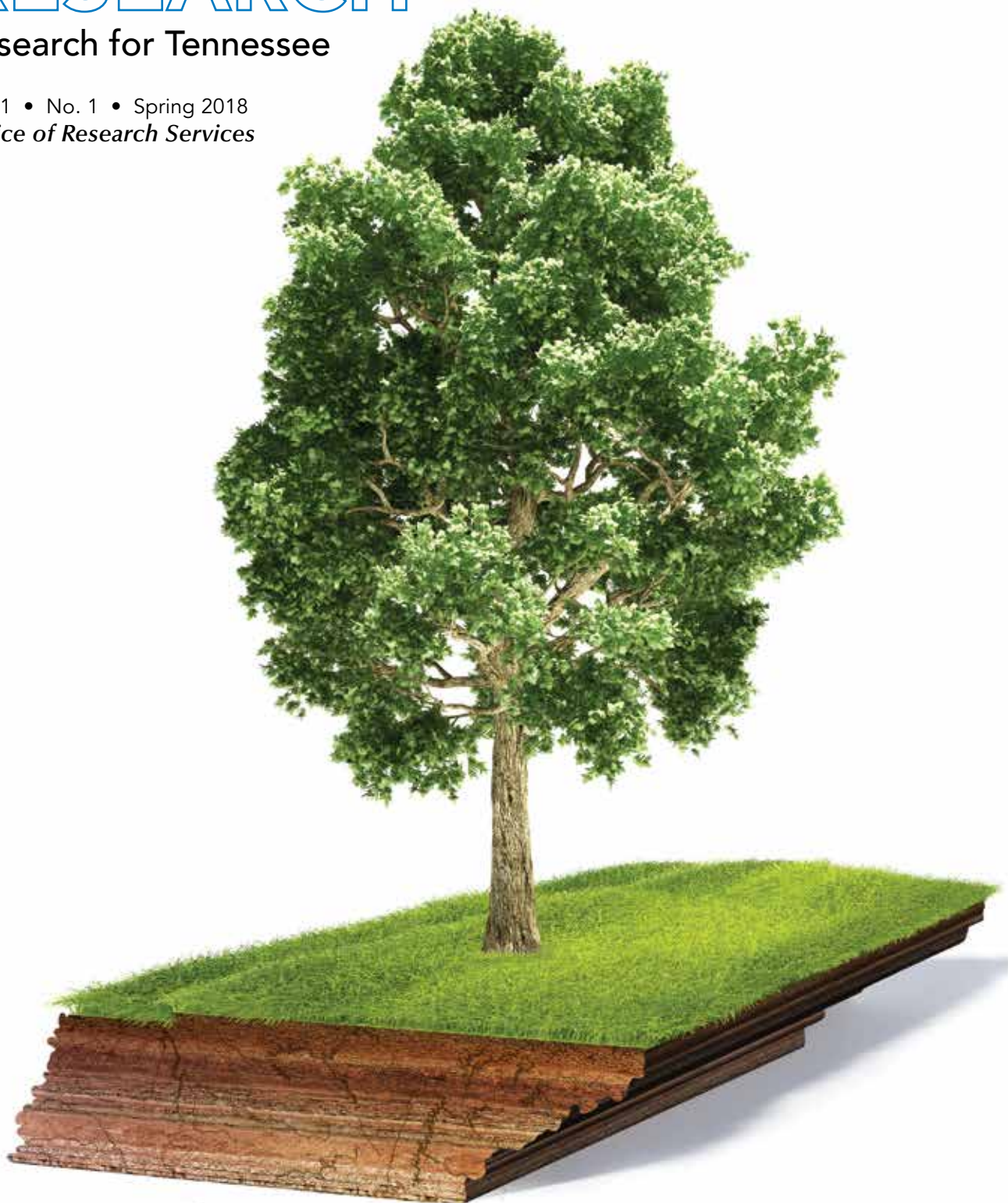


MTSU RESEARCH

Research for Tennessee

Vol. 1 • No. 1 • Spring 2018
Office of Research Services



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This edition of *MTSU Research* magazine showcases numerous important MTSU research initiatives. Each program spotlighted fosters a student-centered learning environment that emphasizes student research experiences. In addition, the partnerships forged between MTSU researchers and industry reap important dividends for not just the betterment of lives but also for Tennessee's economy.

MTSU's commitment to scholarly research is unwavering. We hope you enjoy these articles celebrating the progress, inspiration, and excellence of research at MTSU.

True Blue!

A handwritten signature in black ink that reads "Sidney A. McPhee".

Sidney A. McPhee
President

RESEARCH FOR TENNESSEE

I love research, and thus I am thrilled to share with you the inaugural issue of *MTSU Research*.

The format of this magazine is thematic, with each issue showcasing unique researchers' talents and projects ongoing at MTSU. This first issue, "Research for Tennessee," helps capture the excellent research that leading faculty at MTSU are conducting within Tennessee for the residents of our state.



As a publicly supported institution of higher learning, we take our role to serve the state of Tennessee seriously, which includes educating undergraduate and graduate students to enter the workforce well-educated and skilled. This role also involves conducting research and creative activities that produce knowledge, information, data, technologies, know-how, and other outcomes that are disseminated from MTSU to the state to help improve the economy, services, and quality of life for all Tennesseans.

Future issues of *MTSU Research* will offer windows into the myriad activities ongoing at MTSU, giving you glimpses into the laboratories, fieldwork sites, and creative spaces where our highly skilled faculty at MTSU conduct their research and uncover mysteries.

True Blue!

A handwritten signature in black ink that reads "David Butler".

David Butler
Vice Provost for Research and
Dean, College of Graduate Studies

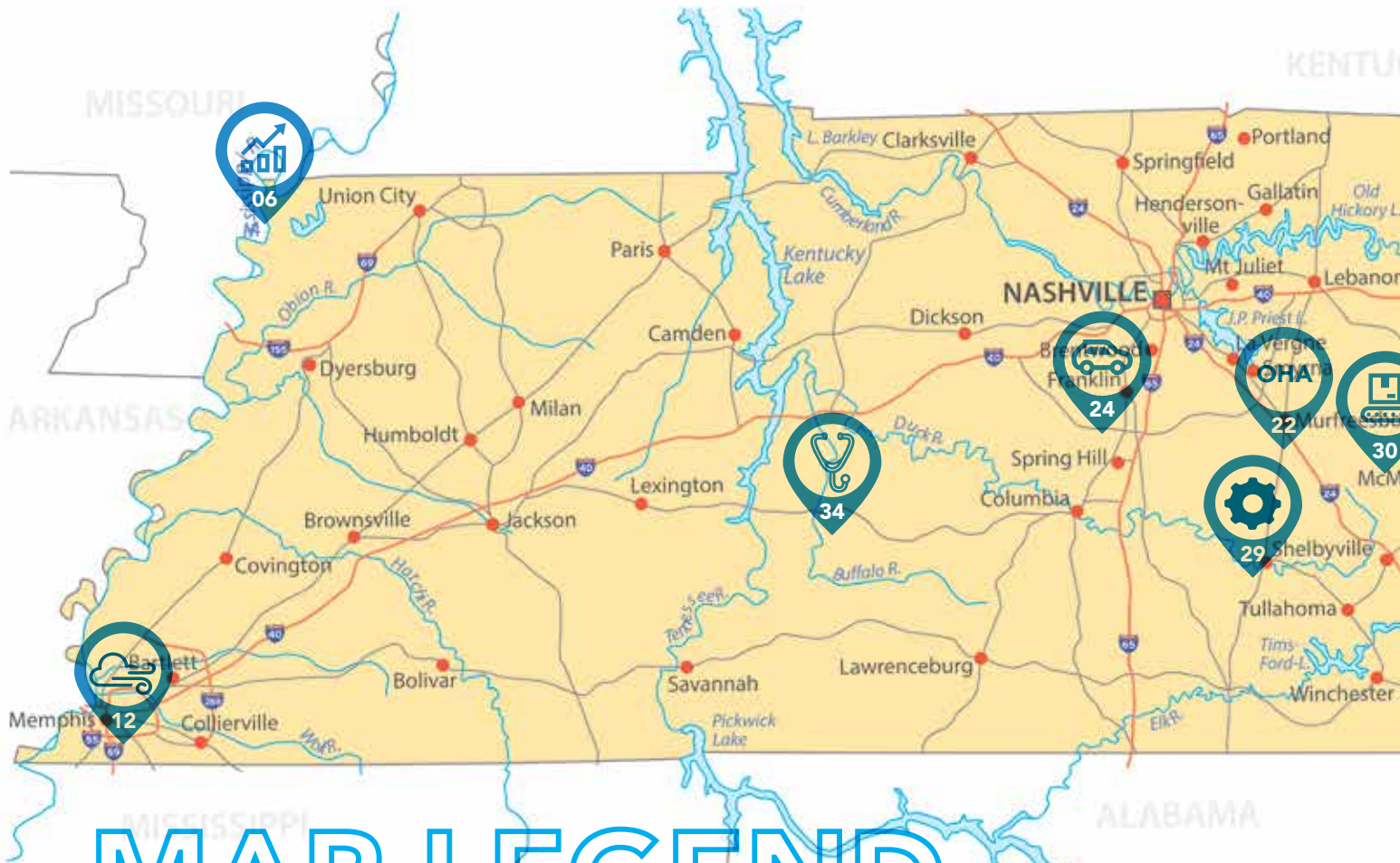
MTSU

RESEARCH FOR TENNESSEE

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RESEARCH



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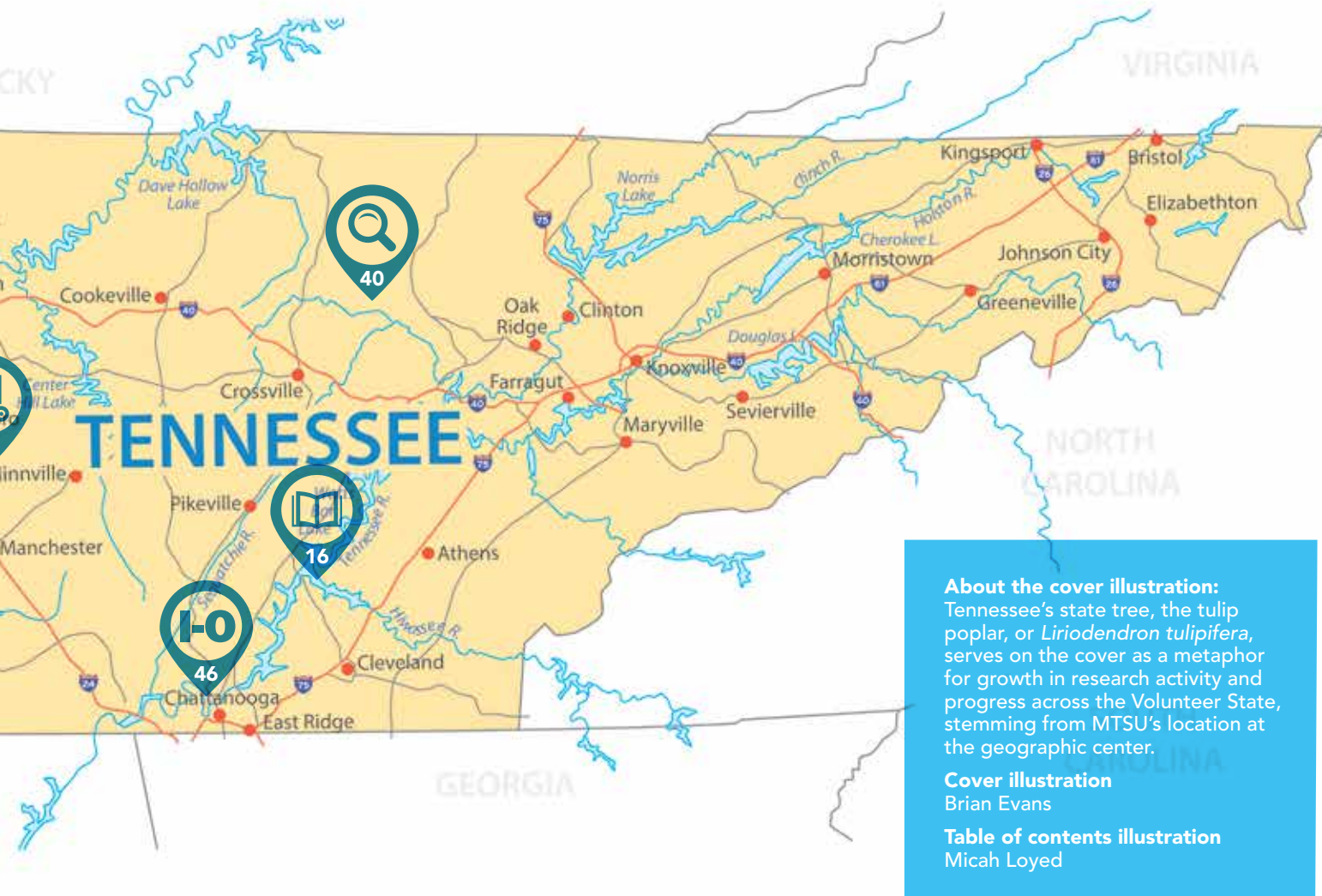
MTSU's Engineering Technology helps local industry

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MTSU's Mechatronics Engineering program quickly becomes a darling of Tennessee industry



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One of MTSU's most-recognized centers counts companies like Jack Daniel Distillery among its clients



MTSU's Economic and Research Center helps civic and government agencies across Tennessee unearth the hard data that can help them attract investment and make financially sound decisions.

