



# VISIONARY PLAN

  
K-State **2025**



As the modern world grows increasingly interconnected and complex, adaptation to change has become a principal challenge. Fundamental issues such as globalization, increasing economic interdependence, population growth, and resource depletion compound associated interdisciplinary technical problems related to human health improvements, energy utilization, infrastructure upgrades, and information technology advancements. Consequently, these issues require comprehensive engineering-related research and education. Contemporary engineers must possess extensive knowledge that spans many domains, unprecedented expertise within a single domain, and the ability to integrate that knowledge and expertise into their respective fields. In addition, the requisite for communication across domains is creating an urgent need for engineers with well-developed problem-solving and critical thinking skills, and collaborative approaches to creativity and innovation. These requirements challenge engineering students as well as the faculty that guide and support them.

The National Academy of Engineering has articulated several grand challenges that dictate and direct 21st century engineering. The Carl R. Ice College of Engineering at Kansas State University has applied past successes in order to articulate a visionary plan that embraces 21st century opportunities. Specifically, the plan anticipates the college's future growth, engineering-related needs of employers and the research community, and objectives for educating a diverse workforce in Kansas, the Midwest, and the nation. The plan interconnects educational excellence with impactful research among undergraduate and graduate students, while recognizing financial realities and identifying select research areas for investment. In the living laboratory of Kansas and the Midwest, the college intends to become a partner of choice by modeling collaboration with internal and external stakeholders, and demonstrating wide applicability of an engineering education in a world that demands interdisciplinary solutions.

# CHALLENGES AND OPPORTUNITIES



**Mission:** The Carl R. Ice College of Engineering serves the citizens of Kansas, the nation, and the world by providing world-class educational, research, and service programs where students and faculty can develop in their chosen disciplines, and advance as successful leaders and professionals.

**Vision:** The Carl R. Ice College of Engineering will pursue academic excellence in all of its endeavors.

**Metrics:** The following metrics were selected to measure our progress against our vision:

- Research expenditures
- Philanthropic giving
- Number of publications
- Doctorate students enrolled
- Number of national faculty awardees
- Number of endowed faculty positions
- Freshman-to-sophomore retention rate
- Number of undergraduate students involved in creative inquiry and research

# METRICS

To ensure we turn our vision into reality, we have defined the following four specific priorities:

- *Academic prowess* — We will attract and retain diverse faculty who are recognized for their expertise and scholarship. Their synergistic intellectual interaction will lead to transformative innovations that will beneficially enhance the citizens of Kansas, the nation, and the world. In order to facilitate this priority, we will recruit and retain outstanding faculty members in the college.
- *Inspiring facilities* — We will construct cutting-edge facilities for instruction, collaboration, and research in order to create an ecosystem that will foster creative thinking and innovation. By 2016, we will open Phase IV which will add 108,000 square feet of additional space in the college.
- *Exceptional educational experiences* — Because higher education is becoming increasingly interdisciplinary and experiential, we will develop innovative pedagogies that integrate classroom instruction, creative inquiry, and real-world experiences.
- *Influential research and scholarship* — The production of new knowledge through research and scholarship is central to the mission of the college. In accordance with the tradition of a land-grant university, our faculty's research will provide real-world solutions for complex problems associated with the global society of the 21st century.

# PRIORITIES



We will execute our vision and strategy while staying true to our core values of —

- *Integrity* — Uncompromising commitment to honesty is the foundation of all college endeavors. We accept responsibility and practice personal and relational accountability.
- *Excellence* — Excellence in the college is derived from a persistent commitment to diligence, perseverance, and consistency in all academic pursuits.
- *Scholarship* — The college promotes the highest levels of scholarship, including excellence in teaching and discovery, application, integration, and dissemination of knowledge.
- *Innovation* — College faculty members value and support each other in the pursuit of high-risk endeavors, and we strive to create economic and societal value for Kansas and the nation.
- *Respect*— The college values, celebrates, and embraces diversity, inclusion, and cooperation of all peoples. We value the rights, cultures, and personal dignity of all contributing colleagues by utilizing individual perspectives and talents.

# CORE VALUES

We will accomplish the vision and strategy of the college by —

- Increasing excellence, size and diversity of the faculty, who are ultimately responsible for achieving our vision;
- Catalyzing the college's research enterprise by expanding existing strengths, hiring experienced faculty, and improving support services for grant and contract development;
- Enhancing the student experience using innovative pedagogies, new curricula, expanded experiential and international opportunities, and college-level investments;
- Improving the quality of our research and educational infrastructure;
- Establishing and stewarding corporate partnerships in order to promote career opportunities for students, research opportunities for faculty, and online instruction for working professionals;
- Strengthening and nurturing relationships across the nation with alumni and friends to promote excellence through philanthropy;
- Investing in revenue-generating entrepreneurship and innovative faculty-driven initiatives; and
- Implementing fiscally sound and effective management practices throughout the college's administration.

