



# **Experimental Program to Stimulate Competitive Research (EPSCoR)**

**Project Directors / Project Administrators**

**Annual Meeting**

**NSF EPSCoR Updates**

---

**Arlington, VA  
17 May 2010**



# What is EPSCoR?

---

- State-based capacity-building program
  - Governance includes State committee
  - Alignment with State S&T plan
  - Research driven: **Science First!**
  - State co-investment – 20% Cost Sharing
  - Economic development
- Multidisciplinary
- Multi-institutional
- Close interaction between NSF and the EPSCoR community

***Multi-faceted State-wide program!***



# EPSCoR in Context

---

- Established by NSB Resolution in 1978
- Target: States receiving lesser amount of NSF research support funding
- Purpose: To build sustainable capacity of educational institutions in those states to compete more successfully in NSF and other research programs



# EPSCoR Investment Strategies

---

- **Research Infrastructure Improvement Awards (RII)**  
Support physical, human, and cyber infrastructure within academic institutions at the state level
- **Co-Funding with NSF Directorates and Offices**  
Supports individual investigators and groups from EPSCoR jurisdictions by co-investment with disciplinary research programs in their meritorious proposals
- **Outreach Activities and Workshops**  
Brings EPSCoR jurisdiction investigators together with NSF program staff; builds mutual awareness and transparency



# EPSCoR Strategic Objectives

---

- Catalyze key research themes
- Activate effective jurisdictional and regional collaborations
- Broaden participation
- Use EPSCoR for development, implementation, and evaluation of programmatic experiments

***Strengthen Jurisdictions Capacity for Competitiveness***



# NSF EPSCoR Jurisdictions

1980

Arkansas  
Maine  
Montana  
South Carolina  
West Virginia

2001

Hawaii  
New Mexico

2002

U.S. Virgin Islands

1985

Alabama  
Kentucky  
Nevada  
North Dakota  
Oklahoma  
Puerto Rico  
Vermont  
Wyoming

