

RESEARCH | KENTUCKY

2016

TODAY THE LABORATORY, TOMORROW THE MARKETPLACE

Kentucky universities are developing
new formulas for economic growth



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The Lane Report

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2016



UNIVERSITY OF LOUISVILLE

With UofL's investment in new research returning an average of 1,127 percent, it has won grants to create a center for translating research into commercial products. Current undertakings involve nanotechnology, the impacts of drama programs on education, cancer treatments that assist the immune system, and a micro-factory for public-private collaboration.



UNIVERSITY OF KENTUCKY

UK expects completion in 2018 of a new \$265 million research facility that will focus on addressing Kentucky's health challenges via multidisciplinary collaboration across healthcare researchers, public health, behavioral science, agriculture extension, economics and engineering. Outreach by UK to elementary school students in Clay County aims to develop the researchers of tomorrow.



EASTERN KENTUCKY UNIVERSITY

EKU is creating a research center to access the commonwealth's old growth Appalachian forests. Other research is examining optimization of brain-injury treatments, and improvement in fermentation processes used by the state's rapidly growing craft breweries, distilleries and wineries.



WESTERN KENTUCKY UNIVERSITY

Teams at WKU are working to develop wearable environmental monitors, to perfect an app for older adults that incorporates exercise and health education into bingo games, to solve engineering problems with innovation that can be commercialized, and to educate residents about the unique groundwater geology of karst regions.



KENTUCKY STATE UNIVERSITY

KSU has ongoing undergraduate research that focuses on: organic and sustainable agriculture, health and food safety, and aquaculture. KSU is nationally and internationally recognized for its aquaculture research to improve the productivity and income generation from farmed water resources.

RESEARCH | KENTUCKY 2016

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Kentucky's universities working with business to commercialize research and technology

Kentucky's research, technology and commercialization efforts remain a key element in the state's continuing economic growth.

Research Kentucky is Lane Communications' effort to bring academic research and profitable entrepreneurship together for common benefit. Each biennial issue of the publication is designed to provide Kentucky's business, professional, political and civic leaders with updates on the activities and successes of research initiatives.

Research Kentucky also supports the state's official economic development, business recruitment and retention efforts.

Kentucky's economic future and competitiveness in the global marketplace are directly connected to these important research activities.

Knowledge-based technologies are the catalyst for Kentucky's future long-term prosperity.

Dick Kelly
Publisher/CEO
Lane Communications

From the Desk of President James R. Ramsey

We work every day at the University of Louisville to be a premier, nationally recognized metropolitan research university.

Since 2000, the university has spent \$11 million on pilot research projects with our faculty using that money to help secure another \$208 million in funding from outside sources. That's an average return on investment of an amazing 1,777 percent.

This means that people around the world realize that the University of Louisville is conducting groundbreaking research that is worthy of their investment. And our research generates results.

It also means UofL researchers are doing work that has real world implications and is helping people lead better and more productive lives.



We're innovators and leaders in the treatment of cancer. We're studying psychological changes in nursing home patients. We're setting the pace in nanotechnology and advanced manufacturing. And we're promoting and supporting the next generation of entrepreneurs through the development of new research parks and the formation of new corporate partnerships.

The work that we do in the lab and in the classroom sparks economic development, creates jobs and means more opportunity for our students, faculty and staff. Perhaps most importantly, our research makes life better for all of us and our families.

UofL Reaps Big Dividends from Research Investments

The University of Louisville's investment in new research resulted in an average return on investment of 1,777 percent. Since 2000, UofL spent a total of \$11 million on pilot research projects with faculty using that money to help secure another \$208 million in funding from outside sources such as the National Institutes of Health or private investors.

"The world understands that our faculty are developing new technologies and doing groundbreaking research" said UofL President James Ramsey. "Our faculty just need a little money to leverage the big bucks that not only get their ideas off the ground, but pay dividends for the university and our local economy as well."

The pilot research program funding also led to 77 awarded patents, licenses for 47 technologies and 32 startup company launches. The return on investment numbers compiled by the office of the Executive Vice President for Research and Innovation cover the past 15 years – a time when state funding for higher education and university research declined. But during that same period, UofL pumped money into research, awarding 445 grants ranging in value from \$5,000 to \$225,000.



Student and faculty researchers in the Department of Pharmacology and Toxicology are working on a variety of projects including plant-based pharmaceuticals.

There are many examples of success stories of faculty researchers who used these small research initiation grant programs to attract prestigious research grants, including:

- Dr. Suzanne Meeks, Dept. of Psychological and Brain Sciences – \$2.1 million to study psychological changes in nursing home residents
- Dr. Nobuyuki Matoba, Dept. of Pharmacology and Toxicology – \$1.5 million to study plant-based pharmaceuticals
- Dr. Ayman El-Baz, Dept. of Bioengineering – \$1.4 million to develop diagnostic techniques for lung cancer
- Dr. Carolyn Klinge, Dept. of Biochemistry and Molecular Genetics – \$2.9 million to investigate molecular mechanisms in breast and lung cancer
- Dr. Terry Scott, Dept. of Special Education – \$6 million for research and personnel development

"The real winners, though, are the rest of us, whose lives will improve because of the new discoveries in medicine, bioengineering and other fields" Ramsey said.



UofL Wins Trifecta in Efforts to Commercialize Research

The University of Louisville is the only university in the nation with a trifecta of grant programs that support translating research into viable commercial products.

UofL was one of three institutions in the United States selected as a Research Evaluation and Commercialization Hub (REACH) by the National Institutes of Health. The REACH award consists of \$3 million over three years from the NIH, matched by an additional \$3.1 million from UofL.

The university also received a three-year, \$300,000 grant from the National Science Foundation to create a center to strengthen the regional innovation and

entrepreneurship ecosystem. The NSF Innovation Corps (I-Corps) Site supports moving technology into the marketplace by providing infrastructure, training and other resources.

Along with the REACH and I-Corps grants, UofL received Coulter Translational Research Partnership grants that help researchers commercialize their discoveries.

The I-Corps Site program is a multidisciplinary partnership between the J.B. Speed School of Engineering and the College of Business's Forcht Center for Entrepreneurship. Robert Keynton, PhD, chair of the Department of Bioengineering, is principal investigator and Forcht Center director Van Clouse, PhD, is co-principal investigator.

Paula J. Bates, PhD, a researcher with the James Graham Brown Cancer Center, is principal investigator on the REACH grant. Eugene Krentsel, PhD, acting director of UofL's Office of Industry Engagement, and Donald Miller, MD, PhD, director of the cancer center, are co-principal investigators.



Undergraduate students participate in research projects across UofL's campus.



University of Louisville Interim Provost Neville Pinto announces a multimillion dollar grant in partnership with the University of Kentucky to create a national center of excellence in micro/nano technology.

UofL, UK Win Large Federal Grant, Join New National Network

The University of Louisville received a highly competitive \$3.76 million grant to create a national center of excellence in micro/nanotechnology. UofL is collaborating with the University of Kentucky on the grant, which is one of just 16 awarded to universities by the National Science Foundation. The two universities join a new national network that makes university facilities, tools and expertise in nanoscale science, engineering and technology available to outside users.

