KY NSF EPSCoR Strategic Plan (2009-2013): Transforming Kentucky's New Economy

Responsive to the terms and conditions of NSF Award #0814194
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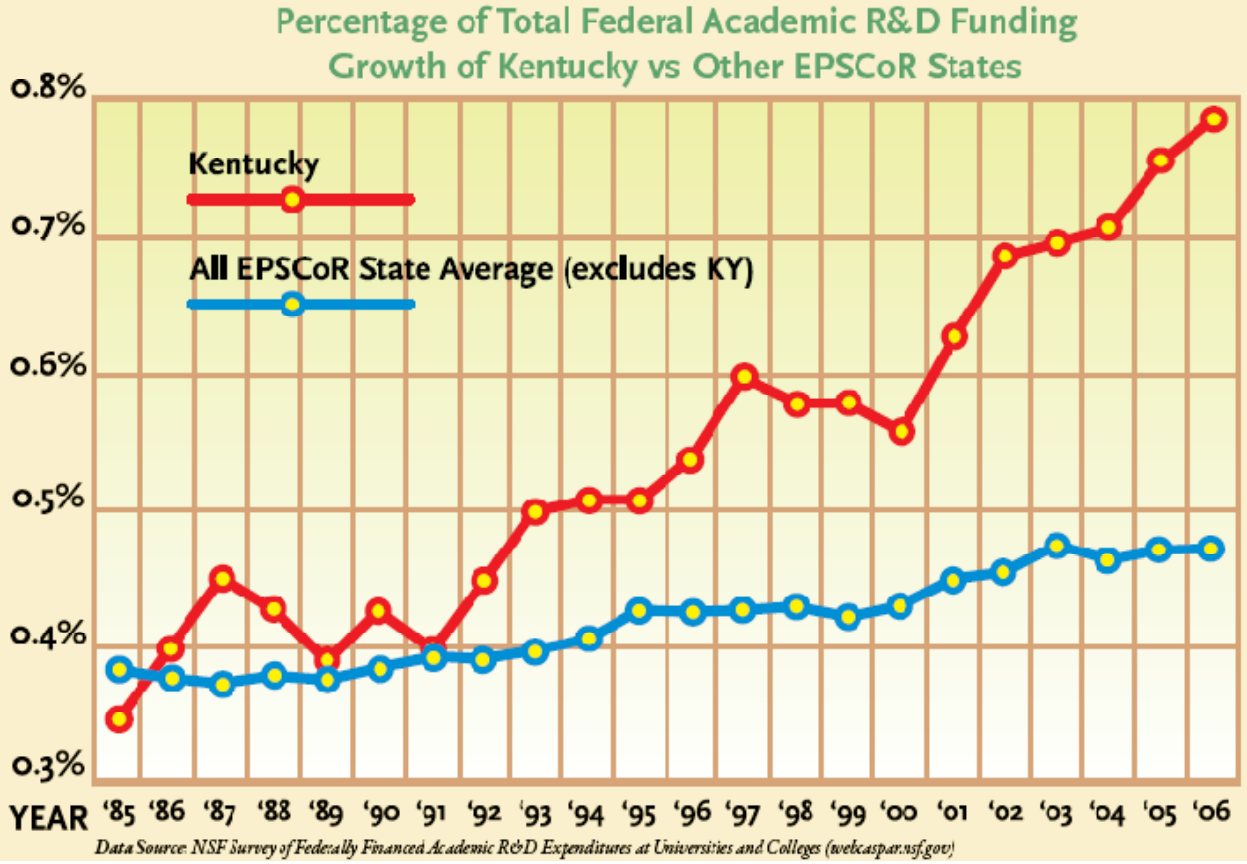
29 January 2009

KY NSF EPSCoR Strategic Plan

Program and Strategic Plan Overview and Purpose

For over twenty years, KY NSF EPSCoR has been a major force in developing research capacity in the postsecondary institutions of Kentucky. Through a strategy of focusing EPSCoR funds in specific areas, we have built up several excellent centers and research facilities, which have led to an increased share of federal research funding for Kentucky (see graph below). The Kentucky EPSCoR committee, directed by the non-profit Kentucky Science and Technology Corporation, has generated the state's strategic plan to encourage research as an engine for economic development. This report contains the Kentucky NSF EPSCoR's strategic vision, mission, goals, objectives, and strategies for developing a nationally competitive research community and infrastructure at the postsecondary institutions in Kentucky.