2003

Delaware

2004

New Hampshire  
Rhode Island  
Tennessee

1987

Idaho  
Louisiana  
Mississippi  
South Dakota

2009

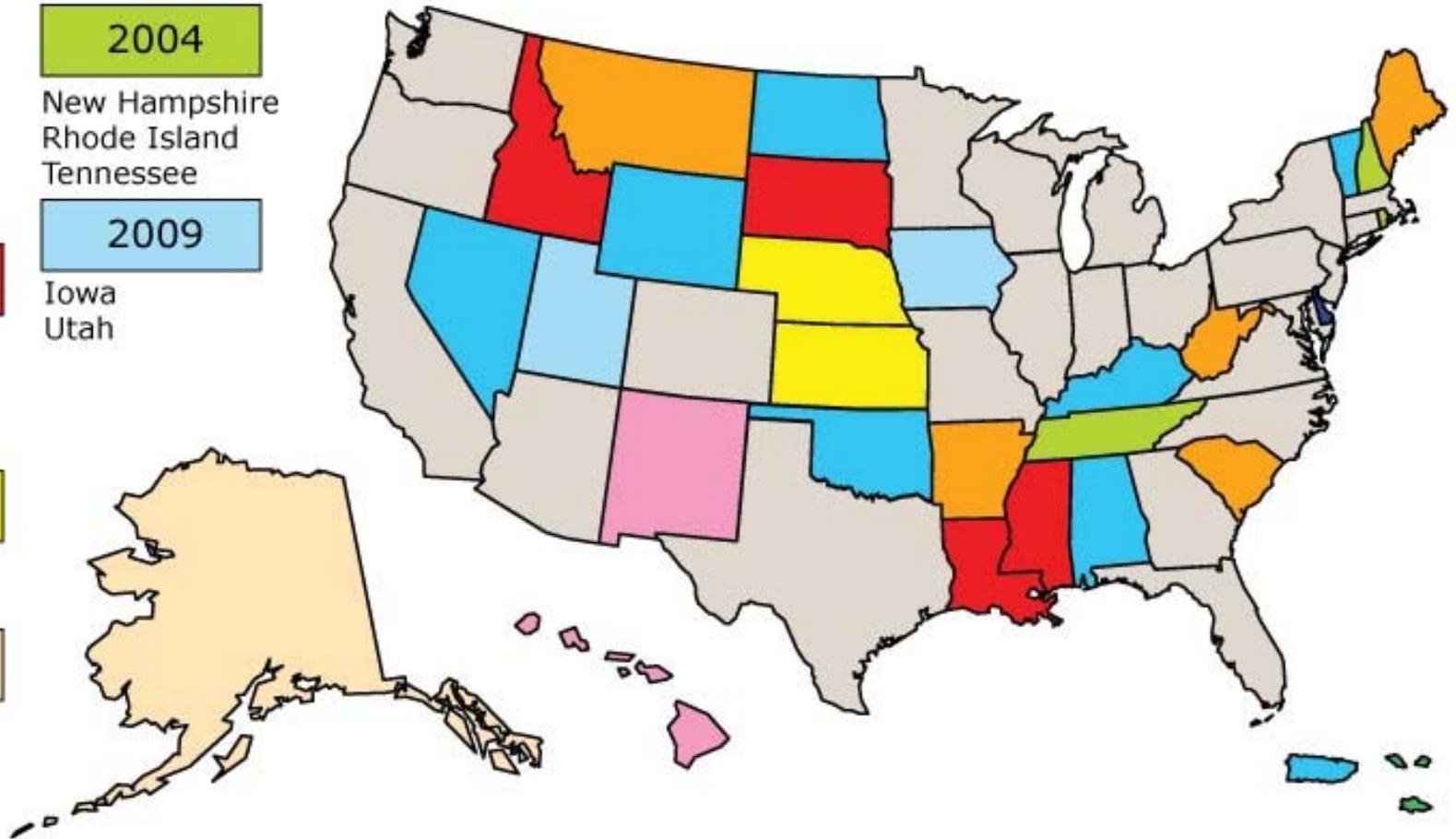
Iowa  
Utah

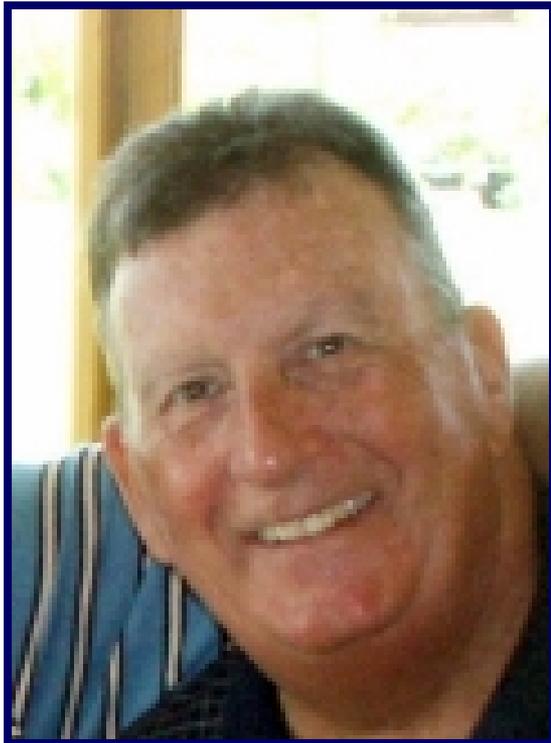
1992

Kansas  
Nebraska

2000

Alaska





Robert L. Dalton

1948 – 2010

Clear Vision

Strong Leadership

---

*The Power of Partnerships*



# **NSF EPSCoR Updates**

---

- **Eligibility**
- **Staffing**
- **Portfolio Activity**
  - **Research Infrastructure Improvement**
    - ✓ **RII Track-1**
    - ✓ **RII Track-2**
    - ✓ **RII C2**
  - **Co-Funding**
  - **Outreach and Workshops**
- **Budget Outlook and Planning**



# NSF EPSCoR Staff

---





# Jurisdiction Responsibilities

<b>Denise Barnes</b>	<b>John Hall</b>	<b>Maija Kukla</b>	<b>Jennifer Schopf</b>	<b>Uma Venkates'n</b>
Alabama	Arkansas	Delaware	Idaho	Alaska
Hawaii	Maine	Kentucky	Mississippi	Kansas
Iowa	Montana	Louisiana	Nevada	Puerto Rico
Utah	N Dakota	Nebraska	N Hampshire	Rhode Is
	S Dakota	Oklahoma	N Mexico	
	Virgin Is	S Carolina	Tennessee	
	Wyoming	W Virginia	Vermont	

Updated 15-May-10



# **NSF EPSCoR Updates**

---

- **Eligibility**
- **Staffing**
- **Portfolio Activity**
  - **Research Infrastructure Improvement**
    - ✓ **RII Track-1**
    - ✓ **RII Track-2**
    - ✓ **RII C2**
  - **Co-Funding**
  - **Outreach and Workshops**
- **Budget Outlook and Planning**



# EPSCoR Investment Tools for Capacity Building

- **Research Infrastructure Improvement Awards (RII)**
  - **Track-1**: Up to 5 years and \$20M to jurisdictions to improve physical and human infrastructure critical to R&D competitiveness in priority research areas.

**In FY 2009: 9 Proposals; 6 Awards**

**In FY 2010: 14 Proposals; 7 Awards**



# RII FY 2011 Update: Track-1

Event	Target Date
• New Solicitation Released (NSF 10-xxx)	07/01/10
• Proposals Due	10/04/10
• Review Panel	Nov 2010
• DRB Review	Mar 2011
• NSB Review	May 2011
• Awards Announced	May 2011
• Start Dates	Jul 2011



# **NSF EPSCoR Updates**

---

- **Eligibility**
- **Staffing**
- **Portfolio Activity**
  - **Research Infrastructure Improvement**
    - ✓ **RII Track-1**
    - ✓ **RII Track-2**
    - ✓ **RII C2**
  - **Co-Funding**
  - **Outreach and Workshops**
- **Budget Outlook and Planning**



# EPSCoR Investment Tools for Capacity Building

- **Research Infrastructure Improvement Awards (RII)**
  - **Track-2**: Up to 3 years and \$6M to consortia of jurisdictions to support innovation-enabling cyberinfrastructure of regional, thematic, or technological importance.