THE CATALYST

By Allison Gorman

CIVIC AND GOVERNMENT AGENCIES ACROSS TENNESSEE TURN TO MTSU'S BUSINESS AND ECONOMIC RESEARCH CENTER TO UNEARTH THE KIND OF HARD DATA THAT CAN HELP ATTRACT INVESTMENT

Lake County, in the northwest corner of Tennessee, has 125,000 acres of land (about a third of it wetlands), a 15,000-acre lake, 28 miles of riverfront, 8,100 people, and no industrial jobs.

"None," said Jimmy Williamson. "It's the 12th-poorest county in the nation—including Indian reservations."

That's a bleak statement from one of the county's most tireless advocates, and it's certainly incongruous with Williamson's usually upbeat tone. In fact, Williamson is pretty encouraged these days, because that jobs number is about to go from zero to 33, with another 30 coming after that. In Lake County, he said, "30 jobs is a big deal."

AFTER DECADES OF HAND-WRINGING ON ALL SIDES, THE COUNTY COMMISSION FINALLY AGREED TO BUILD AN EXPO CENTER AS A WAY TO RAISE FUNDS WITHOUT RAISING TAXES.

About 200 miles to the east, Wilson County Mayor Randall Hutto is watching a political gamble pay off. In politics, everybody wants low taxes, and it's left his county chronically scrambling to

fund its schools. After decades of hand-wringing on all sides, the county commission finally agreed to build an expo center as a way to raise funds without raising taxes.

Hutto likes what he sees so far. The new Wilson County Expo Center in Lebanon stayed solvent through a slow cold-weather start, then geared up for a busy spring and summer.

"After it was built, we had eight months of expenditures and only five months of revenue, and we were already in the black," he said recently.

Meanwhile, Wilson County's noisy neighbor, Nashville, has long enjoyed a strong revenue stream thanks to a certain industry (music) —but for years a more lucrative industry was hiding in plain sight.



Ten years ago, acting on the principle “success breeds success,” Music City also began marketing itself as the nation’s health care capital. Since then, the economic impact of the health care industry on Nashville has grown from \$18.3 billion to \$38.8 billion. (Who says a city can’t have two brands?)

These success stories have at least one thing in common: MTSU’s Business and Economic Research Center (BERC). Civic and government agencies across Tennessee turn to BERC to unearth the kind of hard data that can help them attract investment and make financially sound decisions.

Most universities provide economic research, but BERC’s projects aren’t funded by government grants, said the center’s director, Murat Arik.

“We deal with communities. We deal with businesses. Our work is contract work,” he said.

It’s also steady work. BERC typically has four projects going at once, each lasting several months, and it regularly defers requests to avoid overbooking.

ARIK . . . CALCULATED THE POTENTIAL SAVINGS FROM TAKING TRUCKS OFF THE ROAD AND PUTTING FREIGHT ON THE WATER: ABOUT \$3.50 PER DOLLAR OF INVESTMENT.

Clients are generally willing to wait, according to Arik. They know that if their plan or project has merit, BERC can help get it off the ground. While BERC’s job is to analyze, not advocate, its reports can fuel a successful marketing campaign or explain why “if you build it, they will come.”

SAFE LANDINGS

Since 1999, Lake, Dyer, and Obion counties had been trying to build a port, hoping to attract jobs. Deciding to lure industry with the one resource they had in abundance, they set their sights on Cates Landing in Tiptonville at Mississippi River Mile 900. The counties formed the Northwest Tennessee Regional Port Authority in 2001 with Williamson as chair, but the port wasn’t built until 2013.

It wouldn’t have been built at all without BERC and Arik, Williamson said.

To get a critical \$20 million in federal grant and contingent state funds, the port authority had to show a positive return to the U.S. government. Williamson turned to Arik, who “went above and beyond to help.” Arik assessed the modes of transportation being used to move freight in the area and then calculated the potential savings from taking trucks off the road and putting freight on the water: about \$3.50 per dollar of investment.

“We had to compete nationwide for the grant,” Williamson said. “It was a miracle we got it, since the population of all three counties is only about 100,000.”

The funding Arik helped secure paid for everything visible from a drone shot of the Port of Cates Landing—dock, 37,500-square-foot warehouse, 20-acre laydown area, scales, radiation detector, and office building.

While building that \$55 million complex was a 14-year undertaking, building its customer base has proceeded far more quickly. Riverine Fisheries, with its 63 jobs, is just the beginning, Williamson said. Three more customers, expected to bring 150 or more direct jobs, are in the pipeline.

“We’ve got a lot of things lined up, and they’re starting to happen,” he said. “We’re pretty excited.”

THE CENTER OF IT ALL

When Hutto became mayor of Wilson County in 2010, he inherited a paper trail from the county's long efforts to raise sales tax revenues but not the sales tax.

"I have plans and studies done 25 years ago, wanting a large event center of some kind," he said. "They had different scenarios of projects they wanted to build, but they never could get them passed in the legislative part of the county government."

If the Wilson County Commission was going to spend money for an event center, it needed evidence the risk would pay off. Cue Arik.

Some BERC projects are straightforward: collect data, crunch numbers, and issue a report. But Arik said feasibility studies are more organic, requiring continuous conversation about how to move forward based on what the data reveals.

In this case, the first step involved measuring the regional demand for an expo center in Wilson County: studying hotel-motel occupancy rates, tracking area events, and surveying local businesses.

Then Arik asked county officials questions: How will you charge your customers? Will you charge for county-funded events, such as proms? Will you outsource operations? Will you need a higher headcount?

Based on the answers and best practices from other counties, Arik drew up several scenarios for how Wilson County might build and operate an event center, with high- and low-cost options and break-even points along the way.

"It takes a lot of consultation and time—six or seven months at least," Arik said. "But at the end you have a solid document, a kind of roadmap showing whether or not you want to pursue the project."



Murat Arik (r), director of MTSU's renowned Business and Economic Research Center (BERC), is photographed with MTSU student Estrella R. Ndrianasy, a graduate research associate at BERC who has worked on several key center projects.

Photo J. Intintoli

RECENT STUDIES

The Impact of Federally Funded University R&D on Economic Growth, MTSU

Driving the Next-Generation Regional Economy, MTSU

Wage and Benefit Survey: Middle Tennessee and Upper Cumberland Regions, Middle Tennessee Industrial Development Association and U.S. Department of Agriculture

Economic Impact of Major Military Installations in the Tennessee Valley Corridor, Tennessee State University

Assessing Economic Contributions of Hospital Corporation of America, Cooley's Public Strategies

Tennessee Housing Market, Tennessee Housing Development Agency

Economic and Fiscal Assessment of Tennessee National Guard, Tennessee Department of Military

Economic and Fiscal Impact Assessment of Cumberland County Playhouse, Cumberland County Playhouse

Economic and Fiscal Contribution of Cumberland University to the Regional Economy, Cumberland University

Economic Impact of Nashville Health Care Industry, Nashville Health Care Council

STEM Workforce Dynamics in Tennessee in 2017, Tennessee Small Business Development Center

The report provided a foundation to build on, attracting a \$100,000 buy-in from the city of Lebanon and offering peace of mind for the county commission, Hutto said.

"We took nuts and bolts from it and were able to put into place a solid system the commissioners believed in," Hutto said recently. "And now, many of the things Dr. Arik projected are still holding true."

HIDDEN IN PLAIN SIGHT

IN NASHVILLE
ITSELF, HEALTH
CARE HAS
NEARLY FOUR
TIMES THE ECO-
NOMIC IMPACT
OF THE MUSIC
INDUSTRY.

The Nashville Health Care Council (NHCC) celebrated its 10th anniversary by asking BERC to prove what its members already knew: Their industry keeps Music City humming.

"We can say we're the nation's health care industry capital, that so much health care business is done here that affects lives across the country, but if we don't have numbers to back that up, people

are just going to write it off," explained Katie Schlacter, senior director of communications and content strategy for NHCC.

BERC has now produced three economic impact reports for NHCC, in 2006, 2010, and 2015. Together they demonstrate health care's fast and steady growth in

Nashville, even throughout the Great Recession, and show that music isn't the only way Nashville is making itself heard.

Schlacter noted that Nashville is home to 18 publicly traded health care companies, far more than any other city its size, representing more than 400,000 employees across the country. And in Nashville itself, health care has nearly four times the economic impact of the music industry.

There's a chicken-and-egg effect with these numbers: The chamber of commerce uses them to recruit more businesses, and NHCC uses them to recruit more members. Now 20 percent of its membership is from outside Nashville, Schlacter said.

Between the numbers BERC generates and the media buzz they create, the message has gotten through. "If you're doing business in health care and you want to learn and grow your network, this is the place to be," Schlacter said.

RIPPLE EFFECT

Perhaps the one set of numbers BERC hasn't crunched is its own economic impact on Tennessee. A dollar value would be hard to calculate, even for Arik. But given BERC's 40-year history, we're betting it's big. [MTSU](#)

REGIONAL AND GLOBAL REACH

Producing well-prepared workers for high-paying science, technology, engineering, and math (STEM) jobs at the pace demanded by Tennessee's brisk economy is a recurring topic for BERC. BERC, with MTSU's Tennessee Small Business Development Center, has produced two reports on the status of the state's STEM workforce. BERC plans a pilot implementation project to act on the findings.

Edited by MTSU professor Steven Livingston and published by BERC, the quarterly *Global Commerce: Tennessee in the International Economy* is the only publicly available source of information on Tennessee trade, foreign investment, and immigration.

A CLOSER LOOK

BERC sometimes completes work for the home team, as well. The center recently released its latest economic impact study of MTSU. Highlights of the University's economic impact include:

MTSU is the overwhelming **education choice** of Rutherford County and the Nashville MSA.

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\$1.1 billion+
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spending

\$800 million+
in local, state, and
federal taxes

\$300 million+
in student spending

\$408 million+
in wages and salaries



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CLEARING THE AIR

ONE MTSU PROFESSOR'S WORK WIELDS ANALYTICAL CHEMISTRY TO CURB POLLUTION AND ITS ILL EFFECTS

by Drew Ruble

Ngee Sing Chong, a professor of Chemistry, is director of the MTSU Interdisciplinary Microanalysis and Imaging Center. From 2004 to 2008, he also served on the Tennessee Air Pollution Control Board to address air quality issues in Tennessee and helped formulate strategies for pollution control. Prior to coming to Tennessee and MTSU, Chong worked for the Texas Commission on Environmental Quality, monitoring air pollutants at industrial sites in Texas.

Clearly, Chong knows a thing or two about clean air. The air quality expert applies analytical instrumentation for studying environmental pollution and health-related issues. From electrochemistry to chromatography, mass spectrometry, atomic and molecular spectroscopy, and electron microscopy, he works to solve problems related to environmental risks to human health. His research interests include the air quality impact of wildfires on the health of firefighters, the effects of tobacco smoke and electronic cigarette emissions on smokers, methods for removing air pollutants from engine emissions, and urban air quality.

Chong partners with MTSU's renowned Unmanned Aircraft Systems (UAS) Operations program to carry out chemical cartography. "For the study of emissions from wildfires, it is especially beneficial

to use air-sampling drones for tracking the dispersion of pollutants by real-time monitoring of carbon monoxide, inhalable particulate matter, and other toxicants, so that the extent of the human population affected by poor air quality can be estimated accurately," he said.

