The Lane Report

RESEARCH | KENTUCKY

2010

Turning Science Into Success

Research, Technology Commercialization, and Economic Development Investments are the Building Blocks of Kentucky's New Economy

EXCLUSIVE SPONSORS

McBRAYER
McBrayer, McGinnis, Leslie & Kirkland, PLLC
ATTORNEYS AT LAW

Get connected.

Spaces that inspire. . .
Ideas that work

SPECIAL ADVERTISING REPORT

The Lane Report

RESEARCH | KENTUCKY

2010

Table of Contents

Research and Technology Commercialization Are the Keys to Future Economic Development

Ed Lane
Publisher

AS Kentucky works its way through one of the nation's worst recessions, the state's research, technology commercialization, and economic development efforts remain well funded, viable and focused.

Perhaps a weak economy is the mother of invention. Kentucky's research universities and Cabinet for Economic Development are now sowing the seeds of research and innovation that will grow new economic development opportunities.

Kentucky's future and its international competitiveness are directly related to these important initiatives.

Knowledge-based technologies are the catalysts for Kentucky's future prosperity.

RESEARCH KENTUCKY

The Lane Report's Research Kentucky is a special advertising publication published by Lane Communications Group. *Research Kentucky* is published digitally at lanereport.com.

Publisher/Executive Editor	Ed G. Lane
Associate Publishers	Richard Kelly
	Robin Lachapelle
	Donna Hodsdon
	Lisa Turner
Creative Director	Jessica Merriman
Design & Production	Stone Advisory
Printing	Publisher's Press
Pre-Press	Publisher's Press
Circulation Manager	Alma Kajtazovic

The Lane Report

kybiz.com Kentucky Business Online

Copyright 2010 Lane Communications Group

No part of this magazine may be reprinted without the permission of the publisher. Colleges, universities, state agencies and other advertisers are responsible for the accuracy of their content.

(859) 244-3500 | 201 East Main Street | Lexington, Kentucky 40507

EXCLUSIVE SPONSORS

McBRAYER
McBrayer, McGinnis, Leslie & Kirkland, PLLC
ATTORNEYS AT LAW
Get connected.

CABINET FOR ECONOMIC DEVELOPMENT

Department of Commercialization and Innovation

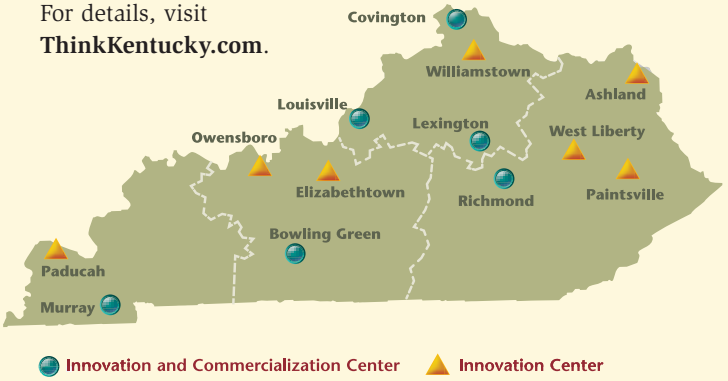
Turning Science into Success™

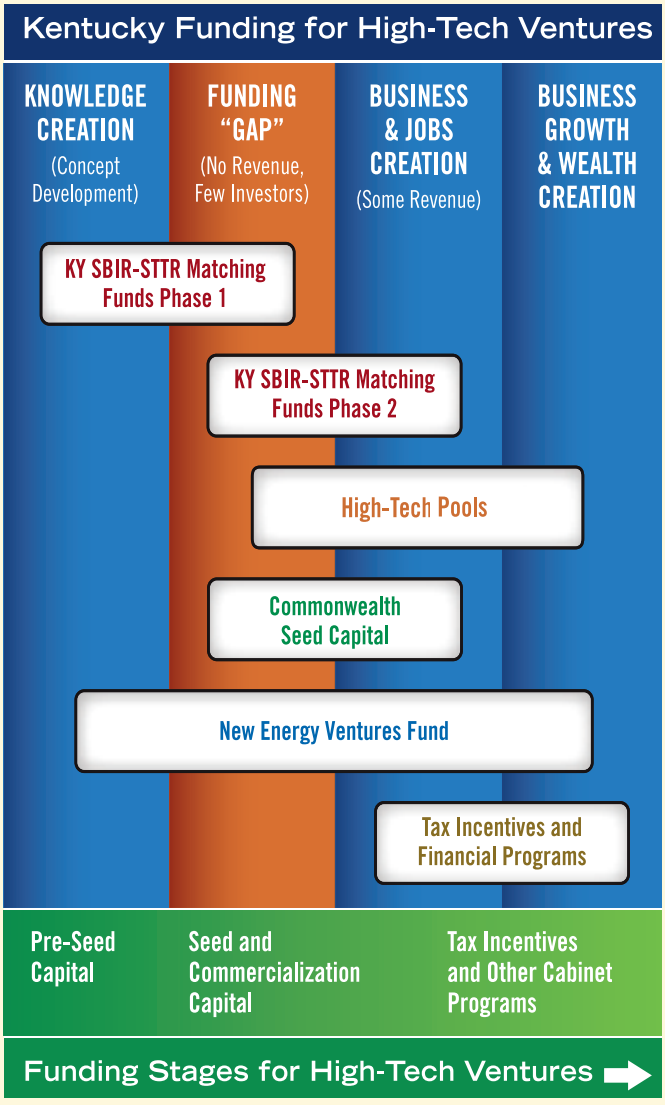
Kentucky's Resources for Technology-Based Ventures

A wide range of public funding and business support programs help Kentucky create and grow over 120 new high-tech ventures each year. From pre-seed, seed and commercialization funds, to tax incentives and other programs, Kentucky has the resources and infrastructure in place to help innovators and entrepreneurs succeed at every stage of growth.

A statewide network of Innovation and Commercialization Centers (see map) offers entrepreneurs advice and help in starting a company and finding funding. State funding is available to qualifying Kentucky-based companies (and those willing to move to Kentucky).

Since 2001, the Cabinet for Economic Development, through its Department of Commercialization and Innovation (DCI), has invested over $150 million in high-tech companies, initiatives and projects that have created thousands of high-paying, high-tech jobs statewide. For details, visit **ThinkKentucky.com**.





Tax Incentives and Financial Programs

KENTUCKY offers a variety of progressive tax incentives and financial programs for companies in high-tech fields and traditional industries.

