VICE PRESIDENT FOR RESEARCH AND PARTNERSHIPS

STRATEGIC RESEARCH VERTICALS

The UNIVERSITY of OKLAHOMA
CONVERGENCE

A vision for transdisciplinary research and creative activity with lasting social impact at the University of Oklahoma.
We live in a time when global social megatrends present the planet with wicked problems that are broad, challenging, and complex. Ten billion people; rising inequality; pandemics and health disparities; doubling, and even tripling, energy demand; changes in weather patterns and impacts of climate change; world-wide need for access to clean water; geopolitical shifts and international conflict; asymmetric threats and unconventional sources of insecurity and disinformation. We face many challenges to sustain and improve our planet’s quality of life, today and for decades to come.

Nonetheless, we live in an era of tremendous promise and abundance. Today more than ever, the rapid and global pace of innovation and the democratization of technology are bringing opportunity and a higher quality of life to many around the world. While much work remains to eliminate inequities and further democratize access to technology, the future is promising, and research universities such as the University of Oklahoma have a strong role to play in making this future a reality.

The answers to these global challenges require an ambitious research and development approach that converges big science and engineering ideas with a comprehensive understanding of underlying human, social, business, and policy dynamics. True solutions, with positive social impact, require working across and beyond traditional academic boundaries that often separate humanists, artists, designers, business leaders, and social scientists from natural scientists, engineers, and technologists.

Leading universities around the U.S. and the world are disrupting themselves and making a strong, strategic push to be at the forefront of this convergence of fields of knowledge and research. State and federal research agencies, as well as philanthropies, are developing programs that increasingly focus research funding into big idea programs that leverage the power of convergence.

As a flagship public institution that is keenly focused on societal impact through research and creative activity, OU is uniquely positioned to bring disparate academic disciplines, from the core STEM fields to the humanities and fine arts, together to foster creative, comprehensive solutions to global challenges. In our vision for research and creative activity, researchers move beyond and across traditional academic boundaries, collaborating across disciplines and globally with other universities, policymakers, economists, and business leaders to create solutions for a better world. Our goal is to transcend academic disciplines and bring all of OU’s institutional strengths together to tackle global challenges and accelerate the delivery of practical solutions that impact society in direct and tangible ways.
This ambitious vision is encapsulated in, and consistent with, the university’s recently published Lead On, University Strategic Plan. This plan, which was approved by the OU Board of Regents in July 2020, lays out the university’s raison d’être – “We Change Lives” as well as a series of pillars with associated strategies and tactics that define precisely how we are going to realize our vision for the future.

Pillar 5 of OU’s Lead On Strategic Plan is titled “Enrich and Positively Impact Oklahoma, the Nation, and the World Through Research and Creative Activity” and lays out the university’s ambition to change people’s lives through discovery, innovation, and creative works. The pillar defines four strategic areas of research focused on grand challenges in aerospace, defense, and global security; environment, energy, and sustainability; the future of health; and society and community transformation. These so-called strategic research verticals represent a way to encapsulate some of the most wicked grand challenges we face as a planet in the 21st century.

In order to explore where OU’s strengths and faculty interest can converge with maximum impact around these strategic research verticals, we convened a team of faculty across campus to participate in a series of strategic planning discussions over several months. The team members were nominated by their deans and the Faculty Senate Executive Committee, and included faculty from all three OU campuses. The teams for each strategic research vertical are listed at the end of this document, pages 69-70. The effort was coordinated by members of the strategic planning firm Thinkenomics. The teams solicited input from and shared their progress with faculty across campus in a series of online town hall meetings, and this document represents the results of those intensive efforts.

The document lays out in great detail a full strategic plan for the future of these four “vertical areas” at OU. The plan outlines the mission and vision for each area, along with the sub-areas where we plan to focus our effort in order to have maximum impact (we call these the strategic research sub-verticals). The plan also lays out the detailed goals and objectives for each area (i.e., how are we going to succeed), which, for consistency with the Lead On plan, we label as strategies and tactics.
Naturally, there exist tremendous synergies and complementary areas across these strategic themes. Nothing in the world we live in exists in a silo, and our comprehensive strategy strives to identify and exploit those synergies in order to build a plan that is truly transformative and transdisciplinary.

As a top-tier research university, it is also critically important that the academic disciplines and research infrastructure that provide the basis upon which to create and translate new knowledge into solutions to society’s challenges be as strong as possible. Without that strong foundation in fundamental and applied research, our transdisciplinary work to impact society’s grand challenges through the strategic research verticals will not succeed. Therefore, in addition to these pillars, we are also starting to engage with colleges across campus to think about what enabling, cross-cutting academic research capabilities need to be strengthened at OU in order to provide the strongest possible integrated system of research and creative activity.

Accomplishing these ambitious goals requires continued faculty growth and an ability to recruit top faculty, student, and staff talent into the university in critical areas of strategic focus. To this end, this research verticals strategic plan is closely coordinated with the Provost’s and deans’ hiring initiatives. **Pillar 1 of the Lead On plan** lays out the foundation for success in meeting the university’s ambitious goal of becoming a “Top-Tier Public Research University” and discusses how new strategic faculty hires and increased doctoral student and staffing levels will be key areas of focus for the next years. Through close coordination and cooperation between the offices of Provost, the deans, and the Vice President for Research and Partnerships, we will ensure success in the implementation of our strategic plans.

Our vision for the future of OU is ambitious. As the flagship university in the state, we will continue to grow as a regional, national, and global force that positively impacts society through education, community service and engagement, and research and creative activity. When we succeed in moving beyond traditional boundaries, collaborating across disciplines and with policymakers and business leaders to create new knowledge and drive convergent solutions that impact global grand challenges, we will no doubt succeed in our ambition to leave the world a better place. Everything else will follow.
EXCELLENCE  SERVICE  INNOVATION
INCLUSIVENESS  DIVERSITY  COLLABORATION  RESPECT

STRATEGIC RESEARCH VERTICALS
COLLECTIVE VALUES

CURIOSITY  CREATIVITY  TRUST
HUMILITY  TRANSPARENCY  TEAMWORK  INTEGRITY
AEROSPACE, DEFENSE, AND GLOBAL SECURITY

STRATEGIC PLAN
A strategic investment in aerospace, defense, and global security will unite the resources of the University of Oklahoma as a major research university, with the unique network of industry and government partners to advance security, liberty, and prosperity for our state, nation, and world. We are poised to grow to national prominence in four crucial areas: Radar Innovations, Sustainment and Modernization, Advanced Technologies, and International Security policy.

OU’s Advanced Radar Research Center is the largest university-based radar center in the nation. Next-generation radio frequency sensing and communication systems address a range of national security issues like spectrum superiority to extreme weather associated with climate change. Oklahoma is home to several military installations, including the headquarters for the Air Force Sustainment Center. Through new partnerships, we would provide sustainment and modernization support through expertise in embedded software systems and advanced manufacturing technologies. Building on expertise in OU’s Center for Autonomous Sensing and Sampling, and the Center for Quantum Research and Technology, we address two areas of critical importance to the U.S. Department of Defense, unmanned systems and applications stemming from quantum science. Global security challenges require actionable policy recommendations. By leveraging existing OU strengths in cybersecurity policy, climate science, and contextual analysis of emerging technologies, we will address global security challenges including climate change and emerging technologies like artificial intelligence and quantum.

Ensuring National and Global Security through Radar Innovations

Ensuring national and global security into the future requires continuous innovation for an advanced arsenal of defense infrastructure. Sensing systems are a vital component of all Department of Defense platforms including
aircraft, ships, tanks, satellites, missiles, and more. Radar is an indispensable sensor because of its long-range, day/night, and all-weather capability. As a result, projections show that by 2027 the size of the global military radar market will exceed $20 billion. However, global challenges in the area of sensing for the U.S. and its allies are growing, including the increased technical sophistication of our near-peer adversaries, spectrum competition regarding 5G and 6G communications, and an aging DOD workforce.

Through strategic investments over the last two decades, OU has created the nationally-recognized Advanced Radar Research Center. The ARRC has developed an exemplary reputation for innovations in radar. By leveraging and growing the ARRC’s infrastructure, personnel, established sponsors, and private-sector contacts, we intend to become the nation’s academic leader in defense-related radar. By realizing this bold vision, we will provide a major contribution to the national defense, which directly impacts many societal challenges. Workforce development is another vital impact, and we intend for OU’s students to be leaders in the defense industry for decades to come. Likewise, our developments will continue to be an important part of OU’s weather community through radar’s use for observing extreme weather events.

After more than 50 years of partnership with NOAA, we have built a vibrant weather monitoring and prediction ecosystem in Norman that includes government, academic, and private-sector leaders. The ARRC grew from this ecosystem and has developed the capability to design, fabricate, and field the most advanced weather radars in the world. These radars are largely based on bleeding-edge technologies that are gaining the attention of the DOD, which is the primary reason the ARRC’s research and development has grown exponentially over the last several years in the DOD space, including current sponsors such as the Navy, Air Force, Army, and DARPA.

Now is the perfect time for OU to leverage these advancements to become the academic leader in defense-related radar.

Supporting the Defense Sustainment and Modernization Enterprise

Sustaining DOD platforms is key to maintaining the readiness and operational capability of the U.S. military. Of the phases in the DOD acquisition process, the sustainment phase is the most costly and lengthiest, often spanning several decades. Through evaluation and utilization of new technologies, we will develop innovative approaches to drive down the cost of sustainment and provide innovative enhancements to the functionality of legacy systems.

We are developing and strengthening partnerships with both commercial and government entities within the sustainment community in Oklahoma. We maintain a formal educational partnership agreement with the Oklahoma City Air Logistics Complex and interact routinely with the complex and the Air Force Sustainment Center headquarters at Tinker Air Force Base. Through collaborative partnerships, we have identified two of the sustainment community’s most critical areas of need, advanced manufacturing and embedded software systems, and have aligned our strategic hiring and infrastructure development plans to expand
Our capabilities and capacities in these areas. Our partnership model delivers impacts at the national, state, and university levels. By creating more efficient and cost-effective methods for sustainment and modernization, our military can retain the technical superiority required to deter potential adversaries.

