This report tells stories of research at Nebraska, where talented, creative people are making an impact on our world.

Nebraska researchers’ work is changing lives, creating new businesses, informing social policy, enlarging perceptions of the world, transforming institutions and providing students with intensive research experiences that prepare them for jobs of the future.

At Nebraska, our faculty is our greatest resource. Strategic hiring initiatives over the past few years have expanded the university’s expertise in high-impact areas and enhanced research infrastructure. Most exciting is a 24 percent increase in early career tenure-track faculty since 2012. They are our future, and it looks bright.

Leadership is another key resource. Danilo Pleseanu and Michael Boehm, two leaders who started new roles in January, are energizing the campus with their enthusiasm and experience. Pleseanu is executive vice chancellor and chief academic officer after serving as College of Business dean for more than six years. Boehm is Harlan Vice Chancellor for the Institute of Agriculture and Natural Resources and University of Nebraska vice president for Agriculture and Natural Resources, joining Nebraska from The Ohio State University.

This report covers a fraction of the innovative work that drives Nebraska’s research growth, with 2016 research expenditures totaling $295 million, and garners recognition and awards for creativity and scholarship.

Great things are happening at Nebraska, and we are confident that our continued pursuit of excellence and investment in faculty will sustain this momentum.
Some of Nebraska’s children, especially those at risk, lack adequate care from qualified adults. To help expand and strengthen the state’s early childhood workforce, the universitywide Buffett Early Childhood Institute tapped three campus experts to participate in a new, comprehensive statewide commission. Marjorie Kostelnik, a renowned education researcher and senior associate to University of Nebraska President Hank Bounds, co-chairs the Nebraska Early Childhood Workforce Commission. Beth Doll, interim dean of the College of Education and Human Sciences and professor of educational psychology, and Linda Boeckner, program leader with Nebraska Extension and professor of nutrition and health sciences, also participate. About 40 commission members represent government, higher education, public schools, child care, philanthropy, health care and business. The group is developing a statewide plan to address three urgent issues: caregiver and teacher shortages, training and education for early childhood professionals, and reducing workforce instability through better compensation.

Nebraska’s Center on Children, families and the Law is leading a long-term multidisciplinary project to strengthen the nation’s child welfare agency workforce and improve children’s lives.

To study and test promising strategies for recruiting and retaining child welfare workers, the center is receiving $15 million over five years from the U.S. Department of Health and Human Services’ Administration for Children and Families. The center has selected a small group of state, county and tribal child welfare agencies in urban and rural areas around the nation that are dealing with a range of workforce issues.

Consulting teams visit sites to assess each agency’s issues. Teams work with staff to develop and implement solutions, then test the strategies for effectiveness. The center will share results nationally.

The center, which specializes in research on workforce issues related to child welfare, is collaborating with three national child welfare consultants and researchers at the University of Colorado, Denver; the University of Louisville; and the University of Tennessee, Knoxville. The project draws on a range of expertise, from social work and human resources management to psychology and the law.

Consulting teams visit sites to assess each agency’s issues. Teams work with staff to develop and implement solutions, then test the strategies for effectiveness. The center will share results nationally.

The center, which specializes in research on workforce issues related to child welfare, is collaborating with three national child welfare consultants and researchers at the University of Colorado, Denver; the University of Louisville; and the University of Tennessee, Knoxville. The project draws on a range of expertise, from social work and human resources management to psychology and the law.

Public child welfare agencies are tasked with protecting children from neglect and abuse and with strengthening families who need assistance. The job can be emotionally taxing and complex. Difficult conditions and low pay lead to burnout.

The national turnover rate for child welfare jobs averages 20 percent but approaches 50 percent at some agencies, Graef said. In addition to high turnover, other workforce issues include insufficient supervision and difficulties in attracting and hiring good staff.

The center has selected a small group of state, county and tribal child welfare agencies in urban and rural areas around the nation that are dealing with a range of workforce issues.

The center has selected a small group of state, county and tribal child welfare agencies in urban and rural areas around the nation that are dealing with a range of workforce issues.

The center, which specializes in research on workforce issues related to child welfare, is collaborating with three national child welfare consultants and researchers at the University of Colorado, Denver; the University of Louisville; and the University of Tennessee, Knoxville. The project draws on a range of expertise, from social work and human resources management to psychology and the law.

Strengthening Child Welfare Workforce

Tending to the nation’s vulnerable children and families takes a toll. Staff turnover at child welfare agencies stands out at six times the national average across all jobs. Ultimately, it’s kids and families who suffer.

Public child welfare agencies are tasked with protecting children from neglect and abuse and with strengthening families who need assistance. The job can be emotionally taxing and complex. Difficult conditions and low pay lead to burnout.

The national turnover rate for child welfare jobs averages 20 percent but approaches 50 percent at some agencies, Graef said. In addition to high turnover, other workforce issues include insufficient supervision and difficulties in attracting and hiring good staff.

The center has selected a small group of state, county and tribal child welfare agencies in urban and rural areas around the nation that are dealing with a range of workforce issues.

The center, which specializes in research on workforce issues related to child welfare, is collaborating with three national child welfare consultants and researchers at the University of Colorado, Denver; the University of Louisville; and the University of Tennessee, Knoxville. The project draws on a range of expertise, from social work and human resources management to psychology and the law.

Educators Lead Way on Early Childhood Workforce Commission

Some of Nebraska’s children, especially those at risk, lack adequate care from qualified adults.

To help expand and strengthen the state’s early childhood workforce, the universitywide Buffett Early Childhood Institute tapped three campus experts to participate in a new, comprehensive statewide commission. Marjorie Kostelnik, a renowned education researcher and senior associate to University of Nebraska President Hank Bounds, co-chairs the Nebraska Early Childhood Workforce Commission. Beth Doll, interim dean of the College of Education and Human Sciences and professor of educational psychology, and Linda Boeckner, program leader with Nebraska Extension and professor of nutrition and health sciences, also participate. About 40 commission members represent government, higher education, public schools, child care, philanthropy, health care and business.

The group is developing a statewide plan to address three urgent issues: caregiver and teacher shortages, training and education for early childhood professionals, and reducing workforce instability through better compensation.
Ensuring Quality Child Care for Military Families

Child care is a worry for military families amid frequent moves and deployments, especially if they live off installation. Nebraska Extension leads a nationwide program to improve access to quality child care for military families living off base. To date, over 60,000 child care providers have participated, benefiting more than half a million children.

The Child Care and Youth Training and Technical Assistance Project delivers professional training to child care providers and distributes information about starting a child care business. Launched in 2010, it operates in 20 states with high numbers of off-base military families.

Tapping the nation’s extensive land-grant university extension network, the project employs a train-the-trainer model, providing extension staff with the skills to conduct workshops for child care providers who work in centers and in-home settings.

Extension staff also can use their knowledge to support providers in non-military settings that have limited child care options, such as rural communities. “Extension is uniquely positioned to do this work because we’re in every county in the country,” said project leader Kathleen Lodl, associate dean of Nebraska Extension.

In collaboration with Penn State Extension, certification-approved professional development curricula also are available online. Workshops and online content are free in targeted areas and publicly available elsewhere, improving child care nationally.

The U.S. Department of Defense Office of Family Readiness Policy and the U.S. Department of Agriculture’s National Institute of Food and Agriculture fund the project.
The Nebraska team found that a protein called NMO2 helps the fungus feed on nitrogen-based molecules and suppress the damage from reactive oxygen species. In doing so, the fungus avoids detection long enough to build up its forces in living rice cells before spreading to and destroying others. Plant pathologist Richard Wilson, recent doctoral graduate Margarita Marroquín-Guzman and colleagues concluded that the NMO2 gene also helps deploy so-called effector proteins that intercept the distress calls sent out by plant cells.

