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Research That Solves North Carolina's Problems

The North Carolina Collaboratory is "working proof" of how state-directed research at universities can make publicly funded science accountable to the people of the state.

Wilmington, North Carolina, is known for its sandy beaches and coastal breezes. But in the summer of 2017, that calm was disturbed by a headline in a local paper: "Toxin taints CFPUA drinking water." The article revealed that GenX, a chemical used in manufacturing nonstick coatings and other products, had been found in the Cape Fear River, the source of drinking water for the region. At the time, GenX was a new and understudied contaminant; scientists and regulators had very little information on its toxicity or how to remove it from water. What began as a local news story quickly became a public reckoning. This report and others sparked questions that rippled through the metropolitan area, which has nearly half a million residents. How safe was the water? What could be done?

In response, the North Carolina General Assembly tasked our organization, the North Carolina Collaboratory, with leading a statewide effort to investigate and address contamination from GenX and other per- and polyfluoroalkyl substances (PFAS). The Collaboratory is a unique state-based research-policy organization that funds research across the University of North Carolina (UNC) System's 17 public institutions as well as private universities located in the state. Lawmakers appropriated more than $5 million in the 2018 budget for the Collaboratory to build research capacity across the state's university system to establish a water-quality baseline, test drinking water sources, and develop mitigation strategies. This directive positioned the Collaboratory at the center of one of the most comprehensive statewide PFAS investigations in the country, with a mission of producing solutions with immediate, local benefits that could have national and global significance. In the current era of federal funding uncertainty, North Carolina's approach offers a practical blueprint for building state infrastructure capable of directing science at research universities to be nimble, accountable, and centered on delivering results for the people they serve.

Shortly after the 2018 budget was passed, one of us (Collaboratory executive director Jeff Warren) was invited to speak at the University of North Carolina at Chapel Hill's chemistry department. I presented the department with the essential challenge: "Our

Illustration by Shonagh Rae

state, like many others, has a PFAS problem. How can we get it out of the environment?" Shortly afterward, chemistry professor Frank Leibfarth proposed a new way to remove PFAS, including GenX, from water supplies that would require innovation beyond existing technologies. With seed funding from the Collaboratory, researchers in his lab designed a resin specifically tailored to remove PFAS from water. This novel sorbent was able to capture contaminants and then be cleaned and reused—a crucial step forward in creating scalable, cost-effective remediation.

When this proof of concept, along with successful lab-scale testing, was brought to the attention of state lawmakers in early 2021, they saw an opportunity to move from scientific discovery to statewide deployment. The General Assembly invested $10 million—as laid out in the Water Safety Act provision of Session Law 2021-180, championed by Wilmington-based state senator Michael Lee (R–New Hanover)—to build upon the Collaboratory's initial investment into the North Carolina PFAS University Research Alliance (dubbed NC Pure). This law stipulated that research and application advance side by side, explicitly directing the Collaboratory to deploy PFAS removal technology in partnership with public water and wastewater systems, and to embed pilot testing in the places most affected by the contamination. Senator Lee sponsored other provisions, bringing the total legislative investment in academic PFAS R&D to over $50 million—$4 million of which is annually recurring, meaning that investigations of forever chemicals, at least in North Carolina, now receive forever funding. This parallel development model—where scientific design and field implementation occur simultaneously—was not an afterthought, but a legislative mandate to intentionally bridge the gap between research and impact.

As a result, NC Pure now partners with six North Carolina water and wastewater utilities, including both surface and groundwater sources. By partnering directly with these organizations, researchers were able to test and refine the resin under real-world scenarios, ensuring seamless integration into municipal treatment systems in the future. In tests, the resin has proven to be more effective than commercially available solutions. NC Pure has already licensed this technology to the company Sorbenta Systems.

