Blueprint for American Prosperity
Unleashing the Potential of a Metropolitan Nation

# CLUSTERS AND COMPETITIVENESS: A NEW FEDERAL ROLE FOR STIMULATING REGIONAL ECONOMIES

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## EXECUTIVE SUMMARY

Regional industry clusters—geographic concentrations of interconnected firms and supporting organizations—represent a potent source of productivity at a moment of national vulnerability to global economic competition. For that reason, the federal government should establish an **industry clusters program** that stimulates the collaborative interactions of firms and supporting organizations in regional economies to produce more commercial innovation and higher wage employment.

### America's Challenge

Due to rising global competition, the nation's capacity for generating stable, well-paying jobs for a large number of U.S. workers is increasingly at risk. In this environment, regional industry clusters represent a valuable source of needed innovation, knowledge transfer, and improved productivity. For that reason, the public sector around the world has launched numerous programs to catalyze growth producing collaboration in key industry clusters. However, this nation's network of cluster initiatives remains thin and uneven. As a result, many U.S. industry clusters are not as competitive as they could be, to the detriment of the nation's capacity to sustain well-paying jobs.

### Limitations of Existing Federal Policy

The federal government has the reach and the resources to stimulate the growth of cluster initiatives and to address the various barriers that limit cluster development and growth. However, current federal programs do very little to support competitive regions in general and competitive clusters in particular. They have evolved in a wildly ad hoc, idiosyncratic, and uncoordinated fashion. Further, the few federal programs that do focus on cluster and network development remain inadequate to the task.

### A New Federal Approach

The federal government should move to promote cluster development and growth nationwide. In this, the federal government's approach should be flexible, "bottom-up," and collaboration-oriented, rather than prescriptive, "top-down," or input-focused. Consistent with this, the federal government should boost the nation's competitiveness by catalyzing increased cluster activity in U.S. regions through a two-part federal clusters program:

- ***Create an information center*** to map the geography of clusters, maintain a registry of cluster initiatives and programs, and conduct research on cluster dynamics and cluster initiative and initiative program impacts and best practices

- ***Establish a grants program*** to support regional and state cluster initiative programs nationwide that would direct financial and other assistance to individual cluster initiatives

## INTRODUCTION

In April 2007, a delegation of boat builders from coastal Maine headed to Shanghai for the China International Boat Show in search of new markets for their products. Treated by the national government as honored guests, the Maine delegation met with numerous potential buyers and visited the sites of planned marinas for hundreds of luxury boats. In China, Monaco, and other far flung places, Maine's boat building industry is aggressively pursuing markets for a diverse, highly regarded product line that includes racing yachts, pleasure craft, workboats, and military vessels. Maine's boat builders are competing worldwide by being at the cutting edge of innovation—taking a 400-year coastal heritage of skilled craftsmanship to a new level through incorporating advanced composite technologies.

Maine's assertive venture into international competition is not a sudden matter of good fortune, but the culmination of a series of deliberate steps by Maine businesses and the state and federal governments. In the 1990s, a series of state and federal investments led to the creation of the University of Maine's Advanced Engineered Wood Composites (AEWC) Center, with particular expertise in the development of wood-based composites for marine uses, including boat hulls. In 2005, recognizing that the future of the state's industry rests on its ability to harness innovation to compete globally, Maine's boat builders, concentrated in an arc along the Maine coast, organized Maine Built Boats, Inc. (MBB) to develop and sustain the state's place as "a worldwide leader in boat building quality, technology, and craftsmanship." Soon after, the State of Maine created the North Star Alliance—bringing together MBB, the AEWC Center, state marine and composites trade associations, and economic development, workforce, training and investment organizations for the purpose of advancing boat building innovation, workforce training, and market development. By April 2006, the North Star Alliance received a $15 million matching grant from the federal Employment and Training Administration (ETA) to implement its plans, allowing, among other efforts, the trip to China.

In regions and states across the U.S., vigorous efforts are underway to attain and sustain a desirable level of economic vitality in the face of the ever-increasing competitiveness of other nations. The Maine story introduces several concepts relevant to these efforts. The first is that of the *industry cluster*, a geographic concentration of interconnected firms and supporting organizations in a particular sector; the Maine boat building case lays out an array of public and private organizations that take part in that particular cluster. (See Box 1 for relevant definitions). Centuries of evidence indicate that the geographic clustering of organizations in a sector significantly facilitates innovation and creativity, productivity, access to essential key inputs such as skilled labor and materials, and improved operating costs. Industry clustering, then, is a manifestation of and primary mechanism for regional economic competitiveness.

**Box 1. Definitions**

***Regional industry cluster:*** a geographic concentration of interconnected businesses, suppliers, service providers, and associated institutions in a particular field

***Cluster initiative:*** a formally organized effort to promote cluster growth and competitiveness through collaborative activities among cluster participants

***Cluster initiative program:*** an effort to create and sustain a series of cluster initiatives

But other elements of the Maine story merit highlighting. The Maine example of state and federal investment in the AEWC Center indicates a traditional public-sector role in enhancing cluster-related research and development (R&D) efforts, one that arguably goes back at least as far as land grant universities. Beyond that, however, the State of Maine's sponsorship of the North Star Alliance reflects a relatively new phenomenon: public sector support for *cluster initiatives*, formally organized collaborative efforts to facilitate cluster competitiveness and growth.[1] The belief here is that government can act as a catalyst to overcome financial, cultural, or institutional impediments to collaboration among organizations within a cluster.

Moreover, the attractions of cluster initiatives are such that several regional, state, and federal agencies have created *cluster initiative programs***,** efforts to seed initiatives across a series of clusters. For example, Greater Louisville Inc. manages GLI Business Networks, involving nine cluster efforts. States such as Oregon, Connecticut, and South Carolina have active cluster initiative programs. At the federal level, ETA's Workforce Innovation in Regional Economic Development (WIRED) program has invested in a series of cluster-focused efforts around the U.S., including Maine's North Star Alliance.

Cluster initiatives are at once an auspicious arrival on the U.S. development scene, and an object of concern, as there are too few of them. Despite the widespread recognition of the importance of clusters in regional competitiveness, the nation's network of cluster initiatives, whether organized by industry or catalyzed by government, is thin and uneven in terms of geographic and industry coverage, level and consistency of effort, and organizational capacity. As a result, clusters in the U.S. are not nearly as well positioned competitively as they could be, to the detriment of the nation's economic strength and its capacity to sustain well-paying jobs. The federal government has the reach and the resources to take advantage of the opportunities offered by cluster initiatives and to address the various barriers that hinder cluster development and growth. However, federal efforts that support cluster development remain ad hoc in nature, insufficient in scope, uncoordinated, and, in the case of the WIRED—the largest, most prominent program—unlikely to extend long into the future.

This paper's purpose is to describe the current problematic situation and present a new, more effective federal approach to stimulating cluster competitiveness across the U.S. This approach reflects a substantial departure from traditional federal economic development. Unlike most federal development programs, the envisioned cluster undertaking will seek to foster collaboration, creativity, and industry leadership; be implemented nationwide, not just in lagging regions; employ a diverse policy tool kit, applied flexibly, not prescriptively; and deploy incentives to link, leverage, and align the multitude of existing, "siloed" federal programs that support regional economic development.

Also underlying this approach is a recognition that regional economies are largely metropolitan in nature—a crucial point of the *Blueprint for American Prosperity*, a multi-year initiative of the Brookings Institution's Metropolitan Policy Program intended to put forth an integrated federal policy agenda that provides cities, suburbs, and metro areas with tools to leverage their economic strengths, grow in environmentally sensitive ways, and create opportunities to build a strong and diverse middle class. In light of this focus and the importance of innovation to metropolitan economic success, this paper is published as part of the *Blueprint* effort, in tandem with another publication proposing the establishment of a National Innovation Foundation (NIF), of which a federal cluster effort could be a part.[2]

Along these lines, this paper begins by examining the nature and role of clusters in the economic development process. It then describes the rise of cluster initiatives and cluster initiative programs in recent years and provides a rationale for a public, particularly federal, role in catalyzing cluster development. Finally, the report critiques current federal activities in this regard and offers a set of specific, legislatable recommendations for a more effective federal effort.

## II. CLUSTERS REINVIGORATE REGIONAL COMPETITIVENESS

In recent decades, the nation's economic dominance has eroded across an array of industries and business functions. In the decades following World War II, the United States built world-leading industries that provided well-paying jobs and economic prosperity to the nation. This dominance flowed from the nation's extraordinary aptitude for innovation as well as a relative lack of international competition. Other nations could not match the economic prowess of the U.S. due to some combination of insufficient financial, human, and physical capital and economic and social systems that did not value creativity and entrepreneurship.

However, while the nation today retains its preeminence in many realms, the dramatic expansion of economic capabilities abroad has seen the U.S. cede leadership, market share, and jobs in an ever-growing, wide-ranging list of industries and business functions. Initially restricted to labor-intensive, lower-skill activities such as apparel and electronic parts manufacturing, the list of affected U.S. operations has expanded to labor-intensive, higher-skill ones such as furniture-making and technical support call centers; capital-intensive, higher-skill ones such as auto, steel, and information technology equipment manufacturing; and, more recently, research and development (R&D) activities in sectors as diverse as computers and consumer products.

Looking ahead, the nation's capability for generating and sustaining stable, sufficiently well-paying jobs for a large number of U.S. workers is increasingly at risk. Across numerous industries, U.S.-based operations have not been fully effective in responding to competitive challenges from abroad. Many struggle to develop and adopt the technological innovations (in products and production processes) and institutional innovations (new ways of organizing firms and their relationships with customers, suppliers, and collaborators) that sustain economic activity and high-skill, high value-added jobs. As a result, too many workers are losing decent jobs without prospect of regaining them and too many regions are struggling economically.[3]

In this environment, regional industry clusters provide a valuable mechanism for boosting national and regional competitiveness. Essentially, an industry cluster is a geographic concentration of interconnected businesses, suppliers, service providers, and associated institutions in a particular field.[4]

Defined by relationships rather than a particular product or function, clusters include organizations across multiple traditional industrial classifications (which makes drawing the categorical boundaries of a cluster a challenge). Specifically, participants in an industry cluster include:

- organizations providing similar and related goods or services

- specialized suppliers of goods, services, and financial capital (backward linkages)
- distributors and local customers (forward linkages)
- companies with complementary products (lateral linkages)
- companies employing related skills or technologies or common inputs (lateral linkages)
- related research, education, and training institutions such as universities, community colleges, and workforce training programs
- cluster support organizations such as trade and professional associations, business councils, and standards setting organizations

The power of clusters to advance regional economic growth was described (using the term "industrial districts") in the pioneering work of Alfred Marshall in 1890. With the sizeable upswing in regional economic restructuring in recent decades, understanding of and interest in the role of clusters in regional competitiveness again has come to the fore through the work of a number of scholars and economic development practitioners.[5] In particular, the efforts of Michael Porter, in a dual role as scholar and development practitioner, have done much to develop and disseminate the concept.