Chong made a major contribution to the field of analytical chemistry with his development of a prototype instrument, combining gas chromatography with inductively coupled

plasma-mass spectrometry (GC-ICP-MS). This technique allows the quantitative analysis of toxic compounds like methyl mercury, tributyltin, and dimethyl arsine that may be found in contaminated seafood. Various methods based on GC-ICP-MS have been used by industrial laboratories, government research institutes, and academic research groups. Chong's research group has recently discovered that surface-enhanced Raman scattering (SERS) can be used for trace analysis of aromatic amines, many

HIS RESEARCH INTERESTS INCLUDE THE AIR QUALITY IMPACT OF WILDFIRES ON THE HEALTH OF FIREFIGHTERS, THE EFFECTS OF TOBACCO SMOKE AND ELECTRONIC CIGARETTE EMISSIONS ON SMOKERS, METHODS FOR REMOVING AIR POLLUTANTS FROM ENGINE EMISSIONS, AND URBAN AIR QUALITY.

of which are carcinogenic and may be generated as waste products of dyes used in textile and leather industries.

Currently, Chong is collaborating with researchers at the Shelby County Health Department and University of Memphis in the air quality study of Memphis and surrounding areas. Results indicate that there are several chlorinated and fluorinated compounds detected that are not in the U.S. Environmental Protection Agency's toxic release inventory list and yet may be significant from the standpoint of risk assessment. [MTSU](#)

CASES IN POINT

Here are five externally funded projects faculty researcher Ngee Sing Chong has completed while at MTSU.

- Atmospheric study of the composition of volatile organic compounds from the biogenic sources—*Research Experience for Undergraduates program of the National Science Foundation*
- Reducing exposure to airborne chemical toxics (REACT) via Community-Scale Air Monitoring in Memphis—*Community Air Toxics Program of the Environmental Protection Agency*
- Monitoring the pollutants released by fracking facilities in Karnes County, Texas—*subcontract of a Northeastern University project sponsored by Earthwatch*
- Release of volatile organic compounds from pig carcasses subjected to different disposal methods—*Southeast Regional Research Initiative of the Oak Ridge National Laboratory*
- Development of biomass-derived fuel additives for improving the emissions profiles of gasoline or diesel combustion—*Tennessee Department of Environment and Conservation*



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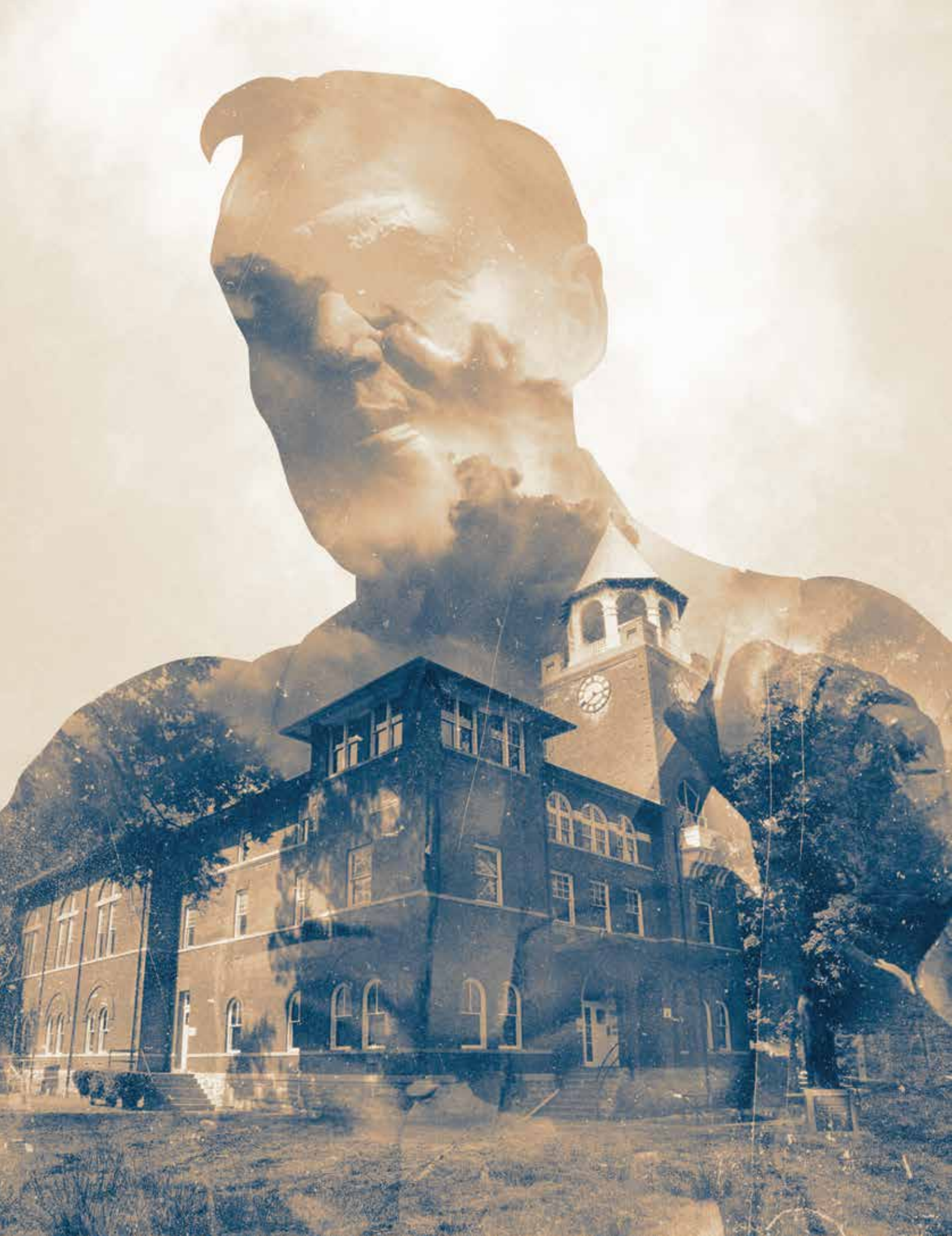
MAKE A DIFFERENCE

Nurses are the health care professionals most people rely on today, whether it's the nurse practitioner who treats their everyday ills at a walk-in clinic, or the emergency room or critical care nurse who soothes fears while helping save lives. Students who care—about people, about technology, about science, about their colleagues and the community—can join the MTSU School of Nursing's competitive and robust academic program to develop their commitment to the art and science of nursing.

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MTSU's School of Nursing is the No. 1 Nursing program in Tennessee and offers the Master of Science in Nursing (M.S.N.) degree with a concentration of Family Nurse Practitioner.

TAKE A CLOSER LOOK: mtsu.edu/programs/nursing-msn



THE VALUE OF HISTORY

MTSU PROFESSOR AND TENNESSEE STATE HISTORIAN CARROLL VAN WEST GUIDES ONE OF MTSU'S MOST RESPECTED CENTERS OF EXCELLENCE IN PRESERVING OUR STATE'S MOST VITAL ASSETS

By Katie Porterfield

On a recent Spring day on the campus of MTSU, Carroll Van West, History professor and director of MTSU's Center for Historic Preservation (CHP), hooded his 20th Ph.D. student at the University's graduate school commencement. The following Monday was reserved for graduate school defenses, and on Tuesday, Wednesday, and Thursday, he was all over the state doing his so-called "economic development thing" in Jackson, Dayton, Knoxville, and Chattanooga.

"That aspect of economic development was in the original charge given to the Center for Historic Preservation, which was MTSU's first Center of Excellence, when Lamar Alexander created it during his time as governor in 1984," said West, who assumed an additional role in 2013 when Gov. Bill Haslam appointed him state historian. "We were created to produce better, more-competitive students, but then also to have that impact on the state. I wasn't here that first year, but I came the second year, and since then, we've stayed true to that general approach."

Indeed, the CHP's mission is twofold: to help Tennessee communities identify and use their heritage assets (historical sites, artifacts, and narratives that tell stories of the past) and to support and direct student research and experiential learning opportunities. The second part of the mission is a byproduct of the first, because satisfying the first goal naturally creates real-world opportunities for M.A. and Ph.D. students in Public History who work alongside West and his staff on every project.

BOOTS ON THE GROUND

Since its inception, the CHP has had its hand in more projects than one can count, and over the years, West said, they've taken the general wish that a Center of Excellence contribute to the

Rhea County Courthouse and statue of renowned defense attorney Clarence Darrow

Photo illustration Micah Loyed



state's economic development and focused it in a couple of different ways.

"One would be really promoting a philosophy and approach of adaptive reuse, instead of historic preservation, *per se*," he said. "Adaptive reuse recognizes that a preserved historic building need not be a museum. It can continue to be part of the functioning economy."

A recent example that warranted West's trip to Dayton in southeast Tennessee during that busy, yet typical, week in Spring involved presenting a Heritage Development Plan for the Rhea County Courthouse, which was home to the 1925 Scopes Trial. In this famous case, teacher John T. Scopes was tried for teaching students that humans evolved from a lower order of animals. The case, which ultimately made it to the Tennessee Supreme Court, garnered national attention and sparked debate about the relationship between science and religion. It drew big-name lawyers on opposing sides, three-time presidential candidate Williams Jennings Bryan and renowned defense attorney Clarence Darrow.

WE WERE CREATED TO PRODUCE BETTER, MORE COMPETITIVE STUDENTS, BUT THEN ALSO TO HAVE THAT IMPACT ON THE STATE.

Today, the courthouse needs some repairs, and though it contains exhibits related to the trial, West said the town believes outsiders have forgotten about the "jewel of the county."

"They said, 'We know it's here, we know it's important, but no one else does,'" West said, paraphrasing his conversations with folks in Dayton. "'Can you help us get the story out there?'"

The CHP's first step was conducting the research to get the story right. The next was looking over the building to determine the best way to display the history.

"So, this is our way; it's adaptive reuse," West said. "We don't want this whole thing to be a museum. It's a courthouse, and that's how it needs to be used, but when visitors come, there is no reason why they can't get that story of the building. It can also serve the county as a historical attraction, and in this county, heritage tourism can make a big difference."

And "heritage tourism" is the CHP's other focus when it comes to satisfying the wish that the center foster economic development.

"There wasn't even a heritage tourism initiative until the late 1980s, so we said, 'Let's find a way to contribute to this new concept,'" West said.

In that capacity, the MTSU center has worked closely with the Tennessee Department of Tourist Development. The largest project with perhaps the greatest impact on the state was the Tennessee Civil War Trails program, which is part of a five-state program that includes Virginia, North Carolina, West Virginia, and Maryland. A seven-year commitment for the CHP, the Tennessee Civil War Trails program launched in 2008 and represents 425 interpretive markers in all 95 Tennessee counties. The CHP's role was to create a product that state tourism officials could sell.

"That's where our partnership merged because they needed someone to tell true, accurate, and full stories, but we're not marketers—they are," West said. "So, we quickly realized that we do different sides of this, and if we work together, that could be really impactful."

And impactful it has been. Lee Curtis, the state tourism department's legislative liaison who worked most closely with West and his team, said the number of visitors to Tennessee has increased since the advent of the CWT program, especially in conjunction with the Civil War Sesquicentennial. In addition, the department has distributed more than 2.5 million Tennessee Civil War Trails map guides, making it the most-requested map guide and the most downloaded of the five-state program.

"The success is largely due to the partnership with Dr. Carroll Van West and the Tennessee Civil War National Heritage Area (TCWNHA), which is the only NHA that encompasses an entire state and is dedicated to Civil War," Curtis summed up.

The TCWNHA, which is administered by the CHP, is a partnership unit of the National Park Service that helps communities both rural and urban create opportunities to continue to tell Civil War stories through projects that are funded by Congress each year.

"Without the leadership of Dr. West and his vision to preserve our state's heritage and history, many of these projects, mainly the Tennessee Civil War Trails markers, would not have been interpreted in such a seamless manner," Curtis said. "By working with our department, the TCWNHA staff has provided the necessary research and tireless assistance that was

crucial to provide for a hugely successful program from conception to installation.”

West saw firsthand how impactful the CWT program is to rural counties at dedication ceremonies held throughout the state. Mayors, council members, and other local representatives came out to support the program because they were so excited about its potential.