The five-year grant will allow for upgrades to eight key nanotechnology and advanced manufacturing facilities at UofL and UK, add staff to support up to 500 new external users and engage more minorities and women in nanoscale science, engineering and technology.

Kevin Walsh, director of UofL's Micro/Nanotechnology Center, pursued and landed the grant award. "The next generation of commercial, medical and industrial

products will contain embedded tiny sensors and miniature wireless communication electronics," Walsh said. "New manufacturing technologies will need to be developed so these smart products can be made quickly, reliably and economically. UofL and UK are tackling those challenges."

Drama Takes Center Stage in Research

The arts have always been a vital part of a well-rounded education, and it's no different at UofL. Two recent research projects illustrate the importance of drama in the classroom and for an audience.

First, Louisville theatregoers have a chance to share how their audience experience affects them – and how it may change their lives long-term, thanks to a collaborative research project with UofL and Actors Theatre of Louisville. The National Endowment for the Arts awarded \$15,000 for the three-year project to gauge audience engagement with the play-going experience. The multidisciplinary research explores psychological well-being among audience members.

Suzanne Meeks, UofL's psychological and brain sciences chair, and Russell Vandenbroucke, theatre arts professor – ATL patrons themselves – are leading the three-part, mixed-methods study. People who attended any ATL performance received an online survey to complete in summer 2015, and those who agreed to be contacted further were asked to participate in focus groups and discuss their experiences in depth later.

"Actors Theatre is thrilled to support Drs. Meeks and Vandenbroucke on this study that we hope will quantify what we in the arts already strongly believe: that artistic programming positively impacts the well-being and lives of our patrons beyond the theatre walls," said Jennifer Bielstein, managing director of Actors Theatre of Louisville.

The study fits with Meeks' gerontological research that explores late-life "flourishing." For Vandenbroucke, who approached ATL about collaborating on the grant, the project represents his longtime interest and involvement in community engagement – an interest that both College of Arts and Sciences professors share. "I'm interested in the broader community impact of social science," Meeks said.

Meanwhile, students at UofL's College of Education and Human Development are focusing on using drama and storytelling to better prep children for kindergarten.

The PNC Grow Up Great Fellows program, funded by a \$247,186 grant from PNC Foundation, brings together UofL, StageOne Family Theatre and Jefferson County Public Schools, to help train future teachers to engage youngsters by borrowing from the world of theater.

About 10 fellows—all of them UofL early childhood/elementary education majors—are selected each fall semester to help at-risk, pre-kindergarten students at JCPS's DuValle Education Center and Unseld Elementary. The UofL fellows work closely with StageOne to hone performance skills and learn how to engage children in the learning process.

A pilot program last fall proved preschoolers who participate in the program are able to quickly step into roles that require them to use math, literacy and social skills to solve problems. To date, nearly 400 children have taken part in the innovative program.



UofL seniors and PNC Fellows Catherine Dirksen, left, and Whitney Thompson-Martin, demonstrate theatre techniques while teaching a class through the PNC Grow Up Great Fellows program.

UofL at the Forefront of Developments in Treating Cancer

From the way medication is packaged to cell-blocking cancer treatment drugs, the University of Louisville's James Graham Brown Cancer Center, a part of KentuckyOne Health, brings patients therapies and innovations available nowhere else.



Jason Chesney, MD, PhD, deputy director of the Brown Cancer Center.

Among those is Keytruda (pembrolizumab), manufactured by Merck for patients with advanced or inoperable melanoma who no longer respond to other drugs. As a site for Keytruda's clinical trial, the Brown Cancer Center was the first in Kentucky to offer the drug in trials and upon Food and Drug Administration approval. Keytruda is the first drug in the United States blocking a cellular pathway known as PD-1 that restricts the immune system from attacking melanoma cells.

It represents a new breed of cancer treatment, said Jason Chesney, MD, PhD, Brown Cancer Center deputy director and UofL's principal investigator on the trial.

"Keytruda galvanizes an immune system attack on tumors by blocking the PD-1 pathway. Left unchecked, this pathway allows cancerous cells to pass undetected."

Another development is innovative packaging for medication given to women previously treated for breast cancer, then prescribed oral anti-estrogen therapy. Continued adherence to this therapy has long been a problem, despite the efficacy of these drugs, with a national adherence rate of 89 percent in the first year of treatment falling to 50 percent by the fourth year.

To help patients comply with therapy, Medical Oncologist Beth Riley, MD, designed new packaging. Rather than distribute the drugs in pill bottles, as has been customary, Riley worked with the Health Sciences Center pharmacy to develop a "bubble pack" with each pill marked by day, much as birth control pills are. Riley's Bubble Study using the experimental packaging lasted from 2012-2014. Despite a 39 percent withdrawal rate from the study, the overall compliance rate was 97 percent. Future plans include continued examination of the benefits of the bubble pack as funding allows.

"Adding to the body of research on new treatments exemplifies the Brown Cancer Center's leadership on a regional, and even national, level, helping citizens throughout the Commonwealth and beyond with increased access and new hope to fight cancer," said Mark Milburn, vice president, oncology services, KentuckyOne Health.

Building Research Opportunity

The University of Louisville continues to develop research parks and form corporate partnerships that will transform the city and provide faculty and students with avenues for furthering their research and education.

The 39-acre Belknap Engineering and Applied Sciences Research Park will house research facilities for the J.B. Speed School of Engineering, office space for applied sciences researchers and areas for private



businesses to collaborate with UofL on a variety of projects. The first building constructed will house components of the Institute for Product Realization. The park eventually will have five to seven buildings with a total of nearly one million square feet of research, development and office space.

Other parks, including the J.D. Nichols Campus for Innovation and Entrepreneurship, provide facilities and space for research opportunities. The campus, located near UofL's Health Sciences Center downtown, houses a variety of life sciences, aging care and innovative start-up ventures, as well as a



technology hub for computer coding classes. The ShelbyHurst Office and Research Park in eastern Jefferson County is home to academic buildings including UofL's Center for Predictive Medicine for Biodefense and Emerging Infectious Diseases, as well as office buildings for public tenants.

Along with facilities, corporate partnerships play a large role in advancing research at UofL. For example, the university partnered with GE and an Arizona-based company, Local Motors, to open the FirstBuild micro-factory on the Belknap Campus as a place where engineers, entrepreneurs, designers and members of

the local community can collaborate to make better appliances.

Similarly, UofL and global safety science organization UL recently teamed up to develop a first-of-its-kind international facility for the training and certification of additive manufacturing professionals. Adjacent to FirstBuild on the Belknap

campus, the joint venture UL Additive Manufacturing Competency Center advances manufacturing knowledge and workforce expertise.

In addition, UofL constructed its own micro-factory to enhance opportunities for faculty, students and those in the community with an urge to tinker.

UNIVERSITY OF LOUISVILLE®

Unique UK Research Facility to Address State's Health Disparities

Images courtesy of UK



Rendering of new research building expected to be complete in 2018.

THE NEW BUILDING, SCHEDULED FOR COMPLETION IN 2018, WILL BE LINKED TO OTHER MAJOR RESEARCH SPACE ON CAMPUS, FURTHER FOSTERING MULTIDISCIPLINARY WORK.

