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U.S. Competitiveness Project

## **ENRICHING THE ECOSYSTEM: FORGING THE MISSING LINKS BETWEEN INNOVATION, ENTERPRISES, AND JOBS**

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**I**nnovation, the classic basis for U.S. success in world markets, rests on foundational institutions which provide fertile soil in which to seed, grow, and renew enterprises. Each is more likely to contribute to shared prosperity when it is networked, i.e., when there are smooth pathways between institutions for the flow of intellectual, financial, and human capital in each phase of enterprise creation, growth, or renewal. Each is less effective as an economic agent if operating in isolation. An important opportunity for U.S. competitiveness lies in strengthening the connections that contribute to a thriving economy.

For historical reasons, American institutions have tended to operate in silos, looking inward to maximize their own performance rather than outward to find benefits in collaborations that could lift all. Multiple levels of political jurisdictions are often fragmented and do not correspond to the scope of economic activity. Educational institutions operating in close proximity that serve different age groups are often unconnected to one another as well as to the surrounding business environment that is seeking a skilled work force.

Innovative models for enhanced linkages and collaborations can enrich the business ecosystem so that more ideas can surface, more job-creating enterprises can be developed, more companies can find skills and innovation, and more enterprises can increase their capabilities to grow and compete in global markets. Related investments in human capital can spread prosperity more widely, helping reverse America's decline in social mobility and produce more inclusive prosperity.

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Facilitating competitiveness-related linkages across silos can increase economic growth while reinventing institutions. Four kinds of linkages are essential:

- linkages that generate ideas and turn them into market-ready enterprises;
- linkages between small enterprises and large companies;
- linkages between education and jobs;
- cross-sector linkages among leaders to develop ecosystem strategies.

I will examine each domain, highlight promising model examples, and conclude with an agenda for leaders.

## LINKING KNOWLEDGE CREATION TO ENTERPRISE CREATION

**Goal 1: Strengthen linkages that accelerate the conversion of ideas into market-ready enterprises. Widen and speed the innovation-to-market pipeline through improved connections among knowledge centers, entrepreneurs, and support systems.**

Innovation and entrepreneurship have long contributed to U.S. leadership in the world economy. Yet, there are signs of jeopardy. Although small companies, especially startups, have historically created a disproportionate share of new jobs, small and mid-sized enterprises (SMEs) have lagged larger companies as job creators in recent years. The chances of a new business surviving after five years have decreased from 50% of those launched in 1995 to 47% of those launched in 2005, according to Bureau of Labor Statistics data analyzed by the Kauffman Foundation.

Furthermore, on 16 indicators of innovation strength used by the Information Technology and Innovation Foundation, including human capital, innovation capacity, entrepreneurship, IT infrastructure, economic policy, and economic performance, the U.S. was second to last in progress from 1999-2011 compared to the OECD and other benchmark countries in innovation progress, up from last in the period 1999-2009; South Korea, Japan, Australia, and Canada showed faster progress, according to a July 2011 ITIF report.<sup>1</sup> Germany was investing 20 times more than the U.S. in government programs to support industrially relevant R&D as a share of GDP.<sup>2</sup>

Within the U.S., however, there is wide variation. Nine U.S. states would lead the world in innovation if they were countries, ITIF analysis shows. Massachusetts would be the most innovative economy in the world. Massachusetts's success draws from a concentration of universities and research laboratories in an enabling context that moves raw ideas into viable ventures. But Silicon Valley out-performed Massachusetts's high-tech corridor during certain periods because of a more open, networked environment compared to Route 128's inwardly-focused, more isolated companies.

The ideas-to-markets chain starts with centers of knowledge creation. R&D increasingly depends on collaboration between firms and universities. But the interests of the parties are not always well-aligned. University technology transfer offices, which have been growing in number over the past 30 years, are often more interested in maximizing their own revenue rather than maximizing venture formation, as Richard Hamermesh, Joshua Lerner, and others have shown.<sup>3</sup> Critics point to unfulfilled potential. A 2009 survey by the Association of University Technology Managers found

that a sample of 181 universities and hospital research labs received \$53.5 billion in sponsored research funding, most of it from federal grants, but had generated only \$2.3 billion in licensing revenue from past investments, about half in life science fields.<sup>4</sup>

MIT and Stanford are notable exceptions, maintaining basic research excellence while giving rise to many dozens of new companies per year. The National Science Foundation hopes to build on their models in its new I-Corps (Innovation Corps) partnership with MIT's Deshpande Center and the Kauffman Foundation to teach entrepreneurship to scientists, connect them with industry mentors, and provide up to \$50,000 in seed funding.<sup>5</sup> Strong industry ties and networks linking faculty, entrepreneurs, and VCs are among the features that translate a strong research base into enterprises, but this focus is more likely at the regional than national level.

