BROOKINGS

THE RISE OF INNOVATION DISTRICTS:

A New Geography Of Innovation In America

Bruce Katz and Julie Wagner

AS THE UNITED STATES SLOWLY EMERGES FROM THE GREAT RECESSION, A REMARKABLE SHIFT IS OCCURRING IN THE SPATIAL GEOGRAPHY OF INNOVATION.

FOR THE PAST 50 YEARS, THE LANDSCAPE OF INNOVATION HAS BEEN DOMINATED BY PLACES LIKE SILICON VALLEY—SUBURBAN CORRIDORS OF SPATIALLY ISOLATED CORPORATE CAMPUSES, ACCESSIBLE ONLY BY CAR, WITH LITTLE EMPHASIS ON THE QUALITY OF LIFE OR ON INTEGRATING WORK, HOUSING AND RECREATION.

A new complementary urban model is now emerging, giving rise to what we and others are calling "innovation districts." These districts, by our definition, are geographic areas where leading-edge anchor institutions and companies cluster and connect with start-ups, business incubators and accelerators.[1] They are also physically compact, transit-accessible, and technically-wired and offer mixed-use housing, office, and retail.

Innovation districts are the manifestation of mega-trends altering the location preferences of people and firms and, in the process, re-conceiving the very link between economy shaping, place making and social networking.[2] Our most creative institutions, firms and workers crave proximity so that ideas and knowledge can be transferred more quickly and seamlessly. Our "open innovation" economy rewards collaboration, transforming how buildings and entire districts are designed and spatially arrayed. Our diverse population demands more and better choices of where to live, work and play, fueling demand for more walkable neighborhoods where housing, jobs and amenities intermix.

Led by an eclectic group of institutions and leaders, innovation districts are emerging in dozens of cities and metropolitan areas in the United States and abroad and already reflect distinctive typologies and levels of formal planning. Globally, Barcelona, Berlin, London, Medellin, Montreal, Seoul, Stockholm and Toronto contain examples of evolving districts. In the United States, districts are emerging near anchor institutions in the downtowns and midtowns

—

Cover: The geography of Barcelona's innovation district, highlighted in blue, is located in the heart of the city. It has served as an inspiration for many innovation districts in the United States.
Credit: Barcelona City Council. Area of Economy, Business and Employment

of cities like Atlanta, Baltimore, Buffalo, Cambridge, Cleveland, Detroit, Houston, Philadelphia, Pittsburgh, St. Louis and San Diego. They are developing in Boston, Brooklyn, Chicago, Portland, Providence, San Francisco and Seattle where underutilized areas (particularly older industrial areas) are being re-imagined and remade. Still others are taking shape in the transformation of traditional exurban science parks like Research Triangle Park in Raleigh-Durham, which are scrambling to keep pace with the preference of their workers and firms for more urbanized, vibrant environments.

"The trend is to nurture living, breathing communities rather than sterile remote compounds of research silos."[3]

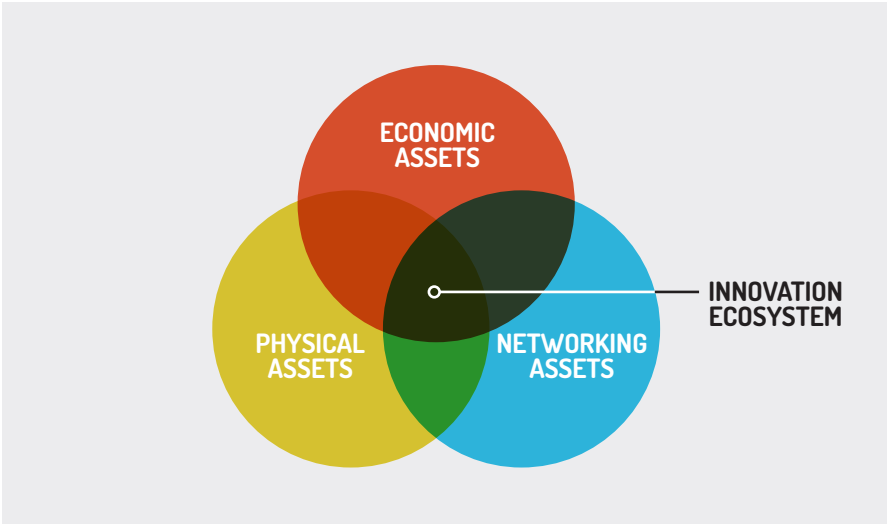
Innovation districts have the unique potential to spur productive, inclusive and sustainable economic development. At a time of sluggish growth, they provide a strong foundation for the creation and expansion of firms and jobs by helping companies, entrepreneurs, universities, researchers and investors—across sectors and disciplines—co-invent and co-produce new discoveries for the market. At a time of rising social inequality, they offer the prospect of expanding employment and educational opportunities for disadvantaged populations given that many districts are close to low- and moderate-income neighborhoods. And, at a time of inefficient land use, extensive sprawl and continued environmental degradation, they present the potential for denser residential and employment patterns, the leveraging of mass transit, and the repopulation of urban cores.

2

WHAT THEY ARE

Innovation districts constitute the ultimate mash up of entrepreneurs and educational institutions, start-ups and schools, mixed-use development and medical innovations, bike-sharing and bankable investments—all connected by transit, powered by clean energy, wired for digital technology, and fueled by caffeine.

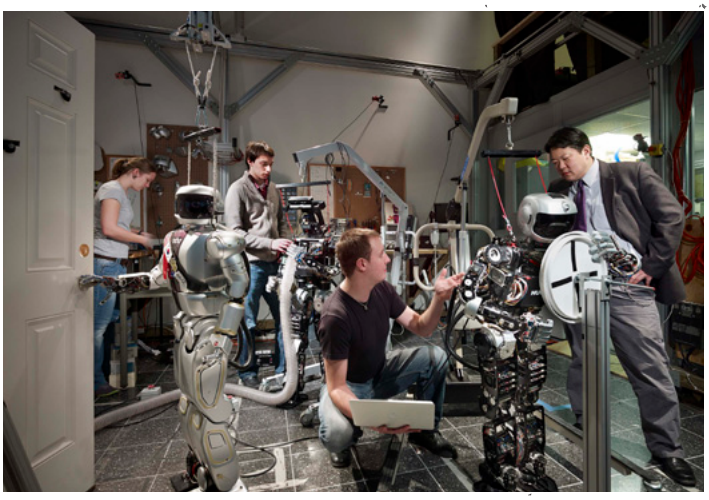
Given the vast distinctions in regional economies, the form and function of innovation districts differ markedly across the United States. Yet all innovation districts contain *economic, physical, and networking assets*. When these three assets combine with a supportive, risk-taking culture they create an *innovation ecosystem*—a synergistic relationship between people, firms and place (the



—
All innovation districts contain economic, physical, and networking assets.

