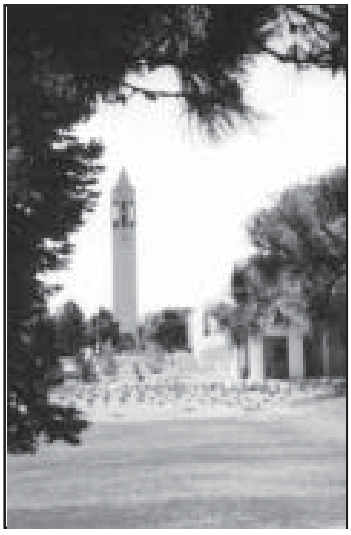
Nebraska EPSCoR



Experimental Program to Stimulate Competitive Research

ANNUAL REPORT

For the period ended June 30, 1997

A Note from the Chair

I am pleased to report that the Nebraska EPSCoR program continues to make important progress. This report provides some of the details of activities in our fourth full year of operation. A new grant from NASA EPSCoR added $1.5 million of funding. Additional funding of eight projects from the Department of Defense through its DEPSCoR program in 1996 overlapped the original five DEPSCoR projects to give the added boost of funding in 1996 as shown graphically on page six. Through June, 1997, Nebraska EPSCoR has assisted state researchers in obtaining over $16.4 million from federal agency EPSCoR funding.

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

Nebraska EPSCoR Newsmakers

Ruma Banerjee (metallobiochemistry cluster scientist) received two NIH grants totalling over $2 million dollars to support her research on biochemistry and molecular biology phenomena related to hyperhomocysteinemia, a risk factor in cardiovascular diseases.

Steve Comfort (bioremediation cluster scientist) received the 1996 "recognition of Junior Faculty for Excellence in Research" award, Agricultural Research Division, UNL.

Peter Dowben (materials cluster scientist) presented an invited talk to the Royal Society of London in March. Invitations to this prestigious forum are rare and issued for a subject in an emerging field.

Jeff French and behavioral biology students

Jeffrey French (behavioral biology cluster leader) presented invited papers at two international conferences in Brazil on his work on the golden lion tamarin, one of the world's most endangered primates.

Larry Harshman (bioremediation cluster scientist) presented an invited paper at the "Studying Stress in Ecological Systems" at Roskilde University, Denmark.

Sitaram Jaswal (materials cluster scientist) organized the 44th annual Midwest Solid State Conference held in Lincoln last October.

Marjorie Langell (DEPSCoR scientist), **Ned Ianno** (NASA EPSCoR scientist), **and Peter Dowben** (materials cluster) received the 1997 UNL College of Engineering Multidisciplinary Award for their research on boron-carbon alloy semiconductor devices.

Jim Merchant (Chair, Earth Systems Scientists Team; GP Network) received the John Wesley Powell Award from the U.S. Geological Survey.

Robert Williams (DEPSCoR scientist) received a NSF-CAREER award in 1996.

NASA Nebraska EPSCoR

A 3-year, $1.5 million grant was received from NASA EPSCoR in 1996 establishing the Nebraska Initiative for Aerospace Research and Industrial Development (NIARID). NIARID is designed to accelerate the state's efforts to expand its capacity, national competitiveness, and infrastructure in aerospace research and industry. NIARID is administered through the Aviation Institute at the University of Nebraska at Omaha under the direction of Brent Bowen.

Two competitively-selected research clusters, Remote Sensing and Earth Data Systems (RSEDS) and Space Environmental Protection (SEP), form the core of the NIARID. Both clusters have considerable applications to industry and the state's overall economic development. In addition, educational outreach mechanisms are utilized to motivate talented Nebraskan youth, in particular those from under-represented populations, to pursue post-secondary and graduate-level education and careers in aerospace science and industry.

Dan Goldin, NASA Administrator, receives UNO lecture award

Three seed research projects were chosen to complement the research cluster component of NIARID. It is the intent that these projects will expand into research clusters as the current clusters become competitive for industrial awards and contracts.

NIARID is purchasing equipment to support the research clusters, acquire aerospace science library resources, and develop the Landsat Software and Data Archive. NIARID underscores its commitment to the NASA EPSCoR program with considerable cost-sharing that far exceeds the 50/50 match required by NASA. Considering the extensive, long-term benefits of the program to NASA, academe, and the State of Nebraska and its citizens, the NIARID is highly cost-effective and cost-efficient.

