

Testimony of Dan Berglund
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Building Regional Innovation Economies

Thank you for the opportunity to testify on a topic that I have dedicated 36 years of my professional life working on—seven working for Ohio's Division of Technological Innovation; four as an independent consultant assisting states and regions to develop, implement and evaluate their innovation strategies; and, the last 25 years leading SSTI. My testimony is grounded in my personal experience in creating, administering and evaluating initiatives in Ohio; serving as the lead author of a book that described and categorized all states' technology programs; and, over the last 29 years, working with all 50 states to provide them with data, best practices and the experience gleaned from practitioners, consultants and academic researchers on what works.

SSTI is a national nonprofit organization that offers information and services needed to succeed in today's innovation economy. We strive to maximize the nation's capacity to deliver successful outcomes within the context of the complex innovation communities in which each of us participate every day. Focused originally on states, our membership has broadened to any organization that is focused on creating a better future through science, technology, innovation and entrepreneurship—this includes state economic development organizations, institutions of higher education, federal laboratories, venture development organizations, incubators, research parks, manufacturing extension centers, local governments, and others.

Since its inception in 1996, SSTI has worked to share lessons learned from a nationwide network of practitioners and policymakers dedicated to creating a better future through science, technology, innovation and entrepreneurship. SSTI conducts research on common performance standards, identifies best practices, analyzes trends in and policies affecting the innovation economy, and fosters greater connection and cooperation among and between all public, private and nonprofit organizations encouraging prosperity.

A board member of one of our member organizations once said that they were working to get their community more pie and that there are two ways to get more pie—you can either steal pie from someone else or work together to make a larger pie. His organization, like that of the other 150 SSTI members, is focused on how we can work together to make more pie.

The American economy faces serious threats. Some, like the shrinking middle class and income inequality, have persisted over decades. Others, like China's threat to our economic leadership, have been steadily increasing. Across the country, there has been broad and bipartisan recognition that reinvesting in American science and innovation presents a—if not *the*—path forward.

For several decades, many states, as well as municipalities, philanthropic and industry partners, have been investing in their regional innovation economies as a means of creating economic opportunities in the face of new technologies and global threats. Georgia, St. Louis and Pennsylvania are among those that have been remarkably successful. We should not hesitate to build on their example and use federal investment to strengthen our regional innovation economies.

The successful efforts share characteristics that can guide a responsible federal program. Successful initiatives do the following:

- Bring all actors together (private sector, institutions of higher education, economic development organizations, nonprofits, foundations) to work collaboratively. Importantly, who takes the lead depends on what issue is being addressed and who is best suited to address that issue, not who has the biggest budget.
- Develop an approach that is customized to the local strengths, capabilities, needs and culture of the region. While there are some who talk about building the “next Silicon Valley,” successful regions and states recognize there is only one Silicon Valley—and one Research Triangle—and one Route 128—and the job of each region is to work on building the regional innovation economy that makes sense for their area.
- Make long-term, sustained commitments that are of a scale to make a difference—and flexible enough to adapt to emerging opportunities and seeking broader impacts.

In short, a federal initiative that empowers an inclusive group of stakeholders to enact a strategy tailored to the strengths and opportunities in their specific region through a substantial and sustained investment is the best approach for strengthening our regional innovation economies—and, therefore, the American economy as a whole.

Innovation economy investments

In considering what we need to do today to build regional innovation economies, we should consider first what has been attempted and what we can learn from that work.

Dr. AnnaLee Saxenian in her brilliant book, *Regional Advantage*, described the origins, growth and differentiators of Silicon Valley and Route 128. Silicon Valley and Route 128 were not planned as technology hubs, but they did not happen by accident either. One of the points she illustrated is the absolutely critical role that the direction of federal R&D funding to these two areas made in their creation; there is a myth that has sprung up over the years that these areas grew up spontaneously and solely because of the private sector, but, in fact, their status as tech behemoths was as a result of defense R&D building an intellectual infrastructure that served as a foundation for all else to come. This is not to say that they became the centers of technology solely because of federal R&D—as many communities with impressive research capacity but lacking spin-off economic activity can attest. Securing federal R&D funding hardly guarantees success for a thriving regional innovation economy—but it was a critical element.