This Kentucky NSF EPSCoR strategic plan is designed to create an on-going framework and guide that will facilitate planning and activities across funding opportunities and initiatives. While it has been developed with the current RII funding stream in place, we also consider the long range goals and objectives of KY NSF EPSCoR. This plan is intended to provide an organizing framework that will allow for the coordination and accountability of its overall long term activities and objectives, and it has been developed with consideration of the larger environment in which it operates. Specifically, the statewide program has an obligation to ensure the direction of the program is in alignment with both NSF EPSCoR goals and Kentucky's

Science and Technology (S&T) strategic plan. Further, it has been developed in consideration of the population and diversity characteristics of the state of Kentucky. Kentucky has communities that classify as underrepresented in STEM in eastern Kentucky, where secondary math and science test scores are persistently below state and national averages. Many of the students in this classification are first-generation college students from rural economically distressed communities.

Strategic Plan Development

This plan is based on discussions and frameworks that have been developed over the past few years. In 2006, Kentucky NSF EPSCoR developed a logic model to enhance the development of a formal strategic plan. This model has been updated and used as a graphical framework to help structure this strategic plan. More recently, KY NSF EPSCoR held a strategic planning session in early December 2008. The event was attended by our NSF EPSCoR Program Officer, Dr. Maija Kukla, and facilitated by our external evaluation consultant, Dr. Julia Melkers, Associate Professor of Public Policy at the Georgia Institute of Technology. This session provided an important overview of Kentucky NSF EPSCoR current RII initiatives, which in turn helped to frame the on-going direction of Kentucky NSF EPSCoR. Overall, this plan has been developed based on sound principles of strategic planning and in consideration of the core science, education and outreach activities, and purpose of Kentucky NSF EPSCoR.