Rice has evolved genes to recognize effector-related damage and coordinate a counterattack. The team discovered that if the initial burst of reactive oxygen species is not suppressed, it can disrupt the accumulation of effectors and avert the infection even without support from the plant’s backup defenses. The finding could redirect existing efforts or stimulate new approaches to fighting blast disease in rice and other crops.

“That’s a novel observation because it moves the point at which you can prevent the infection higher up the chain, to the surface,” Wilson said. “That would conceivably enable you to develop more general approaches to breeding.”

The National Science Foundation and the U.S. Department of Agriculture’s National Institute of Food and Agriculture fund this research.
Improving Road and Railway Safety

Freight trains and trucks crisscrossing the Plains are a familiar sight. Less visible is what’s inside — some of that freight is hazardous. With shipping expected to increase nearly 50 percent by 2040, improving rail and truck transportation safety is critical.

Hazardous material transportation is just one focus of a five-year, multi-institutional program Nebraska is leading to improve transportation safety regionally and nationally.

The Mid-America Transportation Center, a consortium of academic institutions in Nebraska, Iowa, Missouri and Kansas, received $13 million from the U.S. Department of Transportation to develop tools and methods addressing a wide range of safety priorities, particularly in rural and underserved areas.

“The center isn’t just about conducting cutting-edge safety research, it’s also about implementing it,” said center director Laurence Rilett, Keith W. Nossemyer Chair in Engineering. “Our goal is to have a suite of products that promote safety and lead to measurable safety improvements.”

The program focuses on both preventing accidents and mitigating problems after accidents or natural disasters. For example, researchers are developing methods to monitor railroad and truck operators’ health and attentiveness in real time. They’re also developing crash barriers able to withstand freight trucks and prevent the turnovers that release material.

Flooding, another major regional issue, can scour out bridge foundations, causing collapses. Researchers are creating tools to identify and monitor vulnerable bridges and also to provide real-time diagnostics of a bridge’s condition following a flood.

Rural and tribal communities with limited resources are at particular risk from human-caused and natural disasters. The center is collaborating with these communities to develop disaster relief protocols and other strategies to improve their emergency response.

Other projects include communication tools to alert authorities when accidents occur, devices that monitor and relay workers’ hazardous material exposure to local medical facilities, and better bridge design guidelines.

These complex projects require multidisciplinary approaches. Over 40 researchers from five colleges are partnering with consortium colleagues. Partnerships also encompass numerous private- and public-sector entities, including the Nebraska Department of Transportation.

MATC, which serves as the Region 7 University Transportation Center, is one of 32 university transportation centers funded through the Fixing America’s Surface Transportation Act.
To help reduce single-vehicle crashes, Nebraska computer engineer Mehmet Can Vuran and his team, experts in barrier design, vehicular networking and vehicle automation, are developing cyber barriers that can talk to cars.

"Existing vehicle-to-vehicle technology cannot solve all run-off-road problems. We hope cyber barriers will bridge that gap," said Vuran, Susan J. Rosowski Associate Professor of Computer Science and Engineering.

Cyber barriers – both physical and virtual – will alert vehicles when they’re heading off course by sending speed, angle and road condition information to the car’s onboard computer. As vehicle technology advances, cars will one day use the information to take over vehicle control and avoid or mitigate accidents.

Rapid changes in speed and angles during a vehicle’s impending crash into a barrier make the work more challenging than communicating between vehicles, Vuran said. Quick decreases in communication distances affect wireless communication reliability. His team’s preliminary work has shown ways to maintain reliability under those conditions.

Avoiding an accident also depends on road and roadside conditions, such as whether they are pavement or gravel. Cyber barriers will need to store and send relevant information to vehicles so they can incorporate it in calculating the best split-second action to take.

Vuran and his team are in the early stages of finding answers to these challenges. They must ensure their solutions are compatible with existing and developing vehicle-to-vehicle technology. They are testing solutions in collaboration with the university’s Midwest Roadside Safety Facility.

As vehicle technology advances, upgrading roads and infrastructure to take advantage of new cars’ capabilities will be costly. Vuran envisions next-generation cyber barriers initially going up in crash hotspots. As barriers are built or maintained, replacing them with cyber barriers will become routine.
Food for Health Center Focuses on Gut Microbes

When you reach for that box of cereal in the morning, you’re feeding not just yourself, but the 100 trillion microbes living in your gut.

This complex gut microbiome—the collection of microorganisms residing in the digestive system—significantly influences your health, from supporting the immune system to contributing to diseases, such as obesity, diabetes, inflammatory bowel disease and even depression.

The university launched the Nebraska Food for Health Center to help prevent disease by developing foods with ingredients clinically proven to promote a healthy complement of bugs in your gut.

Combining Nebraska’s strengths in agriculture and medicine, this multi-disciplinary center creates a complete research pipeline, from identifying molecules in plant-based foods that support the gut microbiome to translating those discoveries into palatable, healthy foods.

“Uniting agriculture and medicine lets us think differently about agriculture. This new interface … holds tremendous potential to transform how we think about preventing and treating disease,” said center director Andrew Benson, W.W. Marshall Distinguished Professor of Biotechnology.

The center is the first to integrate large-scale agricultural research with biomedical and food science research to develop food products with ingredients clinically proven to promote a healthy complement of bugs in your gut.

The research takes advantage of the tremendous natural genetic diversity of crop plants. Instead of breeding for traits that increase yields, researchers target a unique trait: grains’ ability to affect the gut microbiome. These traits are ultimately validated in animal models and human clinical studies.

The center’s work advances several accomplishments that established Nebraska’s international reputation in the emerging gut microbiome field. Benson and colleagues found, for example, that diet exerts a stronger effect on the gut microbiome than individual genetics. Therefore, diet is the best tool available for manipulating the gut microbiome and influencing health.

The Raikes Foundation and the Bill & Melinda Gates Foundation contributed $5 million toward the center, headquartered at the Food Innovation Center on Nebraska Innovation Campus. Over the next five years, university funds and private donations will provide about $35 million to support this initiative.

The Nebraska Food for Health Center is collaborating with a pharmaceutical company to explore how manipulating microorganisms in the digestive tract could thwart metabolic-related diseases.

Nebraska microbiologist Amanda Ramer-Tait leads the center’s partnership with Ritter Pharmaceuticals. The company, which develops novel therapeutic products that modulate the human gut microbiome to treat gastrointestinal diseases, is supplying researchers with its patented prebiotic RP-G28. Beyond its known potential for combating lactose intolerance, the compound may guard against heart disease, stroke, diabetes and other health problems.

“We are grateful to Ritter Pharmaceuticals for providing RP-G28 so we can study how manipulation of the microbiome may impact metabolic syndrome,” said Ramer-Tait, Harold and Esther Edgerton Assistant Professor of Food Science and Technology. “There is great potential to take prebiotic-based gut microbiota modulators and explore how they may help human health.”

Ramer-Tait and collaborator Jens Walters, a former Nebraska researcher, have designed a new mouse model to evaluate the health benefits of RP-G28 and to study how gut bacteria respond to the prebiotic. The next step is translating the mouse study results into human feeding studies.