“Civil War tourists come in droves to look at these markers,” West said. “That’s where research directly translates into opportunities across the state, and in these rural counties, you realize this is a big deal.”

RESEARCH DIRECTLY TRANSLATES INTO OPPORTUNITIES ACROSS THE STATE, AND IN THESE RURAL COUNTIES . . . THIS IS A BIG DEAL.

OPPORTUNITY: HERITAGE

The CWT success led the CHP to create statewide brochures on the Trail of Tears and the War of 1812 (during the latter’s bicentennial in 2012), both of which also attract visitors to rural areas where these events took place. As West explained, however, some of those towns didn’t have a place to tell their story, or even distribute the brochures, so the CHP has worked with various communities in the last several years to create heritage centers.

“They’re not museums because they are not out collecting a lot of things and storing things; that’s beyond the capabilities of some of these places,” West said. “But they do become places to tell their story, and then they become places to distribute the information to visitors.”

An example is the Hiwassee River Heritage Center in Charleston, Tennessee, in Bradley County. The community provided the building and the people to staff the building, and the CHP did the research for a Trail of Tears driving tour and helped create panel exhibits and an exhibit case. The National Park Service was so pleased with the heritage center that it added new interpretive signs in the community, West said, and the community has further plans to tell more of its story with the CHP’s help.

“So, in Charleston Tennessee, heritage tourism is going to be a component of what they are,” West said.



Carroll Van West (r), professor and director of the Center for Historic Preservation, and graduate student Elizabeth Johnson

Photo J. Intintoli

2016–17 CENTER FOR HISTORIC PRESERVATION PROJECTS IN TENNESSEE

Nashville	RCA Studios Building
Nashville	Northeast Nashville African American Driving Tour
Memphis	Clayborn Temple AME Church Civil Rights History Timeline
Memphis	<i>Rock of Ages CME Church National Register History Report</i>
Chattanooga	<i>Lincoln Park National Register History Report</i>
Chattanooga	<i>Brown's Ferry Tavern Report</i>
Franklin	McLemore House Exhibit
Franklin	Old, Old Jail Exhibit
Dayton	Rhea County Courthouse Heritage Development Plan
McKenzie	Webb School Exhibit
Newport	Tanner Rosenwald School Heritage Development Plan

Something similar is well underway on the western side of the state in Brownsville. The West Tennessee Delta Heritage Center, off I-40, which has been telling and promoting stories about the region since the late 1990s, added an attraction about five years ago that greatly enhanced its heritage tourism footprint. It all started when Heritage Center director Sonia Outlaw-Clark called West to say the owner was ready to get rid of the old Flagg Grove school, which served black students—including music icon Tina Turner—in Haywood County from 1899 until the late 1960s.

"She said, 'I was thinking we need to get some benches from the school for the museum,'" West recalled. "And I said, 'Sonia, why don't we get the whole building?'"

So, Outlaw-Clark and the community went to work on obtaining the building, moving it to the heritage center, and restoring it. The CHP began researching and crafting the story of the school and early African-American education in the region. And when Turner's representatives got wind of all this, they agreed to help tell her personal story, build exhibit cases, and provide some of her memorabilia.

ADAPTIVE REUSE RECOGNIZES THAT A PRESERVED HISTORIC BUILDING NEED NOT BE A MUSEUM. IT CAN CONTINUE TO BE PART OF THE FUNCTIONING ECONOMY.

"We could never have presented the history and information about the school's past without the help of Dr. West and his team," Outlaw-Clark said, adding that she's grateful West encouraged her to save the school and couldn't imagine having to do the research and restore the school at the same time. "Through their research, we are able to tell the school's story in a concise way that makes sense to our visitors."

Since its opening in 2014, more than 81,000 guests have seen the Flagg Grove School and been exposed to rural west Tennessee culture, according to Outlaw-Clark. Just last year, the number of visitors increased 20 percent, international visitors were up 121 percent, and group tours rose 87 percent.

"Through the school, we've been able to increase tourism, fill hotel rooms, and have a positive economic impact on our community, including the hiring of additional personnel to help during our peak summer months," she said.

THE POWER OF PRESERVATION

Perhaps the real bottom line, West explained, is that Tennessee's history is really among the state's best sustainable resources. These stories fascinate the public, and what happened in places like Brownsville happened there, specifically.

"You can't replicate that," West said. "You can't go and get that someplace else, so it can be invaluable to small towns."

When he talks to local government and economic leaders, he said it's clear that they value heritage tourism and its economic impact.

"We're a sales-tax-driven state, and anything that gets people to stop and spend some coin is a plus," West said. "Some of that rolls over into local government coffers, so it helps them, and it helps local businesses that sell services."

As a result, the CHP's successes lead to countless requests from communities seeking to capitalize on their heritage assets.

"We've embedded ourselves in the state through partnership and emphasized that partnership ethic," West said, explaining the CHP's strategy to economic development.

Not to be lost in all this economic development is that all the while the communities and the state benefit financially from this activity, West's students are gaining invaluable experience. Whether they're sitting in the courtroom where the Scopes Trial took place or meeting with Tina Turner's representatives, they're learning firsthand what it takes to help these communities preserve and capitalize on their history.

"I tell them, 'I don't need to talk to these guys, you guys need to get the experience of doing that,' and when it comes back to benefit the students too, it's just a good, win-win strategy," West said.

Sure, West admits, it all makes for busy weeks; but for the MTSU professor and state historian, he said there's no place else he'd rather be. [MTSU](#)

PRESERVE HISTORY

The historic preservation track for the Master of Arts in History concentration in Public History teaches students the skills to preserve public memory, cultural identity, and valuable architecture in their communities.

The Center for Historic Preservation's biggest impact on the communities of Tennessee is developing and providing—at no charge in most cases:

- Historic preservation plans
- Historic structure reports
- Heritage tourism plans
- Main Street program assistance
- National Register and survey projects

To help support students pursuing graduate study, the Department of History offers a number of graduate assistantships at both the M.A. and the Ph.D. levels. These assistantships are awarded on a competitive basis and are renewable for up to two years for M.A. assistantships and up to three years for Ph.D. assistantships. Graduate assistants receive a tuition waiver plus a stipend to cover living expenses.

Gain real-world work experience working with professionals at historic sites.

**MIDDLE
TENNESSEE**
STATE UNIVERSITY.

Application deadline for the M.A. program is **March 1** for Fall admission and **Oct. 1** for Spring.

TAKE A CLOSER LOOK:
mtsu.edu/programs/public-history-ma



THE SPOKEN WORD

THE HEADQUARTERS FOR ONE OF THE NATION'S MOST PRESTIGIOUS AND RESPECTED GROUPS OF HISTORIANS NOW HAS A HOME AT MTSU

by Gina K. Logue

The Oral History Association (OHA) is the leading organization for people who work to preserve and make known the myriad oral history narratives of America. In 2017, OHA chose MTSU to be the site of its national headquarters.

The organization boasts a diverse membership of scholars, activists, journalists, psychologists, folklorists, and others interested in bringing the historical experiences of both everyday people and elites to light. Louis Kyriakoudes, director of MTSU's Albert Gore Research Center, and Kristine M. McCusker, a History professor, will serve as co-directors of the new OHA headquarters.

The relocation to the Murfreesboro campus will "advance MTSU's research, public engagement, and public outreach, both to scholarly and professional environments and also to the general public," Kyriakoudes said.

It's yet another example of the prominence of the Gore Center, a unit of MTSU's College of Liberal Arts that already collects, arranges, maintains, and preserves all manner of historical materials about MTSU, American democracy, and middle Tennessee life in general and is a literal treasure trove for researchers.

Kyriakoudes and McCusker wrote the proposal for the OHA headquarters relocation to MTSU with an emphasis on collaborating with many on-campus partners, including the Gore Center, Department of History, Public History master's and doctoral program, Center for Historic Preservation, Center for Popular Music, and College of Liberal Arts.

"With key supporting internal partners that work in historic preservation, archival management, cultural resource management, museum management, history, and music, the MTSU team represents many of the core constituents within OHA's active membership," said Dan Kerr, chair of the OHA search committee and director of the public history program at American University in Washington, D.C. [MTSU](#)



A CONCRETE ADVANTAGE

MTSU'S INTERNATIONALLY RECOGNIZED
SCHOOL OF CONCRETE AND CONSTRUCTION
MANAGEMENT MAKES AN IMPACT WHERE
RUBBER MEETS THE ROAD IN TENNESSEE

By Allison Gorman

The April 2017 passage of the IMPROVE Act was big news for Tennessee's roads and bridges. The bill sets aside \$350 million for the dedicated highway fund and will kick-start almost a thousand infrastructure projects across the state.

While all 95 counties will be under construction as a result of the IMPROVE Act, one road that gains special significance under the plan is already built: That's the short stretch of I-24 connecting the Tennessee Department of Transportation (TDOT) in Nashville and the School of Concrete and Construction Management at MTSU.

As the first Concrete Industry Management (CIM) degree program in the country, and still one of a select few, CIM has a long history of using research to help TDOT keep our state's roads and bridges among the best in the nation. As recently as 2016, Tennessee tied for second in a CNBC ranking of state infrastructures. For decades before the IMPROVE Act, funding for new construction projects was hard to come by, so a big part of TDOT's success has been the longevity and quality of its construction, as well as its repairs.

"People tolerate improvement for a short time if you have to shut down lanes and impact their morning or afternoon commute. But certainly if you have to go back . . . and revisit that issue again, they're not happy. We don't want to impact traffic in that matter," said Heather Hall, assistant director of field operations for TDOT's Materials and Tests Division.

That's the ultimate goal of the research CIM conducts for TDOT. The state regularly relies on CIM faculty to comparison-test patching materials and other ready-made products, as well as various concrete formulations, to determine which will perform best under Tennessee's traffic, geological, and weather conditions.

*New bridge construction at Broad Street and
Memorial Boulevard in Murfreesboro*

Photo Jason Ayers

Illustration Brian Evans



Having the nation's flagship concrete industry academic program less than an hour away allows for easy collaboration, and its research-oriented perspective encourages TDOT to "evolve into something better" rather than simply sticking to what it knows, said Jamie Waller, who oversees concrete operations for Materials and Tests.

AS THE FIRST CONCRETE INDUSTRY MANAGEMENT DEGREE PROGRAM IN THE COUNTRY, AND STILL ONE OF A SELECT FEW, CIM HAS A LONG HISTORY OF USING RESEARCH TO HELP TDOT.

"MTSU being right down the road from us, as well as just centralized within the state, gives us a great opportunity to expand our research and look at different concrete applications in general within the state," she said.

TDOT has the staff and equipment to perform ongoing tests, but it doesn't have the capacity to fulfill all its research needs, Hall said. CIM's faculty can step in to fill the gap.

For example, TDOT engineers turned to MTSU's Zhifu Yang for answers when they learned that some of their pre-stressed concrete beams had been fabricated using contaminated well water. The worrisome contaminant was chloride, an ion in salt, which can corrode the steel used to reinforce bridge decks and similar concrete structures. The engineers' concern was well-placed. According to Yang, the rusting of steel in concrete is the No. 1 infrastructure problem in the world.

"Actually, billions of dollars are wasted due to the bad performance of infrastructure due to corrosion," he said. Yet surprisingly little research had been done on the subject.

TDOT knew it might have a problem; what it didn't know was "how much is too much," Hall said. "We know that chloride will lead

to the corrosion issue, but we don't know at what level that starts to happen."

That's what Yang is determining now. And given how common the corrosion problem is, his project will likely have applications far beyond the state of Tennessee.

The project dovetails with Yang's interest in using industrial byproducts in concrete—a common practice among transportation departments, he said. It turns out that slag from iron- or steel-making or fly ash from coal-burning power plants can make concrete less permeable and, therefore, more resistant to the corrosive effects of chloride. By exploring the interplay between aggregate blends, chloride levels, and permeability, Yang can help refine this clever form of recycling. Hall said TDOT uses CIM's research in myriad ways—not just to assess the qualities and properties of its materials, but also to steer the direction of its programs, to determine whether to adopt a new process or procedure, and to develop statewide standard operating procedures and specs for materials testing.

"Ultimately, all that will lead to a longer-lasting, better-performing product that's safer for the public and built more cost-effectively and more efficiently," she said.

Other TDOT projects, like one conducted by MTSU's Marcus Knight, ultimately become part of national protocol. Knight compared the quality and durability of various epoxy overlays—the textured aggregate applied to a bridge to improve skid resistance and waterproofing.