The aerospace and defense sector is currently the second-largest contributor to the state economy. Applied research and development in this sector also produces a highly skilled workforce for Oklahoma and increases the portfolio of DOD-funded research at the university. Our proximity to and alignment with the military sustainment community in Oklahoma gives us a competitive advantage. Our long-standing partnerships at the local level, coupled with strong executive leadership and a strategic vision at OU, provide us with unprecedented opportunities. OU is committed to continued growth and investment in support of state and national needs and priorities in the realm of DOD sustainment.

Addressing Emerging Security Challenges through Advanced Technologies

The White House Office of Science and Technology Policy has identified quantum technology, artificial intelligence, and advanced manufacturing as “Industries of the Future,” which will define future focus areas and funding directions for the DOD and other federal entities. These advanced technologies are vital to address current and emerging national and global security challenges. The resulting game-changing technologies will provide unique advantages and enable an agile response to ever-growing threats.

We will build on and integrate work at existing centers at OU, such as the Center for Quantum Research and Technology, the Data Institute for Societal Challenges, and the Center for Autonomous Sensing and Sampling, to establish OU as a national player in these areas. Innovative convergence research that will define new fields of exploration will extend this solid foundation. To further enhance our capabilities, we will continue to develop partnerships with industry and national laboratories. To achieve our goals, we will make strategic hires at the interface of these critical areas and develop state-of-the-art research facilities.

Our convergent approach to advanced technologies will lead to novel, deployable defense and security capabilities. Such advances will enhance global and national security through innovations in telecommunications, navigation systems, and sensing capabilities. Additionally, through our early alignment with the Industries of the Future, we will become a key player in these critical national and economic security areas. This will attract investment and new businesses to Oklahoma and will position OU as a key player in developing the workforce of the future.

OU is likewise well-positioned to define new directions for emerging technologies. The existence of centers with expertise in quantum science, artificial intelligence, and advanced manufacturing affiliated with a single institute will provide a unique environment to forge novel research directions at the interface between existing and emerging technologies.
For example, the convergence of radar and quantum science, or artificial intelligence and quantum science, will lead to new and enhanced defense capabilities necessary to tackle global security grand challenges.

**Developing Innovative and Agile International Security Policy Solutions**

Global security challenges demand coherent strategies coupled with actionable policy recommendations. The U.S. and the world are confronting urgent challenges, including the re-emergence of near-peer geopolitical competition among great powers, disruptive emerging technologies, climate change, and pandemic disease. These circumstances require innovative international security policy thinking that is firmly grounded in sound research, yet able to anticipate and respond to rapidly evolving threats and opportunities. This thinking underpins the revitalization of a stable rules-based international order and renewal of American global leadership.

We generate world-class international security policy research by pairing the university’s areas of excellence in technological research and development with expertise in international security policy. We create knowledge that crosses disciplinary boundaries to ensure that technological systems are ready for effective deployment in a rapidly evolving policy and geopolitical landscape. We also ensure that policymakers are equipped to anticipate and respond to future disruptive advances, transforming threats into opportunities.

We fulfill the promise of OU’s motto – for the benefit of the citizen and the state. We do so by building an array of government, industry, and civil society partnerships. Our work ensures that American national security strategy and policy remain innovative and agile, outpacing peer competitors and providing essential global leadership. We also advise state and local governments, assisting them in serving their indispensable role in securing the homeland. We connect Oklahoma companies to national policy discussions, helping them identify and win business opportunities in the defense and security sector. Finally, we provide transformative educational opportunities to Oklahoma students, preparing them for careers as leaders in national and international security.

We bring together talent and resources from across the university and a unique network of industry and government partners to do what cannot be done elsewhere. From work on spectrum allocation policy at the DOD’s 5G testbed at Tinker AFB, to research on cybersecurity policy for government and industry partners in cyber-governance labs, to studies of emerging technologies in a human context, we provide holistic solutions to complex problems. Together, we are poised to develop 21st century policy solutions responsive to the needs and concerns of the American heartland.
MISSION

Our mission is to perform research, education, and service to address aerospace, defense, and global security challenges relevant to our local, national, and global partners. We will foster an inclusive environment that enables convergence research, leading to the development of innovative and timely solutions to critical problems.

VISION

To be a national leader that brings together the full range of the university’s capabilities and resources to provide holistic solutions addressing the aerospace, defense, and global security challenges of today and tomorrow.
**STRATEGY 1**

**Organizational Structure**

Establish an Oklahoma Aerospace and Defense Innovation Institute (OADII), fueled by a collaborative network of partnerships and programs, to enable convergence research relevant to present and future aerospace, defense, and global security challenges.

<table>
<thead>
<tr>
<th>TACTIC 1.1</th>
<th>Develop and formally document an effective administrative structure and processes for OADII with appropriate leadership, support personnel, faculty affiliation process, roles/responsibilities, and synergies with existing OU research centers. (Year 1, Q1)</th>
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<tbody>
<tr>
<td>TACTIC 1.2</td>
<td>Recruit and onboard OADII leadership, faculty, and key support personnel. (Year 1)</td>
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<tr>
<td>TACTIC 1.3</td>
<td>Create faculty working groups in each of the four core areas, each with a liaison to a convergence research council charged with supporting and encouraging the formation of convergence research teams from across and beyond the four initial areas of emphasis for OADII. (Year 1)</td>
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<tr>
<td>TACTIC 1.4</td>
<td>Work with OU consultants and use respected national studies to determine convergence research areas in aerospace, defense, and global security where OU has or can develop a strategic advantage. (Year 1, Q1 and updated periodically)</td>
</tr>
<tr>
<td>TACTIC 1.5</td>
<td>For selected aerospace, defense, and global security strategic areas, establish and formalize key partnerships with leading universities, private companies, and national laboratories. (Year 2 and updated periodically)</td>
</tr>
<tr>
<td>TACTIC 1.6</td>
<td>Develop a consortium framework with industry and government partners. (Year 3)</td>
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</tbody>
</table>
STRATEGY 2

Finances

Develop a sustainable funding model for OADII, supporting a diversified research portfolio that includes both applied and fundamental research and that leverages expertise from across the university.

**TACTIC 2.1** Establish five-year pro forma budget that includes confirmed internal, multi-year investment plan, long-term expectations, and external funding projections. (Year 1, Q1)

**TACTIC 2.2** Establish external, annual revenue stream via a multi-year membership program to capture investments and/or gifts in kind. (Year 2)

**TACTIC 2.3** Establish incentives for IP disclosures, patents, and license agreements. (Year 2)

**TACTIC 2.4** Establish culture of respect for fundamental research endeavors that lay the foundation for future applied research programs through internal awards and recognition. (Year 2, ongoing)

**TACTIC 2.5** Expand the portfolio of sponsored research agreements (SRAs) by at least three new sponsors per year starting in Year 2, including submission of at least one competitive proposal for center-level funding by Year 5.

**TACTIC 2.6** Significantly increase the percentage of federally appropriated funding for research, development, testing, and evaluation captured by OU and our in-state partners.
STRATEGY 3

Talent

Recruit, retain, and develop high-caliber collaborative people in areas critical to support the growth and success of a convergence research culture in aerospace, defense, and global security.

TACTIC 3.1 Develop and maintain a talent matrix to track the inventory of current areas of expertise that exist broadly at OU and more specifically for OADII-affiliated faculty. (Year 1, then annually or as needed)

TACTIC 3.2 Partner with departments and colleges to advocate for cluster hires that are aligned with research areas important to the mission and impact objectives of OADII, including areas where improved capabilities would have cross-cutting benefits. (Year 1, then annually)

TACTIC 3.3 Create a mentoring program to retain and develop faculty through internal awards and recognition, with a focus on DEI goals and objectives. (Year 2)

TACTIC 3.4 Develop and manage a convergence research incubator function to support affinity groups around research interest areas to develop ideas and pursue external research funding. (Year 1, ongoing)

TACTIC 3.5 Create a visiting faculty program, which supports both inbound and outbound visits, to develop expertise in areas of need and build partnering opportunities. (Year 4 or 5)

TACTIC 3.6 Create postdoc and graduate student communities that expand convergence research in areas of need with a focus on collaboration. (Year 1)

TACTIC 3.7 Establish an undergraduate research program that includes a stipend and encourages students to pursue graduate education. (Year 1)

TACTIC 3.8 Identify needs and hire technical personnel to support infrastructure, instrumentation, and fabrication equipment and expertise that is shared across the entire institute. (Year 1, annually thereafter)

TACTIC 3.9 Develop a highly skilled administrative support staff, including in the areas of business development, contracting, IP, classified research, and general financial management. (Year 1, ongoing)
STRATEGY 4

Infrastructure

Provide access to, and acquisition of, infrastructure, equipment, and technical support needed to perform aerospace, defense, and global security research.

**TACTIC 4.1** Develop and maintain an infrastructure matrix to track the inventory of current infrastructure asset capability and capacity, both owned and shared. (Year 1, then annually or as needed)

**TACTIC 4.2** Pursue infrastructure grant proposals from governmental agencies. (Year 1, then annually)

**TACTIC 4.3** Establish and/or designate state-of-the-art research facilities and adequate laboratory space to accommodate near- and long-term aerospace, defense, and global security initiatives. (Year 3)

**TACTIC 4.4** Develop a nano-technology and advanced manufacturing facility, and expand the capabilities of existing cleanroom facilities through joint effort with the VPRP office and partners. (Year 3)

**TACTIC 4.5** Establish a secure, compartmentalized information facility. (Year 2)
STRATEGY 5

Marketing

Build brand recognition and develop creative information, communication, and marketing multi-media campaign to catalyze convergence research opportunities and to establish national visibility and recognition.

TACTIC 5.1  Establish organizational structure for communications, marketing, and business development across strategic research initiatives. (Year 1)

TACTIC 5.2  Develop a comprehensive communication plan with OU’s existing offices for Marketing and Communications. (Year 1)

TACTIC 5.3  Develop annual budget that enables full execution of communication plan. (Year 1)

TACTIC 5.4  Execute communication plan. (Year 1, Q2, ongoing)
STRATEGY 6

Impact

Deliver high-impact technology and policy solutions to global grand challenges using OU’s unique academic assets and through key partnerships.

