Nebraska EPSCoR

Annual Report

For the period ended June 30, 2000

Experimental Program to Stimulate Competitive Research

A Note from the Chair

The end of June, 2000 marked Nebraska EPSCoR's seventh full year of operation by which time over $29.1 million ($2.9 M this year excluding co-funding) had been obtained by Nebraska researchers from seven federal agencies with EPSCoR programs. Selected activities and progress are highlighted in this report. New funding this year included additional co-funded awards, $1.4 M from the National Science Foundation (NSF) and $833 thousand from the National Institutes of Health (NIH) as well as specific projects including two NSF EPSCoR standard grants, one EPSCoT grant from the Department of Commerce, and two DEPSCoR grants from the Department of Defense. Perhaps more significantly, several large grant proposals were developed in response to new opportunities including NSF ($9 M), NIH ($10 M), Department of Defense ($5 M), and Department of Energy ($2.9 M) which if funded will greatly increase funding from EPSCoR sources next year.

Dr. Robert W. Allington
Chair, Nebraska EPSCoR Committee
CEO and Chairman, ISCO, Inc.

Newsmakers & National News

Royce Ballinger (state EPSCoR Director) was appointed Assistant Exective Vice President and Provost, UN Central Administration.

Brent Bowen (Director, NE NASA EPSCoR) was appointed to a University of Nebraska Foundation Distinguished Professorship in Aviation, UNOmaha College of Public Affairs and Community Service.

Jeffrey French (behavioral biology cluster) was voted President-elect of the 1000-member American Society of Primatologists.

Priscilla Grew (former Co-PD NSF) was awarded the 1999 Ian Campbell medal by the American Geological Institute.

Larry Harshman (metallobiochemistry and bioremediation clusters) received a Distinguished Teaching Award, College of Arts and Sciences, UNL.

Shelton Hendricks (behavioral biology cluster) was appointed Associate Vice Chancellor for Academic Affairs and Dean of Graduate Studies and Research at UNOmaha.

Alan Kamil (behavioral biology cluster) was appointed Director of UNL's Cedar Point Biological Station.

Pill-Soon Song (DEPSCoR grantee) received the Outstanding Research and Creative Activity award from the University of Nebraska system. This is one of two awards given annually to recognize excellence in research/creativity.

Dr. Pill-Soon Song

Marsha Torr (Co-PD NSF) accepted a position as Vice President for Research at Virginia Commonwealth University.

Jim Van Etten (gene expression cluster leader) was appointed to chair the search committee for the Chancellor of UNL.

Awards received in FY 1999-00

NSF EPSCoR
$3.45M

DEPSCoR
$540,000

DOC EPSCoT
$162,000

NIH IDeA
$833,251

EPA
$51,474

Governor Johanns endorses state S&T policy

Governor Mike Johanns issued an affirmation of the state policy on science and technology. The proclamation issued by Governor Johanns on December 10, 1999 supports the "Nebraska Science & Technology: A State Policy" document published by Nebraska EPSCoR on behalf of a governor's task force study and originally signed by former Governor Nelson on May 15, 1995. In his affirmation, Governor Johanns recognized the "significant role that advances in fundamental science and engineering knowledge have as a source of economic growth...encourage the public-private partnerships that will promote innovations and attract science-based activities...[and asks others endorsing the policy to continue]...the responsive development of partnerships that will further the strengths and capabilities of the State of Nebraska in science and technology."

State EPSCoR Conference

Panel discussion group

A state conference, "Integration and Opportunities in the Life Sciences for the 21st Century was held April 4, 2000. Featured speakers included Robert Grey, Provost and Executive Vice Chancellor at the University of California, Davis and Terry Yates, Program Director of the Division of Environmental Biology at the NSF. Panels representing university administrators and discussions groups including faculty, chairs, and industry leaders elaborated on the theme of the conference from several different perspectives. A general notion developed that recent advances in basic biology not only portend major disciplinary changes within biology but also call for increased coordination and collaboration across traditional disciplines.

NSF EPSCoR Outreach Conferences

The NSF EPSCoR program has worked to bring NSF program officers to EPSCoR states through regionally sponsored "Outreach Conferences" that focus on targeted disciplines. Dr. Nancy Dixon of NSF EPSCoR develops these conferences in collaboration with state offices. Each conference brings 4-8 NSF program officers to provide insights into how their programs operate, to advise on developing proposals or to explore new funding inititatives. Past conferences have dealt with biology, engineering, nanoscale initiatives, and computer science. Conferences over the next year involve satellite and wireless technologies, CAREER proposals, research on learning, nanoscale S&T, SBIR, developing S&T centers, and opportunities in social, behavioral and economic sciences. Nebraska EPSCoR has funds to send appropriate faculty to these conferences as deemed important. Also, NSF EPSCoR continues to support the travel of NSF program officers in the research directorates at the invitation of scientists from EPSCoR states. These visits are very important efforts that are supported by NSF EPSCoR to counter the tendency of program officers on limited budgets to otherwise visit only larger universities or national conferences. Combined, these outreach efforts represent unique opportunities that faculty in the EPSCoR states should use for information on programs of their interest (call the Nebraska EPSCoR Office for assistance and watch our website for future conferences).