On June 26, 2009, Governor Steve Beshear signed into law House Bill 3, Incentives for a New Kentucky (INK), which streamlined and modernized Kentucky's business incentive programs.

The legislation significantly expanded a program for Kentucky manufacturers who need to make a significant capital investment in their facilities in order to remain competitive. The bill also consolidated four long-standing incentives into a single, more flexible tax incentive program for new and expanding businesses; provided a sales and use tax refund for companies that are heavy users of computer and telecommunications equipment; and expanded the Kentucky Enterprise Initiative Act to allow sales tax refunds on electronic processing systems that cost $50,000 or more.

Kentucky also offers an array of credits and grants to help businesses train employees, upgrade facilities and equipment, and make other improvements to stay competitive in today's global economy.

The Cabinet for Economic Development is ready to provide companies with assistance in evaluating and selecting sites, obtaining permits and licenses, meeting regulatory requirements, and growing sales – both domestically and internationally.

Whether a company is just starting up or is an established business looking to expand or relocate, the Cabinet for Economic Development has the expertise and experience to facilitate the process. For more information, visit **ThinkKentucky.com**.

CABINET FOR ECONOMIC DEVELOPMENT

Department of Commercialization and Innovation

SBIR-STTR Matching Funds

KENTUCKY'S unique Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Matching Funds program has drawn attention nationwide. It matches both Phase 1 and Phase 2 federal awards received by Kentucky's early-stage, high-tech businesses (and those willing to move to Kentucky).

Phase 1 federal awards are matched up to $100,000 to support studies on the technical feasibility of a technology. Phase 2 federal awards support full-scale research and development and are matched by Kentucky up to $500,000 per year for up to two years.

Solicitations are held regularly and the applications are evaluated by a panel of independent experts.

For guidelines and access to the online application, visit **ThinkKentucky.com/dci**.

New Energy Ventures Fund

BY enabling Kentucky companies to undertake research, development, and commercialization in the fields of alternative fuels and renewable energy, the Kentucky New Energy Ventures (KNEV) fund is helping make the Commonwealth a leader in clean energy innovation.

DCI manages the KNEV program, which provides grants of $30,000 each to qualifying Kentucky-based companies (and those willing to move to Kentucky). Larger awards involve investments of $250,000 to $750,000 each. Companies must provide matching funds for both grants and investments.

Solicitations are held regularly and the applications are evaluated by independent experts.

For guidelines and access to the online application, visit **ThinkKentucky.com/dci**.

High-Tech Pool

HIGH-Tech Pool funds are used for projects with a special emphasis on creating high-tech jobs and knowledge-based companies that can help build research-intensive industries in Kentucky. The awards average $100,000 to $250,000 and are available to Kentucky high-tech businesses (and those willing to move to Kentucky). Funding agreements include milestone dates by which the projected new high-tech jobs must be created.

High-Tech Pool awards are for companies with more developed technologies that are already progressing well in the commercialization process.

Applications are accepted year-round and selected award candidates must be approved by the Kentucky Economic Development Finance Authority. For more details, visit **ThinkKentucky.com/dci**.

Commonwealth Seed Capital

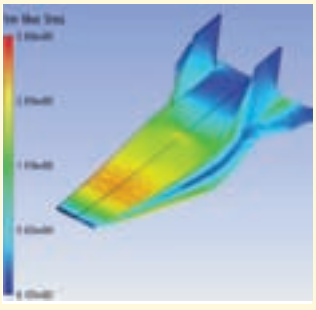
COMMONWEALTH Seed Capital (CSC) is dedicated to creating high-tech jobs by investing state funds as seed capital in promising high-tech companies.

CSC supports companies that are based on innovation, have a meaningful Kentucky presence, and are expected to generate significant profits for the investors.

The CSC fund also invests in other venture capital funds that actively invest in early-stage Kentucky high-tech companies.

CSC is usually not the lead investor, but instead seeks deals where there is substantial investment by other funds and investors. Typical investment is up to $250,000 per round.

Applications are accepted by CSC year-round and selected deals are reviewed by DCI and then approved by the CSC board. For more details, visit **ThinkKentucky.com/dci**.

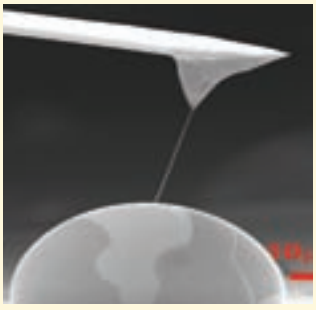


Advanced Dynamics

"Our software firm moved to Kentucky from Utah to receive matching funds for our federal SBIR and STTR awards."
Patrick Hu, CEO

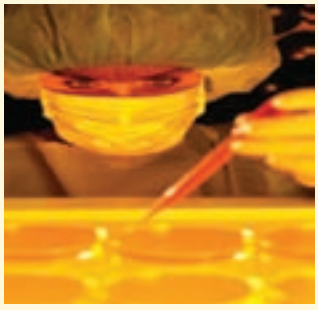
East Kentucky Biodiesel

"The KNEV grant is helping us develop a mobile biodiesel plant to process waste cooking oil from local institutions."
Nathan Hall, Founder and Managing Member



NaugaNeedles

"High-Tech Pool funds helped us finish our Needle-Probe advanced manufacturing system and purchase quality control equipment."
Mehdi Yazdanpanah, CEO



ApoImmune

"CSC funds are helping ApoImmune develop a vaccine that triggers a patient's own immune system to fight their cancer."
Steve Downey, CEO

Awards are subject to the availability of funds allocated for each program.

Rebecca Weatherford/NKU photos

Dr. Mark Bardgett is the psychological science professor at Northern Kentucky University.

Working for a Cure

Dr. Mark Bardgett hopes to cure Alzheimer's, while leading his students along the way

BY KALI BELL AND RYAN CLARK

WHEN **Dr. Mark Bardgett** was growing up he watched his grandmother suffer from Alzheimer's disease. Today, the psychological science professor at Northern Kentucky University focuses his research on neuroscience, or the science of understanding how the brain affects behavior.

His goal? To find an effective treatment for Alzheimer's – so people like his grandmother could one day have a cure.

"I am extremely grateful to be able to continue my research and also extend opportunities to undergraduate students and graduate students to get hands-on experience with these projects," Bardgett says. "I'd like to develop more courses in the area of neuroscience, even ones that have applications for education and business, and to someday expand the neuroscience minor to a major."

Since 2000, Bardgett has been researching these topics at NKU.

