

The Tech Belt Initiative

*Realizing the Full Economic Potential of the
Cleveland-Pittsburgh Technology Corridor*



Project Collaborators

The Cleveland-to-Pittsburgh Tech Belt Initiative is an economic development strategy designed to reinvigorate the region by building on its unique civic, educational, healthcare, and industrial institutions. The transition to the knowledge economy has caused opinion leaders from the technology corridor (encompassing Cleveland, Youngstown, and Pittsburgh) to recognize that the future of these once great manufacturing communities are tied together, and that our continued success depends on our ability to collaborate in the creation of new products, technologies, and wealth. A steering committee comprised of organizations from Southwest Pennsylvania and Northeast Ohio is working to develop a strategic vision for this initiative and build the partnerships necessary to leverage the region's collective resources. Members of the steering committee include:

Allegheny Conference on Community Development	Northeast Ohio Universities College of Medicine and Pharmacy
BioEnterprise	NorTech
Carnegie Mellon University	PA NanoCenter
Case Western Reserve University	Pittsburgh Life Sciences Greenhouse
The Cleveland Clinic Foundation	Pittsburgh Technology Council
The Doyle Center for Manufacturing Technology	Team NEO
The Greater Cleveland Partnership	The Technology Collaborative
The Heinz Foundation	The University of Akron
Innovation Works	The University of Pittsburgh
Kent State University	The University of Pittsburgh Medical Center
JumpStart Inc.	The Raymond J. Wean Foundation
MAGNET	Youngstown Business Incubator
The McCune Foundation	Youngstown State University
	Youngstown/Warren Regional Chamber

Contact Organizations

The **Greater Cleveland Partnership**, the **Allegheny Conference on Community Development**, and the **Youngstown/Warren Regional Chamber** proudly join the Tech Belt Initiative project collaborators in supporting and advocating on behalf of the Tech Belt Initiative.

We believe that the issues identified and solutions detailed in this Tech Belt Initiative white paper are fundamental for the growth of our region. We congratulate the collaborators and urge Federal lawmakers and both presidential campaigns to work with us to achieve the goals outlined in this paper. During the transition from one Administration to another, it is essential that we not lose sight of our regional strengths and goals. *Please contact our organization's representatives for more information.*



Joseph Roman, President & CEO
The Greater Cleveland Partnership
100 Public Square, Suite 210
Cleveland, OH 44113
(216) 592-2471
jroman@gcpartnership.com



Tom Humphries, President & CEO
Youngstown/Warren Regional Chamber
11 Federal Plaza Central, Suite 1600
Youngstown, OH 44503-1592
(330) 744-2131 x14
tom@regionalchamber.com



DeWitt Peart, EVP, Economic Dev.
Allegheny Conference on
Community Development
425 Sixth Avenue, Suite 1100
Pittsburgh, PA 15219-1811
(412) 281-4783, x3109
dpeart@alleghenyconference.org

The Tech Belt Initiative/Executive Summary

Realizing the Full Economic Potential of the Cleveland-Pittsburgh Technology Corridor

The Tech Belt Initiative (TBI) covers an inter-state region of 7.2 million people that would be the 4th largest industrial/technology region nationally, with a potential economic impact of more than \$1B in annual academic R&D. Currently, 700+ companies employ over 25,000+ in bioscience enterprises alone.

Examples of state funding successes of Tech-Based Economic Development (TBED) in Northeast Ohio (via the Third Frontier Project) and Southwest Pennsylvania (via the Ben Franklin Technology Partners) demonstrate an impressive quantifiable return on combined public investments of more than **\$800 million** since 2002, illustrating the tremendous potential and economic utility of the TBI. Each region has exceptional challenges, strengths, and records of achievement enabling public-private partnerships that receive and implement substantial state funding. It is these track records of success and clear signs of economic innovation and transformation that makes the potential for the combined TBI region substantial. However, the regions' combined assets have never been fully leveraged.