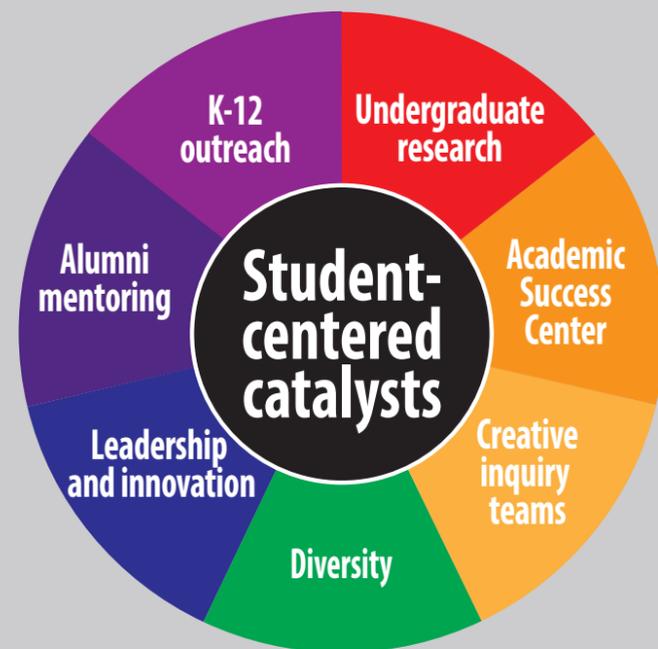
# TACTICS



**Provide a transformational educational experience by promoting student success through impactful learning experiences.**

We will provide relevant, high-quality education for students in order to enable their professional and personal successes, instill institutional pride, promote social responsibility, and encourage lifelong involvement and investment in the college. We will be recognized for engineering education, K-12 outreach, student quality, and diversity of students; furthermore, our alumni will be known as leaders of industry, society, and academe. The following student-centered catalysts will advance our vision:

- *Creative inquiry teams* — hands-on design and fabrication of engineered solutions that directly compete with other design solutions throughout the nation, challenging participants to design, develop, and implement innovative engineering systems.



- *Engineering Leadership and Innovation* — balanced fusion of classroom training, mentor feedback, and hands-on leadership practices that prepares graduates to solve complex technical and team management challenges encountered within modern business practices.
- *Undergraduate research* — discovery-based experiences that prepare the next generation of engineers and scientists to tackle society's most challenging technical problems.
- *Academic Success Center* — research-based proactive advising and development of active learning in a student-centered, supportive, and collaborative environment that provides academic coaching and counseling, peer-to-peer tutoring, and first-year specialized instruction.
- *Diversity* — engagement and support of students from underrepresented groups, including minorities and women, through professional development activities and seminars, networking opportunities, undergraduate research experiences, and scholarship support.
- *Alumni mentoring* — individual interaction with experienced professionals that provide students with guidance and feedback from the industry, and access to a professional network in order to connect to future opportunities.
- *Engineering Educational Experience for Teachers* — professional development workshops that provide highly specialized instruction on engineering content, and activities for middle and high school teachers.
- *Industry engagement* — opportunities and programs (e.g., intern positions, senior design projects, and industrial advisory boards) that promote partnerships between the college and engineering-related businesses, and create the next-generation workforce.

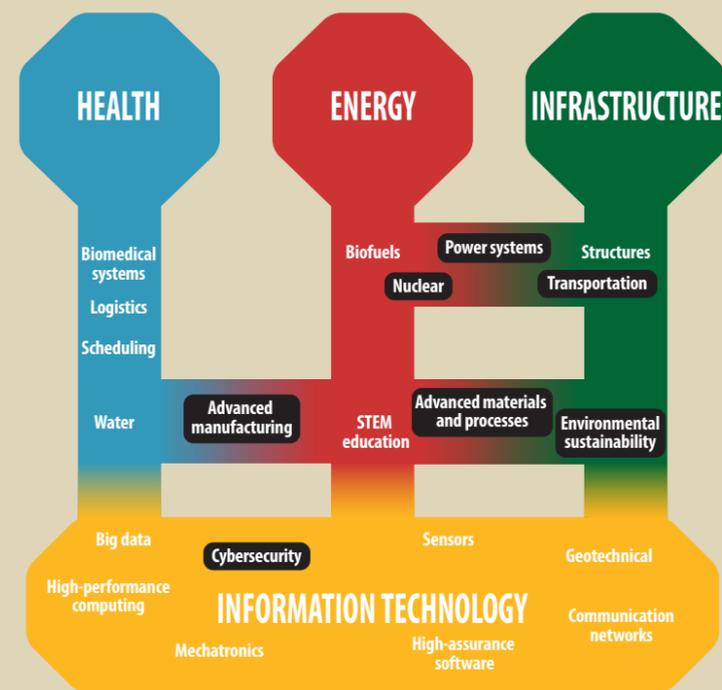
# GOAL ONE



**Drive research- and innovation-related breakthroughs that change the world by investing in, promoting, and advancing research in health, energy, infrastructure, and information technology.**

