

NEBRASKA EPSCoR/IDeA

Science & Technology Implementation Plan

2013



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Implementation in Context

During 1995, the state of Nebraska developed a Science & Technology (S&T) Plan to harness and direct political energies toward the advancement of a robust and globally-competitive research economy in the state. Subsequently, the S&T Plan has been endorsed by every sitting governor, and it continues to reflect state of Nebraska policy.

The S&T Plan inspires and informs the actions of the Nebraska Experimental Program to Stimulate Competitive Research (EPSCoR) and Institutional Development Award (IDeA) programs. During 2003, Nebraska EPSCoR/IDeA developed and codified strategies to implement the Nebraska S&T Plan. This document updates those implementation mechanisms. The revised strategies provide a framework that will guide the Nebraska EPSCoR/IDeA State Committee and its staff in a comprehensive approach to advance the state's science and technology goals.

Through the oversight of its State Committee, Nebraska EPSCoR/IDeA is uniquely positioned to incorporate valuable input from the state's higher education institutions and representatives from industry and state and local government.

The vision of Nebraska EPSCoR/IDeA is for Nebraska to continue its transformation into a robust, nationally-competitive research leader that contributes vital knowledge and innovations to the global community while nurturing a dynamic innovation economy.



State Science and Technology Goals

The following goals are excerpted from the state of Nebraska's Science & Technology (S&T) Plan. The plan was purposefully designed to be non-prescriptive, allowing each governing body to exercise freedom of action consistent with the distributed governance structure of higher education in Nebraska.

1. Utilize partnerships among government, educational entities and the industrial sector to increase global competitiveness, enhance research and development capabilities, increase the education and training of technical personnel and accelerate technology transfer.
2. Promote increased productivity of the science and technology-based economic sector through the use of new technologies.
3. Amplify innovative research leading to new products and new markets.
4. Improve the business environment for retaining and attracting science- and technology-based activity by assessing strengths and building on existing economic opportunities and by creating new opportunities that will generate jobs and greater economic benefits for Nebraska.

Nebraska EPSCoR/IDeA

The Experimental Program to Stimulate Competitive Research [EPSCoR] began in 1979 as a National Science Foundation program and expanded to other federal agencies, including the National Institutes of Health [NIH], which created the Institutional Development Award [IDeA] program. Nebraska became an EPSCoR/IDeA state in 1991.

MISSION

The mission of Nebraska EPSCoR/IDeA is to build the state's research capacity and competitiveness at the frontiers of science, technology, engineering, and mathematics (STEM) and biomedical research in areas of strategic importance to the state and nation.

VISION

Stimulate innovative, sustainable STEM research and technology through strategies that promote dynamic and diverse collaborations at the state, national, and international levels; new discoveries in foundational sciences; and development of large-scale trans-disciplinary, multi-institutional research teams.

Translate research findings into innovative, high-impact commercial products by providing unique collaborative opportunities for scientists, engineers, and private sector partners to explore mutually-beneficial research with an eye toward commercialization of transformative technologies.

Grow Nebraska's economy by providing opportunities for researchers and private industry across a broad science and technology spectrum to collectively harness existing assets and emerging areas of expertise and effectively convert them into successful innovations, products, and services.

Educate a diverse, globally competitive workforce through strategies and programs that strengthen the STEM pipeline, broaden participation of underrepresented groups and prepare Nebraska students to become competent and visionary contributors to the global STEM community.

Implementation Objectives

Nebraska EPSCoR/IDeA adopted the following objectives to implement the goals of the State Science & Technology Plan:

1. Invest in human and physical infrastructure
2. Develop a globally-competitive STEM workforce
3. Promote diversity and broaden participation in STEM
4. Foster visionary collaborations
5. Expand research capacity in existing and emerging areas
6. Support strengths and address needs with innovative responses



Objectives at a Glance



TARGET

Globally Competitive, Innovative Research Programs

Expand Research Capacity in Foundational Sciences

Basic Biomedical Sciences
Foundational Sciences
Neuroscience



Expand Research Capacity in the Translational Sciences

Cyberinfrastructure
and Computing
Energy Science and Technology
Engineering and Technology
Environmental and Natural
Resources Sciences
Information and Communications
Science and Technology
Translational Biomedical Research