**In FY 2009: 9 Proposals; 7 Awards (5 ARRA)**

**In FY 2010: 4 Proposals; 2 Awards**



# RII FY 2011 Update: Track-2

Event	Target Date
• New Solicitation Released (NSF 10-yyy)	08/02/10
• Proposals Due	01/14/11
• Review Panel	Mar 2011
• Awards Announced	May 2011
• Start Dates	July 2011



# **NSF EPSCoR Updates**

---

- **Eligibility**
- **Staffing**
- **Portfolio Activity**
  - **Research Infrastructure Improvement**
    - ✓ **RII Track-1**
    - ✓ **RII Track-2**
    - ✓ **RII C2**
  - **Co-Funding**
  - **Outreach and Workshops**
- **Budget Outlook and Planning**



# EPSCoR Investment Tools for Capacity Building

- **Research Infrastructure Improvement Awards (RII)**
  - **Cyber Connectivity (C2)**: Up to 2 years and \$1M to support the enhancement of inter-campus and intra-campus cyber connectivity and broadband access within an EPSCoR jurisdiction.

**In FY 2010: 23 Proposals; 17 Awards (ARRA)**



# RII FY 2011 Update: C2

Event	Target Date
• Solicitation Released (NSF 10-zzz)	07/14/10
• Proposals Due	11/04/10
• Review Panel	Jan 2011
• Awards Announced	Apr 2011
• Start Dates	Jun 2011



# **NSF EPSCoR Updates**

---

- **Eligibility**
- **Staffing**
- **Portfolio Activity**
  - **Research Infrastructure Improvement**
    - ✓ **RII Track-1**
    - ✓ **RII Track-2**
    - ✓ **RII C2**
  - **Co-Funding**
  - **Outreach and Workshops**
- **Budget Outlook and Planning**



# EPSCoR Investment Tools for Capacity Building

---

## Co-Funding:

**Joint support of research proposals submitted by EPSCoR researchers to non-EPSCoR NSF programs that have been merit reviewed and recommended for award, but could not be funded without the combined, leveraged support of EPSCoR and the Research and Education Directorates and Offices.**



# Co-Funding Essentials

---

- Reviewed and Recommended for Funding within NSF Directorates and Offices
- Combined leveraged support necessary for funding
- Characteristics favoring Co-funding:
  - New PIs
  - Collaborative
  - Multidisciplinary
  - Synergistic
  - Broaden participation
  - Instrumentation
  - R/T Ops for St/Tchrs
  - Integration of R&E
- **Tipping Point is Financial!**



# EPSCoR Co-Funding (\$M)

---

<b>FY</b>	<b>EPS</b>	<b>Dir/Off</b>	<b>NSF Total</b>	<b>Leverage</b>
2000	19.6	30.4	50.0	2.6
2001	33.7	49.1	82.8	2.5
2002	37.7	64.2	101.9	2.7
2003	39.7	58.7	98.4	2.5
2004	36.2	66.2	102.4	2.8
2005	33.7	67.7	101.4	3.0
2006	36.4	56.1	91.5	2.6
2007	36.2	67.4	101.0	3.0
2008	46.7	104.4	151.1	3.2
2009	40.5	66.7	107.2	2.6
<b>FY 00-09</b>	<b>360.4</b>	<b>626.9</b>	<b>991.3</b>	<b>2.8</b>



# FY09 Co-Funding by Award Type (\$M)

Type	EPSCoR	NSF Tot		Type	EPSCoR	NSF Tot
CAREER	11.23	22.58		GOALI	0.63	1.34
IIA	8.19	18.17		PFI	0.60	1.80
HR Dev	7.84	29.70		Math	0.30	2.23
Collabs	4.98	11.24		CCLI	0.22	0.45
Undergrad	2.46	5.32		Centers	0.14	0.27
Equip	1.80	4.54		Internatnl	0.07	0.15
Cyber	1.17	4.27		Other	0.01	0.20
ATE	0.85	5.06		<b>Totals:</b>	<b>40.48</b>	<b>107.15</b>

HR Dev: GK-12; HBCU-UP; TCUP; RDE; etc

Cyber: OCI; CDI

UG: REU, RET, RUI, UBM



# FY09 Co-Funding by Jurisdiction (\$M)

JD	Num	EPSCoR	NSF Tot		JD	Num	EPSCoR	NSF Tot
AK	1	0.14	0.27		KY	7	0.79	1.83
AL	24	3.36	10.73		LA	16	3.44	8.33
AR	6	0.92	3.21		ME	9	1.78	5.67
DE	9	1.86	5.40		MS	12	2.05	4.96
HI	11	0.72	2.10		MT	12	1.72	3.48
IA	1	0.30	0.95		ND	9	2.09	4.88
ID	4	1.19	4.91		NE	5	0.67	3.00
KS	6	0.59	1.74		NH	7	0.85	1.88



