 Internship Mentors	11
2018 Internship Mentors	6
2017 Internship Mentors	6
2019 Conference Mentors	8
2018 Conference Mentors	12
2017 Conference Mentors	14
2019 PEARC Hackathon Mentors	7
2018 PEARC Hackathon Mentors	7
Total	81

Traction - Building a Mentoring Community



Current Status of Past Participants

Where are they now



**Associate Software Engineer
at Red Hat (Disaiah Bennett)**



Graduate Student @ ECSU



**Cloub Engineer at Oracle
(Jacob Harless)**



**Technology Analyst @ Bank of
America ((Andrea Dumalagan)**



**System Administrator at IBM
SoftLaser ((Hagen Hodgkins)**



**GIS Reservist at FEMA
(Joel Gonzales-Santiago)**



**Returning Intern at Ohio
Supercomputer Center
(Michaud Reyna)**



**DESIGNER 1 @ Newport News
Shipbuilding (Derek Morris)**



Suggestions for NITRD members

- Assure that reviewers understand and value WD
- Consider ways to **partner** with minority professional organizations (MPO). (i.e. joint meetings/events, speakers, etc)
- Consider ways to increase scholarships and fellowships funds
- Consider tier 1 and tier 2 summer research training programs based on the Team concept



Suggestions for Federal Agencies

- Have the MPO to nominate students for a conference travel award from your organization.. You can specify your requirements: Classification, GPA, major, research interest, etc. should be factors.
- Mentor the students during the conference. Attend sessions with them to bring your discipline area relevance to what they hear. Let them know about other opportunities you have for them i.e. internships, AY scholarships, etc
- Name seminars/lecture series after your organization.
- Make presentations as part of the MPO conferences.





Suggestions for NITRD members

- National Association of Black Geologists and Geophysicists (NABGG)
- Advancing Hispanic/Chicano and Native Americans in Science (SACNAS)
- The Association of Computer and Information Science/Engineering Departments at Minority Institutions (ADMI)
- The National Technical Association (NTA)



Suggestions for NITRD members

- Society of Black Physicists (NSBP)
- National Association of Black School Educators (NABSE)
- National Association of Mathematicians (NAM)
- National Society of Black Engineers (NSBE)
- National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE)



Suggestions for NITRD members

- Hold Awardees Accountable for Broader Impact Outcomes
 - Results from Prior Funding: Include WD
 - Assure that reviewers hold awardees accountable when proposals are being reviewed
- Invest in Successful MSI-TWI Partners to Help Them Mentor New Partnerships that Involve MSI's
- Conduct strategy sessions with the MPOs and MSIs where they have a voice in the development of the partnership.



Success is in the Numbers

- NITRD WD programs should not produce average, mediocre or typical numbers.
- **NITRD WD efforts should produce FRONT PAGE, JUMP OFF THE PAPER numbers.**
- NITRD WD outcomes should be as impressive as the science and technology outcomes.



"Any opinions, findings, conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the Networking and Information Technology Research and Development Program."

The Networking and Information Technology Research and Development
(NITRD) Program

Mailing Address: NCO/NITRD, 2415 Eisenhower Avenue, Alexandria, VA 22314

Physical Address: 490 L'Enfant Plaza SW, Suite 8001, Washington, DC 20024, USA Tel: 202-459-9674,
Fax: 202-459-9673, Email: nco@nitrd.gov, Website: <https://www.nitrd.gov>

