To help guide Oklahoma State University in the 21st century, Provost Robert Sternberg formed two task forces of faculty, staff, and students to sharpen and refine our vision of how a premier land-grant university could better influence the world of today and tomorrow. One task force was charged with identifying priorities in our strategic plan and evaluating the implementation of the plan, and the second with identifying spires of interdisciplinary excellence that would help communicate who we are as an institution while providing needed education, research, and service for all of OSU’s constituents. Through the work of these task forces, we have identified examples of essential engagement that can contribute to and inform a successful, happy, productive life for students, faculty and staff. Our aim for all members of the OSU family is for them to make a positive, meaningful, and enduring difference to the world.

These task forces have recommended a streamlined strategic plan and supporting structures to evaluate our progress toward our goals and eight research spires of excellence that represent some of our primary strengths as a land grant university. The products of these task forces are springboards for dialogue and development; our plans and goals are unfolding and dynamic, allowing OSU to be flexible as we rise to meet the changing needs of our society.

**Recommendations of the University Research Spires of Excellence Task Force**

Oklahoma State will excel by remaining true to its own ideals while adjusting its approach to the needs of the 21st century. OSU strives to add value to peoples' lives by encouraging thinking, creativity, and practical problem solving while promoting ethical behavior and leadership. Our aim is for our faculty, staff, students, and alumni to make a positive, meaningful, and enduring difference in the world. The institution’s values of respect, enrichment, diversity, and community promote actions for a better tomorrow. Passion for meaningful existence is demonstrated through service to others and the encouragement of lifelong learning. Service to others provides the basic motivation for the research, teaching, and outreach activities that make the world a better place.

The OSU Spires of Excellence focus on challenges facing humanity in the 21st century that OSU is solving or is poised to solve, including food, energy, water, health care, safety and security, infrastructure/technology development, and applying research in cultural and community engagement. In addition, the spires are defined by the existence of cross-disciplinary research that is networked or could be networked to create a more comprehensive picture of understanding. Universities, including OSU, of the 19th and 20th century have contributed much with silos of research and teaching. The student and needed knowledge bases of the 21st century need to reflect the strong networking—social and technical—capabilities of the present and future. To this end, the task force has identified several spires of excellence that illustrate active cross-disciplinary research as well as some where silos of research exist that could be more closely tied to bring about broader understanding of the phenomena.

The identified spires are illustrative of the excellence that exists at OSU. They were chosen to highlight what is meant by a “spire of excellence.” There are many individual areas of excellence at OSU. Our task was to identify concentrated, cohesive areas that included interdisciplinary connections and to invite the campus to envision an even greater
interdisciplinary future. Just as the research of faculty and the catalogue of courses from 50 years ago were much different than they are today, it is expected that these spires will evolve, expand, and be replaced. But it is hoped that the concept of spires of excellence will continue. The task forces believe that OSU must position itself to be known for not just areas or disciplines of excellence, but also for solving complex problems that affect this and future generations. We should turn our sights to weaving complex fabrics of knowledge or painting bright, vivid pictures of holistic spires of truth. It is our sincere hope that the community will use this document to determine what we need to do to network our knowledge and resources to meet our mission of educating the leaders of tomorrow, conducting and applying outstanding research and serving our communities—local, national and global.

The committee grounded the spires in the established or emerging OSU areas of world class excellence with local, national, and global significance. The desired attributes used for selecting the areas of excellence include:

- World-class research with the potential to solve local, national, and global challenges
- Established or potential for cross-disciplinary collaboration
- Scholarship and mentoring across the spectrum from undergraduates to established scholars and/or lifelong learners
- Engagement-driven with clear benefits and relevance
- Sustainable in funding

In developing the OSU spires of excellence, we framed our discussions with the following guiding principles of our land-grant mission and our unique identity and value system as an institution:

- Access to an empowering education focused on problem solving and development of ethical leaders
- Creativity in action (teaching, research, and outreach) to tackle local to global problems
- Transformative research that moves discoveries into innovations
- Problem solving mindset: educating students who can solve problems, researching to solve problems, and outreach to help people solve problems
- Enrichment through diversity of people, ideas, and methods
- Making change happen through ethical leadership
- Supportive and friendly environment for students, faculty, staff, alumni, and community

For each selected spire, we present a brief rationale for the choice along with some examples of the programs OSU has or plans to implement that support the spire (details about each initiative are in Appendix A). This list of established and evolving areas of expertise is not comprehensive. It is expected that the University community will build upon this list as it applies to current and future endeavors. It is also anticipated that advancement of interdisciplinary areas of excellence may require new approaches to organizational structures and experimentation with new higher education models that are sustainable through the 21st century and beyond. Appendix B presents the procedure followed to arrive at the spires. It is
expected that a committee or task force will be appointed as an oversight on our progress on developing these spires and that their relevance be reexamined periodically.

*The OSU Research Spires of Excellence*

- **Applying Research in Cultural and Community Engagement**
- **Enhancing Food Production and Safety**
- **Solutions-Inspired Energy Research**
- **Sustainable Solutions for Water Resource Development and Management**
- **Human Health and Well-being**
- **Animal Health and Well-being**
- **Human and Environmental Safety and Security**
- **Transportation, Building Systems, and Advanced Materials Infrastructure Development**

**Applying Research to Cultural and Community Engagement**

As part of its land-grant mission, OSU has a long history of bringing scientific and technical knowledge to bear on solving real-world issues and problems. In order to build on this historical strength, the university needs to further develop integrative approaches to community engagement through curricular innovation, cross-disciplinary scholarship, cocurricular activities and long-term reciprocal partnerships with local, national, and international communities. Additionally, OSU fosters strong scholarship in the arts, humanities, and social sciences, which provides the foundation for understanding human history, thought, language, and human interaction with social, geographical, and political environments. These disciplines provide foundational knowledge and essential skills needed for local and global engagement in the contemporary context. Colleges currently involved in work related to this spire are: DASNR, Human Sciences, CEAT, A&S, SSB, and COE.

Current initiatives that contribute to this goal include:
- Developing and Demonstrating Ethical Leadership
- Undergraduate Excellence
- Creativity, Innovation, and Interdisciplinary Entrepreneurial Thinking and Behavior
- Center for Native American Studies
- Center for Oklahoma Studies
- The OSU Writing Center

**Enhancing Food Production and Safety**

Food production is a complex, global collective of diverse entities that together supply much of the food energy the world population consumes. The food industry encompasses many different stakeholders and industries including: policy, food quality, technology, education, manufacturing, raising of crops and livestock, food processing, and marketing. Colleges currently involved in work related to this spire are: Division of Agricultural Sciences
Examples of current and developing outstanding programs are the following:

- Oklahoma is a leading cattle-production state, uniquely positioned as a leader in every segment of the beef production industry.
- OSU is one of the few universities in the country that has the capability to conduct its multi-purpose wheat breeding program on its own campus.
- OSU is currently developing drought-tolerant and disease-resistant crops.
- The IERIS Center (Integrated Environmental Research and Education Site).
- The Robert M. Kerr Food and Agricultural Products Center (FAPC).
- The NuPharm Initiative.
- OSU is nationally known in the area of food and agricultural-policy analysis.
- The Center for International Trade and Development Service Abroad.
- The Oklahoma Agricultural Experiment.
- The Institute for Agricultural Biosciences in Ardmore.