Essentially, industry clusters develop through the attractions of geographic proximity—firms find that the geographic concentration of similar, related, complementary, and supporting organizations offers a wide array of benefits. Clusters promote knowledge sharing ("spillovers") and innovations in products and in technical and business processes by providing thick networks of formal and informal relationships across organizations. As a result, companies derive substantial benefits from participation in a cluster's "social structure of innovation."[6] A number of studies indicate a positive correlation between clusters and patenting rates, one measure of the innovation process.[7]

What is more, clusters enhance firm access to specialized labor, materials, and equipment and enable lower operating costs. Highly concentrated markets attract skilled workers by offering job mobility and specialized suppliers and service providers—such as parts makers, workforce trainers, marketing firms, or intellectual property lawyers—by providing substantial business opportunities in close proximity. And concentrated markets tend to provide firms with various cost advantages; for example, search costs are reduced, market economies of scale can cut costs, and price competition among suppliers can be heightened.

Entrepreneurship is one important means through which clusters achieve their benefits. Dynamic clusters offer the market opportunities and the conditions—culture, social networks, inter-firm mobility, access to capital—that encourage new business development.[8]

In sum, clusters stimulate innovation and improve productivity. In so doing, they are a critical element of national and regional competitiveness. After all, the nation's economy is essentially an amalgamation of regional ones, the health of which depends in turn on the competitiveness of its traded sector—that part of the economy which provides goods and services to markets that extend beyond the region. In metropolitan areas and most other economic regions of any size, the traded sector contains one or more industry clusters.

In this respect, the presence and strength of industry clusters has a direct effect on economic performance as demonstrate a number of recent studies. A strong correlation exists between gross domestic product per capita and cluster concentrations.[9] Several studies show a positive correlation between cluster strength and wage levels in cluster.[10] And a third set of studies indicates that regions with strong clusters have higher regional and traded sector wages.[11] Table 1 depicts this latter relationship with wage data on larger metros with the highest and lowest presence of strong clusters.

## Strong clusters lead to higher regional wages, particularly in the traded sector

| 2004 | Metro | Percent of traded employment in "strong" traded clusters | Regional employment | Average regional wage | Average regional traded wage | Ratio of traded wages to average wages |
|---|---|---|---|---|---|---|
| Top 10 | Trenton, NJ | 82.7% | 185,383 | $46,390 | $60,677 | 1.31 |
| | Palm Bay, FL | 80.8% | 174,830 | $33,571 | $44,988 | 1.34 |
| | San Jose, CA | 79.7% | 861,940 | $68,559 | $96,602 | 1.41 |
| | Durham, NC | 78.4% | 221,362 | $43,634 | $73,757 | 1.69 |
| | New York, NY-NJ-PA | 76.7% | 7,584,299 | $52,377 | $80,068 | 1.53 |
| | Boston, MA-NH | 73.6% | 2,259,198 | $49,171 | $70,458 | 1.43 |
| | Las Vegas, NV | 73.4% | 739,434 | $33,884 | $34,394 | 1.02 |
| | Harrisburg, PA | 73.3% | 273,181 | $34,054 | $37,836 | 1.11 |
| | Bridgeport, CT | 72.6% | 450,517 | $62,420 | $109,384 | 1.75 |
| | Dayton, OH | 69.4% | 357,719 | $33,742 | $45,069 | 1.34 |
| | **Top 10 weighted average** | | | **$50,817** | **$75,246** | **1.48** |
| Bottom 10 | Knoxville, TN | 30.8% | 291,046 | $32,873 | $41,763 | 1.27 |
| | Allentown, PA-NJ | 29.5% | 289,149 | $36,723 | $39,216 | 1.07 |
| | Tulsa, OK | 29.3% | 357,231 | $33,815 | $45,686 | 1.35 |
| | Sarasota, FL | 29.0% | 223,504 | $30,570 | $37,890 | 1.24 |
| | Richmond, VA | 28.3% | 508,944 | $37,471 | $48,919 | 1.31 |
| | Columbus, OH | 26.0% | 786,585 | $36,426 | $47,608 | 1.31 |
| | Albuquerque, NM | 25.2% | 287,991 | $31,490 | $40,182 | 1.28 |
| | St. Louis, MO-IL | 11.9% | 1,250,722 | $35,999 | $49,276 | 1.37 |
| | Oklahoma City, OK | 10.5% | 437,476 | $29,995 | $39,729 | 1.32 |
| | Little Rock, AR | 6.3% | 286,046 | $31,787 | $43,808 | 1.38 |
| | **Bottom 10 weighted average** | | | **$34,571** | **$45,297** | **1.31** |

*Note: Metros are top 10 and bottom 10 of 100 largest metro areas, ranked by percent of traded employment in strong clusters.*

For purposes of economic development policy, meanwhile, it should be kept in mind that every cluster is unique. Clusters come in a variety of purposes, shapes, and sizes and emerge out of a variety of initial conditions. (See Appendix A for examples.) The implication is that one size, in terms of policy prescription, does not fit all.

Moreover, clusters differ considerably in their trajectory of growth, development, and adjustment in the face of changing market conditions. The accumulation of evidence suggests, in this respect, that there are three critical factors of cluster success: collaboration (networks and partnerships), skills and abilities (human resources), and organizational capacities to generate and take advantage of innovations.[12] Any public policy for clusters, then, needs to aim at spurring these success factors.

Policy also needs to recognize that cluster success breeds success: The larger a cluster, the greater the benefits it generates in terms of innovation and efficiencies, the more attractive it becomes to firms, entrepreneurs, and workers as a place to be, the more it grows, and so on. As a result, most sectors have a handful of dominant clusters in the U.S. As the dominant sectors continually pull in firms, entrepreneurs, and workers, it is difficult for lower tier regions to break into the dominant group.[13] For instance, the biotech industry is lead by the Boston and San Francisco clusters, followed by San Diego, Seattle, Raleigh-Durham, Washington-Baltimore, and Los Angeles.[14] Moreover, as suggested by the biotech example, the dominant clusters tend to be in larger metro areas. Larger metros (almost by definition) tend to have larger traded clusters, which offer a greater degree of specialization and diversity, which lead to patenting rates almost three times higher than smaller metros.[15] The implication is that public policy needs to be realistic; not every region can be, as many once hoped, the next Silicon Valley.

At the same time, not even Silicon Valley can rest on its laurels. While the hierarchy of clusters in a particular industry may be relatively fixed for a period of time, the transformation of the American industrial landscape from the 1950s—when Detroit meant cars, Pittsburgh meant steel, and Hartford meant insurance—to the present makes quite clear that cluster dominance cannot be taken for granted. This is true now more than ever—as innovation progresses, many clusters have become increasingly vulnerable, for three related reasons.

First, since the mid-20$^{th}$ century, transportation and communications innovations have allowed manufacturers to untether production capacity from clusters and scatter isolated facilities around the nation and the world, to be closer to new markets and to take advantage of lower wage costs. Once relatively confined to the building of "greenfield" branch plants in less industrial, non-union areas of the U.S., the shift of nondurables manufacturing to non-U.S. locations is a more recent manifestation of this phenomenon. Further, these innovations have enabled foreign firms to greatly increase

their share of markets once dominated by American firms and their associated home-based clusters.

Second, more recent information technology innovations have allowed the geographic disaggregation of functions that traditionally had been co-located in a single cluster. Firms now have the freedom to place headquarters, R&D, manufacturing, marketing and sales, and distribution and logistics in disparate locations in light of the particular competitive requirements (e.g., skills, costs, access to markets) of each function.[16] As a result, firms often locate operations in function-specific clusters. The geographic fragmentation of corporate functions has had negative impacts on many traditional, multi-functional clusters, such as existed in 1960. At the same time, it offers opportunities, particularly for mid-sized and smaller areas, to develop clusters around highly specific functions that may serve a variety of industry sectors. For instance, Memphis, TN and Louisville, KY have become national airfreight distribution hubs.

(This geographic fragmentation of corporate efforts is leading some economic development analysts to replace the concept of "cluster" with those of "nodes" and "hubs."[17] Relying on Internet technologies, firms such as IBM and Procter & Gamble are creating virtual clusters, cross-geography "collaboratories."[18] However, by whatever name and changes in information technology, the benefits of the geographic agglomeration of economic activity will continue for the foreseeable future.)

Third, as radically new products and services disrupt existing markets, new clusters that produce them can do likewise. For instance, the transformation in the computer industry away from mainframes and then from minicomputers in the 1970s and 1980s led to a shift in industry dominance from the Northeast to Silicon Valley and Seattle.[19]

In the new world of global competition, the U.S. and its regions are in a perpetual state of economic transition. Industries rise and fall, transform products and processes, and move around the map. As a result, regions across the U.S. are working hard to sustain a portfolio of competitive clusters and other traded activities that provide decent jobs. In this process, some regional economies are succeeding for the moment, while others are struggling. For U.S. regions, states, and particularly the federal government, the challenge is to identify and pursue mechanisms—cluster initiatives, in particular—to enhance the competitiveness of existing clusters while taking advantage of opportunities to develop new ones.

## III. CLUSTER INITIATIVES STIMULATE CLUSTER COMPETITIVENESS AND GROWTH

Cluster initiatives are formally organized efforts to promote cluster competitiveness and growth through a variety of collaborative activities among cluster participants. Examples of such collaborative efforts include:

- facilitating market development through joint market assessment, marketing, and brand-building
- encouraging relationship-building (networking) within the cluster, within the region, and with clusters in other locations
- promoting collaborative innovation – research, product and process development, and commercialization
- aiding the innovation diffusion, the adoption of innovative products, processes, and practices
- supporting the cluster expansion through attracting firms to the area and supporting new business development
- sponsoring education and training activities
- representing cluster interests before external organizations such as regional development partnerships, national trade associations, and local, state, and federal governments

While cluster initiatives have existed for some time, research indicates that the number of such initiatives has grown substantially around the world in a short period of time. In 2003, the Global Cluster Initiative Survey (GCIS) identified over 500 cluster initiatives in Europe, North America, Australia, and New Zealand; 72 percent of these had been created during the previous four years.[20] That number likely has expanded significantly in the last five years. Today, the U.S. alone has several hundred distinct cluster initiatives.[21] (See Box 2 for examples.)

## Box 2. Examples of U.S. Cluster Initiatives

### Cleveland's WIRE-net

WIRE-net was formed in 1988 to assist area manufacturing companies and retain manufacturing jobs in a period plagued by plant closings and downsizings. Partnered with the Cleveland Industrial Retention Initiative (CIRI), WIRE-net is a public advocate on behalf of regional manufacturers and works to raise awareness among its membership of available resources to stimulate business and neighborhood investment, foster job creation, and improve business retention. The organization also operates manufacturing assistance, industrial real estate redevelopment, and workforce programs.

### The St. Louis BioBelt

The St. Louis BioBelt, an organization of plant and life sciences companies, was formed on the recommendation of a Battelle Memorial Institute report in 2000. BioBelt supports life sciences education, works to attract venture capital and government research funding to St. Louis, and facilitates industry networking. BioBelt results include the retention of several major life science corporations in the region, growth of the area research base, two operational life science business incubators, a virtual commercialization center called BioGenerator, and the attraction of several plant and life science start-ups to St. Louis.