—
Boston's 1000-acre innovation district along the South Boston waterfront. Credit: Boston Redevelopment Authority

physical geography of the district) that facilitates idea generation and accelerates commercialization.



Robots come to life at Drexel University in Philadelphia's innovation district.
Credit: Halkin/Mason Photography, courtesy of Drexel University

Economic assets are the firms, institutions and organizations that drive, cultivate or support an innovation-rich environment. Economic assets can be separated into three categories:

Innovation drivers are the research and medical institutions, the large firms, start-ups and entrepreneurs focused on developing cutting-edge technologies, products and services for the market. Due to regional variations in industry strengths, each district is comprised of a unique mix of innovation drivers. Tech driven industries most likely to be found in Innovation Districts include:

- High-value, research-oriented sectors such as applied sciences and the burgeoning "app economy"
- Highly creative fields such as industrial design, graphic arts, media and architecture and
- Highly specialized, small batch manufacturing

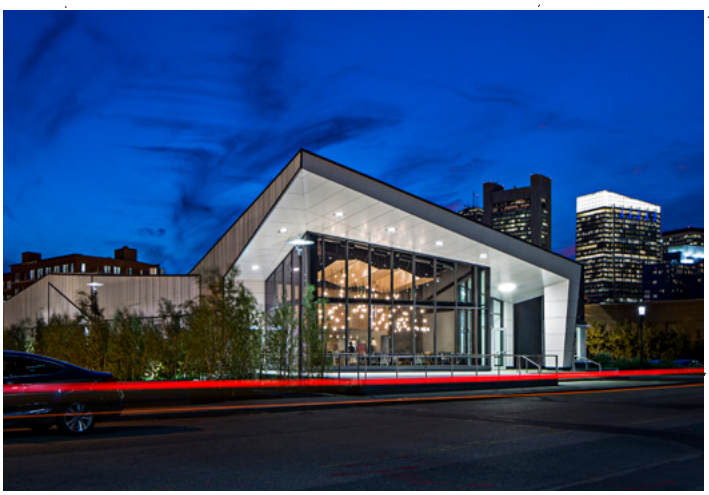
Innovation cultivators are the companies, organizations or groups that support the growth of individuals, firms and their ideas. They include incubators, accelerators, proof-of-concept centers, tech transfer offices, shared working spaces and local high schools, job training firms and community colleges advancing specific skill sets for the innovation-driven economy.

Neighborhood-building amenities provide important support services to residents and workers in the district. This ranges from medical offices to grocery stores, restaurants, coffee bars, small hotels and local retail (such as bookstores, clothing stores and sport shops).[4]

Physical assets are the public and privately-owned spaces—buildings, open spaces, streets and other infrastructure—designed and organized to stimulate new and higher levels of connectivity, collaboration and innovation. Physical assets can also be divided into three categories:

Physical assets in the public realm are the spaces accessible to the public, such as parks, plazas and streets that become locales of energy and activity. In innovation districts, public places are created or re-configured to be digitally-accessible (with high speed internet, wireless networks, computers and digital displays embedded into spaces) and to encourage networking (where spaces encourage "people to crash into one another").[5] Streets can also be transformed into living labs to flexibly test new innovations, such as in street lighting, waste collection, traffic management solutions and new digital technologies.

Physical assets in the private realm are privately-owned buildings and spaces that stimulate innovation in new and creative ways. Office developments are increasingly configured with shared work and lab spaces and smaller, more affordable areas for start-ups. A



1. Coffee shops (like Detroit's Great Lakes Coffee) are now places for entrepreneurs to work and network.
Credit: Marvin Shaouni, originally published in *Model D*

2. The newly constructed District Hall is the hub for Boston's Innovation District, facilitating networking and idea-sharing.
Credit: Gustav Hoiland

new form of micro-housing is also emerging, with smaller private apartments that have access to larger public spaces, such as co-working areas, entertainment spaces and common eating areas.

Physical assets that knit the district together and/or tie it to the broader metropolis are investments aimed to enhance relationship-building and connectivity. For some districts, knitting together the physical fabric requires remaking the campuses of advanced research institutions to remove fences, walls and other barriers and replace them with connecting elements such as bike paths, sidewalks, pedestrian-oriented streets and activated public spaces. Strategies to strengthen connectivity between the district, adjoining neighborhoods and the broader metropolis include infrastructure investments, such as broadband, transit and road improvements.

Networking assets are the relationships between actors—such as individuals, firms and institutions—that have the potential to generate, sharpen and accelerate the advancement of ideas. Networks fuel innovation because they strengthen trust and collaboration within and across companies and in-

—
The new M-1 streetcar line will connect the core elements of the Detroit innovation district—the midtown and downtown.
Credit: Anderson Illustration

dustry clusters, provide information for new discoveries and help firms acquire resources and enter new markets.

Networks are generally described as either having strong ties or weak ties.[6]

Strong ties occur between people or firms with a working or professional history that have higher levels of trust, are willing to share more detailed information, and are more apt to participate joint problem solving. **Networking assets that build strong ties** focus on strengthening relationships within similar fields. These types of assets include: "tech regulars" (where "techies" discuss problems or advances in their work as a collective), workshops and training sessions for specific fields, industry-specific conferences and meetings and industry-specific blogs for local firms and entrepreneurs.