TACTIC 6.1  Develop solutions that are driven by critical technical security needs and informed by the realities of global security policy in four key areas of impact. (Year 1, ongoing)

TACTIC 6.2  Develop partnerships with key internal and external entities. (Year 1, ongoing)

TACTIC 6.3  Collaborate with the other three strategic research verticals to pursue cross-cutting initiatives. (Year 1, ongoing)

TACTIC 6.4  Develop grant funding metrics, establish baselines, and define extramural funding goals for OADII. (Year 1, ongoing)

TACTIC 6.5  Define metrics and establish corresponding goals that will enable OADII to achieve national stature and recognition for original research contributions. (define metrics Year 1, achieve national recognition by Year 5)

TACTIC 6.6  Partner with academic units in placement of graduates with top-tier aerospace, defense, and global security employers, having impact both nationally and locally. (Year 1, ongoing)

TACTIC 6.7  Increase the presence of industry and government partners from the aerospace, defense, and global security sector on OU’s campus. (Year 3)
ENVIRONMENT, ENERGY,
AND SUSTAINABILITY

STRATEGIC PLAN
ENVIRONMENT, ENERGY, AND SUSTAINABILITY

WHERE WE'RE GOING TO HAVE AN IMPACT

We will integrate and expand on OU’s expertise in weather, water, environment, energy technology, climate change, infrastructure, policy, business, entrepreneurship, and community engagement to develop novel solutions that help drive the transformation of the U.S. energy sector while reducing greenhouse gas emissions and enabling a net-zero carbon economy by 2050. Our solutions will increase community resilience and sustainability. To address this grand challenge, we focus on complex interactions among the hydrosphere, atmosphere, geosphere, and biosphere in the critical zone, the thin layer from the shallow subsurface to the lower atmosphere. It has harbored life since its inception, is critical for human welfare, and is threatened by anthropogenic change. Our transdisciplinary research framework focuses on three key research areas: Observing and Predicting Earth Systems, Transforming Energy and Infrastructure Systems, and Co-generating Community Resilience and Environmental Justice.

Observing and Predicting Earth Systems

The Global Risks Report 2020 of the World Economic Forum identified extreme weather, climate action failure, natural disasters, biodiversity loss, and human-made environmental disasters as the top five global risks. All fall into the environmental category, and the report notes that “it is the first time in the survey’s history that one category has occupied all five of the top spots.” The report further highlights the interconnected nature of these risks and calls for a multi-stakeholder mitigation approach. Recognizing these findings and the critical role of weather, climate, water, and ecosystem predictions for many sectors of our society, the U.S. Office of Science and Technology Policy identified “Earth System Predictability” as a top budget priority.

OU has existing strengths in weather, climate, water, and ecosystem science, but these strengths are fragmented by siloed academic departments housed in different colleges. To facilitate a compelling research agenda focused
on Earth system predictions, we propose to invest in a transdisciplinary culture and organization that provides institutional support to teams of scholars who embrace the complexity of the Earth system and seek convergent solutions linking the biosphere, geosphere, hydrosphere, and atmosphere in the critical zone of life. We envision a framework that integrates multiscale modeling, observations, and data science to advance predictions of weather, water, climate, and ecosystems. We will expand our partnerships with federal agencies, including NOAA, NASA, DOE, DOI, and the USDA to collaborate on increasingly ambitious, high-impact projects.

Anthropogenic climate change is driving rapid shifts in weather and water hazards as well as declines in biodiversity and ecosystem services. These impacts threaten the resiliency of Great Plains communities, like those in Oklahoma, that are central to energy production and the transition to a net-zero carbon economy. OU is emerging as a regional and national leader at the interface of weather, water, climate, and ecosystems. Targeted investments focused on Earth system observation and prediction will propel OU to become a national leader in forecasting future environments and working with impacted communities in the state, nation, and internationally to co-generate strategies that increase resilience.

Weather and climate research are critical for OU’s research landscape and Oklahoma’s economy; nearly 50% of OU’s research expenditures currently are in this sector. The partnership with NOAA in the National Weather Center, NASA’s GeoCarb mission, the USGS South Central Climate Science Adaptation Center, and OU’s significant investments in the Advanced Radar Research Center and Data Science Institute for Societal Change are important assets which attract private companies to OU’s research campus. OU is well positioned for the leap to become a global leader in Earth system observation and prediction, capitalizing on its existing expertise in weather, climate, water, ecosystem, and data science. Further, research in these areas is of high societal relevance. The southern Plains are severely impacted by climate and weather hazards. These challenges call for innovations that enable Oklahoma’s economy and communities to become resilient to rapid environmental changes.

Transforming Energy and Infrastructure Systems

Society faces an existential threat from a changing climate linked to anthropogenic carbon dioxide emissions. In addition, population and economic growth are projected to cause a 50% increase in energy use over the next 30 years, further straining aging infrastructure components including the built environment. Decarbonizing solutions that lead to a net-zero energy economy are necessary to mitigate future risks by reducing carbon footprints while providing an equitable supply of energy for the world.

Our research approach focuses on transforming energy and infrastructure systems to become more sustainable in ways that meet the needs of a growing population, enhance resilience, and limit environmental and human impacts. We will find practical solutions to obtain equitable carbon negative solutions, capitalizing on electricity, heat, and hydrogen as the energy carriers of the future. We will infuse smart infrastructure
technology into the design and operation of the built environment to optimize performance and minimize cost. We will take a systems-based approach that treats interconnected systems as a whole, apply a ‘design for life’ concept to infrastructure policy, and engage stakeholders to seek socially acceptable, economically viable, and technologically innovative solutions while preserving ecosystems.

Achieving our aim of transforming energy and infrastructure systems utilizing a diverse energy portfolio and smart technologies will have profound environmental and societal impact. OU’s energy and infrastructure expertise and Oklahoma’s considerable wind, biomass, and natural gas resources uniquely position OU to lead a transition to a net-negative, restorative carbon economy in the state, region, and nation. This initiative will grow OU’s research enterprise and elevate the university’s academic standing. The modernization and diversification of energy sources is critical for revitalizing the state’s economy by attracting new investments, building new enterprises, and increasing employment opportunities.

OU’s research focus on energy and infrastructure has stemmed from Oklahoma’s rich, diverse energy resources and the need for infrastructure resilience to natural hazards across the state. OU is home to federally-funded centers such as the Oklahoma Established Program to Stimulate Competitive Research Center on socially sustainable solutions for water, carbon, and infrastructure resilience in Oklahoma sponsored by the National Science Foundation, and the Southern Plains Transportation Center. OU also has a history of collaborative partnerships between science, technology, engineering, and mathematics fields and applied social scientists at the Institute for Public Policy Research and Analysis (formerly called the National Institute for Risk and Resilience) and Center for Applied Social Research, which makes us an ideal location for transdisciplinary convergence research. We are experienced in engaging stakeholders to create solutions that are socially acceptable, economically viable, and technologically innovative. Our track record of embedding research findings in all educational activities to create next-generation thought leaders is an additional asset.

Co-generating Community Resilience and Environmental Justice

Mitigating the risks posed by extreme weather, climate action failure, natural disasters, biodiversity loss, and human-made environmental disasters requires innovative scientific solutions built upon world-class observatories, systems modeling capabilities, and transformative infrastructure development. However, without a robust social science and humanities focus on human behavior, human institutions, and belief systems, it will be impossible to transform at-risk communities to not only effectively use available resources to respond to and recover from adverse situations, but to grow and thrive in the future. Patterns of environmental injustice have made communities of color and indigenous peoples disproportionately vulnerable to environmental harm and excluded from the benefits of new energy technologies. At the same time, these communities have often not had equitable participation in decisions that affect their lives and lands. We will work to offer solutions that enhance
resilience, create new economic opportunities, and guard against creating new unjust outcomes.

Using social science and humanities-driven data collection, modeling, and theoretical frameworks, we will provide the knowledge necessary to support and build resilient communities. We approach this work with the understanding that many communities already hold knowledge systems that are crucial to a more environmentally just and resilient future. Respectful and reciprocal community partnerships are necessary for all research in these domains, as historic patterns of exploitation have eroded trust among many communities of color and indigenous peoples. Our approach begins from these understandings about the real-world impact and will enable a co-production of knowledge between citizens and researchers as we build a future with new economic opportunities and work to rectify a legacy of environmental injustice.

We will connect our strategic research areas of focus with community-supported and informed social science and humanities scholarship to further community resilience and improve environmental justice outcomes. With meaningful commitments to community-based methods and reciprocal partnerships, OU researchers can provide benefits to our stakeholder communities by offering research that targets stakeholder-defined problems and offering stakeholder-informed solutions that help counter the impacts of extreme weather, climate action failure, natural disasters, biodiversity loss, poor infrastructure, and human-made environmental disasters.

OU is uniquely positioned to succeed in these endeavors due to our strengths in engineering, business, weather, water, climate, and ecosystem science, complemented by strengths in Native American studies, public policy, humanities, and social science. Oklahoma, with its unique All-Black towns and in the heart of Native America, provides opportunities to elevate unheard voices and leaders within Oklahoma’s minority communities. We will promote governance and economic systems that recognize and rectify unjust energy commodity chains and enact community knowledge systems to create sustainable futures for all peoples.
ENVIRONMENT, ENERGY, AND SUSTAINABILITY
HOW WE'RE GOING TO SUCCEED

MISSION
Compelled by ongoing environmental and humanitarian challenges, transdisciplinary teams converge on solutions that empower communities in Oklahoma, the nation, and the world to be sustainable and resilient.

VISION
To transform energy systems and communities to become more resilient and sustainable while protecting biodiversity and ecosystem services.
STRATEGY 1

Create an Institute

Create and resource an Institute for Resilient Environmental and Energy Systems (IREES) as a collaborative space for transdisciplinary research teams providing administrative support, analytical research facilities, and research computing infrastructure dedicated to convergence research.