Awards received in FY 1996-97

NSF EPSCoR Cooperative Agreement, $1.485M

NASA EPSCoR, $1.5M

NSF GPN, Nebraska subcontract, $226,860

NSF Co-funding, 5 awards, $1.56M

DEPSCoR, 8 awards, $2.22M

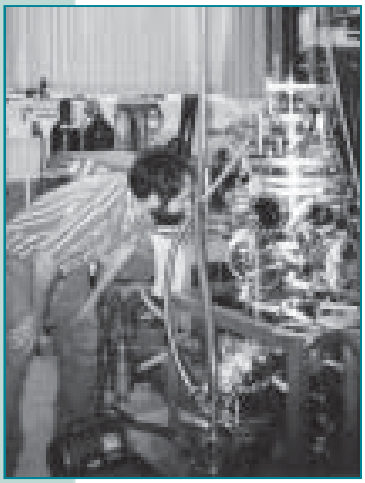
Grant for Great Plains Computer Network

NSF EPSCoR funded a collaborative effort among the six Great Plains EPSCoR states to establish a computer network. The states involved are Arkansas, Kansas, Nebraska, North Dakota, Oklahoma, and South Dakota. The network (GPN) will be configured to enhance sharing of data in earth systems science and to assist participating universities in connecting to the developing Internet 2.

Industrial Collaborations

Several EPSCoR supported research projects include collaborations with private industry. Some examples of these projects are indicated below.

NSF-Materials Research Cluster: This research cluster has over $250 thousand dollars per year of industrial support. Bill Weins is studying growth and impact resistant bearings for Brenco, Inc. Peter Dowben and David Sellmyer are investigating novel materials for plasma displays for Dale Electronics. Craig Eckhardt, Xiao C. Zeng, and Dennis Diestler are working with Analog Devices on tribology of micromachined devices for automobile accelerometers. David Sellmyer, Yi Liu, and Roger Kirby are examining extremely high density magnetic recording media for the National Storage Industry Consortium. John Woollam and colleagues are using ellipsometric techniques to study and control growth of semiconducting films with the J.A. Woollam Company.

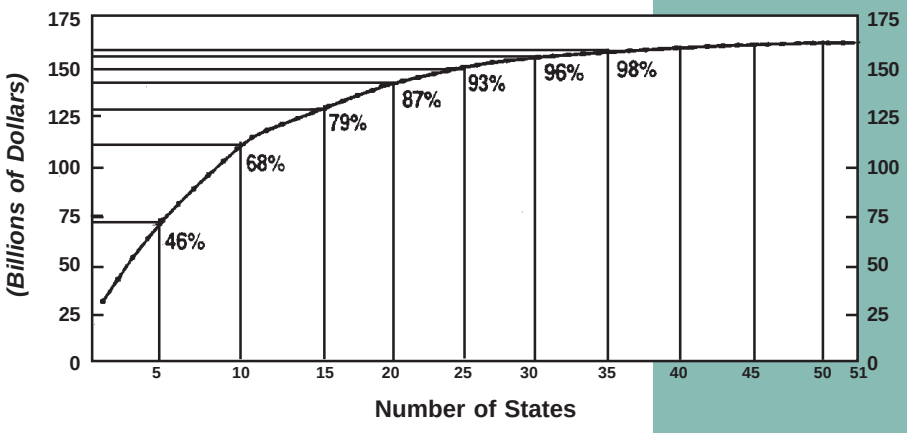


Peter Dowben, materials scientist

DEPSCoR-Nontraditional Machining: The Department of Defense supported project by Robert Williams and K.P. Rajurkar involves rapid prototyping applied to tool design and fabrication related to nontraditional machining and its use in the plastic injection molding industry. The research has attracted the attention of Lucent Technologies in Omaha. This collaboration involves research and development of telecommunications devices.

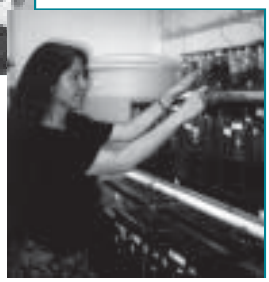
Research Competitiveness: EPSCoR's Role

Research competitiveness is complex and multifaceted and to many people it is a process, not an end in itself. On the basis of grant funds received, Nebraska and other EPSCoR states are "on average" less competitive in their research programs than non-EPSCoR states. According to NSF's most recent data (1993), 20 states with the largest shares of total U.S. research expenditures collectively account for 87 percent of the funds while the 20 states with the smallest shares account for only 4 percent of the