**Solutions-Inspired Energy Research**

OSU is a recognized leader in the field of bioenergy research and development. OSU recognizes the need to draw from its strong base in energy-related research and intensify its efforts in research, instruction, and outreach at the local and global levels. Colleges currently involved in work related to this spire are: DASNR, Human Sciences, CEAT, SSB, A&S, and OSU-OKC.

Our current research efforts are focused on several key areas, including:

- National Energy Solutions Institute (NESI).
  - Unconventional Hydrocarbon Fuel Research Center (UHFRC)
  - The Center for Clean Fuel Production (CCFP)
  - Center for Integrated Bio Energy Systems (CIBES)
  - Center for Power Generation, Transmission and Distribution (CPGTD)
  - Oklahoma Wind Power Initiative (OWPI)
  - Energy Policy Center (EPC)
  - Energy Technology Center (ETC)
- The OSU-Oklahoma City Renewable and Sustainable Energy degree program.
- One of the most recognized oil and gas accounting programs in the nation.
- OSU has one of the leading programs in environmental sociology.

**Sustainable Solutions for Water Resource Development and Management**

Oklahoma has a rich diversity of water resources, ranging from the Blue River in the southeast to the Ogallala Aquifer in the Panhandle. In addition, the state’s wide range of
climate and diverse water usages present Oklahomans with challenges in managing these water resources as diverse as the resources themselves. OSU provides vital leadership, education, and innovation to address issues in water availability, management, sustainability, and contamination. Colleges currently involved in work related to this spire are: DASNR, Human Sciences, CEAT, SSB, and A&S.

Recent examples of OSU leadership and impact include:
- Oklahoma Mesonet.
- Working to develop innovative, sustainable, low impact development techniques for controlling storm water and associated pollutants in urban and suburban areas.
- Investigation and outreach in agricultural conservation practices.
- Providing innovation and outreach to improve use of scarce water resources.
- Providing leadership to identify and control the spread of invasive species in our lakes and reservoirs.
- Research, implementation, demonstration, and training related to improving the stability of Oklahoma streams.
- Oklahoma Water Research Conference.
- The Oklahoma Water Resources Research Institute.
- Developing economic assessments of value-based benefits of Oklahoma’s water resources.

**Human Health and Well-being**

Oklahoma ranks near the bottom in many human health indicators. Many researchers across the OSU system are focused on enhancing the health and well-being of the people of Oklahoma, the nation, and the world. Colleges currently involved in work related to this spire are: COE, DASNR, Human Sciences, SSB, A&S, CVHS, Center for Health Sciences (CHS), CEAT, OSU-OKC, and OSU-Institute for Technology.

Examples of initiatives are:
- The OSU Center for Health Sciences trains primary-care physicians and has one of the top rural health and telemedicine programs in the country.
- The OSU Center for Rural Health.
- The Bioinformatics Core Facility (BIOinfOSU).
- Researchers in numerous departments are investigating and proposing solutions for myriad health threats that compromise quality of life.
- The OSU Center for Family Resilience.
- Research focused on cumulative and permanent improvement in nutritional and health value of animal products important in the human diet.
- NuPHARM initiative will solidify OSU as a world leader in nutraceutical and pharmaceutical product development from natural products.
- Hosting the 1st International Conference on Innovation and Entrepreneurship in Health.
OSU offers many study abroad opportunities focused on improving education and global health outcomes (e.g., Belize, South Africa).

The two branch campuses offer outstanding training to front line practitioners.

OSU promotes a range of health and wellness activities, a state-of-the art health and exercise facility, and outreach and education efforts grounded in research.

Proposed Interdisciplinary Biomedical Research Initiative.

Proposed Interdisciplinary Nutrition and Early Child Development Program.

**Animal Health and Well-being**

The national framework to safeguard animal health is of paramount importance to the U.S. economy, public health, and food supply and has become a locus of OSU expertise due to the important role Oklahoma agriculture and industries play in our State’s and the nation’s economies. Animal health and well-being are also intimately tied to human health and well-being. Several colleges at OSU focus on the original pillars of a land-grant institution while also working to respond to the needs of the contemporary world. Colleges currently involved in work related to this spire are: DASNR, Human Sciences, A&S, and CVHS.

Current and developing initiatives include:

- The Department of Animal Science is one of a very few Animal Science to maintain beef, sheep, dairy, horse, poultry and swine live animal facilities.
- OSU is one of the few veterinary schools in the country that has retained a strong emphasis in training primary-care veterinarians.
- Excellence in research on ticks and tick-borne diseases has been ongoing since the 1960s.
- The National Tick Research and Education Resource (NTRER).
- The National Center for Veterinary.
- The Comparative Exercise Physiology Laboratory.
- Ecology of Infectious Disease Interdisciplinary Program Planning Grant.
- OSU incorporates animal studies from the perspective of the Humanities.

**Human and Environmental Safety and Security**

OSU has a variety of outstanding programs directed to helping Oklahoma, the nation, and the world deal with both man-made security issues and natural disasters. Oklahoma is in a unique position as the site of a terrorist attack on US soil, is located in tornado alley, and is home to extreme weather—ice, heat, wind and earthquakes, factors that have indelibly shaped the experiences of citizens and the research, teaching and outreach landscape at OSU. We have emerged from these events as a vital place for the study of security and safety matters. Colleges currently involved in work related to this spire are: DASNR, Human Sciences, SSB, A&S, CEAT, and COE.

Examples include:
• Aerospace Research, Education and Training
• University Multispectral Laboratories (UML).
• The Center for Telecommunications and Network Security.
• The Information Assurance option in the Management Information Systems.
• The Institute for Protective Apparel Research and Technology.
• Center for the Study of Disasters and Extreme Events (CSDEE).
• OSU’s National Institute for Microbial Forensics & Food and Agricultural Biosecurity.
• The Fire and Emergency Management Administration Program.
• OSU is a national leader in sensors research with applications in food safety, agricultural bioterrorism defense, medical diagnostics, and biosurveillance.
• Proposed Interdisciplinary Program in Toxicology.
• Proposed Interdisciplinary Program in Homeland Security Science and Technology.

• Transportation, Building Systems, and Advanced Materials Infrastructure Development

Robust infrastructure and innovative technologies are the prerequisites for success in the 21st century. Specifically, fundamental and applied research in infrastructure and technology development is a critical element of our economic prosperity and societal advancement. While this spire remains in development, the University is poised to become a leader in this area in light of the Governor’s announcement regarding bridge upgrades across the state by 2018/19, the need for infrastructure upgrades and transportation developments across the United States, and OSU’s already established research record in this area. Colleges currently involved in work related to this spire are: CEAT, A&S, Human Sciences, and CVHS.