**TACTIC 1.1** Select and recruit a strong leadership team for the institute. (Year 1, Q1)

**TACTIC 1.2** Develop and document a sustainable organizational structure for the institute with clear responsibilities for support personnel and affiliated faculty. (Year 1, Q2)

**TACTIC 1.3** Establish agreements on areas of complimentary research between IREES and existing OU research units. (Year 1, Q2)

**TACTIC 1.4** Create a community advisory team to provide input on forming community engaged research partnerships. (Year 1, Q4)

**TACTIC 1.5** Create an advisory board drawn from key internal and external stakeholders representing federal, state, and private research foundations and private companies. (Year 1, Q4)

**TACTIC 1.6** Create an IREES commercialization team, or partnership, in collaboration with the OU Office of Technology Commercialization, Ronnie K. Irani Center for the Creation of Economic Wealth, and Tom Love Center for Entrepreneurship. (Year 1, Q4; ties to Objective 3.7 below)

**TACTIC 1.7** Conduct a space assessment and develop a plan for creating collaborative office, meeting, and laboratory space for the institute. (Year 1, Q3)

**TACTIC 1.8** Conduct a needs assessment and develop an acquisition plan for critical analytical research facilities and computing infrastructure with clear policies for collaboration and sharing of resources between IREES and existing OU research units. (Year 1, Q3)

**TACTIC 1.9** Develop a five-year budget which documents OU’s confirmed internal, multi-year funding commitments, expectations for research growth, and external funding needs. (Year 1, Q4)

**TACTIC 1.10** Develop a fundraising plan targeting private donors and foundations in collaboration with OU Advancement. (Year 1, Q4)

continued on page 27
TACTIC 1.11  Develop a plan to build relationships with funding agencies, foundations, government agencies, and NGOs that leverages resources provided by the VPRP office. (Year 1, Q4)

TACTIC 1.12  Develop a comprehensive marketing and communication plan in collaboration with existing OU marketing and communication offices. (Year 1, Q4)

TACTIC 1.13  Implement the plans identified in objectives 1.7–1.12. (Years 2-3)
STRATEGY 2

Create Teams

Recruit, incentivize, support, and retain diverse, inclusive, and transdisciplinary teams who successfully collaborate on internally and externally funded convergence research.

**TACTIC 2.1**  
Develop a process that directly promotes the mission of IREES to faculty, staff, and students. (Year 1, Q4)

**TACTIC 2.2**  
Conduct an analysis of current gaps in team and research diversity and document the target areas for strategic hires. (Year 1, Q4)

**TACTIC 2.3**  
Establish best practices for hiring diverse and inclusive personnel. (Year 1, Q4)

**TACTIC 2.4**  
Develop a plan with academic units and the Provost’s Office to hire 25 new institute-affiliated faculty that integrate across the IREES impact areas and fill the gaps identified in objective 2.2. (Year 2, Q2)

**TACTIC 2.5**  
Create incentives to affiliate with the IREES and reward transdisciplinary research collaborations. (Year 2, Q2)

**TACTIC 2.6**  
Establish and maintain a seed-funding program, including OU-funded GRA and postdoc positions, for transdisciplinary and diverse teams that have robust community engagement including with Native nations and other communities experiencing environmental challenges and inequalities, and forge inclusive partnerships across STEM, social science, and humanities disciplines. (Year 2, Q1)

**TACTIC 2.7**  
Create a research productivity-centered service center for faculty initiatives that facilitates effective proposal development, grant management, and marketing of results. (Year 1, Q4)

**TACTIC 2.8**  
Develop a marketing plan centered on opportunities for engagement and research partnerships internally and externally. (Year 1, Q4)

**TACTIC 2.9**  
Create (Year 1, Q4) and apply (Years 2-5) a rubric of holistic metrics that will be used to evaluate the efficacy of the transdisciplinary teams to compete for convergence research.
STRATEGY 3

Create Research Programs

Research, create, and implement high-impact programs that lead to equitable solutions for communities in Oklahoma, the nation, and the world.

**TACTIC 3.1** Establish a process to identify key community and academic department partners, develop relationships, and document policies for their engagement in institute-led programs. (Year 1, Q3)

**TACTIC 3.2** Conduct a needs assessment with community partners to scope out specific research programs in IREES impact areas that will address global challenges and lead to equitable solutions for communities in Oklahoma, the nation, and the world. (Year 1, Q3)

**TACTIC 3.3** Conduct a gap analysis and develop a convergence research agenda for IREES with its members and community partners. (Year 2, Q2)

**TACTIC 3.4** Create (Year 1, Q4) and apply (Years 2-5) a rubric of holistic impact metrics that will be used to assess the increase in OU’s research impact in energy and environmental sustainability and progress toward mission and vision at state, national, and global levels.

**TACTIC 3.5** Develop and implement a plan to allocate internal resources to support transdisciplinary teams (Year 1, Q4) with the expertise and resources to compete for and win (Years 2-5) high impact, nationally funded, collaborative initiatives, honors, and awards. STEM-centric examples include NSF ERC, CZN, RCN, and STC.

**TACTIC 3.6** Identify (Year 1, Q4) and establish (Years 2-5) formal collaborations with national and international research centers and corporate partners.

**TACTIC 3.7** Develop a research commercialization and business development plan with the OU Office of Technology Commercialization, Ronnie K. Irani Center for the Creation of Economic Wealth, and Tom Love Center for Entrepreneurship. (Year 2, Q1)

**TACTIC 3.8** Establish a seed fund for IREES research commercialization and providing start-up capital for new business ventures.

**TACTIC 3.9** Create a high-impact marketing plan for targeted audiences aimed at communicating, educating, and/or persuading communities about equitable solutions resulting from IREES research and findings. (Year 1, Q4)

*continued on page 30*
TACTIC 3.10 Establish a process (Year 1, Q4) to continually review and assess (Years 2-5) equitable implementation of co-generated research solutions in affected communities.
STRATEGY 4

Create Education Programs

Produce robust transdisciplinary education programs that prepare OU students, postdocs, staff, and faculty for success in conducting convergence research.

TACTIC 4.1 Conduct a review of undergraduate and graduate programs, certificates, and colloquia offered at OU, identify gaps and overlap, and determine how OU’s academic programs can better prepare students for transdisciplinary energy and environmental sustainability research. (Year 2, Q1)

TACTIC 4.2 Develop an energy and environmental sustainability curriculum that addresses the gaps identified in objective 4.1. (Year 2, Q4)

TACTIC 4.3 Identify and form partnerships with existing OU units to offer convergence education (e.g., CFE). (Year 2, Q1)

TACTIC 4.4 Develop marketing and recruitment plans for the institute’s educational programs. (Year 2, Q4)

TACTIC 4.5 Develop (Year 1, Q4) and implement an assessment plan of the institute’s educational programs to promote a transdisciplinary culture and convergent research. (Years 2-5)
**STRATEGY 5**

**Create Processes**

Develop convergence research policies and procedures that consider the complex technical, social, and ethical dimensions of problems at the nexus of environment and energy and that lead to equitable solutions.

| TACTIC 5.1 | Create personnel policies that promote a diverse, inclusive, and transdisciplinary research culture, including specific guidelines for contributions from IREES leadership to annual evaluations and tenure and promotion reviews led by the academic departments. (Year 1, Q2) |
| TACTIC 5.2 | Develop policies and expectations for mentoring plans for students, postdocs, and early-career faculty affiliated with the IREES. (Year 1, Q4) |
| TACTIC 5.3 | Develop a structured plan to offer workshops, seminars, colloquia, and conferences to create a culture of convergence research in IREES. (Year 2, Q2) |
| TACTIC 5.4 | Develop clear policies for communication of institute-related activities and results to funding agencies, foundations, and media. (Year 1, Q4) |
| TACTIC 5.5 | Develop clear policies for relationships with private businesses and intellectual property rights, with guidance from OTC and OU's General Counsel. (Year 2, Q1) |
| TACTIC 5.6 | Develop policies and plans for the creation of IREES spin-off business ventures, including the use of IREES-generated knowledge in the formation of new business ventures, forming business partnerships with external entities, and the investment of IREES seed funding in new business ventures. |
STRATEGY 6

Create Partnerships

Develop partnerships for co-generating knowledge with stakeholders within communities that seek solutions to complex environmental and humanitarian challenges.

**TACTIC 6.1** Implement best-partnership practices (Year 2-5) identified through an assessment of those used across existing programs at OU and at other institutions. (Year 1, Q4)

**TACTIC 6.2** Establish partnerships with foundations, NGOs, private industries, governments, and other possible sponsorship opportunities for building capacities in IREES and in communities. (Years 2-5)

**TACTIC 6.3** Develop (Year 2, Q1) and implement (Years 2-5) partnerships and collaborations to design and implement transdisciplinary programs for K-12 education.

**TACTIC 6.4** Develop (Year 1, Q4) and implement (Years 2-5) a marketing plan to promote institute partnerships.
THE FUTURE OF HEALTH

STRATEGIC PLAN
Global challenges that affect human health and well-being are rooted in a complex and ever-evolving web of sociodemographic and biospheric systems. These challenges are broad and pervasive in Oklahoma, as evidenced by the state's unenviable position at or near the bottom of the national rankings in most health indicators. Oklahoma scores poorly in overall health, health care system performance, and population health disparities. Building on existing strengths across its three campuses, OU is poised to be at the forefront of transdisciplinary convergent research endeavors that will drive fundamental discoveries related to: clarifying mechanisms and cellular processes to develop new therapies and technologies to combat and eradicate deadly diseases, such as diabetes and cancer, that intersect with clinical and translational research at OU Health; monitoring, predicting, and responding to pathogenic threats, including drug-resistant bacteria, rapidly evolving viral pathogens, environmental risk factors, and the geographical expansion of vector-borne and zoonotic diseases; and addressing growing health-related disparities by partnering OU expertise with industry and Oklahoma's diverse communities.

Eliminating Health Disparities

The U.S. exhibits striking disparities across groups and regions in health outcomes including chronic conditions, disease states, and life expectancy. These disparities are shaped by structural processes of inequality, discrimination, and an economic system that limits access to needed resources in the built, natural, and social environment. The lack of resources, as well as experiences of adversity, lead to biological processes that impact all levels of organismal functioning including gene expression, neurological structure and function, the microbiome, and metabolic processes. Reduced access to resources and increased adversity also shape health behaviors, which combine with biological processes to perpetuate and exacerbate demographic and socioeconomic disparities that negatively impact health outcomes. These poor and disparate health
outcomes are an urgent societal challenge, with billions of dollars in economic costs for the U.S. each year as well as immeasurable costs for humanity.

