

Perspectives



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Message from President Kirk Schulz and Vice President for Research Ron Trewyn



At Kansas State University we have set ourselves an ambitious goal: to become a top 50 public research university by 2025.

As we collaborated with our faculty, staff and other members of the university family about what it takes to become a top 50 institution, we concluded that it is critical for the university to ensure that our discoveries and strengths benefit not just Kansas State University but the broader community — the state, the nation and the world.

With the help of two not-for-profit corporations — the Kansas State University Research Foundation and the Kansas State University Institute for Commercialization — the discoveries and innovations by our researchers benefit Manhattan and the region by increasing commercialization of new technologies.

The Institute for Commercialization helps facilitate the commercialization of technologies for regional economic and social benefits. The Research Foundation works with Kansas State University faculty, staff and students to secure legal protection — predominantly patents — for intellectual property created at the university.

We believe these efforts are integral to the university's goal to become recognized as a top 50 public research university by 2025.

This includes value-added research within the state, the flow of funds into the university and the state of Kansas through licensing agreements, and the startup companies spun off. These bring opportunities for jobs and further resources to the area.

The Research Foundation has the responsibility for managing the intellectual property portfolio of the university, with the Institute for Commercialization serving as the Research Foundation's commercialization agent.

Among the Institute's successes is bringing companies to Kansas State University and the region. The Institute brought animal health company Abaxis into a strategic alliance with the university and its veterinary diagnostic lab. This year Abaxis moved into the Kansas City area, home of the university's Olathe campus. You can read more about that partnership in this issue.

This issue covers how university-industry collaboration, enhanced by the work of faculty, staff and graduate and undergraduate students, is part of what makes Kansas State University unique — and a positive force in the state and nation.



A handwritten signature in black ink, appearing to read "Kirk Schulz". The signature is fluid and cursive, with a long horizontal stroke at the end.

A handwritten signature in black ink, appearing to read "Ron Trewyn". The signature is cursive and somewhat compact.



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Front cover: From lasers to hydrogels, Kansas State University innovations and research are making industries and the economy stronger. It's one of the many ways the university is working to become a top 50 public research university by 2025.

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Safe food for all

When diseases threaten Kansas food crops and the agricultural economy, the Great Plains Diagnostic Network is ready for action.

The network, based at Kansas State University, is a partnership of universities and industry across the Midwest and provides quick and accurate diagnoses of emerging plant diseases. The Great Plains network is one of five regional networks in the National Plant Diagnostic Network, created by the U.S. Department of Agriculture after Sept. 11 to help the country stop the spread of diseases that threaten our food supply and agricultural economy.

With increased globalization, the network addresses the need to export clean material and protect existing agriculture from potential acts of bioterrorism. Kansas exports nearly half of its 10 million acres of wheat produced each year, and more than 1 million jobs nationally are tied to agricultural exports.

“The network allows us to detect, diagnose and provide the information appropriate for a rapid response,” said Jim Stack, director of the Great Plains network and former executive director of the national network. “That’s how you keep these situations small enough to manage.”

The network fulfills three missions: diagnostics, detection and communications. The network trains extension agents for early detection of plant pests and has established an exercise program, where state officials, universities and laboratories practice responding to potential disease outbreaks.

Now in its 10th year, the national network has reached almost 120 labs, including 15 laboratories in nine states that make up the Great Plains network. When beginning the network in 2002, the USDA turned to Kansas State University to provide leadership for the Great Plains region. Stack, professor of plant pathology, joined the Great Plains network in 2003.

The university was already using Plant Diagnostic Information System — a software system for remote diagnosis of plant diseases and pests. Will Baldwin, former associate director for the Great Plains network and current information technology officer at Kansas State University’s Biosecurity Research Institute, designed the system as a statewide tool for Kansas, but expanded its use nationally at the request of the USDA. Through the system, diagnosticians can transmit microscopic images to experts nationwide.

“The system ties together federal and state diagnostic laboratories so that they have access to data, can communicate among labs and upload diagnostic data to a national repository,” Baldwin said.

The benefit is twofold: It helps epidemiologists monitor outbreak trends and establish geographic areas where certain pests do not occur. The system has led to numerous diagnostic successes.

When Asian soybean rust arrived in 2004, the network facilitated a rapid response. Similarly, the network was able to detect and prevent the spread of a strain of *Ralstonia solanacearum* — a bacterium that can hitchhike into the U.S. on plants and threaten potato and tomato crops.