total. Nebraska ranks 44th out of 51 "states" (including D.C.) in federal R&D funds, 42nd in industry R&D funding, and 43rd in total R&D funding ($295 million in 1993). R&D funding is, in part, a function of the number of scientists and engineers in the state (Nebraska ranks 37th and 41st in numbers of Ph.D. scientists and engineers respectively). It is also a function of population size, R&D needs necessary to support a state's particular type of economic focus, and priorities established by the state and its research community. The lower level of R&D funding does not mean that good research does not occur in the state, nor that increased competitiveness is out of reach. The challenge of EPSCoR is to increase research competitiveness, and as indicated below, EPSCoR funding has made a considerable impact in those specific areas identified by the state for EPSCoR funding.

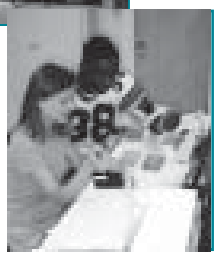
Research Competitiveness: Nebraska EPSCoR Progress



Research cluster faculty and students

Since 1993, Nebraska EPSCoR has supported research in five research areas. Two of these, selected last year, gene expression in plants and bioremediation of xenobiotics, have made a good start but it is too early to assess the impact that EPSCoR funding has had on their competitiveness. Considerable progress has been made by the original three clusters selected in 1993. Indices of increased competitiveness in these clusters include: (1) an increase of 27% in number of grant awards from 45 in year one to 57 in year four, (2) a 67% increase in funding from $6.43 million in year one to $10.76 million in year four, (3) a 65% increase in number of peer reviewed publications from 116 in year one to 191 in year four, and (4) a 149% increase in number of presentations from 107 in year one to 267 in year four. Two of the research clusters (materials research and behavioral biology) have gained national attention as evidenced by sponsorship of national meetings and by finishing high in competitions for graduate training or research center grants. The behavioral biology cluster has had the greatest increase in proportions of faculty competitively funded. Initially only 3 of 10 faculty were funded, but by the end of the fourth year of EPSCoR funding 9 of 11 (82%) of the behavioral biology cluster faculty (across the 3 campuses of UNL, UNO, and CU) had received individual funding from non-EPSCoR sources including NIH, NSF or industry. UNL researchers of the materials cluster had comparable increases of funding from 14/19 (74%) to 19/20 (95%), but when faculty on all three campuses are included the individual faculty record was 14/24 (58%) in year one to 19/25 (76%) in year four.

GEM Program for Minority Students



GEM students engaged in research projects

Beginning in our fourth year of the NSF cooperative agreement, we started a program supporting education of minorities underrepresented in science and engineering. This Graduate Education of Minority (GEM) program is intended to provide research opportunities and encouragement for minorities to pursue careers requiring advanced training in S&E disciplines. GEM includes research experiences for undergraduates prior to enrollment as graduate students. In the summer of 1997, five undergraduate GEM scholars representing three groups (Native American, African American and Hispanic) from five states (Nebraska, Montana, Iowa, Puerto Rico, and Illinois) worked in labs of EPSCoR researchers. GEM graduate scholars pursuing Ph.D. work in areas of EPSCoR researchers are being supported beginning in the fall of 1997.

Activities Supported in FY 1996-97

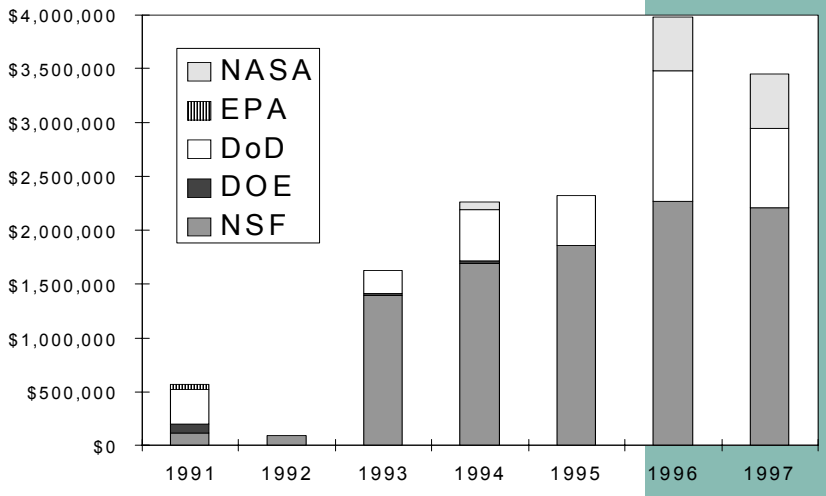
- Statewide conference entitled Science & Technology Research: Connecting Private Sector and University Interests, April 15, 1997.