Examples include:
• Design and Building Systems Center.
• Manufacturing and Advanced Materials Center.
• The Oklahoma Transportation Center.
• The Center for Cyber-Physical Systems Integration (CyPSI).
• Inorganic coatings and corrosion prevention laboratory.
Appendix A
Expansion of Spire Initiatives

- Applying Research to Cultural and Community Engagement

- Developing and Demonstrating Ethical Leadership

In today’s world, solutions to complex, interrelated problems require leaders capable of working with diverse people in a global context. There is a great need for leaders who can address complex business and societal issues using critical-thinking skills and creative problem solving. Furthermore, leaders must be capable of working across academic disciplines, because pressing contemporary concerns including health, education, poverty, civic engagement in democracy, and protection of the environment require ethically responsible, multidisciplinary solutions. Investment in ethics and leadership education is imperative to help future leaders develop healthy, socially responsible organizations for the benefit of society, including traditionally marginalized groups and communities. OSU is committed to preparing leaders who will make a positive and enduring difference in the world. Some of the initiatives ongoing are outlined below.

- Center for Ethical Leadership (housed in the College of Education). The Center for Ethical Leadership’s goal is to work collaboratively with the Center for Ethics and leadership programs at OSU to elevate the attractiveness of OSU graduates as future leaders with high ethical standards, capable of addressing contemporary, complex issues in a global context.

- Oklahoma State University’s Office of Leadership Development, within Campus Life, is dedicated to the comprehensive preparation of individuals to assume the challenges and responsibilities of leadership in a global society. One of its signature programs, the President’s Leadership Council, is a student leadership program and is 45 years old at OSU. It is a scholarship and leadership program for outstanding incoming freshmen that teaches the importance of leadership and lifelong service. It was the first Campus Life Leadership area that pursued academic partners to develop a student leadership certificate program, then a minor in ethical leadership which is housed in the College of Education. The Center for Leadership is housed in the Student Union and includes a leadership curriculum for emerging and existing leaders and a Leader-in-Residence series (bringing great leaders in their fields to talk leadership with student leaders and others). They also support/host a Women’s Leadership Series (for students).

- Center for Ethics (housed in A&S). The Ethics Center, the only college or university ethics institute or center in the state, is committed to promoting moral reflection and deliberation in personal, professional, community, and civic life.
• **Undergraduate Excellence**

OSU has a well-deserved reputation as a university where undergraduates are welcomed and nurtured to reach their highest potential. Student involvement in their campus and local communities is important in student development, institutionalizing the process of leadership development, and creating new ideas and technologies. Focusing on student development and success is a mutually compatible goal with every one of the spires and is vitally important to the sustainability of the University. We must continue to invest in this key aspect of our identity and build programs that serve diverse citizens.

- Holistic admissions process of the PANORAMA project.
- Demonstrated great success in developing national scholarship (e.g., Truman, Udall, Rhodes, Goldwater, Fulbright) recipients through the Office of Scholar Development & Recognition.
- Strong undergraduate research experiences, including Niblack, Wentz, Freshman Research Scholars, an undergraduate research journal, faculty sponsored research projects, ability to obtain an Undergraduate Research Scholar transcript designation for intensive research experiences, and senior/honors theses. This item includes strong faculty mentoring of, and involvement with, undergraduate students and must be rewarded, valued, and enhanced.
- Strong focus on student success (e.g., Learning and Student Success Opportunity Center: LASSO, Camp Cowboy, Welcome Week, Honors College).
- Faculty members in the College of Education conduct significant research on retention, learning, and the undergraduate experience that contributes to the mission of our land-grant university to serve citizens and facilitates our goal of retaining students.

Active engagement of students through extracurricular and social activities that are coordinated under a strong Campus Life office that includes the Service Learning Volunteer Center, Leadership-Development Office, Greek Life, Allied Arts, and Student Government, among others. Individual student involvement and official transcripts of leadership (Student Development Transcript) and volunteer service are available to students as are honor cords for service.

- Student Affairs has a comprehensive program helping students develop competencies in six core pillars: academic excellence, leadership, service and civic engagement, finding your purpose, broadening your horizons—cultural and international awareness, and wellness—developing and maintaining good physical and mental health.
- Student Affairs also developed and hosts the International Symposium on Student Affairs which is a week long program for senior Chinese educators and administrators to learn about issues central to our profession. It is the only program of its kind in the nation. They have offered the symposium for three years and it has grown each year. They also deliver a lecture series in China every other year.
- Unique branch campuses (OSU-IT and OSU-OKC) that work to provide the skills, training, and education that are responsive to industry needs and requirements. The campuses offer degree programs that allow students to enter the workforce well-trained and quickly.
- A Wall Street Journal study lists OSU among only 45 schools in the nation whose graduates are top-rated by recruiters, and the only school in Oklahoma to make the list.

- _Creativity, Innovation, and Interdisciplinary Entrepreneurial Thinking and Behavior_  
Creativity, innovation, and entrepreneurial thinking are crucial to the future success of America – in terms of solving ours and the world's problems. Poverty, access to clean water, renewable and clean energy, access to education, and health care are some of the issues facing our nation and the world. In order to address these challenges, the university campus must be a place in which the people within and around it are empowered and equipped to generate creative and innovative solutions to those challenges.

- OSU has the only School of Entrepreneurship at a major university in the United States. The school serves over 1300 students a year in its courses, is ranked in the top 25 among both graduate and undergraduate programs in the country, is ranked #10 for research productivity, and is the winner of the National Model Undergraduate Entrepreneurship Program Award of the United States Association of Small Business and Entrepreneurship. The school’s university-wide focus involves every college at OSU. These interdisciplinary efforts will be enhanced in the future through a Provost’s Interdisciplinary Grant. The Riata Center for Entrepreneurship impacts nearly 2000 Oklahomans a year with outreach programs.

- OSU is one of the only schools in the country to formally support creativity and innovation through the Institute for Creativity and Innovation (ICI). The focus of the Institute is on helping OSU to become known world-wide as a creative campus by supporting students, faculty, staff and administrators in producing creative solutions to societal challenges and opportunities. ICI coordinate and reward creative and innovative instruction, scholarship, outreach, and ideas/work.

- The Departments of Music, Theatre and Art are dedicated to an essential element of a liberal arts education: exposure to the Arts through public events.

- The Doel Reed Center for the Arts, Taos, New Mexico. Since 2006, OSU has been developing the Center as a location for OSU students, faculty, alumni and national/international visiting artists and scholars to experience the unique historic, cultural, and physical environment that Taos offers. The program is evolving to include cross-disciplinary offerings beyond the visual arts.
• The Department of Art holds up to twelve exhibitions a year in the spectacular Gardiner Art Gallery. They have a sizable lecture series where artists, designers, and art historians present their research.

• The Department of Art is dedicated to excellence in the education of all forms of art creation, art history, and design. They have facilities for painting, drawing, printmaking, ceramics, sculpture, jewelry and small metals, digital photo and video, two-dimensional and three-dimensional design, graphic design, illustration, typography, and art history. The faculty are experts in their fields and have national/international reputations. The Studio Arts, Art History, and Graphic Design programs focus on traditional skills and thorough knowledge of historical and contemporary artmaking practices.

• The OSU Museum of Art [OSUMA] will enable the university and the local community to interact and engage with one another directly. The museum is fashioning itself as a place where people from Stillwater and beyond can learn about themselves and their neighbors. In constructing their membership plan, building their public programs and designing the space, the Department of Art is engaging in extensive efforts to obtain community input about what community members want out of the museum, the arts district, and even their neighborhoods. The department also plans to devise curricular opportunities for students related to museum work.