Research Triangle Park (RTP) in North Carolina, however, was specifically conceived in the 1950s as a planned area to build a technology concentration that would benefit from the strengths of the region’s universities. The success of RTP was slow in coming with visible results being seen about 15 years after conception. Again, the federal government was a critical element in catalyzing development when it announced the National Environmental Health Sciences Center would be located in RTP.

While state efforts to increase competitiveness can be traced back to the creation of the North Carolina Industrial Extension Service in 1955 and Georgia’s Industrial Extension Service in 1961, today’s innovation activities are more closely tied to the 1983 launch of the Ben Franklin Technology Partnership program in Pennsylvania under the leadership of Republican Governor Dick Thornburgh, and Ohio’s Thomas Edison Program under the leadership of Democratic Governor Richard Celeste. Programs in

Michigan, New York and Illinois quickly followed Pennsylvania and Ohio. It is worth noting that the commitment to improving competitiveness through innovation has been a nonpartisan issue throughout the decades.

The motivations for creating these programs will sound familiar. These Great Lakes states were facing significant, structural economic problems with a severe national recession that included the decline of their traditional economic base and the rise of an Asian economic superpower—back then, the concern was Japan. As a result, public and private leaders in these states were driven to modernize and diversify their economies to make them more globally competitive, and to spur the creation of high-quality jobs that would result in a higher standard of living for all. Additionally, they wanted to find new ways to grow the assets they had, particularly the research universities they were already funding, and learn from the experiences of Silicon Valley, Route 128 and RTP. Critically, states' business leadership urged elected officials to act and partnered with policymakers to design and implement the programs.

State and regional commitments toward innovation and technology-based economic development have exploded across the country since then. Over the last 40 years, we've seen myriad approaches at the state and local level with successes and failures alike. Economic transformations in metro Atlanta, Pittsburgh, Albany, and parts of Cleveland and Milwaukee can be traced back in part to the investments that states, communities, foundations and the private sector made.

Georgia: Georgia Research Alliance

These early 1980s organizations were joined in 1990 by the Georgia Research Alliance (GRA). GRA was formed, in part, as a result of the state losing out to Austin, Texas, in a competition to serve as the home for the headquarters of the Microelectronics and Computer Technology Corp. (MCC). Georgia's business community saw an opportunity for improvement by investing in the state's research enterprise and encouraging the state's universities to work more collaboratively. Where the programs from the early 1980s operated out of state economic development agencies, GRA was set up as an independent, non-profit corporation with the business community providing funding to support GRA's operating expenses, the state providing funding to recruit eminent scholars to the state's research universities and build out laboratories for the scholars, and universities raising matching funds for the eminent scholars.

Over the past 30 years, the state of Georgia has provided more than \$660 million in state dollars to GRA, which has strategically invested those funds at Georgia's leading research universities, with every dollar going to build intellectual capital and physical research infrastructure and launch new companies around discoveries made at those universities. Many of the changes in metro Atlanta's economy over the last 30 years can be traced back to the investments GRA made in the state's research enterprise and facilitating the creation of start-up companies based on university-developed technologies.

GRA's 30-year return on investment is \$7.8 billion in direct investment, including:

- \$5 billion in competitive research grants and contracts awarded to the 75 world-class scientists (GRA Eminent Scholars) recruited to Georgia by GRA; and,
- \$1.6 billion in private investment in 195 GRA portfolio companies—all built around technologies and discoveries made at Georgia's universities and launched with the support of the GRA Ventures Program; these companies generate more than \$1 billion in revenue and employ more than 1,500 people.

Just one of the companies GRA has assisted is Diasyst, which makes it easier for doctors and their staff to track and manage patients with diabetes. Patients use an app to record their blood sugar levels; the data is automatically sent to their healthcare team. The Diasyst platform synthesizes many individual measurements into a single actionable data point, which in turn reduces the number of trips to the doctor and allows doctors to adjust medications more precisely. Half of the adult population in Georgia has diabetes or pre-diabetes, and it is a condition that disproportionately impacts Blacks and those who live in rural communities with inadequate healthcare. Studies of the platform indicate participants who use Diasyst showed, on average, lower A1C (blood sugar) levels. The company is a start-up out of Emory University that grew out of a project an undergraduate student from Georgia Tech conducted with an Emory professor. The company now employs 20 people. GRA provided financing at critical stages of the company and technology development.