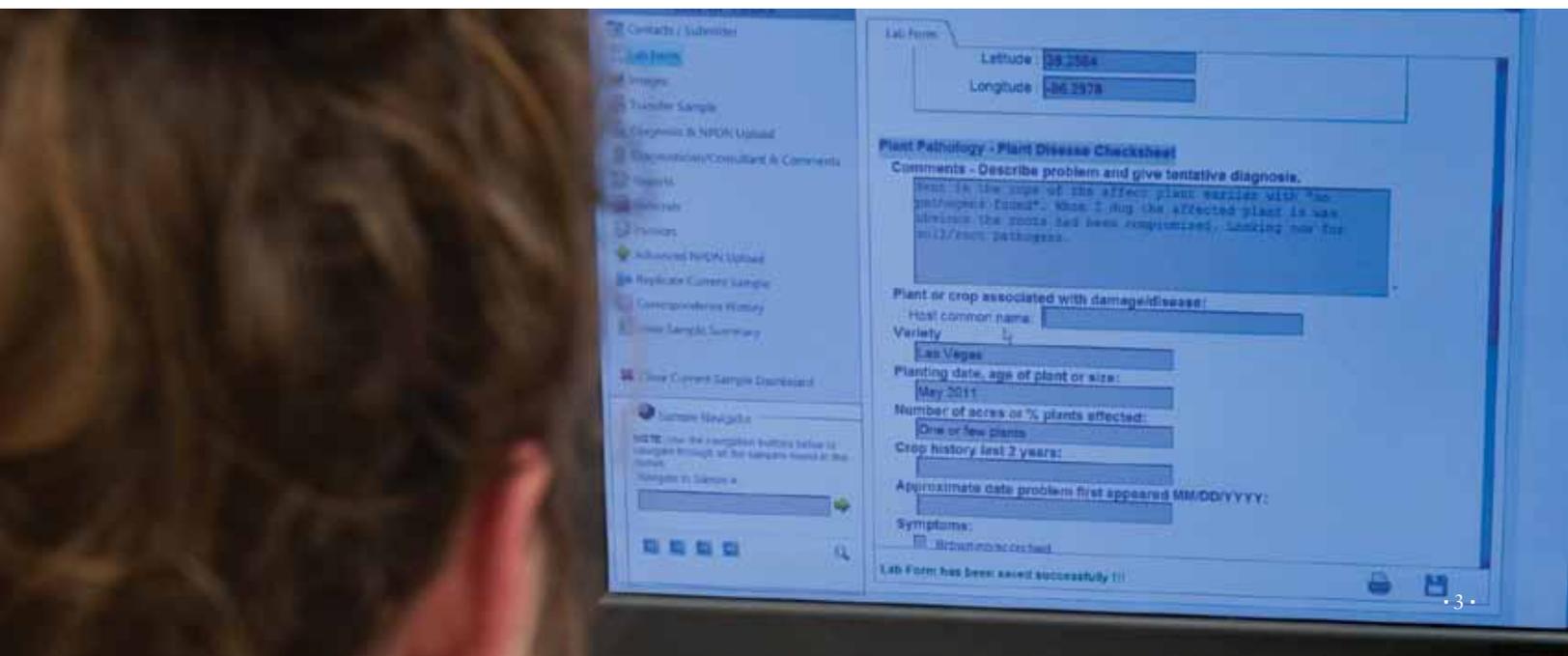
The USDA has recognized the network’s success in transforming plant diagnostics. International leaders are now turning to Kansas State University for help setting up similar networks in Australia and Europe.

“This model is being looked at around the world as an important piece of infrastructure that every nation should have in order to protect our production systems and our export markets,” Stack said.

By Jennifer Tidball, Communications and Marketing



The Great Plains Diagnostic Network is protecting our food supply through early detection, accurate diagnosis and improved communications



Developing electronics, driving the economy

How the Electronics Design Laboratory turns to technology to help research, industry



Timothy Sobering



For the engineers in the Electronics Design Laboratory at Kansas State University, each day brings something different.

They have tested components for an experiment at the Large Hadron Collider at CERN and developed a set of sensors for a team of veterinarians to measure equine intestinal muscle activity. The team is also working with nuclear engineers to develop neutron sensors that could be used in monitoring cargo at ports of entry, assisting with disasters like the Fukushima nuclear plant accident or protecting military personnel on the battlefield.

The subjects vary, but the laboratory's focus remains the same: Help scientists and industry around the world acquire accurate data.

“We help researchers get the information they need,” Sobering said. “Why should biologists or chemists have to be experts in electronics in order to do what they need to do? They don’t have to be, because Kansas State University chose to go forward with this laboratory.”

The laboratory team — composed of Timothy Sobering, laboratory director; Russell Taylor, electrical engineer; David Huddleston, technician; and two students — develops electronics not only for Kansas State University researchers, but also researchers at other universities as well as industry members.

The engineers have the resources and skills to create a variety of electronics: sensors, data acquisition systems, control systems and commercial equipment. To meet budget and schedule needs, they also repurpose old equipment to meet current standards.

In its 15 years, the laboratory has completed nearly 400 projects, some of which have achieved commercial success.

A partnership with the university's Advanced Manufacturing Institute helped a Kansas entrepreneur develop a digital brake controller for large hauling trailers, making it safer to drive with loads of varying weights.

Taylor recently completed a project with Honeywell and developed a low-powered, high-memory system with a USB connection to easily download data. For a project with III Sigma, the engineers helped develop a probe that measures the moisture content of bulk materials, including food, which is an important step in product quality control.