Regional Centers of Excellence are concentrated collaborative efforts to develop technologies of the future. When promoting linkages back to basic science and forward to potential ventures, Centers of Excellence can strengthen the entire business ecosystem and attract new investment.

Consider the Albany chips example. In 2004, the State University of New York at Albany (SUNY Albany) created a College of Nanoscale Science and Engineering<sup>6</sup>, the first in the world with this specialty, which is essential to semiconductors that support IT. At the accompanying Center of Excellence in nanomaterials and nanoelectronics, engineers from some of the center's 250 corporate partners work alongside students and faculty for prototyping and demonstration, while SUNY Albany's business school facilitates spinoff ventures. In September 2011, leading semiconductor manufacturers, including IBM, Intel, Samsung, Taiwan Semiconductor, and AMD formed the Global 450 Consortium and committed \$4.4 billion (\$3.6 billion of this from IBM) to develop advanced chip technologies in the Albany center. Spillover effects include new Intel East Coast headquarters and AMD Globalfoundries facilities in the area.

Rather than languishing in the ivory tower hidden from public view, research is increasingly viewed as a public asset, and some officials are making linkages more explicit. The New Mexico Supercomputer Center<sup>7</sup>, located at the Intel Energy Research Center<sup>8</sup>, recently expanded public use from 8 to 20 remote gateways with teleconferencing facilities at state universities and community colleges. A Massachusetts life sciences center<sup>9</sup> to promote development of the industry is a signature initiative by the Governor. In Holyoke Massachusetts, a new Green High-Performance Computing Center<sup>10</sup>, a partnership of five private and public universities, EMC, and Cisco, occupies the site of a former manufacturing facility and is expected to anchor an innovation district that will attract other businesses. Just \$25 million of the \$168 million in costs came from the state.

Research consortia are difficult to manage. The interests of collaborators can diverge; and there are controversial questions about IP ownership or distortion of a research agenda, which matters to universities. Still, more open networks can help ensure that no idea is left behind. Collective resources and focus can facilitate breakthroughs.

There is always a tension between the search for a big breakthrough and the numerous small initiatives that ensure incremental innovation.<sup>11</sup> But a few big bets can take a long time to pay off, and blockbusters can emerge from unexpected places out of the sheer volume of innovating entities.<sup>12</sup> As a classic study of industrial innovation has shown, it can take as many as 3,000 raw ideas to result in one successful new product. Thus, economic development officials who once

competed to attract a few big companies increasingly consider indigenous entrepreneurship. Numerous startups in diverse fields can create jobs today and potentially be industry-changing heavyweights of the future. Centers of knowledge creation, while supported by and serving the needs of large companies, can and should spawn new enterprises.

The iconic college dorm room is a good starting point. Rather than leave this to stealth all-nighters by the next Bill Gates, Michael Dell, or Mark Zuckerberg, new programs push entrepreneurship education into undergraduate and even high school curricula and host business plan competitions with publicity and incentives. LaunchPad<sup>13</sup>, begun at the University of Miami in 2008 for undergraduates up, with a network of venture coaches from the business community, attracted 1,000 students and alumni in its first two years and resulted in 45 new businesses, most of them off the beaten technology track and thus unlikely to have started without the program. Miami has spawned two counterparts in economically troubled southeastern Michigan, hosted at Wayne State and Walsh College to revive Detroit, in collaboration with the New Economy Initiative for Southeast Michigan with funding from the Blackstone Foundation.