"I was attracted to NKU since it seemed to be a growing university with a great tradition of collegiality among faculty, students, and administrators," he says. "I also saw much better opportunities to get students involved in my research here versus other universities and to work across disciplines to create a novel research program and novel educational programs."

Bardgett and his graduate students have also studied the effects of exercise and its impact on laboratory mice who have sustained damage to the hippocampus, the part of the brain responsible for short-term memory. NKU has provided Bardgett and his team with an extensive laboratory and equipment that enables them to perform this work. As a result, their research led to a recent discovery – that exercise can, in fact, help the brain create new neurons.

Since Dr. Bardgett has been at NKU, he has served on grant review committees for the National Institutes of Health, and his studies have been published and referenced in numerous scientific journals. But Bardgett doesn't do it all for the fame.

"Kentucky ranks low in the U.S. in terms of output or success in the area of biomedical research," he says. "The Kentucky – Idea Network of Biomedical Research Excellence is funded by the National Institutes of Health and is aimed at getting more faculty members and students engaged in two areas of biomedical research – neuroscience and genetics. By fulfilling this goal we hope to attract more researchers to come and teach at NKU and to attract gifted students to NKU."

Bardgett owes his career to what he did in school. "My goal is to give students the same opportunities I had as a student – transformative opportunities that gave me the confidence to pursue a career in research," he says.

Recently NKU was one of six Kentucky universities to share in a $2.8 million grant from the National Institutes of Health, part of which will help Bardgett continue to achieve his goal.

"The majority of the merits are to reward the hard work of the students here at NKU," he says.

Bardgett and his graduate students have studied the effects of exercise and its impact on laboratory mice who have sustained damage to the hippocampus, the part of the brain responsible for short-term memory.

NKU's Dr. Hazel Barton and a select group of her students spent the summer in Kentucky caves investigating White-Nose Syndrome, a disease caused by a fungus that has killed more than a million bats in the Northeast.

Saving the Bat Population

Dr. Hazel Barton and NKU students hope to find why bats are disappearing

BY RYAN CLARK

WHILE some students and professors were off on vacation this summer, **Dr. Hazel Barton** and her students at Northern Kentucky University were doing something a little different.

"I spent my summer vacation investigating one of the biggest wildlife crises of our time," says Barton, the Ashland Endowed Professor of Integrative Science and Associate Professor of Biological Sciences at Northern Kentucky University.

Barton and a select group of her students spent the summer in Kentucky caves investigating White-Nose Syndrome, a disease caused by a fungus that has killed more than a million bats in the Northeast.

"Bats are a vital part of our ecosystem, and their disappearance could have a profoundly negative impact on human health and agriculture," Barton says. "The work we're doing is aimed at preventing the spread of this fungus and protecting bats before it reaches this area."

It is just another way Barton is helping to improve our world. Barton has explored caves on five continents, studying microorganisms to research cures for antibiotic-resistant diseases. She coordinates an active undergraduate research laboratory, including a National Institutes of Health-funded study examining microbial responses to starvation, and a National Science Foundation-funded project examining the energetic interactions of bacteria in cave environments. She is currently a Fellow – and past director – of the National Speleological Society and the recipient of an NSF CAREER Award.

In her research she works to find cures to some of mankind's most confounding diseases by searching for antibiotics in caves, because bacteria develop antibiotic properties that fight off other bacteria. Finding new bacteria may find new cures, and according to the National Institutes of Health, there may never be a more important time. Some 90,000 people die from infections each year. Seventy percent of these infections are resistant to at least one of the drugs most commonly used to treat them.

Barton also studies how microbes can live in extremely harsh places, such as caves, with very few nutrients. And this may also give us clues about how to search for life on the planet Mars.

Originally from Bristol, England, where she started exploring caves near her home, Barton has been featured in many journals and publications such as *National Geographic Explorer*, *Forbes* and *Outside*, as well as on National Public Radio, BBC Radio and television shows like "Animal Planet" and the IMAX movie "Journey into Amazing Caves."

She and her students descend into caves to drill core samples or sample the walls with swabs, which they then streak on to petri dishes.

This fall, the U.S. Fish and Wildlife Service awarded six grants of more than $800,000 to determine the cause and stop the spread of White-Nose Syndrome.

"Most people don't realize that once bats are gone, it leaves a hole in the ecosystem," Barton says. "We need to stop this now, before it reaches our area."

The grant money has been awarded through the USFWS Preventing Extinction program. Since its discovery in New York in 2006, officials say White-Nose Syndrome has killed more than a million bats of six species in nine states. The disease has now spread to Virginia and West Virginia.

Experts are concerned the syndrome will seep into Kentucky and Indiana.

"Nearly 25 percent of all mammalian species in the U.S. are bats," Barton says.

And the average bat eats about 600 insects a night – insects that carry disease like the West Nile Virus.

So Barton and her students are testing a compound to see if it can be used to kill the white-nose fungus without wiping out the critical fungal communities that form the foundation of cave ecosystems.

"It's something we need to work to solve now," she says. "If we don't, and the bats disappear, everyone will feel the effects of it."

UNIVERSITY OF KENTUCKY

Research for Better Health and a Cleaner Environment

WE'D like to tell you about a few of the projects under way at the University of Kentucky that are part of the university's $336 million-a-year research enterprise. Researchers at UK continue to develop new medical treatments, improve the environment, solve manufacturing problems, and enhance the lives of Kentuckians. Our research also leads to new products that become the basis for high-tech startups which provide jobs for graduates and fuel our economy.

The projects and initiatives described below present just a snapshot of the exciting and innovative research under way. For more information, including research featured in Odyssey magazine, see **research.uky.edu**.

—Dr. James W. Tracy
Vice President for Research

UK Attracts 33 New Cancer-Fighters

Kentucky is crippled by cancer. Our state ranks first in lung cancer and second in colorectal cancer. UK researchers are battling cancer on several fronts, and the university just added an impressive group of cancer fighters who have followed accomplished surgeon and prolific researcher **B. Mark Evers**, who was recruited to become the new director of the UK Markey Cancer Center, from the University of Texas to UK.

Led by Evers, 32 researchers and technicians who specialize in colorectal, colon and breast cancers have recently set up shop at UK. And Evers intends to recruit even more cancer experts: "Building up areas where Kentucky has significant problems in terms of cancer is the fastest way to make a difference."

