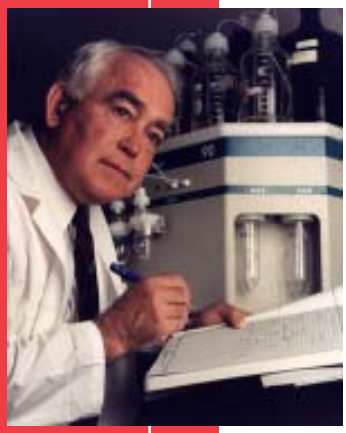
Nebraska EPSCoR



Annual Report

For the period ended
June 30, 2002

Experimental Program to Stimulate Competitive Research

A Note from the Chair

Nebraska EPSCoR completed its ninth full year of operation at the end of June, 2002. Our annual conference, "Diversity of Informatics", was attended by 250 individuals and celebrated our 10th year of activity. Grants totaling more than $70 million have been obtained by Nebraska researchers through EPSCoR mechanisms during this time. This year we increased our outreach and education activities though support from the National Science Foundation. Major new grants received this year included those from the National Aeronautics and Space Administration ($2.1 M), Department of Defense ($638,246), Department of Energy ($591,422), the National Institutes of Health ($ 6 M) and NSF-EPSCoR ($2.99 M in co-funding).

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

Nebraska EPSCoR Newsmakers

Steve Baenziger (Gene Expression in Plants cluster scientist) received a Distinguished Agricultural Alumni Award from Purdue University's School of Agriculture. It is the most prestigious award given by Purdue's School of Agriculture.

Ruma Banerjee (metallobiochemistry cluster) was named Cather Professor of Biochemistry by the University of Nebraska-Lincoln for demonstrating distinguished service and creativity.

Berthe Choueiry (scientist with ERP group) won a five-year National Science Foundation Faculty Early Career Development grant. The grant provides $600,000 over the five years.

Jeffrey French (behavior biology cluster leader) was awarded the Outstanding Research and Creative Activity Award (ORCA) from the University of Nebraska. The award recognizes individual faculty members for research of national or international significance.

Brain Robertson, Shireen Adenwalla, and **Peter Dowben** (past DEPSCoR awardees) and the rest of their group were acknowledged for their first-of-a-kind invention of a highly sensitive, hand-held neutron detection device. Five patents on the device and on the process have been granted or are pending.

Sandy Scofield (past State Committee Member) has been named director of the Nebraska Rural Initiative for the University of Nebraska. She currently serves as director of the Center for Science, Mathematics, and Computer Education at UNL and an NU Cooperative Extension community development specialist.

Shashi Verma (PI of DOE Implementation grant) was named Bessey Professor of Natural Resource Sciences by the University of Nebraska-Lincoln for demonstrating distinguished service and creativity.

Al Wenstrand (State Committee member) as Director of the Nebraska Department of Economic Development accepted a plaque recognizing the department as the first state economic development agency in the nation to become registered under the ISO 9001:2000 Quality Standard.

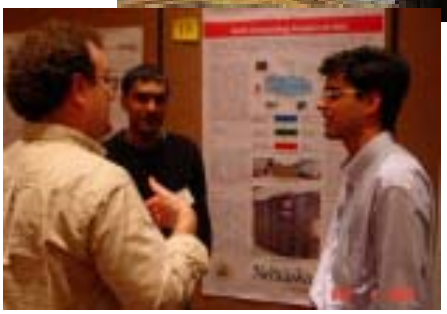
Xiao Cheng Zeng (past DEPSCoR awardee) was named Bessey Professor of Chemistry by the University of Nebraska-Lincoln for demonstrating distinguished service and creativity.

State EPSCoR Conference

Nebraska's 9th Annual State Conference entitled "Diversity of Informatics" was held April 4-5, 2002, at the Embassy Suites Hotel in downtown Lincoln. We received very positive responses from many of the 250 attendees.