### Florida's Technology Coast Manufacturing and Engineering Network

In 1991, 30 defense contractors in Florida's Panhandle were invited to a conference on collaboration held at Okaloosa-Walton Community College. They subsequently formed the Technology Coast Manufacturing and Engineering Network (TeCMEN). With initial support from the state and foundations, members of the network hired a director, solidified their relationships with regular meetings and events, collaborated on training, jointly bid on contracts, and visited federal labs together to find research that could be commercialized.

### Southeast Michigan's Automation Alley

In 1997, Oakland County Executive L. Brooks Patterson announced an initiative to leverage the strength of the county's high-tech companies into a national-marketing strategy designed to attract new talent and development while growing and promoting existing firms. The resulting organization, Automation Alley, now encompasses 850 members across Southeast Michigan, including Detroit. Major efforts include an International Business Center (IBC) designed to assist small- and medium businesses in becoming export ready while simultaneously attracting international investment to the region, and a Technology Center intended to accelerate the commercialization of new technology by bringing together businesses, academics, and government. Automation Alley also is home to a Michigan-wide network of regional associations of technology professionals.

### Oregon Metals Initiative

The Oregon Metals Initiative is a partnership founded in 1991 between Oregon's metals industry and the state's research universities. The consortium fosters inter-industry relationships, develops research infrastructure, and pursues research initiatives to ensure the long term competitiveness of the regional metals industry. Partner companies invest over $1 million in annual research, which is matched on a 1:1 basis by the Oregon University System.

### The Massachusetts Life Sciences Collaborative

The Life Sciences Collaborative is a group of industry, academic, and government leaders assembled in 2006 to develop a strategy to maintain the national dominance of Massachusetts's cross-sector "super cluster" of life science research institutions and companies. In its first year the Collaborative performed research and analysis of the super cluster, provided a comprehensive briefing to the State administration, supported Governor Patrick in the launch of his $1 billion life sciences initiative, sponsored the BIO international convention in Boston, and launched several targeted task forces. The collaborative has recently formed a Leadership Council.

*Sources: Cluster initiative websites*

A look across the breadth of cluster initiatives indicates the following:

- Clusters are present across the full array of industry sectors, including both manufacturing and services—as examples, initiatives exist in information technology, biomedical, photonics, natural resources, communications, and the arts
- They are almost always in sectors of economic importance, in other words, they tend not to be frivolously or naively chosen
- They carry out a diverse set of activities, typically in four to six of the bulleted categories on the previous page
- While the geographic boundaries of many are natural economic regions such as metro areas, others follow political boundaries, such as states
- Typically, they are industry-led, with active involvement from government and nonprofit organizations
- In terms of legal structure, they can be sponsored by existing collaborative institutions such as chambers of commerce and trade associations or created as new sole-purpose nonprofits (e.g., the North Star Alliance)
- Most have a dedicated facilitator
- The number of participants in a cluster initiative can range from a handful to over 500
- Almost every cluster initiative is unique when the combination of regional setting, industry, size, range of objectives and activities, development, structure, and financing are considered

The GCIS is the only known research effort to look across a number of cluster initiatives (over 250) to identify the extent of effectiveness and success factors.[22] Keeping in mind that the survey was worldwide (including North America) and that the respondents were cluster initiative managers, the GCIS finds that appropriately focused, effectively managed cluster initiatives have a visible positive impact on cluster competitiveness and growth. According to the GCIS, successful cluster initiatives:

- are industry-led
- involve state and local government decisionmakers that can be supportive
- are inclusive: They seek any and all organizations that might find benefit from participation, including startups, firms not locally-owned, and firms rival to existing members
- create consensus regarding vision and roadmap (mission, objectives, how to reach them)

- encourage broad participation by members and collaboration among all types of participants in implementing the roadmap
- are well-funded initially and self-sustaining over the long-term
- link with relevant external efforts, including regional economic development partnerships and cluster initiatives in other locations

As properly organized cluster initiatives can effectively promote cluster competitiveness, it is in the nation's interest to have well-designed, well-implemented cluster initiatives in all regions. Cluster initiatives often emerge as a natural, firm-led outgrowth of cluster development. For example, the Massachusetts Biotechnology Council formed out of a local biotech softball league.[23] However, left to the initiative of cluster participants, a good number of possible cluster initiatives never see reality because of a series of barriers to the efficient working of markets (what economists call "market failures"). First are "public good" and "free rider" problems. In certain instances, individual firms, particularly small ones, will under-invest in cluster activities because any one firm's near-term cost in time, money, and effort will outweigh the immediate benefits it receives. So no firm sees the incentive to be an early champion or organizer. Further, because all firms in the cluster benefit from the work of early champions ("public good"), many are content to sit back and wait for others to take the lead (be a "free rider"). Consequently, if cluster firms are left to their own devices and no early organizers emerge, a sub-optimal amount of cluster activity will occur and the cluster will lose the economic benefits that collaboration could bring.

Some firms have issues of mistrust, concerns about collaborating with the competition. In certain industries in certain regions, competition among firms is so intense that a culture of secrecy and suspicion has developed that stymies mutually beneficial cooperation.

Even if the will to organize a cluster initiative is present, the way may be impeded by a variety of factors. Cluster initiatives may not get off the ground because would-be organizers lack knowledge about the full array of organizations in the cluster, relationships or standing with key organizations (i.e., lack the power to convene), financial resources to organize, or are uncertain about how organizing should best proceed. They see the "transaction costs" of overcoming these barriers (that is, seeking information, building relationships, raising money) as too high to move forward.

In the face of the various barriers to self-generating cluster initiatives, public purpose organizations such as regional development partnerships and state governments are taking an increasingly active role in getting cluster initiatives going. (See Appendix B for Michael Porter's rationale for public policy at the cluster level.) So, for example, the Massachusetts Technology Collaborative, a quasi-public state agency, was instrumental in initiating the Massachusetts Medical Device Industry Council (in

response to an economic development report to the governor prepared by Michael Porter). And Maine's North Star Alliance was created through the effort of that state's governor.

However, a number of states and regional organizations—and national governments elsewhere—have come to understand that creating single cluster initiatives in ad hoc, "one-off" manner is an insufficient response to the problem and the opportunity. Rather, as discussed in the next section, they have created formal on-going programs to seed and support a series of cluster initiatives. Even so, the nation's network of state and regional cluster initiatives is thin and uneven in terms of geographic and industry coverage. Consequently, the nation's ability to stay competitive and provide well-paying jobs across U.S. regions is diminished; broader, thoughtful federal action is necessary.

## IV. National Governments Play a Central Role in Cluster Development But Not in the U.S.

In nations across the globe, the number of cluster initiative programs has grown substantially in recent years in response to the pressures of international competition. Twenty-six of 31 European Union (EU) countries have cluster initiative programs in place, as do Japan and Korea.[24] Building on the efforts of its member states, the EU has just published *The European Cluster Memorandum*, a multi-country cluster initiative to promote innovation through cluster development.[25] Closer to home, cluster initiative programs are a component of economic development efforts in a small number of states, including Connecticut, Oregon, Maine, North Dakota, South Carolina, and Washington. In addition, a few local economic development organizations administer cluster initiative programs. (See Box 3 for regional, state, and international examples.)

In contrast to the examples around the world and among the states, the U.S. federal government has been almost entirely absent from the realm of cluster initiative programs. The most prominent exception, an innovative effort to stimulate collaborative regional efforts in economic and workforce development, is the Department of Labor's WIRED (Workforce Innovation in Regional Economic Development) program. While WIRED is not solely a cluster initiative program, a good many WIRED projects are cluster-focused (such as Upstate New York's Optics and Imaging cluster, Northeast Pennsylvania's Wall Street West cluster, and Maine's North Star Alliance). WIRED, however, was developed internally by the DOL in 2005 utilizing H1-B visa fees and appears likely to be short-lived. Though limited and insufficient, several other federal economic and workforce development programs—including the Community-Based Jobs Training Program, the Manufacturing Extension Partnership, and the Partnerships for Innovation Grant Program—are available to support particular slices of cluster collaboration. However, at present, unlike most other developed nations, the U.S. has no legislatively authorized programs specifically dedicated to comprehensively supporting cluster initiatives.

A review of the range of existing cluster initiative programs suggests that the large majority have been created since 2000. The Organization for Economic Co-operation and Development (OECD) found that program purpose can fall into any of these categories: regional economic policy (e.g., lagging regions), science and technology policy (e.g., key advanced technology industries), industrial policy (strengthening important national sectors), and SME policy (promoting the growth of small and medium-sized enterprises).[26]

Whatever the purpose, it is also clear that, given the freshness of the program concept, a substantial amount of experimentation is going on. Existing U.S. cluster initiative programs differ significantly in a variety of ways: level of effort (funds and

human resources allocated); type of support (e.g., cluster data analysis, cluster facilitators, technical assistance, grants); process of clusters selection (e.g., open collaborative process, application from individual clusters, agency-determined); timeframe (one-time v. ongoing); management of individual cluster initiatives by program sponsor (yes v. no); and type of sponsor organization (e.g., non-profit, public-private partnership, government).

**Box 3: City-Regions, States, and Nations Are All Launching Cluster Initiative Programs**

**Louisville, KY:** Founded in 1997 as the merger of two local economic development organizations, Greater Louisville Inc. (GLI) has created a "network of networks," nine large and active industry cluster groups. These cluster initiatives claim large memberships, hold regular meetings and events, and carry out other research, support, and educational activities.

**Fresno, CA:** Launched in 2004, the Regional Jobs Initiative (RJI) has fostered ten cluster initiatives involving businesses, local government, and educational institutions. The cluster efforts claim significant achievements, including the establishment of a technology incubator, several training certificate programs, an Advanced Manufacturing Center, and a Center for Construction Excellence.

**Sarasota County, FL:** The Sarasota County Economic Development Corporation (EDC) began pursuing a cluster-based strategy in 2003, with six initiatives at present. The EDC retains a full-time cluster support liaison, maintains cluster websites, and organizes meetings of cluster members. Each cluster is led by two co-chairs drawn from business leadership.

**Maine:** Since 2000, the non-profit, state-chartered Maine Technology Institute (MTI) has administered a state-funded cluster grant program. Grants of up to $200,000 are for comprehensive projects applicable to, or assisting, one or several of seven Maine technology clusters identified by MTI. Recently, MTI funded initiatives in boatbuilding, composite technology, food, forest products, and sustainable energy.

**Oregon:** In 2005, the Oregon Business Plan launched the Oregon Clusters Network to identify Oregon's mature, emerging, and potential industry clusters and assist cluster participants as they work to accelerate innovation and the growth of their industries. The state expends about $100,000 annually for central staff; it periodically issues RFPs for workforce-related grant funds. At present, there are 18 initiatives in the Network.

**South Carolina:** New Carolina (the South Carolina Council on Competitiveness) is a public-private development effort organized in 2004 in response to a study on South Carolina's industry clusters. The group hosts 15 cluster initiatives. In addition to three full time staff members, New Carolina retains five "change agents" located around the state. These individuals lead efforts to organize clusters programs in their home regions. Total expenditures are slightly over $1 million.

**Canada:** Since 2000, the National Research Council (NRC) has sponsored the Technology Cluster Initiatives program to foster the development of regional innovation-driven clusters. NRC is involved in eleven cluster initiatives. Program instruments include networking and joint initiatives across clusters, and support for training, R&D, and industry development. NRC conducts ongoing evaluations of the cluster initiatives.