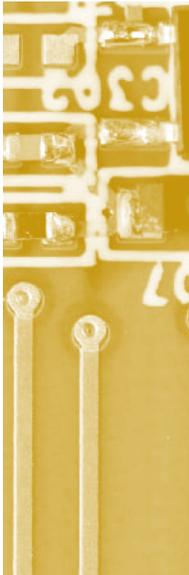
The engineers also worked with grain scientists on a device that prevents insect repopulation in grain bins by producing ultrasonic noise at varying frequencies.

“You use less fumigant and less chemicals, so it’s cheaper for the farmer and better for the environment and the consumer,” Taylor said.

Other collaborative projects have included the University of Kansas, the University of Tennessee and the University of Missouri, among others.

Sobering has noticed other universities developing similar laboratories, showing how Kansas State University was a leader in forming electronics laboratories that contribute to research success and the commercial success of partnering with industry.

“Research is evolutionary,” Sobering said. “You don’t dive in at the end of it; you go through a process and learn along the way. This is why we learn as much from our partners as possible so we can provide them with the best product based on our skills.”



The Electronics Design Laboratory has developed a variety of projects, some of which include:

- Creating a microfluidic system used in microgravity experiments conducted on NASA's "Vomit Comet."
- Collaborating with veterinarians to develop a wireless network for remote monitoring of bovine animal health.
- Working on neutron detectors with researchers at the Semiconductor Materials and Radiological Technologies, or S.M.A.R.T. Laboratory.
- Supporting the design and testing of compact radio systems for use in planetary scout-type applications, such as rovers and short-range probes to Mars.



Fadi Aramouni



Science *of* sustenance:

Foods laboratory helps Kansas companies prosper

The nation's breadbasket is home to some of the country's largest food-related companies, and this presence can be overwhelming to a small food producer looking to enter the market. But a Kansas State University laboratory offers Kansas companies the resources to be successful — and at an especially low cost.

The Kansas Value-Added/Product Development Laboratory supports the Kansas food industry through a variety of services, including: the development of new products; consulting on methods to add value to existing foods; performing pertinent evaluations and tests; offering food safety training; and generating nutritional information for labels. All services are available at a low cost to Kansas companies because of an annual grant from the Kansas Department of Agriculture to the laboratory.

"It's important for these companies because it gives them a comparative edge," said Fadi Aramouni, extension specialist and professor of food science.

Aramouni coordinates the value-added program through Kansas State University Research and Extension. He has guided the laboratory from its humble beginnings to an efficient operation that receives dozens of requests monthly for its services. Requests not only come from Kansas companies, but also from surrounding states. The frequency of requests can be attributed to the laboratory's specialized offerings and responsiveness, Aramouni said.

"We are different in that we respond very fast to a client," he said. "We do the research needed to ensure that they get the contract they are working toward. That is not common at universities."

Among the lab's clients is Grandma Hoerner's Foods Inc., of Alma, Kan. The lab has established an organic certification program, assisted in product development and given food safety programs. Grandma Hoerner's has reciprocated the lab's help by providing internship opportunities for some of the lab's student staff members.

Working with Kansas companies helps Kristin Wirth, junior in food science and industry and the laboratory's microbiologist, identify more with her work.

"Here at Kansas State University I can take it to the next level and help assure the safety of the product," Wirth said. "When I see the counts come back low for microbes it's a good thing."

Wirth and other students have essential roles on the laboratory's staff. Kathryn Deschenes, master's student in food science and industry and laboratory manager, handles communication and outreach as well as special projects. She has received several awards in national contests for product development.

Brennan Smith, doctoral student in food science and industry, is conducting research with protein chemistry, specifically in the development of gluten-free products. His research has focused on substituting sorghum flour and carob germ flour for wheat gluten.

"The actual finished product is probably one of the only, if not the only, gluten-free breads you could compare to wheat bread as far as texture, density and overall quality," he said.

Smith also recently received an award for product development.

Deschenes believes all of the services offered by the Kansas State University laboratory have a great benefit for Kansas companies.

"You really see the impact of your work when you go and visit them and you see how important it is to keeping their business afloat by preventing food safety issues," she said. "It's evident our services are important."



Gary Anderson

Diagnostic laboratory's impact continues to broaden with new testing, partnership

For decades, Kansas State University's Veterinary Diagnostic Laboratory has been the go-to regional source for animal testing and diagnoses, and a national center for rabies serological testing. With recent developments it's likely to remain so for decades more.

The diagnostic lab, headed by director Gary Anderson, offers a complete range of diagnostic services for all species but primarily focuses on food-producing animals. The lab is constantly working to develop new and better tests for veterinary clients to identify, treat and prevent illness in animals.

During the last 18 months, huge accomplishments in the understanding and detection of Bovine Viral Diarrhea Virus have been made. BVDV is a common endemic disease of cattle that causes respiratory illness and reduced productivity, as well as abortion in pregnant cattle. If left undiagnosed, it can lead to economic strain due to reduced herd fertility and increased disease rates.

"We have some really ground-breaking information about BVDV that is being reported right now, and it's related to how easy it is to transmit the virus between animals," Anderson said. "New technology and tests

have been plugged into what happens every day out there in the world of cattle production.”