Since coming to Lexington in April, Evers has hit the ground running. He is heading up the new SPORE (Specialized Program in Research Excellence) grant in gastrointestinal cancers awarded by the National Cancer Institute to the Markey Cancer Center. The three-year, $1.5 million grant is one of six GI SPOREs in the nation.

"This grant will help the Markey Cancer Center's gastrointestinal cancer research program stand out as one of the most accomplished in the country," Evers says. "As both a gastrointestinal surgeon and a cancer researcher myself, I am honored and very pleased by the recognition this grant represents."

Smoke-Free Successes

College of Nursing Professor **Ellen Hahn** is perhaps Kentucky's best-known crusader for smoke-free workplaces. Her research has led to 14 communities with comprehensive smoke-free laws, protecting 30 percent of Kentucky's population. "Lexington's law resulted in 16,500 fewer smokers for an estimated annual healthcare cost savings of $21 million," Hahn says. A subsequent study also found that Lexington's smoke-free law did not have an impact on overall employment, or business closures or openings.

A year later, Hahn headed up a study in Louisville that led to enactment of a comprehensive smoke-free workplace ordinance that took effect in July 2007. In February 2008, she found that there was a 97 percent decline in air pollution linked to secondhand smoke in Louisville businesses after implementation of the comprehensive law. "Louisville's law is very strong. A 97-percent decline is huge."

Most recently, back closer to home, Hahn is co-chair of the Tobacco-Free Campus Task Force at the University of Kentucky. UK became tobacco-free last November. The tobacco-free policy includes all forms of tobacco, including hookah, cigarettes, cigars and smokeless tobacco.

Capturing Solar Energy the Cheap & Easy Way

For **John Anthony** the future is here. UK's Hubbard Professor of Chemistry, he is developing a solar energy panel that will be fueled by spray-on solar cells. Such a panel would be cheap and would transform sunlight into home energy power even on cloudy days.

The problem with the current generation of solar cells is that they are unwieldy and expensive. And the cost could easily top $10,000 – money you won't recoup in energy savings.

Anthony is working on a carbon-based material that could be spread on something like Saran Wrap that you could simply stretch across your roof. He believes these carbon-based cells can also be configured to produce

electricity from fluorescent light instead of sunlight and cover a shelf, desktop or other surfaces in an office, using the light powered by conventional electricity to create more electricity.

The Department of Defense is interested in another focus of Anthony's research – solar cells that could be spray painted onto the sides of a surface in the field. "Special forces soldiers carry about 14 pounds of batteries. Since they don't have the capability of recharging them in the field, they have to carry replacements," Anthony explains. "We're trying to replace those 14 pounds with a couple little cans of spray paint. Soldiers could spray out their solar cell during the day, plug their batteries into it, go to sleep, and when they wake up could pick up their charged batteries; then they'd be off and running."

Targeting Lignin for Biofuel

Making fuel from biomass – a.k.a. plant material – is nothing new. Cellulose, a component of the cell wall, is the main target for biofuels production today. While cellulose is good, lignin is better. Lignin, the plant cell component that gives corn stalks their rigidity, is more energy dense than cellulose. Cellulose is easily fermented to alcohol, but lignin is not.

A four-year, $1.98 million American Recovery and Reinvestment Act grant from the National Science Foundation will fund a project to develop efficient thermochemical (heat and pressure) methods to convert lignin by deconstructing lignin at the molecular level, and engineering plant cells to make it easier and less energy-intensive to process lignin into fuels and chemicals.

Biomass potentially could produce more than 60 billion gallons of fuel annually – replacing nearly a third of the gasoline Americans use.

The lignin project, which will employ 100 scientists and students, is based at the UK Center for Applied Energy Research (CAER) and headed by CAER Director **Rodney Andrews**. The research team includes **Mark Meier** (chemistry), **Seth DeBolt** (horticulture), and **Mark Crocker** and **Samuel Morton** (CAER).

Part of the group of cancer-fighters who have followed new Markey Cancer Center director B. Mark Evers from the University of Texas to UK. Evers is pictured second from left, back row.

UNIVERSITY OF KENTUCKY

Economic Development at the University of Kentucky Begins with Technology Commercialization

Every industry leader I talk to says the future of the U.S. economy lies in innovation and creativity. Building a Kentucky economy that is innovative and creative is at the heart of the University of Kentucky's economic development efforts.

Through the programs and services of our Office for Commercialization & Economic Development, UK is playing a critical role in moving the Commonwealth forward as we bring new technologies to the marketplace, create new businesses, and provide new job opportunities for our graduates.

—Lee T. Todd Jr.
University of Kentucky President

UK Ranks No. 1 in Starting Technology-based Companies

More start-up companies are formed by University of Kentucky faculty and staff entrepreneurs than at any of UK's 19 benchmark institutions per $10 million in annual research expenditures, according to the Association of University Technology Managers. UK climbed from 39th to 7th among all public and private universities for creating new technology-based businesses.

"There is no question that our faculty and staff entrepreneurs are playing a major role in commercialization at UK," says Commercialization & Economic Development Vice President **Len Heller**. "Out of 19 new licenses last year, 10 went to faculty and staff who have their own start-up companies."

In total, UK had 151 licenses last year that generated $1.7 million in gross revenue. The top licenses were for an equine therapeutic for protozoal myeloencephalitis, plant biotechnology, and a superconducting magnetic stirrer. UK has 307 active patents, with a strong portfolio in drug development & design, plant biotech, equine health, and materials for medical implants, drug delivery systems and medical devices.

UK President Lee Todd and UK cardiologist Dr. John Gurley, who had the idea for Therix Medical, were among the 140 who attended the 1st Annual Clinician Innovation Day.

UK College of Engineering professor Kozo Saito leads the Institute of Research for Technology Development (IR4TD). Saito and his team of scientists and students are building partnerships with engineers in companies around the world to solve industry problems.

Business Development Center Opens in ASTeCC Campus Incubator

The Von Allmen Center for Entrepreneurship, UK's nexus for business development on campus, has opened new offices in ASTeCC for faculty, staff and students who want to start a business based on their research and ideas. Services include technology assessment, assistance with business plans and obtaining funding, marketing strategies, and growth planning. UK's business development team is lead by **Dean Harvey** and includes **Pat Powell**, director of the Lexington Innovation & Commercialization Center, who focuses on early stage businesses from both UK and the Lexington community. Powell's office is at Commerce Lexington, which partners with LFUCG and UK in the Bluegrass Business Development Partnership.