The first day of the conference was divided into four tracks with nationally known and local speakers speaking over the course of seven sessions with a poster session at the end of the day. The tracks were titled Bioinformatics: Algorithms; Bioinformatics: In Silico Biology; Secure Distributed Information: Engineering Informatics and Beyond; and Scalable Enterprise Systems. Lunch included a panel discussion entitled "Impact and Future of Informatics" with panelists Suzanne Iacono, National Science Foundation; Michael Fromm, UNL Center for Biotechnology; and Raj Nathan, Sybase.

The second day included talks by directors of grant programs at NSF and NIH that fund informatics disciplines as well as advice on general grant writing, budgeting, and FASTLANE procedures including presentations by NSF and local grants administrators.



As part of our outreach efforts, we supported faculty and students from Wayne State College, Chadron State College, University of Nebraska at Kearney, Little Priest Tribal College, and Nebraska Wesleyan University to attend the conference. This gave them the opportunity to learn more about informatics and to network with faculty and students from other institutions.

Industry Internship Program

The first year of the Nebraska Engineering, Science and Technology Internship Program (NESTIP) involved 26 different businesses and students.

Students from the University of Nebraska-Lincoln, University of Nebraska at Omaha, University of Nebraska Kearney, Wayne State College, and Chadron State College have been able to contribute their knowledge to improve the performance, products, and/ or processes of businesses across the state. Businesses that have benefited from the technology transfer that this program provides between higher education and their business include Digital IMS; Diller Telephone Company; Internet Nebraska; MetaLogic, Inc.; Zoex Corporation; Centurion Wireless Technologies; Goodyear Tire & Rubber Company; High Plains Corporation; Neapco, Inc.; Service and Product Net, Inc.; Ho-Chunk, Inc.; IntelliCom Computer Consulting, Inc.; Transcrypt International; M.I.S. Engineering; Imagine Technology, LLC; Perrin Mfg., Inc.; Morrissey Engineering, Inc.; Kirkham Michael & Assoc.; Olsson Associates; Lincoln Machine, Inc.; BD; and Time Warner Cable. Many of the businesses commented that NESTIP allowed them to capitalize on new ideas through student interns.

New Awards in FY 2001-02

DEPSCoR
$638,246
DOE
$591,422
NASA
$2.1M
NIH BRIN
$6M
NSF
$2.99M

NSF Infrastructure Improvement Progress

Nebraska's RII EPSCoR grant continues to improve research infrastructure in four target areas across four universities in Lincoln (UNL) and Omaha (UNMC, UNO, Creighton). RII activities including collaborative efforts over the past year include:

BRL (Bioinformatics Research Lab) has recruited a new faculty member (Dr. Estuko Moriyama) who specializes in bioinformatics and strengthened statewide hardware infrastructure as well as graduate research and education. A new multiuser computer laboratory facilitates interactions between biologists and computer scientists by supporting microarray database development, data mining, molecular modeling and phylogeny analysis. A new bioinformatics specialization in the M.S. and Ph.D. program in computer sciences has been initiated and the BRL group has held conferences, workshops and seminars including a summer course for high school teachers.

The **ERP** (Enterprise Resource Planning) interdisciplinary group of faculty from three UNL colleges (business, engineering, and arts & sciences) has focused its infrastructure development in six multidisciplinary areas including: 1) semantic web technologies to support intelligent decision management for domains such as automated supply chain and collaborative business; 2) unified modeling language to facilitate multi-enterprise exchange of information among business units and trading partners worldwide; 3) impact of the internet on the life cycle of inter-organizational relationships (IORs) including strategic alliances and networking for successful IOR operations; 4) e-supply chain management in the business to business market; 5) the e-broker web based infrastructure to capture and analyze user's behavior to maximize profits and customize sales offers; and 6) material requirement planning to simulate operations management of procurement of required components for a manufacturer.

