A Brief Overview of Kansas NSF EPSCoR and the ARISE Project

“How Kansas EPSCoR, and the ARISE Project, advance research infrastructure improvement and Science & Technology growth in Kansas (and beyond)”
NSF Established Program to Stimulate Competitive Research

**About NSF EPSCoR**

The U.S. National Science Foundation's EPSCoR program pursues a mission to enhance the research competitiveness of targeted jurisdictions (state, territory or commonwealth) by strengthening science, technology, engineering and mathematics (STEM) capacity and capability through a diverse portfolio of investments from talent development to local infrastructure. The EPSCoR program envisions its jurisdictions as recognized contributors to the national and global STEM research enterprise. The program:

- **Catalyzes** research capability across and among jurisdictions.
- **Establishes** STEM professional development pathways.
- **Broadens** participation of diverse groups and institutions in STEM.
- **Effects** engagement in STEM at national and global levels.
- **Impacts** jurisdictional economic development.

EPSCoR is part of NSF's **Broadening Participation portfolio**.  
[https://beta.nsf.gov/funding/initiatives/epscor](https://beta.nsf.gov/funding/initiatives/epscor)
EPSCoR Research Infrastructure Improvement Program Track-1 (RII Track-1)

RII Track-1 awards provide up to $20 million total over five years to support research-driven improvements to jurisdictions’ physical and cyber infrastructure and human capital development in topical areas selected by the jurisdiction’s EPSCoR steering committee as having the best potential to improve future R&D competitiveness. The project’s research and capacity-building activities must align with the specific research priorities identified in the submitting jurisdiction’s approved Science and Technology (S&T) Plan.
KS State S&T Plan

Table of contents

Executive summary ................................................................. 5

1. Expanding on our vision ....................................................... 8

2. Alignment with statewide higher education + economic development strategic plans
   2.1 KBOR’s Building a Future ................................................. 10
   2.2 KS Department of Commerce Framework for Growth .......... 13

3. Science + technology profile for Kansas ................................ 15
   3.1 Kansas rankings for science + engineering statistics .......... 15
   3.2 Research funding ........................................................ 17
   3.3 Kansas innovation profile .............................................. 18
   3.4 Recent investments in research capacity ......................... 22

4. Areas of strength + established research infrastructure .......... 23

5. Areas to advance research competitiveness, resilience + economic prosperity ........................................ 36

6. 2021 recommendations ...................................................... 45

7. Conclusion ....................................................................... 47

KS State Science & Technology Plan: https://www.kansasregents.org/academic_affairs/kansas-epscor-idea
The ultimate goal is to increase graduates in high-demand, sustaining-wage fields.

Alignment with KBOR Strategic Plan
Foresight 2020

Three Special Initiatives:

3. Kansas Nursing Initiative

Target industries for talent pipeline:

- Advanced manufacturing including aviation
- Agriculture including animal health
- Architecture, construction, engineering
- Business and financial services
- Computer science including cybersecurity
- Education
- Energy
- Health sciences

KS State Science & Technology Plan: https://www.kansasregents.org/academic_affairs/kansas-epscor-idea
KS State S&T Plan

Areas of strength
1. One Health: Intersection of human, animal & environmental health
2. Aviation & transportation
3. Agriculture & bioscience
4. Advanced manufacturing & polymer science
5. Energy & environment
6. Security

Areas of opportunity
7. Smart infrastructure & resilience
8. Precision agriculture
9. Digital transformation & automation
10. Harnessing genomics

We identified two additional foundational areas that require infrastructure investment to build science and technology research capacity broadly across multiple fields.

Foundational infrastructure needs
1. Rural broadband and connectivity
2. Data literacy, data storage, and open data access to enable research

Our vision is to elevate, stimulate, grow, and translate science and technology research in Kansas to improve the quality of life and economic resilience of its citizens.

KS State Science & Technology Plan: https://www.kansasregents.org/academic_affairs/kansas-epscor-idea
Recent Investments in Research Capacity

Kansas University Engineering Initiative

$105M
initial 10-year investment in 2012

1,365
initial annual goal for undergraduate degrees

1,698
revised goal after passing original target in 2018

University engineering facilities

KSU
Engineering Hall
108K sq. ft.
2016

WSU
John Bardo Center
143K sq. ft.
2017

KU
LEEP2
110K sq. ft.
2015

KS State Science & Technology Plan: https://www.kansasregents.org/academic_affairs/kansas-epscor-idea
KS State S&T Plan
Smart infrastructure + resilience

Kansas is uniquely positioned to capitalize on its expertise in cybersecurity and infrastructure to meet the needs of communities to rebuild aging infrastructure and to become more resilient to the changing climate.

**Economic impact to the state**
Every $1 spent on pre-disaster mitigation saves up to $11 on post-disaster recovery, not including the additional quality of life maintained. Resilience- and risk-informed decision-making can be used to more optimally allocate financial resources where the greatest needs exist to prevent hazards from ever becoming disasters. Such resources could be used to maintain, repair, or retrofit physical infrastructure, or it can be used to build human capacity, both of which create more jobs in Kansas.