Connecting potential entrepreneurs to networks provides resources and mentoring. Networks have always been a fundamental part of the culture for innovation and entrepreneurship, as Nitin Nohria found in a study of Massachusetts's high tech corridor. Network connections can be as valuable as capital to fledging enterprises. Accelerators such as incubators and test sites help new businesses develop and move products or service to markets. Incubators have grown from an estimated 425 in North America in 1991 to about 1,100 in the U.S. in 2006, according to the National Business Incubation Association.<sup>14</sup> Most are not-for-profit entities sponsored by a state or local government, economic development agency, or university. A University of Michigan study estimated that North American incubators generated 315,000 full-time jobs, 41,000 part-time jobs, and generated \$18.7 billion in annual revenue in 2008.<sup>15</sup> A U.S. Department of Commerce-commissioned study suggests that in one industry, construction, incubators generate local jobs at a lower cost than other government stimulus programs.<sup>16</sup> (But there are widely varying cost-per-job estimates when public funds subsidize incubators.<sup>17</sup>)

Of all incubator types, university-based incubators appear to have the most positive effects on firm survival and growth—perhaps because of the collaborative possibilities noted earlier plus eager student labor. Incubators that create linkages, including connections to strategic partners and capital sources, greatly improve performance, according to the University of Michigan study. The ventures nurtured by “connector” incubators have an average 5-year survival rate of 75%, much higher than the recent national average of 47%, and create jobs that tend to remain in the host region.<sup>18</sup>

A complete innovation and entrepreneurship ecosystem must also include test sites and showcases—places where companies demonstrate new possibilities, which can speed their development and market receptivity. A particularly imaginative model is the Verizon Innovation Center in Waltham, Massachusetts<sup>19</sup>, conceived in 2009 and followed by an Applications Center in San Francisco in 2011. The center offers space and support for partner companies to create advanced 4G LTE network applications with the potential to transform industries, or at least prime the pump for the next big thing. Verizon's goal is to build the future ecosystem for wireless; it wants network utilization rather than IP to own, although there is no requirement that products must run on the Verizon network. The idea is to take technology out of the phone and into cars, refrigerators,



bicycles, and such. Visitors can see a connected car using OnStar; Touch Tunes, a jukebox app; and two different “connected home” models, one which itself required a complex Verizon-facilitated partnership with Hitachi, LG, and 4Home, a seven-person startup.

The Innovation Center includes a showroom and a factory to build products. Copper-shielded rooms create contained environments so no signals escape. Verizon partner Vodafone’s signal for Europe and other international locations not served by the Verizon network can be accessed for live demos. Verizon provides space, troubleshooting, and tools for certification (e.g., exact replicas of equipment and processes to rehearse tests). Space is free and open to project teams from many companies. Alcatel-Lucent and Ericsson were founding partners; Cisco and Samsung are called premier participants. About 80 partners with diverse capabilities are developing applications. This is open innovation squared—a platform company facilitating innovation for startups and established companies alike.

The ultimate goal of competitiveness is shared prosperity. Test sites that apply new concepts to improving lives in less-advantaged communities can be a competitiveness win-win: enhancing business while improving society.<sup>20</sup> Through predecessor company Bell Atlantic, Verizon refined its understanding of DSL technologies in the 1990s by transforming an aging middle school in Union City, New Jersey, into a technology showcase.<sup>21</sup> This enabled students in a dropout-prone area to finish high school and attend college, while their parents received technology training. With public sector encouragement, other companies could demonstrate their latest ideas at community beta sites, thereby also increasing community skills. Accelerators located in neglected neighborhoods can uncover hidden venture potential and create jobs, as Next Street Financial has found in Boston.

Innovation districts facilitate linkages. Local zoning laws sometimes prevent the operation of 24-hour services or mixed-use, live/work spaces (which are the equivalent of dorm rooms for graduates); small rules adjustments could have dramatic effects on new business formation. Such districts can contain highly innovative businesses that gain additional potency from their connections to knowledge centers, markets, and one another.

Consider the urban aquaponics effort in Milwaukee, which connects urban farms occupying abandoned factories with water researchers at the University of Wisconsin Milwaukee’s Graduate School of Freshwater Sciences (the nation’s first). A new Aquaponics Innovation Center<sup>22</sup> will also link universities and K-12 schools to transfer technology and develop skills and link produce growers with corner stores in poor neighborhoods that lack access to healthy vegetables. The effort, backed by the Mayor, with analytic support from an IBM Smarter Cities Challenge grant, has the potential to increase the locally-grown food supply in water-efficient ways, demonstrate new water systems, attract new businesses and create jobs in urban areas, improve health, and generate growth enterprises that expand beyond the region.