When NC Pure's resin is commercialized, 10% of gross licensing and patent revenue will return to the state's general fund. This approach is rare in academia, where research benefits are not always tangible to the public—and it is the first time it has been implemented at UNC-Chapel Hill. Another 10% of revenue is mandated to support additional PFAS research and technology development. This profit-sharing arrangement was specifically included in the legislative language authorizing NC Pure's development. The provision illustrates the broader philosophy behind the Collaboratory itself, which was conceived to create a true partnership between state and local government, academic expertise, and the people of North Carolina. Because research goals are closely aligned with community needs, every innovation has a built-in pathway to serve the public good. And, by redefining accountability for state investments in science, the initiative synergistically generates measurable outcomes and builds trust with taxpayers and lawmakers—all while laying the groundwork for possible financial benefits over time.

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The story of NC Pure exemplifies how the Collaboratory's design leverages research into actionable solutions that directly benefit citizens. By working alongside utilities, lawmakers, and communities, the Collaboratory ensures that scientific breakthroughs are not just published—they are applied, tested, and scaled to solve real problems. Since its creation in 2016, the Collaboratory has catalyzed academic expertise to tackle some of the state's most complex challenges, demonstrating how state-led research, when designed to be collaborative, flexible, efficient, and accountable, can redefine what publicly funded science looks like and how it impacts everyday lives.

How the Collaboratory has taken shape

In 2016, the Republican-led General Assembly mandated the creation of the Collaboratory with a mission to facilitate the dissemination of research "for practical use by state and local government." This vision extended well beyond the science-advisor fellowship model that has been used in other states. Rather than embedding

individual experts within government offices, the NC General Assembly wanted to institutionalize a statewide research infrastructure by creating a permanent mechanism to respond directly to legislative and agency needs.

Since its authorization by the General Assembly, the Collaboratory, which is housed on UNC-Chapel Hill's campus, has stewarded more than $260 million in legislative appropriations, funding more than 700 research projects spanning environmental science, public health, education, energy, and infrastructure. Intentionally structured for speed, flexibility, and accountability, its enabling statute grants the Collaboratory authority to contract directly with campuses, manage procurement, and structure research agreements independently—reducing administrative barriers and accelerating deployment of funds.

These statutory powers are not abstract; they deliberately shape how science is done within the university system. The Collaboratory's ability to move funding, negotiate contracts, and manage projects outside of traditional constraints gives researchers a rare operational freedom—one that changes how partnerships form and how quickly ideas move from concept to implementation. Together, these authorities create a built-for-purpose model that allows the state to mobilize its academic expertise rapidly in response to emerging challenges.

As part of the Collaboratory's mission, the funding design provides a momentum and sense of purpose that overrides some of academia's slower tendencies. This architecture helps align partnerships across the state, quickly moving projects from legislative language to laboratory benches to the field and the desks of decisionmakers. For example, in the case of NC Pure, the Collaboratory distributed funds directly to participating universities, enabling the acquisition of essential equipment without the usual procurement delays. In practice, that meant the legislative directive was translated into a fully equipped off-campus laboratory within months—rare speed for any university research effort. Researchers were then able to produce a second-generation resin within less than a year of receiving the legislative mandate.

The model also facilitates partnerships that increase the value of the science that is done, turning legislative intent into tangible solutions much faster than a conventional framework would allow. Leibfarth's chemistry laboratory partnered with Orlando Coronell, in UNC-Chapel Hill's Department of Environmental Sciences and Engineering, to continue refining the resin, enabling chemists and engineers to work together to move from molecular design to application. Housing both disciplines inside the same lab has accelerated innovation; constant collaboration ensures the resin is not only effective at removing PFAS, but also practical to implement across water and wastewater treatment systems. By incentivizing this cross-disciplinary work, the Collaboratory catalyzed a scientifically sound and operationally feasible solution.

The story of NC Pure shows how the Collaboratory's funding design and mission work hand in hand—linking state priorities, university expertise, and cross-disciplinary collaboration into a single, accelerated system of innovation. Since its inception, the Collaboratory has evolved from a state-specific administrative experiment in applied research to a working proof-of-concept for a new kind of publicly engaged science.