Weak ties occur between people or firms working within different contexts or economic clusters where there is infrequent contact. Weak ties provide access to new information, new contacts and business leads outside of existing networks. **Networking assets that build weak ties** focus on building new relationships

To help develop networks, 22@Barcelona organizes many events including their monthly networking breakfasts. Credit: Barcelona City Council. Area of Economy, Business and Employment

"It's all about programming: choreographing 'spontaneous' opportunities for smart people to interact with each other. This is what separates us from traditional science parks."[7]

across sectors. Examples include: networking breakfasts (where experts and star innovators offer new insights in their fields followed by open time to network), innovation centers, hack-a-thons across industry clusters such as life sciences and tech, tech-jam start-up classes and even the choreographed open spaces between buildings.

Research indicates that both strong ties and weak ties are fundamental to the innovation process and firm success.[8]

3

WHERE THEY ARE

Burgeoning innovation districts can be found in dozens of cities and metropolitan areas across the United States. These districts adhere to one of three general models.

The "anchor plus" model, primarily found in the downtowns and mid-towns of central cities, is where large scale mixed-use development is centered around major anchor institutions and a rich base of related firms, entrepreneurs and spin-off companies involved in the commercialization of innovation. "Anchor plus" is best exemplified by Kendall Square in Cambridge (and the explosion of growth around MIT and other nearby institutions like Mass. General Hospital) and the Cortex district in St. Louis (flanked by Washington University, Saint Louis University, and Barnes Jewish Hospital).

The "re-imagined urban areas" model, often found near or along historic waterfronts, is where industrial or warehouse districts are undergoing a physical and economic transformation. This change is powered, in part, by transit access, a historic building stock, and their proximity to downtowns in high rent cities, which is then supplemented with advanced research institutions and anchor companies. This model is best exemplified by the remarkable regeneration underway in Boston's South Boston waterfront and Seattle's South Lake Union area.

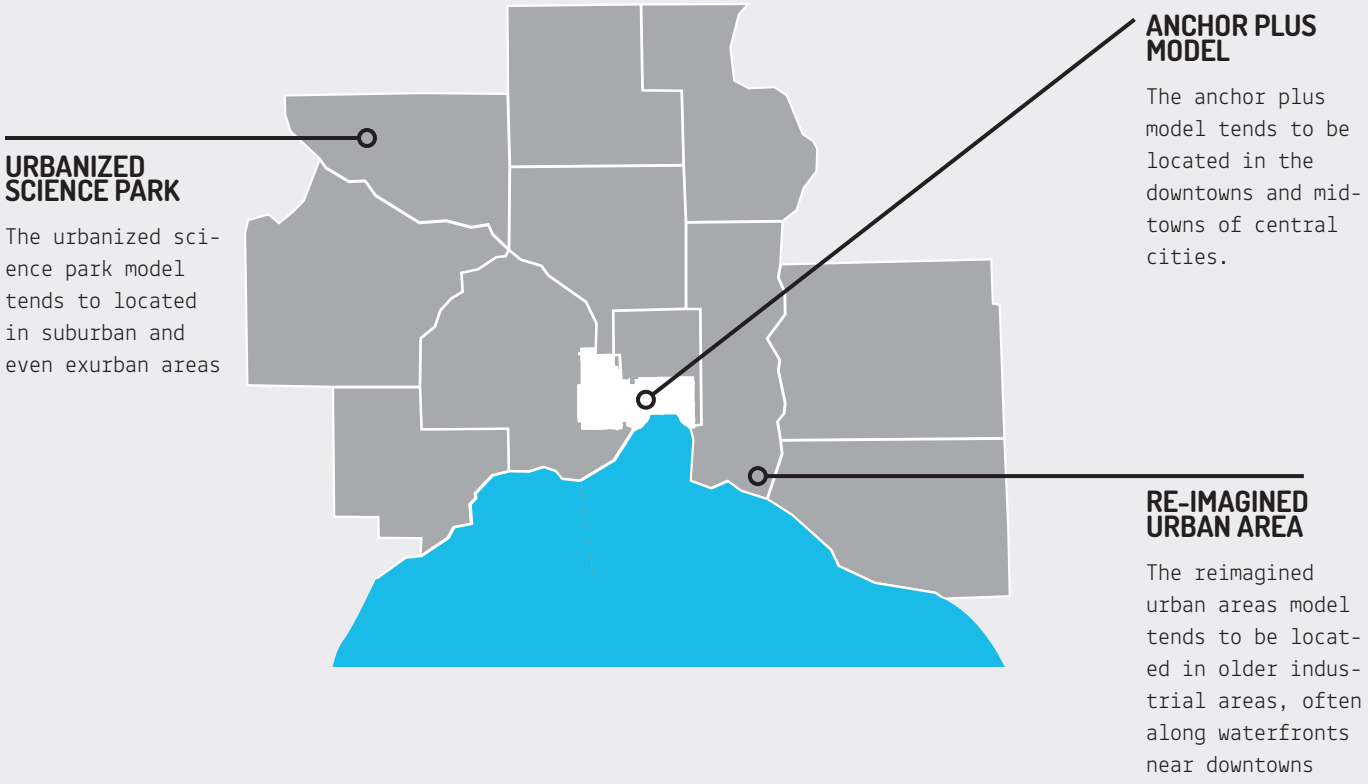
The third model, "urbanized science park," commonly found in suburban and exurban areas, is where traditionally isolated, sprawling areas of innovation are urbanizing through increased density and

—
Barcelona's innovation district, 22@Barcelona, is one of the earlier models found globally.
Credit: Barcelona City Council. Area of Economy, Business and Employment

an infusion of new activities (including retail and restaurants) that are mixed as opposed to separated. North Carolina's Research Triangle Park, perhaps the 20th century's most iconic research and development campus, is the strongest validation of this model. In November, 2012, RTP unveiled a new 50-year master plan that calls for a greater concentration of buildings and amenities, including the creation of a vibrant central district, the addition of up to 1,400 multi-family housing units, retail and the possible construction of a light rail transit line to connect the park with the larger Raleigh-Durham region.[9]

THE THREE TYPES OF INNOVATION DISTRICTS

Their location varies within a metropolis



4

HOW TO GROW

Practitioners in leading edge innovation districts offer five pieces of advice:

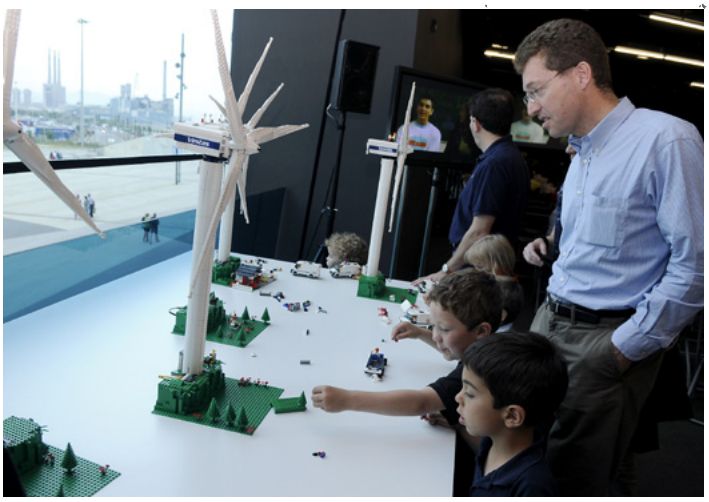
First, **build a collaborative leadership network**, a collection of leaders from key institutions, firms and sectors who regularly and formally cooperate on the design, delivery, marketing and governance of the district. In advanced innovation districts in Barcelona, Eindhoven, St Louis and Stockholm, leaders found the Triple Helix model of governance to be fundamental to their success.[10] The Triple Helix consists of structured interactions between industry, research universities, and government.

Second, **set a vision for growth** by providing actionable guidance for how an innovation district should grow and develop in the short-, medium- and long-term along economic, physical and social dimensions. Most practitioners cite the importance of developing a vision to leverage their unique strengths—distinct economic clusters, leading local and regional institutions and companies, physical location and design advantages and other cultural attributes.

One of Stockholm's innovation districts, Stockholm Life, is implementing a bold plan, which includes extending the district over a major highway.
Credit: WSP

Charting a course for this district's future growth: the Cortex Master Plan in St. Louis.
Credit: Ayers Saint Gross

Third, **pursue talent and technology** given that educated and skilled workers and sophisticated infrastructure and systems are the twin drivers of innovation. Pursuing talent requires attraction, retention and growth strategies; integrating technology requires a commitment to top notch fiber optics (and, in some places, specialized laboratory facilities) to create a high quality platform for innovative firms.



— 22@Barcelona developed several programs to connect area children with work and workers inside the district.
Credit: Barcelona City Council. Area of Economy, Business and Employment

Fourth, **promote inclusive growth** by using the innovation district as a platform to regenerate adjoining distressed neighborhoods as well as creating educational, employment and other opportunities for low-income residents of the city. Strategies in places as disparate as Barcelona, Detroit and Philadelphia have particularly focused on equipping workers with the skills they need to participate in the innovation economy or other secondary and tertiary jobs generated by innovative growth.

Finally, **enhance access to capital** to support basic science and applied research; the commercialization of innovation; entrepreneurial start-ups and expansion (including business incubators and accelerators); urban residential, industrial and commercial real estate (including new collaborative spaces); place-based infrastructure (e.g., energy, utilities, broadband, and transportation); education and training facilities; and intermediaries to steward the innovation ecosystem. Districts in Cambridge, Detroit and St. Louis have successfully re-deployed local capital to meet these needs.

5

THE PATH FORWARD

The potential for the growth of innovation districts in the United States is exceptionally strong.

Virtually every major city in the United States has an "anchor plus" play given the confluence of a vibrant central business district, a strong midtown area and transit connecting the two.

"Innovation districts embody the very essence of cities: an aggregation of talented, driven people, assembled in close quarters, who exchange ideas and knowledge in a 'dynamic process of innovation, imitation, and improvement.'"[11]

Many cities and older suburban communities are also making progress on "re-imagining urban areas," repositioning underutilized sections of their community through investments in infrastructure (or infrastructure removal), brownfield remediation, waterfront reclamation and transit-oriented development.

Lastly, a handful of "urbanized science parks" (and their adjacent suburban communities) are clustering development, encouraging density and creating spaces to allow individuals and firms to network openly.

The rise of innovation districts aligns with the disruptive dynamics of our era and represents a clear path forward for cities and metropolitan areas. Local decision makers—elected officials and heads of large and small companies, local universities, philanthropies, com-

Shared and private wet lab spaces in the Kendall Square innovation district help drive life science innovation at reduced cost. Credit: LabCentral, Inc.

munity colleges, neighborhood councils and business chambers—would be wise to unleash them. Global companies and financial institutions would be smart to embrace them. States and federal government should support and accelerate them. The result: a step toward building a stronger, more sustainable and more inclusive economy in the early decades of this young century. □

Acknowledgments

We extend our gratitude to the following innovation district leaders and practitioners for teaching and advising us throughout the writing process. We realize the extent to which you have become integral to this project: Josep Pique and Isabel Ponti (Barcelona); Nicole Fichera and Mitchell Weiss (Boston); Margaret O'Toole, Tim Rowe and Sam Seidel (Cambridge); Dave Egner, Benjy Kennedy, Pam Lewis, Sue Mosey, Rip Rapson and Laura Trudeau (Detroit); Linco Nieuwenhuyzen, Jasmijn Rompa and Bert-Jan Woertman (Eindhoven); Bill McKeon (Houston); Dennis Lower and Donn Rubin (St. Louis); John Fry and Lucy Kerman (Philadelphia); Kofi Bonner and Roberta Achtenberg (San Francisco); Ada Healey (Seattle); and Thomas Andersson and YIva Williams (Stockholm).

We owe a special thank you to Jennifer Vey for her broad and grounded contribution to the overall direction of the Metro Program's innovation district work over the past year and invaluable help on the individual innovation district profiles. Thank you to Alex Jones for his superb mapping and research talent; David Jackson for his excellent editing; Alec Friedhoff, Dan Essrow, and Han Nguyen for their impressive work on the native web product, and Jody Franklin for teaching us the meaning of "native web product" and helping to guide many aspects of this multilayered work.