The pieces are in place, but the critical tipping point is NOW. A projected economic downturn combined with still struggling regional economies will have immediate negative impact upon both regions, but together as one, the potential for weathering a downturn and promoting mega-region-wide recovery makes this an urgent and timely opportunity for the long-term economic transformation. As such, the TBI seeks to do the following:

- **Identify and accelerate the Greater Cleveland/Greater Pittsburgh synergies** to better develop bioscience and other high-tech company formation and capitalization.
- **Identify organizations, resources and thought leaders** who could benefit from exploiting opportunities in the Tech Belt region.
- **In the near-term, develop and implement a focused marketing/outreach plan** to key constituents outside the region explaining the strengths and opportunities in the region.
- **Organize, lead and market discussions, conferences and meetings** among high-tech industry leaders, state and local government, institutions and the mega-regions' thought leaders.
- **Attract venture capitalists, talent, new businesses and sources of economic growth.**

The TBI committee has identified the following goals for potential TBI partnership opportunities:

- **Encourage the Federal government to identify the region as a Premier Innovation Zone and invest in/augment existing state programs** that support innovation, research, commercialization, etc. in advanced technology fields.
- **Continue Support for SBIR/STTR programs.** These competitive programs encourage small business to explore their tech potential and provide the incentive to profit from commercialization.
- **Reinstate Funding for the National Institute of Standards and Technology's Manufacturing Extension Partnerships (MEP).** The MEP program is a vital resource for manufacturers in both NEO and SW PA that places heavy emphasis on assisting small- and mid-sized firms.
- **Continue the Alternative Energy Tax Credits for wind power, solar energy, and other renewable fuels.** The programs provide important incentives to consumers and businesses to support markets for alternative energy products.
- **Augment Funding for Translational Research at both the university and commercial levels.** Additional resources to fill the gaps where no institutional support for commercialization exists.

The TBI would enhance and extend the reach of Federal TBED strategy, which could create more companies and more high-paying jobs, increase venture capital flowing to the region, accelerate research university engagement with effective tech transfer and thriving business growth, and build an enhanced national image for Northeast Ohio and Southwest Pennsylvania as vibrant, growing, knowledge-driven regions. TBI will benefit existing as well as new start-up companies, entrepreneurs, research institutions, students in STEM curriculum, hospital systems, urban downtown economic revitalization, and the public.

Transitioning towards transformation

The regions of Northeast Ohio and Southwest Pennsylvania, anchored by the metropolitan areas encompassing Cleveland and Pittsburgh, respectively, shared a rich 20th-century history of home-grown, heavily concentrated industrial manufacturing anchored by population growth, local & nationwide industrial employment expansion, and the availability of ample capital resources. However, by the end of the century, both regions experienced the permanent, long-term impacts of transforming economies, manufacturing job losses, and closure and/or geographic loss of large longtime industrial and corporate employers. *The 21st century reality for these regions?:* A subsequent withering of new venture investment resources, reduction in regional GDP, income shrinkage, and further economic anemia and job bleed, even within a growing national economy. The reality remains that future growth, innovation and productivity lies in technology-based enterprises like alternative energy, biosciences, IT/Robotics, advanced manufacturing, and advanced materials.

Northeast Ohio

With an estimated population exceeding 5 million residents and a labor force of almost 2 million, Northeast Ohio (NEO) has been particularly vulnerable to job losses in manufacturing and related industries. Heavily reliant upon industrial employment in particular, the region continues to battle sector-specific job losses and lackluster economic growth. As documented by TeamNEO, a Northeast Ohio economic development group, the region's Gross Regional Product (GRP)—its sum of goods and services—has averaged only 2% growth annually since 1992, well short of the national average of 3 to 3.5% per year over the same period. The sub-standard GRP growth is reflective of the region's struggle to counter job and population losses intrinsic to ongoing economic distress regionally and nationally.ⁱ

Indeed, even during a relative growth period nationally in 2006, economic growth shrank .2 percent from 2005 in Cleveland's five-county metropolitan region (Cuyahoga, Lorain, Medina, Lake, and Summit counties). Growth in the insurance and finance sectors was offset by double-digit contraction in manufacturing and construction activity, according to the Bureau of Economic Analysis. In 363 metropolitan areas, Cleveland ranked at just no. 316 in economic growth, despite having the 26th largest GDP in the nation.ⁱⁱ This is important to note, as the Cleveland Metropolitan Statistic Area (MSA) had a concentration of manufacturing employment 31% *higher* than the national average in 2006.ⁱⁱⁱ

Thus, the full impact of job loss reverberates much more deeply in Northeast Ohio than in other regions. Cuyahoga County—the region's county with Cleveland at its center—has taken deep hits in manufacturing-related employment. One recent study found that from 2000 to 2007, Cuyahoga County alone lost about 77,000 jobs, or about 10% of its total jobs, with an alarming out-migration of population.^{iv}