Dr. Sandor Lovas in Creighton lab

ICLS (Informatics Center for the Life Sciences) is a four campus (UNMC, UNL, CU, UNO) collaboration that has developed a statewide infrastructure for bioinformatics and computational chemistry. The ICLS was approved as a designated Center by the University of Nebraska Board of Regents and the four campus Beowulf computer clusters are being integrated into a super cluster based on grid technologies. The network attached storage capacity of one TB supports genomics and proteomics research and a graduate degree specialization in medical informatics through a UNMC and UNO collaboration. The ICLS group has sponsored seminars, conferences and a recent workshop on DNA microarray analysis as well as a short course on bioinformatics for minority and women students.

Drs. Ramamurthy, Swanson, Jiang and Sharif (on screen) use Access Grid for virtual meeting

The **SDI** (Secure Distributed Informatics) infrastructure group has developed the "PrairieFire" supercomputer (detailed elsewhere in this report), two Access Grid nodes (UNL and UNO) which are state-of-the-art videoconferencing facilities, a distributed storage system, a parallel and distributed middleware for heterogeneous clusters and a Java Object passing interface and related efforts for high-speed optical networks, wireless networks, computer security and multimedia networking. The group has also sponsored seminars, conferences, workshops, and student programming contests.

PrairieFire comes to Nebraska

The SDI infrastructure EPSCoR group in collaboration with others at UNL has developed a supercomputer named "PrairieFire". This computer was ranked in June by the "TOP500" organization as the 107th most powerful computer in the world, 58th in the U.S. and 8th among U.S. academic institutions.

PrairieFire is a 256-processor computer performing computations at a peak rate of 250 GFlops (250 billion operations per second) with 100 gigabytes of RAM and 2 terabytes (2 trillion bytes) of hard drive storage, enough to store every book in the Library of Congress. PrairieFire is 400 times faster than a Pentium III desktop PC.

Prairie Fire computer

EPSCoR Losses

Nebraska EPSCoR was saddened by the death's of two of its early participants.

Dr. Robert Klucas served as one of the PIs on EPSCoR's first Implementation Grant. He also served as head of the Biochemistry Department and director of the Center for Biological Chemistry. His research career focused on biological nitrogen fixation.

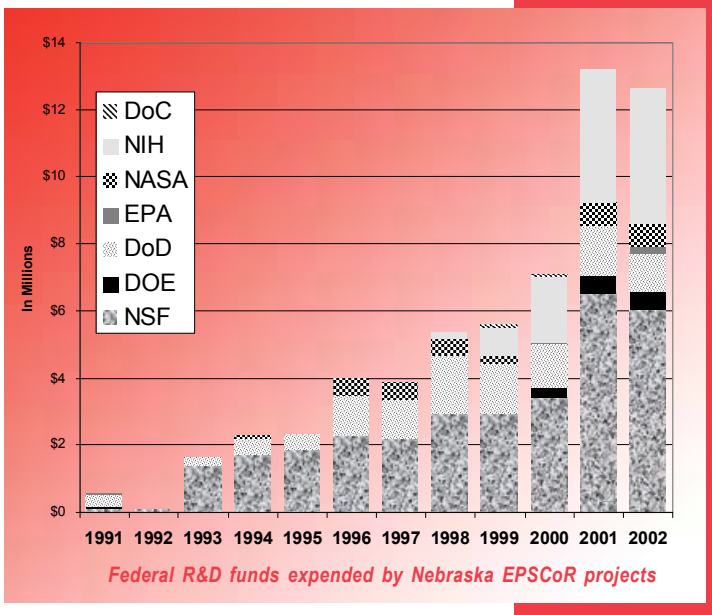
Professor James Eisentrager designed the Nebraska EPSCoR brochure artwork of rectangles of root 3 and 4 to represent the 3 research clusters and 4 universities involved in the original NSF EPSCoR grant. He received many awards for work he described as geometric abstraction from constructivism.