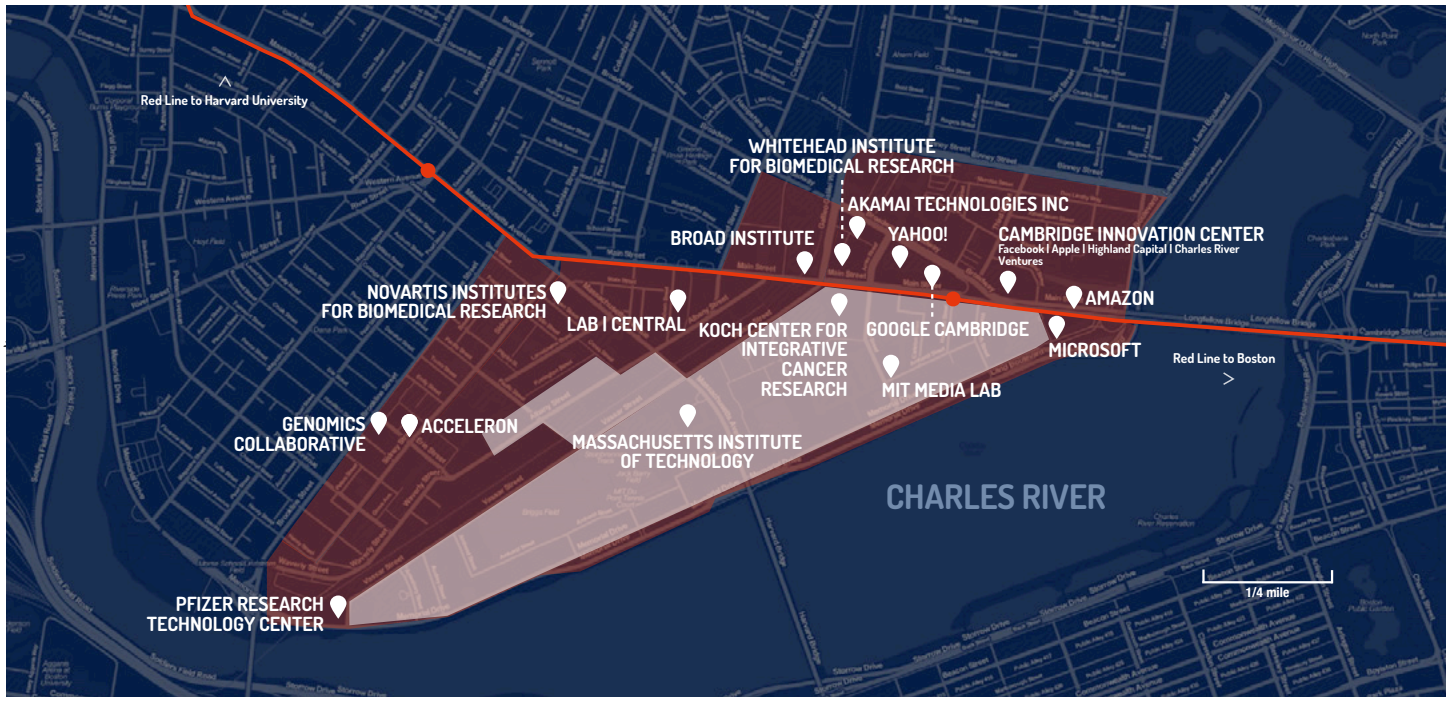
For their insightful reflections and continuous prodding, we extend our deepest thanks to Andy Altman, Dennis Frenchman, Theresa Lynch, and Thomas Osha.

For their helpful comments on early drafts of the paper, we thank Alan Berube, Jennifer Bradley, Chris Leinberger, Amy Liu, Mark Muro, and Rob Puentes.

On behalf of the entire Metropolitan Policy Program, we also thank Vicki Sant, Comcast, the Kresge Foundation, Lennar Urban, the Rockefeller Foundation, the Charles Stewart Mott Foundation, and the New Economy Initiative of Southeast Michigan for their support of our innovation districts work. Finally, we thank the Metropolitan Leadership Council, a network of individual, corporate, and philanthropic investors that provide the Metro Program with financial support and true intellectual partnership.

CAMBRIDGE: KENDALL SQUARE

Anchor Plus Model



Anchored by the Massachusetts Institute of Technology (MIT), and connected by transit to Harvard, Mass General and other research and medical institutions, Cambridge's Kendall Square is today's iconic innovation district.