Kentucky NSF EPSCoR Strategic Plan Framework and Details

Vision

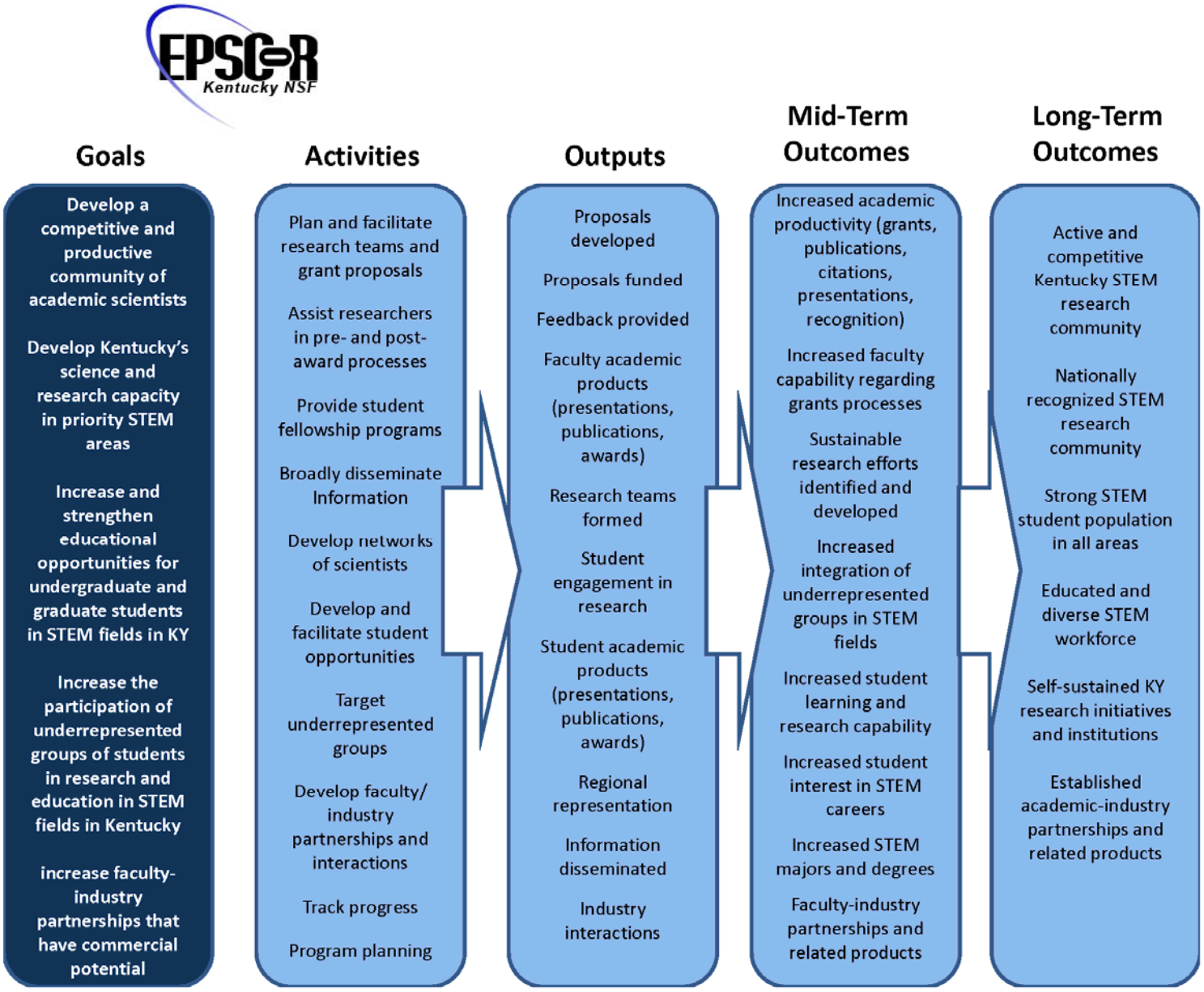
The vision of the Kentucky NSF EPSCoR is to advance scientific discovery, innovation and education throughout the Commonwealth.

Mission

Kentucky NSF EPSCoR endeavors to build the national research competitiveness of Kentucky researchers and students in STEM disciplines through facilitation and coordination of NSF EPSCoR proposals and funding; communication and assistance to the Kentucky research community; facilitating the incorporation of students in research opportunities; encouragement and targeting of underrepresented groups in Kentucky to engage in STEM research; and interaction with external stakeholders. Through these activities, the Kentucky NSF EPSCoR seeks to be a catalyst in stimulating the development of a strong and sustainable research community and capacity of the state of Kentucky.

Kentucky NSF EPSCoR Logic Model

In order to further our mission, the Kentucky NSF EPSCoR has articulated several specific goals that provide the impetus and framework for all Kentucky NSF EPSCoR activities. As shown in the modified logic model below, the subsequent activities and results (outputs, outcomes) flow directly from these goals.