Addressing the grand challenge of health disparities requires a dynamic and innovative approach essential to provide resources and build individual and systemic resilience in partnership with affected communities. Large-scale, transdisciplinary and multi-method data collection and analysis is needed to identify existing patterns and the societal and biological mechanisms that drive health disparities. Micro-processes shaping health outcomes can be unpacked by leveraging laboratory-based cellular and animal research. Together, these efforts will converge to identify and implement interventions to reduce health disparities and improve health outcomes for all.

Uncovering and addressing mechanisms driving poor outcomes, particularly for marginalized populations, will lay the foundation for important policy and public health initiatives to increase opportunity and reduce the impacts of adversity. Providing improved resources and opportunities will support the adoption of positive health behaviors and facilitate healthy development across the human lifespan. Together, these interventions will shore up the health of all people and reduce increased risk of morbidity and premature mortality for marginalized populations.

OU’s disciplinary strengths in social and natural sciences and engineering, combined with expertise in disease state prevention and treatment, provide a strong foundation for this strategic investment. Vibrant existing community partnerships with urban, rural, and tribal communities offer unique opportunities to connect converging disciplinary expertise to communities and frontline staff to ensure the feasibility of efforts to intervene on health disparities. As promising interventions are identified, OU experts in public policy and business are poised to partner with translational scientists at OU Health to design, advocate for, implement, and scale up promising new strategies. Oklahoma is a state with persistent poor health rankings, and some of its communities are living examples of worse outcomes for minoritized and impoverished groups. We will harness the expertise across our university, from the humanities and social sciences to the biological and health sciences and other STEM areas, to better determine and address the health needs of these populations. As disciplines from across OU converge to address these grand and persistent challenges, we all win as we support the health of all Oklahomans and provide a model for the nation.

Molecules to Medicine: discoveries transforming therapeutics and diagnostics

The molecular identification, characterization, and manipulation of cellular pathways that lead to disease is a global grand challenge in the life sciences. Additionally, the development of advanced technologies for the accurate detection and diagnosis of chronic diseases is critical, especially in Oklahoma, as it has one of the nation’s highest cancer mortality rates and ranks in the top five states for diabetes and obesity. Furthermore, Oklahoma’s Native American population has a higher risk of developing diabetes and is almost twice as likely as non-Hispanic whites to die from diabetes. Research in molecular and cell sciences, technology development, and technology transfer will enable
The Future of Health

OU to translate fundamental discoveries into new leads for drug development, new and improved diagnostic capabilities, and ultimately disease treatment.

We will leverage OU expertise in: the development of basic natural and physical sciences, data science, and engineering; the Office of Technology Commercialization and strengths in product management through the business college; and partnerships across the university’s campuses. Fundamental disease-oriented research on the Norman campus significantly complements clinical research trials and patient care provided at the Stephenson Cancer Center and Harold Hamm Diabetes Center. Other areas of cross-campus research strengths include neuroscience, infectious diseases, antibiotic resistance, the gut microbiome, and natural medicines. These areas also support a strategic focus on fundamental research that will pave the way to improved health outcomes. An important component of this approach is the determination of how social, economic, and environmental factors affect drug efficacy at the molecular level and, in turn, impact pathophysiology and patient responses.

It is well known that early detection and treatment of cancer, diabetes, and many other diseases decreases the mortality rate by allowing earlier therapeutic intervention. The translation of fundamental research to products and services that may be deployed in the marketplace is well supported by the applied research and capabilities of OU's top-25 business college, including the Center for the Business of Healthcare and the Tom Love Innovation Hub. For example, understanding fundamental mechanisms whereby nutritional interventions impact our gut microbiome has a direct clinical translation for preventing and treating diabetes and obesity risk, as well as cancer therapeutics. Our goal is to develop disease-focused research at OU into a nationally recognized powerhouse in both the basic science and the translation of that science into products and services that will improve the lives of people in Oklahoma and beyond.

OU-Norman researchers are uniquely positioned to focus on the rational development of new drugs and technologies that improve the human condition, particularly in areas of emphasis that align with the OU Health Sciences and OU-Tulsa campuses, such as cancer and diabetes. Our research strengths are focused on understanding the molecular basis of disease to identify druggable cellular targets, develop drug leads, and advance technology for disease diagnosis and treatment. Our vision is to join forces with our entrepreneurial colleagues to leverage new insights into diabetes, cancer, and infectious diseases along with the tools to invent and launch revolutionary new diagnostics and treatments for these diseases.

Predicting, Preventing, and Responding to Emergent Pathogenic Threats

Human population growth, urbanization, societal behaviors, and climate change are accelerating the emergence and migration of pathogenic threats. Such drug-resistant and rapidly evolving pathogens and expanding vector-borne and zoonotic diseases will have significant impacts on planetary health in the coming decades. Understanding and addressing these grand challenges requires innovation at microscopic to global scales in systems ranging from molecules
to the biosphere. The COVID-19 pandemic has demonstrated how the lack of timely and accurate information prevents effective response to an emerging disease and the impact this can have on vulnerable human populations in both rural and urban areas. There is a need to extend our knowledge of the pathogens that pose the greatest threats, mechanisms that produce them, locations where they will emerge, specific triggers that lead to outbreaks, dynamics of spread, patterns of human vulnerability, and resulting health risks. Convergence research is needed to prevent future pandemics and to ensure a more effective response when new pathogens emerge.

OU will accelerate the development of methods to predict, prevent, and respond to emerging health threats to provide benefits that have broad global impact. A major barrier to addressing such threats lies in the need to clarify the dynamic and ever-evolving interactions between environmental, socioeconomic, and epidemiological factors through convergence across disciplines. To better understand emerging pathogens, we will engage in bold, coordinated, transdisciplinary efforts. This endeavor requires diverse expertise ranging from biologists who study the characteristics and evolution of viruses and microorganisms, ecologists who study the habitat associations of vector and host species, climatologists and geographers who study how environments will change in the future, social scientists who study human behavioral responses and identify populations at greatest risk, and data scientists who apply cutting-edge data analytics to understand complex interconnections.

Specific outcomes will include predictive models that direct disease surveillance toward high-risk locations and times, new informatics tools that can track rapid changes in transmission risk during a disease outbreak, and robust diagnostics and treatments that are quickly adapted and applied in response to novel pathogenic threats. Through transdisciplinary research, OU is well positioned to develop new datasets and models that will significantly advance our capabilities for predicting environmental risk factors associated with disease emergence and spread, providing critical data for pandemic interventions, and advancing our understanding of microbial resistance and the development of novel therapeutic compounds.

OU has foundational expertise for convergence and applied research on pathogens, including integrative studies of infectious diseases and zoonoses, pathogen invasion and persistence, ecosystem and community resilience, social sciences and human health disparities, and environmental monitoring systems with disease applications. By combining strong expertise in climate research with strengths in evolutionary biology, microbiology, geography, ecology, and social science, we have built a foundation that uniquely positions OU to become a leader in addressing emerging pathogenic challenges that face Oklahoma, the nation, and the world.
THE FUTURE OF HEALTH
HOW WE'RE GOING TO SUCCEED

MISSION

We will advance positive health outcomes through convergence research to create new therapies, policies, and practices that will enable recognition of and response to continuing and emerging disease threats and address social and environmental risk factors to promote health equity in Oklahoma, America, and globally.

VISION

Using innovative approaches, concepts, and applications, we will positively transform the health of all peoples and the biosphere in which we exist.
STRATEGY 1

Organizational Structure

Establish a Future of Health (FH) Institute with effective administrative and research infrastructure, including physical space dedicated to FH convergence research and affiliated shared core facilities that integrates all three OU campuses, our community, and the world.

TACTIC 1.1 Recruit, hire, and integrate an FH Institute Director by Year 1, Q1 and campus-specific Associate Directors with a broad vision to integrate the objectives of the institute by Year 1, Q3.

TACTIC 1.2 Recruit, hire, and integrate administrative FH Institute staff in the areas of financial accounting, managing directorship, marketing and communication, diversity and inclusion, IT, and advancement, and identify space for the administrative office(s) in Year 1, Q2.

TACTIC 1.3 Conduct a gap analysis to determine need for contiguous space infrastructure and/or affiliated spaces.

TACTIC 1.4 Work with university officials to identify administrative barriers, resources, and strategic plans that will enable convergence research through the alignment of processes and platforms across campuses by Year 1, Q4.

TACTIC 1.5 Identify existing university shared research core facilities that align with the FH Institute mission and establish partnerships with the FH Institute by Year 1, Q3.

TACTIC 1.6 Establish top-tier infrastructure for drug discovery, including high-throughput screening facility, chemical synthesis, and computational modeling by Years 2-3.

TACTIC 1.7 Establish top-tier infrastructure for biomedical engineering, including immunoengineering, bioimaging, and biosensor development by Years 2-3.

TACTIC 1.8 Establish university-level shared infrastructure and safety protocols for working with emerging pathogens or vectors by Year 3.

TACTIC 1.9 Build a plan to coordinate and collaborate with cross-institute and cross-campus infrastructure needs related to health equity, social and environmental risk factors, data integration, and analysis by Years 1-3.
**STRATEGY 2**

**Talent**

Incentivize, develop, and sustain transdisciplinary research teams of faculty, staff, postdocs and students in areas of strategic importance to the Future of Health.

<table>
<thead>
<tr>
<th>TACTIC 2.1</th>
<th>Identify and recruit existing faculty across campuses to build synergies in FH Institute areas of research by Year 1, Q3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TACTIC 2.2</td>
<td>Working with College Deans, Provost, and VPRP offices, build a plan to identify potential transdisciplinary cluster hire opportunities in order to recruit and hire 15-20 new faculty aligned with the FH strategic research areas. (Years 1-5 with 3-4 new hires per year)</td>
</tr>
<tr>
<td>TACTIC 2.3</td>
<td>Identify resources to help recruit postdoctoral researchers and graduate students in areas of strategic importance to the FH Institute by end of Year 2.</td>
</tr>
<tr>
<td>TACTIC 2.4</td>
<td>Identify resources to help support recruitment and retention of research support staff at a level competitive with national averages and aspirational institutions. (Years 3-5)</td>
</tr>
<tr>
<td>TACTIC 2.5</td>
<td>Provide incentives in the form of a seed grant program for innovative FH-related convergence research. (Years 2-5)</td>
</tr>
</tbody>
</table>
STRATEGY 3

Finance

Build a robust and sustainable financial portfolio of dedicated internal and extramural funding for the operational costs of the FH Institute and in support of its convergence research mission.