**Foster
Collaborations**



**Develop a
Global Workforce**



**Invest in
Infrastructure**

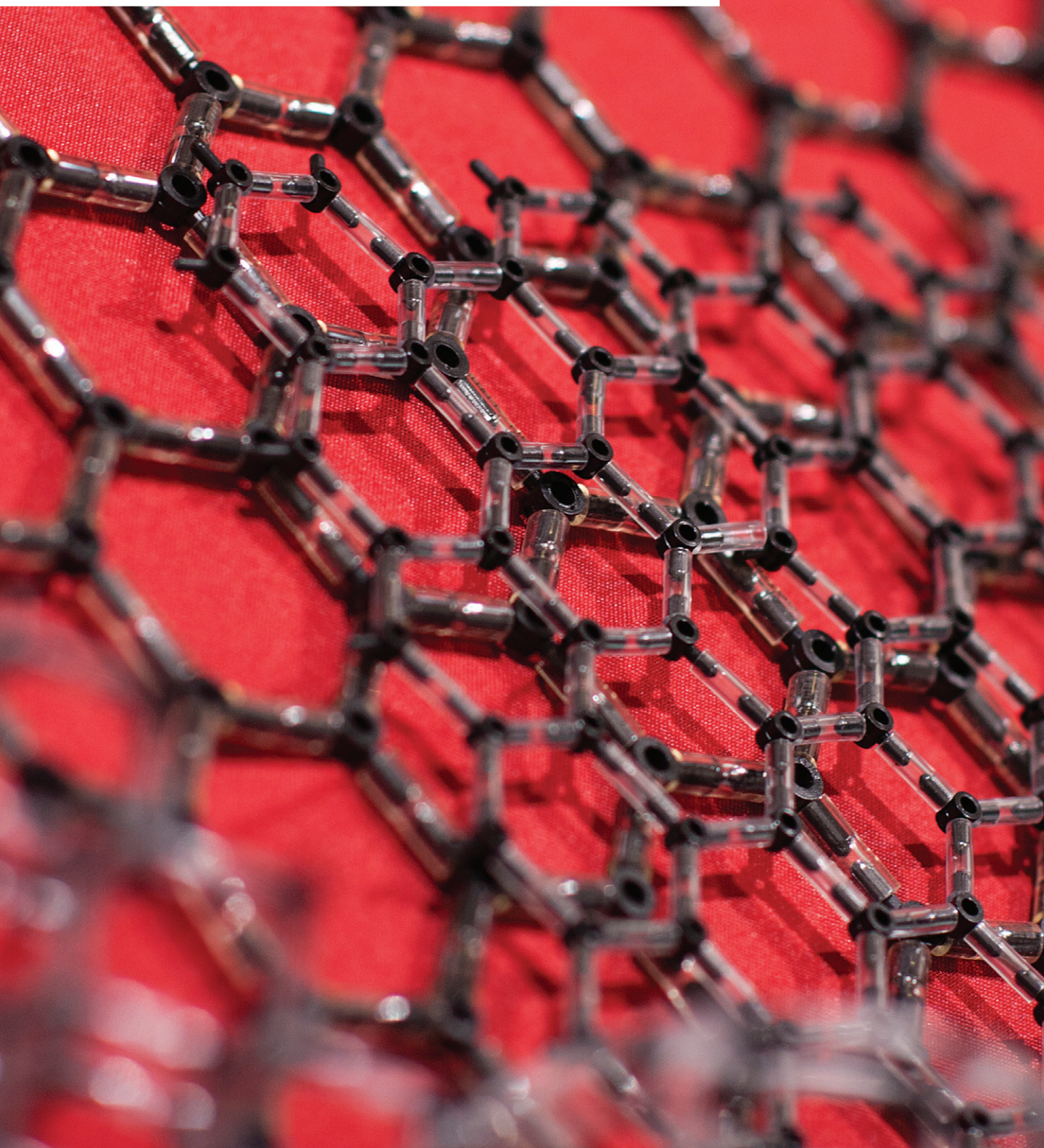


**Innovative
Responses**



**Broaden
Participation**

IMPLEMENTATION OBJECTIVES & STRATEGIES





Objective 1: Invest in Infrastructure

Advance the development of competitive, innovative research programs and centers in the state and its research institutions through strategic investments in physical and human infrastructure that are in line with state S&T goals.