Activities Supported in FY 2001-02

- Conference/Workshop Support: Ninth annual conference, "Diversity of Informatics" (see page 3). Women in Science Conference; Computational Chemistry workshops for high school teachers and students; Regional Programming contest and Bioinformatics workshop; MoKaNe conference for minority upward bound students from NE, KS and MO;

- Educational activities: Undergraduate Minority Programs on four campuses; Growing Nebraska's Own summer science camp for 8th graders and other summer camps for youth; Omaha Connects Kids program; "Build a Human" project for Junior High Students; Development of a web-based course-development system for rural areas;

- Outreach Activities: DOE Lab visit, UNL; SRA Teleconference at UNO; Women in Science collaboration luncheon; CDI-IGERT Assistance Workshop, Boulder, CO; NSF Site Visit, four campuses; DOE PNNL Workshop, Supercomputer 2001 Workshop, San Diego, CA; NIH BRIN Workshop, Grand Island, NE; Keith Parker federal agency visits; NSF EHR Advisory Committee meeting, Washington, D.C.; Nat'l SBIR conference, Anaheim, CA; Nebraska Academy of Sciences; Tribal and state college activities.



Federal R&D funds expended by Nebraska EPSCoR projects

- Research: Total expended federal funds attributed to the EPSCoR mechanism amount to $70.3 million as of June 30, 2002 (DoD, DOE, NASA, NIH and NSF).

Educational and Outreach Activities

Minority Program – EPSCoR minority students participated in a research program during the summer in collaboration with 30 other students supported by other UNL programs (SUROP and McNair). Creighton University sponsored a bioinformatics and research program that attracted 16 students. UNO and UNMC held workshops, short courses and research experiments for 21 students from the Omaha area. Nebraska EPSCoR also sponsored a MoKaNe conference for minority upward bound students from Nebraska, Kansas and Missouri.

Women in Science – The fourth annual "Women in Science" conference attracted 75 young women from high schools to learn about careers in science. The meeting included panel discussions and visits to labs of woman researchers. A workshop for women faculty was held at UNO and Dr. Ilze Zigurs assumed the role of EPSCoR state coordinator for women programs. In consultation with an advisory group, she has developed a small grants program for women faculty in STEM fields.

EPSCoR and ADEC support Tribal Colleges – Nebraska EPSCoR and ADEC (American Distance Education Consortium headquartered at UNL) have collaborated to provide computing access points via satellite technologies to the two tribal colleges in Nebraska, Little Priest Tribal College (LPTC) and Nebraska Indian Community College (NICC). In addition, Nebraska EPSCoR and the Nebraska NASA Space Grant and EPSCoR program have jointly sponsored a variety of education and faculty development activities to LPTC and NICC as well as their primary and secondary tribal schools.

SCOLA Project

A NSF-EPSCoR grant (Dr. Hamid Sharif, PI) established an advanced multimedia infrastructure to broadcast SCOLA (the Satellite COmmunications for LeArning) signals to the members of Internet2 including more than 190 universities and government research laboratories. SCOLA located in McClelland, Iowa, (about 10 miles from Omaha) is a nonprofit organization, providing foreign news, cultural and video language programs unedited and in the native language from over 64 countries to the United States federal government agencies, colleges and universities, K-12 schools, cable systems, foreign language and foreign policy institutes, and businesses and individuals throughout North America.

SCOLA satellite facility

The EPSCoR grant has facilitated the migration of SCOLA from a strictly satellite delivery system to an Internet2 transmission to about 15 million viewers resulting in a higher quality signal. This work has provided a research test-bed to study real-time video streaming. Over 40 universities have participated in test-bed research on the project.