She received a $50,000 Young Investigator Grant for Probiotics Research award from the Global Probiotics Council to support this work.
Construction began in July on an 80,000-square-foot multi-tenant building to be completed in 2018. Plans include a business incubator that could house National Science Foundation I-CORPS teams, student startups and community startups. The idea is to create a one-stop shop for resources to support entrepreneurs’ success, including office space and access to mentoring and development programs, Duncan said. NIC is seeking potential partners and funders for this project.

Driving the state’s economic growth is a key goal of Innovation Campus. A recent Bureau of Business Research report showed that the annual economic impact from NIC business development and operations was $139.9 million in fiscal year 2016.

New partners in 2017 are expanding that economic growth. In July, Bolero Information Systems LLC became the first university staff spinoff company to join NIC. Bolero is a web application development and design company specializing in research administration and business process automation.

Adjuvance Technologies Inc., a biopharmaceutical company, announced plans in March to become the first tenant in the Biotech Connector, a research space that offers wet laboratory space for small- and medium-sized companies. Adjuvance holds a Phase II Small Business Innovation Research grant from the National Institutes of Health and will continue development of vaccine adjuvant products at NIC.

Enhancing the campus’ social and cultural vibe is The Mill Coffee & Bistro, a local favorite that opened its third location in June at NIC. Several NIC partners plan to expand in the coming year. Access to faculty expertise, student talent, and equipment and facilities has driven their rapid growth, Duncan said.

“We are moving forward rapidly. Nothing out here is stagnant,” Duncan said. “Even internationally, there is great interest in coming to Nebraska because of Innovation Campus.”
A universitywide commitment to providing a pipeline from the lab to the marketplace is paying off for the University of Nebraska system, named a leading U.S. institution for technology transfer.

A 2017 report from the Milken Institute, an independent economic think tank, ranked the system’s combined technology transfer efforts 35th among 225 institutions. NUtech Ventures and UNeMed are the technology transfer and commercialization affiliates for the University of Nebraska-Lincoln and the University of Nebraska Medical Center, respectively.

The institute’s top picks actively promote technology transfer and lead efforts to move innovative technologies into the marketplace to enhance economic growth. Rankings are based on data from the Association of University Technology Managers and reflect successes in patents issued, licenses issued, licensing income and startup formation.

“We’ve made it a priority across all our campuses to create a culture of innovation where bold and entrepreneurial thinking are encouraged,” said University of Nebraska President Hank Bounds.

One example is Virtual Incision Corp., a spinoff of research by Nebraska engineer Shane Farritor and UNMC surgeon Dmitry Oleynikov. Headquartered at Nebraska Innovation Campus, the growing company is developing a miniature robot for general abdominal surgery.

NUtech Ventures works closely with NIC and Industry Relations to commercialize faculty research, support faculty and staff startups, and advance partnerships between the university and industry.

“Nebraska innovation is changing lives,” Chancellor Ronnie Green said. “We are leaders in invention and enterprise, driven by the high-quality, relevant research from our faculty.”

Source: Bureau of Business Research. Figures represent fiscal year 2016, the most recent year for which information is available.

For artist Karen Kunc, moving to a rural acreage—with its 30-mile commute to her Lincoln studio—created an intimacy with the land and seasons that inspires her artwork.

“I love the graphic nature of our Brokeback farm,” said Kunc, Willa Cather Professor of Art.

Internationally renowned for her abstract woodblock prints, Kunc’s art conveys pride in her Nebraska roots, but also aims to provoke.

“I like the idea that our earth has been shaped by nature, by time, by weather forces and by mankind,” she said. “Of course, what we get to the mankind part, then we’re talking about issues we’re all concerned about.”

Beautiful and edgy in its contrasting shapes and forms, Kunc’s work challenges us to question how we live in the world and our role in shaping nature’s frame. It touches deeply personal emotions about often intense, politicized issues.

After 30 years of working with communities worldwide, Kunc now concentrates on expanding artist opportunities and opportunities in Nebraska, particularly in printmaking.

In 2013, she opened Constellation Studios in Lincoln to attract international print artists, support Nebraska and create a collaborative atmosphere important to equipment-heavy printmaking.

Kunc also coordinates the university’s Art at Center Point Bioregion initiative near Ogallala in western Nebraska. The interdisciplinary program promotes art and science through undergraduate art courses, artist residencies and community outreach. A new grant from the University of Nebraska’s Rural Futures Institute helps fund the program.

Kunc is committed to connecting her creative activities with all of Nebraska.

“I think the arts in Nebraska are an untapped resource, but it needs people to support it,” she said. “There are many creative people who want to work in their own environment and prove that art belongs there.”

Kunc has won numerous awards for her teaching and teaching, and her art has been exhibited in more than 300 galleries and public collections worldwide, including the Museum of Modern Art in New York.

But the project’s most crucial impact is the role it played in shuttering Whiteclay’s liquor stores. The report debuted at a time of mounting public pressure to close the stores. In April, the Nebraska Liquor Control Commission refused to renew their liquor licenses. Though a district judge overturned that decision, an appeal from the Nebraska Attorney General’s Office sustained the closures. In September 2017, the Nebraska Supreme Court rejected the store owners’ appeal to reopen, all but guaranteeing permanent closure.

Starita said his team helped drive this change by exposing the insidious relationship between Whiteclay and Pine Ridge.

“The students’ greatest accomplishment is that they did something to improve lives,” Starita said. “They should be most proud of that.”

Chris Bowling recalls his first visit to Whiteclay, Nebraska.

The senior Nebraska journalism student knew the town’s dark backstory. The 12-person village, dubbed the “skid row of the Plains,” neighbors South Dakota’s Pine Ridge Indian Reservation, where rates of poverty, domestic violence, murder, suicide and birth defects are among the nation’s highest. Whiteclay’s four liquor stores sold more than 42 million cans of beer over the past decade, fueling social decay.

“I was in disbelief that so much cultural destruction came from this one little area,” he said.

For two semesters, Bowling and 10 other undergraduates immersed themselves in shining a light on Whiteclay and Pine Ridge, ultimately producing a multimedia report, “The Wounds of Whiteclay: Nebraska’s Shameful Legacy,” with guidance from Nebraska journalism faculty Joe Starita and Rebekka Herrera Schlichting.

The online project captures diverse snapshots of life in this remote area, including a foster mother raising nine children with fetal alcohol spectrum disorder in a doublewide trailer, a 22-year-old Minnesotan ministering to Whiteclay’s street people and Nebraska’s first Native American state senator campaigning for office.

“Through photography, journalism students James Wooldridge and Jake Crandall captured life in Whiteclay, Nebraska.”

Joe Starita


But the project’s most crucial impact is the role it played in shuttering Whiteclay’s liquor stores. The report debuted at a time of mounting public pressure to close the stores. In April, the Nebraska Liquor Control Commission refused to renew their liquor licenses. Though a district judge overturned that decision, an appeal from the Nebraska Attorney General’s Office sustained the closures. In September 2017, the Nebraska Supreme Court rejected the store owners’ appeal to reopen, all but guaranteeing permanent closure.

Starita said his team helped drive this change by exposing the insidious relationship between Whiteclay and Pine Ridge.

“The students’ greatest accomplishment is that they did something to improve lives,” Starita said. “They should be most proud of that.”

Chris Bowling recalls his first visit to Whiteclay, Nebraska.

The senior Nebraska journalism student knew the town’s dark backstory. The 12-person village, dubbed the “skid row of the Plains,” neighbors South Dakota’s Pine Ridge Indian Reservation, where rates of poverty, domestic violence, murder, suicide and birth defects are among the nation’s highest. Whiteclay’s four liquor stores sold more than 42 million cans of beer over the past decade, fueling social decay.