Current NSF Infrastructure Project

UNL — Computational studies underway include: Research in Mechanical Engineering (Dr. Gogos) on comprehensive models for fuel droplet evaporation and combustion to improve global spray modeling to benefit diesel engines, high out-put aircraft combustors, and industrial furnaces; Research on Crashworthiness Simulation by Dr. Reid (Mechanical Engineering) has developed a new bullnose guardrail system that meets federal safety requirements. No other system has met these stringent requirements; Research Computing (Dr. Swanson) has an SGI Origin 2000 (now SGI 2400) that serves over 150 users at 3 UN campuses; A University of Nebraska Foundation award will make it possible for a large Beowulf cluster to be added; Dr. Tuan (Advanced Materials in civil engineering) is investigating the behavior of a novel thermoplastic honeycomb core material known as NorcoreÒ; Dr. Xiao Zeng, chemistry, is studying factors that are responsible for rigidification of the amide linkage in oligo amides.

UNO — The Jet Propulsion Laboratory is studying the usefullness of space imagery and data in science and mathematics education (Drs. Grandgenett and Bishop). Thanks to internal funding, a NSF-EPSCoR grant, and a University Foundations award (Dr. Flocken), the Complex Systems Simulation Laboratory now has an ONYX2 with 8 processors and a 16 processor Origin. Molecular dynamics simulation of molecular compounds resembling the ferroelectric material LiNbO3 is being studied (Drs. Mei, Flocken, and Hardy).

Creighton — Peptide-based Bioorganic Chemistry (Drs. Conlon, Knoop, and Basir) researchers are working with peptide and protein components in the skin of a pickerel frog *Rana palustris*. The analysis has led to the discovery of 22 peptides with antimicrobial activity; 13 of these are toxic to mammalian predators. Molecular dynamics calculations (Dr. Lovas and student Toth) using a powerful computer cluster has revealed the importance of weakly polar interactions in secondary structures of proteins. Research on peptide hormones (Drs. Murphy, Lovas, Gembitsky, Smith and Petzel) has been given recognition from the organizers of the 26th European Peptide Symposium held in Montpelier, France. All 6 Creighton presentations, dealing with forces maintaining important peptide conformations (promotion of nurite outgrowth and tumor growth, control of blood pressures, and isolation of a novel insulin from Antarctic teleost fish) were selected to be included in the book **Peptides 2000.**

Dr. Sandor Lovas and Gergely Toth

Ongoing Progress in past NSF Projects

The Bioremediation research cluster (Drs. Comfort and Shea) developed methods to remediate PLP and PAH-contaminated soil. The effectiveness of zero-valent iron to remediate RDX, TNT, or pesticide-contaminated soil is also being demonstrated.

The Plant gene expression cluster is working with gene expression in transgenic plants, allowing examination of the interplay between eukaryotic and archael chaperones (Drs. Blum and Elthon) in protein folding and using RNA plant viruses (Drs. French and Morris) for high level transient expression of foreign genes in plants. This technology is now recognized as a useful shortcut for expression of valuable proteins and for rapidly testing the function of useful genes.

NSF EPSCoR National Conference

Nine representatives from Nebraska attended the 15th Annual NSF EPSCoR National Conference in Orange Beach, Alabama in November. The conference, "EPSCoR: Past. Present and Future" was organized by the state EPSCoR program in Alabama. The conference featured national speakers and discussions highlighting successful programs and important issues faced by EPSCoR. Topics ranged from improving competitiveness to developing institutional and public support. Dr. Judith Sunley (NSF head of the Directorate for Education and Human Resources) spoke on partnerships to build the 21st Century workforce, and Dr. Thomas Meredith (Chancellor, University of Alabama System) talked on the role of state government in developing research and higher education. Jack Horner (Director, Museum of the Rockies) spoke about how his EPSCoR supported research in paleontology led to Jurassic Park, the movie.

Activities Supported in FY 1999-00

- Seventh Annual Statewide conference held on April 4, 2000 focused on "Integration and Opportunities in the Life Sciences for the 21st Century" (see p. 3).