The lab’s findings have been shared at conferences on both U.S. coasts — in Buffalo, N.Y., and San Diego — solidifying the lab’s relevance to the national cattle industry.

The lab is also world-renowned for its rabies serological testing. It handles large volumes of rabies cases — more than 60,000 samples a year from all corners of the earth.

“The rabies lab is very productive and popular. When we find rabies in the animals that are sent here, those viruses are typed, and from there we can start identifying where the virus came from and how it relates to other infections in the region it came from,” Anderson said.

Beginning Oct. 1, nationwide commercial operations began as part of the recent alliance between Abaxis Inc. and the College of Veterinary Medicine. Abaxis is a medical products company that provides blood testing for medical and veterinary clients.

The Abaxis Veterinary Reference Laboratories in Olathe, Kan., along with the Kansas State University partnership, is the first of its kind and offers a variety of tests, some of which will be performed at the university’s diagnostic lab in Manhattan, Kan. The alliance was made to take advantage of what could potentially be an \$800-million veterinary laboratory market, according to Abaxis. More than 400 clinics nationwide have already signed up for its services.

This strategic relationship will allow Kansas State University veterinary and graduate students hands-on experience with what is one of the nation’s leaders in point-of-care blood analysis. In addition, the alliance provides direct support to the university’s clinical pathology resident training program through the Abaxis Clinical Pathology Resident Fund.

“We see the Abaxis partnership as a way to increase our exposure in the companion animal diagnostic space. It will yield material that will be useful to teach and train graduate students, as well as residents who are becoming specialists in the area of pathology,” Anderson said. “It’s also a nice opportunity for us to grow revenue for our operation, because we’ll receive royalties on their success.”

As for what’s to come, Anderson hopes to see new labs that can accommodate ever-changing diagnostic technologies and increased growth, especially as Kansas State University continues work toward becoming a top 50 public research university by 2025.

The diagnostic lab is committed to connecting with clients and other stakeholders via the newly formed outreach and field investigation program. This program focuses on investigations of complex herd disease outbreaks and provides active communications between diagnostic laboratory veterinarians with private practice experience and practitioners in the field.

“A dream of mine is to obtain the animal disease diagnostic laboratory facilities that Kansas deserves and needs for the next generation as we look to what animal and public health requirements will be in the future,” Anderson said.

By Rachel Skybetter, Communications and Marketing





Engineering a profitable future:

Advanced Manufacturing Institute helps industry, companies succeed

A high-speed train quietly whisks passengers on a 30-minute, 60-mile journey from home in the countryside to work in city skyscrapers. The train races past bumper-to-bumper highway traffic.

Factories earn record profits with on-time rail shipments. American manufacturers rush to hire more workers to build rail cars and tracks. New businesses open near high-speed rail stations.

Engineers at Kansas State University's Advanced Manufacturing Institute are working with university professors to create one such prosperous economic scenario in the United States. They're researching and testing concrete rail ties, which hold rail tracks together, to make them more durable. The research will help position America for high-speed rail lines found throughout Europe and Asia, where concrete rail ties are commonly used.

Concrete rail ties have the potential to last longer and provide better fuel economy than their wooden counterparts traditionally used in the United States. Fewer greenhouse gases are released during production.

"Part of the economic benefit of this research would go back to the concrete tie manufacturer, improving upon a safe product to make it even better," said Taylor Jones, the institute's chief engineer. "If pre-stressed concrete rail ties are even more competitive, American manufacturers will gain more business and employ more workers."

The research is one of many projects at the institute that will help jump-start the economy. The institute provides services like business planning, product design and manufacturing development. It serves small companies, university professors, entrepreneurs and Fortune 500 companies.

"We fill in the gaps where companies do not have the internal resources because they haven't yet grown sufficiently in size," said Jeff Tucker, the institute's associate director. "In other cases, large companies come to us seeking our expert technical advice."

The institute worked with Hutchinson, Kan.-based Shield Agricultural Equipment to increase profits and create jobs. The institute redesigned a device that cuts through soil and spreads fertilizer. Since the product's launch six years ago, the company has seen an uptick in sales, created eight full-time jobs on top of 32 existing positions, and launched an ancillary business.

The institute also boosts economic development. For instance, planners are studying the possible creation of an innovation business accelerator in south-central Kansas to expand rural manufacturing. The incubator could launch more startups, create high-paying jobs, and expand existing small businesses.

"Every day we help shape and form companies and communities so that they can be more competitive in the global marketplace," Tucker said. "Once we help companies and communities grow and expand, they will create a bigger work force. By working with one company and community at a time our efforts add up to set the foundation for a stronger economy."

By Trevor Davis, Communications and Marketing





Taking commercialization to **new heights:**

Unmanned aerial systems research takes off

Some of the newest research at Kansas State University is taking place on the Salina campus, and the sky is the limit when it comes to its potential. “Unmanned aerial systems research is the major thrust of work at the Applied Aviation Research Center at Kansas State University Salina, and we’re one of the first programs in the country to offer a program in this area,” said Kurt Barnhart, the center’s executive director and professor and head of the university’s department of aviation.