An integrated ecosystem strategy should build on model initiatives that more closely connect the elements of successful innovation and entrepreneurship and spread them widely; much of what I describe is new. Promising collaborations should be encouraged, e.g., through larger R&D tax credits for corporate R&D with a university; while university licensing should be reoriented to favor venture creation. Established businesses should be encouraged to support and participate in shaping

Centers of Excellence, incubators, and demonstration sites that are platforms for innovation and enterprise creation.

## LINKING SMALL AND LARGE ENTERPRISES

**Goal 2: Increase growth and success for SMEs through large company linkages, and large company renewal through investments and partnerships with innovating SMEs. Tap supply chain synergies to build competitive capabilities.**

To thrive, ventures must reach markets. For many SMEs, large companies are potential customers and a source of credibility to open doors to a broader set of customers, including international trade. The impact of large companies on job creation and the economy is not only through their direct employment but through their purchasing of goods and services.

The magnitude of total purchases by large U.S.-based companies is difficult to determine. An Institute for Supply Management survey in June 2011 that included a non-representative sample of 35 manufacturing and non-manufacturing firms with sales over \$5 billion indicated that aggregate expenditures by those large companies alone totaled \$305 billion, \$190 billion of which was spent in the U.S. and \$115 billion outside the U.S.<sup>23</sup> Even a conservative extrapolation to the largest 1000 industrial and service companies would put the potential opportunity for SMEs in large company supply chains in the trillions of dollars, if they could compete for a greater share of purchases.

It is similarly difficult to determine the number of SMEs that consider themselves B-to-B rather than B-to-C. But for the undoubtedly large number seeking business customers, becoming a corporate supplier can produce significant growth. About 200 small businesses in 15 states were surveyed by the Center for an Urban Future<sup>24</sup> in March 2011, including technology startups. About 70% of the respondents who became a supplier to a large company grew revenues and employment between the year before and two years after—jobs grew on average by 2-1/2 times. Large companies push SMEs to develop new features, which increases innovation. Corporate sales, even if small, enhance reputation; for 63% in the survey, one corporate contract leads to others.<sup>25</sup>

But breaking into corporate supply chains is difficult, especially for startups. The biggest obstacle, according to the Center for an Urban Future survey, is getting information (cited by 48%)—to whom at the company to make the pitch and what they need. For those small companies that sell to large companies, the potential is far from realized. Few of those surveyed felt they received advice; even fewer felt they got technical assistance or mentoring. Most of them experienced problems with a slow sales cycle, slow payment, and price pressure.

Large companies could be encouraged to commit to enhance productive linkages to SMEs through a national campaign led by the White House, vanguard companies, business associations, and state and local officials. Evidence that this can work comes from the Welfare-to-Work Partnership, a national coalition convened by the President following passage of the 1996 welfare reform bill and funded by the private sector to encourage companies to hire former welfare recipients.

A national supply chain initiative could engage large companies in supporting and growing domestic SMEs. They could provide mentors to advise selected supply chain partners about

strengthening of functional capabilities. They could provide online training and tools, and perhaps access to internal training programs. Multinational companies could help promising SME suppliers gain access to global export markets, by making introductions for U.S. suppliers in growth markets or offering temporary space in a multinational's office. They could include qualified supply chain partners in purchasing and insurance pools, which could lower costs for the SMEs and allow them to invest in innovation and new jobs. The latter is a promising but unexplored area for rules change, especially with respect to insurance.

For large companies, increased capabilities and motivation of vendors and distributors should contribute to lower costs and higher performance. Identification and development of new sources of supply in the U.S. could ease logistics. Participating companies could become customers of choice for innovators.

One important basic step is simplifying the process by which SMEs bid for business and offering one door to many companies. IBM has developed a prototype in "Supplier Connection," a Web-based process for vendor applications across partner companies, facilitating access while reducing administrative burdens.<sup>26</sup> The initial partners—UPS, Pfizer, Bank of America, Citigroup, IBM, and AT&T—have supply chain spending of over \$160 billion annually. In the first few months after a soft launch in March 2011, IBM found that SMEs received an increased \$40 million in IBM contracts, including to three new IBM suppliers. By October 2011, AMD, Caterpillar, Dell, and others had joined the consortium. Supplier Connection also enables small suppliers to learn from and collaborate with one another.