University of Kentucky President Eli Capilouto, former Gov. Steve Beshear and other state legislative leaders last year announced the beginning of work on a research facility unique in the country – a building dedicated to addressing health challenges and disparities in Kentucky.

The facility – scheduled for completion in spring 2018 – is a \$265 million building. Half of the funding is coming from the state of Kentucky; half is coming from university resources, including private gifts.

Two unique areas of focus will distinguish the building:

- Its focus on Kentucky challenges, particularly health disparities in areas such as a cancer, diabetes, heart diseases, drug abuse and other health conditions where the state is among the country's leaders in incident rates.

- Its fostering of multidisciplinary research across numerous fields – health-care researchers (both basic and clinical),

public health, behavioral sciences, agriculture outreach and extension, economics and engineering – working in close proximity and collaboratively to develop solutions to these complex problems.

The design and focus of the building come with a specific scientific underpinning:

The new facility will focus work and attention on health disparities in Appalachia, a region with some of the most pronounced rates of chronic diseases in the country.

The building will also be linked to other major research space in the heart of the campus, the Bio-Pharmacy Building and the Biomedical/Biological Sciences Research Building, further fostering collaborative and multidisciplinary work. Being referred to as the “Appalachian Translational Trail,” this connecting conduit will house the nucleus of translational researchers who bring together all disciplines.



Kentucky legislators who helped celebrate the groundbreaking of the new research building left to right: Rep. Rick Rand, Rep. George Brown Jr., Rep. Ruth Ann Palumbo, Senate President Robert Stivers, UK President Eli Capilouto, former Gov. Steve Beshear, Rep. Rocky Adkins, Sen. Reginald Thomas.

Community Research Partnership Inspires Young Scientists from Rural Kentucky

A group of Eastern Kentucky fourth- and fifth-grade students have partnered with University of Kentucky researchers to study circadian rhythms, or body clocks.

Students from Manchester and Oneida Elementary Schools in Clay County, Ky., became scientists alongside the research team of Jody Clasey, Ph.D., professor of kinesiology and health promotion, and Karyn Esser, Ph.D., professor of physiology. The students wore Fitbits and temperature monitors and recorded their daily activity, sleep and eating habits in a data notebook.

Clasey and Esser are analyzing the data collected to learn more about the relationship between circadian rhythms, activity, eating, and weight in children. The project is funded by a pilot grant from the UK Center for Clinical and Translational Science. Additional support is provided by the UK Barnstable Brown Diabetes and Obesity Center, the UK Center for Muscle Biology and the UK Pediatric Exercise Laboratory.

A community partnership from the beginning, the UK research team and Clay County educators worked together to plan the project in a way that would be beneficial to everyone involved. For



Researchers from UK partnered with Clay County elementary students to gather data about weight, physical activity, and circadian rhythms in children.

Clay County educators, the collaboration presented a unique educational opportunity for their students to get hands-on experience with the scientific process.

Teachers incorporated the project into science and math lessons to enhance their own curriculum.

“Each day they would record their sleep time, what they had for breakfast. It was all on a schedule,” said Leisa Frazier, a third-grade science teacher at Oneida Elementary School. “We used a lot of charts and we graphed results – how many people brought their buttons back, maybe how many people went to bed at so and so time, and we compared those as we went along the cycle.”

For Clasey, learning more about circadian rhythms and weight in children will be a beneficial outcome of the project, but she hopes for other outcomes, too.

“My real long-term goal is that maybe in a few years I’ll have one or more of the Clay County Clock Study children sitting in my classroom, and they’ll say ‘I remember when we came to UK to see what you do as scientist,’” she said. “To have that kind of impact and then to actually see that happen – that would be incredible.”



Clay County elementary students who participated in health research with UK faculty were rewarded with a field trip to campus, where they toured science labs including seeing how the brain works.

Eastern Kentucky University is known first and foremost as a teaching institution, but that instruction is often informed by cutting-edge research that impacts our quality of life and economic growth in our communities. Here are three prominent examples among many:

Lilley Cornett Woods: Remote Locale, Global Significance

Tucked in a picturesque valley in far southeastern Kentucky, at the edge of the commonwealth's longest-preserved old-growth forest, is a new facility set to welcome scientists from across the region and country and enable "sustained, high-impact research of global significance."



Lilley Cornett Woods is now home to a research center and bunkhouse/kitchen to accommodate visiting scientists.

Assisted by a \$300,000 grant from the National Science Foundation, ECU recently opened a 1,500-square-foot Research and Learning Center at Lilley Cornett Woods in Letcher County. ECU funded the construction of an adjacent 800-square-foot bunkhouse and kitchen to house up to 10 visiting scientists.

The recent additions were greeted enthusiastically by researchers from various academic disciplines as well as by educators at all levels, according to Dr. Stephen Richter, associate professor of biological sciences and associate director of the ECU Division of Natural Areas.

"I've had faculty, students, administrators and others from ECU and elsewhere tell me that they can't wait to have a place to work and sleep down at Lilley Cornett Woods," he said.

Less than 1 percent of all forested areas in the eastern U.S. is old growth, and the relatively high biodiversity in eastern Kentucky opens opportunities to link on-site and regional research to national and global research in such areas as climate change, carbon sequestration and cycling, ecological system modeling, environmental adaptation in response to landscape change, and large-scale ecosystem monitoring and analysis.

Researchers have flocked to the ECU-owned and managed Lilley Cornett Woods for 45 years, and for good reason. "It's one of the most unique, data-rich deciduous forest research sites in eastern North America," Richter said. "The new facilities shift the level of research from somewhat

sporadic to a potential for sustained, high-impact research of global significance."

Increasingly in recent years, the site has drawn researchers from outside ECU, including college students from across the nation. The research center will better facilitate long-term projects that require data and samples to be processed immediately, rather than taken back to a lab elsewhere.

Much of the research will continue to focus on "disturbance ecology" in eastern Kentucky.

"Lilley Cornett Woods is situated in a landscape of high biodiversity but also where large-scale ecological disruption is

occurring despite a relatively poor understanding of its effects on biodiversity and ecosystem function," Richter explained. "We also know relatively little about the human health consequences from the airborne and waterborne contamination caused by these impacts. Research at this site can close gaps in our understanding of how these large-scale ecological changes affect the land, air and water."

For more information, contact Richter at stephen.richter@eku.edu.

Tanea Reed: Brainwork

Approximately 10 million people worldwide have suffered a traumatic brain injury (TBI). Although there is no known cure for TBI, immediate medical attention and proper post-therapeutic strategies are critical to reducing the chance of a progressive secondary injury.

Finding that optimal treatment is the passion of Dr. Tanea Reed of the ECU chemistry faculty. Reed was the principal investigator as ECU played the leading role in a recently-completed \$394,000 National Institutes of Health grant that examined a potential glutathione (GSH)-based therapeutic at several time points to determine the best course of protection against progressive secondary TBI injury.

Especially in rural areas, such as eastern Kentucky, where the time of transport to a hospital can be lengthy, the use of a neuroprotective agent such as gamma glutamylcysteine ethyl ester (GCEE) could be invaluable in cases of moderate TBI, according to Reed, assistant professor of chemistry at ECU and principal investigator for the three-year, \$394,000 NIH grant.