Missouri: BioSTL

Like many parts of the heartland, the St. Louis region experienced a clear shift out of manufacturing firms and into services firms. Significant downsizing in core industries, including the defense industry in the 1990s; significant re-structuring and closures in the automotive industry; and the loss of local corporate headquarters through global mergers and acquisitions marked this transition. To counter the region's economic decline, in 2001, corporate, philanthropic, academic, and civic leaders—led by the late-Senator Jack Danforth's brother, Dr. William Danforth—launched BioSTL, as the lead entity of St. Louis' bioscience cluster, to capitalize on St. Louis' scientific strengths and to position the region as a leader in the high-growth sector of biosciences.

Execution of a shared, regional vision by BioSTL and its partners has resulted in: more than \$2 billion in locally-managed venture capital (up from \$0 in 2000); more than 1000 jobs in the Cortex innovation district; growth of the Donald Danforth Plant Science Center into the world's largest, independent plant science institution; the launch of more than 300 new bioscience startups through BioSTL's startup arm, BioGenerator; and a growing STEM talent pipeline through the STEMSTL ecosystem to ensure inclusion and equity in new career opportunities.

Together, with over 20 years' of work, these coordinated initiatives to grow St. Louis' innovation economy have served to stabilize declines in the region's economy and position St. Louis to be globally competitive in the 21st Century. While significant challenges still exist across the region, St. Louis' bioscience innovation economy is helping rebuild a culture of innovation and entrepreneurship, which waned in the 20th Century. While biosciences account for just more than 2.5 percent of regional employment, a new breed of bioscience entrepreneurs has garnered nearly 80 percent of all venture capital to the region and increased the number of establishments in the cluster from less than 800 to more than 1500, creating thousands of high-paying jobs (from associates degree-level technicians to Ph.D.-level biologists)—that average 55 percent higher wages than the regional median. This growth, through a long-term, regional commitment to building the innovation economy, has helped diversify the region's economy and provide economic resilience to job losses (even within the bioscience cluster) caused by global corporate consolidation, economic recessions, and the pandemic.

Pennsylvania: Ben Franklin Technology Partners

Since its inception in 1983, Pennsylvania's Ben Franklin Technology Partners has invested in more than 4,500 technology-based companies and boosted Pennsylvania's economy by more than \$25 billion, helping to generate 148,000 jobs through investments in client firms and spinoff companies. The in-

demand, family-sustaining jobs created by Ben Franklin’s clients pay an average of \$79,364 annually—52 percent higher than the average non-farm wage in Pennsylvania. Not only are these jobs that pay well, they are jobs that can help attract and keep talent and drive Pennsylvania’s economy.

Even during the pandemic year of 2020, the Pennsylvania Department of Community and Economic Development reports that its programs administered through the Ben Franklin Technology Development Authority had an impactful year. The \$42 million in public funds resulted in 100 new company formations, 2,071 jobs created, 14,721 jobs retained, \$2.2 billion revenue earned, and 295 new products commercialized.

One of the start-up companies that Ben Franklin Technology Partners of Northeast Pennsylvania (BFTP/NEP) has assisted is Scranton-based Signallamp Health (SLH), an IT-enabled Chronic Care Management provider that works as an extension of primary care practices. It allows physicians to provide better care to patients who have multiple chronic conditions. Utilizing a proprietary electronic medical record interface, experienced registered nurses deliver telephonic care to patients, focusing on prevention. SLH has more than 1,000 doctors under contract, representing 78,000 eligible patients. Signallamp extends the reach and clinical capacity of healthcare providers to manage vulnerable patients, including those affected by COVID-19, outside of the traditional clinical setting. SLH serves more than 25,000 patients across seven health systems, dozens of group practices, and 10 states. In 2019, the company expanded its product offering to provide telehealth services to individuals with Opioid Use Disorder. With more than 100 employees, the company was recognized on the Inc. 500 list of the fastest-growing private companies in the U.S., ranking No. 240 overall, No. 18 in the health industry, and No. 1 in Pennsylvania, with a three-year growth rate of 1,844 percent. SLH received just over \$300,000 from BFTP/NEP in three separate rounds from 2015 to 2020.