Unmanned aerial systems are rapidly growing in terms of engineering, operations, intelligence gathering, search and rescue, and more, he said.

“Research at the center involves both commercial, off-the-shelf technology and new design technologies, such as wireless power transmission and new antenna design,” said Josh Brungardt, director of the university’s unmanned aerial systems program.

Unmanned aerial or aircraft systems look much like the remote-control miniature planes hobbyists have long enjoyed — but these aircraft can do much more than fly in a circle at a pilot’s command, said Kirk Demuth, chief pilot for the unmanned aerial systems program. These unmanned systems can be programmed to fly long distances — even across oceans — and land about anywhere; can be reprogrammed — or rerouted — in flight; can carry small payloads of 8 to 10 pounds; and, most importantly, can send data, including live camera feeds, infrared imaging and a multitude of sensor information, to a ground station. Such information could be crucial in search-and-rescue missions.

Staff at the Applied Aviation Research Center work closely with aviation-related manufacturers and the military.

“We’ve had numerous industry come through and work with us,” Brungardt said. **“We’re able to take those design and research elements from industry, vet them through safety protocols and actually do testing so the manufacturer can take these vehicles or new products to market.”**

The star of the university’s unmanned fleet is an Aerosonde Mark 4.7. Produced by AAI Corp., it weighs about 50 pounds and is not much larger than a Canada goose. While small, the Aerosonde can fly up to 20 hours on a full tank of fuel. Another vehicle in the fleet is the Wolverine 3, a helicopter used for shorter distances.

Current research at the center involves the Aerosonde and the world’s smallest aviation transponder, the XPS-TR made by Sagetech Corp. The aircraft is the first anywhere to have this cellphone-size transponder, which communicates key data about the aircraft, such as altitude and flight plan information, to air traffic control radar. Unmanned aircraft systems are naturally invisible to such radars, so learning how to equip these tiny transponders to unmanned aircraft will open up their use for civilian missions in the national air space, Brungardt said.

The center also includes the Advanced Avionics Miniaturization Laboratory, where technology can be shrunk and mounted on a printed circuit board for testing in an unmanned aircraft system.

The center has already received two grants from the U.S. Air Force Office of Scientific Research in Arlington, Va. The multimillion-dollar grants are for the continued development of mission planning, operations and a disaster training center for the university’s unmanned aerial systems program.

By Beth Bohn, Communications and Marketing





Why unmanned aerial systems?

The unmanned aerial systems program at Kansas State University Salina was born from disaster, according to Kurt Barnhart, professor and head of the department of aviation.

It all started in 2007, a bad year for weather-related disasters in Kansas. Heavy snow storms, an ice storm that knocked out power and power transmission equipment and a devastating tornado that wiped out the town of Greensburg had the National Guard responding on multiple fronts. But the Guard itself was shorthanded and under-equipped because of deployments.

“There was a call for the ability to put an eye in the sky without necessarily putting a person in the sky,” Barnhart said. “This can be done quickly and cheaply with unmanned aircraft systems, and you can get the same — or better — information.”

“Unmanned aerial systems are good for three things — the three D’s in our industry: dull, dangerous and dirty,” said Josh Brungardt, director of the unmanned aerial systems program.

“In a disaster, you have all three,” he said. “The dull side is that the incident commanders or generals need to have eyes-on capabilities for a long time. Being able to send a UAS to a town badly damaged by a tornado can help authorities figure out unblocked routes for emergency vehicles. Seeking heat sources through the system’s infrared imaging capabilities can be dirty but save lives.”



AT HOME AND AWAY

University research, outreach benefit soldiers in the field
and their families at home

“Military tactics are one of the pillars the
land-grant philosophy was based on. This fact
gives us a greater appreciation of the soldiers’
sacrifice and commitment.”

— Ron Trewyn,
vice president for research at Kansas State University





While land-grant institutions typically include teaching science, agriculture and engineering, another important component can get lost in the shuffle — the military. Researchers at Kansas State University are the exception, often combining military research with result-oriented programs that help soldiers and their families all around the world.

The university shares that commitment by focusing on research that helps soldiers and their families at all stages of their service: at home; as they prepare to deploy; and during their time overseas.

HELPING AT HOME

There may be seemingly endless programs for soldiers and their families focused on relationships, finances or trauma. But Briana Nelson Goff, director of the Institute for the Health and Security of Military Families at Kansas State University, said the questions, too, are endless.

“We have to discover if the programs are effective,” she said. “The military is starting to look at that, and we want to help answer those questions. We have to ask what we can do as a university, then provide the research.”

The institute, which is part of the university’s School of Family Studies and Human Services, addresses important questions through research related to the familial aspects of the military. Jared Anderson, assistant professor of family studies and human services, is currently conducting the study “Transition to Marriage in the U.S. Army,” an effort to understand the relationship between areas like marital risk factors and external stress to improve programming supporting Army couples.