Large companies are important to small company success and growth in numerous ways. A preliminary study in seven new technology fields, including search engines, new media, and medical devices, that Robert Wheeler and I are conducting, shows that the companies that emerge as the dominant player in each field have more and stronger partnerships from their early stages.

Large enterprises can build the capabilities of startups and benefit from the results through investments. Corporate venture capital (CVC) is minor at only about 6-7% of all venture capital deal amounts, but a strategic U.S. strength. The U.S. outpaces the rest of the world, although China and Europe are picking up the pace compared to the U.S., according to analyses by Global Corporate Venturing publishing group. Of the 1,273 CV deals between May 2010 and August 2011 with an identified location, 69% are in the US. The next biggest markets are China, India, and Germany.

The corporate VC track record is mixed; some corporate venture units have closed after failing to produce innovation for the parent or a sufficient return on capital. But when the CVC investment is business-strategic and the investor is also a customer, the potential for impact can multiply. Reuters was an early investor in Silicon Valley Internet companies, including Yahoo and VeriSign, that gave Reuters access to new technology and the startups access to a large customer user (or in the Yahoo case, to content from Reuters News which drove traffic to the Internet portal). The Reuters Greenhouse Fund facilitated collaborations among its portfolio companies that spurred further innovation.<sup>27</sup> Multi-purpose collaborations can be mutually beneficial. Verizon Ventures invested in4Home, the connected home startup mentioned earlier, included it in innovation partnerships at its Innovation Center, and facilitated its sale to Motorola.<sup>28</sup>

Small company mentoring and investment should be on large companies' agendas—an Americanized version of the Japanese keiretsu model, which was one factor in Japan's economic rise in the 1980s. Enhancing the capabilities of SMEs could help bring jobs back to the U.S. and take more SMEs into international markets.

## LINKING EDUCATION TO ENTERPRISES

### **Goal 3: Improve the match between education and jobs. Develop a job-ready work force through apprenticeships and other education-industry links, including new structures for schooling.**

Business ecosystems should contain the skills that are needed to grow a competitive economy. Enterprises must be connected with the skills they need to succeed, and people must be connected with the opportunity to gain those skills.

Although U.S. unemployment rates have hovered between 9 and 10 percent since the global financial crash, over 3 million jobs remain unfilled. As much as one-third of the increase in U.S. unemployment in the Great Recession could be due to a mismatch between skills and jobs.<sup>29</sup> A glaring gap involves middle-skill jobs—jobs that require more than a high school diploma but less than a bachelor's degree. This category includes well-paid growth occupations such as dental hygienists, medical and clinical laboratory technicians, electricians, and aircraft mechanics.

Even in fields such as IT where many jobs require advanced education, there are entry level jobs for middle-skill workers, especially in light of an acute shortage of software engineers in Silicon Valley and the Greater Boston region. According to a Federal Reserve Bank of Boston report, by 2018 the number of middle-skill workers is projected to fall short of demand by roughly 15% nationwide but by a much larger 30% in New England, which depends on advanced skills and yet needs workers with middle skills to support the innovation economy.<sup>30</sup> Middle-skills make it possible for companies to manufacture and expand close to the knowledge centers where they develop concepts.

The costs of mismatch are human as well as economic. Opportunity is a key motivator; unless people see opportunity for a well-paid job, their performance motivation declines, which further reduces opportunity. The U.S. has an alarmingly high school dropout rate—and a high school diploma is itself insufficient in the job market. There is no equivalent to the German apprenticeship system for those who will not (immediately) seek a four-year college degree; in Germany<sup>31</sup> and neighboring Austria and Switzerland, over half of those under 22 years old pursue an apprenticeship program to learn a skilled trade. The U.S. has unrealized potential. Under the U.S. National Apprenticeship Act, there are 850 apprenticeable occupations which can be registered and certify graduates, but a handful of occupations, mostly in construction, account for 80% of all apprentices<sup>32</sup>, and apprentices constitute under 4% of recent cohorts entering the work force.<sup>33</sup>

