

Growing a Regional Cluster in the US

The Case of the N.Y. Nano cluster

High Level Forum

Leading Innovation Ecosystems

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Charles W. Wessner

Georgetown University

`<cw826@georgetown.edu>`

Leading Countries and Regions are Responding to the Global Competitiveness Challenge

- They are providing:
 - High-level Focus on Growth and National Strength—not consumer choice...
 - Sustained Support for Universities
 - Rapidly Growing Funding for Research
 - Support for Innovative Small Businesses
 - Government-Industry Partnerships to bring new products and services to market
 - **Substantial resources to create Innovation Clusters**
 - Source: NRC, "Rising to the Challenge, U.S. Innovation Policy for the Global Economy."

Growing Clusters In the United States

- Today's talk reviews an example of a US cluster that reflect many of the precepts of what the EU calls "Smart Specialization".
- This presentation focuses on the New York Nano-cluster because the New York case offers valuable policy lessons, not least because **the NY cluster is a major success, in terms of innovation, employment, and reputation.**
- Fundamentally my talk demonstrates that disadvantaged regions can change if there is a long-term policy commitment and substantial resources are made available.

The Albany Model: A Growing Success Story

The Albany-Malta corridor is a powerful policy model that draws on elements of both U.S. and foreign experience. Importantly, it reflects a long-term commitment at the state and regional level but interestingly, it did not benefit from substantial Federal investments.

The Crucial Role of Universities

“Industry is finding that, for activities involving a high level of scientific and technological creativity, a location in a center of brains, is more important than a location near markets, raw materials, transportation or factory labor.”

- Fred Terman, Stanford University, “The Father of Silicon Valley”

The New York Capital Region is exceptionally rich in higher education resources with 11 major institutions graduation over 10,000 STEM majors per year.

New York State Investments in education, infrastructure, and applied research have been the foundation of the region’s renewal.

The Crucial Role of Universities

“Universities Open to Industry: A core lesson from the New York cluster is the power of educational institutions that can and will engage with industry--institutions able to carry out applied research and train students to work with the new technologies of today and tomorrow.

A New Institution and New Jobs:

- New York’s ability to create a **new research institution** specifically designed to address the opportunity of nano-technologies, with a focus on the needs of the semiconductor industry, was instrumental in transforming the region.
- **The College of Nano Scale Science & Engineering** became, in itself, a driver of regional employment with some 4,000 employees. It also attracted a major supply chain to maintain and exploit its exceptional facilities

Key Features of this Successful Nano Cluster

- **CNSE--POLY TECH:** An industry-oriented university, guided by entrepreneurial leadership, provided reputation, researchers, & resources, while serving as a neutral site for applied research.
- **Unique Cutting Edge Equipment:** The construction of a state-of-the-art, 300mm fab in a university setting was, and remains, unprecedented.
- It allowed for research, testing, and training on the newest manufacturing equipment, attracted by the presence of a modern commercial scale fab *in a facility that existed no where else and one the companies could not afford to build themselves.*

A Successful Industrial Transition

- The case of New York shows the value of **effective leadership, consistent commitment and broad cooperation** to transform a region's industrial base by capitalizing on existing industrial and educational assets.
- New York's ability to draw on the reputation and resources of established companies such as IBM was critical to the success of the CNSE initiative. Placing high cost research facilities on a new campus side-stepped questions of "corporate welfare".
- NY State also had the capacity—and the political will—to offer globally **competitive incentives** to attract a major device manufacturer.

New York's Incentives Package for the AMD/GlobalFoundries Investment

AMD – New York's Successful Incentives Package	
<u>Item</u>	<u>Amount (\$million)</u>
State grant for buildings and equipment	\$ 500
State grant for R&D	150
Empire Zone tax credits/incentives	250 est.
Infrastructure (includes some federal funds)	300 est.
Total	\$1,200
AMD Commitment: Create 1,205 jobs by 2014 -Maintain 1,205 jobs for 7 years	
Source: "New York's Big Subsidies Bolster Upstate's Winning Bid for AMD's \$3.2-Billion 300-mm Fab," <i>Site Selection</i> (July 10, 2006)	

- The region realized the necessity of competing on a global scale.

**So what was the impact of the
investments?**

**Jobs, Jobs, and More Jobs
And large Scale Tax Revenue**

Tech Valley Semiconductor R&D and Manufacturing Jobs Impact

	<u>Direct Employment (2015)</u>	<u>Estimated Indirect Employment (2015) based on:</u>		
		<u>ESD Multiplier (2.25)</u>	<u>SIA Multiplier (4.89)</u>	<u>Moretti Multiplier (5.00)</u>
GF	3,538	7,960	17,300	17,690
Malta/Stillwater				
GF E. Fishkill	2,085	4,691	10,196	10,425
CNSE Albany	4,000	9,492	19,560	20,000
Totals	9,623	22,143	47,056	48,115

Returns in the Form of Substantial Tax Revenue and Investments

- **GlobalFoundries' investments have generated and continue to generate substantial state and Federal tax receipts.**
- In total, between 2010 and 2016 these investments generated approximately \$2.3 billion in state and Federal taxes.
- Total state taxes generated for 2010-2016 were \$992 million, growing from less than \$50 million in 2010 to \$257 million in 2016 alone.
- These tax revenues more than compensate the initial state investment without including the receipts from enhanced economic activity across the region.

The Importance of a Strong Regional Approach to Development

- The role of the **Center for Economic Growth** (CEG), an umbrella group of businesses and regional leaders, was key in helping to brand the region, advocate for investments, share information, and finance studies.
- CEG's ability to work above the fragmented political units of the region was a key contribution. This is an important model for other states such as Ohio and Pennsylvania that have literally thousands of small jurisdictions.