“I was in disbelief that so much cultural destruction came from this one little area,” he said.

For two semesters, Bowling and 10 other undergraduates immersed themselves in shining a light on Whiteclay and Pine Ridge, ultimately producing a multimedia report, “The Wounds of Whiteclay: Nebraska’s Shameful Legacy,” with guidance from Nebraska journalism faculty Joe Starita and Rebekka Herrera Schlichting.

The online project captures diverse snapshots of life in this remote area, including a foster mother raising nine children with fetal alcohol spectrum disorder in a doublewide trailer, a 22-year-old Minnesotan ministering to Whiteclay’s street people and Nebraska’s first Native American state senator campaigning for office.

“Through photography, journalism students James Wooldridge and Jake Crandall captured life in Whiteclay, Nebraska.”

Joe Starita


But the project’s most crucial impact is the role it played in shuttering Whiteclay’s liquor stores. The report debuted at a time of mounting public pressure to close the stores. In April, the Nebraska Liquor Control Commission refused to renew their liquor licenses. Though a district judge overturned that decision, an appeal from the Nebraska Attorney General’s Office sustained the closures. In September 2017, the Nebraska Supreme Court rejected the store owners’ appeal to reopen, all but guaranteeing permanent closure.

Starita said his team helped drive this change by exposing the insidious relationship between Whiteclay and Pine Ridge.

“The students’ greatest accomplishment is that they did something to improve lives,” Starita said. “They should be most proud of that.”

Chris Bowling recalls his first visit to Whiteclay, Nebraska.

The senior Nebraska journalism student knew the town’s dark backstory. The 12-person village, dubbed the “skid row of the Plains,” neighbors South Dakota’s Pine Ridge Indian Reservation, where rates of poverty, domestic violence, murder, suicide and birth defects are among the nation’s highest. Whiteclay’s four liquor stores sold more than 42 million cans of beer over the past decade, fueling social decay.

“I was in disbelief that so much cultural destruction came from this one little area,” he said.

For two semesters, Bowling and 10 other undergraduates immersed themselves in shining a light on Whiteclay and Pine Ridge, ultimately producing a multimedia report, “The Wounds of Whiteclay: Nebraska’s Shameful Legacy,” with guidance from Nebraska journalism faculty Joe Starita and Rebekka Herrera Schlichting.

The online project captures diverse snapshots of life in this remote area, including a foster mother raising nine children with fetal alcohol spectrum disorder in a doublewide trailer, a 22-year-old Minnesotan ministering to Whiteclay’s street people and Nebraska’s first Native American state senator campaigning for office.

“Through photography, journalism students James Wooldridge and Jake Crandall captured life in Whiteclay, Nebraska.”

Joe Starita


But the project’s most crucial impact is the role it played in shuttering Whiteclay’s liquor stores. The report debuted at a time of mounting public pressure to close the stores. In April, the Nebraska Liquor Control Commission refused to renew their liquor licenses. Though a district judge overturned that decision, an appeal from the Nebraska Attorney General’s Office sustained the closures. In September 2017, the Nebraska Supreme Court rejected the store owners’ appeal to reopen, all but guaranteeing permanent closure.

Starita said his team helped drive this change by exposing the insidious relationship between Whiteclay and Pine Ridge.

“The students’ greatest accomplishment is that they did something to improve lives,” Starita said. “They should be most proud of that.”

Chris Bowling recalls his first visit to Whiteclay, Nebraska.

The senior Nebraska journalism student knew the town’s dark backstory. The 12-person village, dubbed the “skid row of the Plains,” neighbors South Dakota’s Pine Ridge Indian Reservation, where rates of poverty, domestic violence, murder, suicide and birth defects are among the nation’s highest. Whiteclay’s four liquor stores sold more than 42 million cans of beer over the past decade, fueling social decay.

“I was in disbelief that so much cultural destruction came from this one little area,” he said.

For two semesters, Bowling and 10 other undergraduates immersed themselves in shining a light on Whiteclay and Pine Ridge, ultimately producing a multimedia report, “The Wounds of Whiteclay: Nebraska’s Shameful Legacy,” with guidance from Nebraska journalism faculty Joe Starita and Rebekka Herrera Schlichting.

The online project captures diverse snapshots of life in this remote area, including a foster mother raising nine children with fetal alcohol spectrum disorder in a doublewide trailer, a 22-year-old Minnesotan ministering to Whiteclay’s street people and Nebraska’s first Native American state senator campaigning for office.

“Through photography, journalism students James Wooldridge and Jake Crandall captured life in Whiteclay, Nebraska.”

Joe Starita
In tests, the model correctly categorized novels 80 percent of the time, according to their likelihood of becoming a New York Times best-seller. From this, the “best-seller-ometer” was born. The algorithm scores books to differentiate between novels that sink or swim to the top.

The researchers identified roughly 2,800 characteristics that a computer can use to predict a manuscript’s potential to hit the best-seller list. The research is summarized in The Bestseller Code, a book that sheds light on key ingredients of literary blockbusters.

“The primary distinguishing feature is human closeness,” said Jockers, Susan J. Rosowski Associate Professor of English and associate dean for research and partnerships in the College of Arts and Sciences. “Closeness” refers not to sexual intimacy, he said, but to the everyday, meaningful interactions between people. Other recurring traits are colloquialisms, active and determined characters, and plots with a steady rhythm of highs and lows.

To develop the algorithm, the researchers harnessed the power of Tusker, a supercomputer at the university’s Holland Computing Center, to analyze thousands of books and analyze their traits using artificial intelligence. But that’s just what Nebraska researcher Matt Jockers pulled off with collaborator Jade Archer, a former acquisitions editor for Penguin Books UK. Their work, a blend of computing and the humanities, produced a predictive algorithm capable of forecasting a manuscript’s potential to hit the best-seller list.

Jockers is the primary researcher and leads the Nebraska team. Archer is the project’s co-principal investigator. She’s known for her academic and professional contributions to the book industry. Together, they’re working to develop new tools and methods to help writers find a market for their work.

Speaking to a sold-out crowd of 170 university and community members, they emphasized the importance of meeting the challenges of a society in rapid transformation. Students must learn to not only use cutting-edge storytelling technologies — such as artificial intelligence, game engines and virtual production — but also to help shape the future of storytelling.

“About 60 percent of the jobs that our graduates will be doing haven't been invented yet,” Elliott said. “So we want to help students develop resilient and adaptive mindsets and skill sets so they can flourish in a time of constant change.”

The Carson Center interdisciplinary program will include storytelling, creative coding, virtual production and entrepreneurship. The facility will offer design labs, studios and virtual reality technologies. It is establishing strong industry collaborations to ensure graduates have the necessary skills and internship opportunities and to attract leading experts to instruct and mentor students.

The program aims to offer coursework that fosters collaboration among students from many disciplines and to become a community resource in digital communication.

The center is a $57 million university investment made possible by a $20 million gift from the Johnny Carson Foundation, named in honor of the late entertainment icon and Nebraska alumnus. The center is a $57 million university investment made possible by a $20 million gift from the Johnny Carson Foundation, named in honor of the late entertainment icon and Nebraska alumnus. The center is a $57 million university investment made possible by a $20 million gift from the Johnny Carson Foundation, named in honor of the late entertainment icon and Nebraska alumnus. The center is a $57 million university investment made possible by a $20 million gift from the Johnny Carson Foundation, named in honor of the late entertainment icon and Nebraska alumnus.
We started from scratch. When we first went (to Zambia) in 1997, we thought, ‘How do you do research when there’s no infrastructure?’” said Wood, the Lewis Lehr/3M University Professor of Biological Sciences and director of the Nebraska Center for Virology.