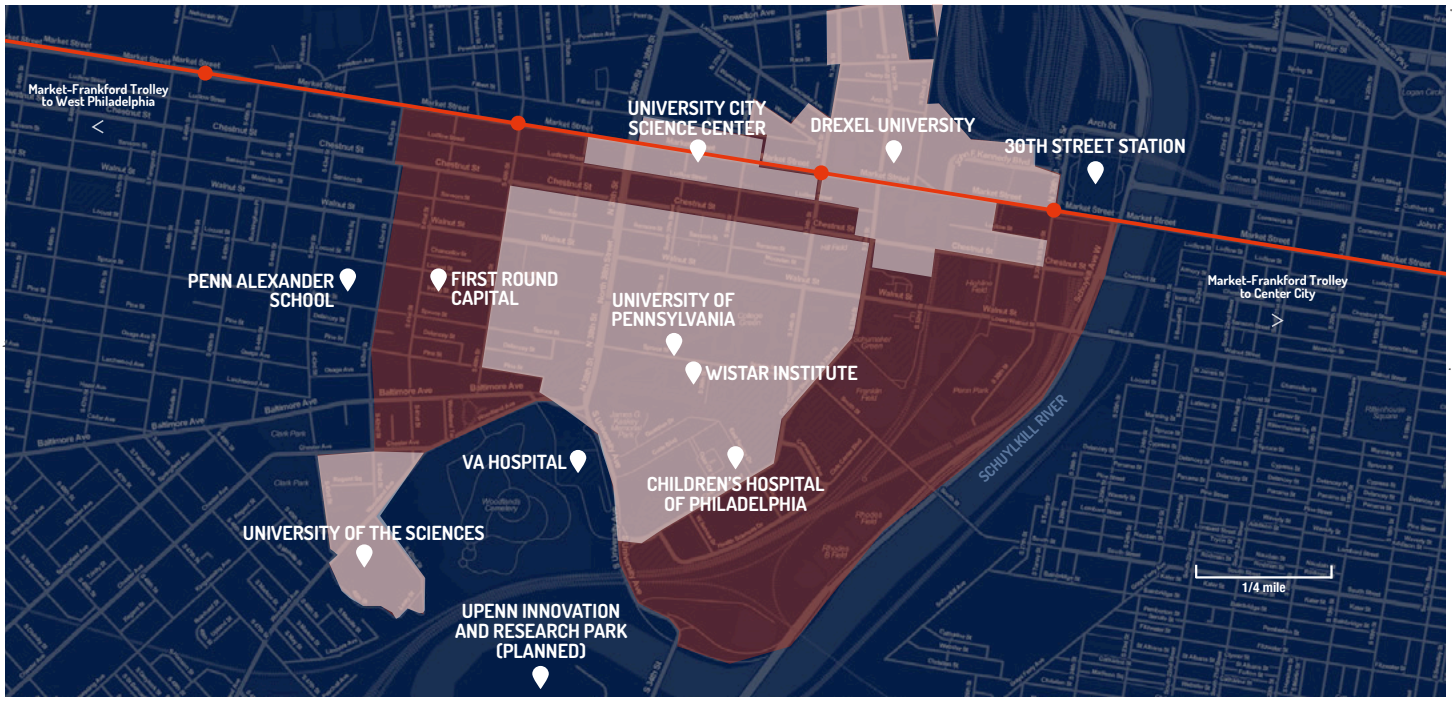
Since its founding in 1861, MIT has emphasized university/industry partnerships and the commercialization of ideas. Starting in the 1950s, the university has actively deployed university-owned land to support this goal. In the last two decades, this strategy has helped catalyze growth of a nationally significant life sciences/pharmaceutical cluster. It has also spurred the development of hundreds of small firms and attracted several major technology companies.

The Cambridge Innovation Center (CIC), founded in 1999 and housed in an MIT-owned building, is a good example of the interplay between the university and private sector. An independent organization, CIC has helped develop the modern concept of co-working while encouraging entrepreneurs and start-ups in its high quality environment. Firms at CIC have attracted billions of dollars of seed funding and later-stage investment.

Making Kendall Square a dynamic residential district with associated amenities is now a focus in Cambridge. Since 2005 nearly 1,000 new housing units have been built in the area, as well as many new restaurants and retail outlets.

PHILADELPHIA: UNIVERSITY CITY

Anchor Plus Model



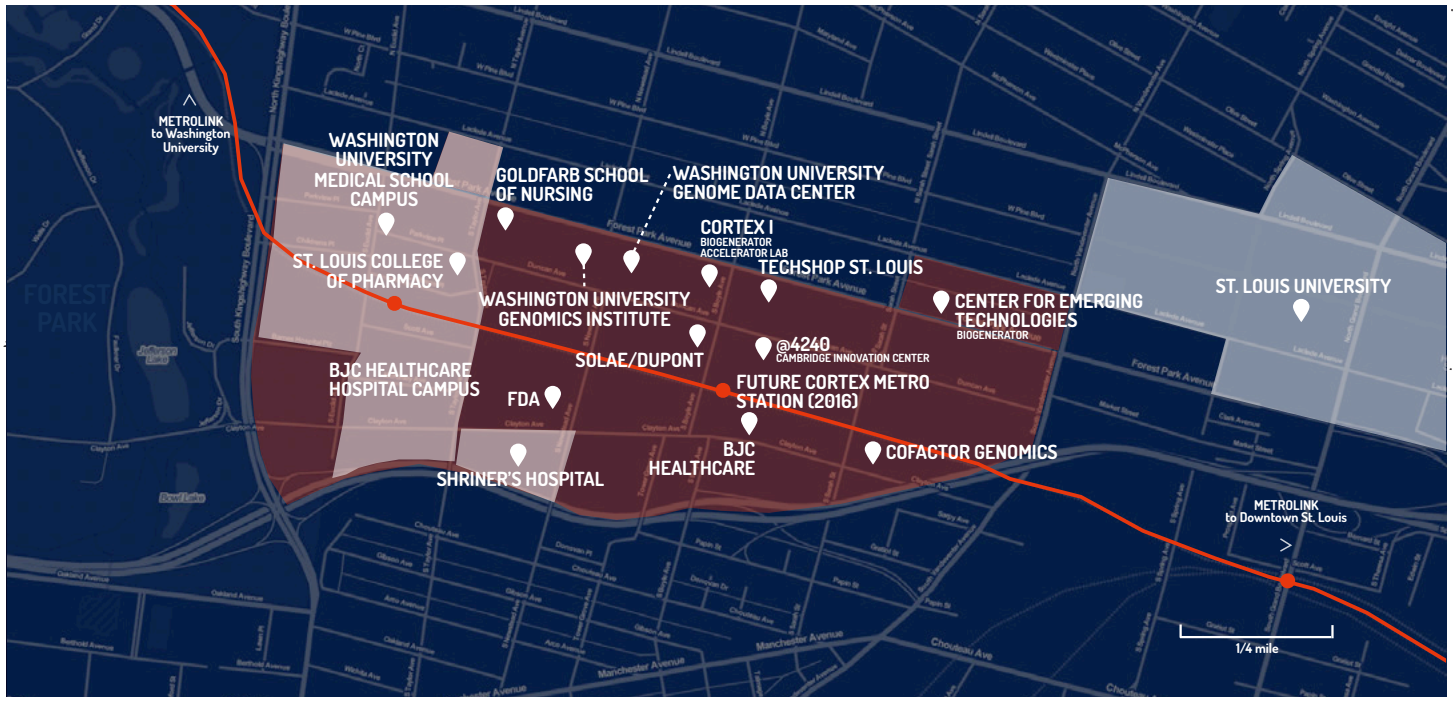
Home to the University of Pennsylvania, Drexel University, University of the Sciences and Children's Hospital of Philadelphia, University City is leveraging its assets in teaching, research, and medicine to become a hub of innovation and entrepreneurship.