• The Music Department strives to expand its effectiveness in educating and inspiring students to be models of excellence in the musical arts, as well as creative artists, dynamic thinkers, and effective cultural ambassadors capable of making significant contributions to the art and discipline of music in the twenty-first century.

• In 2007, the Department of Music became only the 100th university music department in the United States to be designated an All-Steinway School by the Steinway and Sons piano manufacturer.

• The Department of Music plays a major role in the cultural vitality of the OSU campus community by presenting over 200 campus concerts and recitals each year, including performances by students, faculty, as well as many guest artists of national and international renown.

• Many musical ensembles are housed in the Department of Music, and have brought national attention to our program and campus. These performing ensembles represent diverse majors because they are open to any OSU student and they are frequently selected to perform at national and international conferences and conventions.

• The Department of Music is home to numerous outreach projects, including the OSU String Academy, the Horizons Summer Music Camp, the Oklahoma Honors Orchestra, and the Stillwater Honor Choir. They regularly host weekend festivals for various instrumental and choral collegiate and pre-college musicians, including Wind Day, CelloFest, OK Bass Bash, Brass Day, OSU Jazz Festival, and several choral festivals targeting specific age or voice part groups.
Education and work experiences.

The Department of Theatre is an accredited member of the National Association of Schools of Theatre. The theatre faculty is dedicated theatre professionals who continue to work professionally both nationally and internationally.

The Department of Theatre faculty is committed to providing a strong, broad education in theatre, as well as providing students the training and skills required for advanced graduate education and/or successful careers in their chosen fields. The department regularly brings guest artists to work with students as a vital component of their educational and artistic growth and experiences.

The Department of Theatre, as a cultural force for the state of Oklahoma, is committed to providing students at the university with a comprehensive professionally focused theatre education within the context of a liberal arts education which fosters lifelong intellectual pursuit and develops critical thinking and creative, collaborative, and communication skills.

The Department of Theatre annually produces 3-4 main stage productions and 2-4 studio theatre productions in the Jerry L. Davis Theatre. Both undergraduate and graduate students regularly direct and design in the Davis Theatre throughout the year.

Since 2007, OSU has been a member of Imagining America, a consortium of colleges and universities that supports public scholarship and practice. Imagining America’s mission is to strengthen the public role and democratic purposes of the humanities, arts, and design, recognizing the reciprocal benefits of community-based scholarship and practice. Faculty members can anchor their work in concrete case studies, and students experience the difference they can make through active, community-engaged learning.

OSU has strong humanities programs focused on providing familiarity with the literary works that shape cultural heritage and allow students to develop the ability to think analytically, to write effectively, and to consider various points of view.

OSU provides undergraduate and graduate service abroad opportunities where students are able to use their skill set to solve education, health, food, energy, water systems, and transportation problems with locally available materials. These opportunities provide not only a theater for creativity but the potential to develop new technologies to help reduce energy dependence in the United States.

ECLIPSE: Environment for Contextualized Learning and Insightful Problem-Solving Experiences. This is a newly proposed program designed to improve and expand interdisciplinary instructional practices and increase OSU students’ creative problem-solving skills and career awareness.

Bridging the 21st Century: Transforming Life Science Instruction through Collaborative, Interdisciplinary Research is a newly developed program. This initiative addresses needs for creative solutions to the problems associated with retaining STEM students by utilizing collaborative problem solving.
• **Center for Native American Studies**

Oklahoma has a unique history and culture derived from its large and diverse American Indian (AI) population and existence of sovereign AI Nations within our borders. OSU has a strong history of partnering with Oklahoma tribes. Currently the nation’s tribes are at a crossroads as they face emerging economic, education, and healthcare challenges in the 21st century. OSU recognizes the inexorably-linked economic and cultural health of the State and AI Nations. OSU currently leads the US by graduating more American Indians at the bachelors level than any other university. The long-term health and sovereignty of the AI Nations is rooted in (i) maintaining language, culture, and history for future generations, (ii) maintaining economic viability and relevance in a highly technological world, and (iii) ensuring quality education and healthcare for citizens.

We acknowledge these needs of the AI Nations and seek explicitly to develop a strong OSU program that contributes to addressing them through business, psychology, language, culture, health, and arts. We will partner with existing tribal colleges and AI Nations in a synergistic fashion to increase the quality of culturally relevant education at OSU. Likewise, we seek to build strong ties among science, technology, engineering, and mathematics education, and build from existing research and the entrepreneurial spirit that leads economic growth. Currently the Center is housed in A&S.

• **Center for Oklahoma Studies**

The Center for Oklahoma Studies (COS) serves as a gathering place for scholars and others whose work focuses on Oklahoma, promoting activities that identify, examine, and disseminate aspects of the state’s richly textured, multicultural past that not only impact the present but also influence its future. Created to inspire interdisciplinary work and encourage an exchange of ideas, COS brings together a diverse group of individuals who contribute to the ever-expanding pool of knowledge about our State. The faculty members currently leading the center come from History, English, and the Library, but affiliate members represent a range of departments at the university. A few of their programs are highlighted below:

• The RODEO [Research on the Dialects of English in Oklahoma] project is conducting cutting-edge research on language variation and language attitudes. This initiative integrates internationally recognized scholarship, course offerings, undergraduate and graduate student research, and community outreach.

• A directory of Oral History Collections in Oklahoma has been compiled. The directory is an alphabetical listing of institutions providing information regarding their oral history collections.

• They also maintain a website and provide curriculum materials to schools related to women in politics in Oklahoma and nationwide.
• *The OSU Writing Center*

The OSU Writing Center (in the English Department in A&S) has developed model university-community partnerships that play a role in socializing students in civil and civic discourse. A few example projects are below:

• The OSU Writing Center tutors fifth-grade students at Skyline Elementary school, teaching them to tutor their peers. The students learn how to discuss writing and content, using effective questions that go beyond criticism to help the writer communicate more effectively. The OSU tutors also facilitate groups of fifth graders to prepare for the Oklahoma standardized writing test. The project has expanded to include a grant from the National Writing Project, which focuses on the teachers’ writing and teaching of writing. The project has created an environment for teachers to increase attention to and incorporate best practices of writing in their classrooms.

• A three-way partnership with the local two-year college, Northern Oklahoma College, the OSU Writing Center, and the alternative high school, Lincoln Academy, involves OSU Writing Center tutors in NOC composition classroom to help the students learn to peer-tutor. The composition students, who are also earning service-learning credits, then go to the alternative school to help the high-school students with their writing. Both the NOC and Lincoln Academy students write “This I Believe” essays (http://thisibelieve.org/), which are compiled into an anthology. “This I Believe” essays are designed to engage students in civic discourse, an uncommon opportunity for students placed in an alternative school to contextualize their own convictions within a larger societal frame.

• The OSU Writing Center has taken this stance of engagement in a transdisciplinary context on campus as well: It has trained and supervised writing fellows, undergraduate peer tutors, in History, English, and Chemical Engineering. In addition, graduate student tutors have acted as writing fellows in Psychology, Animal Science, Plant and Soil Sciences, and History. Writing Center work is ongoing through collaborative grant work with Chemical Engineering and Electrical and Computer Engineering faculty.