# FY09 Co-Funding by Jurisdiction (\$M)

- continued -

JD	Num	EPSCoR	NSF Tot		JD	Num	EPSCoR	NSF Tot
NM	15	1.88	3.91		TN	24	3.27	8.49
NV	5	0.82	1.73		UT	0	0	0
OK	9	1.64	3.87		VI	0	0	0
PR	8	1.03	4.21		VT	4	0.42	0.85
RI	8	1.32	3.16		WV	6	0.79	1.80
SC	16	2.53	5.20		WY	12	2.07	5.03
SD	5	2.26	5.67		<b>Tot</b>	<b>251</b>	<b>40.48</b>	<b>107.15</b>



# **NSF EPSCoR Updates**

---

- **Eligibility**
- **Staffing**
- **Portfolio Activity**
  - **Research Infrastructure Improvement**
    - ✓ **RII Track-1**
    - ✓ **RII Track-2**
    - ✓ **RII C2**
  - **Co-Funding**
  - **Outreach and Workshops**
- **Budget Outlook and Planning**



# **EPSCoR Investment Tools for Capacity Building**

---

## **Outreach & Workshops**

**Support of outreach activities by NSF disciplinary and professional staff;  
Support of strategic planning and capacity-building workshops. (NSF 06-613)**



# Outreach Investments FY05-09

<b>Fiscal Year</b>	<b>EPSCoR Investment (K\$)</b>	<b>Person- Trips</b>
<b>2005</b>	<b>111.3</b>	<b>108</b>
<b>2006</b>	<b>83.9</b>	<b>78</b>
<b>2007</b>	<b>98.2</b>	<b>85</b>
<b>2008</b>	<b>183.9</b>	<b>110</b>
<b>2009</b>	<b>204.2</b>	<b>121</b>



# **NSF EPSCoR Updates**

---

- **Eligibility**
- **Staffing**
- **Portfolio Activity**
  - **Research Infrastructure Improvement**
    - ✓ **RII Track-1**
    - ✓ **RII Track-2**
    - ✓ **RII C2**
  - **Co-Funding**
  - **Outreach and Workshops**
- **Budget Outlook and Planning**



# NSF EPSCoR Funding (\$M)

<b>Activity</b>	<b>FY05 Actual</b>	<b>FY06 Actual</b>	<b>FY07 Actual</b>	<b>FY08 Actual</b>	<b>FY09 Actual</b>	<b>FY10 CP</b>
<b>RII</b>	59.0	61.7	65.8	72.8	92.0	114.4
<b>Co-Fund</b>	33.6	35.9	34.5	46.7	40.5	31.2
<b>Outreach Workshps</b>	0.7	0.6	1.8	0.5	0.5	1.5
<b>Total</b>	93.3	98.2	102.1	*120.0	133.0	147.1

\* Includes \$5M in Supplemental Funding



Enough with the Numbers!  
Where's the Science?



# Arkansas

- **Renewable Energy**

- Plant biosynthesis, Alternate Energy, and Nanotechnology



- **Compelling Elements:**

- Innovative approach to plasmonics, photovoltaics research; increasing solar cell efficiency and enhancing the ability of plants to function as factories for biofuels
- Research themes are tightly woven into educational and workforce development activities



- **Participants:**

- University of Arkansas at: Fayetteville, Little Rock, Pine Bluff, and Fort Smith; University of Central Arkansas, Philander Smith College, and Arkansas State University





# Hawaii

- **Ecosystem Sustainability**
  - Understanding and predicting how invasive species, anthropogenic activities, and climate change impact biodiversity, ecosystem function and use of Hawaiian endemic species
- **Compelling Elements:**
  - A vibrant indigenous understanding, perspective, and history of the islands is embedded in the research, education, and outreach components
  - Clearly shows how science can be of service to protecting quality of life; could contribute to understanding the impacts of human activities on tropical ecosystems world-wide
- **Participants:**
  - University of Hawaii System (Manoa, Hilo, Kapiolani Community College)
  - Chaminade University (Private Institution)



UH Hilo Core Analytical Facility



YSI Water Quality Sonde



# Kansas

- **Climate Change and Energy: Basic Science, Impacts, and Mitigation**
- **Compelling Elements:**
  - Innovative workforce development plan, excellent integration of research and education
  - Broad-based integrated approach to issues of climate change and energy use and management, emphasizing the integration of natural and social sciences
- **Participants:**
  - Four universities: KSU, KU, Wichita State University, and Haskell Indian Nations University;
  - Two economic growth organizations: KTEC (Kansas Technology Enterprise Corporation) and KBA (Kansas Bioscience Authority);
  - Four Kansas-based companies: Abengoa Bioenergy, MGP Ingredients, White Energy, and Nanoscale; and
  - Two companies outside of Kansas: ADM (IL) and Netcrystals (CA)