**South Korea:** The Korean Industrial Complex Corporation's (KICOX) The Innovative Cluster Cities program aids large regional industrial complexes to help them convert from manufacturing centers to innovation hubs. Activities are diverse across cluster cities, and often include technical training, incubator development, research infrastructure developments, and the provision of

services for small and medium sized enterprises.

**Sweden:** The Regional Cluster program, sponsored by Nutek, the Swedish Agency for Economic and Regional Growth, supports international competitiveness with market-focused assistance. A "process manager" is funded in each cluster.

*Source: Program websites and OECD*

A review of existing programs also makes clear that national efforts and sub-national (state, provincial, regional) ones play roles that are different and complementary. As sub-national programs are "on site," they are particularly good at relational and interpersonal tasks—providing leadership in bringing firms together; helping firms appreciate the benefits of collective action; bringing in key network resources such as universities; community colleges, and workforce boards; and providing technical assistance to get initiatives off the ground. Put another way, they help address public good, free rider, trust, and transaction cost issues identified earlier.

The advantage of national programs is in providing "on site" actors with information, knowledge, and financial resources; spanning political boundaries; and providing nationwide coverage:

- National programs can gather, organize, and provide cluster initiatives with current, detailed information on topics such as cluster composition, performance, competitive structure, trade flows, and trends. Cluster initiatives can use such information to better chart their collaborative strategy for cluster competitiveness
- National governments also facilitate the development and dissemination of knowledge about effective cluster initiative practices. National programs can fund research on cluster dynamics, for example, including on cluster types, evolution, and success factors in various circumstances.[27] In addition, national programs can sponsor research on cluster initiative impacts and practices, create large peer-to-peer networks, and develop cluster initiative performance indicators. Sub-national programs operate on too small a scale to be effective in this regard
- National programs have the wherewithal to provide financial resources at the necessary scale to support individual cluster initiatives. A review of U.S. state and regional programs indicates that individual initiatives typically are provided access to technical assistance and/or a small (five-figure) start-up grant. Only in a few instances, larger (six- and seven-figure) grant funds are available through an RFP process for cluster-specific training and R&D projects
- National programs can encourage and enable cluster initiatives to take advantage of an extensive array of complementary national economic and workforce development program resources, such as grants for infrastructure,

R&D, and workforce. Sub-national programs do not have such influence. The OECD identified and organized 32 "instruments" on which cluster initiative programs rely, from within and without, to promote cluster development (Appendix C)

- National programs are able to seed initiatives in clusters that cross state or provincial political boundaries. State programs often have jurisdiction over only one portion of an interstate region
- Through this collection of advantages, national programs can facilitate the creation of cluster initiatives nationwide. Because of their deficiencies in information, knowledge, resources, and authority, many sub-national organizations do not start cluster initiative programs or are not able manage them adequately. Without a national effort, parts of the nation would be unevenly covered

Through PRO INNO Europe and Europe INNOVA, the EU is playing a supranational role to promote effective national cluster initiative programs in its 31 member states. To aid information and knowledge development, the EU has created the European Cluster Observatory, which gathers and provides data on European clusters and cluster policies to inform policymakers, cluster practitioners, and researchers. The observatory provides cluster-mapping data on regional concentration and specialization patterns, lists regional and local cluster organizations and cluster initiatives, and serves as a center of information on cluster policies and best practices.[28] In addition, the EU created the European Cluster Alliance "for cluster trans-national cooperation at policy level and . . . elaborating new ideas and practical tools for improving cluster policy in Europe."[29] The EU recently published *The European Cluster Memorandum* as an agenda for member action. (See Box 4).

**Box 4. Promoting European Innovation through Clusters: Findings of *The European Cluster Memorandum***

- The strategic importance of clusters for European innovation and global competitiveness is only now becoming fully recognized
- Cluster policy in Europe needs a step-change in ambition and effectiveness to reach its potential as a real driver of European prosperity
- Success depends on concerted changes in policies, programs, initiatives, and thinking at many different levels and in many different places across Europe
- This Memorandum - supported by national and regional agencies for innovation and economic development and addressed to policy makers at the national and European levels - lays out a path forward; it commits its signatories to concrete action and identifies the changes necessary in regional, national, and European policies

*Source:* The European Cluster Memorandum*, presented at the European Presidential Conference on Innovation and Clusters, January 22-23, 2008, Stockholm, Sweden*

Clearly, then, national governments can play a central role in cluster development, though in this country that role currently is going unfulfilled. In the federal government's absence, the nation's network of cluster initiatives is thin and uneven in terms of geographic and industry coverage, level and consistency of effort, and organizational capacity. While a few states and regions have formal cluster initiative programs, most do not.[30] Existing cluster initiatives and programs are shorter-lived and less effective than they would be if they had adequate information, knowledge, and financial resources.[31] No ongoing mechanism is in place for managers to learn about the activities and impacts of other efforts around the country, and the world.[32] As a result, clusters in the U.S. are not nearly as well positioned competitively as they could be, to the detriment of the nation's economic strength and its capacity to sustain well-paying jobs.

Now, it bears asking: Why is the federal government largely absent from the work of bolstering industrial clusters? The answer is twofold.

First, the federal government has not historically viewed regional competitiveness as an important foundation for national economic well-being, instead concerning itself with the "macro" and the "micro." As Michael Porter notes:

> Economic policy, especially at the federal level, has traditionally focused on opposite poles. On one extreme, policymakers have sought to improve the general business environment that affects all firms. This occurs through policies such as macroeconomic stabilization, tax policies to encourage saving, investment and R&D, public investments in universities and physical infrastructure, and enforcement of antitrust regulations. On the other extreme, policies have sought to benefit the competitiveness of individual firms and individual workers. There are many such policies, including loan guarantees from the Small Business Administration and the Export Import Bank, technical assistance programs, training support for qualifying workers, procurement policies benefiting small businesses, and SBIR grants.[33]

Those federal programs that do support regional economic development are oriented almost entirely to lagging regions, ones with high unemployment or low per capita income or suffering an "economic shock" of some sort. Essentially, Washington lacks a "middle" or "meso-"strategy, one that seeks to strengthen all regional economies. At a time when economic leaders around the globe recognize that the importance of clusters and regional competitiveness to national economic well-being, this is a major gap.

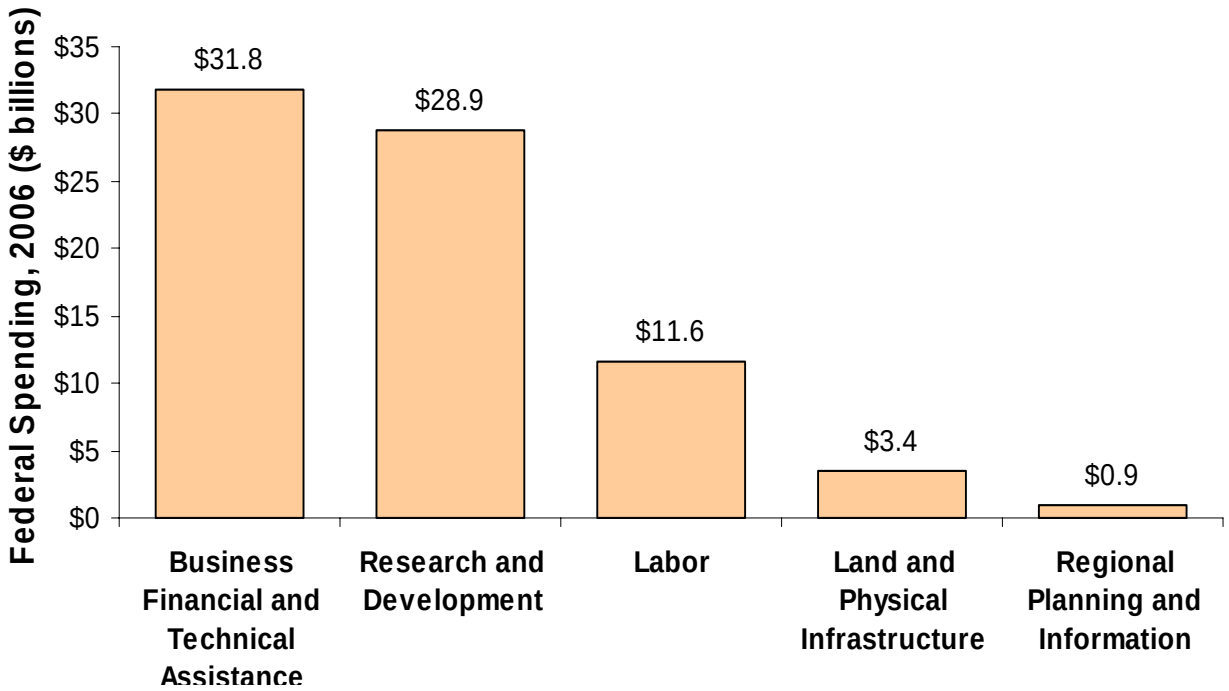
Second, whether for business, workforce, economic, or technology development, federal programs typically aim to provide the "right" level of economic inputs; by design,

they assume that markets will then take full advantage of their availability. So, for example, federal economic development grants largely are used for economic inputs such as physical infrastructure, worker training, and revolving loan funds. Historically, the federal government's innovation policy has focused on inputs such as basic and applied research funding at universities and federal laboratories, R&D tax credits, and the training of scientists and engineers. (See Figure A.) For example, the recent America COMPETES Act focuses largely on the human capital and research inputs into the innovation process, not the process itself.[34]

When world competitors were not at America's door, an input-based approach worked fairly well. Today, however, it leaves a policy gap when it comes to ensuring that all inputs, publicly and privately provided, are effectively used. Inputs of land, labor and capital are important, but how those inputs—federally funded and otherwise—are mixed matters most. There is no right input-based formula for economic development. Economic competitiveness is very much about stoking the fires of inter-organizational collaboration, within clusters and beyond. The key is to trigger the creative capacities of firms, entrepreneurs, chambers, universities, governments, and other organizations to find new and better ways to compete in the marketplace.

Whatever the theory behind federal efforts, at any rate, they have evolved in a wildly ad hoc, idiosyncratic, and uncoordinated fashion. As a result, federal government spent $76.7 billion in Fiscal Year 2006 across 14 different federal agencies and departments on 250 separate programs with activities useful to regional economic development. With 250 of them in play, a lack of coordination is understandable. And these programs were devoted almost entirely to the key "factor endowments."[35] Activities such as small business assistance, workforce training, and R&D usually fail to complement each other because they operate in their own agency silos (and report to different Congressional oversight committees). For example, when Economic Development Administration-funded districts organize regional strategic plans, they are often unrelated to the priorities of federally-funded workforce training centers operating in the same area. Compared to what is possible, the federal government's current approach of a multitude of fixed silos has high transaction costs, low synergy, and, ultimately, insufficient return on taxpayer investment.