"Immediate medical attention after an incident is most beneficial for patient recovery," Reed said. "Since TBI is a sudden injury, post-therapeutic strategies are the only viable approach to therapy. Preliminary data show a significant reduction in oxidative stress levels when GCEE is administered 10 minutes post TBI," Reed said, adding that early management of injury is the best preventative measure of progressive secondary injury.

Although she couldn't share full details, pending publication, Reed said the research stemming from her grant will pinpoint the "golden hour" at which treatment is most beneficial, as well as recommend dosages. "We have also observed that this treatment reverses oxidative stress in cultures exposed to oxidants. We have also showed several key energy-related proteins that are affected that have their activities restored post treatment. These are, overall, very positive findings."

Reed is now focusing her efforts on combination therapies (treatments using two or more drugs) to further reduce oxidative stress.

Infants and the elderly are most susceptible to TBI, and brain injuries occur commonly in combat situations. But, as any sports fan knows, you can scarcely watch a game or turn on a sportscast these days without hearing the word "concussion." It's even the title of a major motion picture.

Reed welcomes the extra attention on the topic.

"The movie and the new regulations regarding head injuries and professional athletics have truly shined a light on this research and made the need for a treatment strategy more urgent," she said.

For more information, contact Reed at tanea.reed@eku.edu.



Dr. Tanea Reed headed a recent NIH grant to study treatment of traumatic brain injuries.



EKU's New Science Building will be home to a new Fermentation Science program.

Fermentation Science: Tapping into Growth Industry

A new academic program at EKU is tapping into rapidly growing interest in craft breweries, distilleries and wineries across the Commonwealth.

Besides building leadership capacity in the workforce by offering courses leading to a fermentation science concentration in chemistry, the program includes a critical research component designed to help the growing industry manufacture the best possible products.

For example, research by Dr. Christian Paumi, assistant professor of chemistry, is focused on oxidation of beer and wine and how changes in the manufacturing process can extend the lifespan of beverages once they are bottled.

Paumi is also working with an EKU colleague, forensic biologist Dr. Jamie Fredericks, to identify yeasts that contaminate facilities, whether breweries, distilleries and even ethanol production facilities.

"The worse the contamination, the more vigorous the treatment. We hope we can decrease the treatment and, consequently, the down time."

Research, often involving private partners in the industry, will also center on those yeast strains unique to Kentucky.

Chemical analysis aside, mere taste testing can also help manufacturers. Once the program is launched in Fall 2016, those testings on and possibly off campus (open only to those 21 and older) will be a "fundamental measurement" of quality.

Program Director Dr. Darrin Smith said he envisions the program's quality control lab in EKU's state-of-the-art New Science Building as an "incubator" servicing entrepreneurs testing their products, whether beverages or biofuels, before market launch.

In addition to its industry partners, the program also hopes to team with EKU's Department of Agriculture "to see how different feedstock processes translate to products."

"Fermentation has produced a variety of commodities for centuries but, still, active areas for scientific investigations are possible," Smith said. "Academia can play a vital role in educating future employers and entrepreneurs about the scientific basis, quality management, responsible use, and the industry's role regarding fermentation."

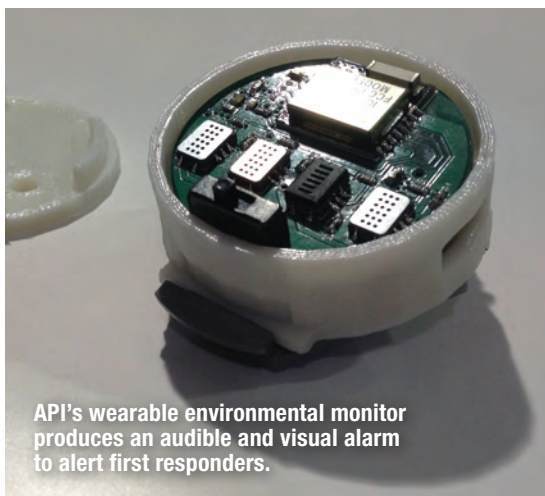
For more information, contact Smith at darrin.smith@eku.edu.



Environmental Monitor for First Responders

Dr. Vladimir Dobrokhoto and his research group from the Applied Physics Institute of WKU have developed a new technology that will provide first responders with access to rapid and reliable environmental monitoring. Several techniques were used in order to develop a novel, wearable, highly integrated sensory system for the simultaneous monitoring and wireless transmission of environmental data signals in real time. This light and compact system allows fully automatic operation, and is set up to generate an audible and visual alarm in case of an environmental

threat. Advantages of the new system include the ease of deployment, low power consumption, low cost, small size, and flexible integration with other wireless sensors or devices. Novel microfabrication techniques were utilized to successfully miniaturize the electronic nose, increase the number of sensing elements, reduce power consumption, and expand the range of detectable gases. High gas analytical power is provided in the form of a small and inexpensive module capable of characterizing chemical states immediately. This new technology will help to prevent a variety of dangerous incidents and could save thousands of lives. The Kentucky Science and Technology Corporation provided funding for this project.



API's wearable environmental monitor produces an audible and visual alarm to alert first responders.



Exercise with Bingocize®

WKU Assistant Professor of Exercise Science, Dr. Jason Crandall, has used the popular game of bingo to create an active and engaging health promotion program called Bingocize®. Crandall and his research team found significant improvements in physical function in older adults who adhered to this innovative program that incorporates bingo, health education, and exercise. The U.S. Department of Health and Human Services Administration on Aging found the Bingocize® program met the minimal level criteria for evidence-based disease prevention and health promotion programs. The Healthy Communities Institute also recognized the program as an evidence-based practice. Bingocize® has been successfully implemented at facilities across western and south central Kentucky and in seven other



Helen Summers (left), does resistance exercises during a break in a game of Bingocize at the Roosevelt House in Owensboro, Kentucky.

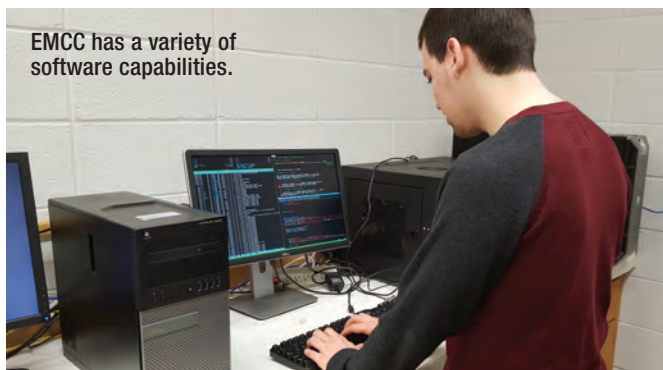
states. In 2014, Dr. Crandall, Dr. Matthew Shake, Assistant Professor of Psychological Sciences, and Dr. Guangming Xing, Professor of Computer Science, received a Kentucky Commercialization Fund grant from the Kentucky Science and Engineering Corporation to create a mobile application. The Bingocize® app engages older adults in a fun activity that can improve physical functioning, health knowledge, and even elements of cognition. Pilot testing of the mobile app is currently underway at senior centers in the area.