Infrastructure tools: aquatic ecology

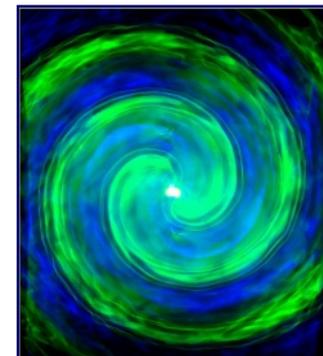




# Louisiana

- **Computational tools for multiscale phenomena**

- Correlated electronic materials
- Energy materials
- Biomolecular materials



- **Compelling Elements**

- Potential national impact linked to grand challenges in materials science
- Rich education outreach portfolio
- Diversity and cyber-infrastructure plans reach students effectively



- **Participants**

- Louisiana State Univ; Louisiana Tech Univ;
- Univ of New Orleans, Tulane Univ,
- Grambling State Univ; Southern Univ at Baton Rouge; Xavier Univ





# Maine

- **Sustainability Science**

- Expand capacity to understand and respond to sustainability challenges; coupled dynamics of social-ecological-systems (SES) and the use of SES in decision-making



Advanced Engineered Wood Composites (AEWC)

- **Compelling Elements:**

- Potentially transformative, high integration of natural and social science; model for sustainability research that could be adapted for other ecologically sensitive systems
- Engagement of Native Americans to foster better stewardship of tribal lands; strong mentoring program for new faculty

- **Participants:**

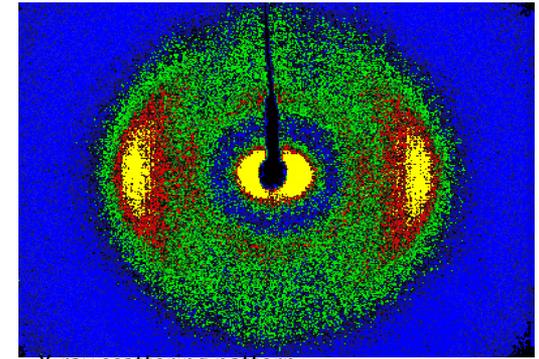
- University of Maine System (Seven Institutions); University of New England
- Bates, Bowdoin, Colby (Private), Unity, College of the Atlantic





# Mississippi

- **Modeling and Simulation of Biological Systems**
  - To advance understanding of complex biological systems and networks; and the understanding of the effects of nanoparticles on specific functions of biological systems
- **Compelling Elements:**
  - Focuses on biological systems of critical importance for human health, food safety, biosecurity, and the environment
  - Tight integration of computational efforts across the state
- **Participants:**
  - Univ. of Mississippi, Mississippi State Univ., Jackson State Univ. (HBCU), Univ. of Southern Mississippi, Univ. of Mississippi Medical Center
  - Mississippi College (PUI)



X-ray scattering pattern stretched DuPont fuel cell membrane.



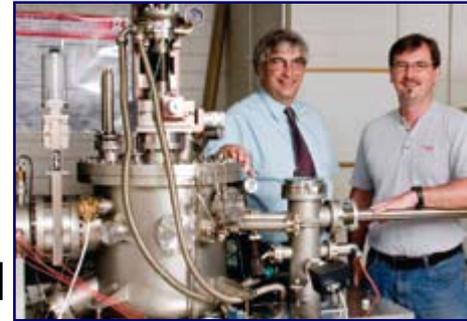
Participants shown incorporating a green fluorescent protein into bacteria



# Nebraska

- **Nanohybrid Materials and Algal Biology**

- Establish interdisciplinary research centers of excellence:
  - > Center for Nanohybrid Functional Materials, and
  - > Nebraska Center for Algal Biology and Biotechnology



- **Compelling Elements**

- Potentially transformative energy production strategies
- Notable diversity, outreach and workforce development plans



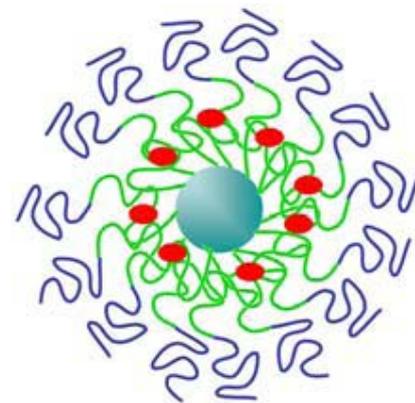
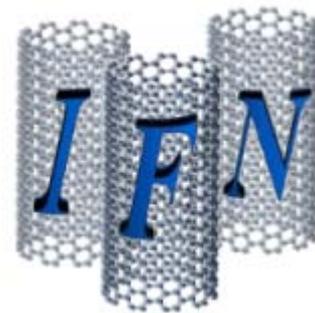
- **Participants**

- University of Nebraska-Lincoln; Creighton University; Doane College; University of Nebraska at Kearney, University of Nebraska Medical Center
- Little Priest Tribal College and Nebraska Indian Community College