Concern about this situation has pushed community colleges—public 2-year post-high-school institutions—to the forefront of policy discussions. They are also considered central to retraining. But all too often their track record is dismal. A U.S. Department of Education longitudinal study found that only one-third of community college entrants in 2003-2004 had earned a certificate, associate's degree, or bachelor's degree from any institution within six years<sup>34</sup>, and their graduates are generally behind apprentices in early career and lifetime earnings, according a study at the

Upjohn Institute for Employment Research.<sup>35</sup> Retraining, too, has had mixed results and been widely criticized for often failing to provide participants with specific skills connected to job openings; a U.S. Labor Department study found little difference in earnings between those who went through training and their counterparts, despite an expanding economy at the time of the study.<sup>36</sup>

When disconnected from the enterprises that create employment, community colleges and related training centers remain weak links. Training works best when closely tied to immediate employment opportunities and customized to groups of employers. For example, when WorkFast in Minneapolis-St. Paul retrained workers via Hennepin Technical College<sup>37</sup> to meet specific needs of the medical device industry, it placed about 80% of the retrained machinists. In Michigan, the No Worker Left Behind program, which guarantees two years of free tuition toward an associate's degree or occupational certificate, works closely with industry; in its first evaluation, 72% of 62,000 enrolled had either found a new job or retained the current job.

Community college partnerships with business enhance motivation to complete a program because of preferred access to hiring, and they provide community colleges with valuable curriculum input. For examples, a General Electric aircraft engine division match-up with a neighboring Massachusetts community college to produce advanced manufacturing workers leads to a GE interview and opens the door to other employers.

Middle-skills collaborations can become strategic for an entire region, making community colleges fundamental to an enriched ecosystem. South Carolina grew its upstate manufacturing corridor by strengthening its community college system and focusing on employer-customized education. Recent campaigns elsewhere, such as the Skills2Compete<sup>38</sup> efforts in New Mexico, New York, and Massachusetts launched in collaboration with the National Skills Coalition, connect business associations and employers with community colleges, state agencies, labor, and training advocates to hammer out a coherent strategy. A Massachusetts Middle Skills Act<sup>39</sup>, which started legislative hearings in late October 2011, proposes to form Regional Skills Academies—geographic clusters of community colleges and collaborating employers.

Such coalitions can include innovative not-for-profit social enterprises that provide other missing links. Year Up<sup>40</sup>, for example, is an intensive one-year professional and technical training program with college credits and a corporate internship for young urban adults 18-24, with a placement rate of 84% of graduates within 4 months after graduation in well-paid jobs or college. Its expansion beyond the current 7 cities it serves is hampered by rules limiting use of public funds for programs that pick and choose participants, but as part of a regional consortium, such apprenticeship models could thrive. Other social enterprises also build skills while addressing community needs. Youthbuild, which teaches construction skills, is a prime example.<sup>41</sup> City Year, a flagship AmeriCorps program on whose national board I serve, puts 17-24 year olds in troubled urban public schools in 23 U.S. cities to work with drop-out prone youth to keep them in school; many corps members go on to careers in education.<sup>42</sup>

Taking linkages up a notch are partnerships that reinvent the nature of the system itself. In New York City and Chicago, public-private partnerships are creating an entirely new structure: 6-year public high schools. This bold innovation blends secondary with two-year post-secondary education and includes business as a partner in providing skills for jobs of the future. Pathways in Technology



Early College High School (P-Tech)<sup>43</sup>, a New York City public school, opened in September 2011 in an old school building in a rough neighborhood in Brooklyn in partnership with City University of New York, New York City College of Technology, and IBM. Students can earn a four-year high school diploma and enter college, or remain for the full six years and earn an associate's degree, along with a preference for an IBM job upon graduation. IBM mentors guide them along the way. The P-Tech model has been embraced by the Mayor of Chicago, who has initiated plans to transition to six-year public high schools linked to the Chicago community college system, which has been a weak link.

Improved education-business linkages could also address other critical U.S. challenges, such as shortages of science and math teachers for public schools or qualified faculty with relevant industry experience for community colleges. IBM developed Transition to Teaching<sup>44</sup> in 2006 to help retiring scientists and engineers get teaching credentials and find second careers in public schools. California later created EnCorps<sup>45</sup> along similar lines, with IBM among the business partners.