Department of Defense (DEPSCoR)

The Department of Defense's "DEPSCoR" program over the past eight years has awarded 45 grants to Nebraska researchers totaling over $11.62 million. In 2002, three grants were awarded to scientists in Nebraska who are doing research of special interest to the Department of Defense. Following is the list of current awards. Dennis Alexander (Electrical Engineering, UNL) *"Improved Optical Communications: Femtosecond and Attosecond Laser Pulse Propagation in the Atmosphere"*; Herman Batelaan (Physics and Astronomy, UNL) *"Matter Interferometry with Charged Particles";* Lance Perez (Electrical Engineering, UNL) *"Wireless Multiple Access Communications Using Collision Frequency Shift Keying".*

DOE EPSCoR

DOE site visit with Senator Hagel at field demonstration

The Carbon Sequestration and Global Climate Change research project supported by DOE EPSCoR is in its second year of research. The group of 12 scientists, led by Dr. Shashi Verma, and their students, post-docs, and technicians have established carbon flux measurements and detailed process level studies which are being conducted year round. Experiments involving two irrigated and one dryland agricultural production fields are designed to understand how agricutural practices can enhance carbon sequestration. Two partnership projects with national labs continue to make progress and five new lab partnership grants were submitted.

EPA EPSCoR

The Nebraska EPA EPSCoR proposal led by Dr. Pat shea received positive reviews. Funding for two of the three research clusters is expected before the end of the summer. These projects include *"Using vertical attachment energies to predict dehalogenation rates of environmental contaminants"* (PIs Paul Burrow and Steve Comfort) and *"Kinetic and mechanistic framework for remediation using zerovalent iron"* (PIs Tian Zhang and Patrick Shea).

NASA EPSCoR

Nebraska's NASA EPSCoR program is beginning its second year of a $3.5M, 5-year research grant focused on three projects (airborne remote sensing, small aircraft transportation systems, and fuel droplet combustion). Dr. Brent Bowen (UNO Aviation) serves as PI of the grant that includes researchers at UNL and UNO.

NIH IDeA Program

Nebraska BRIN Scholars for 2002

A COBRE (Centers of Biomedical Research Excellence) award supporting the Nebraska Center for Virology led by Dr. Charles Wood (UNL) and co-directed by Dr. Howard Gendelman (UNMC) and Dr. James Van Etten (UNL) began its second year. The $10.7 million project fosters partnerships, collaborations and faculty development to address fundamental questions about infectious agents and host responses.

A new $6 million grant, BRIN (Biomedical Research Infrastructure Network) was funded by the NIH-IDeA program. This project, led by Dr. James Turpen (UNMC) involves a collaboration among UNMC, UNL, and Creighton to serve as mentor institutions to five smaller universities in the state (UNO, UNK, Wayne State, Chadron State, and Nebraska Wesleyan) to foster student research development in biomedical related fields.

State EPSCoR Committee Members

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. Judith Christman, *Stokes-Shackleford Professor & Chair, Department of Biochemistry & Molecular Biology, UNMC*

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

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, Creighton University*

Dr. Prem Paul, *Vice Chancellor for Research, UNL*

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

Senator Ron Raikes, *State Senator, State of Nebraska*

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

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

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

Dr. Roy Wilson, *Vice President for Health Sciences,Creighton University*

Dr. John Woollam, *President, J.A. Woollam Co., Lincoln*

Dr. Ilze Zigurs, *Mutual of Omaha Distinguished Chair of Information Science & Technology, UNO*

EPSCoR:

An Investment in Science and Engineering Research Competitiveness

STATE EPSCoR OFFICE

Nebraska EPSCoR • UNL Campus • 203 Whittier
• Lincoln, NE 68583-0848 • Ph: (402) 472-8946
• Fax: (402) 472-8948 • Email: epscor@unl.edu
• http://www.unl.edu/nepscor/index.html

Dr. Royce E. Ballinger, *Director, Nebraska EPSCoR and Assistant Executive Vice President and Provost, UN*

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

Ms. Nancy Simnitt, *Administrative Technician, Nebraska EPSCoR Office*