UK's Next Success Story: Therix Medical

UK HealthCare clinicians can now turn their ideas to improve patient care into products thanks to a new commercialization initiative that was unveiled last fall during the 1st Annual Clinician Innovation Day. Clinicians will work with an experienced business team in a privately funded company called Therix Medical to develop their concepts for medical devices and diagnostics. Therix will launch the resulting products in the marketplace either through licensing to industry or creating a start-up company. UKCED partnered with UK cardiologist **Dr. John Gurley** to develop the clinician innovation initiative and Therix Medical.

For more information on the UK Office for Commercialization & Economic Development, including news, programs and services, see **www.EconDev.uky.edu**. Email EconDev@uky.edu to subscribe to the quarterly e-news, **UKEconDevNews**.

UK's Coldstream Research Campus Connects Business and Research

Redundant Power and Fiber Optics Available First Quarter 2010

Coldstream Research Campus is now positioned in the top tier of research parks in the Midwest with the addition of redundant power and fiber optics. This important infrastructure enhancement, financed primarily with a $5.5 million grant from the Kentucky Economic Development Finance Authority's High-Tech Investment Pool, ensures that if one source of power malfunctions, a second can pick up the slack without interruption. Fiber optics provide some of the highest Internet connection speeds possible, letting companies share large amounts of data quickly with suppliers, partners, researchers and customers.

"We know that redundant power and fiber optics are important to the types of companies we want at Coldstream – data and technology centers, biotech and pharmaceutical research labs, and equine testing and diagnostic facilities," says **Len Heller**, UK vice president for Commercialization & Economic Development.

Nanotech-Based Topasol Partners with Major Coatings Manufacturer

UK researcher Uschi Graham, front, and two of Topasol's senior scientists, Ken Partymiller and Rajesh Khatri, test scratch resistance of their coatings.

UK Center for Applied Energy Research scientist **Uschi Graham**, who moved her company from UK's ASTeCC campus incubator to Coldstream last year, is partnering with large coatings manufacturer PPG to develop nanoparticle-based additives designed to enhance a range of coating materials. The new low gloss and abrasion resistant nanocoating will have applications in solar cells, LCD displays, and paper and pipe substrates, as well as automotive and aerospace top coats. Topasol's international R&D team of four Ph.D.s, lead by principal research scientist Rajesh Khatri, also developed a breakthrough design on impact sensor nanocoatings for aircraft exteriors for the Navy. Other projects include developing smart coating systems that have the ability for visual impact recognition.

Allylix is using molecular genetics, biochemistry and structural biology research from the University of Kentucky College of Agriculture and the Salk Institute for Biological Sciences to produce low-cost natural products called terpenes for a variety of markets, including clean fuels and fuel additives.

Equine Diagnostic Lab Reopens as New Business

UK graduates **Jennifer Morrow** and **Amy Graves** went from employees to entrepreneurs when they opened Equine Diagnostic Solutions LLC (EDS) at Coldstream last fall. The two had worked for IDEXX/ Equine Biodiagnostics until the company merged the Coldstream lab with one in California.

New owners Jennifer Morrow, back, and Amy Graves prepare samples to be tested.

Now, with the addition of a full-time employee, EDS is back in business performing specialty diagnostic tests not usually available from veterinarians. EDS uses technology originally developed in the labs at the UK Gluck Equine Research Center, part of the College of Agriculture. **David Granstrom** founded the original company, Equine Biodiagnostics Inc., in 1995 to test for equine neurologic diseases, including Equine Protozoal Myeloencephalitis. Morrow and Graves plan to develop second generation tests through new partnerships with UK.

For more information on the news and developments at UK's Coldstream Research Campus, see **www.UKColdstream.com** and **UKEconDevNews**.

UK College of Agriculture Research Touching All Kentuckians

Jamie MacLeod is part of a team of geneticists at UK's Maxwell H. Gluck Equine Research Center making important discoveries in equine genomics.

FROM finding innovative ways to protect the nation's food supply to discovering new bioenergy potential and unlocking equine genomics mysteries, UK College of Agriculture researchers impact Kentuckian's lives.

Fostering Biofuel Discoveries

A recent Brookings Institute analysis showed Louisville and Lexington as two of the nation's top carbon emitters, largely due to the fact the state produces 95 percent of its energy from coal.

"Kentucky is ground zero in the United States for bioenergy agriculture when you bring marginal lands into the equation," said **Seth Debolt,** assistant professor UK College of Agriculture Department of horticulture. "Kentucky has limited options for electric power production from low carbon sources such as solar thermal, photovoltaic solar, wind, geothermal and hydroelectric. Our research shows using native, warm-season grasses on marginal, otherwise abandoned agricultural lands, we can reduce greenhouse gas relative to gasoline and substantially increase renewable energy production in the state."

Debolt is working with UK Forage Extension Specialist **Ray Smith** and **Mike Montross**, faculty member in the UK Biosystems and Agricultural Engineering in the study that could lead Kentucky to a decreased reliance on fossil energy.

UK Researchers Continue Efforts to Secure U.S. Food Transportation

For nearly four years, UK College of Agriculture researchers have been working toward improving food safety and defense measures associated with bulk milk transport. Their efforts also are streamlining the information gathering process associated with farm milk pick-ups and deliveries to processors.

Fred Payne from the UK Biosystems and Agricultural Engineering Department and **Chris Thompson**, UK Regulatory Services milk coordinator, have been guiding a team of researchers from UK, Western Kentucky University and the University of Louisville to develop and test an electronic system to secure milk transported from producer's farms to processors.

"The system is designed to incorporate security and accountability with the electronic locks, which will interact with other parts of the system to only allow legitimate users, such as a milk hauler, inspector, etc., access to the tanker," Thompson said. A comprehensive prototype system was extensively field tested in Kentucky during 2007-08. More recently, the milk data collection part of the system was tested in New York in October and an optimized version, including the milk data collection system and the electronic locking system on the tank, was field tested in Kentucky in November.

"This system will provide enhanced security for the safe transport of milk and other bulk liquid food products across the country," Payne said.

Equine Genomics Leadership

In 2006, UK scientists provided key leadership to sequence the horse genome. When scientists study a single hereditary trait, it's called genetics, however when they study all the genes, it's called genomics. The complete DNA sequence of the horse is available on the Internet for use in research. Genes control the response of cells in routine activities or in response to stress caused by infections, damage or management.

Geneticists at UK's Maxell H. Gluck Equine Research Center are using tools from the horse genome sequence to solve horse health problems

Jamie MacLeod, holder of the Knight Endowed Chair for Equine Musculoskeletal Diseases, investigates changes in gene action for all 21,000 horse genes when cartilage tissue is undergoing repair. MacLeod's work may suggest a way to augment treatment and speed recovery.