**Figure A. Federal spending for regional economic development focuses on inputs, not collaboration**




*Note: Federal spending numbers include loan guarantees as well as direct spending*
*Source: Brookings analysis of data from the Catalogue of Federal Domestic Assistance*

Within the tangle of federal economic development programs, the WIRED program does indicate that the federal government is capable of a more effective approach to regional development in general and clusters development in particular. Created in 2005, WIRED catalyzes collaboration-driven development efforts across the nation, including a number of cluster initiatives. It has provided one-time grants ($15 million per award in the first round and $5 million in the subsequent two rounds) to 14 metropolitan areas and 25 larger regions through competitive processes that reward self-organized, market-driven initiatives; private sector leadership; fact-based strategies based on existing regional advantages; collaboration across public, private, and nonprofit actors; and leveraged resources from other programs.[36] Since the program's inception, WIRED regions have received over $106 million of additional federal funding in 50 separate awards from agencies such as Defense, Commerce, Energy, NSF and HUD. By its example, WIRED is serving to steer traditional regional economic

development towards a more collaborative model.[37] It offers both lessons and proof regarding a realistic, flexible, collaborative approach to regional economic development.

However, as noted earlier, it appears unlikely that WIRED will have additional funding rounds. Moreover, even if it continued to exist, with its broader focus and limited number of grant recipients, WIRED as currently structured would be an excellent complement to, but not substitute for, a federal cluster initiative program.

To its detriment, then, the U.S. is fairly alone among the developed nations in its passive stance towards regional competitiveness and cluster development. To correct the federal government's current flawed approach, this paper proposes that the government launch a national cluster development agenda. The next section outlines the principles of approach to such an effort and the section following lays out program recommendations.

## V. EXPERIENCE SUGGESTS AN APPROPRIATE FEDERAL ROLE IN CLUSTER DEVELOPMENT

The previous section makes clear that if the nation is to effectively promote cluster development and growth nationwide, the federal government must play a central role. In light of the nation's increasing vulnerabilities to global competition, the time for taking on this important role is now. The federal government should encourage cluster development all across the nation, using its scarce resources in the most cost-effective manner.

Optimally, the federal effort should be in a position to positively affect, at some level, every regional traded cluster in the U.S. Says Michael Porter: "A selective federal role in cluster-based policy will make Federal economic policy more effective, and encourage cluster-based approaches at the state and local level."[38] And economist Joseph Cortright notes, "Policymakers and practitioners can as readily work with large, well-established, and slow-growing clusters as with smaller, newer, and faster-growing clusters."[39]

In order to achieve the goal of effective cluster development nationwide, the federal government should adhere to the following principles, drawn from experience:

### *1. The federal government's approach should be flexible, "bottom-up," and collaboration-oriented, rather than prescriptive, "top-down," or input-focused*

The federal government should seek to increase the probability of success by creating the conditions in which market actors, private and public, can collaborate in new, productive ways and can make more informed decisions. Experience repeatedly has shown that outcomes cannot be guaranteed through providing some desired mixture of federally-funded economic inputs. While federal support for economic inputs remains appropriate, most important are the actions taken to utilize all factors of production in innovative and efficient ways. Consequently:

- The federal government should be *flexible* regarding the type of organizations with which it has relationships, including public-private partnerships, chambers of commerce, governments, quasi-public agencies, and universities. In addition, the government should be flexible regarding how these organizations utilize federal resources. The situation of every cluster, every cluster initiative, and every cluster initiative program is unique. Consequently, tools cannot be applied in a standardized fashion; cluster actors should be able to make use of the array of federal tools that best suits their needs [40]
- The government should facilitate cluster initiatives that have *strong industry leadership*. Firms form the essential foundation of clusters—the role of public

purpose organizations, be they non-profits or government, is to support and enhance the capacity of firms to compete. Industry is in the best position to know what it needs collectively to compete. Further, collaborative industry leadership of initiatives facilitates and promotes a culture of interfirm collaboration in realms such as marketing, research, and training

- The government *should not "pick winners,"* pre-determining those industries and clusters eligible or desirable for assistance. Rather, the government should seek to engage the passion, interests, and creativity of traded clusters throughout the country regardless of sector [41]
- At the same time, the government should only support cluster development *grounded in economic reality.* As Cortright notes: "Although government policy can play an important supporting role, it is abundantly clear that government can almost never create clusters where none exist. . . ." [42]

### *2. The government should have a diverse tool kit, including information, knowledge, and grants*

As indicated in the previous section, all three tools are valuable in the cluster development process. Information and knowledge are low-cost public goods (one person's use does not prevent another's); a rich information and knowledge base on clusters can be fruitfully utilized by cluster actors of all types across the U.S. Grants should be available to address market barriers that cannot be resolved by the other, less costly tools. A diverse tool kit will facilitate a flexible, "bottom-up" approach by cluster efforts in the field.

### *3. The federal effort should be funded at a level appropriate to the need*

To have a nationwide impact, the federal effort must be sufficiently funded to address the gap between the current impact of cluster initiatives and their potential to promote innovation and improved productivity. An ad hoc, targeted, or demonstration approach will not lead to the necessary and desirable results.

### *4. Federal grants should be provided to state and regional cluster initiative programs rather than to individual cluster initiatives*

The rationale for this approach is as follows.

- As suggested in the previous section, sub-national organizations, such as regional development partnerships and state governments, are in a much better position than the federal government to do the "retail" work of catalyzing individual cluster initiatives. They know the industries and the players, federal agencies do not; moreover, regional and state organizations can (and now do) act as part of clusters. Sub-national actors are better equipped to develop

programs custom-fit to local circumstances. The federal government cannot effectively oversee the implementation of individual cluster initiatives across the entire country; even if it could do this job well at the necessary scale, it likely would lose the "forest" for the "trees." The federal government's proper role is "wholesale"

- Regional and state organizations are in a much better position than the federal government to support and be engaged with cluster initiatives over the long term. They have the incentive (both political and economic) to do so. Cluster initiatives will benefit from having support capacity in place after federal funds are expended
- In varied, diverse, and creative ways, states and regions are active in economic development, pursuing strategies that fit, as they see it, their unique economic base. A federal cluster development effort should be complementary to, not be inconsistent with, these efforts. A meaningful intermediary role for states and regions in a federal cluster effort would enable the alignment of the work of the former with the latter
- States and regions are in a position to experiment with approaches to encouraging effective cluster initiatives; the federal role is to encourage that experimentation and to capture lessons learned so that all can advance

### *5. The federal effort should build the capacity of state and regional development organizations to be active, productive partners in the cluster development process*

While, as noted above, state and regional development organizations are quite active, they differ considerably in their capacity for working in an innovative, cooperative fashion—an essential quality for cluster development. For instance, in certain states, regional actors of the WIRED program find that state agencies are not as collaborative and knowledgeable as is desirable. A federal clusters program should provide incentives that encourage productive participation by state organizations in region-led cluster efforts and vice versa.

Sometimes state and regional development efforts may not be realistic or well-aligned with individual cluster activities. Since 2005, 34 states have committed close to a total of $9 billion in launching 77 new funds supporting technology-based economic development (TBED).[43] Typically, these funds provide resources for activities such as creating state/regional "tech councils," improving science and technology education, supporting sector-specific R&D, and upgrading 21st century infrastructure, such as broadband access. It is worth noting that the bulk of recently committed resources is dedicated to just two industries—life science and energy. While state TBED outcomes can be quite positive, the economic development field has a rich history of state "copycat" efforts, the collective pursuit of the next new thing in economic development

that, for some states, may not have a strong connection to economic reality. A benefit, then, of federal engagement of the states and regions in cluster development is to encourage more realistic economic development efforts and to reduce emphasis on politically attractive, but often less effective, approaches.

***6. Finally, and very importantly, a federal cluster development effort should link, leverage and align existing federal programs that support regional economic development***

While rationalization of the multi-headed, idiosyncratic federal economic development system lies outside the scope of this paper, a federal cluster program should aim to take advantage of the multitude of other applicable federal resources. As noted earlier, WIRED has demonstrated the feasibility of successfully encouraging collaboration-driven development efforts to leverage additional federal funding.

Such leveraging not only boosts the power of the original grant, it also serves to align—create synergy and complementarity among—the activities of various siloed federal programs. Since most of these programs are not specifically structured to support regional clusters or collaboration such alignment reorients their use towards the principles espoused here. Further, it should be noted, there is a small number of federal efforts that support cluster development and collaboration in one specific realm (e.g., training, public works, R&D, business technical assistance); these would be particularly ripe for leveraging. (See Appendix D for list.)

In sum, the realities of economic development, misfit between those realities and existing programs, and emerging on-the-ground successes all suggest the outlines of a lean, smart, and potentially transformative federal intervention to stimulate cluster activity nationwide. The following section proposes such an intervention.

## VI. THE FEDERAL GOVERNMENT SHOULD CREATE A NATIONWIDE PROGRAM TO SPUR REGIONAL DEVELOPMENT

In light of the central importance of clusters to regional and national economic competitiveness, the value of cluster initiatives, and the flaws in current federal approaches to economic development, the need for a new, innovative, effective federal effort is clear. Moreover, there are no limits on the possible economic benefits that might emerge from a well-designed federal effort to stimulate collaborative activities of private and public actors at every level of geography.

And so, to facilitate cluster development and to spawn a nationwide system of effective cluster initiatives, the federal government should structure a nationwide clusters program around two sets of tools. Needed in this respect will be:

- *Information* regarding the geography of clusters and markets and the nature of cluster initiatives and cluster initiative programs, as well as *knowledge* regarding cluster dynamics and effective practices in cluster development
- *Grants* for the development, operation, and activities of regional and state cluster initiative programs. Smaller grants would be available for program feasibility studies and startup. Through a competitive process, larger grants would be available to fund project-specific collaborative activities of state or regional cluster initiative programs

Along these lines, the federal government should:

### *1. Create an information center to track cluster activity and support effective cluster efforts*

Modeled on the European Cluster Observatory, the Cluster Information Center (CLIC) would promote the development and dissemination of cluster-related information and knowledge in several ways. First, it would provide a constantly updated, data-rich picture of the geography of cluster activity across the U.S. and the world. Such a picture would inform:

- cluster initiative vision and strategy
- cluster initiative program choices for investment and focus
- economic and workforce development agency determination of strategically appropriate investments
- federal program agency understanding of how best to direct scarce financial resources
- federal economic policymaker understanding of the geography of U.S. competitiveness

- business decision-making regarding site location, R&D investment, and workforce development

This information effort would aim to provide:

- breadth—a geographically-specific picture of the array of clusters in each key industry, with data on size, specialization, and competitiveness
- depth—for each cluster, detailed data such as regional domestic product contribution, total jobs and earnings by key occupations, establishment size, nature of specialization, patents, federal R&D spending, citation patterns, and trade
- flow—estimates of supply-chain product and service flows within and between clusters

CLIC data and indicators would be available as time series to the extent that data sources allow. Initially, the database would be constructed from existing federal data sets available from the Census Bureau, the Bureau of Economic Analysis, the Bureau of Labor Statistics, the International Trade Administration, the Statistics of Income program of the Internal Revenue Service, the Office of Patent Resource Administration in the U.S. Patent and Trademark Office, the National Science Foundation, and the proposed NIF. As appropriate, it also would utilize private databases, such as those on scientific citations. In the development of the database, identified gaps would inform Congressional and Office of Management and Budget (OMB) direction concerning federal statistical policy, so that the gaps could be filled.