Leadership:

The Need for Civic Entrepreneurs

Public-private cooperation was essential **to develop a common vision** of what is needed and the ability to generate public-private contributions to achieve it.

- Even with a shared vision of regional progress, there is **a need for civic entrepreneurs** able to motivate public officials and university faculty to take new approaches with the goal of having new, and better outcomes.
- **The willingness to learn from others** and adopt and adapt best practices is a key characteristic of successful regions.

The Role of Cooperative Research Facilities & Agile Management

- A major source of success was the ability to establish non-profit foundations that were not subject to the bureaucracy of the NY State University system thereby enabling the CNSE to interact with companies competing in a rapidly evolving technological landscape.
- The enabled CNSE to reduce the cycle time for decisions and their execution and was a key factor in attracting elements of the semiconductor supply chain for cooperative research.
- The use of foundations and other industry based intermediary organizations was instrumental in creating the educational and research capabilities needed to attract and interact with high-tech manufacturing.

A Focus on Talent Creation

- Substantial investments were required for the creation of **connected universities**, community colleges and even high schools that cooperated with industry to provide hands-on experience and training.
- The creation of a high-quality, versatile workforce was contributed to the region's success and underscores the need for **targeted investments across the training spectrum**, from universities to community colleges to high schools.
- **CNSE's agile entrepreneurial management**, able to capitalize on the new collaborative opportunities presented by advanced manufacturing was a key element.

Global Value Chains and Start-ups

- The cases of New York and others underscore the important role of large corporations and their ability to connect the region to global value chains.
- Over time they can also be drivers of innovative activity by small firms and start-ups within the region.
- Start-up activity, however, needs to be activity supported. This can include incubators, mentoring, backed by repeated rounds of financing by public and private sources.
- A supportive national policy framework is also needed, e.g., bankruptcy laws and early finance.

A Key Challenge and a Solution

- **Poor or absent university-industry linkages in advanced industrial countries are often an intractable impediment to innovation.**
- Many universities in the U.S. and many countries in Europe have strong science but do not effectively commercialize technologies to the market.
- The cooperative research institutes described here, supported by targeted public funds (and foundations) are an effective means to commercialize technologies if they are given the autonomy and resources to act and professors and industry are given effective incentives.
- Too often funding & professional incentives are left out.

Commercializing University Research is Politically Important Because it...

- Provides a Return to Public Investments in Teaching and Research
 - Ensures that new & promising ideas are not trapped in the University laboratory
- Justifies New Research Allocations
 - Creates tangible outputs from public investments
- Fosters Skill Pools Needed for Innovative Clusters
 - Provides Services to Firms within the Innovation Ecosystem
- Provides a Source of New Firms & Jobs
 - Needed for Economic renewal & competitiveness

The Crucial Role of Public Seed Finance

- The U.S. has the richest venture capital market in the world, but little goes to seed financing, usually less than 4%.
- The federal government, some states, and angel investors provide significant resources.
- The U.S. SBIR Program (approximately \$2.8 billion) connects small companies to DOD procurement and pushes NIH inventions towards the market with sequential funding.
- University prizes, and investments, can help change university incentives and attitudes while providing resources to help commercialize new ideas.

Another Case: The Chicago Resurgence

- Ten years ago Chicago was not a major player in the startup ecosystem. Now it's one of the most important U.S. cities in tech.
- In fact the overall Illinois rate of startup growth is 68.85%, and Chicago is now consistently ranked first for VC returns.
- Chicago is now named alongside Boston, Los Angeles, and Austin as one of the country's best startup cities reflecting one of the most innovation-driven higher education systems across the U.S.
- **HOW?** A university with a large research budget, a supportive culture, the State S&T Commission, an Innovation Fund to invest in start ups and attract venture funding and the creation of the number one university accelerator in the country.

What are the Lessons?

A Long-Term Bipartisan Commitment

- Over fifty years, all of New York's governors from Nelson Rockefeller down through Andrew Cuomo—Republican and Democrat—**shared a commitment to university-based innovation as a driver of economic development.**
- That commitment was also manifested in a bipartisan manner by the state's legislative leaders.
- **This broad consensus** has enabled a series of mutually-reinforcing state policies and sustained investments extending over a period of half a century
- **A long-term, systematic approach** was required to develop new institutions, transform regional infrastructure, and create a high-tech work force.

Summary of Best Practices for Clustering from the New York Nanocluster

- **Ensure industry leadership** as a partner, a co-funder, and a reputational anchor.
- Encourage multiple **adaptable public-private partnerships**.
- **Make parallel investments** to encourage industry-oriented universities and researchers.
- Create cooperative programs to **develop a skilled workforce** with certificates and training directly relevant to industry needs.
- **Pay attention** to what the rest of the World is doing, especially China. Learn from their best practices where possible, e.g., Germany or the US, and understand their intentions and formulate a response.

Summary of Best Practices for Clustering from the New York Nanocluster

- **Provide substantial and sustained funding** to develop facilities not available elsewhere and provide incentives to attract investment.
- **Make parallel investments** to develop industry-oriented universities and researchers incentivized to work on applied research questions with industry and able to accept industry support.
- Encourage multiple **adaptable public-private partnerships to facilitate this cooperation.**
- Create cooperative programs to **develop a skilled workforce** with “stackable” certificates and training directly relevant to industry needs.

The Most Important Lesson

State and Regional investments in partnership with universities and industry can transform a region and the lives of those who live there.

**Success requires
Commitment, Continuity,
Cooperation
and Investment at Scale.**

Thank You