Cytogeneticist **Teri Lear** investigates reduced fertility in mares based on genomic rearrangements detectable at the chromosome level. **Kathryn Graves**, Animal Genetic Testing and Research Laboratory director, provides parentage testing for horses as well as genetic-marker testing for a wide array of hereditary traits in horses and dogs. Work in her laboratory uncovered the genetic basis for a skin disease in American Saddlebred Horses.

UK Genomics and Immunogenetics Professor Ernest Bailey supervises several students who use genomics tools to discover and understand the genetics of coat color, swayback, dwarfism and laminitis in horses.

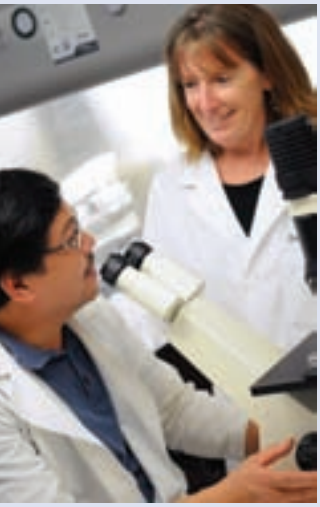
"The most exciting aspect of equine genomics," Bailey said, "is that these new tools will speed the work in all fields, including infectious diseases, reproduction, nutrition, toxicology and performance."

This tanker is the result of research aimed at providing enhanced security for the safe transport of milk and other bulk liquids in the United States.

UNIVERSITY OF KENTUCKY

Bench, Bedside and Beyond:
Research at the UK College of Health Sciences

AT the University of Kentucky College of Health Sciences, research comes full circle. Researchers are not only busy studying everything from human reproduction to aging, and muscle function to cancer at the lab bench, but are also taking their knowledge to the bedside and into the community. By working with clinicians, other investigators, caregivers, patients and their families, our researchers are making sure that even those in rural areas have access to the latest research information relevant to their care.



Dr. Charlotte Peterson is the Associate Dean for Research at the College of Health Sciences. Her funded research projects focus on maintaining muscle function during aging and with disease. She is the top funded researcher in the college and is the co-director of the University's Center for Muscle Biology.

This effort to affect the daily lives of individuals comes at a time when the college has strengthened its commitment to building an internationally recognized research enterprise.

In 2006, the College of Health Sciences broke into the top 20 in NIH research funding among colleges of allied health for the first time in the college's long-standing history. That same year the college increased overall research funding by more than 60 percent. Through cutting-edge research, we are now working to continually increase research support in order to find better, more effective ways to improve health.

Becoming a Top 20 university enables us to strengthen Kentucky communities and better the lives of Kentucky residents; however, we want our research to extend beyond the bounds of the state. At the College of Health Sciences, research is underway that explores new approaches to help patients navigate complex health care issues. Researchers are also developing a network of care providers for patients and developing innovative strategies to educate teachers, all of which will ultimately impact the standard of care and quality of life in rural America.

Many research projects in the college start with basic science at the bench, such as work in infertility and its causes.

In addition to working with communities in the state and around the nation, researchers in the college are joining together to bridge the two departments of the college – Clinical Sciences and Rehabilitation Sciences. We are finding creative ways to make a difference by utilizing the knowledge of our internationally renowned researchers and collaborating with health care partners. Our three major areas of research are Reproductive Health, Voice and Language Disorders, and Frailty and Disability Prevention

Importantly, all of our projects have a strong translational component, so they are directly relevant to clinical care. Our research will lead to novel intervention and rehabilitation strategies that will improve health and function by reducing illness and disability.

We are truly impacting scientific progress, care for patients and the community at large by focusing on the bench, the bedside and beyond.

UK College of Health Sciences

- Approximately 40 percent of regular title series faculty in the college have funded research projects underway.
- In 2006, the college increased research funding by more than 60 percent.
- All researchers in the college work on interdisciplinary and collaborative projects with other UK colleges and various institutions around the world.
- Three young investigators in the college were recognized nationally for their research contributions in 2009.

EDS Co-owner Amy Graves, MT (ASCP)

Millinda Fowles, Kentucky Small Business Development Center photo

Turning the Economic Tide

Kentucky Small Business Development Center accelerates Kentucky's economy

THE Kentucky Small Business Development Center (KSBDC) is a network of 17 service centers located throughout the Commonwealth that help start-up and existing businesses succeed by offering high quality, in-depth and hands-on consultations; comprehensive planning and market research; and expert-led entrepreneurial workshops. KSBDC clients:

- Increase profits through aggressive business strategies
- Decrease risk due to extensive research and analysis
- Grow sales through vital network development
- Gain access to experts on funding sources

Client Focus:

Equine Diagnostic Solutions LLC

Jennifer Morrow, Ph.D., and **Amy Graves**, MT, have over 20 years of combined experience in equine diagnostic testing. Jennifer Morrow earned her Ph.D. in Microbiology from the University of Kentucky and went on to direct laboratory services at Equine Biodiagnostics Inc. This company commercialized diagnostic testing developed by researchers at UK's Gluck Equine Research Center for the puzzling equine disease named EPM. Two years later, Amy Graves brought her educational expertise in animal and clinical laboratory science and her passion for horses to the company.

Equine Biodiagnostics Inc. was eventually sold to a private investor who sold it again to a large corporation. In early 2009, the corporation decided to close the equine operations in Lexington to focus on its core business. This eliminated seven jobs. With their experience and passion, Dr. Morrow and Ms. Graves knew they could develop a business model that would be profitable. They began working on plans to open their own reference laboratory.

Consultants with Bluegrass Small Business Development Center worked with Dr. Morrow and Ms. Graves on researching financial statements from other laboratories in the industry and prepared financial projections. The SBDC gathered names of commercial lenders focusing on medicine and orchestrated meetings between Dr. Morrow, Ms. Graves and lenders to pursue financing. They received the necessary funding for equipment, supplies and working capital to start Equine Diagnostic Solutions LLC (EDS).

With the SBDC's help and assistance from UK's Office of Commercialization and Economic Development, the newly formed EDS opened its doors on the Coldstream Research Campus. Diagnostic testing started on August 7, 2009.

Known for their testing expertise, high throughput and elevated laboratory standards, the EDS staff has previously collaborated in a number of university and industry based equine research projects and plans to participate in future studies with their new laboratory. Additionally, EDS is available as an outlet for universities to commercialize diagnostic tests developed by their researchers in equine veterinary science.