With closer linkages, businesses can find the skills they need to expand, and training expenditures can be better targeted. Evidence suggests that this could also generate considerable public benefits. For example, increasing the number of U.S. adults with middle-skill credentials by 10% could boost federal tax revenue by \$14 billion and reduce public assistance costs, according to analyses by Northeastern University's Center for Labor Market Studies. An equally positive picture is presented in a U.S. Department of Labor review of apprenticeship programs, which includes 37,000 programs with 440,000 apprentices for 250,000 employers; it estimates that every federal dollar invested, which leverages private funds, produces about \$50 in federal tax revenues.<sup>46</sup>

## LINKING LEADERS

**Goal 4: Strengthen the infrastructure for collaboration. Connect leaders across sectors to develop regional strategies that build on local assets and attract new investment. Engage business leaders as innovators, partnering to produce scalable models for institutional innovation.**

Ecosystems are inherently place-based. While national policies shape the economy in profound ways, activity comes together on the ground in numerous regions that differ in their institutional composition. Indeed, the U.S. has been called the world's largest common market of independent economic regions.

Regions are key competitiveness units. The scope of economic activity and the fluid boundaries of ecosystems do not correspond to government jurisdictions. Economic regions and their community identifications overlap cities, counties, and states, as the Brookings Institution's Metropolitan Studies Center has emphasized.<sup>47</sup> Industry clusters, identified in Michael Porter's seminal work, and the ecosystem linkages that produce new industries and innovations are forged region by region. Ecosystem enrichment involves multiple actors that share an interest in regional quality of life: government entities, educational institutions, community-based non-profits, labor, civic advocacy groups, and businesses.<sup>48</sup>

Before globalization and industry consolidation disrupted local ties, business leaders often served as civic patriarchs, favoring their headquarters city and donating to local causes via

checkbook philanthropy. This is neither feasible nor effective for today's competitiveness challenges. Business leaders must play a more strategic and systemic role, targeting institutional interactions and building the equivalent of an infrastructure for collaboration—scaffolding which helps align and connect institutions.

CEOs from major companies have long guided regional revitalization and transformation, leaving long-lasting legacies. For example, decades ago, Roger Milliken, late head of the textile manufacturer bearing his name, was a key figure in making South Carolina a magnet<sup>49</sup> for foreign manufacturers by encouraging equipment suppliers to locate in the Greenville-Spartanburg area. This was followed by collaborations among local Chambers of Commerce, mayors, Governors, public schools systems, and community colleges to become foreigner-friendly and job-ready, focused on increasing the supply of workers for middle-skill jobs but also offering an international baccalaureate degree in the high schools, which appealed to families of foreign executives. The ideas were promoted throughout the region, and dense network ties ensured coordination. The interstate highway between Charlotte and Atlanta became known as “the autobahn” because of the large number of German companies drawn to the wider region. The region's manufacturing capabilities soon attracted auto-related companies, most notably BMW and Michelin. South Carolina remains relatively low in income, but has recently reinvested in middle skills through Apprenticeship Carolina.<sup>50</sup> The state funded a modest \$1 million a year apprenticeship expansion initiative with annual employer tax credits of \$1000 per apprentice, which has more than doubled the number of apprentices in the state. In September 2011, Japanese tire manufacturer Bridgestone announced plans to spend \$1.1 billion to expand an existing auto-tire plant in South Carolina and build a new factory nearby to produce tires for heavy vehicles—its first outside of Japan—for U.S. distribution and export to Latin America. The strong work force was cited as a primary draw.