Ohio: JumpStart

One of the venture development organizations Ohio helps support reports significant results in 2020 as well. JumpStart, which is based in Cleveland and services northeast Ohio, works with dozens of other non-profit economic development organizations, universities, and institutions in Ohio to support tech startups through technical assistance and venture capital investment, helping early-stage companies start and scale. In 2020, technology companies receiving assistance from JumpStart and its partners directly and indirectly supported an estimated \$882 million of economic output, including \$490 million in payroll from 7,186 jobs which helped support more than 4,400 households.

New York: LaunchNY

Launch NY was established to serve the 27 westernmost counties of New York State, including Buffalo, Rochester, Syracuse, and Southern Tier regions, including urban, suburban, and rural communities, which have been among the most economically distressed in the country with poverty rates exceeding 30 percent in the most affected areas. With a dying traditional-industry base among companies ranging from Bethlehem Steel to Eastman Kodak, creating new-economy businesses has been a critical focus. Against this backdrop, Launch NY was created as a nonprofit venture development organization in 2012 to provide pro bono mentoring and seed capital for high-growth potential startup businesses. It became one of only 15 U.S. Treasury Designated Community Development Financial Institutions (CDFIs) nationwide, and the only one in New York State, providing venture capital directly to businesses in low income communities. Shortly after starting its first fund in 2016, Launch NY became the most active seed fund in New York State and one of the most active in the country. Serving a region that in 2010 saw

only 3 percent of the venture capital invested in New York State annually and was not even considered among the top 100 regions in the U.S. for entrepreneurship, Launch NY has helped drive the incredible progress reflected in Western New York being rated among the top 100 emerging ecosystems globally based on The Global Startup Ecosystem Report from Startup Genome in 2020.

Since 2012, Launch NY has served 1,210 companies, has more than two dozen experienced local entrepreneurs-in-residence, and developed its National Mentor Network of 2,000 industry, business and investment experts. Launch NY mentored companies, including 27 percent women-led and 26 percent minority-led startups, that have created 4,300 jobs, attracted nearly \$1.3 billion in co-investment and follow-on capital, and generated over \$146 million in annual revenues. Those funded by Launch NY starting in 2016, including 73 portfolio companies comprised of 33 percent women-led and 27 percent minority-led, have created nearly 350 jobs, attracted over \$69 million, and generated over \$16 million in annual revenues. Launch NY also leads the premier Emerging Cleantech Opportunity (ECO) Incubator, one of six designated clean-energy incubators sponsored by the New York State Energy Research and Development Authority (NYSERDA), as well as the Founders Go Big program, an innovative diversity and inclusion initiative introduced in 2020. Over 70 percent of Launch NY's portfolio companies are in low-income census tracts and nearly 45 percent are led by persons of color and/or women.

Oklahoma: i2E

States with smaller populations or dispersed population centers often use single organizations to build a critical mass of activity across the state. Oklahoma's partnership with i2E provides a good example. i2E is now in its twenty-third year of operations and client services. Since inception, i2E has received \$49 million in state funding from the Oklahoma Center for the Advancement of Science & Technology (OCAST). i2E has leveraged that state funding into \$938 million in private capital while serving more than 740 Oklahoma companies. The \$938 million represents a 19X return measuring *only* private capital attracted by i2E client companies. In addition to the private capital, i2E clients report annual wages that are consistently 50-90 percent above the average annual wage in Oklahoma. Clients also consistently report that 80 percent of their revenues originate from outside Oklahoma through national and international sales. Including other gains to Oklahoma, such as jobs created, \$85.1 million in grants received, and number of patents issued, the quantitative impact is astounding.

Approaches to strengthening regional innovation capacity can be sector based (such as BioSTL), focused on one or more key assets within the regional economy (such as tying equity financing to entrepreneurial development for companies like Jumpstart, I2E and Launch NY do) or nodal, meaning they concentrate small public investments on single places over a long period of time. Incubators, research parks and innovation districts are examples of nodal approaches to supporting regional innovation capacity.