# Puerto Rico

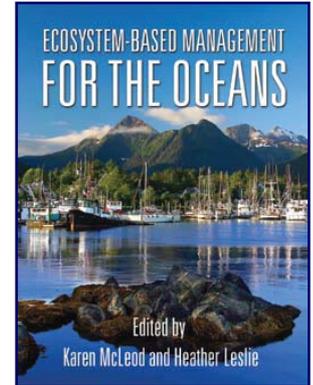
- **Functional Nanomaterials**
  - Applications in energy, information technology, biosensing, and bioimaging
- **Compelling Elements**
  - Basic research to commercialization pathways
  - Well-integrated research, education, workforce development, and external engagement for knowledge-based economic growth
  - Extensive collaborations with universities and national laboratories on the mainland
  - Strong underrepresented minority participation
- **Participants**
  - University of Puerto Rico (UPR) - Rio Piedras Mayaguez, Humacao, Cayey;
  - Inter-American University at Bayamon





# Rhode Island

- **Impacts of Climate Change on Marine Life**
  - Response of marine ecosystems to ocean warming and acidification
- **Compelling Elements**
  - Regionally relevant (Narragansett Bay) and nationally significant frontier research
  - Statewide integration via Life Sciences platform
  - Unique model for visualization and communication of science (Rhode Island School of Design)
- **Participants**
  - University of Rhode Island, Brown University
  - Bryant University, Community College of RI, Providence College, RI College, RI School of Design, Roger Williams University, and Salve Regina Univ

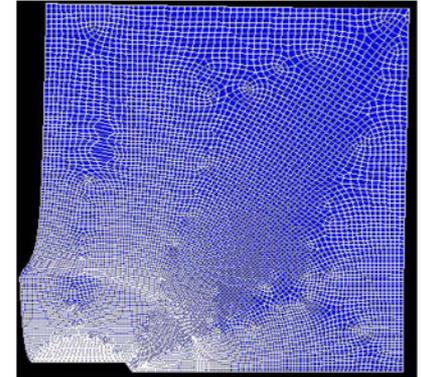




# South Carolina

- **Biofabrication**

- Computer-aided, layer-by-layer deposition of bio-material with the purpose of engineering functional 3D tissues and organs



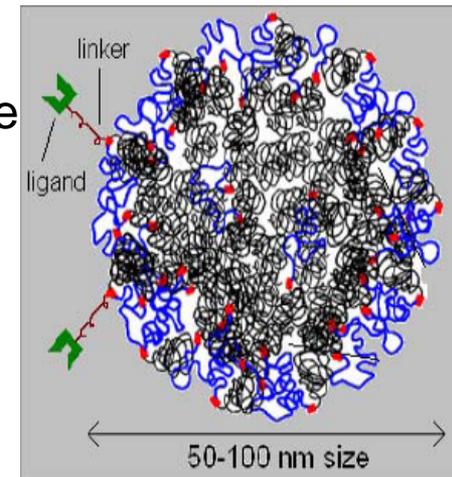
- **Compelling Elements:**

- Highly innovative, may lead to large scale industrial biofabrication of human tissues and organs and create a new biofabrication industry
- Broad institutional engagement; inclusive manner of the selection process by which the research idea was chosen



- **Participants:**

- Clemson University, MUSC, USC (Doctoral),
- Claflin Univ., South Carolina State Univ., Voorhees College (HBCUs),
- Furman University, University of South Carolina-Beaufort (PUI)
- Denmark Technical College, Greenville Technical College (Two Year Colleges)





# South Dakota

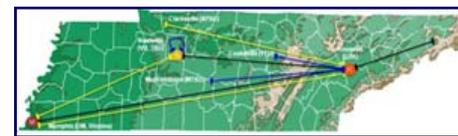
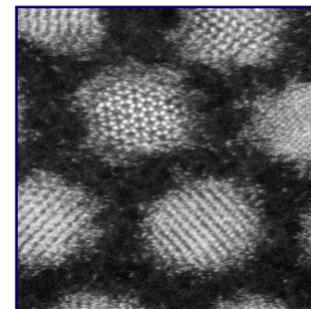
- **Photoactive Nanomaterials and Devices for Energy Applications**
- **Compelling Elements:**
  - Close connection to the state S&T plan
  - Workforce development
  - Innovative model for Tribal College faculty development
- **Participants: Nine academic institutions**
  - South Dakota State University, South Dakota School of Mines and Technology, University of South Dakota (Doctoral)
  - Augustana College, Black Hills State University, Dakota State University (PUI)
  - Oglala Lakota College, Sinte Gleska University, Sisseton Wahpeton College (Tribal Colleges and Universities)