Regional strategies work best and produce the most enduring results when focused on underlying capabilities and the foundational institutions that produce them.<sup>51</sup> These may start serendipitously but then become targets for continuous investment. Massachusetts's extensive set of colleges and universities have been a factor in the ability of the Commonwealth to repeatedly move from old to new industries. The transition from an industrial economy (shoes and textiles) to a high-tech economy was aided by MIT's applied laboratories and tech licensing programs, state investments in Centers of Excellence at public university campuses, and the formation of industry councils in which business leaders participated actively. University-based medical centers become a force in the transition to life sciences industries, and business networks then helped make this a focus for public as well as private investment, attracting R&D labs from major pharmaceutical firms and including a public Life Sciences Center to coordinate resources.<sup>52</sup>

Foundational institutions can include infrastructure and population attributes. Investments in the airport and seaport helped Greater Miami become an international trade capital for the moving of goods, and immigration helped it become a trade capital for services. A concentrated influx of educated Cuban exiles provided a unique human capital base for trade with Latin America, augmented by later waves of Spanish-speaking immigrants. Business associations developed a competitiveness strategy that made the region an international hub, the operative capital of Latin America, housing regional headquarters for over 125 multinational companies and attracting trade-related financial and professional services.<sup>53</sup>

Once developed, regional industry capabilities can serve as the basis for renewal. In Maine, as SBA administrator Karen Mills has described, the North Star Alliance revived the craft construction industry by bringing together a variety of business and government groups to support transformation: the Maine Built Boats Initiative, Advanced Engineered Wood Composites Center, and the state marine and composites trade associations, with economic development, training, and investment organizations.<sup>54</sup>

Business leaders should be at the forefront of regional coalitions and national competitiveness campaigns that support them. Issues that are highly contentious and appear partisan at the national level take on a different tone when part of a dialogue among those who occupy (so to speak) territory in the same local or regional ecosystem. For example, in 2008, Miami-Dade County voters, in the midst of rising anti-tax sentiment and a troubled economy, voted overwhelmingly in favor of reauthorizing a 2003 tax levy for a Children's Trust to finance children's services.<sup>55</sup> When 86% of the voters in a no-taxes environment approve a tax, it is clear that ideological warfare is not inevitable. The campaign was led by a former CEO, David Lawrence of the *Miami Herald*, who relentlessly used his social capital to forge a cross-sector coalition to support the tax levy. Collaboration is necessary to get beyond sector and political silos and enrich the linkages and networks that make ecosystems productive.

Leaders can also be institutional innovators. Businesses are already enmeshed in complex systems requiring the most creative leaders to not only think outside the box, but also—in my preferred metaphor—to think outside the building. Every enterprise is affected by the context surrounding its operations. Looking at the institutional context and improving it can provide the company with new opportunities and a role in shaping policy directions. When the private sector innovates to produce prototypes for structural change, the public sector can scale the innovations. Examples from IBM, which I've served as a consultant, appear throughout this article, because they are business-strategic, involve a wide range of business functions, and directly address ecosystem challenges.<sup>56</sup> IBM is a lead actor in the semiconductor research consortium in Albany; deploys Smarter Cities teams to support innovation districts in Milwaukee; runs Supplier Connection for SMEs; participates in creating the 6-year high school model in New York and Chicago; and deploys scientists and engineers to teach K-12 science and math through Transition to Teaching. Each is a model that can combine with other public and private investment to go to scale.

Institutional innovations provide better ways to focus investments already being made. R&D, supply chain, or training expenditures can become more productive by ensuring that resources do not disappear into potholes between institutional silos. Collaboration is sometimes thought of as unwieldy, but it can produce efficiencies and multiplier effects.

Leaders should encourage policy-makers to target resources in focused, strategic ways that fill gaps between institutions and provide more fertile environments for jobs to grow into inclusive prosperity. That agenda includes a commitment to:

- Invest in foundational institutions that are sources of enduring strength, including centers of knowledge creation, incubators, apprenticeships, and high quality education adaptable to changing job skills.

- Facilitate collaborations and resource-sharing, whether in collaborative research, innovation zones with live/work spaces, supply chain resource pooling, or education-employer collaborations.
- Seek integrated solutions that link institutions, by directing resources to regional coalitions and public-private partnerships with coherent strategies.
- Identify and reward excellence. Rather than sprinkling resources everywhere, invest in the best ideas and then spread institutional innovations.

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Critics and skeptics might say that the best role for business leaders is to mind their own business. But as my analysis and examples make clear, there is much work to be done that requires the unique capabilities and involvement of companies, in collaborations that produce innovative solutions and innovative growth businesses. The competitive ecosystems that result are good for individual businesses and the economy.

An enriched business ecosystem will strengthen enterprises that create jobs and match them with people who are job-ready. Forging those linkages will ensure competitiveness and inclusive prosperity for all.

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