Second, CLIC would maintain a publicly available registry of cluster initiatives and programs. Cluster initiatives would provide essential details of their efforts, such as mission, organizational structure, membership, activities, funding, and perceived impacts. [44] Cluster initiative programs would provide information regarding scope, approach, and initiatives supported. To register, initiatives and programs would need to meet certain criteria.[45]

Cluster initiatives and programs would be given incentive to register in order to gain priority for certain federal programs and funding. (Incentive would be provided through cooperative arrangements with other programs and/or through legislation.) The registry would be openly accessible and so would allow economic development organizations, industry associations, and cluster initiatives themselves to identify and explore promising approaches and models. It also would allow policymakers, for the first time, to see the breadth and nature of cluster initiative activity across the U.S.

Third, CLIC would support research and knowledge dissemination on cluster dynamics and cluster initiative and initiative program impacts and best practices in the U.S. and abroad. It would seek to understand cluster types, trajectories, and success factors in various circumstances. It would develop technical assistance guides for regional cluster analysis and cluster initiative and initiative program development and operations. It would host in-person conferences, teleconferences, and webcasts bringing together initiative and program managers, experts, and scholars. It could catalyze the creation of a national association of cluster initiatives. Through newsletters, a web site, and other means, it would communicate new developments in cluster analysis, initiatives, and programs.

The host agency would have the option of contracting out the operation of the information center with an external organization such as a university, other nonprofit research entity, other federal agency, or private firm. Annual operating expenses for the information center are estimated to be about $10 million.

### *2. Establish a grants fund to support cluster initiative programs nationwide*

The CLUSTER (Competitive Leadership for the United States Through its Economic Regions) fund would provide several types of grants to support the development of an effective network of cluster initiative programs. Eligible grantees would include public purpose organizations representing economic regions, states, and multiple states. Awardees would agree to support cluster initiatives operated in a manner consistent with key experience-based success factors. Specifically, the initiatives should:

- be industry-led
- be inclusive—seeking any and all organizations that might find benefit from participation, including startups, firms not locally-owned, and firms rival to existing members
- encourage broad participation by and collaboration among all types of participants
- involve key state and local government actors

First, the CLUSTER fund would provide grants for state and regional cluster initiative program feasibility studies, planning, and operations. Program feasibility study and planning grants would be up to $250,000, one-time only, no matching funds required.[46] Annual grants of up to $1 million would be made to new and early-stage cluster initiative programs to support cluster initiative planning studies, technical assistance, and start-up and operating activities. For new programs, matching funds on a 1:1 basis would be required; grants would be available to existing programs with demonstrated effectiveness at a higher level of match. Initiatives supported by each program must participate in the CLIC registry and research activities. All applicants that

meet minimum requirements would be funded. To expedite matters, the application process would be on a rolling basis.

The second, more substantial, grant effort would provide state and regional cluster initiative programs with funds to support well-defined collaborative activities of individual cluster initiatives. Matching grants of between $1 million and $15 million would be awarded on a competitive basis to support cluster-specific collaborative efforts in, for example, training, R&D, technology adoption, marketing, business and workforce attraction, and other realms. To encourage linkage and leverage with, and improved alignment of, existing federal, state, and local resources, a 1:1 match would be required. Grants would be awarded on the basis of a number of criteria, including:

- the probable impact of the proposed effort on the competitiveness of the area's traded sector
- fit within a broader achievable economic development strategy
- sponsoring organization capacity and commitment
- the degree of support and involvement from relevant state and regional economic and workforce development organizations, other public purpose institutions (such as universities, community colleges, workforce boards), and the private sector, including industry associations
- expected ability to access additional funds from local, state, and federal sources
- capacity to sustain activities once CLUSTER funds are expended

Regional diversity across the U.S. would be sought. Grantees could seek additional funds to support new collaborative activities of individual cluster initiatives.

Funding for the CLUSTER program would be $350 million annually. At the same time, the CLUSTER effort is designed to draw in other existing federal resources. One role of CLUSTER staff would be to facilitate grantee access to other relevant sources of federal funding.

With total annual funding of $360 million, the proposed two-pronged federal clusters agenda would enable a thicker, more robust network of effective cluster initiatives around the nation and, as a result, stronger regional clusters and improved U.S. capacity to be competitive and provide well-paying jobs.

Two possibilities are suggested for the placement of this new program. The preferred home is the proposed National Innovation Foundation described in the companion *Blueprint* paper. NIF's design purposely provides a place for the elements of the proposed cluster program. If NIF is not created, the preference among existing

agencies is the Economic Development Administration (EDA) in the Department of Commerce. EDA supports cluster efforts through its existing grants program and for some time has been seeking to transform its traditional approach to economic development to a more open, flexible one that makes use of a variety of tools.

## VII. CONCLUSION

The nation's capability for generating and sustaining stable, sufficiently well-paying jobs for a large number of U.S. workers is increasingly at risk. Across numerous industries, U.S.-based operations have not been fully effective in responding to competitive challenges from abroad. Many struggle to develop and adopt the technological and institutional innovations that sustain economic activity and high-skill, high value-added jobs. As a result, too many workers are losing decent jobs without prospect of regaining them and too many regions are struggling economically.

Against this backdrop, regional industry clusters—which can spur innovation and with it productivity—represent an essential source of increased regional and national competitiveness. For this reason, the public sector around the world has launched numerous programs to catalyze growth-producing collaboration in key industries.

In contrast to the situation in other nations, the U.S. lacks a sufficiently scaled federal effort to promote cluster development. Federal understanding of and interest in the economic competitiveness of all regions has been minimal; existing development programs rarely reflect an appreciation of the importance of institutional collaboration and the unique dynamics of clusters.

Given the nation's increasing vulnerabilities to global competition, now is the time for the federal government to take on a central role in promoting cluster development and growth. Implementation of the proposed CLIC and CLUSTER efforts would promote a stronger nationwide array of clusters with relatively few dollars. CLIC would allow cluster participants to understand market realities and benefit from the experience of innovative, effective cluster efforts. CLUSTER grants would lead to the creation of a network of industry-led cluster initiatives across the nation. These relatively modest investments will have substantial multiplier effects to the extent they link, leverage and align $77 billion in existing federal programs around regional clusters. They will act as catalysts in attracting non-federal resources as well.

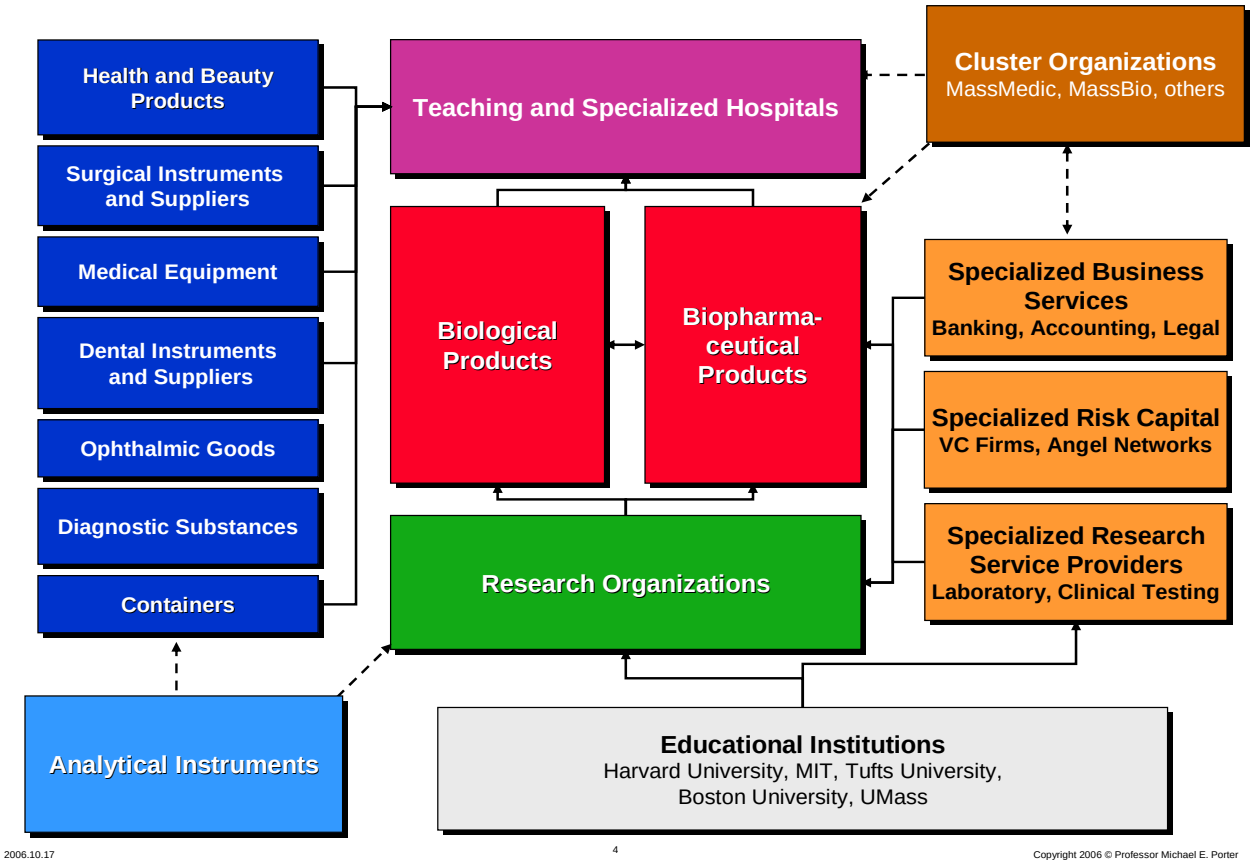
Regions and states are actively exploring clusters as a valuable means for improved economic performance. A strategically designed, adequately funded federal clusters program would provide the information and financial resources that public and private actors at the state and local level need to sustain clusters that achieve their potential to compete, provide well-paying jobs, and enhance economic performance of their regions and the nation.