# Tennessee

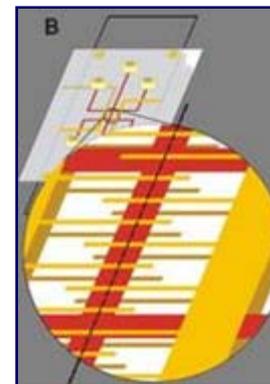
- **Solar Energy Conversion and Storage**
  - Sustainable methods and materials to enhance energy efficiency
- **Compelling Elements**
  - Frontier research builds on existing expertise
  - Renewable energy technologies-based education and workforce development across the state
  - Leverages state investments in the energy sector and facilities of Oak Ridge National Laboratory
- **Participants**
  - Univ Tennessee Knoxville, Univ Tennessee Space Institute, University of Memphis, Vanderbilt University
  - East Tennessee State University, Fisk University, King College, Middle Tennessee State University, Tennessee State University, TN Tech University





# West Virginia

- **Bionanotechnology for Public Security and Environmental Safety**
- **Compelling Elements**
  - Multifaceted approach to national security: Portable, rapid platforms; microfluidic electrochemical sensors for heavy metals and toxins; *ex-vivo* and *in-vitro* biomimetics for monitoring cellular response
  - Partnership involves small companies, industries, and government agencies
- **Participants**
  - West Virginia University, Marshall University, and West Virginia State University
  - Predominantly Undergraduate Institutions and Community and Technical Colleges