The University City Science Center is a driving force behind this evolution. Founded in 1963 as the nation's first urban research park, today it comprises 31 member institutions throughout Pennsylvania, New Jersey, and Delaware. Penn Medicine is anchoring the newest UCSC building, and Drexel has opened its ExCITe Center and (in partnership with UCSC) a tech incubator in the area. Both are part of Drexel's Innovation Neighborhood project, which extends to 30th Street Station. All told, UCSC's 17-acre campus houses 2.5 million square feet of office and lab space, with business incubation, networking opportunities, and support services for a cluster of emerging and established companies in life sciences, nanotechnology, IT and other sectors.

University City's leaders are actively engaging with nearby neighborhoods. Drexel helped win a federal "Promise Zone" designation to revitalize Mantua, just north of the area. Penn and Drexel have also championed public education: Penn built and helps operate a nearby pre K-8 school, and Drexel is exploring a similar endeavor.

ST. LOUIS: CORTEX

Anchor Plus Model



The Cortex Innovation Community (Cortex) aims to make the core of St. Louis a platform for commercialization and entrepreneurship and "a lively setting for work, play and living."

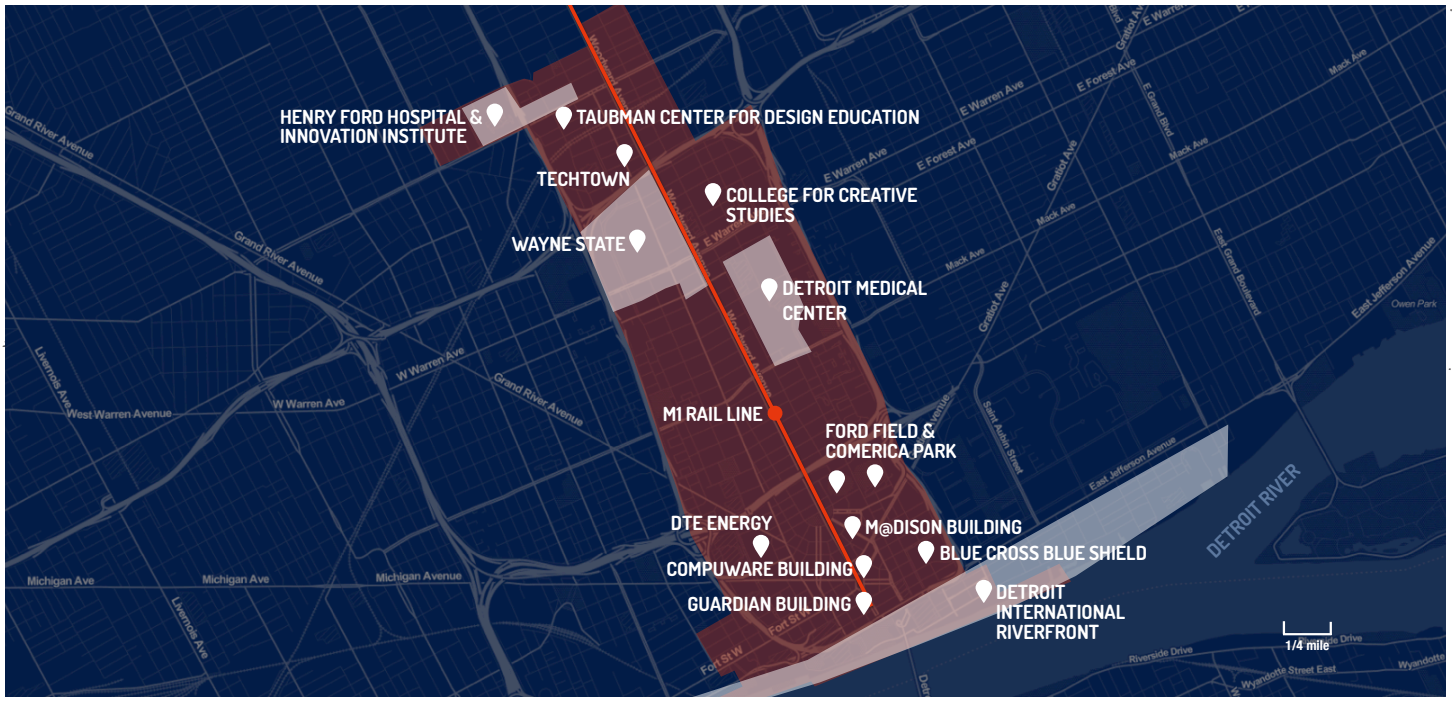
Cortex was formed in 2002 by a consortium of anchor institutions, which pooled local institutional and philanthropic funds with state tax credits and city resources. The goal is to transform a 200-acre corridor between St. Louis University, Washington University Medical School, and Barnes Jewish Hospital into a vibrant urban community and a center of research and enterprise, building on the city's base of world-renowned plant and life sciences research.

Several pieces of the strategy are already taking shape. Cortex is aggressively working to build a cluster of innovation centers to attract investment and stimulate entrepreneurial growth. The founding of the BioGenerator (a sophisticated accelerator) has helped close the funding gaps challenging dozens of local startups.

The Cortex West Redevelopment Corporation, the city-designated master developer of the area, has also sparked 1.5 million square feet of office and research space, housing, infrastructure, and retail, leveraging $500 million in public, private, and civic capital and creating 2,850 direct jobs to date; over 10,000 jobs are projected upon completion of the $2 billion buildout.

DETROIT: DOWNTOWN, MIDTOWN

Anchor Plus Model



After decades of well-documented economic decline and population loss, Detroit intends to build on the assets of its Downtown and Midtown core by designating the area as an innovation district.