Pennsylvania: University City Science Center

The University City Science Center (Science Center) in Philadelphia presents an example of a long-term sustained investment in a specific facility to serve as a node for encouraging the growth of innovation-based companies in the heart of the city. Established in 1963, the Science Center is a nonprofit innovation intermediary that helps commercialize promising technology, convenes people to inspire action, and cultivates talent for a 21st century STEM workforce. The Science Center supports multi-state and regional economic development through a suite of commercialization and finance programs supporting an eclectic portfolio of entrepreneurs from proof-of-concept through all phases of growth.

Over the last 10 years the Science Center has supported over 600 startups and invested \$14 million, with over \$1 billion raised in follow-on funds. The Science Center's 2020 impact included: 45 percent minority founders supported; \$43.3 million in follow-on funds for companies in Science Center programs and 44 percent non-white, 51 percent women attendees at Venture Café.

Wisconsin: The Water Council

In 2009, forward-thinking Milwaukee business, education and government leaders came together to establish The Water Council, which has coalesced one of the most concentrated and mature water technology clusters in the world. Recognizing the need for smarter and more efficient use of water worldwide, The Water Council is increasingly focused on water stewardship as a natural complement to water innovation in the effort to preserve freshwater resources in the Midwest and around the world. Today, The Water Council has established itself as a global leader in the water industry.

In 2013, The Global Water Center (GWC) opened in the Walker's Point neighborhood of Milwaukee as The Water Council's headquarters and a collaborative space for water technology corporations, startups and local universities. The GWC serves as the physical manifestation of Milwaukee's water hub and has spurred significant development in Walker's Point, including new headquarters for major corporations such as Rexnord, Komatsu, Michels and Rite-Hite.

The examples that I've provided here just begin to scratch the surface of what is being done across the country. While the results are impressive, there is so much work that needs to be done.

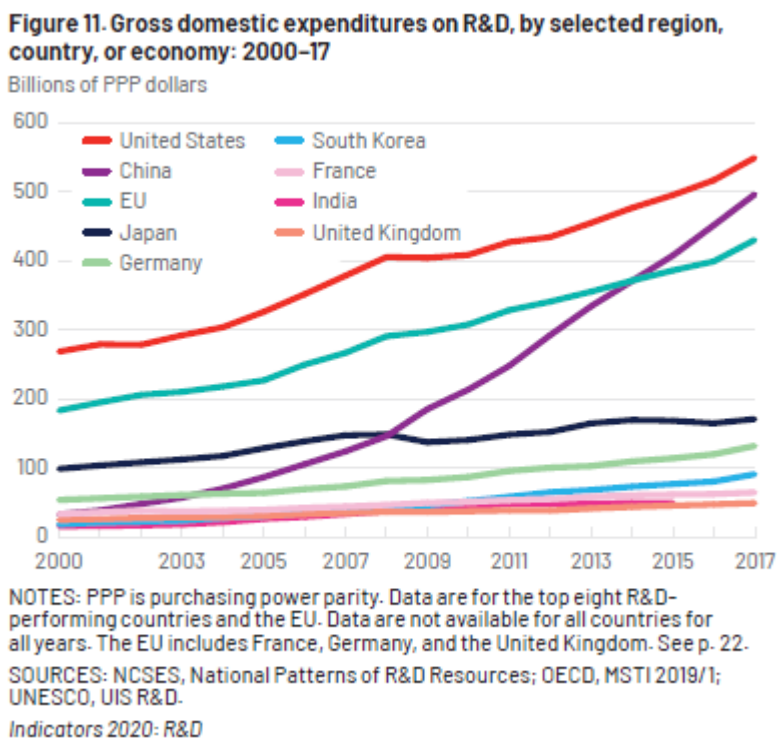
Threats to the American economy

Data show we face significant economic problems—and these problems transcend presidential administrations. In 1970, the middle class made up 62 percent of U.S. aggregate income, according to the Pew Research Center; by 2018, that had declined to just 43 percent.ⁱ The percentage of population in the middle class shrunk in every state but Nebraska from 2000 to 2017, according to an analysis by *Stateline*.ⁱⁱ The gap between Black and whites median household incomes continues to be far too wide. In 1970, the Pew Research Center calculates that Black median household income was 56 percent that of white households; by 2018, we had barely made any progress in closing that gap with Black median household income at 61 percent that of white households.ⁱⁱⁱ And, we need to work to ensure all regions of the country benefit from a growing economy. Iowa State University economist David Swenson has estimated that between 2008 and 2017, 98.5 percent of non-farm job growth occurred in metropolitan counties.^{iv}