Sonya Britt, assistant professor of family studies and human services, and Mary Bell, doctoral student in personal financial planning, are also conducting longitudinal research on financial behaviors and resilience in soldiers and spouses across the deployment cycle.

“This generation is different because they face unique demands like multiple deployments, and that has a different impact, creating wounds that have yet to be fully understood,” Goff said. “Resiliency is a big focus, and as a society we need to ask what we can do for those who aren’t so resilient. Our programs are systemic, based on family.”

CULTURAL PREPARATION

Proper preparation for deployment is crucial, often going beyond combat training. That’s where research from Kansas State University Libraries comes in. Daryl Youngman, associate professor at Hale Library, said that Kansas State University Libraries have been leaders in creating productive engagement with various elements of the Army community.

“Partnerships have been developed and are being recognized at higher levels,” he said. “There’s a realization of the mutual benefits of working together.”

Through cultural seminars, soldiers are trained to interact with other soldiers and civilians in the countries where they will deploy. At these seminars, Youngman said soldiers participate in activities like cultural meal lessons. They learn the importance of properly engaging Afghan leaders and conducting business during meals by interacting with Kansas State University students who are natives of Afghanistan.

Female U.S. soldiers also have the opportunity to work with Afghani female scholars to discuss cultural issues and the role of women in Afghan society, creating specialized engagement teams.

“These female engagement teams can then go to Afghanistan and interact with female soldiers and civilians in ways that men cannot,” he said.

EXTENDING THE REACH

It is also important not to overlook the importance of food and agriculture when preparing for deployments, Youngman said. “As a soldier, you can’t prepare to interact with a society of farmers if you don’t understand their culture.”

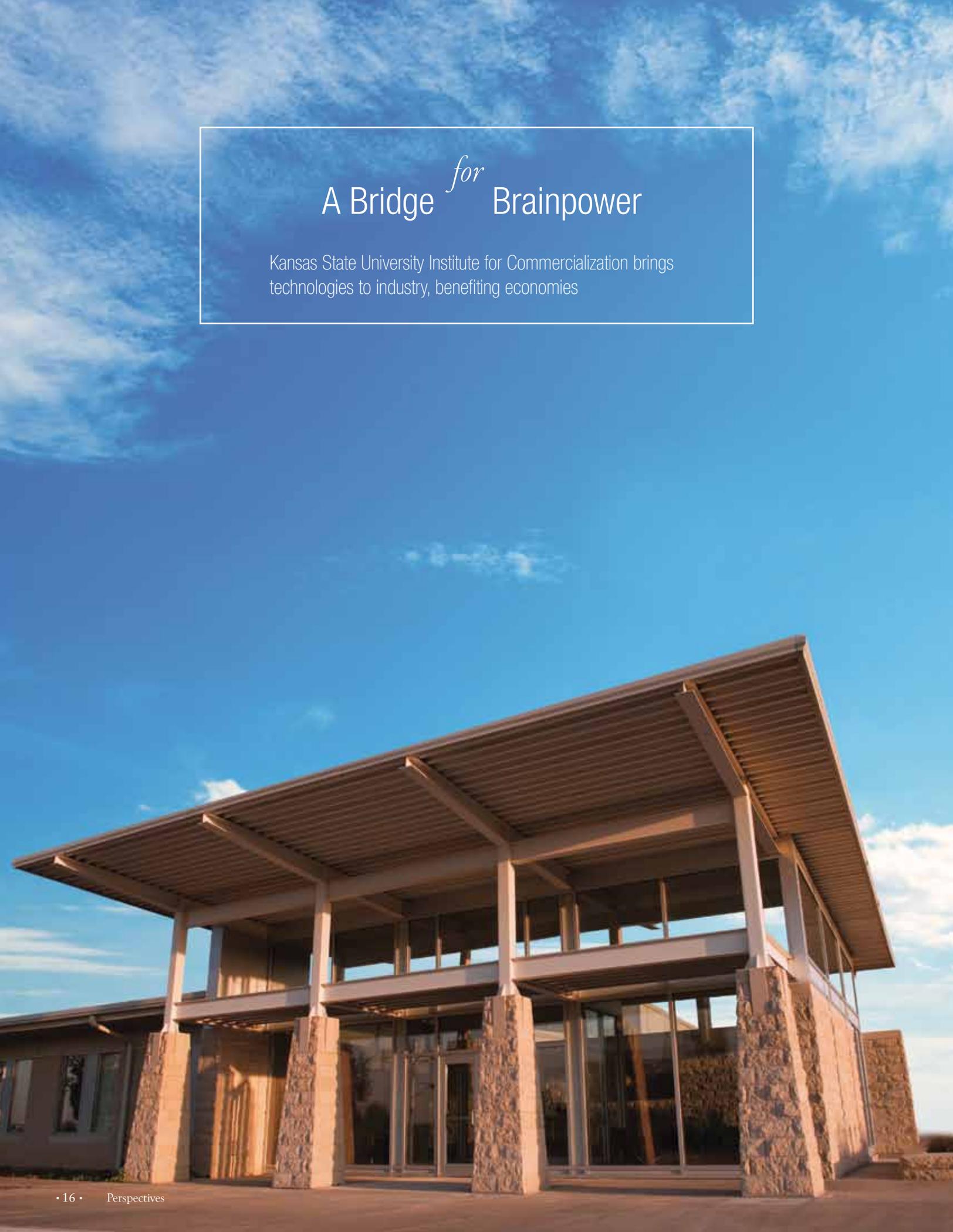
Kansas State University’s College of Agriculture aims to blur the boundaries between the professions by training Agribusiness Development Teams, in which soldiers learn to be semi-extension agents.