PHYSICAL INFRASTRUCTURE

- Commit resources for advanced instrumentation in current and emerging research niches that are of strategic importance to the state and nation.
- Promote broad access to advanced instrumentation by Nebraska scientists across research institutions to maximize use and increase collaborations.
- Prioritize investments that utilize collaborative approaches and develop infrastructure that increases collaborative research.
- Encourage rigorous project planning for the effective acquisition of instrumentation and development of state-of-the-art research infrastructure.

HUMAN INFRASTRUCTURE

- Leverage resources to attract and hire talented, world-class faculty in areas of strategic importance to the state that expand research capabilities and national competitiveness.
- Support programs that promote the development and retention of existing faculty.
- Support programs that assist early career faculty to initiate successful research programs.
- Provide funding for technicians with the expertise and skills to ensure infrastructure investments are efficiently and effectively facilitated.



Objective 2: Develop a Globally-Competitive Science & Technology Workforce



Nurture a diverse, robust pipeline of students engaged in STEM through a portfolio of programs that reach students in grades K-16 as a first step to increase the number of professionals choosing STEM careers.

- Support programs that connect academic and informal STEM experiences in grades K-16 with the research of Nebraska scientists.
- Immerse secondary and post-secondary students in STEM research opportunities and work experiences in university laboratories and at Nebraska businesses.
- Support rigorous mentoring programs for undergraduates, graduates, and post-doctoral research associates.
- Expose the public to informal and formal STEM education programs that highlight the work of Nebraska scientists.