SSTI has pointed out, alongside other organizations, the geographic concentration of venture capital and the movement of venture capitalists toward larger and later-stage deals.^v We have also reported on a similar, although not as severe, concentration—primarily because the venture capital concentration is so lopsided—of federal R&D.^{vi}

Meanwhile, the Chinese are making major investments in science and technology, and this is not just political rhetoric. In the 35+ years that I have been in the field, I have seen few charts that are more chilling than the one reproduced here from the National Science Board's *The State of U.S. Science and Engineering 2020*. While the press focus was on the likelihood that China would surpass the U.S. in R&D expenditures, the real story in my view was the pace at which the Chinese investment was accelerating. From less than 50 billion in purchasing power parity dollars in 2000, Chinese R&D spending increased to

roughly 500 billion in purchasing power parity dollars in 2017. While U.S. spending increased over the same time period, it was not nearly at the same rate of increase as China's.



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Indicators 2020: R&D

The report points out that countries vary in their focus on basic research, applied research, and experimental development. It states, “According to the most recent estimates, the United States spends 17 percent and China spends 6 percent of its annual R&D funds on basic research. ... China spends 84 percent of its R&D funds on experimental development, compared to 63 percent in the United States.”^{viii} An NSF press release at the time quoted one member of the National Science Board as saying, “Basic research is the 'seed corn' of our US S&E enterprise, a global competitive advantage, and the starting point for much of our GDP growth since World War II.”^{ix}

The implication here is that as long as we lead in basic research, we will be fine. There is no question that basic research is of fundamental importance—see again the origins of Silicon Valley and Route 128—and I commend the House Committee on Science, Space and Technology for its recent action to increase funding for the National Science Foundation.

At the same time, part of the economic advances China, South Korea and Japan have made in recent decades have been because of their expertise in investing in experimental development. Assuming that the U.S. will be fine because we continue to invest in basic research is representative of the typical D.C.-centric approach on science and technology: fill the pipeline with basic research and somehow magically that research will make it into the marketplace. It will take more than that.

Catalyzing regional innovation economies

The practitioners involved in tech-based economic development know that the private sector is not getting everything to the market and that it takes hard work to make it happen. Among the steps are identifying research that has commercial potential, determining a strategy to get it to the marketplace, and finding funds for proof-of-concept.

We know this work can be done successfully because we're seeing it done at the local level.

U.S. supremacy in basic research will be meaningless from an economic perspective unless the federal government begins investing in and encouraging investment in a strategic fashion to move our research "seed corn" to planting and ultimately, harvest.

So, what do we need to do?

States have been referred to as "laboratories of democracy" so frequently that it's almost become a cliché, but as the cliché goes, there's a reason a phrase becomes a cliché. We have 40 years of experience at the state, local and university level on approaches to build innovation economies. What we don't have is a national strategy and the funding to take those lessons and implement them in a sustained effort to bring this work to scale.

The federal government has played a relatively minor part when it comes to an intentional role in building regional innovation economies. The Economic Development Administration (EDA) and the Appalachian Regional Commission (ARC) were created in the 1960s to focus on the general economic development of specific distressed areas, and these are important agencies. But what we need now is an approach rooted in 21st Century challenges, recognizing that these challenges are occurring in every community.

We need bold, robust support from the federal government that offers flexible funding to states and organizations to build regional innovation economies and locally-designed efforts that address broad national goals, but allow for differences in delivery and emphasis based on local conditions. Emphasis from the federal government has been on funding for physical assets rather than the operation of the organizations going in those buildings. As a result, we have, for example, a proliferation of building construction for incubators with communities scrambling to determine how they will fund the actual service delivery.