[KS State Science & Technology Plan](https://www.kansasregents.org/academic_affairs/kansas-epscor-idea)
Vision: ARISE will build research capacity in Kansas by creating a new social equity-driven paradigm for resilience analysis that, through a pipeline of community leaders and decision-makers, will transform how communities invest in, and manage, human and physical infrastructure.
Project Overview

Institutional Decision Makers

Cyber Physical Systems
Water, Energy, Transport

Community and Social Equity

Theme 1: Socially equitable interdependent infrastructure
Theme 2: Scalable holistic resilience evaluation
Theme 3: Infrastructure enhancement and decision lever case studies
Theme 4: Decision support structure

Cross-cutting Theme

K-12 Engagement
Pathways to Higher Ed + Data Science Credentials
Data Science Corp, REU, Build Your Future

Workforce Development and Community Engaged Research
Research Overview

Theme 1 - Socially Equitable Interdependent Infrastructure for Resilience Analysis
  T1-1 Measuring social equity
  T1-2 Model Framework
  T1-3 Model specification and validation

Theme 2 - Scalable holistic resilience evaluation
  T2-1 Holistic resilience metric development
  T2-2 Institutional decision-making
  T2-3 Probabilistic resilience characterization
  T2-4 Scalable resilience computation with uncertainties
Research Overview

Theme 3 - Infrastructure Enhancement and Decision Levers: Case Studies

- T3-1 Transportation management and recovery planning
- T3-2 Resilient, safe drinking water delivery
- T3-3 Resilient wastewater and stormwater collection
- T3-4 Distributed energy resources

Theme 4 – Decision-Support Structure

- T4-1 Understanding and nudging decision-makers
- T4-1 Decision-support tool implementation
Education & Workforce Development

Edu Obj 1 - Develop an interdisciplinary data science consortium

Task 1 Develop a data science capstone course called Community Data Lab (CDL)
Task 2 Establish an online repository for data science curriculum material

Edu Obj 2 – Train the next generation of ARISE scientists

Task 1 REU
Task 2 Collaborate with KS NSF LSAMP Program
Task 3 Create a multi-institution resilience course for graduate students
Education & Workforce Development

Edu Obj 3 - Engage youth and families through educational programming

  Task 1 TRIO Youth & Family Programming
  Task 2 Family STEM nights
  Task 3 Community Connections through Public Libraries

Edu Obj 4 – Implement a network of community-engaged research

  Task 1 CITI Training and Completion of the Community Engagement Module
  Task 2 Community Engagement and Outreach Roundtables
  Task 3 Community Engagement Advocates
  Task 4 Build Public Utility Workforce Capacity
Seed Funding Opportunities
FUNDING OPPORTUNITY

First Awards for research in resiliency and smart infrastructure

Kansas NSF EPSCoR is requesting proposals from early career faculty for First Awards. These seed grants are designed to spur research in resiliency and smart infrastructure. Experts in the field will review the submissions, and offer feedback to help awardees compete nationally for funding.

Who should apply?
Any tenure-track faculty member* who is an Assistant or non-tenured Associate Professor at Kansas State University, University of Kansas, Wichita State University, Emporia State University, Fort Hays State University, Pittsburg State University, or Washburn University.

*Other restrictions apply.

About Us
The National Science Foundation Established Program to Stimulate Competitive Research (NSF EPSCoR) ensures every citizen has access to STEM experiences by increasing research capacity in traditionally underfunded regions of the country. For every dollar it invests in Kansas, the state gets back twice that in non-EPSCoR funding.

LEARN MORE
arisekansas.org

Proposed Notice of intent
Due Nov. 29, 2022

Full proposal
Due Jan. 10, 2023

Direct budget up to $50,000 for 12 months

Who should apply?
Any faculty member at Kansas State University, University of Kansas, Wichita State University, Emporia State University, Fort Hays State University, Haskell Indian Nations University, Pittsburg State University, or Washburn University is eligible to apply.

About Us
The National Science Foundation Established Program to Stimulate Competitive Research (NSF EPSCoR) ensures every citizen has access to STEM experiences by increasing research capacity in traditionally underfunded regions of the country. For every dollar it invests in Kansas, the state gets back twice that in non-EPSCoR funding.

LEARN MORE
arisekansas.org

Proposal
Due Jan. 10, 2023

Total direct budget up to $50,000

Duration of award
Up to 14 months

REI Awards are funded by the NSF EPSCoR RII Track 1 award (DPI-1948878); the Kansas Board of Regents (K伯) and the participating universities.
ARISE Management Structure

Theme Leaders
- Each Research Theme and Education Objective has a theme leader

KNE Office: nsfepscor@ku.edu, ARISEkansas.org

Belinda Sturm  
Project Director

Doug Byers  
Project Administrator

Claudia Bode  
Director Education & Outreach

Cynthia Walker  
Financial Manager