WKU Engineers Respond to Needs of Industry

The WKU Engineering-Manufacturing-Commercialization Center (EMCC) responds to the needs of industry and manufacturing by solving engineering problems and assisting with innovation and commercialization. The center has a wide range of capabilities and expertise including machining, PCB Design and Manufacturing, and Software Design. Since the creation of the center approximately three years ago, the EMCC has worked with over eighteen companies to solve engineering and manufacturing problems. Fifteen inventors have received assistance with product improvement and creation of prototypes. The Center (which includes staff members Dr. Stacy Wilson, Ron Rizzo, Wade Decker, and Kyle Moss) has received three external grants to develop and commercialize new technologies and have assisted in one patent application and two provisional patent applications. There has been one successful spin out company and there are plans for the formation of up to three additional companies based upon products successfully developed in the center.



EMCC supports applied research such as the creation of a cyber physical system test bed.



EMCC has a variety of software capabilities.



Real-time monitoring site at Lost River Rise. Data are streamed live to the UnderBGKY.org website.

Under BGKY Designated as “Model Practice”

The UnderBGKY Karst Groundwater Awareness Campaign, made possible through a partnership between the City of Bowling Green’s Department of PublicWorks and faculty and staff in WKU’s Department of Geography and Geology, was recently selected as a “Model Practice” by the American Public Works Association (APWA). “We are very excited to have this collaborative project selected as an APWA Model Practice,” said Dr. Leslie North, leader of WKU UnderBGKY educational activities. “This designation helps to illustrate the importance of this work not only in Bowling Green, but also karst regions throughout the United States”. The City of Bowling Green and WKU partnered to educate the public about karst landscapes by combining multiple informal educational techniques, which led to the development of the

www.UnderBGKY.org website. The website has a karst and groundwater-related events community calendar, a pledge for individuals to make a commitment to reduce their impacts on our karst re-



Student Adam Shelley collects water samples from Lost River as part of the UnderBG science and education campaign.

gion, a karst “quiz” to evaluate quantitative learning outcomes of visiting and exploring the website, and a voluntary survey designed to reveal what visitors would like to see on the site. A series of infographics, created by graphics designer Jonathan Oglesby, are provided as free downloads on the website. The team has also created a series of Red is Green videos about water resources. A real-time monitoring network of rainfall and groundwater levels (stage height) at select locations within the Lost River drainage basin is under development.

Kentucky State University Land Grant Program: A Commitment to Undergraduate Experiential Learning

Kentucky State University is an 1890 Land Grant University with funds from the United States Department of Agriculture to support stakeholder-driven research efforts, and it is uniquely positioned for training students in STEM (science, technology, engineering, and math) fields.

sustainable agriculture include projects within the world's only full-time pawpaw research program as well as opportunities in vegetable and grain production, alternative fruit and nut crops, value-added product development, biofuel feedstock production, ecological entomology, alternative pesticides and water quality, meat goat production, apiculture, soil science, and Geographic Information Systems.



Mentoring undergraduate students in research programs improves critical thinking, problem solving abilities, communication skills, and confidence levels of underrepresented students.

The KSU Land Grant learning experience is supported by the 300-acre research and demonstration farm, the 300-acre Environmental Education and Research Center, the 14-acre Aquaculture Research Center, and numerous research and demonstration laboratories and experiment stations.



Photos by Charles Weibel

Mentoring undergraduate students in research programs improves critical thinking, problem solving ability, communication skills, and confidence levels of underrepresented students. USDA Evans Allen formula funds and USDA Capacity Building Grant funds support dozens of undergraduate student researcher experiences each year. Undergraduate research projects are focused on three main areas: organic and sustainable agriculture, health and food safety, as well as aquaculture.

ORGANIC AND SUSTAINABLE AGRICULTURE

New organic food markets continue to grow and alternative crops and production methods are desired by farmers. The KSU Land Grant Program's Organic Program is nationally ranked in the top 20 among 1890 and 1862 Land Grant Programs. Research opportunities in organic and

children and adults, and examining methods to keep foods safe. The Shape Up-KSU Program is offered for assessing risk factors for metabolic syndrome in African-American young adults. Cutting edge molecular biology techniques are being used to screen produce throughout the growing and shipping process for pathogens. Research on new safe techniques to cleanse fruit, fish, and vegetables of bacteria with electrolyzed water have been developed for value-added processing are ongoing.

HEALTH AND FOOD SAFETY

Undergraduate research has also focused on reducing the health risks with obesity, examining eating habits of

farming, which bring new economic opportunities to Kentucky. The Division of Aquaculture, KSU's Program of Distinction, is widely recognized as being a top-5 aquaculture program in the United States. Undergraduate research projects focus on water quality, disease diagnostics, aquaponics, pond development and management, fishmeal replacement research, paddlefish culture, freshwater prawn and saltwater shrimp culture, catfish and hybrid striped bass production, Koi breeding, and production of largemouth bass on feed.

AQUACULTURE

The KSU Land Grant Program has nationally and internationally recognized research programs in Aquaculture, or fish



Undergraduate research projects in Kentucky State University's Land Grant Program are focused on three main areas: organic and sustainable agriculture, health and food safety, and aquaculture.

Kentucky's Leader in Aquaculture Research

KENTUCKY STATE UNIVERSITY RESEARCHERS SUPPORT AQUACULTURE PRODUCTION ACROSS THE STATE

Kentucky State University is home to one of the top aquaculture programs in the United States. Known for its innovative research, KSU supports aquaculture initiatives across the state. The Division of Aquaculture is the university's Program of Distinction and the region's only full-service aquaculture program offering opportunities in teaching, research, and extension.



Kentucky State University's Division of Aquaculture is the university's Program of Distinction and one of the top aquaculture programs in the United States.

The goal of the Kentucky State University aquaculture research program is to increase the aquaculture knowledge base of producers across the state and thereby facilitate increases in farm income and the productivity of on-farm water resources in Kentucky and around the world.

This is accomplished by examining and developing production technologies suitable for the climatic and physiographic conditions prevalent in Kentucky and similar regions. To meet these goals, the Division of Aquaculture's initial studies were directed toward the development and adaptation of pond and cage-culture techniques for channel catfish and trout as the principal species of the Kentucky fish farming industry.

The intent of the KSU aquaculture program's research, extension, and education activities is to assist Kentucky producers in this future development by investigating alternative aquaculture species that

can be produced profitably in Kentucky. The Division of Aquaculture is recognized nationally and internationally as a leading program in the areas of paddlefish culture, freshwater prawn culture, production of largemouth bass on feed, fishmeal replacement research for catfish and hybrid striped bass, aquaponics, and genetics.

Kentucky State University has worked with the Kentucky Department of Fish and Wildlife Resources on methods to reproduce endangered freshwater mussels to restock Kentucky rivers and streams. And outside of local borders, the Division of Aquaculture is involved in a project to help control a disease in West Africa.

