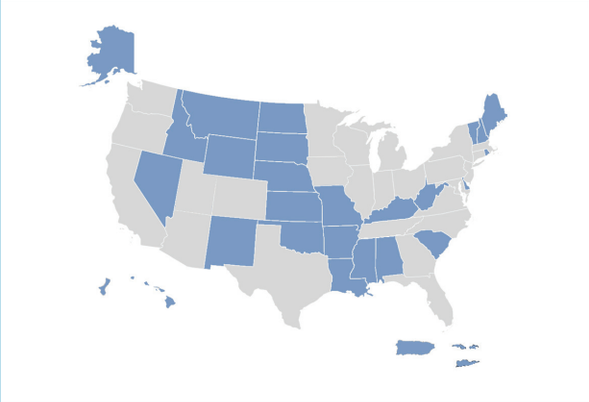
Building Research Infrastructure to Advance Science and Engineering Research and Education Across America

ESTABLISHED PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCoR)

WHY EPSCoR?



The National Science Foundation Act of 1950 states that "It shall be an objective of the Foundation to strengthen science and engineering research potential and education at all levels throughout the United States; and avoid undue concentration of such research and education, respectively." This congressional directive recognized the inherent value of a truly national science and engineering (S&E) research enterprise. Over time, however, the nation's S&E efforts became concentrated geographically, focusing primarily on a limited number of major research universities. NSF's resources became concentrated to the point where in 1977, in response to congressional concerns, the National Science Board (NSB) established a task force to examine the geographical distribution of NSF awards. Approval was requested for initiation of a program designed to "stimulate competitive research in regions of the country that were less able to compete successfully for research funds." These regions are called EPSCoR jurisdictions[1]. In 1978, NSB approved a resolution establishing the Established Program to Stimulate Competitive Research (EPSCoR).

EPSCoR THROUGH THE YEARS

1978 NSB establishes EPSCoR at NSF

1980 The first EPSCoR jurisdictions (AR, ME, MT, SC and WV) receive awards totaling $3 million for up to five years.

1985 The program is deemed successful and the merit review competition is repeated, resulting in eight new EPSCoR jurisdictions (AL, KY, NV, ND, OK, PR, VT and WY).

1987 Four additional jurisdictions (ID, LA, MS and SD) are awarded following proposal revisions from the previous competition.

1992 Changes to eligibility criteria (from a fixed dollar amount to a percentage of NSF research funding) allows two additional jurisdictions (KS and NE) to compete and receive awards.

Ukeamezhim Ayaugbokor uses a high-temperature differential scanning calorimeter to analyze process conditions for advanced composite materials. Credit: Eddy Perez, LSU Strategic Communications

2009 EPSCoR RII[2] Track-2, promoting interjurisdictional collaboration, is competed for the first time.

2013 EPSCoR RII Track-3 begins, seeking to broaden participation of underrepresented groups in STEM fields.

2015 Three jurisdictions (IA, TN and UT) "graduate" from EPSCoR. EPSCoR currently supports 25 states, two territories and one commonwealth in its efforts to build a sustainable research and human capital infrastructure.

1 An EPSCoR-eligible jurisdiction is defined as a state, U.S. territory or U.S. commonwealth that receives less than or equal to 0.75 percent of NSF research funding. The current eligibility table can be found at http://www.nsf.gov/od/oia/programs/epscor/Eligibility_Tables/FY2016_Eligibility.pdf

2 The Research Infrastructure Improvement (RII) program has been the cornerstone of EPSCoR since its inception, but was not officially designated as RII until FY 2000. Its main focus is to aid jurisdictions in building physical, human capital, and cyber infrastructure.

IMPACTS

In Montana, EPSCoR funding helped seed almost 30 start-up laser/optical companies. In 1980, southwest Montana boasted just a single one. Now known throughout the world for its innovation and discovery, Montana's prominent optics and photonics industry currently employs an estimated 400 professionals.