He and a Zambian colleague began the arduous process of building a fully functional research and clinical facility in the capital, Lusaka, where patients receive free treatment. They also began training personnel, offering specialized instruction and educating Zambian graduate and postgraduate students at Nebraska. Today, this new generation of researchers is preparing to lead the way, ensuring the program’s sustainability.

Wood’s team found immunosuppression caused by HIV is a risk factor for acquiring the virus that causes Kaposi’s. The virus is endemic, infecting about half of all Zambians, but jumps to over 70 percent in those with HIV, including infants.

Researchers learned that mothers and other household members pass the Kaposi’s virus to babies through saliva, but treating HIV-infected newborns with antiretroviral drugs dramatically reduces infection risk. Staff educate patients on reducing transmission and work with the Zambian government on reduction and other public health measures.

Wood’s team continues studying many aspects of HIV and related diseases. The researchers also have begun developing research and clinical facilities in neighboring Tanzania.

When Charles Wood learned Zambian children commonly suffer from Kaposi’s sarcoma, a rare skin cancer associated primarily with AIDS in adults, he decided to learn why and do something.

Twenty years later, the Nebraska virologist has made important discoveries about how children contract the Kaposi’s virus and has developed public health intervention strategies to prevent the disease.

Wood and colleagues built an internationally recognized research and clinical laboratory in Zambia that will continue important research on HIV/AIDS and associated diseases in the future.

Because people with HIV are living longer on new drugs, secondary diseases, like Kaposi’s, are getting more attention. Wood’s early research focus and strong collaborations in Zambia put Nebraska at the forefront of research on HIV and related diseases.

The National Institutes of Health’s Fogarty International Center and the National Cancer Institute provided significant funding for this research and capacity building in Zambia.

“HIV and other viruses, like Zika, even the flu, are global. They travel and affect the U.S.,” Wood said.

Building capacity in foreign countries helps researchers better understand diseases and halt their spread.

“It’s really a no-brainer.”

Pioneering Work in Global AIDS Fight

Charles Wood (center) and virologists Salum Lidenge, Eun Hee Kwon, Danielle Shea, Lisa Poppe, John West, Godefroid Musema and Dongmei Li

Wood and colleagues built an internationally recognized research and clinical laboratory in Zambia that will continue important research on HIV/AIDS and associated diseases in the future.

When Charles Wood learned Zambian children commonly suffer from Kaposi’s sarcoma, a rare skin cancer associated primarily with AIDS in adults, he decided to learn why and do something.

Twenty years later, the Nebraska virologist has made important discoveries about how children contract the Kaposi’s virus and has developed public health intervention strategies to prevent the disease.

Wood and colleagues built an internationally recognized research and clinical laboratory in Zambia that will continue important research on HIV/AIDS and associated diseases in the future.

Because people with HIV are living longer on new drugs, secondary diseases, like Kaposi’s, are getting more attention. Wood’s early research focus and strong collaborations in Zambia put Nebraska at the forefront of research on HIV and related diseases.

The National Institutes of Health’s Fogarty International Center and the National Cancer Institute provided significant funding for this research and capacity building in Zambia.

“HIV and other viruses, like Zika, even the flu, are global. They travel and affect the U.S.,” Wood said.

Building capacity in foreign countries helps researchers better understand diseases and halt their spread.

“It’s really a no-brainer.”
Unraveling Biomolecular Communication

As with any successful team effort, the human body’s cells must communicate effectively to function properly. Miscommunication within or between cells leads to complex diseases such as cancer, diabetes and chronic liver diseases.

The university created the Nebraska Center for Integrated Biomolecular Communication, or NCIBC, to better understand how cells communicate and the role miscommunication plays in complex diseases.

The center fosters a systems approach, which combines research by chemists, biochemists, engineers and bioinformaticists and includes faculty development and research infrastructure.

The center promotes interdisciplinary research collaborations, merging new techniques with investigating disease pathways that arise from miscommunication at the molecular level.

“Once upon a time, the thought of a colonoscopy evokes dread. It’s invasive. It’s uncomfortable. And it’s pricey, costing several thousand dollars. Nebraska researchers aim to change that. They hope that replacing the traditional colonoscopy with a more patient-friendly robotic device encourages more people to have the procedure, considered the Cadillac of colonoscopy screenings. The disease is the second-leading cause of cancer-related deaths in the U.S.

Communication, or NCIBC, to better understand how cells communicate and the role miscommunication plays in diseases.

The university created the Nebraska Center for Integrated Biomolecular Communication, or NCIBC, to better understand how cells communicate and the role miscommunication plays in complex diseases.

“Once upon a time, the thought of a colonoscopy evokes dread. It’s invasive. It’s uncomfortable. And it’s pricey, costing several thousand dollars. Nebraska researchers aim to change that. They hope that replacing the traditional colonoscopy with a more patient-friendly robotic device encourages more people to have the procedure, considered the Cadillac of colonoscopy screenings. The disease is the second-leading cause of cancer-related deaths in the U.S.

As with any successful team effort, the human body’s cells must communicate effectively to function properly. Miscommunication within or between cells leads to complex diseases such as cancer, diabetes and chronic liver diseases.

The university created the Nebraska Center for Integrated Biomolecular Communication, or NCIBC, to better understand how cells communicate and the role miscommunication plays in complex diseases.
Targeting E. coli’s Threat to Food Safety

The U.S. beef industry – and the public – are benefiting from a major Nebraska-led effort to improve food safety.

The multi-institutional research and outreach project, launched in 2012, is reducing the public’s risk from Shiga toxin-producing E. coli, or STEC, in the nation’s beef supply. The broad-ranging project has produced detection, intervention and food safety education techniques to minimize STEC contamination in the supply chain and improve food safety.

Illness from STEC should decline as the beef industry and public adopt these methods, said project director Rodney Moxley, Charles Beney Professor in Veterinary Medicine and Biomedical Sciences.

STEC organisms are harbored by cattle and may enter beef during harvest. Other foods, such as lettuce, can become contaminated by cattle feces or undercooked beef. Most infections resolve themselves, but serious, sometimes fatal, complications can occur. The U.S. Department of Agriculture estimates that STEC-related illnesses cost the U.S. economy about $500 million annually.

The federal government regulates seven STEC strains as adulterants in raw beef, but controlling the bacteria is challenging. The USDA selected Nebraska to lead a $25 million Coordinated Agricultural Project to tackle the complex issue on multiple fronts. More than 50 researchers at 18 institutions have collaborated. The project is expected to be extended five years beyond its scheduled 2017 completion.

“Nebraska has the highest number of cattle on feed in the country,” Moxley said. “We have the expertise, the cattle industry and the connections to put together a huge team.”

Researchers have developed detection methods to better identify contaminants before they lead to food recalls or illnesses. Two rapid screening techniques, both based on detecting DNA or other molecules unique to toxic strains, offer significant advances over current methods, Moxley said.

Other studies have elucidated STEC biology, baseline contamination levels and STEC proliferation. Researchers also have improved surveillance methods, developed intervention strategies for meatpacking plants and investigated food-handling practices.

The project also targeted education and outreach, helping to train a new generation of food safety researchers and specialists. It provided over 100 internships for students, including those from minority-serving institutions, and developed educational materials for K-12 students and the public, among other activities.