Dr. Morrow and Ms. Graves intend to work with veterinarians to identify opportunities for surveillance and better diagnostics of equine infectious diseases. One practical project is the investigation of alternative sampling methods for such diseases as foal pneumonia, caused by Rhodococcus equi. Testing currently requires a tracheal wash, an invasive procedure which can be difficult on young horses.

The mission of EDS is to provide relevant and timely diagnostic testing in a combined effort with veterinarians and researchers to reduce the economic impact of infectious diseases on the equine industry.

Generating Positive Economic Returns for Kentucky

	FY 2008	FY 2009	TOTAL
Loan Dollars	$24.9 million	$49.4 million	$74.3 million
Sales Growth	$53.5 million	$88.7 million	$142.2 million
Tax Revenues Generated	$4.2 million	$7.2 million	$11.4 million

$10.86 was returned for every dollar invested in the KSBDC consulting services.

Researchers Work to Improve Lives of Young Kentuckians

Staton-Tindall receives NIH grant

Dr. Michele Staton-Tindall was recently awarded a grant from the National Institutes of Health/National Institute on Alcoholism and Alcohol Abuse to examine the feasibility of using telemedicine technology to deliver an evidence-based alcohol intervention (MET) to rural offenders re-entering the community from prison.

Hazardous use of alcohol is a considerable problem in rural areas, and a primary correlate of problem alcohol use is the limited access to and availability of health and behavioral services. In the absence of available and accessible re-entry alcohol interventions, rural offenders with a history of hazardous drinking are at heightened risk for alcohol relapse and recidivism when they return to the community. Subsequently, their children and families may also be at considerable risk.

The study includes screening and recruiting rural offenders with a pre-incarceration history of hazardous drinking, baseline interviews within one-week of prison release, and randomization to one of two study conditions: 1) Motivational Enhancement Telemedicine (METelemedicine) delivered in the local parole office and combined with usual re-entry services, or 2) Re-entry services as usual.

Outcome data will be collected at three months post release to examine number of days of alcohol abstinence at re-entry. In addition, because the majority of participants are expected to be parents, a number of measures are being integrated into the study in order to better understand the experiences of children of alcohol users during the community re-entry process.

The long-term objective of this research is to increase access to effective treatment approaches for rural re-entering offenders in order to promote alcohol abstinence, reduce recidivism, and improve the lives of offenders, their children, and their families.

Professor focuses on suicide prevention

Dr. Julie Cerel

Julie Cerel, Ph.D., an assistant professor in the College of Social Work, focuses her research on suicide prevention. Suicide is the 11th leading cause of death in the United States with more than 33,000 Americans dying by suicide each year. About 600 Kentuckians die by suicide each year, making Kentucky the 16th worst state in terms of rate of suicide deaths. Suicide is the second leading cause of death among college students and for every suicide death in young people, it is estimated that there are more than 100 attempted suicides.

Those left behind, often called "survivors," are one focus of Dr. Cerel's research. Her work as part of the state's Substance Abuse and Mental Health Services Administration (SAMHSA) funded youth suicide prevention grant found that 60% of Kentucky residents knew someone who had attempted or died by suicide, 40% knew someone who had died by suicide and 33% felt they were intimately affected by the suicide of someone close to them.

In October 2008, the University of Kentucky was awarded one of 17 SAMHSA grants for suicide prevention on college campuses. The UK Increasing Networks for Campus Awareness to Suicide and Emergencies Program (UK-IN-CASE) is under the direction of Dr. Cerel (**uky.edu/socialwork/incase**).

UK-IN-CASE expands current prevention and gatekeeper training efforts, increases awareness and availability of mental health services to students and better links the various means by which students access support and mental health resources at UK. In addition to Cerel's leadership, the project, which requires 100% local match funding, will include substantial support from **Dr. Mary Bolin-Reece** and the UK Counseling and Testing Center staff. UK-IN-CASE brings together current efforts between the university's student affairs, academic affairs and the medical center enterprises.

Preventing violence in Kentucky schools

Communities across Kentucky are about to embark on an unprecedented five year research project in 26 high schools across the state with a mission to reduce violence among high school students. Implementing a new prevention program, Green Dot, and armed with a $2 million evaluation research grant from the Centers for Disease Control and Prevention, Dr. **Patty Cook-Craig**, Assistant Professor from the UK College of Social Work is working with a multidisciplinary research team, including Dr. **Ann Coker** from the Colleges of Medicine and Public Health and Dr. **Dorothy Edwards** from the UK Violence Intervention and Prevention (VIP) Center, to engage in this community led effort. Green Dot is a bystander education intervention, based on academic research, which was first developed and implemented on the UK campus by the VIP Center.

This project is the outgrowth of work that began over four years ago when UK's College of Social Work partnered with key stakeholders across the state to work toward increasing Kentucky's capacity to prevent sexual violence. It represents a truly translational effort between the university and the state to identify, pilot and test the effectiveness of new programming targeted at primary prevention of sexual violence. Community partners for the study will include the Kentucky Association of Sexual Assault Programs (KASAP) and local rape crisis centers throughout the state. The Green Dot study will launch in spring 2010 and continue until 2014, following freshmen throughout their four years of high school.

UNIVERSITY OF KENTUCKY

Smoke-Free Communities:
Good for People, Good for Business

UK Alumni Professor Ellen Hahn, director of the Tobacco Policy Research Program

What a great thing it would be for Kentucky to no longer be a national leader – in youth and adult smoking, that is.

In the meantime, Ellen Hahn, alumni professor in the University of Kentucky colleges of Nursing and Public Health, and director of the Tobacco Policy Research Program, works with colleagues and communities to reduce or eliminate secondhand smoke exposure.

Secondhand smoke alone kills 53,000 in the U.S. annually, making it the third leading cause of preventable death. Smoke-free ordinances and regulations in communities such as Lexington and 23 other Kentucky communities (**mc.uky.edu/tobaccopolicy/Ordinances/Smoke-freeOrdinances.htm**) are resulting in cleaner air and fewer visits to hospital emergency departments for problems such as asthma attacks and heart problems.

Results of a study published in October 2009 by Hahn and colleagues showed that eliminating secondhand smoke exposure via smoke-free laws decreased emergency department visits for asthma by 22 percent. This was the first study to find a link between smoke-free laws and reduction in emergency visits for asthma in the general population.

"Our findings add to the growing body of scientific evidence that smoke-free laws are good for public health in that they reduce emergency visits for asthma and health care costs and improve quality of life," Hahn said.