We will be known for solving critical problems facing society and making research contributions that are recognized internationally. We will develop centers of excellence and a funding base to address grand challenges, while expanding the world's knowledge base through new discoveries and recognized scholarly publications. Faculty will be rewarded for their scholarship, and the college's research enterprise will be expanded by developing existing strengths in the following technical areas:

- *Cybersecurity* — cyber-based research that targets enterprise network security management and defense; safe and secure medical system coordination; and mobile device security, privacy, and anonymity.



- *Advanced materials and processes* — fundamental research focused on applications such as energy storage, efficient production of fuels and high-value chemicals, and detectors for pathogens and other biological molecules.
- *Nuclear* — energy-based research focused on safe and efficient operation of current and future nuclear power reactors, neutron detectors for in-core measurements, computational tools for reactor physics and thermal hydraulic models; generation of experimental data for verification and validation of computational models; and improvements in dispatch ability and fuel tolerance.
- *Transportation* — basic and applied research programs to improve safety and sustainability of transportation systems and the related infrastructure.
- *Power systems* — smart grid-based research focused on intelligent and secure distribution systems, efficient generation, renewable energy, and the advancement of communications and control for the electric grid.
- *Advanced manufacturing* — fundamental and applied research that develops innovative, efficient, and sustainable manufacturing processes, and integrates cyber-physical manufacturing systems using existing and emerging materials in order to produce next-generation products of superior quality and performance.
- *Environmental sustainability* — basic and applied research that promotes sustainable engineered systems that support global food systems, human health, and the environment while balancing societal needs, ecological protection, and natural resource conservation.

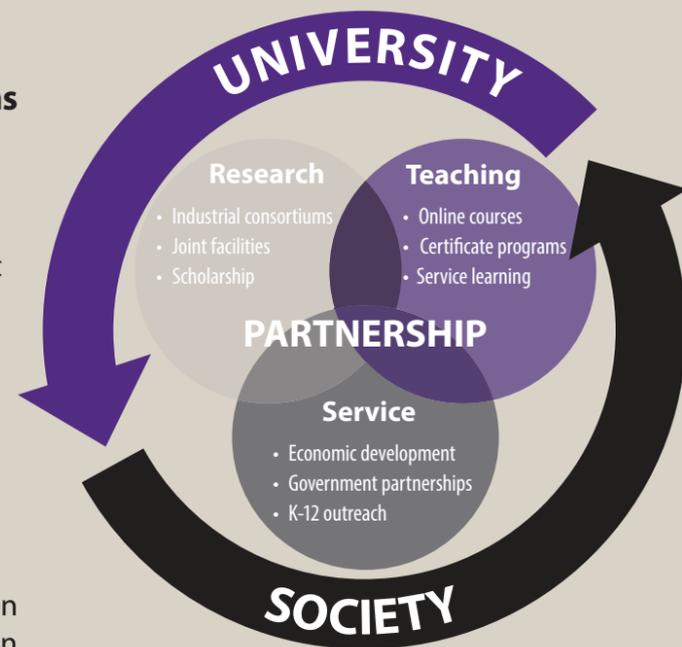
# GOAL TWO



**Establish the college as a partner of choice for industry, government, and academia by ensuring our research and educational programs are responsive to changes in technology and workforce needs.**

The college will facilitate new, improved partnerships with industry, alumni, professional associations, government and public sector organizations, and international educational institutions. We will innovatively partner with industry and government in order to enhance the nation's economic well-being, while enabling future prosperity of Kansas with the following research and educational platforms:

