

# Making Connections

BY CHIP MINTY

**D**avid Ebert is a born matchmaker.

He's spent much of his career bringing people together, but he's no cupid. He's more along the lines of a switchboard operator, connecting people and ideas in an ever-expanding world of problem solving through science, technology and big data.

The University of Oklahoma electrical and computer engineering professor and associate vice president of research and partnerships has always been a trailblazer, but that has never been truer since becoming the director of OU's Data Institute for Societal Challenges (DISC).

Ebert works with people from many different disciplines to develop better cancer treatments, improve severe weather prediction, develop green energy solutions, fight opioid addiction, understand economic forces, improve wellness, and the list goes on.

While Ebert has been using big data to solve problems ranging from

social issues to scientific puzzles for more than two decades, he says the practice has become more widely used at universities during the past five years.

"Universities are now creating data institutes or degree programs in data science. So compared to academia, it's extremely new. There are only a few dozen programs like this across the country.

"One of the main functions of DISC is to serve as a connection point for all the people across the campus who do data-related activities," Ebert says. "We have people in atmospheric science who do very advanced predictive analytics for weather forecasting. We have people in mechanical engineering who are applying artificial intelligence to additive manufacturing."

DISC connects expertise from such areas as data and data science, computer science, electrical engineering, and industrial systems. The institute also links to professionals from disciplines like cognitive psychology to provide statistical analysis in understanding how humans think and reason about problems.

"We help create convergent teams to get researchers talking. We hook

people together to solve problems," he says, "from data science to AI research."

Ebert earned his Ph.D. in computer science from Ohio State University, where he specialized in computer graphics, simulating natural phenomenon such as cloud steam and smoke. He also developed special effects techniques now being used by the movie industry.

After starting his first faculty position at the University of Maryland, Baltimore County, Ebert transitioned away from natural phenomenon and applied his techniques to scientific data. He began working with flow researchers, astrophysicists and others to help them better understand their data. Eventually, he moved to Purdue University, where his work evolved over the next 20 years to include public safety, crowd behavior and prediction.

Along the way, he developed a passion for big data, the growing flood of information that is being collected and stored from just about every facet of society.

"There are more and more things being collected," he says. "There are images and video recordings of all that's occurring. We now have so much



Data Institute for Societal Challenges Director David Ebert uses his passion to help others solve problems ranging from social issues to scientific puzzles.

Ethan Stewart

## *Research Teams Use Big Data to Target Societal Challenges*



Yessenia Torres, DISC managing director, joins David Ebert on a project. “There are only a few dozen programs like this across the country,” Ebert says of DISC.

information about our environment. It’s literally an ocean or a galaxy of data. So, you start thinking about issues data could help. Then you form partnerships with people who have the data.”

His work analyzing activities of people, places and events took off, and soon he landed a role with the U.S. Department of Homeland Security, leading the agency’s Center of Excellence in Visual Analytics. Ebert and his team created tools used by the U.S. Coast Guard, as well as police departments and emergency management organizations from across the country. He used big data to create a situational awareness tool called Social Media Analytics Reporting Toolkit, or “SMART,” to help first responders do their jobs better. For example, SMART has helped police identify activity patterns within their cities, and the

Coast Guard has used the system to improve search and rescue operations.

“It was all done in response to people who had a problem,” Ebert says. “Some came to us and said, ‘We are getting a lot of information from social media. How can we use the information to make our city safer?’

“So, we started working with them, doing real-time analysis of everything that was going on within Facebook and Twitter. That project ended up evolving over the years and was used at large-scale, public events to monitor for disturbances, traffic problems and developing emergencies.”

At a Purdue football game, for example, first responders pinpointed a fan tweeting about someone showing signs of heat stroke, Ebert says. Paramedics were able to immediately locate that point in the stands and

get there before the person became critically ill.

Police have used SMART to discover school shooting threats posted on social media, and the Coast Guard has used the toolkit to direct operations following hurricanes to locate where people were trapped in flooded areas.

When Ebert joined the University in 2020, he brought with him a passion to help others solve problems by using big data and became DISC’s first director.

“We do a lot of outreach,” he says. “We look at projects that are coming out in terms of the government’s needs and find opportunities. We talk through problems with people. I look at their problems, ask questions, then start trying to figure out who would be the best fit to work with them and where we could get funding.

“We need to bridge together because



Travis Caperton

OU Sociology Professor and Associate Research Director Erin Maher has received two grants to assist in her work with pregnant and parenting mothers fighting addiction. She says that DISC has helped her by bringing together the right people.

the whole point here is constant interaction,” he says. “You’re making sure you’re bringing everyone’s expertise and considering all factors in the solution.

“We’re getting a great response. People are excited to collaborate. In our first year, we’ve interacted with more than 750 faculty and graduate students,” Ebert says. “They are looking for chances to grow, and there is interest in growing beyond their disciplines. There are a lot of people who are looking at broader problems and want to be part of bigger things.”

OU sociology professor and researcher Erin Maher began talking to colleagues about research on opioid addiction in 2019, but after joining DISC as an associate research director in 2020, her opioid consortium quickly grew. Now, she says there are more than 80 OU faculty and graduate students

involved in opioid-related projects.

Maher’s work focuses on Oklahoma mothers who are struggling with substance disorders, while others in her group are looking into additional facets of opioid abuse. Two of those projects have each received \$10,000 in seed grants from DISC, and in November, Maher announced a \$1.5 million grant from public and private sources to support her work with pregnant and parenting mothers fighting addiction.

She says DISC has assisted her with campuswide communications support and by setting up events to help bring the right people together.

“We can credit our growth and sustainability to DISC,” Maher says. “My project started as service work, but now I’ve been able to grow it because of DISC.”

While Ebert has focused much of

his early attention on building teams, his underlying goal is to attract research dollars to OU. He is nurturing start-up research with seed grants funded from within the university; those grants help researchers establish early results that can be used to attract larger awards from outside sources.

DISC has provided seed funds to about a dozen teams so far, with amounts ranging from \$5,000 to a \$100,000 grant for research at OU’s Stephenson Cancer Center in Oklahoma City.

“You put these groups together and they begin to solve a problem, and once they reach a certain point, they’re ready to seek federal funding,” he says. “We work with them on the proposal so they’re able to get funding to really solve the problem.”

In the future, Ebert would like to reach beyond the University and invite companies from throughout the state to collaborate with OU researchers. Businesses could come in with their data and DISC would form teams of faculty and students from across campus to help meet their needs.

“Getting companies here on campus, working with a team, it makes a big difference. When I’ve had people from agencies or corporations come and work with grad students ... and they’re meeting frequently, the rate of improvement and solution drastically increases. It gets the students really excited about the work the company is doing and creates a pipeline for employment.”

Like any good switchboard operator, Ebert sees red lights all around, problems to solve, connections to be made.

“We enable and we also provide expertise, but I think a big portion of it is making the connections.”

*Chip Minty is a Norman-based writer and the principal of Minty Communications, LLC.*