TACTIC 3.1 Establish five-year pro forma budget, which includes confirmed internal, multi-year investment plan, long-term expectations, and external funding needs. (Year 1, Q1)

TACTIC 3.2 Increase federal funding of FH research, particularly from the NIH, by 20% each year. (Years 1-5)

TACTIC 3.3 Secure funding from foundation and philanthropic sources for funding of FH research projects, endowed chairs (5-10), and core infrastructure. (Years 1-5)

TACTIC 3.4 Develop stable and sustainable funding streams for filling gaps in equipment and other research needs. (Years 4-5)

TACTIC 3.5 Provide seed funding to incentivize FH convergence research teams. (Years 2-5)

TACTIC 3.6 Establish three or more centers of excellence in FH Institute focus areas by Year 5.

TACTIC 3.7 Build a plan to attract industrial and business funding that will lead to development of and licensing of IP. (Years 2-5)
STRATEGY 4

Culture
Create diverse, equitable, and inclusive transdisciplinary initiatives to support the FH Institute and broaden the participation of under represented groups in health-related convergence research.

TACTIC 4.1 Create diverse, equitable, and inclusive training programs to broaden the participation of underrepresented groups in transdisciplinary health research. (Years 1-5)

TACTIC 4.2 Create infrastructure for institutional promotion and dissemination of convergence research. (Years 1-2)

TACTIC 4.3 Develop infrastructure to be incubator of FH convergence research from initial ideas to completed projects. (Years 1-5)

TACTIC 4.4 Develop a reward system that encourages rather than discourages the risk-taking that is needed to engage in novel transdisciplinary research. (Years 2-5)

TACTIC 4.5 Create effective cross-campus collaboration on health equity while strengthening involved colleges and departments. (Years 1-5)

TACTIC 4.6 Enhance and promote undergraduate research, leading to promising candidates for graduate students. (Years 1-5)

TACTIC 4.7 Build a robust plan to increase the participation of undergraduate research by students from underrepresented groups. (Years 1-5)
STRATEGY 5

Partnerships
Develop dynamic collaborations with cross-sector community partners that further the FH Institute's convergence research and educational mission.

TACTIC 5.1  Conduct an asset mapping exercise of community engagement activities and offices across all three OU campuses and include best practices from peer universities and institutes. (Year 1, Q4)

TACTIC 5.2  Develop a list of possible partners (private, NGO, governmental) external to OU and identify opportunities for integrating and co-producing knowledge with communities currently working to improve their own health equity. (Year 1, Q4)

TACTIC 5.3  Identify strategies for leveraging community partnerships to achieve other institute goals, particularly the financing (Goal 3) and culture goals (Strategy 4). (Year 2, Q2)
STRATEGY 6

Marketing

Produce targeted and creative marketing and communication strategies that promote the FH Institute’s mission, initiatives, and successes to generate convergence research opportunities and funding and to effect research-based community impact.

TACTIC 6.1 Develop a strategic marketing and communications plan, including identifying target audience and a selection process, with the FH Institute’s leadership and OU’s Marketing & Communications. (Year 1, Q1)

TACTIC 6.2 Establish an FH Institute website and social media presence. (Year 1, Q2)

TACTIC 6.3 Establish monthly newsletters to highlight achievements, announce initiatives, and feature research groups. (Year 1, Q3)

TACTIC 6.4 Produce news stories that highlight the FH Institute’s initiatives and achievements. (Years 1-5)

TACTIC 6.5 Work with FH Institute leadership to produce reports and other publicly available documents. (Years 1-5)

TACTIC 6.6 Establish a monthly seminar/webinar series on the future of health with internal and external presenters. (Year 1, Q3)
OU has an opportunity to capitalize upon its expertise and build on existing strengths to promote societal well-being by focusing on three key research areas: Technology, Society, and Human Flourishing; Native Nations, Sovereignty, and Partnerships; and Equity and Opportunity. Existing and emerging research at OU will enhance knowledge about the beneficial and harmful impacts of technology on society, including artificial intelligence and the impact of technological adaptation, and on human behavior across health, education, and work-family life.

OU’s institutional resources and collections, faculty capabilities, and geographic location in the state provide an unmatched opportunity for community-engaged, collaborative partnerships that place the sovereignty of Native nations and the cultural continuance of Native peoples at the center of academic research and forms a key area for OU’s growth and national distinction. Oklahoma has a population that suffers from many significant challenges, including very poor outcomes in education and health and high levels of incarceration, especially among women. OU is uniquely positioned to conduct meaningful transdisciplinary research to address issues related to equity and opportunity at the state and national levels by expanding existing expertise in early childhood, carceral studies, and health disparities across all three OU campuses.

Enhancing Knowledge at the Intersections of Technology and Society

Technology profoundly influences the human experience, offering potential to advance the flourishing of individuals and communities. Medical technologies and information systems extend health care to people lacking access. Learning technologies support both remote and face-to-face education. E-commerce and business analytics inform the way we work today and in the future. Communication technologies bring new levels and types of social and cultural connections. Artificial intelligence and machine learning technologies are influencing work, public policy, and everyday life. These technologies also introduce challenges such as cybersecurity threats, workforce changes,
family strains, digital disinformation campaigns, and inauthentic behavior enabled by digital media. The use of biased algorithms can foster discriminatory practices and decisions. The study of the interconnections between technology and society is a robust field embracing work from many disciplines, ranging from historical technology studies, to social scientific analyses of emerging technologies, to explorations of human-centered design.

By leveraging transdisciplinary research related to society and community transformation, from the humanities and creative arts to the social sciences and core STEM fields, we can effectively address emerging needs in the public/private sector at state, national, and global levels. We will study the capabilities and risks of artificial intelligence technologies and identify cybersecurity vulnerabilities. We will better understand the impacts of health care information systems and medical technology on public health. We will explore the ethics of technology uses and social media communication, technology adoption, and legal implications along with technology impacts on the U.S. workforce, U.S. intelligence gathering, and technology-related public policies.

Research on emerging technologies offers numerous opportunities for OU. Furthermore, our location in Oklahoma uniquely positions us to study the impacts of technology on multiple populations, including Native nations, and to address state challenges such as poverty and social inequities.

**Advancing Equity and Opportunity**

Societies that flourish are those that provide safe, stable, and nurturing environments for children and families. However, individuals and communities flounder when there is unequal access to opportunities and supportive environments. These inequalities are reflected in vast disparities in education and health outcomes and in disproportionate and excessive incarceration. Emerging transdisciplinary research shows promise of discovering actionable solutions to help all caregivers of young children provide nurturing environments, improve education and health outcomes at the individual and community level, and prevent involvement in the criminal justice system.

Oklahoma has a population that suffers from many significant challenges. Oklahoma ranks last
or near the bottom in several educational and health indicators, and first in female incarceration. Most of these indicators show disparities by race, ethnicity, and social class and cluster in segments of the Oklahoma population that further amplify inequity. Women, children, and families bear a large burden of these challenges that carry the potential for intergenerational cycles of social disadvantage with high costs to society if not addressed.

While these challenges and the disparities are complex, the solution lies in holistic transdisciplinary research. A recent landmark study found that high-quality early childhood programming improves children’s educational outcomes as well as longer-term outcomes, such as adult employment, health, and lower incarceration rates. Preventing adversities in early childhood is also associated with better health and longevity. While this growing body of research is compelling, little is known about the underlying mechanisms producing these results, how to equalize opportunity for the most disadvantaged, and how to disrupt the interconnections between early childhood experiences, educational problems, involvement with the criminal justice system, and health and well-being throughout life. These topics are significant not just for Oklahoma, but for other states, the nation, and international contexts.

Convergence research positions OU to make real progress in improving the prospects for many of Oklahoma’s citizens and communities and applying this scholarship beyond Oklahoma. The transdisciplinary, partnership approach proposed here will also attract graduate students and faculty who want to conduct meaningful scholarship with positive benefits to society. Few top academic institutions have this targeted comprehensive focus on improving the lives of and addressing inequities for women, children, and families through research-based solutions, transdisciplinary emphasis, and innovative graduate training. OU could become the place that grows top new faculty, inviting the best to stay at OU and launching others to fill top positions at other institutions.

By virtue of its location in the midst of communities with high levels of need, OU can fill a void and emerge as a leader in these research areas and bridge theoretical and practical interconnections among them. We will build on strong existing relationships among researchers and Oklahoma communities and state and tribal agency leadership to ensure our research is relevant and put into practice.

Partnering with Native Nations to Strengthen Cultural Continuance and Sovereignty

A recent resurgence of tribal institutions and dynamic new leadership is addressing global challenges for Native nations. Oklahoma is home to 39 culturally distinctive Native nations and nearly 500,000 American Indians, representing approximately 16% of the total state population. Native nations are key actors in Oklahoma’s culture, economy, and governance structures. Building roads and bridges, funding schools, operating health care clinics and hospitals, providing social services and child welfare programming, shepherding environmental and natural resource management and research, and preserving and revitalizing languages and cultural practices, Oklahoma tribes are, more
now than at any time in U.S. history, creating greater opportunities for everyone in the state. Unfortunately, tribal communities have often lacked true partners from research institutions, and models for effective collaboration are in short supply. Our work in this area seeks to advance the science and scholarship of tribal engagement, establishing the standard for national and international work to advance the causes of Native peoples.

OU’s institutional resources and collections, faculty capabilities, diverse student body, and geographic location in the midst of unique and diverse tribal nations provide an unmatched opportunity for community-engaged, collaborative partnerships that center the sovereignty of Native nations and the cultural continuance of Native peoples. Our grand challenge is to seek out and address the needs of tribal communities where tribes set the priorities and shape research, scholarship, and creative activity to advance the well-being of tribal citizens and communities, while also providing unique opportunities for university faculty, staff, and students.

A legacy of historical trauma and loss, combined with persistent ongoing neglect by U.S. institutions, has often generated significant disparities for Native people. Despite these challenges, tribal communities across the country have articulated innovative models of tribal governance and unique approaches to addressing global challenges. Authentic engagement by the university with tribal institutions, which privileges Native voices and perspectives, can point the way to transformations in Native communities throughout the world.