In 1986, the Diama Dam was built on the Senegal River in West Africa to stabilize river flow, reduce drought, and support agriculture. Despite an environmental impact study predicting no problems, within five years of dam completion, the parasitic disease schistosomiasis spread rapidly among local villagers. The epidemic has now reached 80 percent prevalence in some areas. Ecologist and epidemiologists from the University of California-Santa Barbara conducted field studies, which found that the construction of the dam had blocked the spawning migrations of the local species of a freshwater prawn,



Kentucky State University's Division of Aquaculture works to increase the aquaculture knowledge base of producers across the state through innovative research.

the African River prawns, *Macrobrachium vollenhoveni*. As older prawns gradually died out, they were no longer grazing down the snail populations in the river. These snails serve as an intermediate host in the schistosomiasis parasite's life cycle. As the snail populations increased, parasite populations also increased leading to the disease outbreak.

Researchers at UC-SB approached Kentucky State University about developing aquaculture technologies needed for reproducing the native prawn for restocking. Prawns were shipped from Africa to KSU and have now been spawned and raised to juveniles in Kentucky.



The Division of Aquaculture is recognized nationally and internationally as a leading program in the areas of paddlefish culture, freshwater prawn culture, production of largemouth bass on feed, fishmeal replacement research for catfish and hybrid striped bass, aquaponics, and genetics.

Amazing Aquaponics

KSU LEADS IN INNOVATIVE RESEARCH COMBINING AQUACULTURE SYSTEMS AND SOILLESS PLANT PRODUCTION

Interest in aquaponics has grown considerably in recent years. Aquaponics combines recirculating aquaculture systems with hydroponics, essentially using fish waste as liquid fertilizer for the plants. In its most basic form, aquaponics systems include an area for fish production, a space for solids/waste removal, and a hydroponic production unit.

Aquaponics is gaining ground when compared to other food production systems. Not only are there two cash crops (fish and vegetables), but aquaponics systems use significantly less water than traditional agriculture, and the plants reach marketable size at faster rates.

Aquaponics research at Kentucky State University's Division of Aquaculture in its College of Agriculture, Food Science, and Sustainable Systems and Land Grant Program uses a raft design based on the University of the Virgin Islands system.

Grants through the United States Department of Agriculture in aquaponics research. The first evaluates the potential of bringing aquaponics into urban environments that lack access to fresh produce, also commonly called food deserts. Researchers have evaluated the growth of basil, romaine lettuce, Bibb lettuce, kale and Swiss chard under different types of indoor lighting technologies. The university's research focus has primarily been on leafy greens as they grow quickly, leading to higher profit turnover for producers than fruiting plants like tomatoes and cucumbers.

The second Capacity Building Grant is a three-year project that will incorporate research, education, and extension to build 16 aquaculture tanks inside the Kentucky State University high tunnels. These wood-framed, rubber-lined tanks present a low cost means of producing fish in high tunnels. Across the course of this research, these tanks will grow tilapia and Australian red claw crayfish. Algae from the tanks will be removed and used to fertilize plants in the high tunnels as well as evaluated as a fish feed ingredient. Kentucky State University will build two educational high tunnels in

Woodford and Fayette counties to grow fish and plants, develop hands-on educational lessons in STEM (science, technology, engineering, and math) principles, and to train K-12 educators. The project



Aquaponics research at KSU uses a raft design based on the University of the Virgin Islands system. In total, KSU has six replicate aquaponics systems that provide the unique ability to conduct replicated research trials.



Researchers at KSU have evaluated the growth of basil, romaine lettuce, Bibb lettuce, kale and Swiss chard under different types of indoor lighting technologies.

In total, KSU has six replicate aquaponics systems that provide the unique ability to conduct replicated research trials.

Kentucky State University is currently working on multiple Capacity Building

will also develop a series of how-to videos on high tunnels, building fish tanks, fish husbandry techniques, and solar technologies in agriculture.



Photos by Charles Weibel

Kentucky State University is currently working on multiple Capacity Building Grants through the United States Department of Agriculture in aquaponics research.

Legal expertise in needed whether the strategy is trade secrets, non-disclosure agreements, provisional or full patents, IP insurance – or good old first-to-market

Eric Hauck's success commercializing the Parasight System – a novel, smartphone-based technology allowing veterinarians to detect and identify intestinal parasites in less than 5 minutes – is the type of story every inventor dreams of.

"This is technology that was developed in Lexington, with assistance from some professors at the University of Kentucky, and it went from an idea in my small little head to a fully developed product that we were able to license to a publicly traded company in less than 18 months," said Hauck, founder, president and CEO of MEP Equine Solutions, which developed the Parasight System.

Zoetis, a world leader in veterinary medicine, obtained a license to produce and distribute Parasight and plans to take it to market in the third quarter of 2016.



Eric Hauck

A portrait of Eric Hauck, a man with a mustache and goatee, wearing a blue button-down shirt under a dark suit jacket. He is smiling. The background is a blurred green plant. The name "Eric Hauck" is printed in white text at the bottom right of the image.

Eric Hauck

“The pursuit of intellectual property needs to be a well-timed event within the growth and development of the company,”

said Hauck, a board member with both Lexington Venture Club and Bluegrass Angels. With an MBA and master of science in technology commercialization, he has 27 years' experience as CEO of various companies.

in order to be able to get investors in. And they become cash poor very quickly.

“On the other hand, I’ve also seen entrepreneurs who come in and they don’t do a good job of protecting their intellectual property. And suddenly they find that

others have taken their ideas. Then they no longer have any intellectual property, and finding people to invest in their company at that point becomes an issue."

Clearly, how and when to apply for intellectual property protection – which can come in the form of copyrights, trade-

Finding precisely the right time to begin pursuing protection of new IP can be tricky, Hauck said, and expensive – a challenge facing all entrepreneurs and new business start-ups.

“The pursuit of IP is both lengthy and costly, which are adversarial to starting up a new company,” he said. “That’s why the pursuit of IP has to be so well-planned, because it will be a cash-flow drain on your company – and not only a cash-flow drain but also resources, because it takes energy and company know-how to generate IP and to prosecute it.”

Pursuing IP too early can lead to financial burdens that stymie a new firm's ability to develop and market its innovation. On the other hand, waiting too long to apply for a patent or trademark runs the risk that others will infringe on your ideas.

"I've seen young entrepreneurs make mistakes both ways," Hauck said. "They think, I have to immediately secure IP, which can be a \$30,000 to \$100,000 process, but at the same time, they haven't made enough money to do proof of concept

marks, patents, or contractually via confidentiality agreements or non-disclosure agreements – can be a make-or-break decision for a new business start-up.

While there are no universal strategies for IP protection, since each individual company's market and business schemes will differ, there are some fundamental considerations to keep in mind:

1 WORK WITH AN INTELLECTUAL PROPERTY ATTORNEY YOU TRUST

"Finding the right relationship, where you feel like your (IP) attorney has the right level of expertise and knowledge to make judgments and to give you guidance is crucial," said Terry Minton, vice president of operations for Louisville-based PGXL Technologies, which specializes in developing new molecular diagnostics capabilities for the medical field.

An innovation's patentability is not a black or white issue in many cases, Minton said: "It's really an art, from both



the attorney's side and the scientists' side, to try to move things forward."