• **Enhancing Food Production and Safety**

• Oklahoma is a leading cattle-production state, uniquely positioned as a leader in every segment of the beef production industry. OSU is at the crossroads of U.S. beef production, with major activity in the cow-calf, stocker, feeder, and purebred seedstock sectors. OSU has an outstanding set of physical facilities and resources in the Division of Agricultural Sciences and Natural Resources (DASNR) and the Center for Veterinary Health Sciences (CVHS). Active research is currently conducted in molecular genetics and biology, meats and food science, nutrition, beef cattle grazing research,
reproductive physiology, bovine respiratory viral infections, virus-bacteria interactions in disease induction, tick-borne diseases, immune responses in the pulmonary and central nervous systems, cytokine networking, and immunopathogenesis of viral infection. OSU maintains significant numbers of animals to provide teaching and research opportunities that benefit our students and industry, and our scientists have national and international reputations and connections in multiple disciplines and industries.

- OSU is one of the few universities in the country that has the capability to conduct its multi-purpose wheat breeding program on its own campus.
- OSU is currently developing drought-tolerant and disease-resistant crops. This development is not only vital to OK and the US but also to developing countries, underscoring OSU's strong international ties/connections and contributions.
- The IERIS Center (Integrated Environmental Research and Education Site) in DASNR is a multi-disciplinary program that is part of the New Botanic Garden at OSU and will be a one-of-a-kind facility in the U.S. IERIS incorporates, in one location, water-quality protection, university-level research opportunities, green building techniques, and public education. As the program grows it will extend beyond DASNR.
- The Robert M. Kerr Food and Agricultural Products Center (FAPC) has programs and projects that support innovation and growth of the food and agricultural business sectors of Oklahoma, increase food safety for consumers, prepare students for careers in the Oklahoma food industry, and support and enhance the impact of the Center on the state, region, and nation. Its mission is to discover, develop, and deliver technical and business information that will stimulate and support the growth of value-added food and agricultural products and processing in Oklahoma.
- The NuPharm Initiative is an innovative program in which faculty conduct research and development activities for the extraction process and new extraction products related to new crop introduction, cropping and handling systems improvement, new-product evaluation/testing and market development for new medicinal products. A sophisticated laboratory has been specifically engineered for high-pressure extraction leading to improved taste and shelf-life of food products and the commercialization of several specialty food products. Existing OSU partners include Horticulture and Landscape Architecture, Biosystems and Agriculture Engineering, Plant and Soil Sciences, the Robert M. Kerr Food and Agricultural Products Center, Animal Science, Chemical Engineering, and Nutritional Sciences.
- OSU is nationally known in the area of food and agricultural-policy analysis, having researchers in the areas of food security, food and feed grain market analysis, livestock market analysis, land-use and natural-resource analysis, and food safety and nutrition.
- The Center for International Trade and Development Service Abroad offers opportunities that focus on the use of local materials in developing settings to provide efficient and sustainable production of required nutrients for families and communities. These opportunities allow students to rethink production processes in the developed world by incorporating concepts from less developed societies.
• OSU is committed to the sustainability of agriculture through economic viability, sound environmental and natural-resource management, and awareness of changing societal expectations. The Oklahoma Agricultural Experiment Station generates knowledge through basic and applied research. The Cooperative Extension Service trains extension field staff and personnel from private and non-governmental agencies to disseminate information through a variety of educational programs and information, one-on-one producer assistance, business development and planning, pilot plant operations, and much more.

• The Institute for Agricultural Biosciences in Ardmore is devoted to creating new and improved crops that will enhance livestock production and assist state and regional agricultural producers. On-site activities will be enhanced through collaboration with other OSU units, such as the Department of Animal Science and CVHS relative to livestock production and the Biobased Products and Energy Center in developing techniques to efficiently convert biomass into usable forms of energy.

• **Solutions-Inspired Energy Research**

  • An Energy Taskforce appointed by OSU leadership to establish/create the National Energy Solutions Institute (NESI). NESI “will fuse the needs of private industry in energy production, distribution, and conservation with practical and impactful academic research.” The research will focus on developing energy solutions for the current and future needs of the nation. Researchers will collaborate with private, state, and federal sectors to enable the nation’s transition to a sustainable energy future. The Institute will also emphasize education and training to supply the state and nation with the educated workforce needed to advance energy technology, policy and economics.

  • **Unconventional Hydrocarbon Fuel Research Center (UHFRC)**

    Currently the most successful unconventional fossil fuel development is in shale gas. New horizontal drilling and completion techniques, including multistage hydraulic fracturing, have allowed the development of this energy resource to the extent that it, along with coalbed methane, has reversed the decline in US gas production, with a more than 3000% increase in gas production being recorded over the past decade. The strategic technical goals of the UHFRC are to conduct research and education programs on unconventional hydrocarbon resources and to integrate geology, geophysics and engineering to better understand and develop these resources in the future.

  • **The Center for Clean Fuel Production (CCFP)**

    The energy security of the US is predicated on a reliable supply of domestic energy and the efficient use of all energy resources. As a result, one of the primary goals of the energy policy in the US is to “advance new, environmentally friendly technologies to increase supplies and encourage cleaner, more efficient energy use.” This translates to the need for technologies to utilize fuels of reduced carbon content, improve efficiencies in energy use, and capture and sequester carbon. The CCFP will support this national energy agenda.

  • **Center for Integrated Bio Energy Systems (CIBES)**
CIBES provides a multi-disciplinary approach to address bioenergy issues such as cellulosic ethanol, production, distribution networks, and economics to train personnel from around the world on the possibilities and benefits of harnessing renewable energy resources. The approach is a holistic one in which biofuels production is considered alongside food production, land use and water resources. An interdisciplinary team at Oklahoma State University and cooperating institutions will create new advanced biofuel production practices that will enhance and strengthen the state’s multi-billion-dollar energy industry. The OSU Biofuels Team is a multi-college, multi-institutional effort, with the current team encompassing scientists and engineers within the OSU Division of Agricultural Sciences and Natural Resources; the OSU College of Engineering, Architecture and Technology; the University of Oklahoma; The Noble Foundation and Brigham Young University. Research being conducted by the OSU Biofuels Team involves the study of several promising biomass-to-advanced biofuel pathways, including feedstock development (such as switchgrass, sorghum, woody materials and crop residues) and both chemical and microbial conversion processes (such as the gasification-fermentation technology). Applications will include primarily road transportation fuels and, of increasing importance, jet fuels for the air transportation industry.

- **Center for Power Generation, Transmission and Distribution (CPGTD)**
  The generation, transmission and distribution of electrical energy requires a transformation of the existing electric power grid into a “smart” system to enable the realization of an efficient, green, reliable and economic energy delivery system. The CPGTD will develop concepts, components, subsystems, software and interfaces needed to achieve this goal. This will be achieved via simultaneous activities involving model formulation, simulations and laboratory experiments to advance and sustain the necessary technology. R&D efforts will include: development of sensors for monitoring electrical parameters and their temporal variations; innovative architectures and models for the smart grid; data collection and handling (from smart meters, smart appliances, etc.); integration of distributed renewable energy sources with existing/modified grids; exploring the potential of microgrids; cyber and physical security; and many more.