There is, quite simply, no other institution in the country with the tribal partnerships and historical commitments to do this work. OU serves unrivaled numbers of Native students for a research-intensive institution, with significant Native faculty leadership in almost every college, including every campus. Numerous tribal partnerships have now been in place for decades, giving rise to significant work in the arts and humanities as well as the social and natural sciences, while our professional programs have been foundational for the tribal workforce in the state. These dynamics make OU uniquely positioned to advance this work.
MISSION

To reduce inequity and forge new pathways toward positive societal transformation through community-engaged research and creative activity that advances health and well-being, social justice, arts and humanities, education, and technological and workforce adaptations.

VISION

Transforming societies by setting the national standard for convergent, community-engaged research and creative activity.
STRATEGY 1

Organizational Structure

Create and sustain an Institute for Society and Community Transformation (ISCT) that houses methodological expertise and includes a repository of data and technological tools to support research and creative activity.

**TACTIC 1.1** Recruit an engaged, agile leadership team for ISCT. (Year 1, Q2)

**TACTIC 1.2** Secure collaborative physical space for the activities of the institute to house ISCT leadership, faculty affiliates, staff, graduate students, visiting scholars, and postdoctoral fellows. (Year 1, Q2)

**TACTIC 1.3** Develop a sustainable organizational structure that provides administrative proposal development and grant management support. (Year 1, Q2)

**TACTIC 1.4** Build a premier repository of data, scientific, and technological tools that facilitate insights into the causes and consequences of inequity and inform research-based solutions in Oklahoma. (Years 1-2)

**TACTIC 1.5** Develop a resource matrix and a staffing requirement plan to support collaborations with external partners and maintenance of the data repository. (Year 1)

**TACTIC 1.6** Establish data analytics and methodological research expertise and/or partnerships to support society and community grounded convergence research. (Year 1)

**TACTIC 1.7** Build a baseline budget for analytical facilities, IT infrastructure acquisition and maintenance, seminars, seed funding, and course release support to sustain ongoing collaborations, and nucleate new research teams. (Year 1)
STRATEGY 2

**Talent**

Establish and support transdisciplinary research teams in areas of strategic importance to Society and Community Transformation.

**TACTIC 2.1** Assess existing capacity and perform gap analysis to identify transdisciplinary teams in strategic areas for ISCT research. (Year 1, Q2 and yearly thereafter)

**TACTIC 2.2** Identify, contact, and recruit OU faculty and researchers from diverse groups who have interest and expertise in our identified areas of strategic importance. (Year 1)

**TACTIC 2.3** Develop transdisciplinary collaboration in each area through specific writing projects and other creative activity. (Year 1 and yearly thereafter)

**TACTIC 2.4** Recruit new faculty to complement existing faculty expertise in our research focus thrusts by adding three to five new lines in each of the areas of strategic importance for the institute. (Years 1-3)

**TACTIC 2.5** Grow postdoctoral capacity by funding and filling four postdoctoral fellowships annually across the identified areas. (Years 1-2)

**TACTIC 2.6** Create a visiting faculty program to help build expertise in areas of strategic importance for ISCT and enhance potential for outside partnerships. (Year 2)

**TACTIC 2.7** Build graduate student capacity through six additional GRA lines for the institute. (Year 1, Q4)
STRATEGY 3

Partnerships

Establish and nurture community partnerships and engagement vital to the ISCT's success.

TACTIC 3.1 Provide research and scholarship support for tribal community engagement through strategic partnership. (Year 1)

TACTIC 3.2 Recruit a community matchmaker and broader impact specialist. (Year 1, Q2)

TACTIC 3.3 Leverage and expand existing relationships with relevant state agencies in collaboration with OU’s Office of Government Affairs. (Year 1, Q4)

TACTIC 3.4 Identify national and international research institutes, centers, and corporate partners to initiate formal collaborations. (Years 1-3)

TACTIC 3.5 Assess, catalog, and promote current faculty partnerships and research expertise in ISCT-related research to foster transdisciplinary collaboration. (Year 1, Q2)

TACTIC 3.6 Build community capacity and long-term sustainability of collaborations between community and university. (Year 2)
STRATEGY 4

Processes
Develop transdisciplinary/convergence research processes to guide and govern successful research and creative activity within the ISCT.

**TACTIC 4.1** Create an advisory board and establish annual meetings. (Year 1, Q2)

**TACTIC 4.2** Develop a transdisciplinary process and an internal funding allocation mechanism to promote deep integration among disciplinary scholars and create diverse and inclusive partnerships. (Year 2)

**TACTIC 4.3** Create processes for external outreach that include community stakeholders and collaborators. (Year 1)

**TACTIC 4.4** Organize research and community engagement events for the university to encourage transdisciplinary research in accessible terms and catalyze cross-disciplinary involvement. (Year 2, Q1)
STRATEGY 5

Finance

Build a robust and sustainable financial portfolio of dedicated funding for the operational costs of ISCT and in support of its convergence research mission.

**TACTIC 5.1** Identify interdisciplinary and convergence funding opportunities as candidates for developing extramural proposals, and assemble teams of interested researchers and practitioners on a continuous basis from the start of the institute. (Yearly)

**TACTIC 5.2** Develop strategies and plans for pursuing possible funding opportunities from the federal government. (Year 1, Q2)

**TACTIC 5.3** Identify a set of strategies for pursuing possible funding opportunities from donors and foundations. (Year 2, Q2)

**TACTIC 5.4** Develop and submit one convergence research proposal. (Year 1 and yearly thereafter)

**TACTIC 5.5** Develop and submit at least one major funded interdisciplinary or transdisciplinary proposal for each major strategic area of importance. (Year 2, Q4)

**TACTIC 5.6** Develop a process to regularly promote ideas to funding agencies and seek funding to host workshops on themes that could bring awareness to ISCT’s strengths and lead to funding opportunities. (Years 1-2)

**TACTIC 5.7** Establish seed funding programs to stimulate convergence research relevant to fundamental ISCT activities and in alignment with federal and foundational funding opportunities. (Year 1)
STRATEGY 6

Marketing

Produce targeted and creative marketing and communication strategies to increase convergence research and creative-based opportunities, contribute to ISCT's sustainability, and inform policy and practice.

**TACTIC 6.1** Recruit, fill, and onboard a Director of Communications in coordination with the other strategic research verticals institutes and OU Marketing and Communications. (Year 1)

**TACTIC 6.2** Develop a comprehensive communication plan, including the identification of target audiences and budget, in coordination with OU’s Marketing and Communications. (Year 1)

**TACTIC 6.3** Convene stakeholders to provide input and evaluate communication processes and products. (Biannually)

**TACTIC 6.4** Develop and deliver communication training to ISCT faculty and staff. Focus on supporting faculty/staff to tailor and package messages for varied audiences. (Year 2, Q4)

**TACTIC 6.5** Provide a menu of research/creative activity and evaluation research services available to community and government agencies in a partnership context. (Year 1, Q4)
CROSS-CUTTING ENABLING CORE CAPABILITIES
Data science is becoming increasingly critical to current and future discovery and innovation in the state of Oklahoma, the nation, and the world. The University of Oklahoma is redefining the landscape as a leading center of excellence in data science research and data-driven solutions. With the introduction of the Data Institute for Societal Challenges (DISC), OU is swiftly advancing the forefront of discovery through its investment in highly skilled researchers, top-tier research facilities, and partnerships that bridge the academic, private, industrial, and governmental sectors. DISC is setting a new benchmark for cutting-edge advances in artificial intelligence, machine learning, and real-world applications driven by advancements in data-enabled research. OU’s extensive research investment in these technologies will profoundly impact society, from breakthroughs in the development of robust and predictive software and guidance systems used by the U.S. Air Force, Army, and Department of Homeland Security, to advances in precision medicine that aid in the early detection and more effective treatment of disease, to the development of more accurate, timely, physics-informed weather and severe storm predictions and forecasts, all of which protect millions of lives. The development of ecologically sustainable communities and energy grids, as well as transformed modern supply chains around the world, are not just goals, they are achievable through the data science research endeavors at OU.

The DISC team is focused, driven, and fully committed to tackling the greatest data science challenges facing society today and tomorrow to develop real-world solutions and innovation at the local and global scale. Through the development and growth of convergent research teams, DISC will achieve these goals and lead the way in foundational data science and data-enabled research for aerospace, defense, and global security; community and societal transformation; the future of health; and the environment, energy, and sustainability. Societal challenges recognized, solutions realized – DISC is defining what it means to be a leader in data science research.
Data Institute for Societal Challenges

Human-Guided Artificial Intelligence and Machine Learning

Artificial intelligence (AI) and machine learning (ML) are unlocking the next generation of advances in science, engineering, and other disciplines. AI and ML are currently used in a variety of capacities, such as developing pricing models for utilities and assisting with drug and protein discovery. However, AI and ML systems function in ways that are not always well understood and are still in their infancy.

The goal of developing robust, trustable, explainable, and fair AI and ML is to help users understand how these systems produce results, remove biases in how these systems work, and promote the further use and adoption of AI and ML. Developing interactive, human-guided techniques that harness user expertise and knowledge has the potential to improve the robustness and performance of pure automated AI/ML techniques and to increase understandability and trust in the results.

AI and ML will have a lasting impact on the community, the nation, and the world. For example, the near-term impacts include the development of the next generation of AI and ML systems to help public health officials respond to infectious diseases, predict the development and trajectories of large-scale weather events, and generate patient-specific treatment strategies. AI and ML have the potential to unlock new insights for low-carbon power grids and carbon-neutral energy production.

OU is currently using and developing innovative AI and ML convergent research that brings together expertise from science, engineering, and social science, as well as computer and data science. Specifically, OU is home to one of five NSF Artificial Intelligence Institutes that will create trustworthy AI methods for environmental scientists while revolutionizing our understanding of atmospheric phenomena. DISC is leading an NSF Planning Grant to create a roadmap for ensuring sustainable agricultural production and communities using AI and ML. DISC will build on OU’s strength in integrating AI/ML specialists with social scientists, cognitive psychologists, political scientists, biologists, and engineers to create cross-disciplinary AI/ML solutions for advancing theories to solve societal challenges.