"With that project, we learned a lot about tests we need to run to evaluate those overlay products," Hall said.

From the results of Knight's project, TDOT created a list of qualified products for projects requiring epoxy overlays. And the process Knight developed for evaluating those products is now standard practice for transportation departments across the United States.

"Our research is out there, and any state or city can look at it and get information, as far as comparing different products and the results that we got, so it is universally applied by departments of transportation outside of Tennessee," Knight said. "At the same time, though, when we use the products, we . . . apply them to concrete like the Tennessee Department of Transportation uses, so we can get as close to a real-world result as possible."

Once again, that's the beauty of having a nationally renowned concrete industry program just down the road, especially when TDOT prefers to keep its research dollars at home.

"You have more personal relationships with the people in your own state," Hall said. "It could come down to material suppliers and the types of materials you get, or even geological differences—Tennessee's not made up the same as Wisconsin. Or climate differences—they're more familiar with the effects that we would see here in Tennessee. It just makes sense."

With so much new infrastructure spending on the horizon, it probably makes cents, too.



Zhifu Yang (r) with MTSU student researcher Peter Roldan, who assists Yang with the specimen preparation and strength testing for various concrete mixtures.

Photo J. Intintoli

HARD EVIDENCE

MTSU's School of Concrete and Construction Management is a powerhouse in research.

Research has included:

- Investigating concrete **mix optimization** using byproducts to reduce permeability in bridge decks—[TDOT](#)
- Conducting rapid repair **product analysis** of concrete bridge decks—[TDOT](#)
- Studying **moisture mitigation** of concrete floors to receive floor coverings—[U.S. Concrete, Inc.](#)
- Investigating **water quality** and pollutants that are absorbed by pervious concrete and permeable pavers—[Belgard Environmental](#)
- Determining if a **Tennessee-mined kaolin clay** is suitable for concrete once mined, burned, and crushed into metakaolin—[USGS Minerals](#)
- Investigating the long-term **durability** and bond strength of thin overlay systems for bridge decks and highway applications—[TDOT](#)
- Comparing different **curing methods** and products for pervious concrete to determine if plastic sheeting can be eliminated—Tennessee Concrete Association
- Conducting testing on three manufactured fibers and one recycled fiber for use in pervious concrete to **increase freeze/thaw resistance** and abrasion resistance—[Forta Corporation](#)

Much of the research produced by CIM is done by undergraduate students and in time intervals that match the speed of the ever-evolving concrete industry.

"Essentially, we investigate anything to do with concrete floors, roads, elevated slabs, walls, bridges, columns, etc.," said Heather Brown, director of the School of Concrete and Construction Management.

"It's pretty unusual nationally to see students involved in state transportation projects like this," added Bud Fischer, College of Basic and Applied Sciences dean. "It allows our students to do hands-on research activity, which is also important for the state." [MTSU](#)



A stroll across MTSU's campus reveals many examples of CIM's work. The most significant is the iconic Horseshoe statue located in Walnut Grove, which is actually made of blue concrete and not painted.

BUILD THE FUTURE



MIDDLE TENNESSEE

STATE UNIVERSITY

MTSU's 15-month distinctive Concrete Industry Management executive M.B.A. degree program is the only one of its kind in the country and offers a mostly online delivery to accommodate students from the industry, both nationally and internationally.

This highly interactive degree program takes participants beyond basics to a true understanding of forces that shape the concrete and construction industry. Participants can immediately benefit their companies by applying knowledge gained from their courses. M.B.A. coursework is tailored specifically to the concrete and construction industry.

APPLICATION DEADLINE

July 1 enrollment for
15-month program
starting in January

TAKE A CLOSER LOOK: [MTSU.EDU/PROGRAMS/CONCRETE-INDUSTRY-MBA](https://mtsu.edu/programs/concrete-industry-mba)

LEAN AND MEAN

MTSU'S DEPARTMENT OF ENGINEERING TECHNOLOGY IS WELL POSITIONED TO HELP INDUSTRY IN THE REGION

from staff reports

For more than a decade, faculty and students of MTSU's Department of Engineering Technology have provided consulting services to improve the efficiency and competitiveness of Middle Tennessee industries through the application of Lean and Six Sigma principles.

"Industry partners in this activity benefit from the problem-solving skills of MTSU students to address their current issues. This service is provided to the local industry free of charge and is an important part of the public service that MTSU provides to the local industry," said Vahid H. Khiabani, an Engineering Technology assistant professor and coordinator of the Engineering Management master's program. "These activities help strengthen the local industry, which in turn positively strengthens the local economy. In many cases, MTSU students are eventually hired by these affected industries."

Based on a 2016 Quality Progress salary survey, holders of U.S.-based Six Sigma "black belt" and "green belt" certificates like MTSU students achieve can earn an average annual salary of \$93,558 to \$104,974.

"Building and maintaining relationships with our industry partners is one of our primary goals promoting both student and company success," said Walter Boles, Engineering Technology department chair.

LEAN AND SIX SIGMA PRINCIPLES

- Focus on the customer.
- Identify and understand how the work gets done.
- Manage, improve and smooth the process flow.
- Remove non-value-added steps and waste.
- Manage by fact and reduce variation.
- Involve and equip the people in the process.
- Undertake improvement activities in a systematic way.

GOOD PARTNERS

Following are the client firms during 2016 and 2017.

LEAN MANUFACTURING PROJECTS

Company	No. of MTSU student members
---------	-----------------------------

FALL 2017

Magna Seating	3
Tachi-S Automotive Seating	3
AllVan Corp.	3
Saint Thomas Rutherford Hospital	3
MAHLE	4
Calsonic Kansei North America	3

SPRING 2017

MAHLE	4
AllVan Corp.	3
Hayward Pool Products	5
O-Flex Automotive	4
Tachi-S Automotive Seating	4


FALL 2016

Schneider Electric	5
TennCare Healthcare Informatics	2
Calsonic Kansei North America	4
AllVan Corp.	4

SPRING 2016

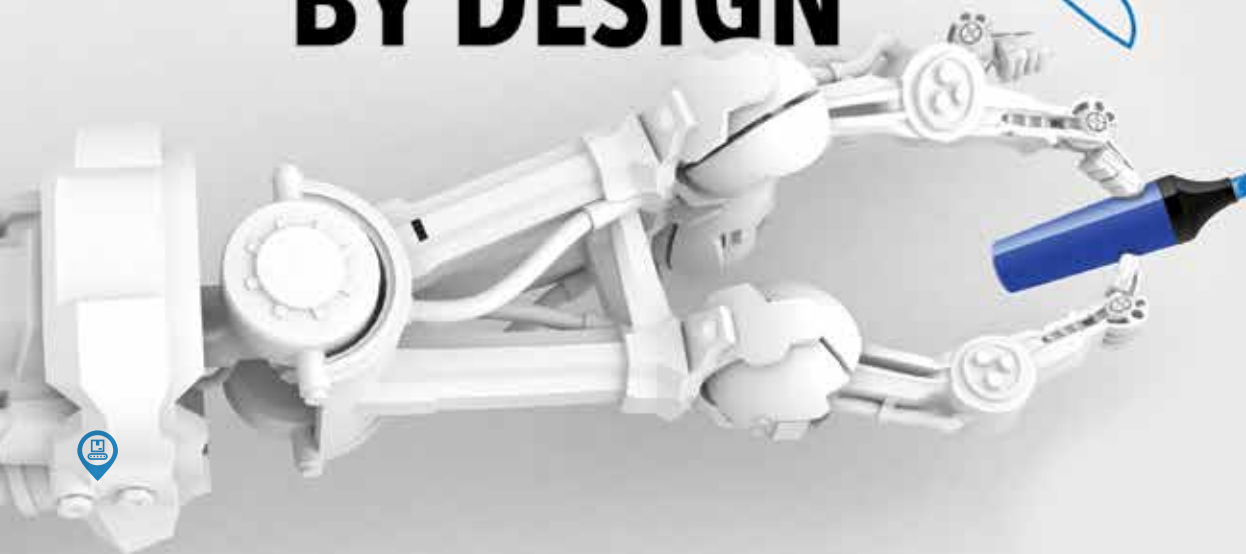
Hayward Pool Products	4
Feintool	3
AllVan Corp.	3
O-Flex Group	4
Tachi-S Automotive Seating	3
Hennessy Industries	3
Calsonic Kansei North America	3
Schneider Electric	3





MTSU'S MECHATRONICS
ENGINEERING PROGRAM,
ONE OF THE FASTEST-
GROWING MAJORS
IN THE STATE, HAS
QUICKLY BECOME
A DARLING OF
TENNESSEE
INDUSTRY

**BETTER
BY DESIGN**



By Drew Ruble and Randy Weiler

Illustration Micah Loyed

Mobile robots that can move traffic safety barrels for road repairs, freeing workers from a dangerous task. Surgical robots that let doctors perform operations through small incisions or get enhanced views of an abdominal cavity. Specialized robots for planetary exploration.

All are examples of mechatronics systems, a design process that combines mechanical, electrical, and robotic work with computer programming and control systems.

In the summer of 2013, MTSU launched a Mechatronics Engineering degree program. That fall, the first donation—\$15,000 from the Southeast chapter of the International Beverage Packaging Association to endow student scholarships—was received.

Why the support? Chapter member Jimmy Davis, an MTSU alumnus, past president of the Engineering Technology Advisory Board, and owner of the Murfreesboro-based Davis Groupe, which supplies machinery, tools, and parts to Toyota, General Motors, and Nissan, among others, described the new program as a “game-changer.”

“The Engineering Technology Department is taking it to the next level,” Davis said.

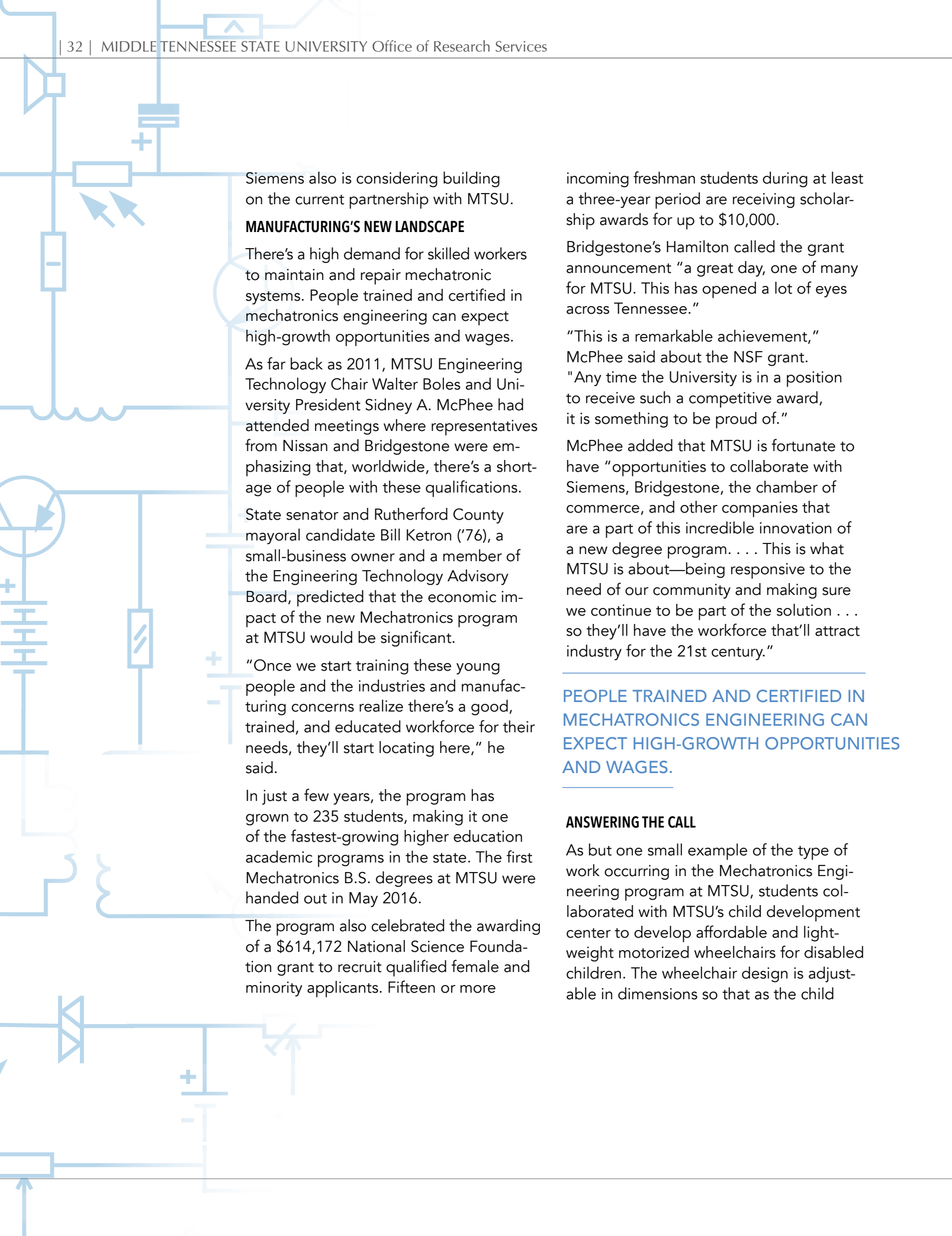
Bud Fischer, dean of the College of Basic and Applied Sciences at MTSU, the college that houses the program, agreed.