Lackluster growth in per capita income has also been a drag on NEO regional economic transformation. According to a new report by the Fund for Our Economic Future and the Center for Economic Development at Cleveland State University, “[i]n 1996, NEO's per capita income was 1.6 percent higher than the U.S., but by 2006, the average per capita income fell 4.8 percent below the U.S. ... The deterioration in per capita income is due to steep recession declines of the early 2000s and slower growth during the recovery.” Even though the Akron and Cleveland MSAs showed per capita growth rates of 12.3% and 10%, respectively, these rates were still well below the U.S. sample average of 16.7%.^v

Southwest PA

The Pittsburgh MSA is home to more than 2.3 million and has likewise struggled to counter job losses in a changing economy. The growth of metropolitan Pittsburgh and its economy was spurred by the extensive trade in steel. Pittsburgh has since adapted to the collapse of the region's steel industry. The primary industries have shifted to high technology, such as robotics, health care, nuclear engineering, tourism, biomedical technology, finance, and services. The region's technology industries, when taken in

aggregate, have a total annual payroll that exceeds \$10.8 billion.^{vi} Since the early 1980s, manufacturing's share of total employment has fallen faster in Pittsburgh than in the U.S., and currently Pittsburgh's share of employment in manufacturing is smaller than the national average.^{vii} However, from 2001 into 2006, even Pittsburgh lost 1.5% of its jobs despite job growth in Pennsylvania of 1.2% and national job growth of 3.6%. Significantly, the Pittsburgh's region example of long-term economic transformation away from a manufacturing base in part explains why job losses in Southwest Pennsylvania (SWPA) have not been as steep as in NEO.

Statistically, the income growth for the Pittsburgh MSA has risen impressively from 1985 to 2005, ranking 4th in per capita income among the top 40 regions nationwide, and from 2000 to 2006, real per capita income growth in the Pittsburgh MSA was measured at 7.6%, the highest in its Federal Reserve Bank District.^{viii}

However, these statistics and the way they're calculated are deceptive. In fact, the Pittsburgh/SWPA region suffered the third slowest growth in total income from 1985 to 2005, as well as the largest population loss for any comparable region in the country. Specifically between 2000 and 2005, the region had the 10th slowest growth in total income as well as the largest population loss, and as such 'per capita income' actually registered as the 9th fastest. One economist states that the more correct measures are growth in jobs and average wages per job. Based on those criteria, Pittsburgh and SWPA had the 4th worst rate of job creation and 9th lowest pay per job for 40 comparable metro areas in the U.S. Overall from 1985 to 2005, the region had the 5th slowest growth rate in average wages.^{ix}

Southwest PA & Northeast OH: Leveraging State Investments in Critical Technology Areas to Spur Economic Transformation

Importantly, the state and local strategies to bolster and enable regional recovery reveal specific successes in Technology-Based Economic Development (TBED) and other growth sectors, which enable an evolution to diverse, innovative and transformational economies. TBED-focused programs and existing public-private partnerships in the NEO/SWPA Tech Belt region now offer exceptional opportunities to evolve the area into THE center for high-tech development and commercialization in the Midwest.

The Commonwealth of Pennsylvania and the State of Ohio each instituted large-scale targeted investment and business-assistance programs designed to spur innovation and business growth amid long-term economic transformation through TBED in a variety of industrial sectors. These programs have proven vital to infusing much-needed capital into their respective target areas, as well as an avenue to spur further private sector investment. Strategically, each program demonstrates the many 'upsides' that public-sector investment can achieve, including the following:

- Business and job creation through targeted investments in promising early-stage companies in high-growth technology-based sectors
- Business assistance and entrepreneurial support resources to assist and advance start-ups
- Commercialization assistance
- Advance technical and Research & Development support from universities and other advance research institutions.
- Business incubator support that provides the early-stage small businesses with physical resources to grow and evolve into steady, wealth and job producing enterprises.

Indeed, preliminary Tech Belt project collaboration has already demonstrated success for BioScience investment in recent years. In 2007, joint work by BioEnterprise of Cleveland and the Pittsburgh Life

Sciences Greenhouse (PLSG) as part of the emerging Tech Belt Initiative revealed the following impressive metrics regarding BioScience venture activity:

- The combined regions drew \$343 million in healthcare venture investment in 2007 across 45 companies;
- The regions boasted 8 company exits;
- PLSG and BioEnterprise made numerous cross-introductions of venture capital firms and initiated the exploration of 18 company collaborations;
- The regions have hosted and leveraged four (4) national healthcare venture investment conferences since 2005, including the Global Healthcare Investing Conference, the Cleveland Clinic Medical Innovation Summit, the Stem Cell & Regenerative Medicine Conference, and the 3 Rivers Venture Fair.