## APPENDIX A. Varieties of Industry Clusters

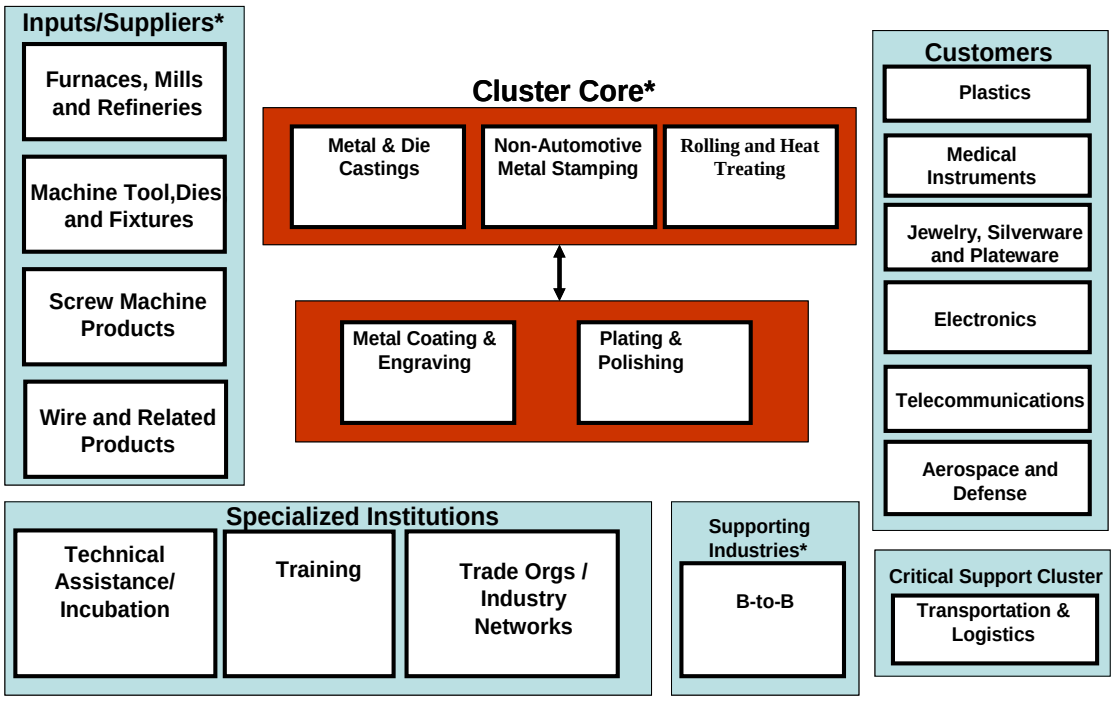
Clusters can be organized around traded goods or services anywhere along the supply chain, from final goods and services (Wall Street in New York City and skiing in Colorado) to intermediate goods (steel minimills around Chicago) to distribution services (Louisville and Memphis) to research and development (the universities around Boston).[47] They can be built around many small firms (such as New York City's fashion cluster), a moderate number of mid-sized organizations (Boston's research hospitals), a handful of very large firms (Detroit's auto industry), one anchor institution (Corning in Elmira, New York, the Mayo Clinic in Rochester, Minnesota), and an eclectic combination of firm sizes (Houston's oil and gas industry). They can be large and dense (San Francisco's biotech industry) or smaller and thinner (biotech in Austin, Texas). Clusters can develop for any number of reasons, such as proximity to natural resources (Gulf Coast fishing), spin-outs from a key institution (Massachusetts Institute of Technology), ethnic concentrations (Jewish diamond merchants coming from Europe to Manhattan), intention (the State of Texas attracting the Microelectronics and Computer Technology Corporation to Austin), political decisions (George Washington selecting the site for the nation's capital at the nation's midpoint), and serendipity (Bill Gates being from Seattle).

As can be seen from the examples in the following charts, clusters come in a variety of configurations while retaining a certain amount of commonality.

# The Massachusetts Life Sciences Cluster

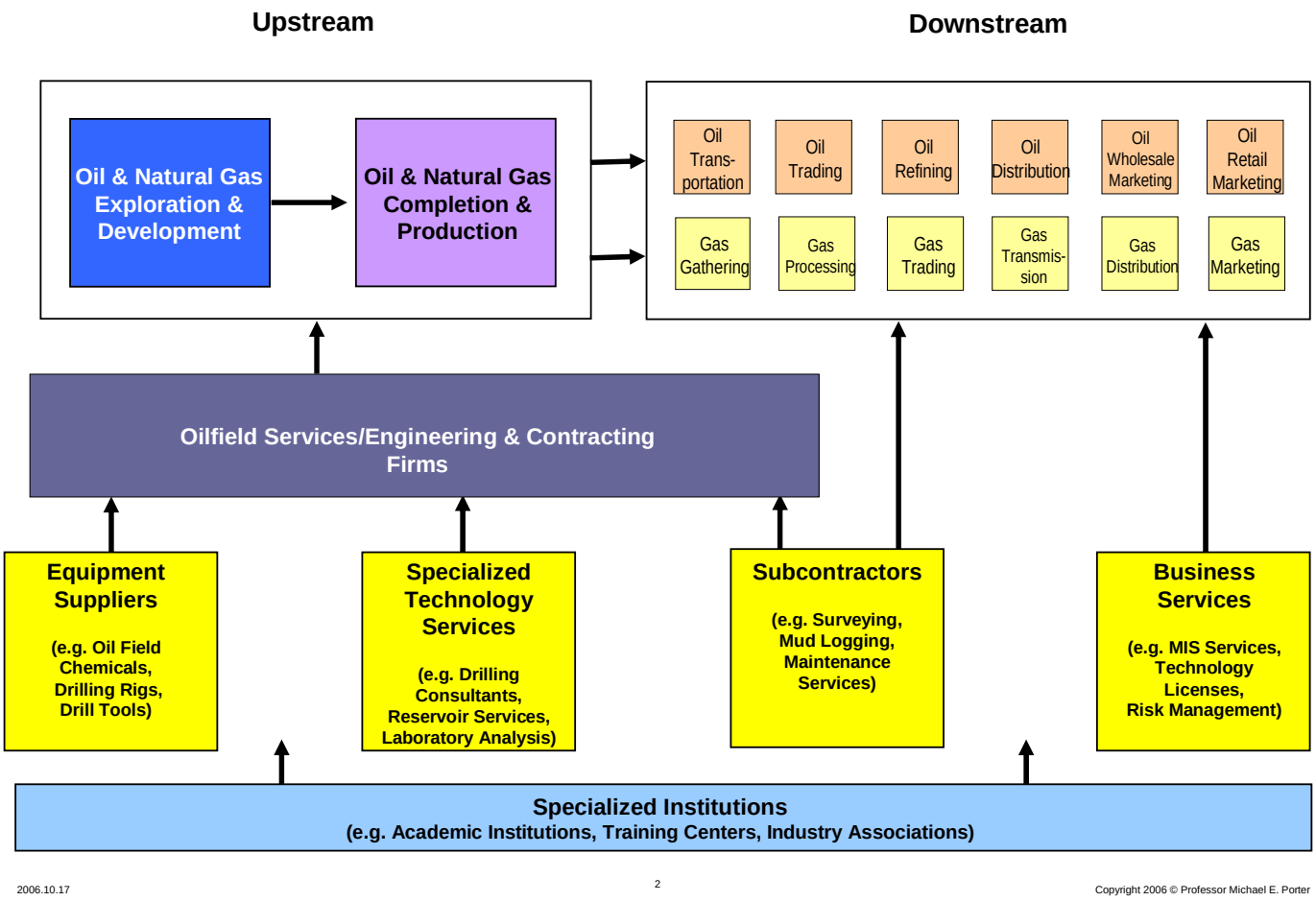


# Providence RI Metal Manufacturing Cluster




(*) The company lists for each industry are not exhaustive.

# The Houston Oil and Gas Cluster




*Sources: Michael E. Porter, Institute for Strategy and Competitiveness, Harvard Business School (forMassachusetts, Houston); Initiative for a Competitive Inner City (Providence)*

## APPENDIX B.
## Michael Porter on the Role of Public Policy in Cluster Development

Clusters emerge spontaneously, and the process of cluster formation will occur naturally as new firms form, suppliers develop, infrastructure investments respond to needs, and established firms locate operations in growing cluster concentrations. Given these spontaneous economic processes responding to market signals, should clusters just be left alone to develop naturally?

Since clusters involve powerful externalities across firms in a location, and associated public goods, there is a strong rationale for public policy. Market failure in the presence of positive externalities will lead to underinvestment in specialized skills, scientific knowledge, and specialized infrastructure that benefits the entire cluster and increase competition by lowering the barriers to entry of new firms. Public policy that provides structure and incentives to capture external economies will improve productivity and enhance growth.

Public policy at the cluster level begins with identifying clusters, providing information of cluster membership and performance, and convening cluster participants if private sector institutions have not arisen to do so. Government agencies should be active participants in dialogs with cluster participants to understand constraints to productivity and identify weaknesses in public policy that need to be addressed. There is also a strong rationale for public investments in assets that benefit many cluster participants, and incentives to spur collective investment by cluster participants in such assets.

Public policy at the cluster level, in contrast to the industry or firm level, avoids the inefficiencies, moral hazard, potential distortions, and dubious rationale of many narrowly targeted policies such as loan guarantees or single industry technical assistance programs. The case for a public role in training, for example, is much stronger at the cluster level than at the industry or firm level because training investments will benefit numerous firms with little risk of distorting competition. (There is a rationale for public investment in training even at the firm level because trained workers may leave an individual firm but benefit the economy as a whole. Here, firms will underinvest in training from society's viewpoint.)

Cluster-based policies, unlike sectoral or industrial policies, are *neutral* with regard to industry or type of economic activity. In cluster theory, all clusters are good. Enhancing cluster externalities and spillovers will increase productivity and prosperity in *any* cluster. Hence government should not choose among clusters but create policies that support upgrading in every cluster. Cluster policy is thus fundamentally different from sectoral or industrial policy, the fatal flaw of which is a tendency to favor particular types of economic activity, pick winners, and tilt the playing field in favor of a particular country or region.

*Source: Michael E. Porter, "Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition," White Paper (Institute for Strategy and Competitiveness, Harvard Business School, 2007*

## APPENDIX C.
## Instruments Promoting Regional Specialization and Clusters

| Goal | Instruments |
|---|---|
| ***Engage actors*** | |
| Identify clusters | • Conduct mapping studies of clusters (quantitative and qualitative)<br>• Use facilitators and other brokers to identify firms that could work together |
| Support networks/ clusters | • Host awareness raising events (conferences, cluster education)<br>• Offer financial incentives for firm networking organisations<br>• Sponsor firm networking activities<br>• Benchmark performance<br>• Map cluster relationships |
| ***Collective services and business linkages*** | |
| Improve capacity, scale and skills of suppliers (mainly SMEs) | • SME business development support<br>• Brokering services and platforms between suppliers and purchasers<br>• Compile general market intelligence<br>• Co-ordinate purchasing<br>• Establish technical standards |
| Increase external linkages (FDI and exports) | • Labels and marketing of clusters and regions<br>• Assistance to inward investors in the cluster<br>• Market information for international purposes<br>• Partner searches<br>• Supply chain linkage support<br>• Export networks |
| Skilled labour force in strategic industries | • Collect and disseminate labour market information<br>• Specialised vocational and university training<br>• Support partnerships between groups of firms and educational institutions<br>• Education opportunities to attract promising students to region |
| ***Collaborative R&D and commercialisation*** | |
| Increase links between research and firm needs | • Support joint projects among firms, universities and research institutions<br>• Co-locate different actors to facilitate interaction (*i.e.*, science parks, incubators)<br>• University outreach programmes<br>• Technical observatories |
| Commercialisation of research | • Ensure appropriate intellectual property framework laws<br>• Overcome barriers to public sector incentives in commercialisation<br>• Technology transfer support services |
| Access to finance for spinoffs | • Advisory services for non-ordinary financial operations<br>• Public guarantee programmes and venture capital<br>• Framework conditions supporting private venture capital |

*Source: Organization for Economic Co-operation and Development,* Competitive Regional Clusters: National Policy Approaches*, (OECD Reviews of Regional Innovation, 2007)*

## APPENDIX D.
## Current Federal Programs Supporting Collaboration and Clusters

| Department/Agency | Program | Focus | Support for Collaboration or Clusters | FY2006 Program Budget ($ Millions) |
|---|---|---|---|---|
| **Department of Labor** | | | | |
| *Employment and Training Administration* | Community-based Job Training Grants | Labor | Competitive grant to drive collaboration between community colleges and private sector | $125 |
| | WIRED - Workforce Innovation in Regional Economic Development | Labor | Competitive grant to drive collaboration between workforce and private sector and leverage additional federal funding for regional clusters | $80 |
| **Department of Commerce** | | | | |
| *Economic Development Administration* | Economic Adjustment Assistance | Strategic Planning | Cluster-oriented economic development | $44 |
| | Grants for Public Works and Economic Development | Land/ Infrastructure | Cluster-oriented economic development | $158 |
| *National Institute of Standards and Technology* | Manufacturing Extension Partnership | Capital/ Technical Assistance | Government engagement driven by private sector | $106 |
| **National Science Foundation** | | | | |
| | Advanced Technology Education | Research & Development | Collaboration between technical colleges and private sector | $36 |
| | Partnerships for Innovation Grant Program | Research & Development | Competitive grant to drive collaboration between academia, government, and private sector | $9 |
| | Industry / University Cooperative Research Center Program | Research & Development | Research and development collaboration between academia, industry, and government on fundamental research | $7 |
| | | ***Total Spending*** | | $565 |

*Source: Authors' analysis of Catalog of Federal Domestic Assistance, 2006*

## NOTES

[1] Örjan Solvell, Göran Lindqvist, and Christian Ketels, "The Cluster Initiative Greenbook" (Stockholm: The Competitiveness Institute, 2003).