The examples of Research Triangle Park, the Georgia Research Alliance, BioSTL and the Ben Franklin Technology Partners, show that it takes a sustained, long-term commitment for this work to succeed. The federal government should provide long-term support designed to encourage transformational results, and this investment should occur in dozens of regions across the country.

A particular challenge in building regional innovation economies is the specific constraints placed on funding that is received. Those constraints are understandable from a funder's perspective, but they discourage cooperation among the elements required for an innovation system. For example, developing a workforce is key to a regional innovation economy, but workforce development funding from the federal government is rarely tied to broader efforts to develop an innovation economy. Funding from the federal government that addresses the whole innovation system rather than individual elements of a system would be a critical additional tool to building a regional innovation economy. It would help break down the silos that have occurred between the K-12 systems, higher education,

workforce development, economic development and tech-based economic development communities, all of which have important roles to play but are not incentivized to work with each other.

Regional Technology Hubs

As I prepare this testimony, the U.S. Senate is considering a regional technology hubs program as part of the *Endless Frontier Act*, and as the program has come out of the Senate Committee on Commerce, Science and Transportation, it deserves serious consideration by this committee.

The legislation accomplishes much of what I have described above with specific focus on entrepreneurship and business development, technology maturation and workforce. The legislation as it passed through committee would accommodate dozens of hubs that are focused and large enough to have a meaningful impact on their regions. The result would be more areas and people benefiting from a technology economy and a stronger country.

The need is significant across the country. Based on past state initiatives, I would consider a range of \$20-50 million annually per hub as a sufficiently-strong investment to allow for transformational programmatic activities over the five-year authorization of the program; I am assuming that this amount would be used for program operations and delivery, not building construction. Like other federally-funded organizations, the hubs should be able to apply for continued funding. The scale of investment in each hub should vary based on the need and stage of the region's development. The range should be assessed as part of the program evaluation.

As this committee considers its priorities for investments in regional innovation economies, the Senate bill offers a framework. Additional considerations include the following:

- a. *Consortium requirements.* Recipients of a substantial, federal regional innovation economy grant should include *all* of the relevant stakeholders. This appears to be the intent of the regional technology hubs program, for example, but the Senate committee version is not entirely clear whether a consortium may or must include each of an institution of higher education, local or tribal government, state government, economic development organizations, industry, and labor organization. The consortia should be required to have all of those organizations as members. Again, a lesson learned from our experience is that those efforts that have been successful are the ones that bring *all* relevant actors together.
- b. *Selection criteria.* Congress should articulate selection criteria for significant investments in regional innovation economies to provide clear guidance to the implementing agency.
 - Regions requesting \$20-50 million over five years should be proposing to expand the availability of well-paying jobs through science, technology and innovation, and have a reasonable proposal for how this can be achieved.
 - More specifically, applicants should be expected to articulate their vision for inclusion and shared prosperity among all and the likelihood that they will be able to achieve it. The technology industry from virtually every conceivable measure—workforce, founders, venture capital received—has a woeful record of building a sector that includes all people. Large IT companies are talking about the problem, and there are attempts being made at the local and state level to address this, but they are still nascent and need to be encouraged.

- c. *Metrics.* The primary metrics used to evaluate the success of each investment in a regional innovation economy will depend on what the region is attempting to accomplish. Historically, for state programs, the metrics of success shift over time as the development of the regional innovation economy changes; for example, in some communities building research capacity is critical, so measuring the increase in research funding, particularly from industry, is a reasonable measure. As research capacity improves, shifting focus to start-up company success in raising follow-on funding, sales and employment is a reasonable approach. All regions should be measuring R&D, commercialization, company formation, employment and sales but the hub's performance should be evaluated based on the ones relevant to its goals.
- d. *Evaluation.* In comparison to Canada and the European Union, the U.S. spends little on evaluation of its economic development programs and analyzing the broader results of the work undertaken. For decades, the Economic Development Administration's research and national technical assistance program has been below \$3 million per year. An investment in regional innovation economies should follow the lead of the Manufacturing Extension Partnership and some of the NSF-funded centers that do annual evaluations. Spending \$70 million—less than one percent of the total authorization level of the Senate's proposal—is reasonable.
- e. *Administration.* The best federal agency to operate a program of this nature would be a new one that could be completely dedicated to understanding and improving regional innovation economies. The Department of Commerce has a track record of operating the Build to Scale program through the Office of Innovation and Entrepreneurship and the many innovation-related activities at the National Institute of Standards and Technology (NIST). The Senate's approach of placing the regional technology hubs within EDA in consultation with NIST is, therefore, understandable. However, I would encourage the committee to consider the creation of a new agency within the U.S. Department of Commerce—such as by evolving the Office of Innovation and Entrepreneurship into an agency in its own right and allowing EDA to continue its focus on distressed communities. This new agency would focus exclusively on innovation and competitiveness and could be responsible for not only the regional technology hubs program, but also the regional innovation strategies program, the Hollings Manufacturing Extension Partnership and the Manufacturing USA Institutes.