Paige Brown, a high school student in Bangor, Maine, is one of the many success stories to come out of EPSCoR. Hearing impaired in both ears, Brown studies pollution in the city's six impaired streams and has presented her work at nine regional, national and international meetings. She has won multiple awards, including a scholarship to Drexel University.

The U.S. experiences an average of more than 800 tornadoes per year, resulting in billions of dollars in damages and lost lives. With EPSCoR funding, Researchers in OK, NE, and KY are collaborating to build a remotely operated small weather-sensing drone, strong enough to fly close to super storms. The data collected in the air will measure what we can't on the ground, resulting in more precise predictions that may lengthen tornado warning time from the current ten to fifteen minute mark all the way up to the hour mark.

Alaska researchers have discovered that 48 million tons of organic carbon will be deposited in the ocean via glacial melt by 2050. The carbon consists of by-products of plants and animals that have been covered by moving ice and are now being released. Increased carbon deposits significantly affect water chemistry and marine food webs.

Plastics usually don't decay for hundreds of years, potentially leaching chemicals into the environment or creating toxins in the air when burned. A discovery by EPSCoR-funded researchers at North Dakota State University, Fargo, holds scientific promise that could lead to a new type of plastic derived from biomass that can be broken down when exposed to a specific type of light, then be used to create new plastic.

Nevada's EPSCoR project on the Solar Energy-Water-Environment Nexus has an Undergraduate Research Opportunity Program that provides students with an authentic research experience by engaging participants in research related to aspects of the project's focus on other STEM-related topics. Working with faculty mentors, undergraduate students develop and submit project proposals.

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EPSCoR GOALS

Catalyze the development of research capabilities and the creation of new knowledge
EPSCoR projects supported over 7,400 faculty researchers and 16,700 students over the past five years.

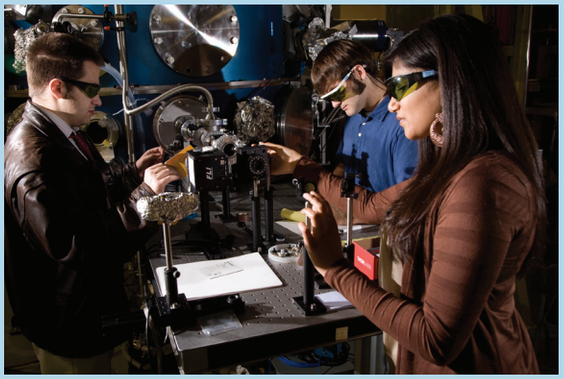
Broaden direct participation of diverse individuals, institutions and organizations
In the past five years, 745 underrepresented minority graduate and undergraduate students involved in EPSCoR projects attained their degrees.

Establish sustainable STEM education, training, and professional development pathways
EPSCoR has co-funded 151 Faculty Early Career Development (CAREER) awards in the past five years, helping to spark the research careers of junior faculty.

Effect engagement at the academic, government and private-sector levels
In the past five years, EPSCoR-supported outreach engaged over 23,000 faculty in academic institutions, more than 22,000 K-12 teachers, and over 300,000 K-12 students.

Impact research, education and economic development
EPSCoR jurisdictions have received 84 new patents and leveraged over $1 billion in new awards in the past five years.

Montana agricultural ecosystems provide food for the U.S. *Credit: Patrick Lawrence, Montana State University and Montana Institute on Ecosystems*



Three NSF EPSCoR Undergraduate Research Opportunity Program award recipients working in a physics lab. *Credit: Jean Dixon*

BY THE NUMBERS

- 1,346 academic faculty hired since 1980
- 78 percent of faculty hires remain in original jurisdictions
- 66 research centers created in EPSCoR jurisdictions as a direct result of the program
- 83 new or upgraded laboratory facilities created
- 100-plus new degree programs established, including 64 new Ph.D. programs
- 20 institutions in 14 EPSCoR jurisdictions participating in Blue Waters, one of the most powerful supercomputers in the world
- 243 researchers in EPSCoR jurisdictions utilizing the Extreme Science and Engineering Discovery Environment (XSEDE), the most advanced, powerful and robust collection of integrated advanced digital resources and services in the world

National Science Foundation