- **Oklahoma Wind Power Initiative (OWPI)**
  The Oklahoma Wind Power Initiative (OWPI), begun in 2000, is a collaborative research and outreach project between Oklahoma State University and the University of Oklahoma. Since 2004, Oklahoma has seen the installation of 1.5 gigawatts of installed wind capacity with much more under development. The industry is a multi-billion dollar industry within Oklahoma alone. OWPI investigates and promotes wind energy resources for Oklahoma and has accomplished a wide range of tasks that leave it poised to tackle problems outside of Oklahoma. OWPI has provided resources and economic information to policy makers, land owners, wind farm developers, potential investors, and interested citizens. This work has included modeling the wind resources of Oklahoma, installing instrumentation to confirm those resources, and statistically analyzing data obtained. OWPI’s efforts have used spatial analyses within geographic information systems to determine optimal turbine placement in context of multiple
environmental and social factors. There are areas in which OWPI’s unique expertise can be readily extended, with wind resource modeling, collegiate education wind industry professional, and assistance in formation of locally-owned wind cooperatives among them.

- **Energy Policy Center (EPC)**
The EPC is devoted to establishing, developing policy recommendations and advising legislators and decision-makers on energy policy, economics, and future trends for local and state governments and corporate sectors.

- **Energy Technology Center (ETC)**
The ETC is the commercialization arm of the National Energy Solutions Center. It is owned and operated by OSU’s University Multispectral Laboratory (UML). The ETC will not own Intellectual property but will conduct collaborative research and development and facilitate the rapid commercialization of new energy technologies created in the NESC and elsewhere through affiliated corporate entities using proven methodologies to drive integration and optimization initiatives. ETC’s current focus is on electromechanical battery systems for energy storage and on biomass conversion technologies for renewable, sustainable and inexpensive energy.

- The OSU-Oklahoma City Renewable and Sustainable Energy degree program offers students the opportunity to contribute to this important field. Designed to be a renewable-energy education hub for Oklahoma, the program offered at OSU-OKC focuses on the needs of today’s energy industry and prepares students for varied industry fields, including: onsite solar and wind energy systems, geothermal heating and cooling systems, residential energy auditing, advance green building systems, and understanding the Leadership in Energy and Environmental Design (LEED) Green Building System.

- The Spears School of Business has one of the most recognized oil and gas accounting programs in the nation.

- OSU has one of the leading programs in environmental sociology, which focuses on environmental concerns, including trends in public opinion on environmental issues; cross-national comparisons of citizen concern for the environment; and the nature and sources of environmental attitudes, beliefs and worldviews.

- **Sustainable Solutions for Water Resource Development and Management**

  - Oklahoma Mesonet, which was developed in partnership with the University of Oklahoma. Oklahoma Mesonet is the premier weather network in the world. Mesonet applications enable improved decision making in public safety, crop management, drought, fire prevention, and lawn irrigation.

  - Integrated field studies, laboratory experiments, and computer modeling of the water resources in the Illinois and North Canadian River basins that continue to be utilized to protect and improve water quality in those watersheds.
• Working with communities across the state to develop and provide resources and training related to innovative, sustainable, low impact development techniques for controlling storm water and associated pollutants in urban and suburban areas.
• Investigation and outreach in agricultural conservation practices and technologies such as no-till cropping, improved grazing, and improved animal waste management, which protect our water resources and improve agricultural production.
• Providing innovation and outreach to improve use of scarce water resources through better management of plant communities and development of forage and food varieties that are more drought-tolerant and able to utilize lower quality water.
• Providing leadership and expertise in Oklahoma’s efforts to identify and control the spread of invasive species in our lakes and reservoirs.
• Research, implementation, demonstration, and training related to improving the stability of Oklahoma streams through techniques that utilize natural materials and processes to prevent flooding, improve water quality, and increase aquatic habitat.
• OSU faculty founded the annual Oklahoma Water Research Conference to provide a venue for sharing water research and policy innovations among researchers, regulators, and practitioners. The 2-day conference has since combined with the Oklahoma Governor’s Water Conference and is annually attended by over 300 stakeholders.
• The Oklahoma Water Resources Research Institute, in cooperation with the Oklahoma Cooperative Extension Service, completed over 72 stakeholder meetings and workshops throughout the state to insurc complete public input to the new Oklahoma Comprehensive Water Plan.
• Developing economic assessments of value-based benefits of Oklahoma’s water resources, such as improved water quality, aesthetics, recreation, and improved long-term sustainability of drinking-water sources, which will allow for a more realistic cost-benefit analysis of water-resource improvements across the state.

• Human Health and Well-being

• The OSU Center for Health Sciences trains primary-care physicians and has one of the top rural health and telemedicine programs in the country.
• The OSU Center for Rural Health funds programs aimed at providing Oklahoma’s rural practitioners, hospitals, and clinics the support necessary to ensure access to quality healthcare for our state’s rural residents. These geographic and context-specific initiatives help support a healthier future for Oklahoma.
• The Bioinformatics Core Facility (BIOinfOSU) blends the definitions of pure Bioinformatics and Computational Biology and is a unique locus for investigating and addressing biological, behavioral and social systems as they apply to modeling medical, behavioral, or health data.
• Researchers in numerous departments are investigating and proposing solutions for myriad health threats that compromise quality of life (e.g., hypertension, diabetes, obesity, cancers, anxiety, depression, suicide). Among those conducting research related to health outcomes are investigators in pathology, biology, behavior, context, and
genetics in Psychology, Educational Psychology, Counseling Psychology, Health and Human Performance, Human Development and Family Relations, Nutritional Sciences, and the Center for Health Sciences.

- The OSU Center for Family Resilience in Human Sciences focuses on research and outreach emphasizing individual and family risk and resilience in different communities. Their mission is to promote resilience and reduce risk for? Oklahoma’s diverse citizens through multidisciplinary research, education, and outreach.

- Research in the Department of Animal Science is focused on using new technologies to develop selection tools needed to bring about cumulative and permanent improvement in nutritional and health value of animal products important in the human diet. Improving nutritional and health value of animal products is an efficient way of providing health benefits to a large proportion of the population without requiring major changes in dietary habits or affecting food quality, convenience, and costs and represents a key component of a preventive health care strategy.

- NuPHARM initiative (outlined earlier) will solidify OSU as a world leader in nutraceutical and pharmaceutical product development from natural products.

- The School of Entrepreneurship and Emerging Enterprises, with the Center for Health Sciences, is hosting the first ever global health innovations conference and is poised to become a world leader in the field of health innovations.

- Several departments in different colleges produce a significant number of licensed mental health practitioners that not only serve various sectors of the state’s health and well-being, from schoolchildren to specialized populations (e.g., at risk youth, people with disabilities, people in crisis after environmental disasters), but also have a significant economic impact. These departments also offer on campus clinics.

- OSU offers many study abroad opportunities focused on improving education and global health outcomes (e.g., Belize, South Africa).

- The two branch campuses offer outstanding training to front line practitioners in that the OSU-OKC Division of Health Sciences offers degree programs in Echocardiography Technology, Nurse Science, Dietetic Technology, Radiography and Vascular Technology. Allied Health at OSU-Institute for Technology offers degrees in Nursing and Orthotics and Prosthetics.

- OSU promotes a range of health and wellness activities, a state-of-the-art health and exercise facility, and outreach and education efforts grounded in research.