Researchers Dustin Loy and student Chloe Buzz from Nebraska’s Veterinary Diagnostic Center MALDI-TOF sample plate

Researchers have developed detection methods to better identify contaminants before they lead to food recalls or illnesses. Two rapid screening techniques, both based on detecting DNA or other molecules unique to toxic strains, offer significant advances over current methods, Moxley said.

Other studies have elucidated STEC biology, baseline contamination levels and STEC proliferation. Researchers also have improved surveillance methods, developed intervention strategies for meatpacking plants and investigated food-handling practices.

The project also targeted education and outreach, helping to train a new generation of food safety researchers and specialists. It provided over 100 internships for students, including those from minority-serving institutions, and developed educational materials for K-12 students and the public, among other activities.

Researchers have developed detection methods to better identify contaminants before they lead to food recalls or illnesses. Two rapid screening techniques, both based on detecting DNA or other molecules unique to toxic strains, offer significant advances over current methods, Moxley said.

Other studies have elucidated STEC biology, baseline contamination levels and STEC proliferation. Researchers also have improved surveillance methods, developed intervention strategies for meatpacking plants and investigated food-handling practices.

The project also targeted education and outreach, helping to train a new generation of food safety researchers and specialists. It provided over 100 internships for students, including those from minority-serving institutions, and developed educational materials for K-12 students and the public, among other activities.

Researchers have developed detection methods to better identify contaminants before they lead to food recalls or illnesses. Two rapid screening techniques, both based on detecting DNA or other molecules unique to toxic strains, offer significant advances over current methods, Moxley said.

Other studies have elucidated STEC biology, baseline contamination levels and STEC proliferation. Researchers also have improved surveillance methods, developed intervention strategies for meatpacking plants and investigated food-handling practices.

The project also targeted education and outreach, helping to train a new generation of food safety researchers and specialists. It provided over 100 internships for students, including those from minority-serving institutions, and developed educational materials for K-12 students and the public, among other activities.
Nebraska researchers are solving today’s complex challenges with Faculty Early Career Development Program awards from the National Science Foundation. These prestigious five-year awards support promising pre-tenure faculty. Recent winners are investigating K-12 math curricula and computer network visualization tools.

Supporting Future Math Teachers

While developing math curricula requires much research attention, little effort goes toward helping K-12 math teachers use textbooks effectively. Nebraska education researcher Lorraine Males received a $630,000 CAREER award to support future teachers in employing math curricula. Males studies how teachers currently approach textbooks. She will use the results to develop teacher education materials for college-level courses, with the goal of better preparing students for teaching positions.

Males’ team is interviewing Nebraska teachers as they actively plan a classroom lesson to understand their rationale as they move through the planning process. Males also uses eye-tracking technology, which monitors eye movements, to observe how teachers visually approach the material.

From this research, Males will develop collegial instructional materials. To evaluate effectiveness, her team will follow up with former students as they begin their teaching careers. She plans to make the materials available nationally.

Expanding Network Visualization Capabilities

Solving a mystery usually involves understanding connections. Nebraska computer scientist Hongfeng Yu received nearly $477,000 to expand network visualization capabilities that could help crack complex scientific puzzles.

Yu is creating software that allows users to visualize and explore billions, even trillions, of interconnected entities. Expanding that capability has diverse applications, from better understanding gene regulation networks to improving supercomputing speeds and investigating large social networks. These advancements could lead to better disease treatments, climate change mitigation and improved disease-spread tracking, among many other applications.

Yu is developing techniques to identify, extract and organize information from within densely interconnected large graphs. Preprocessing information allows users greater manipulation and visualization options. Nebraska’s Holland Computing Center facilitates his research.

MicroRNA Discovery

Nebraska biologists recently discovered an important component plants need to make microRNAs, tiny molecules critical in regulating gene expression. Despite their vital role, microRNAs are little understood. Bin Yu and colleagues discovered a protein that plays a role in the early stages of microRNA creation. Uncovering new clues into understanding how crops respond to droughts and other stressors. The protein is found in humans and other organisms; so these findings may help elucidate microRNA processes from plants to humans. There is potential for applications in crop improvement.

Yu discovered a protein that plays a role in the early stages of microRNA creation. Uncovering new clues into understanding how crops respond to droughts and other stressors. The protein is found in humans and other organisms; so these findings may help elucidate microRNA processes from plants to humans. There is potential for applications in crop improvement.

Finding Clues to Alcohol Tolerance

Using modern molecular genetic techniques, Nebraska biologist Krist Mon tochto and colleagues refuted a long-held theory about how fruit flies developed a high alcohol tolerance. More than two decades ago, scientists hypothesized that an adaptive change in the fly’s alcohol dehydrogenase protein – an enzyme that breaks down alcohol – enabled them to colonize alcohol-rich habitats. But Mon tochto’s team used genetic engineering to resurrect the protein from fruit fly, ancestral species and found that changes in the protein did not improve alcohol tolerance. This trait must be due to other genes, Montochto said. Identifying these key pathways in fruit flies may offer clues about human alcohol tolerance. Findings also show that understanding molecular evolution remains more than just interesting science; scientists must test how changes actually function in an organism. The study, founded partly by the National Science Foundation and the National Institutes of Health, appeared in Nature Ecology and Evolution.

Expanding Beetle Nanostructure Knowledge

Nebraska biologist Krist Mon tochto and colleagues refuted a long-held theory about how fruit flies developed a high alcohol tolerance. More than two decades ago, scientists hypothesized that an adaptive change in the fly’s alcohol dehydrogenase protein – an enzyme that breaks down alcohol – enabled them to colonize alcohol-rich habitats. But Mon tochto’s team used genetic engineering to resurrect the protein from fruit fly, ancestral species and found that changes in the protein did not improve alcohol tolerance. This trait must be due to other genes, Montochto said. Identifying these key pathways in fruit flies may offer clues about human alcohol tolerance. Findings also show that understanding molecular evolution remains more than just interesting science; scientists must test how changes actually function in an organism. The study, founded partly by the National Science Foundation and the National Institutes of Health, appeared in Nature Ecology and Evolution.

Nanocrystals are tinier, lighter, harder materials that should weigh them down but actually is surprisingly light. Better understanding these nanocrystal properties could help scientists engineer lighter, stronger materials. Involving new technology and collaborative research, the National Science Foundation helped fund this research.

Research Highlights

Biology

MicroRNA Discovery

Nebraska biologists recently discovered an important component plants need to make microRNAs, tiny molecules critical in regulating gene expression. Despite their vital role, microRNAs are little understood. Bin Yu and colleagues discovered a protein that plays a role in the early stages of microRNA creation. Uncovering new clues into understanding how crops respond to droughts and other stressors. The protein is found in humans and other organisms; so these findings may help elucidate microRNA processes from plants to humans. There is potential for applications in crop improvement.

Finding Clues to Alcohol Tolerance

Using modern molecular genetic techniques, Nebraska biologist Krist Mon tochto and colleagues refuted a long-held theory about how fruit flies developed a high alcohol tolerance. More than two decades ago, scientists hypothesized that an adaptive change in the fly’s alcohol dehydrogenase protein – an enzyme that breaks down alcohol – enabled them to colonize alcohol-rich habitats. But Mon tochto’s team used genetic engineering to resurrect the protein from fruit fly, ancestral species and found that changes in the protein did not improve alcohol tolerance. This trait must be due to other genes, Montochto said. Identifying these key pathways in fruit flies may offer clues about human alcohol tolerance. Findings also show that understanding molecular evolution remains more than just interesting science; scientists must test how changes actually function in an organism. The study, founded partly by the National Science Foundation and the National Institutes of Health, appeared in Nature Ecology and Evolution.