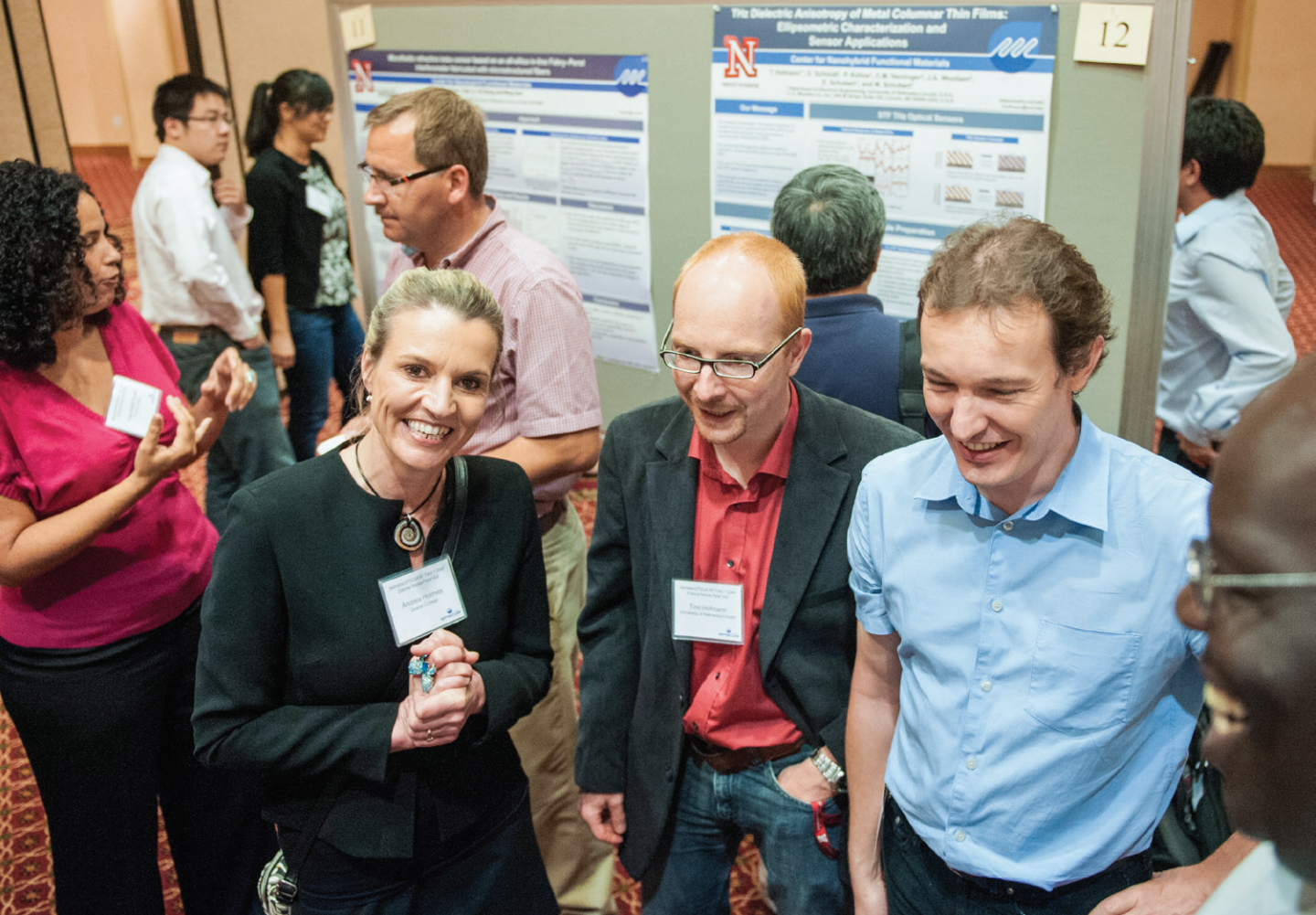


Objective 3: Promote Diversity and Broaden Participation



Support a STEM research and education ecosystem of excellence that is comprised of a broad array of backgrounds, perspectives, knowledge, and insights.

- Broaden participation and increase diversity in all Nebraska EPSCoR/IDEA programs by fostering engagement among demographic groups, institutions, and geographic regions underrepresented in STEM.
- Support programs that enhance STEM education and research opportunities at Nebraska's small colleges and non-research academic institutions.
- Enhance STEM education for students in Nebraska's tribal colleges with strategic infrastructure investments.



Objective 4: Foster Visionary Collaborations



Strengthen and sustain transdisciplinary and multi-institutional partnerships and enhance linkages with industry consistent with the state's S&T Plan.

PUBLIC-PRIVATE PARTNERSHIPS

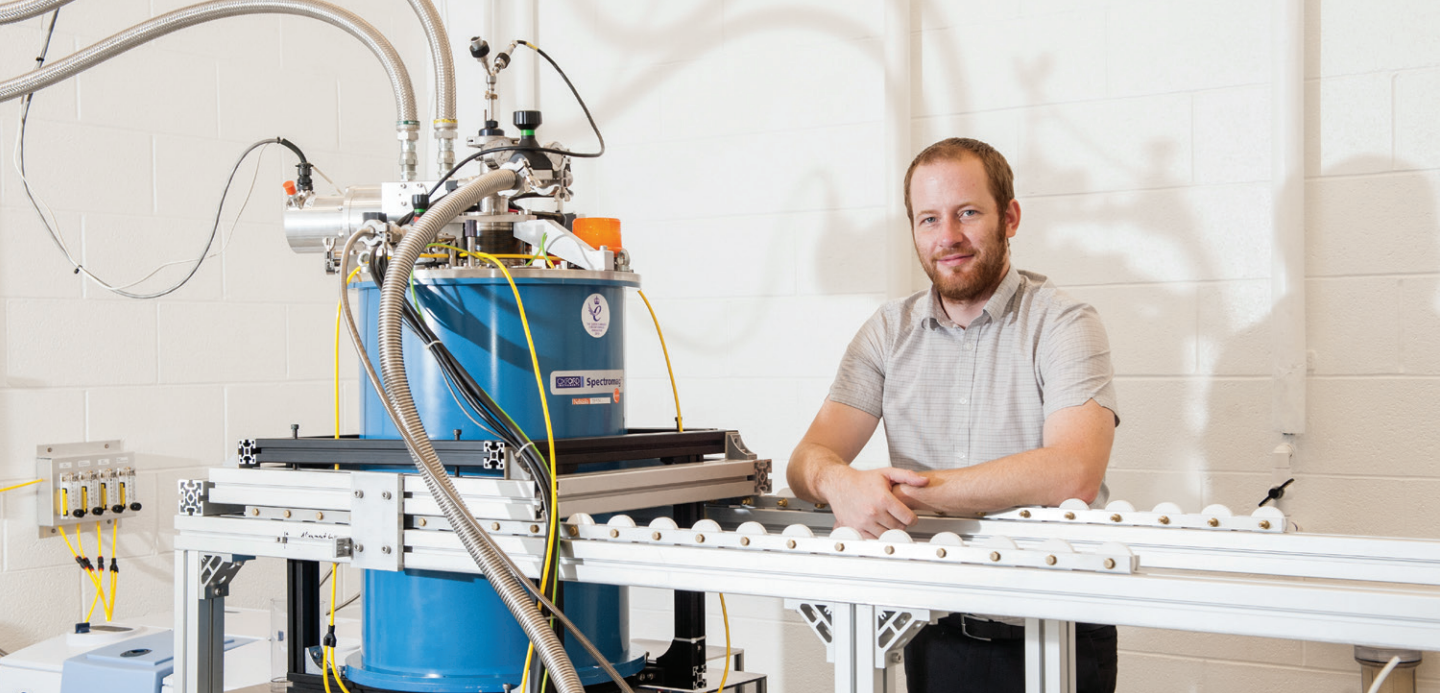
- Invest in research collaborations between in-state STEM industries and university researchers with the potential for high growth that result in nationally competitive research, stimulate entrepreneurial activities, and develop and market intellectual property.
- Sponsor events and create settings for meaningful industry-university interactions with the potential to rapidly stimulate innovation and competitiveness.