On the economic front, the most common objection to smoke-free ordinances relates to fears that business revenues will take a big hit. It's a common argument, Hahn says, but findings from as far back as 1993 don't support the contention. New York City's 1995 Smoke-free Air Act had no adverse effects on restaurant employment, and restaurant employment growth was three times higher than in the rest of the state from 1993 to 1997. Gross restaurant sales in Flagstaff, Arizona, increased 16 percent one year after a smoke-free ordinance.

So what about Lexington? Two economists, one of them **Donald Mullineaux** – a professor in UK's Gatton College of Business and Economics – found that restaurant employment increased after the Lexington law took effect, while the average number of bar workers remained stable.

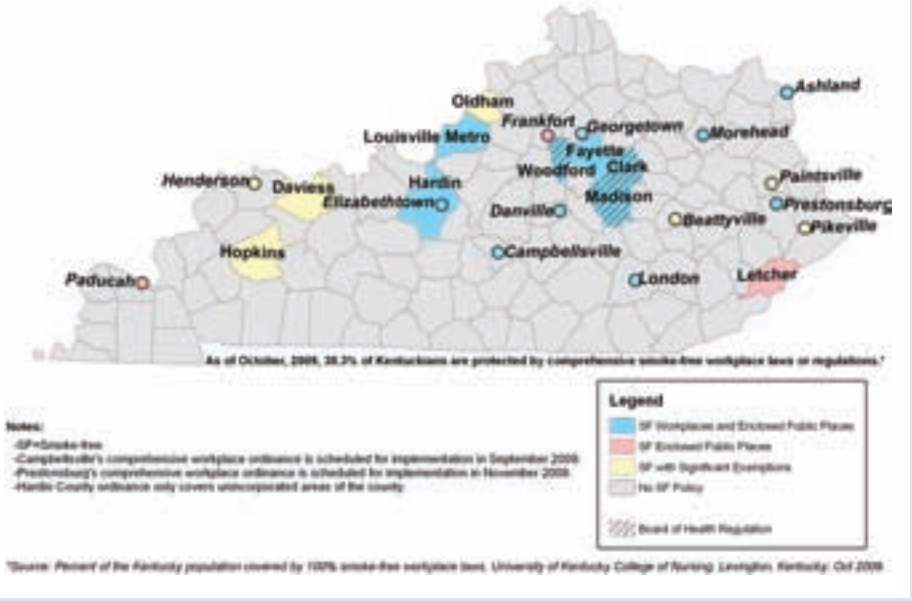
Is Hahn's next goal to move her smoke-free crusade onto a state platform? "It would seem to follow, wouldn't it, that with the consistent data we've gathered in Kentucky's largest cities and smaller communities, we'd be knocking at the door of the legislature soon, advocating for a strong, state smoke-free law," says Hahn. "The problem is, too many Kentuckians aren't ready for that yet."

Hahn says timing is everything. When Ohio, Georgia, and Tennessee passed statewide smoke-free laws, they didn't start enacting ordinances in enough smaller communities first. She says it's crucial to "prepare the way" through education about health benefits and local debate about local solutions, especially in rural communities.

"So we are building support at the local level for comprehensive smoke-free laws that cover all workplaces. Someday, when more Kentuckians are accustomed to being smoke-free at the local level, we will be ready for the General Assembly to consider a statewide smoke-free law that covers all workplaces. Just think of the immense health benefits. Think about how the $21 million per year that's been saved in Lexington in health care costs would translate to the entire commonwealth."

Visit the Kentucky Center for Smoke-free Policy at **kcsp.uky.edu** or follow the group on twitter: **twitter.com/kysmokefree**!

Strength of Smoke-Free Laws and Regulations in Kentucky Communities



High-Tech Facilities Under Development at the University of Kentucky

Staff photos

University of Kentucky Albert B. Chandler Hospital

The $525 million first phase of construction for the new 1.2 million s.f. UK Albert B. Chandler Hospital is one of the largest construction projects in state history, not just in terms of size – but in the impact it will have on Kentucky's economy and health. It is the cornerstone for a 20-year, $2.5 billion plan on the south side of campus to construct an academic medical campus of the future that will further accelerate growth in research and health education.

Architectural firms GBBN and AM Kinney are coordinating the project at the local level, while drawing on the design talents of national health care architects Ellerbe Becket. Utility infrastructure engineers are Staggs and Fisher Consulting Engineers, and AEI is the building design engineering firm.

University of Kentucky College of Pharmacy

The University of Kentucky College of Pharmacy will open a new 286,000 s.f. state-of-art facility targeted for completion in early 2010. The $132 million building will be the largest academic building in Kentucky and among the largest in the nation.

The five-story building will include academic and research facilities for educating future pharmacists and pharmaceutical scientists as well as providing laboratory space for faculty's pharmaceutical and clinical research programs.

Messer Construction is the construction manager, architects are EOP Architects, and Ellenzweig is the design architect and lab planner. The building will enable the college to increase enrollment of its nationally top-10 ranked pharmacy program. The college currently enrolls 490 students in its doctor of pharmacy (Pharm.D.) professional program.

University of Kentucky Livestock Disease Diagnostic Center

The UK College of Agriculture recently "topped off" its $28.5 million renovation of the Livestock Disease Diagnostic Center. Upon completion of renovation and expansion in Fall 2010, the center will contain over 65,000 s.f. The project's construction manager is Congleton-Hacker Company.

Spaces that inspire. . .
Ideas that work

ID&A, Inc.
155 E. Main
Suite 100
Lexington, KY 40507
859-255-7595

1700 S. 5th St.
Louisville, KY 40208
502-562-9255

ID&A
1229 E. Virginia St.
Evansville, IN 47711
812-422-7811

HermanMiller

www.id-a.com

Your single source for facility solutions

Increase *performance*

Workspace that maximizes your critical assets…

Reduce *fixed costs*

People
Technology
Real Estate

Maximize *your investment*

201 East Main Street, Suite 1000
Lexington, Kentucky 40507
(859) 231-8780 | www.mwlk.com

Business Law ☐
Government Access ■
Healthcare Regulation ☐
Real Estate ☐
Litigation ☐

HOW THE LAW PAVES THE WAY FOR ECONOMIC DEVELOPMENT.

THIS IS AN ADVERTISEMENT

McBRAYER
McBrayer, McGinnis, Leslie & Kirkland, PLLC
ATTORNEYS AT LAW

Get connected.