“It’s created a program that’s designed by industry that creates an engineer who has the ability to do multiple types of engineering,” he said.

MTSU’s Mechatronics program, based on a three-level international certification program, was created in partnership with

German engineering company Siemens. To date, MTSU is the only Siemens-certified Level 3 four-year mechatronics program in the world. The company has international certification exams for Level 1 and Level 2 qualifications. In nonprofessional terms, Level 1 is like an operator’s license for complex automation equipment, and Level 2 is for troubleshooting and repair. With the advent of MTSU’s Bachelor of Science program, Siemens consulted with MTSU and created a Level 3 certification for engineering design of complex automated systems. As the model and the requirements develop, the resulting methods and literature will be distributed worldwide for others to consider Level 3 certification.

Evidence of the program’s impact on jobs development includes a visit to campus by representatives from Siemens and other interested parties in Spring 2017. Dana Soukoup, vice president of Siemens Building Technologies Division in Chicago, was joined on the tour of MTSU’s Mechatronics facilities by fellow Siemens officials Judith Bevels of Murfreesboro and Sara Mould of Nashville; Davis of Murfreesboro-based The Davis Groupe; and Keith Hamilton, who retired in 2016 from Bridgestone Americas Inc. but continues to promote mechatronics engineering at all levels.



Siemens also is considering building on the current partnership with MTSU.

MANUFACTURING'S NEW LANDSCAPE

There's a high demand for skilled workers to maintain and repair mechatronic systems. People trained and certified in mechatronics engineering can expect high-growth opportunities and wages.

As far back as 2011, MTSU Engineering Technology Chair Walter Boles and University President Sidney A. McPhee had attended meetings where representatives from Nissan and Bridgestone were emphasizing that, worldwide, there's a shortage of people with these qualifications.

State senator and Rutherford County mayoral candidate Bill Ketron ('76), a small-business owner and a member of the Engineering Technology Advisory Board, predicted that the economic impact of the new Mechatronics program at MTSU would be significant.

"Once we start training these young people and the industries and manufacturing concerns realize there's a good, trained, and educated workforce for their needs, they'll start locating here," he said.

In just a few years, the program has grown to 235 students, making it one of the fastest-growing higher education academic programs in the state. The first Mechatronics B.S. degrees at MTSU were handed out in May 2016.

The program also celebrated the awarding of a \$614,172 National Science Foundation grant to recruit qualified female and minority applicants. Fifteen or more

incoming freshman students during at least a three-year period are receiving scholarship awards for up to \$10,000.

Bridgestone's Hamilton called the grant announcement "a great day, one of many for MTSU. This has opened a lot of eyes across Tennessee."

"This is a remarkable achievement," McPhee said about the NSF grant.

"Any time the University is in a position to receive such a competitive award, it is something to be proud of."

McPhee added that MTSU is fortunate to have "opportunities to collaborate with Siemens, Bridgestone, the chamber of commerce, and other companies that are a part of this incredible innovation of a new degree program. . . . This is what MTSU is about—being responsive to the need of our community and making sure we continue to be part of the solution . . . so they'll have the workforce that'll attract industry for the 21st century."

PEOPLE TRAINED AND CERTIFIED IN MECHATRONICS ENGINEERING CAN EXPECT HIGH-GROWTH OPPORTUNITIES AND WAGES.

ANSWERING THE CALL

As but one small example of the type of work occurring in the Mechatronics Engineering program at MTSU, students collaborated with MTSU's child development center to develop affordable and lightweight motorized wheelchairs for disabled children. The wheelchair design is adjustable in dimensions so that as the child



Walter Boles (r), chair of Engineering Technology, is with James Farzidayeri, Computational Science graduate assistant.

Photo J. Intintoli

grows, the wheelchair changes dimensions accordingly. It is also collapsible and fits in the trunk of a sedan.

Developing more intelligent mechanisms that can spark economic development across Tennessee, improve quality of life, and solve some of the world's most intractable problems is a worthy but never-ending pursuit. With industry partnerships and cooperation, MTSU's Engineering Technology Department can now apply its considerable resources to that important effort. [MTSU](#)

MIDDLE
TENNESSEE
STATE UNIVERSITY

LIVE ON THE CUTTING EDGE

MTSU's Mechatronics Engineering degree is on the cutting edge of a fast-growing industry. Mechatronics combines mechanical, computer, and electrical engineering, along with systems integration and technical project management.

Jobs are waiting for you to design and enhance robotics and automated systems. This program teaches students interpersonal, management, and engineering skills needed for success in technology-driven organizations.

The **Engineering Technology M.S.** program, geared toward full-time professionals with night classes, addresses dynamic changes in business and industry.

Application deadline
is **April 15** for graduate
assistantships and admission
in the Summer or Fall,
Oct. 1 for Spring

TAKE A CLOSER LOOK:
[MTSU.EDU/PROGRAMS/ET-MS](https://mtsu.edu/programs/et-ms)



PREVENTIVE MEASURES

MTSU'S CENTER FOR HEALTH AND HUMAN SERVICES WORKS NOT ONLY TO IMPROVE PUBLIC HEALTH OUTCOMES BUT ALSO THE ECONOMIC OUTLOOK OF TENNESSEE

Danny Cupples, a Maury County paramedic and death scene investigator, regularly travels across the state, talking to other first responders. There's one story he always shares. It's about the day in August 2007 when his sister called him, crying hysterically, to say that her 5-month-old son, Adam, was dead.

The telling never gets any easier, but Cupples considers it critical to his mission. He's part of a three-person team that teaches Tennessee's first responders how to investigate the death of an infant who passes away with no obvious explanation. The training was standardized in 2004, after Tennessee's legislature mandated it for every law enforcement officer, firefighter, and EMT in the state.

Given that tall task, several divisions within the Tennessee Department of Health (DOH) turned to well-known experts—MTSU's Center of Health and Human Services (CHHS)—to help fulfill it. Originally founded in 1993 through a gift from the Adams family of Murfreesboro that created the Adams Chair of Excellence in Health Care Services, CHHS collaborates with public agencies and nonprofits to improve the well-being of Tennesseans through training, research, communication, and education.

"Because of our history of doing professional training for health providers, the state came to us and said, 'We need some help developing and implementing a training program. We need to have well-trained professionals, and we don't have the capacity to do this,'" said Cindy Chafin, interim director for CHHS.

The best practices program CHHS created for DOH uses a "train-the-trainer" model, and now online training as well, to reach all 95 counties in Tennessee. To date, more than 27,000 emergency and municipal workers across the state have received this training, directly or indirectly, through CHHS.



By Allison Gorman

Photos J. Intintoli



D. Cupples D-ABMDI
Death Investigator

Danny Cupples is part of a three-person team that teaches first responders how to investigate the death of an infant who passes away with no obvious explanation.

The benefits of this 13-year-old program are multifold. Local health departments have better information about which neighborhoods are at high risk for sudden infant death. First responders are better equipped to assess a death scene and help families grieving the loss of a baby. And medical examiners get better information so they can find the true cause of deaths that, not too many years ago, would have been categorized as Sudden Infant Death Syndrome.

"Adam was a SIDS case," Cupples said. "That's one reason I decided to work hard to find out how we can prevent more children from dying. Because most infant deaths are preventable—that's the sad thing. Infant deaths are decreasing, primarily because we're finding out the causes. And by finding out the causes, we can actually prevent more deaths from happening."

CONNECTING THE DOTS

Even before SIDS became a dreaded acronym, parents were haunted by what seemed like a cruel form of roulette: put your baby to bed, and there's a small but terrifying chance that he or she won't wake up. But medical scientists now know that when a baby dies unexpectedly, it's rarely an arbitrary twist of fate. Two of the biggest and most controllable risk factors are an unsafe sleeping situation (in a caregiver's bed, tummy down, or with soft bedding or toys) and exposure to cigarette smoke (both in utero and in the home).

In fact, many medical examiners have stopped using the term SIDS, said Cupples' training partner, Memphis forensic investigator Sean Lester. Perhaps because of the word syndrome, people often mistake SIDS for a diagnosis, but it actually means that an investigation resulted in no diagnosis. By adopting a new term, SUID, or Sudden and Unexplained Infant Death, doctors and health departments hope to eradicate the

widespread notion that an infant dying unexpectedly while asleep is simply an unavoidable tragedy.

But making a finding in a SUID case requires critical details from the death scene. Before the CHHS training, getting those details was challenging in Tennessee, where 90 of 95 counties don't have a forensic anthropologist to go to the scene or conduct an autopsy, according to Lester. When a SUID case happens in one of those counties, the body and any investigative information must be sent to a regional forensic center in Memphis, Nashville, Knoxville, Chattanooga, or Johnson City.

"There's a distance there," he said. "An investigator from my office can't go to the

scene; we only cover Shelby County. So we make it abundantly clear to the counties we serve that autopsy is only a small part of the investigation. We need a good, thorough scene investigation . . . to

help the doctor determine the cause and manner of death."

The data gathered through this process doesn't just help clear up the case in question. It's also used by the Department of Health to identify epidemiological patterns for SUID, including high-risk ZIP codes. Then it's used by local health departments to target outreach to parents in those neighborhoods, and even by police and firefighters, who can be on the lookout for unsafe situations and possibly prevent tragedies before they occur. This can translate into dollars spent more effectively.

Since the CHHS death scene investigation training was made available online in February 2016, 562 first responders have taken advantage of it, said John Burchfield, who developed the web-based training and

helped write the original curriculum in 2004.

From 2012 to 2017, since CHHS has revisited its training methodologies and made some changes with guidance and input from the DOH's Family Health and Wellness Division, and in conjunction with other efforts that may contribute to improved data collection, SUID forms submitted by investigators went from a 64 percent completion rate to 98 percent according to information shared at the 2017 annual site visit. "Better data equals better decision-making at the local level as to where to direct fiscal resources," Chafin said.

Efforts by CHHS in this area receive crucial funding from the state Department of Health, whose advocacy in this realm is led by Rachel Heitmann. As section chief of the DOH's Injury Prevention and Detection section, Heitmann directs multiple public health programs, including child fatality review, fetal and infant mortality review, infant mortality reduction, and sudden death in the young, among others.

"We have seen an increase in the number of forms completed and the quality of data that we receive from the forms, which in turn helps our prevention efforts here," Heitmann said. "The training really helps the medical examiner with cause and manner of death, because getting this very specific information at the death scene can help the medical examiner determine what the official cause and manner of death is. . . . There's information that we really wouldn't get from any other source."

BETTER METRICS THROUGH BETTER OUTCOMES

All CHHS programs like SUID investigation aim to improve Tennessee's health, but many of them also improve its bottom line. For instance, according to Chafin, the

BETTER DATA EQUALS BETTER DECISION-MAKING AT THE LOCAL LEVEL.

*In 2002 Tennessee
had the second-
highest maternal
smoking rate in the
United States.*

center's smoking cessation program targeting low-income pregnant women is estimated to have saved millions in medical costs.

According to the American Lung Association, smoking during pregnancy is estimated to account for 20–30 percent of low-birthweight babies, up to 14 percent of preterm deliveries, and about 10 percent of all infant deaths. As a result, getting even one pregnant woman to quit can mean big cost savings, in addition to the health benefits.

"The difference in cost for a normal-delivery baby versus a low-birthweight baby that has to stay in the NICU averages \$90,075 per baby," Chafin said.