- There is a proposed Interdisciplinary Biomedical Research Initiative which is a join program between the Center for Health Sciences, OSU-Stillwater, and OSU-Tulsa to encourage collaboration among units on the three campuses. Any researcher interested in biomedical research will be invited to participate.

- There is a proposed Interdisciplinary Nutrition and Early Child Development Program involving the Departments of Nutritional Sciences, Psychology, and Human Development & Family Sciences that follows up and translates research on infant nutrition and cognition into action -- both interdisciplinary instruction in the classroom and extension programming in the community. The project allows the researchers to
extend a USDA-NIFA funded research project and add an instructional and extension component.

- **Animal Health and Well-being**

  - The Department of Animal Science houses degree programs in Animal Science and Food Science and is one of a very few Animal Science departments in the country to maintain beef, sheep, dairy, horse, poultry and swine live animal facilities that are used to enhance undergraduate teaching programs and are vital to the OSU Center for Veterinary Health Sciences to help train veterinary students. Outstanding research programs include beef, poultry and swine production and animal health. Large range and pasture resources and cattle finishing facilities, which are close to campus and support cow-calf, stocker cattle, and feedlot cattle research, teaching and extension programs. These resources coupled with the cattle slaughter and processing facilities in FAPC uniquely position the Department to conduct integrative (systems) research that encompass all phases of beef production, assessments of final product value, and studies of pre- and post-harvest interventions relative to the national dialog of food safety issues.
  
  - OSU is one of only two universities in the six-state area that has an “on-campus” dairy farm used for teaching and research in the areas of milk production and animal health.
  
  - OSU is one of the few veterinary schools in the country that has retained a strong emphasis in training primary-care veterinarians and has been increasing its class size in recent years.
  
  - Excellence in research on ticks and tick-borne diseases has been ongoing at OSU since the 1960s. Oklahoma is one of the states most affected by ticks and tick-borne diseases. While the impact of tick infestations on cattle production has been studied, studies on the types of tick-borne diseases that affect animals and humans and the changing patterns of tick species that populate Oklahoma are much needed. The OSU Tick Research Group’s research interests and capabilities encompass vector ecology and surveillance, epidemiology, tick physiology and feeding, biochemistry, tick-borne pathogens of humans, wild and domesticated animals, molecular biology of host-pathogen interactions, and vaccine development as a control measure for both ticks and tick-borne pathogens.
  
  - The National Tick Research and Education Resource (NTRER) was established at OSU in 2008. The NTRER is a multi-disciplinary group that includes involvement of Oklahoma State University departments from the College of Agricultural Sciences and Natural Resources, Center for Veterinary Health Sciences, and College of Arts and Sciences. The centerpiece of the tick research and education program is the OSU Tick Rearing Facility, largely self-supporting, in which 6 species of ticks are routinely raised for research at OSU, as well as for research and industry nationally and internationally.
  
  - The National Center for Veterinary Parasitology is housed at the OSU Veterinary Health Sciences Center. The mission of the National Center for Veterinary Parasitology is to further the many advances made in controlling parasitic diseases of animals through
integrated programs of applied graduate and residency training, targeted current research initiatives, and a diagnostic and consulting service that serves the veterinary profession worldwide.

- The Comparative Exercise Physiology Laboratory has access to USDA-approved housing for research dogs and horses and conducts field research with Alaskan sled dogs. Strenuous exercise in humans, horses, and dogs is associated with the development of gastrointestinal disease and the laboratory seeks solutions to these problems.
- Ecology of Infectious Disease Interdisciplinary Program Planning Grant will focus on facilitating the interactions of scientists in A&S and CVHS to study the ecology of diseases that affect human health, zoonosis, and domesticated animals.
- OSU also incorporates animal studies from the perspective of the Humanities. The thinking and research that is being done on human-animal relations within the Humanities allows questions of ethical treatment of animals to be addressed in a serious and disciplined fashion.

- **Human and Environmental Safety and Security**

- Aerospace Research, Education and Training
  - Aerospace is a key, multibillion economic sector in Oklahoma. Specifically, the aerospace industry provides one in 10 jobs in Oklahoma, and it is one of the top three economic sectors in the state with estimated expenditures of $11 billion annually. OSU offers a strong aviation-education program, well-trained professionals, and a world-class research capability to support the multidimensional needs of the military and commercial aerospace industries, as exemplified by the (a) Unmanned Arial Systems program, which offers the only PhD program in the nation, and (b) the K-12 NASA education, in which OSU offices are established at 10 NASA centers across the US with military science ranked in top 10 of 273 and aerospace ranked in top 15 of 144. The Aviation Education program offers degrees in five areas of aviation, including security, and one of the few doctoral degrees in the nation.
  - Applied linguistics in the Department of English is known internationally for curriculum design and language-testing initiatives for the effective English-language training of international pilots and air traffic controllers.
- OSU established the University Multispectral Laboratories (UML) as a government-owned, contractor-operated nonprofit 501(c)3 corporation, tasked as a “Trusted Agent” to develop and operate research, development, testing, evaluation, and training laboratory and field facilities. These resources support the development of equipment and sensors that meet Federal, State, local and commercial requirements and contribute better detection of threatening and dangerous substances.
- The Center for Telecommunications and Network Security serves as a focal point in coordinating efforts and further developing this area of excellence across multiple departments, colleges, and campuses. Several million dollars in Federal support have been awarded to the Center and its participating faculty.
• OSU is the first institution to have curriculum mapped to all six federal domains of Information Assurance, which is the practice of managing risks related to the use, processing, storage, and transmission of information or data and one of the first in the county to be named a National Center of Academic Excellence in Information Assurance Education and Research.

• The Information Assurance option in the Management Information Systems provides students with in-depth study and hands-on analysis of critical organizational issues in information assurance and security. Additionally, it offers a Graduate Certificate in Information Assurance, a degree option, and a minor. There is also a Data Mining graduate certificate program with Marketing and MIS in the Spears School of Business.

• The Institute for Protective Apparel Research and Technology conducts various protective clothing design and research projects on cooling vests, firefighter ensembles, QuadGard™ and TorGard™ body armor, and smart clothing. The multi-disciplinary Institute focuses on the design, performance testing, and technology transfer of protective clothing.

• The strength of the Center for the Study of Disasters and Extreme Events (CSDEE) is growing and unique in the nation. Since its creation in 2005, CSDEE members have studied such topics as the handling of mass fatalities in India following the Indian Ocean tsunami, effective emergency response issues, emergent shelters, the role of faith based organizations during Hurricane Katrina, and terrorism. Other efforts include analyses of school preparedness and disaster preparedness within the hospitality sector. External funding sources have included the National Science Foundation, The Oklahoma Office of Homeland Security, and the Department of Homeland Security. Faculty in DASNR, A&S, the CVHS, Fire Safety and Emergency Management, the OSU Department of Forensic Sciences, the University Multispectral Laboratory, and Sociology have teamed up on a number of large proposals and educational offerings.

• The mission, focus, and work of OSU’s National Institute for Microbial Forensics & Food and Agricultural Biosecurity are unique in the Nation and fill an important niche in U.S. homeland security focused on agricultural and food forensics.