Pennsylvania TBED Programs & Initiatives

The Ben Franklin Technology Partners (BFTP), Governor's Action Team (GAT), and Technology Investment Office (TIO)

Created in 1983, BFTP works to “diversify and strengthen Pennsylvania's economy by focusing on entrepreneurial development and technological innovation. With a focus on the entrepreneur as the ultimate engine of growth, BFTP delivers crucial resources for technology-driven enterprises in sectors such as information technology, life sciences, communications, advanced manufacturing, advanced materials and environmental technology.”^x BFTP achieves these goals by investing capital in emerging technology-based enterprises and established businesses, providing hands-on technical and business expertise to spur enterprise growth and accelerate commercialization activities; and, delivering customized solutions that draw on an extensive network of public and private resources, including universities, federal laboratories and research institutions.

From January 2002 to the end of December 2006, the Governor's Action Team (GAT) committed over **\$46 million** in state assistance to technology employers in Pittsburgh-area counties (Allegheny, Armstrong, Beaver, Butler, Fayette, Green, Indiana, Washington, and Westmoreland). In return, these companies committed to create 3,320 new jobs and retain 5,567 existing jobs, and to invest an additional \$281 million in the region.

For the SW PA Region from 2002 to 2006, **\$179,452,758** has been invested through the Technology Investment Office (TIO). Funding was committed to the following TBED initiatives:

- BFTP and Innovation Works (IW)
- Legislative Line items (Governor's Action team):
 - The Technology Collaborative
 - Pittsburgh Supercomputing Center
 - Idea Foundry
 - PA Infrastructure Technology (Collaboration between Lehigh U & CMU)
 - PENNTAP (Statewide project)
- Industrial Resource Centers (Catalyst Connection)
- Life Sciences Greenhouses (Pittsburgh LSG)
- Ben Franklin Technology Development Authority (BFTDA)
Technology Development Grants (Includes some statewide projects)
- BFTDA–Technology Investment Grants
- BFTDA–University Research Grants (Includes some statewide projects)
- BFTDA–Company Investments
- BFTDA–Venture Investments
- Keystone Innovation Zones–Operational and Planning Grants
- Keystone Innovation Starter Kit (KISK) Grants
- Keystone Innovation Grants (KIG)

- New PA Venture Investments
- Workforce Leadership Grants

In total, **\$150,930,861** was directly invested in Southwest PA. \$28,521,897 was invested in statewide projects that in turn impacted the Pittsburgh/SW PA region, for a total of **\$179,452,758** regional TBED activity.

Moreover, in FY07, Pittsburgh’s Innovation Works, a state-government-funded venture development nonprofit established in 1999, compiled the following metrics through ‘investments’ of early-stage businesses in Greater Pittsburgh/SW PA:

Jobs Created (attributed):	243.5
Jobs Retained (attributed):	185
Follow-on Funding (attributed/gross)	\$71M/\$172M
Companies assisted:	180
New Company Formation (attributed):	11

Ohio TBED Programs & Initiatives

The Third Frontier Project (TFP) of the Ohio Department of Development (ODOD) was created in February 2002, and represents the state's largest-ever commitment to expanding Ohio's high-tech research capabilities, as well as promoting innovation and company formation that can create high-paying jobs for generations to come. The 10-year, \$1.6 billion initiative is designed to build world-class research capacity, support early-stage capital formation and the development of new products, and finance advanced manufacturing technologies to help existing industries become more productive. It is projected that through the Third Frontier Project, additional federal and private sector support can boost the total investment to more than \$6 billion.^{xi}

According to the ODOD and NorTech (the region’s TBED agenda leader), 105 grants totaling **\$404.5 million** have been made in the Northeast Ohio region since the Third Frontier’s inception, resulting in a co-investment leverage of **\$1.26 billion**, with an estimated 2,076 jobs created and/or retained. (Northeast Ohio is here defined as Cuyahoga, Lake, Lorain, Mahoning, Portage, Richland, Summit, and Stark counties, although all other NEO counties are eligible). The TBED program area and tech investment categorization breaks down as follows:

<i>Program Area (TBED)</i>	<i>Amount</i>	<i>% of total</i>
Advanced Materials	\$80,322,088	20%
Bioscience	\$211,883,400	52%
Entrepreneurship / Early-stage capital	\$28,313,761	7%
Fuel Cells / Energy	\$52,773,659	13%
Electronics / Controls	\$29,628,465	7%
Internships	\$1,587,564	>1%
Total	\$404,508,937	100%

This funding has been distributed through the following organizations and initiatives that serve as business assistance conduits/funnels for state funding, as well as directly to small regional start-ups:

- Biomedical Research and Commercialization Program
- Entrepreneurial Signature Program (JumpStart, BioEnterprise, NorTech, GLIDE (Lorain County), Akron Global Business Incubator, Youngstown Business Incubator, MAGNET)
- Fuel Cell Program (Ohio Fuel Cell Coalition)
- Ohio Research Commercialization Grant Program
- Ohio Research Scholars Program

- Pre-Seed and Seed Funds (JumpStart)
- Research Commercialization Program
- TF Advanced Energy Program
- TF Action Fund
- Wright Centers of Innovation (Engineering & Innovation)
- Wright Mega-Center of Innovation, and other Wright Projects
- *TF internships grants:* Greater Cleveland Growth Association, Ohio Aerospace Institute, Workforce Institute of Lorain Co., Lake County Economic Development Center, The Employment Source of Canton, and the Industrial Information Institute of Youngstown/Mahoning Valley

As with Innovation Works in Pittsburgh, JumpStart Inc. in Cleveland, established in 2004, is a nationally-recognized venture-development non-profit that has produced impressive metrics as it works to grow and advance promising tech-based early-stage companies, as well as to provide a continuum of entrepreneurial resources to grow the economic landscape of its 21-county service area in NEO. Generously supported by the Third Frontier Project as well as other public-private philanthropic partners, Jumpstart has produced the following metrics from inception through to September 30, 2008:

- 55,250 Total Hours in Technical Business Assistance
- 43 Investments in 32 Companies
- \$12M in JumpStart Funding Invested
- \$65.6M in Outside Funding Raised by Portfolio Companies
- 169 Companies Assisted
- 1,450 Business Plans Vetted
- 5,600 Advise Sessions
- 25,700 Exchange Connections
- 25% of Portfolio Companies Led by Women/Minorities
- \$56M+ in Total Economic Impact (as of 12/07)

Overall, VC investment has boomed in recent years as the region's entrepreneurial climate has blossomed, with investments in NEO totaling \$318 million in 2007, twice the dollars invested in 2006, and well over half of the estimated \$536 million in VC investment throughout Ohio for the year. 75% of NEO VC investments were in healthcare and bio-science related companies. Four (4) new venture firms set up offices in NEO in 2007, and 30 firms made their first investments in Northeast Ohio enterprises.^{xii} Moreover, in 2007 over 82,000 NEO residents were employed in tech-based enterprises. Projections from TeamNEO and *Moody's Economy.com* estimate positive potential employment growth through 2017 in Hi-Tech Management (+10.98%), Hi-Tech Computer & Math (+18.97%), Hi-Tech Architecture & Engineering (+5.3%), and Hi-Tech Sciences (+5.72%).^{xiii} These estimates plus 22% projected growth in manufacturing and manufacturing-related technologies illustrate tremendous growth potential that nonetheless in these crisis-tinged economic times need proactive catalysts to come to full fruition.

Built for the Future: An Innovation-Based Economics Agenda

With the change in Presidential administrations in January 2009, this is a unique time to highlight and position state TBED funding with newer non-partisan strategic initiatives.

Recently the **Information Technology & Innovation Foundation** (ITIF), a non-partisan research group, issued a call to put "innovation at the center of our nation's economic policies, [so] we can ensure robust economic growth and rising standards for all Americans" through an economic policy that emphasizes growth with "proactive and strategic policies to spur innovation."^{xiv} Indeed, there is "wide agreement among economists and other experts that the capacity to innovate is central to growth, quality of life and success in the global marketplace."^{xv}

The Tech Belt Initiative would seize upon this call for fresh approaches to innovation in federal economic policy in advocating for collaborative, groundbreaking regional approaches that build upon working successes and advance new, bright ideas from the broad spectrum of its member institutions and organizations which stand at the national forefront of tech-based economic development.