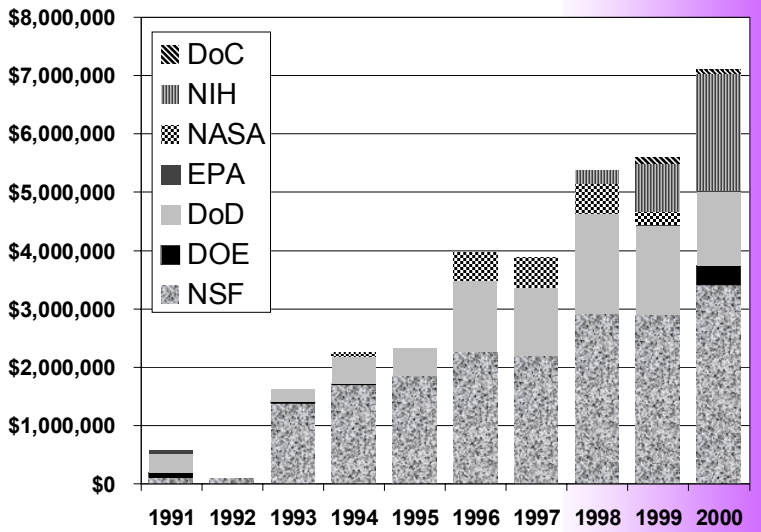
- Conference/Workshop Support: Women in Science Conference, Lincoln; NCURA Satellite Video Conferences on Award Administration at UNO.

- Educational activities: NSF Graduate Education for Minority (GEM) Students Program and support of undergraduate GEM scholars.

- Outreach Activities: NSF Research Opportunities for Environmental Engineers, Jackson, WY; NSF Engineering Conference, PR; National Symposium on the Great Plains Tornado Outbreak, Oklahoma City; NSF Polar Conference, Maine; NSF EPSCoR Materials Research and Engineering Conference, Louisville, KY; AAAS "Strategies for Enhancing Research Competitiveness in the Mainstream", Coeur d'Alene, ID; NSF EPSCoR Social, Behavioral, and Economic Sciences Conference, Jackson, MS; Alliance Chatauqua '99, Lexington, KY; SC 99, Portland, OR; "Partners in Collaboration: The National Laboratories", Oak Ridge National Laboratory; SDSC Computing Conference, San Diego.

- Research: Research and infrastructure development supported by NSF, NIH, DoD, DOC and EPA.

- Total federal funds attributed to the EPSCoR mechanism amount to $29.1 million as of June 30, 2000.



Federal R&D funds received through Nebraska EPSCoR

Educational Activities

Through the Native American Outreach program the Aviation Institute and NASA Nebraska EPSCoR held Aeronautics Day at the Sioux City Gateway Airport in Iowa on October 11, which allowed 150 Native American fifth grade students from surrounding schools the opportunity to experience hands-on aviation through presentations and guided tour of the Iowa Air Guard and JetSun Aviation.

5th grade students at Aeronautics Day

Royce Ballinger with summer 2000 GEM students

Four undergraduate students from three institutions (Alcorn State U., Grambling U., and New Mexico Highlands U.) participated in lab research at UNL in the summer of 2000 as part of a program to increase minority students pursuing advanced degrees in science and engineering.

Women in Science conference participants

A "Women in Science" conference attracted over 180 participants from three states (NE, SD, OK) to Lincoln, March 31. The keynote speaker was Dr. Evelyn Patterson, Director of the Center for Physics Education and first civilian faculty member at the U.S. Air Force Academy. The conference featured science departmental exhibits, tours to science labs and panels of women scientists from industry and academia.

Other Nebraska EPSCoR Developments

Dr. Mat Varma, Director, DOE EPSCoR

Dr. Mat Varma (Director, DOE EPSCoR) gave notice of his intention to fund part of our Department of Energy EPSCoR grant ($975,000) supporting the "carbon sequestration research cluster" led by Dr. Shashi Verma. That three year project will develop infrastructure to support experimentation on various agriculture practices that lead to differential carbon cycle scenarios that could reduce atmospheric carbon.

Late word also indicates that the NIH COBRE proposal led by Dr. Charles Wood will be funded for five years at approximately $10 million. That project involved researchers at UNL, Creighton, and UNMC in developing a program in viral pathogenesis combining and building on strengths from all three campuses.

Nebraska EPSCoR gratefully acknowledges the service of three statewide Committee members from the private sector who have served over the past several years but recently left the Committee. These individuals are Gary Curtis (Harris Labs, Lincoln), Sam Rao (ConAgra, Omaha) and Cliff Williams (International Sensor Systems, Aurora). We are pleased to announce two new members, Bradley Edwards (General Partner, Heartland Capital Management) and John Woollam (President, J.A. Woollam Co.).