• The Fire and Emergency Management Administration Program is one of the top such degree programs in the nation. Their program clientele are management-level personnel in the emergency services professions. Included are fire and rescue, law enforcement, emergency managers, emergency medical, safety and security, and personnel in related professions in both the public and private sectors. There is a BS Fire Protection and Safety program in the College of Engineering. The Department of Fire Protection and Safety Technology at OSU-OKC was created as an Associate degree-granting outreach program of OSU-Stillwater’s Fire Protection and Emergency Management Department. Both programs prepare students for assessing and reducing the loss potential in industrial settings with respect to fire, safety, industrial-hygiene, and hazardous-material incidents.

• The first academic peer-reviewed journal focusing on fire service, the International Journal on Fire Service Leadership and Management, is housed at OSU. The journal is supported and published by Fire Protection Publications. The International Fire Service
Training Association (IFSTA) and the International Fire Service Accreditation Congress (IFSAC) are also headquartered at OSU. IFSAC is the only accrediting agency in the U.S. that provides program accreditation for fire and emergency-management degree programs and also accredits certificate training programs.

- OSU is a national leader in sensors research with applications in food safety, agricultural bioterrorism defense, medical diagnostics, and biosurveillance. Sensor research at OSU covers the broad spectrum of Chemical, Biological, Radiological/Nuclear and Explosive detection, and Intelligence, Surveillance and Reconnaissance sensors. Examples of OSU programs of excellence include the College of Veterinary Health Sciences' programs involving select biological agents, the College of Arts & Sciences programs in the Physics Department on radiological detection, the Chemistry Department program on explosive detection, and the College of Engineering and Architectural Technology's program on infrared detection.

- There is a proposed Interdisciplinary Program in Toxicology that combines OSU’s expertise in human, veterinary, and ecological toxicology.

- There is a proposed Interdisciplinary Program in Homeland Security Science and Technology that encompasses several colleges across campus.

- **Transportation, Building Systems, and Advanced Materials Infrastructure Development**

  - Design and Building Systems Center (Adverse Climate Structures and Sustainable Environments): This center seeks to develop an integrated capability to conduct solutions-inspired research relating to design and building systems. Example projects include: (a) design of homes and building structures better suited for adverse climate events such as tornados and flooding, (b) development of improved construction methodologies, construction processes and materials, (c) development and testing improved fire-resistant materials, and (d) design of homes and structures more resistant to fires. The center will also serve as a focal point for sustainable building technology research, development, education and outreach throughout Oklahoma, the Midwest, the nation, and the world. It addresses the need for energy efficient buildings aligned with environmental context and resources that promote health and productivity. The center will draw on expertise in engineering, architecture, and technology as well as environmental sciences and sociology.

  - Manufacturing and Advanced Materials Center: Currently, world-class research is undertaken at OSU in manufacturing and advanced materials. The Center will integrate the current efforts and focus on material systems essential for the 21st century production of products that are focused on science-based manufacturing and materials with priorities in the areas of energy, environment, sustainability, recycling, life cycle, and human health as it impacts product manufacturing. As such, this center aligns with critical-need national initiatives. In fact, the National Academy of Engineering has named improvements in Material Science and Engineering as one of its Grand Challenges of the next century. One area of intense focus has been creating lighter and stronger materials with improved economy and sustainability. Nationally recognized
work can be found in Engineering, Physics, Chemistry, Human Sciences, DASNR, and Center for Veterinary Sciences.

- The Oklahoma Transportation Center: The state and nation’s roads and bridges are in drastic need of repair and renewal. Multi-disciplinary teams in Engineering, Chemistry, Geography, and Computer Science have worked closely with private industry, state, and federal research sponsors to find ways to plan and construct this needed infrastructure with improvements in construction speed, sustainability, durability, and economy. These efforts have been implemented by Oklahoma and surrounding states.

- The center for Cyber-Physical Systems Integration (CyPSI): A cyber-physical system is any system that utilizes both computational and physical components. Here, the term “cyber” refers to virtual and/or distributed contexts utilizing Internet-based technologies and/or virtual reality simulation. The “physical” component refers to a physical device, structure, or process. The mission of CyPSI is to promote research, practice, and education in the integration of cyber technologies and physical systems. CyPSI will allow industries to rapidly harness virtual and distributed resources for revolutionary product and process design activities.

- Inorganic coatings and corrosion prevention laboratory: This research is focused on the application of metallo-organic chemistry to challenges faced by our society in the areas of protection and clean-up of the environment, improvement of industrial processes, and the development of novel routes to advanced materials including nanomaterials. The research tackles many significant problems including corrosion, flame-retardants, counter-terrorism products and sensors, and catalysis.
Appendix B: Procedures followed to determine spires

The Provost appointed a campus-wide “vision” committee in Fall 2010 that was chaired by Dr. Robert Dooley. The Provost charged the committee with determining what OSU does best and where they should be in the next decade. Dr. Dooley left the committee at the end of the academic year to take a position at another university. He was replaced as chair by Dr. Melanie Page. Dr. Page asked to have committee members added from Colleges that were not represented, as well as from OSU communications and asked the Provost office to contact the undergraduate and graduate student governments for new student representatives (due to the student representative graduating). In further conversations with the Provost about the purpose of the committee, he expressed his interest in areas in which we have a strength, an interest, and that serves Oklahoma – what is unique about OSU? He further asked us to specifically focus our efforts on research spires. In addition to the ideas generated by the committee, we also solicited feedback from other stakeholders. Specifically, in summer, 2011, all of the deans were asked by the current chair by email to describe the strengths of their college. Dr. Page presented an update of the process at Provost Council in early Fall 2011 at which several deans and Vice Presidents added their feedback. A survey was sent to the OSU community asking similar questions, focused on OSU’s current and unique strengths and potential future strengths as a land-grant university. The survey was also featured in the Stillwater NewsPress so that the broader community could participate. We received nearly 300 responses. From this diverse feedback and our own discussions, we narrowed our areas of research excellence to 8 spires. If we were uncertain about the elements of specific Centers or projects, we contacted the director or others involved directly and asked for their feedback and input. A draft of this document was presented to Provost Council in late fall and feedback incorporated as appropriate. The task force was given a set of criteria to begin campus discussions, to tie together related programs across colleges and disciplines as well as to explore particular areas in which OSU could make meaningful contributions. The committee delineated eight “research spires of excellence” to start the conversation. The next step will be for us to obtain in-person faculty discussion through faculty council and other forums as designated by the Provost.

While we listed examples of the initiatives that are on-going or planned under each spire, there are likely many more that we have not identified and believe it is the responsibility of the campus community to do so. A single committee cannot possibly know every area of excellence on campus and thus we strongly encourage units to engage in considering how we might enhance this living document as well as expand our interdisciplinary research initiatives. We suggest that each academic unit “map” their programs to the spires, if appropriate, identify other areas of excellence that might transform or expand existing spires, and communicate these ideas to appropriate administrators.

Members
Kari Aldredge, Lucy Bailey, Steve Damron, Michael Dicks, Khaled Gasem, Carrie Hulsey-Greene, Christine Johnson, Jason Kirksey, Brenda Masters, Melanie Page, Nani Pybus, Kayse Shrum, Margaret White; Ashley Leonard, undergraduate student & Jeff Simpson, graduate student