[2] Robert Atkinson and Howard Wial, "Boosting Productivity, Innovation, and Growth through a National Innovation Foundation" (Washington: Brookings Institution, 2008).

[3] In the companion Blueprint paper, Atkinson and Wial discuss the relationship between innovation and economic performance in greater depth.

[4] This definition and subsequent listing of cluster participants adapted from Michael E. Porter, "Clusters and the New Economics of Competition," *Harvard Business Review*, November-December 1998, pp. 77–90.

[5] For an integrated review of the extensive literature on clusters, see Joseph Cortright, "Making Sense of Clusters: Regional Competitiveness and Economic Development" (Washington: Brookings Institution, 2006).

[6] Pontus Braunerhjelm and Maryann Feldman, eds., *Cluster Genesis: Technology-Based Industrial Development* (Oxford: Oxford University Press, 2006).

[7] Michael E. Porter, "The Economic Performance of Regions," *Regional Studies* 37 (6-7) (2003): 549–578; Maryann Feldman, "The New Economics of Innovation, Spillovers and Agglomeration: A Review of Empirical Studies," *Economics of Innovation and New Technology* 8 (1999): 5–25.

[8]Annalee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128 (*Cambridge: Harvard University Press, 1994); S.S. Rosenthal and W.C. Strange, "The Geography of Entrepreneurship in the New York Metropolitan Area," *Federal Reserve Bank of New York Economic Policy Review* 11 (2005): 29–53; Elaine Romanelli and Maryann Feldman, "Anatomy of Cluster Development: Emergence and Convergence in the US Human Biotherapeutics, 1976-2003," in Braunerhjelm and Feldman, eds., *Cluster Genesis: Technology-Based Industrial Development.*

[9] Christian Ketels, Göran Lindqvist, Sergiy Protsiv, and Örjan Sölvell, "EU Vs US: A Comparative Analysis of Geographical Concentration Patterns of Employment Across Cluster Categories" (CSC Working Paper, Stockholm School of Economics, 2008).

[10] Robert Gibbs and G. Andrew Bernat, Jr. "Rural Industry Clusters Raise Local Earnings," *Rural Development Perspectives*, 12 (3) (1997): 18–25; William C. Wheaton and Mark J. Lewis, "Urban Wages and Labor Market Agglomeration," *Journal of Urban Economics* 51 (3) (2002): 542–562.

[11] Porter, "The Economic Performance of Regions" and Mercedes Delgado, Michael E. Porter, and Scott Stern, "Convergence, Clusters, and Economic Performance," draft, July 20, 2007.

[12] Ecotec Research and Consulting, "A Practical Guide to Cluster Development" (U.K. Department of Trade and Industry, 2004).

[13] David Audretsch and Maryann Feldman, "R&D Spillovers and the Geography of Innovation and Production," *The American Economic Review* 86 (3) (1996): 630–640; David B. Audretsch and Paula E. Stephan, "Company-Scientist Locational Links: The Case of Biotechnology," *The American Economic Review*, 86 (3) (1996): 641–652.

[14] Joseph Cortright and Heike Mayer, "Signs of Life: The Growth of Biotechnology Centers in the U.S." (Washington: Brookings Institution, 2002).

[15] Metro areas with a million or more jobs had a median rate of 71 patents per 100,000 jobs in 1999, compared to a median rate of 28 patents per 100,000 jobs for smaller metros (under 1 million jobs). Interestingly, the patent rate for smaller metros is about that of rural areas (26). Andrew Reamer, "Technology Transfer and Commercialization: Their Role in Economic Development," (Boston: Andrew Reamer & Associates, 2003). A similar finding is in Delgado, Porter, and Stern, "Convergence, Clusters, and Economic Performance."

[16] Paul Sommers and Daniel Carlson, "What the IT Revolution Means for Regional Economic Development" (Washington: Brookings Institution, 2003).

[17] See, for instance, this *Wikipedia* entry originated by New Economy Strategies: http://en.wikipedia.org/wiki/Hubs_and_Nodes.

[18] Steve Hamm, "Big Blue Goes for the Big Win," *Business Week*, March 10, 2008, pp. 63–65; Larry Huston and Mabil Sakkab, "Connect and Develop: Inside Proctor & Gamble's New Model for Innovation," *Harvard Business Review*, March 2006, pp. 58–66.

[19] Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128.*

[20] Solvell, Lindqvist, and Ketels, "The Cluster Initiative Greenbook."

[21] In the realms of economic and workforce development in the U.S., the model of cluster-focused collaboration-stimulating efforts has a number of complements. In economic development, regional targeted industry strategies have been carried out since the early 1980s. In workforce development, "sector initiatives" are industry-specific workforce development approaches that seek to benefit low-income individuals. (The National Network of Sector Partners has been active since the 1990s, see http://www.insightcced.org/.) Most every region has one or more collaborative business development organizations (e.g., chamber of commerce) that include firms in unrelated markets. A cluster initiative can be distinguished from these other efforts by being focused on a range of collaborative activities in one cluster.

[22] Solvell, Lindqvist, and Ketels, "The Cluster Initiative Greenbook."

[23] Michael E. Porter, Monitor Group, ontheFRONTIER, and Council on Competitiveness, "Clusters of Innovation: Regional Foundations of U.S. Competitiveness" (Washington: Council on Competitiveness, 2001).

[24] Ifor Ffowcs-Williams, "On Nurturing Competitiveness #3," Cluster Navigators, April 1, 2008 (e-mail newsletter).

[25] Center for Strategy and Competitiveness, "The European Cluster Memorandum" (Stockholm School of Economics, 2007).

[26] Organisation for Economic Co-operation and Development, *Competitive Regional Clusters: National Policy Approaches* (Paris: 2007).

[27] Cortright notes the need for such research in "Making Sense of Clusters: Regional Competitiveness and Economic Development."

[28] For more information on the European Cluster Observatory, see www.clusterobservatory.eu.

[29] "European Cluster Alliance," available at http://www.proinno-europe.eu/index.cfm?fuseaction=page.display&topicID=223&parentID=50.

[30] According to several economic and workforce development experts, while a large number of states do support collaborative targeted industry activities in one specific domain, usually workforce or innovation, most do not support integrated efforts that cut across the multiple realms covered by cluster initiatives. And some states have "cluster initiatives" that are competitive workforce development grants programs and do not appear to be particularly collaborative in nature. Further, a review of the Web suggests that while a large number of states conducted cluster studies in the last decade, relatively few created cluster initiative programs on the basis of these studies.

[31] In phone interviews, one state program manager notes, "We're still learning about what works and why. As a result, we don't quite know what we're doing." Another says, "We've had a grant program for several years. We had no idea until recently that some other states use cluster coordinators."

[32] The National Governors Association Center for Best Practices is holding a yearlong policy academy for seven states entitled "State Strategies for Promoting Innovative Clusters and Regional Economies."

[33] Michael E. Porter, "Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition," White Paper (Institute for Strategy and Competitiveness, Harvard Business School, 2007).

[34] For more information about market failures in the innovation process, see Atkinson and Wial, "Boosting Productivity, Innovation, and Growth through a National Innovation Foundation."

[35] The full list of federal programs that can support economic development is available on the Brookings Metropolitan Policy Program website (blueprintprosperity.org). This analysis differs from other analyses, particularly by Mark Drabenstott, in that it does not include "broad-based" development programs such as transportation, housing, or K-12 education, which we consider foundational investments. Of the remaining programs listed in the Catalogue, we include $76.7 billion out of the total $664 billion (2005) of grants, direct loans and guaranteed or insured loans. Research and development does not include $37 billion that the federal government spends on defense research contracts with private companies. Mark Drabenstott, "Rethinking Federal Policy for Regional Economic Development," *Federal Reserve Bank of Kansas City - Economic Review* (1) (2006): 115-142.

[36] For more information on the WIRED program, visit the Department of Labor website: www.doleta.gov/WIRED/.

[37] See, for example, WIRED Nation http://wired-nation.net/wiki.

[38] Porter, "Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition."

[39] Cortright, "Making Sense of Clusters: Regional Competitiveness and Economic Development."

[40] *Ibid.*

[41] Organization for Economic Co-operation and Development, *Competitive Regional Clusters: National Policy Approaches* and Porter, "Clusters and Economic Policy: Aligning Public Policy with the New Economics of Competition." Writes Michael E. Porter:

> Cluster-based policies, unlike sectoral or industrial policies, are neutral with regard to industry or type of economic activity. In cluster theory, all clusters are good. Enhancing cluster externalities and spillovers will increase productivity and prosperity in any cluster. Hence government should not choose among clusters but create policies that support upgrading in every cluster. Cluster policy is thus fundamentally different from sectoral or industrial policy, whose fatal flaw is their focus on favoring particular types of economic activity, picking winners, and attempting to tilt the playing field in favor of a particular country or region.

[42] *Ibid.*

[43] Data was obtained from the SSTI website www.stti.org and funding was confirmed with internet research of state websites.

[44] The Oregon Cluster Network provides a model of how cluster registration could be solicited and facilitated through a well-organized website. For more information see www.oregonclusters.org/index.html.

[45] For example, to register, a cluster initiative might need to demonstrate that it is: an industry-led effort with at least five member firms; has a lead organizing entity; involves at three cluster support organizations such workforce boards, community colleges, universities, and industry associations; and has a strategy to enhance the competitive position of the cluster.

[46] Other federal economic and workforce development agencies have provided such low-cost grants to good effect. See, for instance, the Employment and Training Administration's Regional Innovation Grant Program and EDA's Planning Grant Program.

[47] An inventory of the nation's clusters is maintained by the Cluster Mapping Project at the Institute for Strategy and Competitiveness at the Harvard Business School, see https://secure.hbs.edu/isc/login/login.do?http://data.isc.hbs.edu/isc/index.jsp.

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