Current market momentum in the area reflects years of investment by dozens of public, private, and philanthropic organizations. Corporate relocations—most notably the headquarters of Quicken Loans—have fueled a downtown renaissance, sparking the growth and attraction of IT and other firms as well as the expansion of housing and retail. Midtown's resurgence can largely be attributed to anchor-driven expansions and focused efforts to restore the urban fabric. Today, the entire 4.3 square mile area comprises just 3.1 percent of the city's land area—yet it has nearly 55 percent of the city's jobs, and 11 percent of its business establishments. The soon-to-be built M-1 streetcar line will both serve and boost this activity.

The Detroit Innovation District (DID) is officially designated by the city, supported by the state, and governed by stakeholders from anchor institutions, the private and civic sectors. The District represents Detroit's best potential to grow population and jobs in a way that both stimulates innovation and brings real value to residents and neighborhoods.

SEATTLE: SOUTH LAKE UNION

Re-Imagined Urban Area

The rapid revitalization of South Lake Union ("SLU")—from a run-down, low-rise warehouse district a mere decade ago to a vibrant, mixed-use engine of housing, transit and global technology and life science firms today—stands out as one of the most dramatic urban transformations in the United States.

The transformation has been spearheaded by Vulcan Real Estate, a company owned by Microsoft co-founder Paul Allen. In the aftermath of a failed referendum to approve a public park, Vulcan began to assemble distressed properties in the area. In the early 2000's, it persuaded the University of Washington to locate its medical and bioscience campus in SLU. UW and the existing Fred Hutchinson Cancer Research Center fueled the growth of health care and life science firms. In the late 2000s, Amazon decided to locate its global headquarters in SLU, accelerating growth in not only housing and retail but also entrepreneurial businesses.

The growth of SLU has been marked by a close public/private partnership—including key public investments to build transit, fix congestion, and enhance energy—as well as extensive engagement of local neighborhoods and residents. Growth has been iterative and incremental and built on trust and collaboration.

BOSTON: INNOVATION DISTRICT

Re-Imagined Urban Area

In 2010, former Boston Mayor Tom Menino outlined a bold vision for a Boston Innovation District, arguing, "There has never been a better time for innovation to occur in urban settings ...."

Reconnected to the city with the "Big Dig" and Boston Harbor Cleanup projects, Boston's once-isolated Seaport is transforming into a hub of innovation and entrepreneurship. While lacking a world-class research engine or an established cluster of firms, a powerful regional knowledge base combined with good infrastructure provided a strong foundation for growth. Since designation, more than 200 technology, life science and other companies have moved into the District, adding over 6,000 jobs.

Several unique assets have helped to create what is now a dynamic, collaborative environment. MassChallenge, the world's largest startup accelerator, provides shared office space and no-strings attached grant financing to startup firms from around the globe. District Hall is the world's first public innovation building, providing civic gathering space for the innovation community. And Factory 63 is an experiment in "innovation" housing, offering both private micro apartments and public areas for working, socializing, and events.

Success has wrought growing concerns about affordability. Private investment is expected to add thousands of housing units over the next few years.

RALEIGH-DURHAM: RESEARCH TRIANGLE PARK

Urbanized Science Parkv

Recognizing that the 20th century model of suburban science parks demands an update, Research Triangle Park (RTP) leaders are working to urbanize portions of the 7,000 acre park and its environs.

Hailed as a center of innovation since the late 1960s, by the mid-2000s RTP stakeholders became concerned that the park's sprawling structure and closed research environment could hinder its long term success. In response, in 2012 the RTP foundation released a new 50-year master plan for physically remaking the area, with the purpose of both enticing workers to live nearby, and keeping and attracting firms that want to benefit from the "random collisions" that density and open innovation offer. "Many of today's knowledge workers expect amenities and opportunities to connect and share ideas in a socially dynamic setting," the plan observes. "The independent campuses at RTP, mostly hidden behind trees, do not reflect this trend."

Build-out of the urbanization plan will begin with Park Center, a nearly 100 acre site at the heart of RTP that will be redeveloped to include high-density residential and mixed-use buildings. RTP is also advocating for a new commuter rail system that would connect the park to the downtowns of Raleigh and Durham.

Endnotes

1. Anchor institutions are research universities and research-oriented medical hospitals with extensive R&D.

2. Select excerpts come from the recent book, *The Metropolitan Revolution*, co-authored by Bruce Katz and Jennifer Bradley.

3. Pete Engardio, "Research Parks for the Knowledge Economy," *Bloomberg Businessweek*, June 1, 2009.

4. See Christopher Leinberger and Mariela Alfonzo, "Walk this Way: The Economic Promise of Walkable Places in Metropolitan Washington DC" (Washington: Brookings Institution, 2012).

5. Michael Jaroff, Dennis Frenchman, Francisca Rojas, "New Century City Developments Creating Extraordinary Value" (Cambridge: Massachusetts Institute of Technology, 2009).

6. Mark Granovetter, "The Strength of Weak Ties," *American Journal of Sociology* 78 (6)(1973): 1360-1380.

7. Dennis Lower, President and CEO, Cortex

8. Tom Elfring and Willem Hulsink, "Networks in Entrepreneurship: the Case of High-technology Firms," *Small Business Economics* 21 (2003): 409-422.

9. Research Triangle Foundation of North Carolina, "Research Triangle Park: Master Plan" (2011).

10. Professor Etzkowitz, "Innovation in Innovation: The Triple Helix of University-Industry-Government Relations," *Social Science Information*: 3 (2003): 293-337.

11. Peter Hall, *Cities in Civilization: Culture, Innovation, and Urban Order* (London: Phoenix Giant, 1999).

Metropolitan Policy Program
at BROOKINGS

About the Authors

Bruce Katz is a vice president at the Brookings Institution and founding director of its Metropolitan Policy Program. **Julie Wagner** is a nonresident senior fellow with the program.

For More Information

Alex Jones
Policy/Research Assistant
Brookings Metropolitan Policy Program
acjones@brookings.edu

About the Metropolitan Policy Program at Brookings

Created in 1996, the Brookings Institution's Metropolitan Policy Program provides decision makers with cutting-edge research and policy ideas for improving the health and prosperity of cities and metropolitan areas including their component cities, suburbs, and rural areas. To learn more visit: www.brookings.edu/metro

BROOKINGS