In 2002, when CHHS launched Smart Mothers Are Resisting Tobacco (SMART Moms), Tennessee had the second-highest maternal smoking rate in the United States. More than 29 percent of the state's pregnant recipients in the Women, Infants, and Children nutrition supplement program smoked.

predicted savings of \$378,315 based on expected and actual outcomes for low-birthweight babies.

PROUD HISTORY, BOLD FUTURE

After nearly 25 years of developing such community-level, research-based ways to make Tennesseans healthier, the Center for Health and Human Services is raising its game. Since 2001, CHHS has received over \$7 million in grants and contracts to conduct or facilitate public health training, research, and education, bringing measurable benefits to Tennesseans, particularly those in economic distress.

Now Chafin hopes to forge more partnerships with community organizations, amplifying their work through the center's diverse capabilities. "We can do some of the things they don't want to do or don't have time to do," she said.

So while a partner like the Rutherford County Health Department can focus on patients, for example, CHHS can handle provider training and community outreach, plus add a research element to

BY FINDING OUT THE CAUSES, WE CAN ACTUALLY PREVENT MORE DEATHS FROM HAPPENING.

As a collaboration between CHHS, the state Department of Health, and the Tennessee chapter of the March of Dimes, SMART Moms ran for four years in all 95 counties. Of the program's 13,000 enrollees, more than 24 percent stopped smoking, far exceeding both the 14 percent success rate of similar programs and SMART Moms' original goal of 10 percent.

During 2014–16, more than 200 women completed the SMART Moms program in Rutherford County, where MTSU is located. While they can't say that all of the women would have had a preterm baby had they continued to smoke, they can use statistical analysis to demonstrate a

document the effectiveness of the organization's work, broaden its scope, or attract new funding.

Dana Garrett, a nurse and director of the Rutherford County Health Department, said her agency's relationship with the center "has allowed us to work closely on important community health issues such as obesity, physical inactivity, tobacco use, and substance abuse and misuse."

Chafin also wants CHHS to become more of a thought leader and to help inform Tennessee's health policies. For example, currently she's seeking grant funding to study communities at high risk for shaken baby syndrome and to facilitate a pilot program to educate new parents—fathers

SMART Success

 **24%**
stopped smoking of 13,000 SMART
Moms enrollees—exceeding 14% rate
of similar programs (goal was 10%)

\$378,315



savings estimated
based on birthweight
outcomes

**200
Women**



completed program in Rutherford
County during 2014–16

\$7 Million

received in grants by CHHS
for public health since 2001



*CHHS director Cindy Chafin (r),
pictured with Christina Byrd, Chafin's
former intern who studied Health
and Human Performance at MTSU
and is now employed with CHHS as a
project assistant on the Death Scene
Investigation Grant.*

Photo J. Intintoli

and male caregivers in particular—on the subject. A similar program, mandated in Pennsylvania, resulted in 50 percent fewer infant deaths due to head trauma.

Through the work of CHHS, Tennessee could follow that lead, turning solid research into lifesaving legislation.

TURNING THE TIDE

Convincing parents they can prevent sudden infant death is one challenge; convincing them to change longstanding habits is another. But as public health seatbelt and anti-smoking campaigns have shown, it's possible to transform attitudes and behaviors through time and steady effort. With collaborations among CHHS, the state DOH, and other community partners in their second decade and going strong, the tiniest Tennesseans have momentum on their side. [MTSU](#)

SMART
About Tobacco

SMART Moms
Smart Mothers Are Resisting Tobacco


Smile SMART
Everyone Tobacco and Smoke-free

RECENT STUDIES

Sports, Play, and Active Recreation for Kids (SPARK) evaluation, Tennessee Department of Health

Smile SMART (Smart Moms are Resisting Tobacco) training for dental-care providers to counsel mothers regarding tobacco cessation, Tennessee March of Dimes

SMART Moms counseling for mothers regarding tobacco cessation, Rutherford County and Wilson County health departments

Sudden Infant Death Syndrome death scene investigation, Tennessee Department of Health

Statewide tobacco use prevention and control program, Tennessee Department of Health

Tennessee comprehensive cancer control plan and education, Tennessee Department of Health

Project Diabetes initiative, Tennessee Department of Health

Career mapping handbook, Metro-Nashville government



A SENSE OF DUTY

MTSU FORENSIC EXPERTS SPEARHEAD
EFFORTS TO IDENTIFY AND BRING HOME
THE REMAINS OF MEXICAN-AMERICAN WAR
SOLDIERS WITH VOLUNTEER STATE TIES

By Allison Gorman

The Mexican-American War cemented Tennessee's reputation as the "Volunteer State." Like so many Americans who volunteer for war, these men—most in their teens or early 20s—enlisted out of a sense of duty, and perhaps to improve their lot in life. But they were fatally unprepared for this foreign battle. Their style of combat didn't fit the urban terrain. The desert climate was nothing like the cool green hills they knew. The Americans won the battle but suffered heavy casualties. These young men were buried where they fell, in shallow graves thousands of miles from home.

The thought of abandoning our war dead on foreign soil is shocking to Americans, whose military credo is "Leave no man behind." And our government's commitment to that effort is unparalleled, notes MTSU Anthropology professor Hugh Berryman, a forensic anthropologist who helps identify recovered remains of U.S. soldiers. The military is still actively recovering casualties from 20th-century conflicts around the world, and then it takes the mission further: "We put a tremendous amount of effort into identifying who they were, so they can be returned to their wives, their children, their parents, whoever the next of kin is," Berryman said.

But at the time these soldiers described above fell—on Sept. 21, 1846, in the Mexican-American War—the U.S. government had little experience fighting on foreign soil and few resources for retrieving its fallen heroes.

As such, when Berryman heard that American remains had been accidentally unearthed near the Tannery Fort site in Monterrey,

Photo Illustration *Brittany Blair Stokes* |



Mexico, he was determined to repatriate them. Taking it further—returning them to their families—seemed an impossible task, but this native Tennessean decided to try.

THE LARGEST NUMBER OF DEAD IN THAT SPECIFIC AREA OF THE BATTLE WHERE THESE SOLDIERS WERE UNCOVERED WERE FROM TENNESSEE—THESE WERE THE ORIGINAL "VOLUNTEERS."

A PROPER HOMECOMING

The Volunteer State got its nickname from its residents' overwhelming response to the call of duty—first in the War of 1812, then again in the Mexican-American War. Judging from the location of these remains, and from buttons, coins, and other artifacts found with them, Berryman said, the odds are high that many are from the First Regiment of Tennessee Volunteers out of Nashville—known after the Battle of Monterrey as "the Bloody First."

"What made me especially interested in this project is the fact that the largest number of dead in that specific area of the battle where these soldiers were uncovered were from Tennessee—these were the original 'volunteers,'" he said. "Just the idea of being able to bring one home after 171 years is so appealing to me. It's never been done, and we've got a shot at it."

This isn't the first time Berryman has blazed a trail in the world of forensic anthropology.

A former student of that field's original trailblazer, Bill Bass (of the University of Tennessee's "Body Farm" fame), Berryman began his pioneering research into bone trauma in the 1980s. At MTSU, he launched the Forensic Institute for Research and Education (FIRE), which assists local and state law enforcement, medical examiners, and other agencies in conducting death investigations, and the all-student Forensic

Anthropology Search and Recovery (FASR) Team, which helps recover and document skeletal remains from crime scenes.

Working with the state medical examiner's office, FIRE developed and conducts virtual crime scene training, bridging the gap between law enforcement and death investigators. With a grant from the U.S. Department of Justice, Berryman created a crime scene investigation app so law enforcement can document and capture evidence on their smartphones.

While FIRE and FASR do most of their work in Tennessee, Berryman is nationally renowned. For 20 years he's been part of a select forensic team that identifies recovered American casualties for the U.S. Department of Defense.

That's how he learned about the American soldiers disinterred during construction in Monterrey. In 2013, he began the push to bring them home.

By "home," Berryman meant Tennessee. His original plan was to sort out the commingled remains, identify what soldiers he could, and either return them to their families or bury them in Gallatin City Cemetery, where there's a monument to Tennesseans killed in the Mexican-American War. He got a \$56,000 grant from the Tennessee Wars Commission, assembled a team of 25 renowned scientists with complementary expertise, and recruited state and federal legislators from Tennessee to help get the remains out of Mexico.

Repatriation was a years-long process, culminating last September, nearly 171 years to the day after the soldiers' deaths, with their arrival in flag-draped caskets at Dover Air Force Base, where all American war dead are ceremoniously received.

And Dover or nearby Arlington National Cemetery is where the soldiers will stay, unless Berryman and his team can identify them and find some living kin. That late order came as a



surprise to Berryman, who had planned to do the forensics at MTSU.

So with multiple trips to Delaware and another \$25,000 in grant funding from the MTSU Foundation Special Projects Committee, his team began the painstaking work of analyzing the remains and matching them to the 28 Tennesseans assumed to have been buried at Monterrey. A smaller number of non-Tennesseans fought and died there, too.

There appear to be 18 sets of remains, Berryman said. One is represented only by a single bone fragment.

The job is less jigsaw puzzle than Rubik's Cube. The team must align evidence on three planes: forensic, historical, and genealogical.

As for the forensics, Berryman's team has the advantage of "technology—and the expertise to go with that technology."

Through stable isotope analysis, the experts can use a soldier's teeth to pinpoint where he lived while those teeth were forming. His six-year molar, for example, will retain the chemistry of the specific creek from which he drank when he was a little boy—whether that's in Tennessee, another state, or even another country.

Bones tell an even fuller story, offering a window into a soldier's life "almost like an

IN EXPERT HANDS, THESE BODIES REVEAL ALMOST EVERYTHING BUT THEIR NAMES.

interview," Berryman said. They can reflect repetitive physical behaviors that suggest he had a certain civilian occupation, like blacksmithing. They might hold trace amounts of opiates (a sign he was being treated for an injury) or lead (a sign his family could afford pewter dishes). And of course bone trauma, Berryman's specialty, can reveal how the soldier's story ended.

Yet even Berryman was stumped when he found green residue, apparently from copper, on the leg bone of a soldier who'd sustained widespread injuries. A military weapons expert

HANDS-ON LEARNING

Maybe he got the sharp eye from working crime scenes, but Hugh Berryman can spot promising students. And when they're motivated, he puts extraordinary energy into helping them succeed—which they do. There's

the freshman who won a research grant, as well as an invitation to assist Berryman's all-star forensics team at Dover Air Force Base. Or the underclassman who's already published, with her dream job waiting.

Berryman doesn't just push early research and networking; he also preaches communication skills, body language, and the elevator speech. And by inviting students (many of whom are undergraduates) to join the selective Forensic Anthropology Search and Recovery (FASR) Team, which commonly goes behind the yellow tape on actual crime scenes across Tennessee, or pulling them on to his own projects, including his Forensic Institute for Research and Education (FIRE), which provides training and education to law enforcement and other groups, he offers them real-world experience and professional visibility. (FIRE's external board consists of top administrators from state and federal agencies, including the Tennessee Bureau of Investigation; Metropolitan Nashville and Davidson County Medical Examiner's Office; Tennessee Fire and Codes Academy; Federal Bureau of Investigation; Tennessee Department of Safety and Homeland Security; Drug Enforcement Administration; and the Bureau of Alcohol, Tobacco, Firearms, and Explosives.)

Thanks to Berryman and his star students, forensic science is keeping a sharp eye on MTSU.



Hugh Berryman (r), Anthropology professor and director of MTSU's Forensic Institute for Research and Education, is shown with Devin Adcox, an Anthropology major, Forensic Anthropology minor, Honors College student, and one of the youngest members accepted as part of the Forensic Anthropology Search and Recovery (FASR) Team at MTSU. In the spring of 2017, Adcox applied and received a URECA grant to travel to Dover, Delaware, to help Berryman and other nationally recognized anthropologists with the skeletal analysis of the Mexican-American War dead from 1846.

Photo J. Intintoli

explained that Mexico had so much copper—a byproduct of silver mining—that its army shot canisters filled with copper balls from cannons.

In expert hands, these bones reveal almost everything but their names.

DIFFERENT PERSPECTIVES

In all, three MTSU researchers are among the experts working on this project.