Summary: Creating a better American economy

Many areas of the country have a strong base of R&D activity that can be better-nurtured into new products, companies, and well-paying jobs. However, we can no longer afford to follow an approach that forces regions to piecemeal support from states, private entities, and single-purpose federal programs. Instead, Congress, which clearly recognizes the critical threats facing the American economy, should guide a strategic, substantial investment in regional innovation economies.

Regions as diverse as Georgia, Western New York, Oklahoma, Milwaukee and St. Louis have provided examples of how initiatives can help foster new technology hubs in areas that are not known historically for startups or venture capital. These types of efforts succeed through the efforts of broad partnerships, strategies tailored to the regions, and sustained investments. As well as these efforts have fared, only the federal government is positioned to transform this approach from a series of one-off successes into a national strategy capable of bolstering American global competitiveness.

Regionally-driven, federally-funded investments can advance emerging tech hubs to the international stage while catalyzing a new crop of emerging regions. Such an effort will result in new technologies—including life-saving treatments, energy-saving devices, and productivity-boosting processes—higher-paying jobs for Americans of all backgrounds, and a renewed footing atop the global economy.

Thank you for the opportunity to provide this testimony.

ⁱ “The Gaps in Income between Upper-Income and Middle- and Lower-Income Households Are Rising, and the Share Held by Middle-Income Households Is Falling.” *Pew Research Center*, Pew Research Center, 7 Feb. 2020, www.pewresearch.org/fact-tank/2020/02/07/6-facts-about-economic-inequality-in-the-u-s/ft_2020-02-07_inequality_06/. (accessed June 6, 2021).

ⁱⁱ Henderson, Tim. “Economists Remain Worried About Slow-Growing Middle Class.” *The Pew Charitable Trusts*, www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2019/05/20/economists-remain-worried-about-slow-growing-middle-class. (accessed June 6, 2021)

ⁱⁱⁱ “In the U.S., Black-White Income Gap Has Held Steady since 1970.” *Pew Research Center*, Pew Research Center, 7 Feb. 2020, www.pewresearch.org/fact-tank/2020/02/07/6-facts-about-economic-inequality-in-the-u-s/ft_20-02-04_economicinequality_3/. (accessed June 6, 2021)

^{iv} Swenson, David. “Most of America’s Rural Areas Are Doomed to Decline.” *The Conversation*, 4 Jan. 2021, theconversation.com/most-of-americas-rural-areas-are-doomed-to-decline-115343. (accessed June 6, 2021)

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^{vi} Edwards, Colin. “Useful Stats: Federal R&D Obligations by State and Agency, 2019.” *SSTI*, ssti.org/blog/useful-stats-federal-rd-obligations-state-and-agency-2019. (accessed June 6, 2021)

^{vii} National Science Board, National Science Foundation. 2020. *Science and Engineering Indicators 2020: The State of U.S. Science and Engineering*. NSB-2020-1. Alexandria, VA. Available at <https://nces.nsf.gov/pubs/nsb20201/>, p.8

^{viii} *Ibid.*, p. 9

^{ix} “America’s Share Decreasing as Global Science and Engineering Grows.” *National Science Board*, nsf.gov/nsb/news/news_summ.jsp?cntn_id=299790. (accessed June 6, 2021)