MULTI-INSTITUTIONAL PARTNERSHIPS

- Cultivate collaborative, multi-institutional research initiatives and strategic multi-state projects that lead to large-scale collaborative research and/or center grants.

TRANSDISCIPLINARY RESEARCH

- Support transdisciplinary research initiatives of strategic importance to the state and nation as well as innovative projects with the potential for substantial and transformational results.
- Foster collaborations and initiatives that lead to formal federal agency proposals and provide funding for promising research that spans disciplinary boundaries.



Objective 5: Expand Research Capacity in Existing and Emerging Areas



Develop programs to foster competitive research and technological development in basic and applied sciences that increase the state's research capacity and national competitiveness.

FOUNDATIONAL SCIENCES & ENGINEERING

Basic Biomedical Sciences

Increase knowledge in biochemistry, anatomy, immunology, cellular and microbiology, pharmacology, and physiology to advance the sciences that are the basic foundation for medicine.

Foundational Sciences

Pursue new discoveries and development of ideas and techniques that advance the boundaries of foundational science disciplines: physical, mathematical, computational, earth, biological, materials, and behavioral sciences.

Neuroscience

Enhance understanding of complex neurobiological systems from genetic determinants to cellular processes to the complex interplay of neurons, circuits, and systems that influence and orchestrate behavior and cognition. This area of emphasis includes: 1) biological, physiological, and chemical sciences; 2) cognitive and behavioral sciences; and 3) engineering, computational, and mathematical neurosciences.

TRANSLATIONAL SCIENCES

Cyberinfrastructure and Computing

Develop high performance computing to advance the analysis of complex phenomena through modeling and simulation. Improve cyber-connectivity to facilitate collaboration and access to national and international data sets and computing facilities.

Energy Science and Technology

Develop alternative energy sources, materials science and engineering for energy technologies, energy consequences of climate and environmental change, site characterization and remediation, and biological effects of energy related chemicals and radiation.

Engineering and Technology

Create and/or advance knowledge for intelligent automation and robotics, material characterization and synthesis, biomedical devices and tissue engineering, civil infrastructure and transportation engineering, advanced manufacturing processes and equipment, sensors and sensing principles, and bioengineering related to national security.

Environmental and Natural Resources Sciences

Expand methods and knowledge in environmental toxicology, waste management, water sciences, global climate change, biodiversity, contamination of surface and ground water, geographic information and remote sensing technologies, hazardous and medical waste management, risk analysis, and biosecurity.

Information and Communications Science and Technology

Innovate and advance knowledge in software engineering, sensor, and communication networks; remote sensing technologies, mobile computing, and artificial intelligence; data mining and data fusion techniques to extract and analyze information from very large data sets and social networks, bioinformatics, and computational biology.

Translational Biomedical Research

Promote innovative biomedical methods and technologies that will enhance the development and implementation of diagnostics and therapeutics that promote increased health and quality of life for our citizens.



Objective 6: Support Strengths and Address Needs with Innovative Responses



Nebraska EPSCoR/IDeA is committed to continuous improvement. Its management structure allows for rapid, effective responses to opportunities within the state to support STEM areas of strategic importance and in those cases where current projects require adjustments.

EXPERIMENTAL, INNOVATIVE, TRANSFORMATIVE

- Innovate and experiment in developing and implementing programs to support existing strengths and address needs. Emerging research opportunities or challenges sometimes require nimble action to identify and respond appropriately and creatively.

A CULTURE OF CONTINUOUS IMPROVEMENT

- Continuously improve through internal and external evaluation of projects; maintain a willingness to self-correct and redirect.