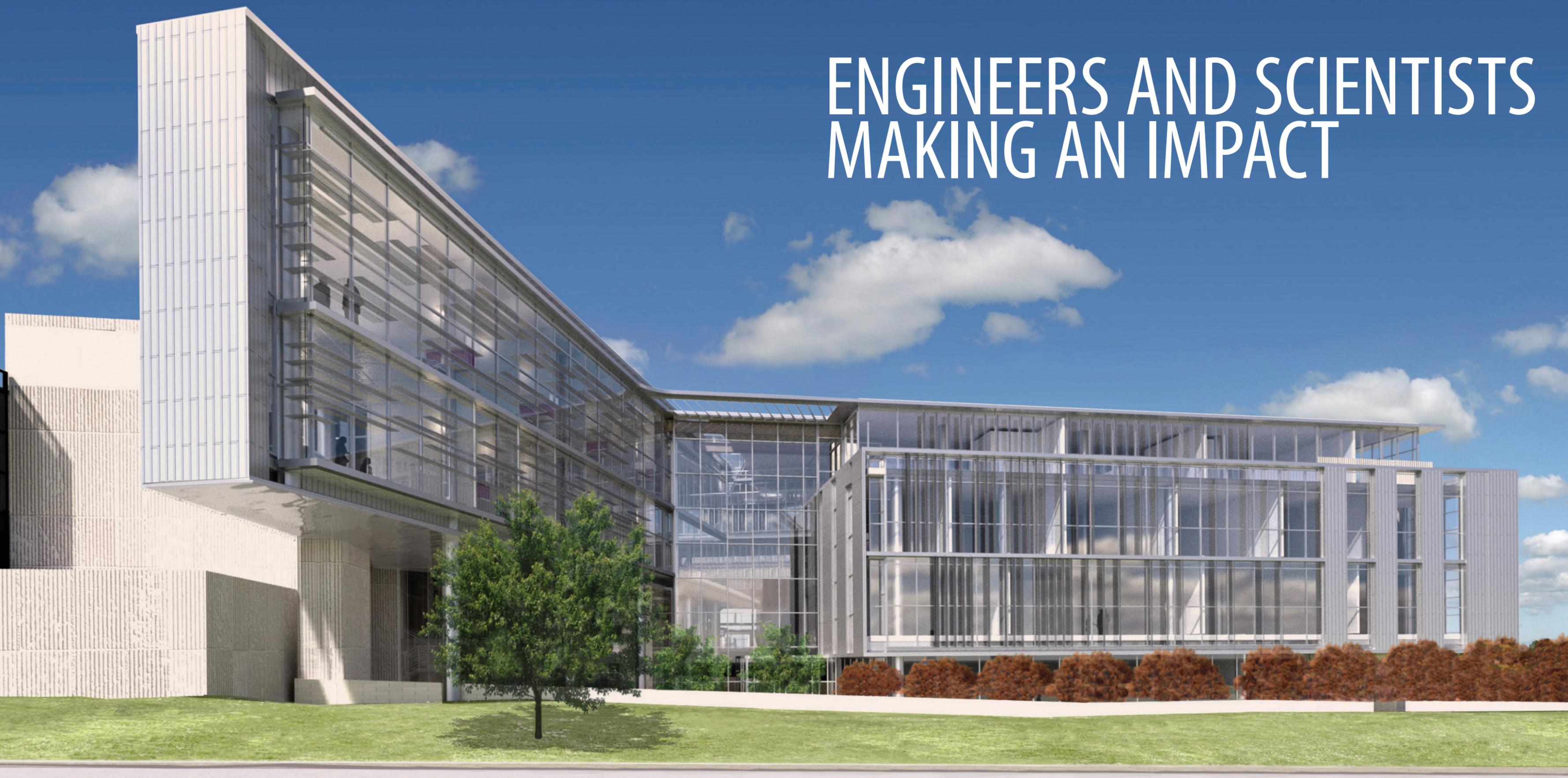
- *Center for Information and Systems Assurance* — The center supports the understanding, operation, and development of secure software systems, and has been designated a National Center of Academic Excellence in Information Assurance Research by the Department of Homeland Security and the National Security Agency.



- *Center for Sustainable Energy* — This center focuses on sustainable, renewable energy as it relates to maintaining environmental quality and ensuring an adequate global food supply.
- *SMART Laboratory* — In addition to the TRIGA Mark II nuclear reactor, this laboratory continues to lead the nation in nuclear research pertaining to radiation detectors and sensor systems for homeland security, industrial, and medical applications.
- *University Transportation Center* — The center supports collaborative research, technology transfer, education, industry training, and workforce development programs in order to improve the safety and sustainability of transportation systems and infrastructures in Kansas and the nation.
- *Electric Power Affiliates Program* — This consortium of industrial partners supports multidimensional goals of increasing the number of graduates who pursue careers in electric power, as well as engaging faculty and students in industrial-sponsored research.
- *Advanced Manufacturing Institute* — This institute partners with entrepreneurs, technology-based companies, university researchers, and economic development agents in order to accelerate innovation by creating and developing new products, supporting technology commercialization efforts, and advancing regional innovation strategies.
- *Urban Water Institute* — This institute supports research and engagement of sustainable water management in urban and urbanizing environments by promoting treatment technologies, management approaches, and public policy.

# GOAL THREE

# ENGINEERS AND SCIENTISTS MAKING AN IMPACT



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