Kentucky NSF EPSCoR Goals

1. **To develop a competitive and productive community of academic scientists via infrastructure and on-going initiatives and activities.** KY NSF EPSCoR provides initial funding to research projects with the potential to be self-sustainable, competitive programs at the KY postsecondary institutions. This initial funding develops the infrastructure at the research institutions. It often takes the form of support for new faculty hires, advanced equipment and instrumentation, and support for underrepresented students.
2. **To develop science and research capacity through coordination and alignment with the priority STEM areas of the Commonwealth of Kentucky's strategic plan; (such as Material Sciences, Life Sciences, Information Technology and Nanotechnology).** KY NSF EPSCoR has the obligation to ensure its investments are focused and consistent with the larger strategic plan of its sponsors—the NSF and the state of Kentucky. Consistency and synergy with state and national directives are part of the evaluation criteria of all KY NSF EPSCoR investments.
3. **To increase and strengthen educational opportunities for undergraduate and graduate students in Kentucky through greater participation in research.** Strong research infrastructure is not developed in a vacuum, but necessitates the participation of all state citizens and entities. Supporting the development of a well-educated student population and encouraging their participation in the research of the commonwealth is a priority of the KY NSF EPSCoR.
4. **To increase the participation of underrepresented groups of students in research and education in STEM fields in Kentucky through coordination with institutions and research groups.** In Kentucky, there are significant populations of underrepresented groups in the Appalachian region and other areas. The development of a strong research capacity in the state of Kentucky relies on the integration and active involvement of students and researchers from these areas. The Kentucky NSF EPSCoR seeks to integrate individuals from these underrepresented populations with areas in the STEM research and education activities of the Commonwealth.
5. **To increase faculty-industry partnerships that have commercial potential in the State of Kentucky through outreach and communication activities with the intention of improving economic development in the state.** A strong economic base is one of the long-term results of improved research infrastructure. States that have the strongest research infrastructure at their postsecondary institutions also have the strongest job markets in the sciences as well as the highest standards of living for their citizens.

Kentucky NSF EPSCoR Alignment of Goals, Objectives and Strategies

The goals listed above articulate our overall ambitions and intentions as a state NSF EPSCoR office. In order to accomplish these goals, we must define and address particular objectives that will help us in this achievement. The table below illustrates the specific goals and active strategies engaged to accomplish the Kentucky NSF EPSCoR goals.

KY NSF EPSCoR Goals and Objectives	Strategies
Goal 1: To develop a competitive and productive community of academic scientists	
Objective 1.1: Improve KY faculty grant getting capacity in the research proposal process Objective 1.2: Increase the integration of scientists from regional schools in collaborative research activities Objective 1.3: Increase the development of multi-disciplinary teams for relevant proposals and activities Objective 1.4: Increase faculty and student EPSCoR-funded research productivity	Pre-Award and On-Going • Assist scientists throughout the proposal process and offer training workshops, establish external reviews, evaluation sessions and other interactions. • Target and facilitate interdisciplinary and inter-institutional research team development to maximize the synergistic KY NSF EPSCoR effect. • Include travel and workshop support for junior faculty to attend national and international conferences to present research findings. • Provide information to the KY research community regarding funding opportunities. • Hold external expert review meetings of Kentucky research proposals (substantive, AAAS and KY NSF EPSCoR panels). • Provide assistance regarding guidelines and requirements for funding and proposal submission to potential investigators. • Coordinate and implement (Track 1 and 2) proposals to NSF EPSCoR Post-award: • Engage in on-going interaction and feedback sessions with NSF-EPSCoR funded faculty regarding project-specific progress, budgets, and milestone attainment. • Assist faculty in project planning, report development, and on-going reporting. • Maintain and analyze on-going success stories and performance data for continual improvement.
Goal 2: To develop Kentucky's science and research capacity in priority areas	
Objective 2.1: Increase external funding at Kentucky's postsecondary institutions in the priority areas	• Build a network of scientist across KY via investments in priority research disciplines including scientists from regional schools • Initiate centers and facilities proposals in state priority areas via proposal development processes. • Target and facilitate team development of researchers for proposal development in state STEM priority areas (as relevant). • Disseminate information through state site visits, annual KY NSF EPSCoR meetings, the Kentucky NSF EPSCoR website, and other materials regarding state STEM priorities to the Kentucky research community.
Goal 3: To increase and strengthen educational opportunities for undergraduate and graduate students	
Objective 3.1: Improve opportunities in KY that engage undergraduate and graduate students in targeted STEM educational and research programs	• Create and provide opportunities to engage undergraduate and graduate students in targeted STEM educational and research programs. • Maintain and administer the Research Scholars Program. • Disseminate information to Kentucky research faculty regarding educational and research opportunities for students in STEM fields.