2013 State EPSCoR Committee Members

Nebraska EPSCoR is guided by policies and priorities set by a 19-member, Governor-appointed state committee. The committee membership includes senior administrators and researchers from the state's major research institutions, industry leaders, and representatives of state government. Nebraska EPSCoR is housed on the campus of the University of Nebraska-Lincoln.

Mr. Lyle Middendorf | *Committee Chair, Sr. Vice Pres. & Chief Technical Officer, Advanced Research & Development, LI-COR, Inc., Lincoln*

Dr. Iqbal Ahmad | *Professor, Dept. of Ophthalmology and Visual Sciences, UNMC*

Dr. Vimla Band | *Ardith and Anna Von Housen Professor and Chair, Dept. of Genetics, Cell Biology and Anatomy, UNMC*

Dr. Charles J. Bicak | *Senior Vice Chancellor for Academic and Student Affairs, UNK*

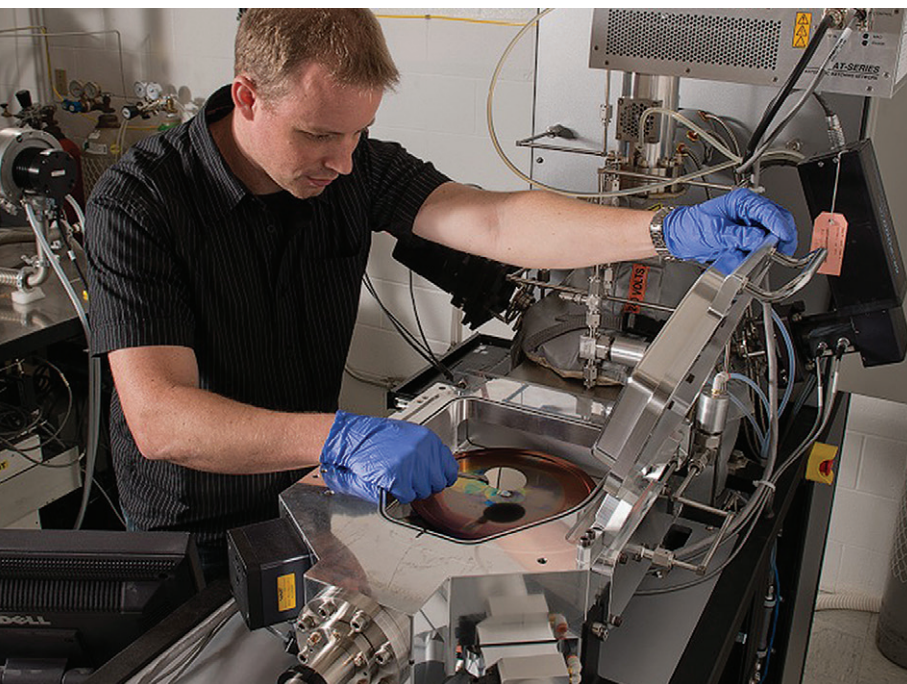
Dr. Valery Forbes | *Director and Professor, School of Biological Sciences, UNL*

Dr. Susan Fritz | *Interim Executive Vice President and Provost, University of Nebraska*

Dr. Clague P. Hodgson | *President, Nature Technology Corporation, Lincoln*

Ms. Catherine Lang | *Director, Nebraska Department of Economic Development*

Dr. Jennifer Larsen | *Vice Chancellor for Research, UNMC*





Dr. James McClurg | *President, Technical Development Resources Company, Lincoln*

Dr. Thomas Murray | *Associate Vice President for Health Science Research, Creighton University*

Dr. Prem Paul | *Vice Chancellor for Research & Economic Development, UNL*

Dr. Scott D. Snyder | *Associate Vice Chancellor for Research and Creative Activity, UNO*

Dr. Juliane Soukup | *Professor, Department of Chemistry, Creighton University*

Dr. Anthony F. Starace | *George Holmes Distinguished Professor, Dept. of Physics and Astronomy, UNL*

Dr. Nicholas Stergiou | *Isaacson Professor, School of Health, Physical Education & Recreation, UNO*

Dr. Raymond Ward | *President, Ward Laboratories, Inc., Kearney*

Dr. Terri L. Wasmoen | *Associate Vice President (ret.), US Biological Research, Merck Animal Health, Elkhorn*

Senator Ken Haar | *State Senator, State of Nebraska*



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Advancing Nebraska Through Transformative Research & Workforce Development

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