Human-Computer Teaming

Human-computer teaming, a critical problem space for data-enabled research, is the efficient and effective integration of humans and complex machines. Effectively blending human and machine capabilities while accounting for the unique strengths and limitations of both will enable us to address complex problems, such as introducing autonomous vehicles to roadways, disaster recovery, and medical diagnostics.

Over the last 25 years, discoveries in cognitive neuroscience and technological advancements in machine learning have led to new insights into the underlying capacities needed to support effective human-computer teams and overcome the limited contextual knowledge, cognitive inflexibility, and opaqueness of AI and ML. Transforming intelligent machines from tools to teammates requires cognitive and computational models of beliefs, desires, intentionality, and capabilities. Our approach draws on the expertise of cognitive psychologists, device designers, human factors...
engineers, decision-making and risk-perception researchers, user experience researchers, and computer scientists. Each supplies unique insights into how humans work in team science and process design.

Many aspects of society can benefit from improvements in human-computer teaming. OU researchers are well-positioned to address these challenges, given the existing strengths and collaborations of AI and ML specialists and social scientists, cognitive and social psychologists, computer scientists, human factors engineers, and medical researchers, scientists, and engineers.

**Predictive Analytics**

Predictive analytics, the practice of analyzing and mining data and historical trends to make a prediction or find a solution, is empowering research, policies, and decisions that affect our daily lives. Predictive analytics is needed to solve some of the world’s most pressing problems.

OU researchers have expertise in creating tools and systems capable of extracting, assimilating, and analyzing data for accurate, timely, reliable forecasts and predictions with quantifiable uncertainty. Predictive analytics are already impacting our daily lives by transforming drug discovery, vaccine production, and enabling effective, personalized treatments and new pathways for the future of health. Furthermore, predictive analytics have led to earlier and more precise forecasts for the impact of various events. However, research is needed to identify and correct for some potential pitfalls of predictive analytics. Our goal is to develop analytics in such a way that we can be constantly correcting for unintended consequences or adverse implications.

OU centers and labs are conducting research at the forefront of predictive analytics, including industrial, health, atmospheric science, and business applications. One such center is the Energy Institute in the Price College of Business, which uses predictive analytics to assess the impact of risk on energy markets. Additionally, OU has multidisciplinary research teams developing predictive analytics to detect and deter the spread of medical misinformation. These teams bring science-based and social principles together with statistical and computational theories to develop new impactful and robust predictive analytics for many domains.

**Collaborative, Data-Driven, Discovery, and Decision-Making Environment; Visual Analytics**

The data revolution has led to a rapid increase in the rate at which systems generate and store data. Computers are better equipped and designed to process, store, and utilize large volumes of data than humans are. Combining human expertise with computational methods through interactive environments and visual analytics systems improves data-driven decision-making.

Recent advances in AI and deep learning have made it feasible to combine highly accurate and efficient ML outputs with human expertise to generate actionable insights for decision-making in domains such as cyber and aerospace security, disaster response, agriculture and community sustainability, and medical preparedness. Further, developing novel visual analytics systems that combine state-of-the-art AI and interactive techniques will be foundational to providing near
real-time decision-making environments in which users can rapidly identify complex patterns and actionable insights from massive amounts of data.

The design, development, and deployment of human-computer decision-support systems is an enabling technology for discovering new relationships and is relevant to all of OU’s strategic pillars. Innovative human-computer collaborative environments can expedite and improve situational awareness and decision-making related to public health crises, natural disasters, global security, environmental sustainability, and community outreach. One such project led by OU researchers has been the development of machine learning models to help doctors predict preeclampsia in pregnant women.

OU is well-positioned to provide innovative solutions for data-driven decision-making and visual analytics by leveraging the skills and expertise of leading interdisciplinary researchers in centers such as DISC, the Cognitive Science Research Center, and the Center for Cyber-Physical-Social Systems.

Scalable, High-Performance Software and Hardware Architectures

Cutting-edge AI and ML algorithms are computationally intensive and must process large quantities of data to perform well. The slow training and performance of AI and ML algorithms are attributable to large volumes of data necessary for learning and their increasing computational complexity. This challenge limits their wider use in real-time applications (e.g., self-driving cars). Interdisciplinary teams researching solutions to global grand challenges need scalable and elastic solutions powered by emerging computing architectures, cloud-based storage, and the processing of globally distributed data.

Neuromorphic computing, probabilistic computing, and quantum computing, all have the potential to transform our ability to create real-time, trustable AI and ML solutions. These new hardware architectures also require updated software architectures and pipelines for reliable, efficient execution that can scale to the ever-growing sea of data generated by evolving sensing technologies and platforms. The development of these new hardware and software architectures enables advances in AI and ML research. Specifically, these technologies would enable AI and ML systems to be used in situations where scalable, secure, and real-time processing is needed, such as pandemic response, object detection for cyber and aerospace defense, and route efficiency optimization.

At OU, we have research teams developing and applying these new approaches to power data-enabled science as they work to solve problems such as early detection and response to emerging infectious diseases; sub-surface carbon sequestration to create net-zero carbon energy and sustainable environmental solutions; improved maintenance and life-extension of critical defense aircrafts; improved medical treatments and strategies to reduce health disparity; digital preservation of cultural artifacts and understanding of ancient peoples and societies; and social justice and reduced disparity among communities. The ongoing, synergistic AI and ML research at OU seeks to solve today’s challenges using tomorrow's technologies.
DATA INSTITUTE FOR SOCIETAL CHALLENGES
HOW WE'RE GOING TO SUCCEED

MISSION
Empower transdisciplinary research and collaboration to drive convergent solutions to societal challenges in Oklahoma, the nation, and the world through data science research, tools, and capabilities.

VISION
OU is a nationally recognized leader for data science research and data-driven solutions to societal challenges.
STRATEGY 1

Develop, sustain, and grow a robust and transdisciplinary network of diverse OU researchers while enhancing research accessibility, quality, diversity, and competitiveness.

**TACTIC 1.1** Develop OU data science communities of practice. (Q1, 2021)

**TACTIC 1.2** Create an OU DISC membership model and increase the number of members in the DISC network. (Q1 2021)

**TACTIC 1.3** Develop and publish a newsletter containing upcoming funding information, DISC affiliate profiles, and publication announcements. (Start Q1 FY2021)

**TACTIC 1.4** Develop talent recruitment and retention pipeline for faculty, staff, postdocs, and students. (Q2 FY2021)

**TACTIC 1.5** Provide support for developing data science and data enabled research proposals. (START Q2 FY 2021)
STRATEGY 2

Establish relationships and partnerships with external researchers, scholars, and industry to address societal challenges using data science tools.

TACTIC 2.1 Develop a partnership plan to pursue external funding and collaborative research. (2021)

TACTIC 2.2 Establish a learning community and network with other similarly situated data science institutes at universities. (2021)

TACTIC 2.3 Create a guest speaker program. (2021)

TACTIC 2.4 Develop and submit a proposal for a Dream Course with external speakers on Data Science and Societal Transformation for Social Good. (2022)

TACTIC 2.5 Establish a process to support OU faculty grant proposal submissions with external partners as lead, co-lead, or subcontractors. (Start in 2021)

TACTIC 2.6 Create a program of events to engage public state agency leadership. (2022)

TACTIC 2.7 Establish a community and corporate affiliates program. (2022)

TACTIC 2.8 Establish named student data science scholarships funded by industry leaders and begin recruiting student DISC fellows. (2023)
STRATEGY 3

Build a growing and sustainable financial foundation that will support the institute’s operations and increase the amount and quality of data-enabled research at OU.

**TACTIC 3.1** Develop and implement a financial plan to ensure DISC sustainability and growth. (Q1 2021)

**TACTIC 3.2** Create a plan to lead federal funding applications in data science or data-enabled research per FY. (Q2 2021)

**TACTIC 3.3** Incubate federal funding applications in data science or data-enabled research per FY. (Q3 2021)

**TACTIC 3.4** Develop a seed funding program to grow data science research and data-enabled research initiatives. (Q3 2021)

**TACTIC 3.5** Create a corporate affiliates/partnership program. (Q4 2021)
STRATEGY 4

Partner with stakeholders across OU to identify, build, and provide the necessary data science capabilities and infrastructure to effectively lead and support data science research.

**TACTIC 4.1** Create a plan to identify relevant OU stakeholders with critical data science capabilities and infrastructure needs. (Q1 2021)

**TACTIC 4.2** Develop a marketing and communication initiative across all three campuses that highlights DISC capabilities. (Q2 2021)

**TACTIC 4.3** Create a data science capabilities support ecosystem across campus. (Q2 2021)

**TACTIC 4.4** Develop and grow OU stakeholder training in data analytics and data-enabled research techniques. (Q1 2022)
STRATEGY 5

Be nationally recognized as a leader in data science and data-enabled science by accelerating and advancing emerging research in data science, engineering, science, and creative activities driven by real-world applications.

**TACTIC 5.1** Develop and deploy an outreach and communication plan for DISC. (Q1 2021)

**TACTIC 5.2** Facilitate data-enabled research proposal team submissions covering important problems in each of the Research Strategic Framework verticals. (Q1 2021)

**TACTIC 5.3** Create a public events program. (Starting in Q2 2021)

**TACTIC 5.4** Establish and track metrics for OU recognition. (Q2 2021)

**TACTIC 5.5** Increase DISC student membership through involvement in data-enabled or data science research projects by 5% every year. (Q2 2021)

**TACTIC 5.6** Create an early career competitive travel grant program. (Q3 2021)

**TACTIC 5.7** Increase DISC member external research presence by 5% per year. (Q3 2021)

**TACTIC 5.8** Grow OU data science and data-enabled faculty by three faculty per FY. (Q4 2021)

**TACTIC 5.9** Create DISC undergraduate data science research program in collaboration with programs across campus. (Q1 2022)

**TACTIC 5.10** Increase OU recognition by 10% per 18 months starting in 2022.
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Thank you to the members of the strategic theme working groups for their help developing our areas of focus. Faculty interested in participating in the development of the implementation plan should contact the working group leads:

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Glossary

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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AGS</td>
<td>College of Atmospheric and Geographic Sciences</td>
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<td>CAS</td>
<td>College of Arts and Sciences</td>
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<td>OVPRP</td>
<td>Office of the Vice President for Research and Partnerships</td>
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