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As national funding structures and priorities shift, the Collaboratory offers a preview of how the scientific enterprise could broadly reimagine the way publicly funded research serves society. Today, the national research landscape is going through a historical upset as the federal government reconfigures how research is funded, what kind of projects receive priority, and who is entrusted with those dollars. Although the long-dominant model of federally driven, university-led research produced extraordinary breakthroughs in medicine, technology, and public health over the last eight decades, at times it has been rigid and disconnected from the immediate needs and expectations of the public it serves. The current disruption offers an opportunity to reimagine the partnership between government and academia—one rooted not only in discovery, but also in delivery.

In North Carolina, the Collaboratory provides an example of an alternative that has embedded research directly within the state's decisionmaking process, transforming universities from passive recipients of federal grants into active partners in public problem-solving. It has also significantly changed the way researchers in the state do science by coupling theory with

application and community engagement. In this way, it helps universities partner with communities to improve life within the state, directly building popular trust through the processes and outcomes of the research.

Research capacity that is storm-ready

One important component of the Collaboratory's relationship with the state is its ability to mobilize North Carolina's research infrastructure when crises strike, deploying researchers in real time to protect communities and inform policy. This capacity was put to the test when Hurricane Helene struck the western part of the state with unprecedented force in September 2024, causing devastating flooding that damaged infrastructure, took many lives, and displaced thousands. In the immediate aftermath of the storm, the Collaboratory empowered local researchers who understood the terrain, the communities, and the unique challenges posed by the storm. The researchers' proximity to the storm's impacts meant they could recognize when it was appropriate to document critical conditions and when communities needed space to focus on recovery before transitioning into research and restoration work.

Partnership-driven research like this must be intentional. Local leaders must shape the studies in tandem with academics, and the emphasis should be placed on implementing the findings, rather than simply publishing them. In light of recent skepticism around the public value of research, this collaboration offers an example of how research can unfold—not in ivory tower silos, but collaboratively, with faculty, policymakers, and federal and state officials working together.

In parallel with these microgrants, the Collaboratory also partnered with the NC Department of Public Safety's emergency management division to fund a high-resolution LiDAR (light detection and ranging) and digital orthophotography initiative across 13 of the hardest hit counties. This $4 million project is generating precise elevation and imagery data to quantify what was lost, assess long-term environmental changes, and provide actionable insights for recovery and resilience planning. Built on the state's existing geospatial infrastructure, the effort is already giving emergency managers, local governments, and planners an unprecedented level of detail to guide both the immediate response and future mitigation efforts.

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By leveraging its discretionary funding, the Collaboratory awarded 21 microgrants totaling nearly $300,000 for rapid-response efforts to Appalachian State University, Western Carolina University, and UNC Asheville. Within the microgrant initiative, members of UNC Asheville's Atmospheric Sciences Department—researchers Doug Miller, Caitlin Crossett, and Chris Godfrey—came together to study the hurricane's impact on regional infrastructure. By combining academic analysis of rainfall, wind damage, and radar coverage gaps with the lived experience and operational knowledge of local agencies, their work generated insights that can be applied by emergency responders, infrastructure planners, and policymakers alike in future crises.

This project exemplifies the Collaboratory's approach to prioritizing local needs when uniting academics with state and local partners. Experts from the state's Department of Transportation, Emergency Management Services, and local legislators collaborated with the research team, ensuring that findings were not only rigorous but also actionable. This ongoing work then helped inform legislation to improve weather infrastructure. And it will continue to guide disaster preparedness, long-term resilience strategies, and community recovery efforts.

Building trust at the core of research

Over the past decade, many other projects in the Collaboratory's portfolio have demonstrated how this state-based model can translate university expertise into knowledge, technologies, and workforce capacity to serve the public good. The $20 million Innovative Highly Treated Wastewater Pilot Program, for instance, is helping rural towns rebuild aging wastewater systems through partnerships with the UNC School of Government, North Carolina State University, and the Department of Environmental Quality. In Winston-Salem, a Collaboratory-funded project between Winston-Salem State University and the UNC School of the Arts led to Patient Ready, a start-up that uses virtual reality and artificial intelligence to train nurses in real-world clinical settings, bridging academic research with workforce development. And in Union County, a high-dosage tutoring partnership supported by the Collaboratory has become a model for postpandemic educational recovery statewide. Together, these efforts illustrate how academic expertise can build tangible impact for taxpayers through relationships between universities, local governments, and the citizens they serve.