Anthropology professor Shannon Hodge is a bioarchaeologist at MTSU who will be examining the bones to determine the biological parameters of age, sex, ancestry, and stature, as well as skeletal pathology. Hodge recently spearheaded a separate project, reinterring the bodies of 20 enslaved workers on the site of the Grassmere Historic Farm at the Nashville

from survivors. As preliminary newspaper accounts of the battle weren't always accurate, he had to rebuild casualty reports based on personal correspondence.

Individuals who've heard about the project have stepped up with letters and other family documents.

"We've had people call us and say, 'Hey, I've got a map of Monterrey that was drawn by somebody at the battle,'" Frisby said. "They're just keeping it in a box in their basement."

But DNA is these soldiers' surest ticket home. To that end, Frisby is building genealogical profiles of the 28 Tennesseans, hoping to find a living ancestor carrying genetic proof of the familial link.

Old bones contain mitochondrial DNA, which is passed through the female bloodline only. So Frisby must trace each soldier's lineage beginning with his mother or a sister and then working from daughter to daughter to modern times. That's an especially tough task in a historically patriarchal society, where women were legally referred to by their husband's names, if at all.

The entire mission to bring these volunteers home is impossibly complex—"like going to the moon," Frisby said.

But with three or four potential DNA donors identified already, and the research ongoing at least through 2017, that moon shot is looking promising.

"I don't know how long it will be before those (donors) are approached," Frisby said, "but the fact that we're at that point in the project is huge."

Berryman said he'll let the military do the approaching; he's just proud to facilitate.

"Any member of the military today goes in with that expectation that, if worse comes to worst, they will make it back home one way or the other," he said. "We're keeping that promise, through FIRE and through MTSU." [MTSU](#)

JUST THE IDEA OF BEING ABLE TO BRING ONE HOME AFTER 171 YEARS IS SO APPEALING . . . IT'S NEVER BEEN DONE, AND WE'VE GOT A SHOT AT IT.

Zoo in preparation for construction of an entrance kiosk near the original burial grounds.

In addition, knowing that history could take him where science couldn't, Berryman tapped History professor Derek Frisby, MTSU's specialist in Tennessee and military history, to learn as much as possible about each Tennessean thought to have been buried at Monterrey. The plan is to see how 18 sets of remains align with 28 stories.

Which of these 28 Tennesseans might have eaten off pewter dishes? Which ones grew up near which creek? Were any reported to have died by cannon fire?

Using information from the National Archives and other historical repositories, Frisby began poring over government documents, military records, and letters

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TAKE A CLOSER LOOK: [MTSU.EDU/PROGRAMS/LIBERAL-ARTS-MA](https://mtsu.edu/programs/liberal-arts-ma)



I-O, I-O . . . IT'S OFF TO WORK WE GO

ONE OF MTSU'S SIGNATURE PROGRAMS,
AND MOST-RECOGNIZED CENTERS,
COUNTS COMPANIES LIKE JACK DANIEL
DISTILLERY AMONG ITS CLIENTS

By Drew Ruble and Vicky Travis

Industrial and organizational psychologists find themselves in great demand in a growing field—the science of the workplace. And yes, I/O Psychology grads, specifically MTSU's I/O grads, are off to work as quickly as they can graduate.

While the mouthful of a title is still sometimes met with a "What's that?", graduates of MTSU's I/O Psychology master's and undergrad programs find jobs (and then promotions) in myriad workplaces from government to education to business. The master's program at MTSU attracts top students from across the country and the world.

Through 2024, the Bureau of Labor Statistics expects employment of I/O psychologists to grow 19 percent.

Think about it. Since many of us spend at least 40 or more hours per week at workplaces (for 25 to 40 years of our lives, no less), the need for people who understand the science of the workplace—hiring, retaining, training, and more—will never go away.

"When you improve a workplace, you change hundreds of lives," said Michael Hein, Psychology professor, consultant, and a primary driver of the program's national reputation.

Photo *Ryan Tang* |
"Home they Go" |

continued on page 49

RECENT COHRE PROJECTS

- Regents Online Community Collaborative (ROCC)—organizational performance measurement and onboarding
- Tennessee Board of Regents—organizational survey
- Jack Daniel Distillery workforce analysis
- Tenet Health—leadership coaching
- Tennessee Department of Human Resources—measurement workshop II
- First Presbyterian Church—organizational survey
- Tennessee Highway Patrol—promotion process (year 2 of 5)
- Tennessee Highway Patrol—cadet selection (year 1 of 5)
- ROCC—staffing support, search for director of Nursing
- Roosevelt University—review of Consulting Center
- University of Texas–Dallas Student Services Division—strategic planning
- Murfreesboro Police Department—“Physical Abilities Job Analysis and Best Practices in Police Selection,” white paper
- Psi Chi National Office, Chattanooga—organizational assessment
- Tennessee Department of Human Resources—measurement workshop III
- Rutherford Cable—all-member survey



EFFECT MEANINGFUL CHANGE

Industrial and organizational psychology graduates improve the lives of people and the effectiveness of organizations.

MTSU has one of the top-ranked Industrial/Organizational Psychology master's programs in the nation. With a projected job growth rate of 53% for the I/O field through the year 2022, the future continues to look bright for program graduates.

Applications for Fall admission must be complete by **March 1** or **Oct. 1** for Spring.

TAKE A CLOSER LOOK:

[MTSU.EDU/PROGRAMS/PSYCHOLOGY-MA-IO](https://mtsu.edu/programs/psychology-ma-io)

A RECIPE FOR STUDENT SUCCESS

As new hires in the early 1990s, Hein, wife Judith Van Hein, and another husband-wife faculty duo, Richard Moffett and Beverly Burke, elevated MTSU's I/O Psychology master's program, which already had a sound curriculum in place and was attracting students.

"We inherited that curriculum from people who did a lot of hard work," said Hein, who emphasized that the breadth of the curriculum remains a magnet. "The four of us decided we wanted to create the best applied master's I/O Psychology program in the country."

WE KNOW THAT THESE PEOPLE ARE MAKING A DIFFERENCE IN THE COMPANIES THEY ARE IN. THAT'S A MAJOR WIN WHEN YOU SEE THAT WE'RE INDIRECTLY INFLUENCING COMPANIES TO MAKE BETTER DECISIONS.

Many I/O master's programs have only one to three faculty members and some adjuncts, Hein said. Today, MTSU's I/O program boasts six full-time faculty and requires master's candidates to complete a thesis, a comprehensive exam, and an internship.

"Almost no other program requires all three," Hein said. "And the fact that they've done all three makes a difference to employers."

Hein also wrote the proposal for a stand-alone I/O Psychology undergraduate major, making MTSU's the only undergraduate I/O program in the country. (Other universities may offer a concentration, but not a full undergrad major.) Graduates with the bachelor's degree complete courses in the same content areas as the master's students and land jobs in human resources and related fields throughout the state.

"Our graduates go into a job and start bringing value," Moffett said. "The best seller for our program is our graduates. We have employers who tell us, 'We hired

so-and-so—could you give us another one of those?'"

"We know that these people are making a difference in the companies they are in," added Hein, referencing a story he heard from two recent graduates who successfully steered their companies away from the Myers-Briggs personality indicator test to a better assessment deemed more appropriate for hiring.

"That's a major win," he said, "when you see that we're indirectly influencing companies to make better decisions."

REAL-WORLD EXPERIENCE FOR STUDENTS

A major milestone for the I/O Psychology program was the creation of the Center for Organizational and Human Resource Effectiveness (COHRE) in 2004. The team proposing the center came at the perfect time—while MTSU President Sidney A. McPhee was encouraging the development of signature programs from the colleges.

The faculty had been doing consulting work since 1992 through the Continuing Education Department to support and train graduate students, but they felt the need for a dedicated space and more control over working with clients, Moffett said.

So, the team proposed and won University funding to start up the center—a place that would give I/O Psychology master's candidates real-world education and help the community build better businesses and nonprofits.

Since then, COHRE's client list has grown to include federal, state, and local government departments; school systems; medical companies; banks; and many different nonprofits and companies, including Jack Daniel Distillery (see opposite page for a list of recent clients).

The center, set up much like a typical consulting firm, is now self-sustaining with about 75 percent of its income going to pay graduate students. "We always involve students in the research, which feeds back

into our teaching,” Hein said. “So, I stay current partly from the research but also from the consulting.”

Another milestone happened in 2010, when the I/O Psychology faculty collaborated with the Department of Aerospace to create the NASA FOCUS (Flight Operations Center–Unified Simulation) Lab, where Aerospace students must communicate and solve problems to manage 80 simulated flights during a three-hour shift. Graduate assistants from I/O Psychology and Aerospace, along with faculty from both programs, are involved in the NASA-funded project.

“Students get a lot of interactions with faculty from diverse backgrounds and do a deep dive into material and get lots of real-world experience,” said Mark Frame, a Psychology professor in the I/O program.

Hein consistently acknowledges the team effort that goes into growing the nationally recognized program. After all, it only makes sense that a group of industrial and organizational psychologists could create such teamwork and stability. [MTSU](#)



PROOF IS IN THE PUDDING



MTSU master's candidates won the Krannert School of Management Human Resources Case Competition at Purdue University in Indiana and split a \$5,000 award.

The value industrial and organizational psychologists can bring to a company was showcased by a group of MTSU master's candidates as they blew past business master's students to win a national competition in Fall 2016.

The five second-year students won the Krannert School of Management Human Resources Case Competition at Purdue University in Indiana.

Chosen as finalists after submitting a solution to a human resources case sent to them, the team paid their own way to go to the finals, where each team had 60 minutes to prepare, 20 minutes to present, and 10 minutes to answer questions from a panel of HR experts from Amazon, Dell, and General Electric.

Team members (photographed here) were Kin Chan of Paya Besar Kedah Lunas, Malaysia; Katelyn Class of Oxford, Ohio; Jacqueline Masso of Peoria, Illinois; Hung Nguyen of Lawrenceville, Georgia; and Megan Wertheimer of Waterford, Michigan.

MTSU's team defeated finalists from Brigham Young University, the University of Minnesota, Penn State University, the University of Pittsburgh, and Purdue University. The prize was a \$5,000 check that was split among the students.

SOLID TO THE COHRE

Forty-six Tennessee Highway Patrol (THP) cadets earned their badges in a graduation ceremony last June, a class selected with assistance from MTSU's Center for Organizational and Human Resource Effectiveness (COHRE).

Consultants and graduate assistants at COHRE designed interview questions, trained interview teams of THP personnel, and crafted interview/testing systems for choosing the class of cadets.

That's 46 more troopers on the road with the help of COHRE!

Photo courtesy of the Chattanooga Times Free Press



CAREER ACHIEVEMENT

A professor of Psychology in the Industrial/Organizational (I/O) Psychology program, **Michael Hein** is also director of MTSU's Center for Organizational and Human Resource Effectiveness (COHRE), which he helped establish. Hein has served as director of MTSU's I/O Psychology master's program, taught graduate courses, and developed four graduate courses, a graduate lab, and a hybrid course.

His research interests include leadership, best use of training/practice time, the determinants of skilled task performance, and the development of expertise. Widely sought after as a consultant, Hein also has more than 25 years of experience working with clients in a variety of industries on projects regarding job analysis, employee surveys, training needs analysis, onboarding new employees, leadership development, performance appraisal, and organizational performance measurement. Some of his past clients include Toshiba and Kroll Background America.

A consistent grant award recipient over several years, Hein has most recently helped secure grants for A Catalyst to ADVANCE the Participation and Advancement of Women in Academic STEM Careers at MTSU (NSF evaluator-funded, \$15,000) and, in collaboration with colleagues Cen Li, John Wallin, and Qiang Wu, for MTSU Student Success: Improving Minority Student Success through Data-Driven Comparative Analysis (Tennessee Board of Regents-funded, \$40,000).

For these and many other major contributions to his profession, graduate and undergraduate program development, and the stellar educational preparation of his students, Hein was selected as the University's recipient of the 2016 MTSU Career Achievement Award.



Michael Hein (r) with Christopher Ryan Bearden, who started in the MTSU I/O Psychology master's program in Fall 2017. Bearden won the Provost's Award for undergraduate research at MTSU. His Honors thesis was done on data from the NASA FOCUS Lab—a Psychology-Aerospace collaboration that Hein has been involved with for the past seven years. Now a graduate assistant, Bearden is continuing to work in the FOCUS Lab.

Photo J. Intintoli



I AM *true*
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MIDDLE TENNESSEE STATE UNIVERSITY