Conclusion

Tough economic times are nothing new to the “Midwest rust belt” region in general, and more specifically to the Pittsburgh-Cleveland corridor. For many years, this mega-region, through a variety of programs detailed above, has been working diligently to transition its economies toward more technology-based opportunities to ensure a bright future as it relates to job growth, per capita income and other measures. But while these and other efforts are laudable, the region has been entirely dependent on state and local funding in order to build its economic development initiatives. Results have been positive and a great deal of infrastructure have been put in place, but the time to move this to a whole new level is upon us and can only be accomplished through assistance from the federal government.

Simply put, the Tech Belt Initiative is intended to link the synergistic resources of the Pittsburgh and Cleveland region across all industries to ensure a bright economic future. Over a 4-year period, nearly \$180,000,000 has been committed to TBED activity in the Southwest Pennsylvania region alone, while the State of Ohio has committed \$404,500,000 in the same timeframe to Northeast Ohio TBED.

The infrastructure that has been built and the assistance that has been put in place to spur the transformation have been incredible. Beyond capital flowing to the technology-based companies in the region, countless hours of technical business assistance to hundreds of companies have had the desired impact in terms of adding the right kinds of companies and jobs to the area. This has resulted in more jobs created and retained while providing attractive opportunities for college graduates to remain in the area. In addition, this has also had the desired effect of attracting additional capital to the region as these companies have grown and proven themselves.

Yet, with all this, the indicators are still negative. More can and must be done. With support and funding from the Federal government, programs like the TBI can leverage regional resources and help complete the transformation of the region and ensure its long-term viability.

The timing for the Tech Belt Initiative is now. The economy will be the top priority for the next President, who will need ideas that provide the greatest impact in the shortest period of time. With the right kind of effort, job and enterprise growth that can significantly increase disposable income for the greatest impact on the economy can become a reality.

ENDNOTES

ⁱ Betanyou, Frank. "Worse Than We'd Like, Better Than We Think: TeamNEO Examines Region's Economic Well-Being." *The Plain Dealer*, 9 October 9 2007, Final Edition: C1.

ⁱⁱ Roguski, Robert. "Cleveland Area's Economy Shrank While Most of Country Grew." *The Plain Dealer*, 25 September 2008.

ⁱⁱⁱ Fee, Jyle and Bob Sadowski, "Economic Trends: The Cleveland Metropolitan Statistical Area." Federal Reserve Bank of Cleveland. www.clevelandfed.org/research/trends/2007/0807/02regact.cfm

^{iv} Smith, Robert. "Cuyahoga Population Drop is Second-Worst Among U.S. Counties, Census Reports." *The Plain Dealer*, 20 March 2008.

^v Austrian, Dr. Ziona, et. al. "Regional Dashboard of Economic Indicators 2008: Comparative Performance of Midwest and Northeast Ohio Metropolitan Areas." Cleveland: The Center for Economic Development, Levin College of Urban Affairs/Cleveland State University, September 2008.

^{vi} <http://www.pghtech.org/aboutus/about-our-region.aspx>

^{vii} Miller, Christian and Brian Rudick, "The Pittsburgh Metropolitan Statistical Area." Federal Reserve Bank of Cleveland. March 2007.

^{viii} Dunne, Tim and Kyle Fee. "Economic Trends: Real Income Growth Across Metropolitan Areas (June 6, 2008)." Federal Reserve Bank of Cleveland. <http://www.clevelandfed.org/research/trends/2008/0608/02regact.cfm>

^{ix} Miller, Harold D. "Per Capita Income Growth Hides Seriiious Economic Weaknesses." PittsburghFuture.blogspot.com.

^x <http://www.benfranklin.org/about/index.asp>

^{xi} http://www.ohiochannel.org/your_state/third_frontier_project/about.cfm

^{xii} JumpStart Inc., NorTech and BioEnterprise. *The 2007 Venture Capital Report*. Cleveland, March 2008.

^{xiii} TeamNEO. *Northeast Ohio Economic Review*. Cleveland, OH: TeamNEO, March 2008.

^{xiv} Atkinson, Robert D. "An Innovation Economics Agenda for the Next Administration." Washington, DC: The Brookings Institution and The Information Technology & Innovation Foundation, 2008.

^{xv} Broad, William J., and Cornelia Dean. "Rivals' Visions Differ on Unleashing Innovation." *The New York Times*, 17 October 2008.