Another place this partnership is evident is in the Collaboratory's work on foster care recruitment and retention, which has reimagined how researchers and local governments work together to solve urgent social challenges. Rather than conducting studies in isolation, teams from UNC-Chapel Hill, Duke University, and East Carolina University partnered directly with social services departments in the Appalachian counties of Clay, Jackson, Rowan, and Rutherford to co-design research projects. Small planning grants allowed county directors and researchers to jointly define priorities and shape studies around the realities of frontline service delivery—ensuring the findings are both rigorous and immediately usable. By embedding practitioners at every stage, the initiative combines academic expertise and local insight to find evidence-based solutions that directly benefit children and families.

Turning doubt into dialogue

As the Collaboratory approaches its tenth anniversary, it has become a trusted resource to the legislature, demonstrating the value of weaving university research focused on critical issues into the fabric of state decisionmaking. But this was not always the case: The Collaboratory faced early challenges in gaining traction in the state. Its creation in 2016 came at a politically charged moment in North Carolina, when the idea of a Republican-led legislature supporting a research entity sparked skepticism from faculty, media, and advocacy groups who feared it might compromise academic independence. Working through these tensions ultimately became an opportunity to demonstrate how transparency and collaboration could build credibility across partisan divides. Responding to that initial skepticism has become part of the DNA of the program and lies at the core of its approach to building trust.

Across the research enterprise, there is concern about falling polling numbers around "trust in science." But leaders often frame this loss of trust as a communications failure and a matter of handling the logistics of explaining research results after the work has been done. At the Collaboratory, we have learned a different lesson. During the last decade, the team has come to realize that trust is much deeper, starting before research is conceived—and certainly before it is conducted. At its heart it is a simple principle: Scientists must be a trusted partner to lawmakers, faculty, and the public. This trust has been earned through persistence, accessibility, and a deep commitment to proving that we can deliver results to the lawmakers and taxpayers who support us.

Part of our task was to build trust with lawmakers so that the Collaboratory became their go-to resource. I (Warren) make it a point to answer every call, connecting lawmakers across the state to the right academic experts whenever needed. "If a legislator calls, we answer," is a slogan for the whole team. This responsiveness has cemented relationships in Raleigh and beyond, ensuring that legislation affecting natural resources, public health, and infrastructure is informed by data rather than speculation. The early headwinds the organization faced instilled a culture of openness and accountability that continues to define our work.

At the same time, the Collaboratory needed to expend equally deliberate effort to build trust with the academic community. Faculty participation in statewide studies doesn't happen by email alone. It requires organizing face-to-face meetings, facilitating calls, and fostering conversations that connect researchers with legislators, state agencies, local governments, media, and advocacy groups. Another critical step in ensuring that university researchers would participate in Collaboratory projects involved creating an advisory board. Comprised of senior faculty, the board provides independent guidance on funding priorities, advises on the design of emerging program portfolios, and upholds the Collaboratory's commitment to transparency and academic rigor. By cultivating academic networks, the Collaboratory has not only increased its own familiarity with critical issues, but has also built a cadre of engaged faculty partners who contribute their expertise to solving problems that affect millions of North Carolinians.

As evidenced by the Collaboratory's diverse research portfolio, it functions as a bridge between the practical needs of policymakers and the world of rigorous academic research. Success for the Collaboratory isn't measured only in published papers or legislative citations. It's measured in trust earned and relationships built, in the faculty who step forward to lend their expertise, in the lawmakers who call knowing they'll get answers, and in the residents who benefit when research is applied to the problems they care about most. North Carolina is a state of firsts—first in freedom, first in flight, and the home of the nation's first public university. By bridging academia and policy in a way few organizations can, the Collaboratory is a model that positions state-based research to inform policy while actively shaping the future of North Carolina. In many ways, we're first in that, too.

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