Steven Graham, assistant to the dean of agriculture/director of research and extension, said faculty members put together a crash course in agriculture, with topics ranging from pest management to soil fertility. With this training, soldiers are able to help with things like seed planting, irrigation, crop storage and growing livestock.

“We teach soldiers techniques to make farmers more profitable and to practice safety,” Graham said. “If we can take people up one step, that is a success. If a village doesn’t have clean drinking water, the soldiers can help them build a well. The projects must be sustainable once the soldiers leave, so simpler is better.”

Kansas State University researchers work to arm soldiers with knowledge to help others and themselves.

By Megan Molitor, Communications and Marketing



A Bridge *for* Brainpower

Kansas State University Institute for Commercialization brings technologies to industry, benefiting economies

Sometimes even brainpower needs a little extra intellectual brawn in a crowded marketplace. That's where the Kansas State University Institute for Commercialization excels.

The Institute for Commercialization is a nonprofit technology transfer initiative of Kansas State University, the city of Manhattan, Kan., and the Manhattan Area Chamber of Commerce. It licenses technologies from Kansas State University and other state universities and centers of excellence, bridging the research and intellectual property to industry. In return, the local and regional economies benefit from monetizing the technologies.

"The big question for tech transfer operations is really how do you take a major American university where you have a lot of really smart and skilled people, and then leverage the intellectual property and the intellectual capability that resides at the institution into monetary gain for that institution and the community," said Kent Glasscock, president of the Institute for Commercialization.

But for Glasscock and his team of seven, it's a question they've already answered.

Since 1994, the Kansas State University Institute for Commercialization has created more than 170 jobs in the region, which average \$57,000 annually. In the past 11 years the Institute has also generated nearly \$165 million in new revenue into the economy of Manhattan, and each month brings nearly \$1 million in revenue back to the area.

Monetizing Kansas State University's research has also generated approximately \$12 million in revenue back to the university during the past 10 years. Most recently the Institute is licensing the university's technology for a plentiful and noncontroversial source of stem cells, as well as for feed encapsulation technology used in food animal production.

Institute staff members also specialize in marketing faculty expertise to industry in order to create partnerships that generate new technologies. This includes developing several national consortiums from the brainpower of Kansas State University faculty in cybersecurity and veterinary medicine, said Rebecca Spexarth, the Institute's director of economic development.

"Once we start on that first project, companies often become interested in working with Kansas State University or another of our partners for additional projects because now we have a relationship with them and they realize the quality knowledge and resources they're getting," Spexarth said.

In addition to Kansas State University technologies, the Institute also licenses more than 1,000 patents donated through the national Technology Acquisition, Development and Commercialization program, which generate more than \$45 million annually.

From its technologies the Institute for Commercialization has also created nearly 25 startup companies. NutriJoy Inc., which produced a non-refrigerated fruit and dairy drink, was acquired by the Coca-Cola Co. in 2008. ScavengeTech LLC, a Manhattan-based company that designs technology that monitors the system health of the legacy engines on the natural gas pipelines across the nation, was a spinoff of technology developed by a former professor of mechanical and nuclear engineering.

But the Institute for Commercialization benefits more than just the economy of Manhattan. Partnerships are also bringing revenue into other communities, said Lindsay Biggs, director of marketing for the Institute. These partnerships include those with MRI Global — a scientific/engineering organization with headquarters in Kansas City, Mo., that performs research and technical services for government, industry and academia — and Wichita State University in Wichita, Kan.

"At Wichita State University they have a lot of great technology but weren't extracting the maximum amount of value from it," Biggs said. "In working with us, they began to reap additional rewards related to their patents."

Glasscock said much of the Institute's success stems from not only his staff members' talent, but also from the close ties between the university and city.

"The relationship between Kansas State University and the city of Manhattan is one of the handful of very outstanding relationships in the country between a major American university and its host community," Glasscock said. "The community's economic development strategy and the university's vision of becoming a top 50 public research university by 2025 are perfectly in sync. I don't know if there's another university and community in the country where the vision of the institution is an absolute match for the economic development strategy for the host community. That's pretty remarkable."

By Greg Tammen, Communications and Marketing



Rebecca Spexarth, Kent Glasscock, and Lindsay Biggs

A broad foundation for intellectual property

The Kansas State University Research Foundation's patent portfolio underscores the breadth and the depth of quality, economically significant research performed by university faculty members and students.