Materials Science

Nanocrystals are tinier, lighter, harder materials that should weigh them down but actually is surprisingly light. Better understanding these nanocrystal properties could help scientists engineer lighter, stronger materials. Involving new technology and collaborative research, the National Science Foundation helped fund this research.

Future Nanomaterials

By understanding and exploiting nanotechnology, the Nebraska team's findings were featured on the cover of Advanced Functional Materials. The Air Force Office of Scientific Research’s Multidisciplinary University Research Initiative funded this research.

Beetle Shells

Beetles were a study error that should weigh them down. Instead, their shells are surprisingly light. Better understanding these nanocrystal properties could help scientists engineer lighter, stronger materials. Nebraska and materials engineer Ruping Yang collaborated with experts to understand the microstructure in the common beetle's exoskeleton. Their technique can be used on other beetles and hard-shelled creatures and might extend to artificial materials with unique structures. Comparing beetles with differing demands on their exoskeletons, such as defending against predators, could lead to evolutionary insights and a better understanding of relationships between structural features and properties. The Nebraska team's findings were featured on the cover of Advanced Functional Materials. The Air Force Office of Scientific Research’s Multidisciplinary University Research Initiative funded this research.
Partnering on Drone Journalism Training Nebraska’s Drone Journalism Lab at the College of Journalism and Mass Communications is a partner in an innovative program to train journalists in using drones for news coverage. The project included three-day workshops in 2016 covering safe drone operation, basic practices in drone journalism, legal and ethical issues with hands-on flight practice, and information to study for Federal Aviation Administration drone certification. Online training is available at The Poynter Institute’s News University. The program is a partnership with Poynter, Google News Lab, Drone Journalism Alliance, National Press Photographers Association and Drone Racing League leader DJI. University of Georgia, Syracuse University, University of Missouri-Columbia and University of Oregon hosted workshop shops. The nationwide training expands on the 2015 drone journalism training in Nebraska, which drew 62 national journalists and journalism educators. Nebraska professor of practice Matt Wolfe launched the Drone Journalism Lab in 2011.

Charting Learn of Cuss Variations Researchers from Nebraska’s Center for Digital Research in the Humanities are identifying and understanding variations among the first editions of Walt Whitman’s seminal work, Leaves of Grass. With a $300,000 grant from the National Endowment for the Humanities, Kenneth Price, Hillegass Professor of American Literature and Center co-director, and colleagues are examining at least 20 copies of the original 1855 edition of the book, recording and providing a background on each variation. The team will develop a digital variorum—a collection containing different versions of the text as well as Whitman’s earlier manuscripts connected to sources of Grass—as part of the online Walt Whitman Archive. The project’s aim is to make the text accessible to a wide audience as possible.

Targeting Nebraska’s Legal Needs Some Nebraska communities lack a sufficient number of attorneys who will practice law in the state, Nebraska College of Law dean and Richard and Linda Woldon Professor of Law, Richard Moberly, said. “Some Nebraska communities lack a sufficient number of attorneys who will practice law in the state,” said Richard Moberly, Nebraska College of Law dean and Richard and Linda Woldon Professor of Law. To strengthen the state’s legal options, Nebraska leads an international effort to increase wheat yields and help feed a growing global population. The project aims to develop hybrid wheat lines that boost yields and climate resilience through breeding. “With new genetic and chemical tools available … we think the time is right to attempt to create a viable hybrid wheat market again,” said agronomist Stephen Baenziger, Nebraska Wheat Growers Presidential Chair, who leads the project. Plans include developing a public foundation for hybrid wheat research and creating hybrid seed on a commercial scale. Collaborators include Texas A&M University, Kansas State University and the International Maize and Wheat Improvement Center (CIMMYT). The U.S. Department of Agriculture’s National Institute of Food and Agriculture funds this three-year project. It’s part of the U.S. contribution to the International Wheat Yield Partnership, a consortium of public and private partners.

Heart-reactive T-cells’ Role in Myocarditis Heart failure, a leading cause of death, can originate with a virus. But the body’s own immune system sometimes plays a role by attacking heart tissue after the virus is gone. The autoimmune response begins when a virus damages cells, releasing their internal components. Nebraska immunologist Jay Reddy has pinpointed a component that appears to be a target for certain T-cells, front-line defenders against invaders. The T-cells mistake the newly exposed protein as foreign, and the reaction triggers heart inflammation, or myocarditis. The discovery could lead to better diagnosing and treating myocarditis by targeting heart-reactive T-cells, while sparing the rest of the immune system. Reddy worked with a large multidisciplinary Nebraska team that published its findings in The American Journal of Pathology.

Neonatal Exchange Program in Nebraska growing in rural areas. The study assessed these programs in rural and urban areas. The study assessed these programs in rural and urban areas. The study assessed these programs in rural and urban areas. In rural areas, the programs were being used to exchange programs reduce disease transmission by providing clean injection supplies and education, sociologists in Nebraska’s Research, Evaluation and Analysis for Community Health Lab found access to such programs may be limited in rural areas. The study assessed these programs in rural and urban areas. To strengthen the state’s legal options, Nebraska leads an international effort to increase wheat yields and help feed a growing global population. The project aims to develop hybrid wheat lines that boost yields and climate resilience through breeding. “With new genetic and chemical tools available … we think the time is right to attempt to create a viable hybrid wheat market again,” said agronomist Stephen Baenziger, Nebraska Wheat Growers Presidential Chair, who leads the project. Plans include developing a public foundation for hybrid wheat research and creating hybrid seed on a commercial scale. Collaborators include Texas A&M University, Kansas State University and the International Maize and Wheat Improvement Center (CIMMYT). The U.S. Department of Agriculture’s National Institute of Food and Agriculture funds this three-year project. It’s part of the U.S. contribution to the International Wheat Yield Partnership, a consortium of public and private partners.

Nebraska Leads Hybrid Wheat Project Nebraska leads an international effort to increase wheat yields and help feed a growing global population. The project aims to develop hybrid wheat lines that boost yields and climate resilience through breeding. “With new genetic and chemical tools available … we think the time is right to attempt to create a viable hybrid wheat market again,” said agronomist Stephen Baenziger, Nebraska Wheat Growers Presidential Chair, who leads the project. Plans include developing a public foundation for hybrid wheat research and creating hybrid seed on a commercial scale. Collaborators include Texas A&M University, Kansas State University and the International Maize and Wheat Improvement Center (CIMMYT). The U.S. Department of Agriculture’s National Institute of Food and Agriculture funds this three-year project. It’s part of the U.S. contribution to the International Wheat Yield Partnership, a consortium of public and private partners.
RESEARCH HIGHLIGHTS

Nebraska Researchers Among the Most Connected

Nebraska political scientists John Hibbing and Kevin Smith ranked among the top 20 most connected political science authors in the world, according to research published in the journal PS: Political Science and Politics. Using social network analysis, the study’s German authors assessed more than 67,000 articles from four leading journals to rank more than 300,000 authors and assign each to one of three categories — researchers, teacher-scholars, and textbook authors. Hibbing and Smith were in the top 20 in the researcher category.

Using social network analysis, the study’s German authors assessed more than 67,000 articles from four leading journals to rank more than 300,000 authors and assign each to one of three categories — researchers, teacher-scholars, and textbook authors. Hibbing and Smith were in the top 20 in the researcher category.