# 2008 Presidential Awards for Excellence in Mathematics and Science Teaching



82 Awardees; 45 from EPSCoR Jurisdictions



# Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring 2007 - 2008



22 Awardees; 6 from EPSCoR Jurisdictions



# Recognizing EPSCoR Scientists and Engineers



# DUSEL Deep Underground Science and Engineering Laboratory at Homestake, SD

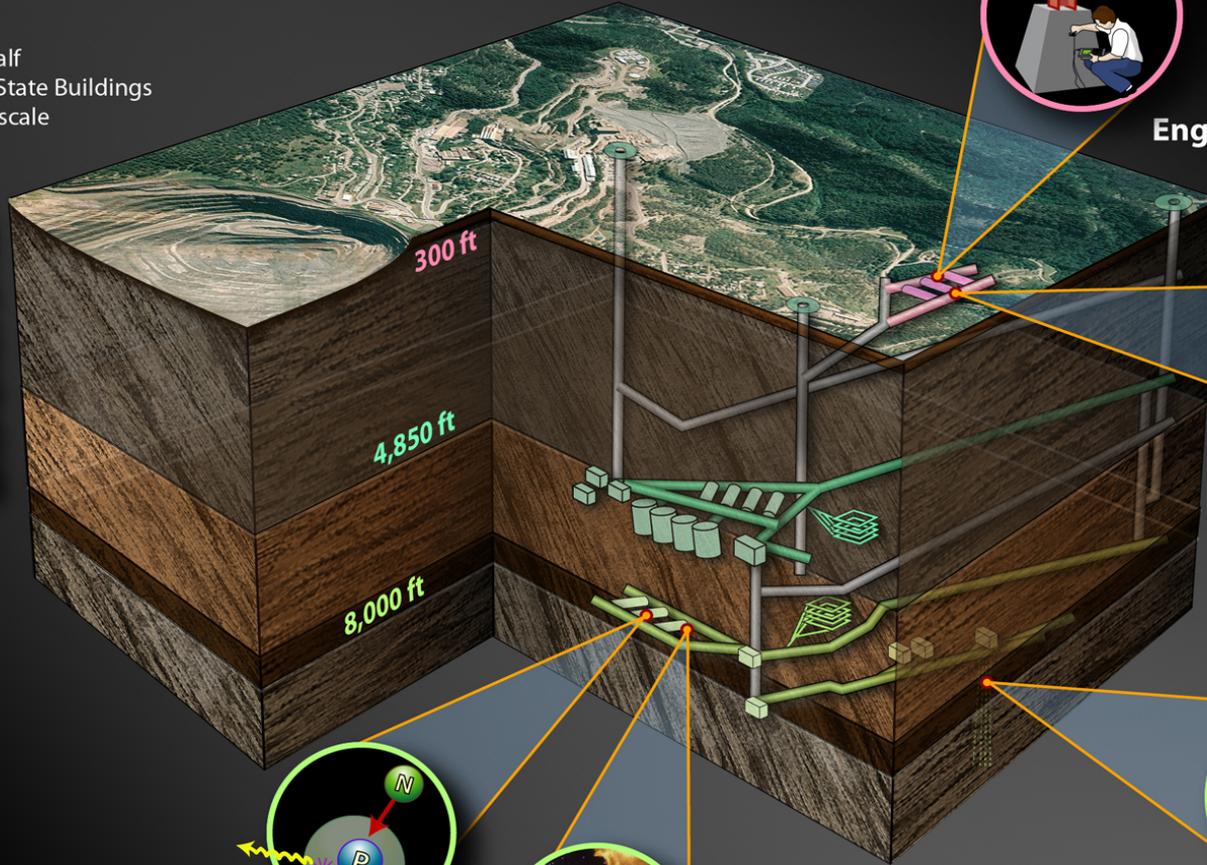


Six and a half  
Empire State Buildings  
for scale

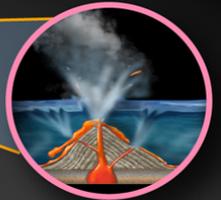
Shallow  
Lab

Mid-level

Deep  
Campus



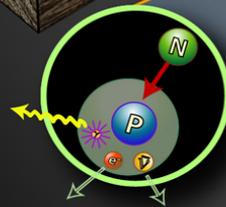
Engineering



Geoscience



Biology



Physics



Astrophysics



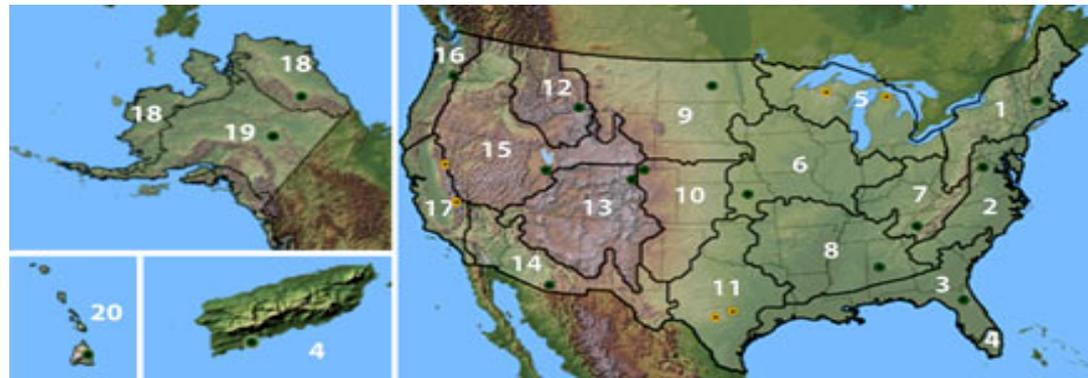
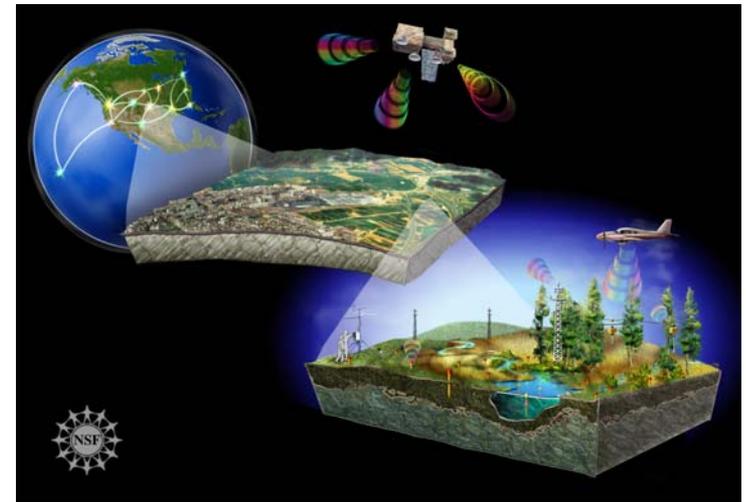


# NEON: National Ecological Observatory Network

**A continental scale research platform to advance ecological research at regional to continental scales in order to understand the impacts of climate and land-use change and invasive species on the ecosystems of the US**

NEON will:

- Consist of geographically distributed sensor networks, instrumentation, experimental infrastructure and remote sensing tools linked via cyberinfrastructure.
- Facilitate multidisciplinary research on a virtual platform enabling a predictive understanding of the environment
- Support education and citizen science
- Enable resource management

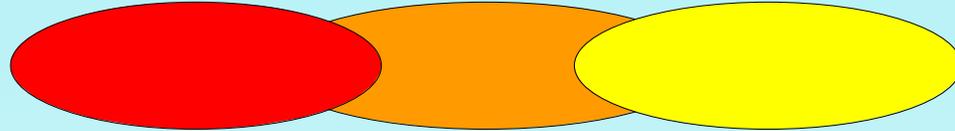


• 8 of the 20 NEON Core Sites are in EPSCoR States

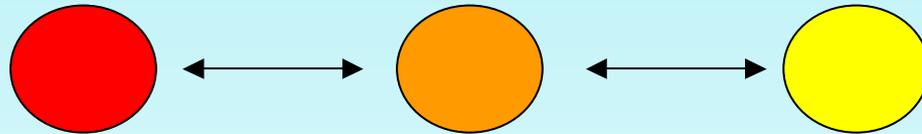
Transdisciplinary



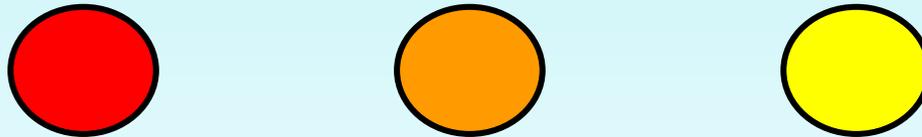
Interdisciplinary



Multi-disciplinary



Disciplinary



# The Sciences In Transition

# The Road Ahead