Goal 4: To increase the participation of underrepresented groups of students in research and education in STEM fields in Kentucky	
Objective 4.1: Increase the participation of under-represented students and research team members from those residing in the Appalachian region of eastern Kentucky.	• Recruit students and research team members from those residing in the Appalachian region of eastern Kentucky. • Maintain and administer the Research Enhancement Grant Program. • Maintain a mentored cyberinfrastructure research program for computer science graduate students across the state, with initial focus on Kentucky State University (the state's only historically black college/university). • Work with faculty investigators to include summer research experiences, research assistantships, and other opportunities for underrepresented students. • Disseminate information to students at Kentucky institutions in underrepresented areas of the state regarding educational and research opportunities in STEM fields.
Goal 5: To build faculty-industry partnerships in the State of Kentucky	
Objective 5.1: Increase private sector partnerships	• Disseminate information to private sector stakeholders regarding EPSCoR activities in Kentucky. • Facilitate faculty-industry interactions regarding industry applications for research. • Coordinate network meetings for (appropriate) EPSCoR-funded research projects between faculty and external private sector stakeholders. • Include private sector representatives on our KY NSF EPSCoR Subcommittee to seek private sector input on program's direction.

Potential Measures

In order to track progress toward KY EPSCoR goals and objectives, we will develop a performance monitoring plan that will allow us to track short-term progress and outcomes, as well as longer term outcomes and programmatic impacts. This is an important aspect of a comprehensive strategic plan and will work toward the development of these metrics. Specifically, our purpose here will be to develop measures that blend our efforts in annual reporting, together with our other on-going performance tracking. We are aware that the NSF EPSCoR program officers are developing revised annual reporting guidelines and metrics. We will work with our NSF program officer and other staff to ensure that we are gathering, tracking and reporting the metrics and measure they require for programmatic evaluation.

Current Activities and Milestones for Current and Pending Research Tracks (2009-2013)

In order to accomplish the goals and objectives above, the Kentucky NSF EPSCoR has mapped out an implementation plan for its current and pending funding tracks that outlines important tasks and activities that will be addressed over the next 5 years and that are consistent with the above goals and objectives. It provides detailed information on Kentucky EPSCoR activities. While the vision, mission, and overall goals of Kentucky NSF EPSCoR are intended to be a long-term framework, this implementation plan serves as a management and planning guide that is structured to allow for necessary adjustments in specific funding periods, given any changes as

we move forward. The items below are distilled from the individual track proposals and serve as an on-going management and assessment guide.

EPSCoR RII Track 1 – Materials Sciences (2009-2013)

- New faculty hires at UK in physics and chemistry (over next 2 yrs.)
- Acquisition of production/characterization equipment for UK Center for Advanced Materials (CAM's) shared-use lab (over next 5 yrs.)
- CAM summer research opportunities for KY students (over next 5 yrs.)
- Establish CAM's graduate student RA-ships (over next 5 yrs.)
- Development of CAM's seminar series for materials science education (over next 5 yrs.)
- Development of new course offerings at UK in materials science (within 3 yrs.)
- Develop CAM labs and student "feeder programs" at regional KY institutions (over next 5 yrs.)
- CAM student/faculty collaborations with Oak Ridge Scientists (over next 5 yrs.)
- Host international workshop on materials research (2011)
- Monthly seminar series and annual conference series in bioengineering
- Acquisition of bioengineering instrumentation on UK and UofL campuses (over next 5 yrs.)
- Expand bioengineering (statewide) faculty usage of acquired instrumentation (over next 5 yrs.)
- Develop and host bioengineering HS teacher fellows training program (summers, over next 5 yrs.)
- Host Bioengineering Dept. "open houses" at both campuses (annually, over next 5 yrs.)
- Host bioengineering museum exhibits in the local communities (annually, over next 5 yrs.)
- Faculty participants visit K-12 schools for bioengineering outreach (annually, over next 5 yrs.)
- Develop a statewide communication & equipment use network for nano/micro research (established 2009, enhanced over next 5 yrs.)
- Acquire high throughput photolithography equipment at UofL cleanroom (2009)
- Establish statewide lithography "service center" model and provide services for state faculty (2010)
- Develop/ acquire licenses for micro/ nano research and education shared software module for the established network (established 2009, expanded over next 5 yrs.)