Department of Defense (DEPSCoR)

The Department of Defense's "DEPSCoR" program over the past six years has awarded 34 grants to Nebraska researchers totaling over $8.69 million. In 2000, two grants were awarded to scientists in Nebraska who are doing research of special interest to the Department of Defense, Army Research Office including Sy-Hwang Liou (Physics & Astronomy and Center for Materials Research & Analysis, UNL) "*Magnetic Domains of Nanometer-Size Magnetic Features" and* Mao S. Wu (Engineering Mechanics, UNL) "*Polycrystal Modeling of Ceramics Subjected to High Strain Rates and Pressures".* Fifteen additional proposals are currently pending at DoD.

Department of Commerce (EPSCoT)

Ram Narayanan, Professor of Electrical Engineering at UNL received an EPSCoT award entitled "Establishment of a RF and Wireless Testing and Training Cluster in Eastern Nebraska." This project brings together expertise and support from UNL, Southeast Community College, UNL Engineering Extension, and the Lincoln Partnership for Economic Development to support Nebraska companies' emerging expertise in RF and wireless technologies. The project involves provision of a test facility, delivery of short courses and workshops to foster ongoing training for participants at all levels, and development of hands-on experimental training modules for engineers and technicians on the use of high-technology test equipment and computer-aided design (CAD) software. This activity will provide critical support to an emerging RF and wireless industry cluster and increase the state's capacity to create high value-added jobs.

NASA EPSCoR

NASA Nebraska EPSCoR is in the final two years of a five-year contract. During this time, our funded research projects have shown tremendous progress. Perhaps the greatest news this past year was the notification by NASA of our national ranking as the number one EPSCoR state in the NASA Space Grant ten-year evaluation!

UNO Aviation Institute field workers

NSF EPSCoR

Three researchers from UNL received a National Science Foundation EPSCoR Grant. Brian Robertson (Mechanical Engineering and Center for Materials Research & Analysis) "Development of Polarized Electron Facilities for New Magnet Research and Technology Transfer", Ram Narayanan (Electrical Engineering) "Establishment of the University of Nebraska Airborne Remote Sensing Facility" and Dennis Alexander (Electrical Engineering & Director, Center for Electro-Optics) "Science and Engineering Research Center (SERC) for Durable Miniaturized Systems."

EPA EPSCoR

Blair Siegfried (Entomology, UNL) received funding from EPA EPSCoR as part of a collaboration with Kansas scientists for their proposal "Evaluating the Effects of Pesticide Mixtures to Aquatic Organisms: Mechanisms of Synergistic Toxicity".

State EPSCoR Committee Members

EPSCoR: An Investment in Science and Engineering Research Competitiveness

Dr. Robert Allington, Chair, *CEO and Chairman, ISCO, Inc., Lincoln*

Dr. Lee Jones, Vice Chair, *Executive Vice President and Provost, University of Nebraska*

Dr. Dennis Alexander, *Director, Center for Electro-Optics and Kingery College Professor of Electrical Engineering, UNL*

Dr. David Crouse, *Associate Vice Chancellor for Academic Affairs, and Associate Dean for Graduate Studies & Research, UNMC*

Dr. Gary Curtis, *Vice President of Clinical Operations, Harris Laboratories, Lincoln*

Dr. F. Joseph Daugherty, *Management Consultant, Omaha*

Dr. Derek Hodgson, *Vice Chancellor for Academic Affairs, UNO*

Mr. Lyle Middendorf, *Vice President of Research & Development, LI-COR, Inc., Lincoln*

Dr. Richard Murphy, *Chairman, Biomedical Sciences and Associate Dean of Research, Creighton University*

Mr. Herman Person, *Director, Corporate Product Development, Dale Electronics, Columbus*

Dr. Sam Rao, *Vice President of Research, ConAgra Trading & Processing Cos., Omaha*

Dr. Richard Reinhardt, *Moran Professor of Periodontology and Director of Research, College of Dentistry, University of Nebraska Medical Center, Lincoln*

Ms. Sandra Scofield, *Director, Center for Science, Mathematics & Computer Education, UNL*

Dr. David Sellmyer, *Director, Center for Materials Research & Analysis and George Holmes Distinguished Professor, Physics & Astronomy, UNL*

Dr. Robert Sweeney, *Executive Director, Applied Information Management Institute, Omaha*

Dr. Marsha Torr, *Vice Chancellor for Research, UNL*

Dr. James Van Etten, *William Allington Distinguished Professor of Plant Pathology, UNL*

Mr. Al Wenstrand, *Director, Nebraska Department of Economic Development*

Mr. Cliff Williams, *President, International Sensor Systems, Aurora*

STATE EPSCoR OFFICE

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Dr. Royce E. Ballinger, *Director, Nebraska EPSCoR and Associate Vice Chancellor for Research, UNL*

Ms. Karla Roth, *Administrative Assistant, Nebraska EPSCoR Office*