(To qualify for a patent, which typically is valid 20 years, an innovation must prove patent eligibility in one of four categories – a process; machine; manufacture; or composition of matter – defined by the US Patent and Trademark Office (USPTO). Once that threshold is crossed, the innovation further must be "useful," "nonobvious" and "novel" – terms that allow for some degree of subjectivity – compared to earlier patents.)

In many cases then, it's key to work with an attorney specializing in patent law – not all IP attorneys do – or with a patent agent registered with the USPTO to identify what innovations coming out of your firm may be eligible for patent application.

Taking time to check for eligibility can save thousands of hours and dollars, since pursuing a patent can easily cost \$20,000 or more – depending on the level of sophistication of technology being protected – in a process that often takes three to five years.

Just "getting a good handle on what they have and what they may be able to claim and differentiate as IP" is often a start-up's first step in protecting their IP, agreed Sean O'Leary, associate vice president of the Kentucky Science and Technology Corp.'s Kentucky Enterprise Fund.

② NEVER DISCLOSE YOUR IP UNINTENTIONALLY; HAVE NON-DISCLOSURE AGREEMENTS IN PLACE AS A MATTER OF COURSE

This is key for several reasons. First, any public disclosure of your company's IP begins the clock running on your ability to file for patent protection: In the U.S., a firm or inventor has just 12 months from the time of first public disclosure in which to apply for a patent. If that one-year deadline is missed, the IP becomes part of the public domain and is no longer patentable.

Non-intentionally disclosing your IP may be easier than you think: Any disclosure at trade shows counts. Sharing off-hand details about your new invention with a friendly waiter at a restaurant counts.



What's more, there's no so-called 12-month grace period for patent application internationally, meaning that any public disclosure without a patent application already in place can nullify your ability to file for a patent – at all – in foreign countries.

"To preserve all potential patent protection anywhere in the world, it's essential to at least file in the U.S. before you go to market," said Jack Wheat, an IP attorney in Louisville and partner at McBayer, McGinnis, Leslie & Kirkland.

"Public disclosure can be a bar to patentability. A lot of times we need clients to keep information confidential until we get a patent application on file," said Terry Wright, a registered patent attorney and member of the Intellectual Property and Technology service group at Stites & Harbison in Louisville.

"The rules regarding public disclosure are pretty strict," said Mandy Decker, a registered patent attorney and Wright's IP service group colleague at Stites & Harbison. "If you have non-disclosure agreements, or NDAs, in place, talking with even one person – even if it is just a waiter at a restaurant – outside of that NDA about your invention or product can ultimately jeopardize your ability to protect your rights to the IP, as drafted in the NDA contract."

"If a company can show that the inventor went to a trade show and disclosed his invention to a bunch of people, or did something else that made a disclosure not under secrecy, that can undo the benefit of the NDA," agreed Steve Hall, a partner with Wyatt, Tarrant & Combs in Louisville and member of the firm's intellectual property protection and litigation team.

"A good rule of thumb: Whatever you do, make sure you're doing it on purpose. Don't make disclosures by accident. Don't lose rights to secrecy or confidentiality unwittingly. That's one of the areas where having a good patent advisor comes into play," Hall said.

Decker advises that clients utilize contractual non-disclosure agreements or confidentiality agreements whenever they're planning to talk with any potential business partner or investor.

Her client Sam Lee said he has this made a matter of course in his day-to-day business operations. Lee is founder and CEO of Louisville-based NormaLyte, producers of an oral rehydration salt that, when mixed with water, can treat dehydration and replenish a person's electrolytes.

Before contracting with manufacturers in India, members of Lee's NormaLyte team met with them face-to-face to sign NDAs, "so that they cannot sell our formula to certain countries and continents in the world," he said.



"Before we shared any of our stuff with them, we made sure all the paperwork was in place," Lee said. "In my mind, you just can't protect yourself enough. We have everyone – even our own employees – who is working with any part of our product or who has any exposure to our IP signing an NDA. We're point blank about it: We tell them, 'This is to protect both you and me.'"

③ UNDERSTAND THE VALUE OF FILING A PROVISIONAL PATENT APPLICATION; FILE WITH DELIBERATE SPEED

In 2011, the America Invents Act changed U.S. patent application law from its previous first-to-invent standard (which relied on inventors' lab and technical records to prove date-of-idea conception) to instead now give priority for being "first-to-file" a patentable idea – in accord with international patent law.

While the "first-to-file" change has, in terms of the rule of law, made filing a patent application as early as possible all

the more important, in practice the need to file with “deliberate speed” has always been the case, Hall said.

“We’ve always told clients to move with deliberate speed,” Hall said. “When your idea is fully realized in your mind, that’s the time to move with deliberate speed to get it patented.”

Above all, Hall advised, aim to have at least a provisional patent application in place before reaching out to potential business partners or investors.

“When the person has an idea and is contemplating seeking a private funding source, whether it’s an investor, a group of investors, an angel, or an established company, I think it’s helpful to have a patent application on file before that contact is made. It’s not an absolute requirement, but I think it benefits both sides,” he said. Without that patent application in hand, Hall said, trying to litigate any potential infringement that may come out of a disclosure at such a meeting creates a “very muddy litigation picture.”



Sam Lee

cation – does not require full delineation of “claims,” which outline how the law will define future infringement by others, Hall said. Provisional patents are typically cleared in just a few months; immediately after applying, the innovator is able to use the “patent-pending” status on their property.)

While provisional patent applications can be a key tool in protecting intellectual property – essentially offering inventors’ a date stamp on their property while they build their market, further develop their innovation and prepare to apply for the full, non-provisional patent – the danger is that too many inventors attempt to file overly vague provisional patent applications, which essentially negates their value, Hall said.

“You don’t want to file something that is very thin and think, ‘Let’s see if there’s

any interest, and we’ll beef it up in a year when we go to file the non-provisional,’” Hall said. “It’s very important that you file a detailed description in the non-provisional patent application.”

Many potential investors look to ensure that a start-up firm has at least a provisional patent on file for IP before even considering investing. At times, that’s true even when the IP may not be essential to the company’s

primary product or focus, O’Leary said.

“We see companies that will patent something, perhaps not even vital to the business, as a sort of check-the-box thing, (so they can say to investors) ‘Yes, we’ve applied for this patent.’ Ultimately, investors want to see that there is something definable around the company, something

that will give it an edge that it can compete in, and in many cases, IP is sort of the proxy for that,” O’Leary said.

4 CONSIDER IP INSURANCE; THE ONUS IS ON PATENT’S HOLDER TO PROTECT AND ENFORCE IT

Once a patent is granted, it’s up to the holder to monitor for infringement and enforce its protection – but doing so often requires entering into patent litigation, which is, by all accounts, very expensive. IP insurance provides funds to pay for attorney and legal fees involved in any IP litigation defending patent claims. Thus, securing an intellectual property insurance policy early on in a new business venture can be key.

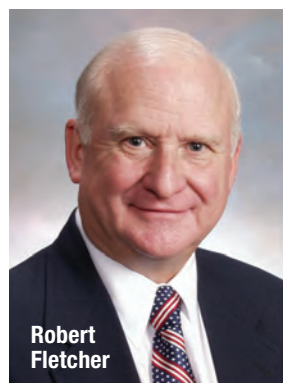
Louisville-based Intellectual Property Insurance Services Corp., or IPISC, is the industry leader in

intellectual property insurance services, providing policies to protect clients’ IP for more than 25 years.