EPSCoR RII Track 1 – Genomic Sciences (2009-2013)

- Acquisition of high throughput DNA sequencing equipment at UK's facility (2009)
- Provide support for new faculty hire in statistics (2009 and 2010)
- Acquire high performance computing and bioinformatics software (over next 5 yrs.)
- Expand genomic (statewide) faculty usage of acquired instrumentation (over next 5 yrs.)
- Support genomics student's research at regional collaborative institutions (over next 5 yrs.)
- Establish rotating genomic faculty seminar series (over next 5 yrs.)

EPSCoR RII Track 2 – Cyberinfrastructure (2009-2012)

- New faculty hire at UK in Computer Science, Visualization (Yrs. 1-3)
- Enhance capacity for broad-based discovery across large-scale spatial systems
- Develop the Virtual Observatory and Ecological Informatics System (VOEIS) to monitor, analyze, model and forecast the consequences of climate and land use change.
- Demonstrate the utility of the VOEIS via publications and web-based sharing of data and data products
- Research-based Education of the VOEIS project
    - Graduate Student Education—1 PhD and 8 MS students in Kentucky—Full research assistantships provided including tuition.
    - Sensor and CI education for all VOEIS graduate students
    - Develop a small cadre of graduate and undergraduate students (16 per summer) exposed to development and implementation of cyber-enabled research with targeted involvement of underrepresented students—Appalachian first-generation college attendees in Kentucky.
    - Undergraduate Educational Programs—both field stations will hold nationally advertised 8-week summer field sessions at the undergraduate and graduate levels.
    - Underrepresented Undergraduate STEM students—four academically talented students/year (2 KY, 2 MT) who have completed their junior year will be selected to participate in the 8-week summer program at Hancock Biological Station in KY and Flathead Lake Biological Station in MT.
    - KWRRI Water Pioneers and MWC Watercourse will conduct a specially designed program for 16 advanced high school students (30-50% selected from economically depressed regions of each state) to become acquainted with sensor networks and usage, data collection and producing graphical and statistical reports.
    - Develop a K-12 program to expose younger students to cyber-enabled research thru State Water Centers.
    - Provide web-based education and outreach material for increased ecological literacy of ecological concepts to the broader public.
- Raise awareness of how human activities have impact on the environment.
- Design and test a new undergraduate curriculum in limnology and ecology in Kentucky universities.
- Acquisition of cyberinfrastructure necessary to connect the Hancock Biological Station and Murray State University to KyRON.
- Acquire or develop specific scientific equipment and connectivity—sensors, computers, wireless and grid—to create an end-to-end solution from lake and watershed sensors to visualization of the data.
- Employ a private consultant to assess progress toward project goals and on-going project impacts.
- Develop a detailed set of metrics.

- Employ ongoing performance metrics and an external evaluation that will provide both formative input and a summative analysis of project outcomes.
- Conduct an external evaluation to assess the progress toward the Track-2 goals with a particular focus on students, especially underrepresented minorities—economically disadvantaged, rural, first generation college students in Kentucky.
- Support graduate students to attend and present papers at annual meeting of professional scientific societies.
- Involve Kentucky Water Resources Research Institute's (KWRRI) Water Pioneers Program in outreach and undergraduate education.
- Faculty mentors will work with students on preparation of conference abstracts, papers and presentations.