Doctoral Program Links Big Data, Life Sciences

Technological advances in the sciences research require dealing with massive amounts of data. To gain future leaders in data science, Nebraska established a new doctoral program that provides the skills and experience to answer questions only big data can handle. The Complex Biosystems program assembles more than 150 faculty from across four colleges to train students in acquiring, evaluating and analyzing big data. This highly interdisciplinary program exposes students to five specializations, encompassing a range of quantitative approaches and life sciences — from mathematical models and algorithms to immunological and microbiome interactions. The program director is Jennifer Clarke, head of the Quantitative Life Sciences Initiative. The first students graduated in 2017.

Understanding Girls’ Attitudes Toward Science

Gender norms, stereotypes and friendships all play a role in curbing middle school girls’ interest in science, a team of Nebraska sociologists found. A survey of 444 middle school students showed girls and boys had similar comprehension and grades in science. When asked about their friends, both genders were more likely to consider boys as a “science kind of person.” Yet when asked to consider whether that label applied to themselves, both genders answered similarly, indicating that social perceptions about gender influence girls’ career choices. The survey found that girls interested in science are more likely to have close friendships with like-minded girls. The study suggests educators can use inclusive science curricula, presentations from diverse scientists and lessons relating science to students’ everyday interests to encourage girls’ interest in science. The team, led by sociologists Patricia Wonch Hill and Robert Gauthier, published its findings in Sociological Sciences. The National Institutes of Health funded this research.

Charting Photobiological Responses to Neighborhood Environment

Does a cracked sidewalk, broken window or graffiti make a neighborhood feel less safe? An interdisciplinary Nebraska team aims to find out using sensory assessment tools that measure pedestrians’ physiological responses to environmental conditions. The research provides evidence-based data of perception to augment traditional methods of visual audits and surveys. Construction engineer Changhun Ahn and community and regional planner Yunmoo Nam are teaming for the National Science Foundation-funded project. In the study, GPS-enabled smartphones are synced to motion sensors attached to participants that record physiological data and monitor alarm conditions. Ultimately, researchers plan to make recommendations for safer, more walkable neighborhoods.

Building Trust in Government

Citizens who feel they have gained knowledge about government institutions may be more likely to trust those institutions, according to a University of Nebraska Public Policy Center research. Trust may grow when people perceive they know more, regardless of whether they actually do. Nebraska psychologists, led by Lisa Putik Zillig, gave one group of people specific information about water regulatory agencies. Another group learned about a different agency. Though both groups showed increasing trust in water agencies, members of the first group perceived that they knew more about the agencies and their trust in them was less likely to be affected by overall trust in government. Results suggest institutions can build trust by communicating effectively, building familiarity and treating people fairly. But personality still matters. A person’s natural inclination to trust or mistrust plays a significant role. The National Science Foundation-funded study was published in PLOS One.

RESOURCES AT NEBRASKA 2016-2017 REPORT
Leadership

Bohm, Plessow Lead UNL, Chief Academic Roles
Chancellor Ronnie Green filled key leadership positions during his first year at the helm. Michael Leininger, dean of arts and sciences, and Tim Taylor, dean of agriculture, have begun their terms, and a new research building will wrap up in August and doors open for the fall semester. The growing college has 4,200 students, 117 faculty and 65 staff members, with an additional 1,500 students taking courses to complete business minors.

SEC Leaders Boost Tax Compliance
Compliance Committee chair Michael Leininger, chairman of the Chemistry Department, said that students, faculty and staff are encouraged to do their part to ensure that the university complies with tax laws. The committee is responsible for ensuring that the university complies with tax laws and regulations and that the university operates in a way that is consistent with its mission and values. The committee also oversees the university's financial reporting and tax compliance policies and procedures.

Bohm in Hunter Vieck Chair for the Institute of Agriculture and Natural Resources and University of Nebraska-Nebraska Cooperative Extension for Agriculture and Natural Resources, titles remain proudly held by Green. In addition to leading agriculture programs and outreach, he directs the University of Nebraska Institute for Food Science and Technology, the Doane Water for Global Food Institute and the Nebraska College of Technical Agriculture. Bohm began at The Ohio State University, where he was also vice president for academic and strategic planning and a professor of plant pathology.

RESEARCH HIGHLIGHTS

Five Faculty Named AAAS Fellows
Patrick Dussault, Mary Anne Holmes, Gary Pickard, Ronnie Green, and Shane Farritor were named by the American Association for the Advancement of Science as Fellows in 2017.

Pat Dussault, Charles Bessey Professor of Chemistry, was recognized for contributions to the chemistry of organic peroxides.

Mary Holmes, emeritus professor of earth and atmospheric sciences, was honored for contributions to combating gender inequity in the advancement of women in science.

Gary Pickard, professor of Chemistry, was recognized for contributions to the chemistry of organometallics.

Ronnie Green, Omtvedt Professor of Animal Science, was recognized for contributions to research on plant lipid metabolism aimed at improving the nutritional and industrial value of crops.

Shane Farritor, associate professor of agricultural and biological engineering, was selected for contributions to research on plant lipid metabolism aimed at improving the nutritional and industrial value of crops.

ACCOLADES

Five Nebraska faculty received the 2017-2018 Corn屿dong U.S. Scholar grants from the Council for International Exchange of Scholars. In South Africa, Drama and theatre associate professor of history and ethnic studies, was selected for contributions to research on plant lipid metabolism aimed at improving the nutritional and industrial value of crops. In South Africa, Drama and theatre associate professor of history and ethnic studies, was selected for contributions to research on plant lipid metabolism aimed at improving the nutritional and industrial value of crops.
NEBRASKA RESEARCH AT A GLANCE

30% NITROGEN FIXATION
23% R.E. DEPARTMENT OF AGRICULTURE
17% NATIONAL INSTITUTE OF HEALTH
8% DOD
5% TRANSPORTATION
4% USDA
3% DTRA
2% EPA
2% DOD

25,897 STUDENTS

1,378 SPONSORED AWARDS

29% INCREASE IN RESEARCH EXPENDITURES OVER THE PAST 10 YEARS

$295M TOTAL RESEARCH EXPENDITURES FY 2016

1,720 RESEARCHERS

1M SQUARE FEET OF SPACE FOR RESEARCH

2016-2017 NEBRASKA RESEARCH REPORT
©2017, University of Nebraska-Lincoln Office of Research and Economic Development

MANAGING EDITOR
Ashley Washburn

EDITORS/WRITERS
Monica Norby | Tiffany Lee

CONTRIBUTING EDITORS/WRITERS
Gillian Klaus | Vicki Miller | Scott Schrage | Elizabeth Banset

Some articles based on stories from University Communication and other sources

PHOTOGRAPHY
Craig Chandler | Alan Jackson | Greg Nathan | James Wooldridge | Jake Crandall | College of Business
Shutterstock/Mile Studios, p. 5 | maverickart, p. 8 | symgaboardo, p. 8
Shutterstock/Diptya Zirkneck, p. 33 | Photosand29, p. 33 | hables, p. 33

DESIGN
Modus Persona

ONLINE EDITION/ILLUSTRATION
Joel Brehm

CONTACT US
Steve Goddard
Interim Vice Chancellor for Research and Economic Development
University of Nebraska-Lincoln
301 Condict Administration Building
Lincoln, Nebraska 68588-0433
402-472-3123 | goddard@unl.edu
research.unl.edu

The University of Nebraska does not discriminate based on race, color, ethnicity, national origin, sex, pregnancy, sexual orientation, gender identity, religion, disability, age, genetic information, veteran status, marital status, or political affiliation in its programs, activities, or employment.

CONNECT WITH US

This report is available online: research.unl.edu/annualreport/2017