- Educational activities: Science Works Outreach Program for graduate assistantships (UNL); "60 second Scientist Series" TV outreach and public service; Published "Writing from the Winner's Circle: A Guide to Preparing Competitive Grant Proposals." Development of the GEM Program and support of undergraduate GEM scholars.

- Equipment Funds: Provided matching funds for augmenting the prestigious NSF Academic Research Infrastructure Grant.

- Research: Research projects supported by NSF, NASA and DoD.

- Total federal funds attributed to the EPSCoR mechanism amount to $16.4 million since Nebraska was identified as an eligible state.



Federal R&D funds received through Nebraska EPSCoR

Nebraska Infrastructure Needs: Faculty Questionnaire

Nebraska EPSCoR received 276 returns (25%) of 1088 questionnaires sent to science and engineering (S&E) faculty at UNL, UNO, UNMC, and Creighton University. The four infrastructure items, among 14 choices, that were consistently ranked as the most important by Nebraska S&E faculty were, in order of most to least important, (1) time for research (including release time, summer support, and sabbatical time), (2) enhanced support for graduate education (GE), (3) acquisition of state-of-the-art equipment or instrumentation (EQ), and (4) research technician support (RT). S&E faculty not previously supported by EPSCoR (195 responding) had exactly the same ranking as the pooled data, whereas EPSCoR supported faculty (49) ranked equipment and graduate education first and second followed by research technician (3) and time (4). Rankings of items by other faculty categories are provided in the adjacent table.

	N	Time	GE	EQ	RT	Set Up	Travel	Retrain	Post Doc
Overall	276	1	2	3	4				
EPSCoR	49	4	1-2	1-2	3				
Non-EPSCoR	195	1	2	3	4				
9 mo.	156	1	2	3	4				
12 mo.	113		2	3	1	4			
Prof.	133	4	1-2	1-2	3				
Assoc. Prof.	72	1	2	4	3				
Ass't Prof.	66	1	3	4		2			
UNL	193	2	1	4	3				
UNMC	14	2	3-4			1			3-4
UNO	43	1		2	4		3		
CU	24	1		2		3		4	

Faculty infrastructure questionnaire results

New Directions for NSF EPSCoR

Beginning with FY98, NSF-EPSCoR will pursue new directions that include two major changes, (1) support of infrastructure rather than research clusters and (2) enhancing opportunities for shared funding responsibilities with the regular NSF research directorates, which NSF has termed "co-funding." State cooperative agreements, to be reduced from $1.5 to $1 million per year, will be expected to focus on enhancing the infrastructure (broadly defined) leading to increased research competitiveness. The co-funding mechanism will provide enhanced opportunities to EPSCoR states by funding proposals submitted to regular NSF programs that are judged to be "on the bubble," that is, those receiving sufficiently high merit reviews to be funded by the NSF program if funds were available. Funds will be made available by combining EPSCoR funds with the $8-$10 million that Dr. Neal Lane, Director of NSF has committed to the co-funding mechanism. This mechanism formalizes a relationship between the EPSCoR program and the research directorates that has operated informally over the past few years with more limited funds. Nebraska has received over $2 million by the previous co-funding mechanism, and we expect to be able to take advantage of the new program. Co-funding will require certification by the states' EPSCoR Directors and will be limited to "new" investigators (i.e. not senior faculty with continuing research grants) in target areas that have been selected by the state for infrastructure development or to existing NSF-EPSCoR funded research clusters in the state.

Richard Anderson and Jim Hoehn, NSF EPSCoR Program Directors

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

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

Dr. Joseph Daugherty, *Management Consultant, Omaha*

Dr. Priscilla Grew, *Vice Chancellor for Research, UNL*

Mr. Lyle Middendorf, *Vice President of Research & Development, LiCor, Inc., Lincoln*

Ms. Maxine Moul, *Director, Nebraska Department of Economic Development*

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

Dr. Ernest Peck, *Vice Chancellor for Academic Affairs, UNO*

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

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

Ms. Sandra Scofield, *Project Director & Principal Investigator, Nebraska Math & Science Initiative*

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

"An Investment in Science and Engineering Research Competitiveness"

STATE OFFICE

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

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

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