“We, here in Louisville, dominate the U.S. IP (insurance) market at this time. Kentucky is the mecca for IP insurance at this moment,” said Bob Fletcher, president of IPISC, who moved from a career with GE to investment banking at Hilliard Lyons before buying out IPISC from Hilliard Lyons in 1990.

While other IP insurance firms have come and gone in that time, Fletcher attributes IPISC’s success to its IP-minded approach to underwriting policies.

“Other people who have tried to get into the business in the U.S. wrote the policies from a commercial point of view,” he said. “One by one we saw those competitors come into the business, take serious losses and then drop the product again. But we’ve prevailed by our strong technical underwriting. We are all technical people. We have five patent attorneys and a patent agent and a lot of technical help. So we underwrote our policies from a technical point of view.”



Robert Fletcher



(A provisional patent application is less expensive to file than a full, or non-provisional patent application and is valid for 12 months, by which time the full patent application must be filed. Provisional patent applications require inventors to describe the IP’s functionality and innovation but – unlike the non-provisional patent appli-

One of IPISC's largest successes to date was the 2014 Supreme Court ruling in which its client, Octane Fitness, won and was awarded precedent-setting defense fees against a litigating market competitor.

When evaluating whether or not the expense of obtaining an IP insurance policy is worthwhile, companies should evaluate how vital being able to enforce their patent is to their overall business success, Decker advises.

"If being in a position to enter into patent litigation to enforce your patent is a very important piece of your business model," she said, "and you don't necessarily have other funding to achieve that goal, then it may become useful to obtain some IP insurance so that you're in a position to enforce your patent if you need to."

⑤ UTILIZE CONTRACTS TO CLARIFY WHO OWNS ANY IP COPYRIGHTS OR TRADEMARKS

While the above IP discussions have centered mostly on patent-related issues, firms should understand that obtaining

copyrights and trademarks for their intellectual property are also essential.

First, while it's commonly understood that any original creative work can be said to be copyrighted immediately without actually filing for a copyright through the U.S. Copyright Office – an application process that costs roughly \$30-\$50 – those rights cannot be enforced in federal court, explained Amy Berge, an IP attorney with Middleton Rutlinger law firm in Louisville. Types of property eligible for copyright protection include written manuals, books, articles, advertising materials, websites and computer software.

Items eligible for trademarks could include a company's name, logo or tagline. Applying for a trademark through the USPTO costs around \$200-\$300, with additional attorney fees of roughly \$1,000. Trademarks are typically granted in about three months and must be renewed usu-



Amy Berge

ally every five to six years, said John Schlipp, associate professor and intellectual property librarian at Northern Kentucky University's Intellectual Property Awareness Center.

IPAC offers frequent IP workshops and one-on-one consulting – both in-person and online – to community members with IP questions.

Company names are especially important, Berge said. Companies should give careful thought to their name and work with an IP attorney to ensure it is eligible for trademark both by not infringing on others' trademarks and by meeting the legal definition of being specific and protectable versus being overly vague or generic.

"The more creative you are (in developing your name), the better able you are going to be in protecting your mark," Berge said.

For example, Wheat said, much as they might want a new distillery could not name its product "Good Whiskey" because

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that is too general and could be said to potentially apply to any whiskey on the market.

"It might look nice on a bottle, but it's too descriptive of a name to be protected by trademark," Wheat said. "Anyone in the industry could say, 'Our whiskey is good whiskey.'"

Further, companies need to be mindful up front to establish clear contractual ownership of any copyrighted and/or trademarked material that may be developed by a third-party contractor, such as an advertising firm or software developer. "Unless you expressly state in the contract that all copyrights are assigned to you," Berge said, "then the independent contractor would own it, and you would not."

Wheat agrees.

"All you need is a simple form agreement in place, which we do for clients all the time," he said. "If you're going to bring in anyone seeking collaboration or if you're seeking any outside assistance, you need written understanding of who will own the resulting intellectual property. For example, if someone is creating a software program and they bring in an outside consultant to draft some of the code, unless there is a signed written agreement providing otherwise, then that outside consultant will be at least co-owner of the copyright in the software program."



John Schlipp

While many IP discussions tend to focus on patents, as Wheat noted and as business headlines in Louisville last year have shown, the value of a good trademark can sometimes itself be worth millions of dollars.

"We're seeing these multimillion-dollar sales and of trademarks lately in the industry. Two examples that come to mind are when Hillerich & Bradsby sold the trademark for Louisville Slugger to Wilson Sporting Goods" for \$70 million, Wheat said. "The other was the recent news of the sale of GE's appliance park in Louisville, in which the purchaser is acquiring the rights to call their appliances

GE appliances for 40 years, in a trademark licensing agreement."

6 SOMETIMES IT'S BETTER TO USE A 'TRADE SECRETS' OR A NON-IP, FIRST-TO-MARKET STRATEGY

When you file for a patent, you must publically disclose the details of your intellectual property within the application, in exchange for a patent protection of 20 years, if granted. Trade secrets, on the other hand, have no limitation of protection, assuming they can be kept secret via NDAs or confidentiality agreements.

A quick question of reverse engineering can often determine whether or not utilizing a trade secret approach is even an option, explained patent attorney Warren Schickli of Lexington's King & Schickli law firm.

"If the technology can be reverse engineered, then you don't consider trade secrets. Since most things can be reverse engineered, trade secrets are generally taken off the table very early on," he said. But in cases where the IP is not self-evident, "then trade secrets are actually an attractive option because the protection can last as long as you can keep the secret, so conceivably it could last forever."

While the recipes for KFC and Coca-Cola are perhaps the most famous trade secrets in America, Schickli noted that many trade secrets are intentionally invisible to the public, since companies may choose not to advertise or market them, simply saying instead, for example, "our saw blade cuts better than competitors'," without telling the proprietary reasons why.

"Trade secrets don't cost you anything, but you have to understand how to protect them as trade secrets in your dealings with investors," said MEP Equine Solutions CEO Hauck. "You have to be very careful about how you handle that information, but it can be a fantastic way for some companies to be able to not have to file or disclose or go through the expensive IP process and yet still keep their idea novel and unique while they further develop their prototype and proof of concept."

A first-to-market strategy that foregoes pursuit of IP development entirely is an altogether different approach that may



"I'll need you to sign this full nondisclosure agreement."

be appropriate for some business models, Hauck said.

"If your product is just a different application of something else already out there, and it's questionable whether or not you will be able to obtain a patent for it, then first-to-market may be the more important priority," Hauck said. "If, for example, you're coming up with a new way to take a pan out of the oven, you don't want IP out of that. You want to come up with some way to produce it cheaply and be first to market and then get out (before competitors begin copying you). That is also a viable business model for some companies."

Ultimately, companies should sit down with their attorneys and financial advisors to investigate all their options. "You need to understand that IP (protection) does cost the company to get there. So you have to know your company and know which risks you should pursue," Hauck said.

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