The Research Foundation's technologies include a plentiful and noncontroversial source of stem cells; a space glue; methods for improving wireless data and other communication systems; and a self-cleaning animal watering tank, among others — all made by the university's faculty and students.

Recently the Research Foundation was issued new patents for technologies to treat wastewaters, develop anti-Alzheimer drugs and create a synthetic antimicrobial peptide that improves the canine immune system. Pending patents include technologies for cancer detection and treatment; abdominal hemorrhages; improved disease and insect resistance in plants; a white wheat, Clara-CL; and numerous engineering solutions.

According to Marcia Molina, the foundation's vice president for technology transfer, being a land-grant university affords a rich and diverse base for scientific pursuits, many of which lead to intellectual property.

"A lot of Kansas State University's land-grant functions focus on applied research," Molina said. "If you look at animal sciences and industry, agronomy and grain science and industry, these are applied disciplines. Because of that, these areas often lead to discoveries that can more quickly lead to a marketable product, making for more opportunities."

The Research Foundation's portfolio includes 231 issued U.S. patents. An additional 45 patent applications are undergoing examination. Discoveries largely stem from Kansas State University's colleges of Agriculture, Engineering, Veterinary Medicine, and Arts and Sciences — which account for 94 percent of the overall intellectual property portfolio.

More than 40 of the Research Foundation's technologies are being licensed to industry through the Kansas State University Institute for Commercialization, a marketing partner that channels profits from the monetized technology into each partner's local and regional economies.

Patents in use include:

- A blood-typing kit for cats and dogs undergoing surgery;
- Resistant starch technology that increases fiber content by lowering digestible carbohydrates in foods like pastas, breads, crackers and chips;
- Animal feed technology for swine and cattle;
- A cattle vaccine for calf scours, or neonatal diarrhea; and
- Various laser technologies.

In addition to patents, the Research Foundation also manages copyrights, trademarks and protection of plant varieties and biological materials, Molina said.

The Kansas State University Research Foundation is also one of the first in the nation created to manage intellectual property in academia. It began operations in 1942 and included technologies for making stoppers for bottles and test tubes; plastic containers for frozen foods in freezer lockers; and dehydrating starchy vegetables and fruits.

By Greg Tammen, Communications and Marketing



231 | U.S. patents issued

45 | Patent applications undergoing examination

40+ | Technologies being licensed to industry through the Kansas State University Institute for Commercialization



Beef Cattle Institute links beef industry and public with timely university research, information



Last year, Kansas produced 5.4 billion pounds of beef — enough to supply the roughly 300 million Americans living in the U.S. with 72 quarter-pound burgers each for an entire year.

“Our economy is dependent on being the best at producing beef,” said Dan Thomson, Jones professor of clinical epidemiology at Kansas State University’s College of Veterinary Medicine and director of the university’s Beef Cattle Institute.

The institute was founded in 2007 to help Kansas continue to be the best at beef production. Its goal is to tackle tough issues facing the beef industry through education, research and outreach.

Clayton Huseman, executive director of the feedlot division at the Kansas Livestock Association, said one way the Beef Cattle Institute has helped the industry is by streamlining the flow of information and knowledge from the university to the field. It has brought together resources from every college on campus, allowing producers to

get information on issues such as business, economics and beef production — all with just one phone call to the institute.

While the institute works face-to-face with beef producers at regional workshops, it also offers an online training platform. Animal Care Training contains more than 300 training modules in both English and Spanish and covers all segments of the beef industry.

Thomson said their research has shown the Beef Cattle Institute improves the knowledge base of industry workers by 27 percent with a five-minute audiovisual module. More than 8,000 producers and industry workers have gone through the online training modules.

Thomson also serves in an advisory role to companies like Cargill Inc. The institute acts as a third-party information source, offering science-based facts on hot-button issues like animal welfare and food safety.

The institute essentially operates like a small business, according to Thomson. Aside from his own salary, the institute’s staff and graduate student salaries, along with operating funds, are generated by service revenue.

“We have created tools that have value to the beef industry,” Thomson said. “If our tools aren’t needed, we don’t have a business.”

The institute has conducted international symposiums that have addressed beef cattle welfare and antibiotic usage in cattle. More than 800 stakeholders attended the international symposium on welfare in 2010, with an additional 500 watching by live webcast from 27 states and six countries. Thomson said the institute plans to hold a symposium next year on the relationship of the environment and our carbon footprint to beef production.

By Bethany Sanderson, K-State Research and Extension

From the food that we eat to the way we see the world, Kansas State University is improving lives in the state and around the world.



Gap junction technology created by university scientists improves drug delivery to cells, advancing the treatment of retinoblastoma, heart surgery, strokes and cancer.



University research has made it possible for food producers to replace the digestible carbohydrates with fiber in our favorite starchy foods like pastas, cookies, chips, breads and crackers.



With one of the nation's top-rated physics programs, university physicists have illuminated laser-based technologies by inventing a holographic particle imaging system that is capable of recording 3-D images at an individual particle level.



A world leader in wheat genetic research and development, Kansas State University has created a new white wheat that allows producers to reduce weeds in a crop without decreasing crop yield.