THE EVOLUTION OF INNOVATION DISTRICTS THE NEW GEOGRAPHY OF GLOBAL INNOVATION

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he rise of innovation districts continues. In 2014, "The Rise of Innovation Districts: A New Geography of Innovation in America," documented an emerging urban geography of innovation that sits at the intersection of economy-shaping, place-making, and network-building.¹ The growth and rapid evolution of this new geography is in response to broader economic and demographic forces including the pervasiveness of technology.

Innovation districts are, in essence, the physical manifestation of a changing time where the inherent characteristics of the city are enablers of heightened connectivity and knowledge exchange. Unlike science parks and science corridors that use expansive greenways and parking lots to separate institutions and companies, innovation districts embrace the attributes of density and proximity to facilitate collaborative, "open" innovation and strong social networks. Inside these growing and everchanging districts, workers learn new ideas from fellow workers, entrepreneurs learn from nearby mentors, and venture capital firms are more likely to wisely invest in a company they can observe.²

The reaction to the development of this new urban model of innovation was nothing short of astounding. It set off a wave of interest around the world that was both palpable and inspiring. Cities representing all global regions—cities with vastly different economic starting points, uniquely structured by national and state policies, and with distinctive economic and innovation strengths reached out to validate the findings of the paper drawing on local empirical evidence.



In some cities, leaders offered detailed examples of how they, over the past five to 10 years, have been observing, if not gathering evidence on, the concentration of advanced sectors in physically compact geographies. In other cities, leaders illustrated how new partnerships across organizations and institutions in discrete urban geographies were amounting to a new "collaborate to compete" model. And then there were other cities, including smaller and midsized cities and regions, that saw the innovation district model as a new path forward. Here, local leaders looked to their most promising research universities, seeing how- through changes in policy and practice-they could precipitate the development of an innovation district.

Today, by conservative estimates, there are more

than 100 innovation districts emerging around the world. In the United States alone, roughly 20 districts have reached a high level of sophistication, concentrating in close proximity a mix of research institutions, mature companies, start-ups and scale-ups, co-working spaces, and supportive intermediaries. Districts such as these are emerging as powerful economic engines in their cities and metropolitan areas, serving as platforms for research commercialization, firm formation, and mixed-use (often transit-oriented)

development, as well as enhancing tax revenues and, in some cases, energy diversification. The Pittsburgh Innovation District, for example, has emerged as a global leader in robotics, machine learning, and immunology, thanks to the research prowess of Carnegie Mellon University and the University of Pittsburgh and the consistent support of well-endowed philanthropies.

In Europe, mostly concentrated in countries in the north, initial counts reveal more than 40 districts in emerging stages. Clusters of districts can now be found in the U.K., Denmark, Sweden, and the Netherlands—each with a unique set of specializations that commonly draw on its region's historic strengths and advantages. At the same time, new districts are advancing quickly in cities in Germany, Italy, and France with strong public and private involvement and support. Other countries such as Finland, Poland, and Ireland are capturing this moment and are places to watch.

Similarly, cities in Australia, Latin America, the Middle East, and Asia are observing the rise of innovation districts, building off specific innovation and research capacities. Appendix 1 offers an initial list of districts. Deeper research currently under way is revealing a longer and far more extensive list.

Innovation districts are defined as geographic areas where leading-edge anchor institutions and companies cluster and connect with start-ups, business incubators, and accelerators. They are also physically compact, transit-accessible, and technically wired and offer mixed-use housing, office and retail.³

Katz and Wagner, The Rise of Innovation Districts, 2014

The potency of districts is, by their very nature, their complexity and their mixing or integration of what was previously separated and "siloed" people, quality of place, and innovation. The ability for local leaders to braid together different disciplines and approaches is raising questions on how best to begin and what levers to push. The desire to encourage organic, evolutionary growth but also drive intentional, deliberate change is raising valid questions about how to lead, when to lead, and who should lead.



We have seen and are therefore deeply cognizant of these challenges in certain districts. It has, in turn, increased our sensitivity to innovative practice, processes, and policies and how those teachings can be scaled. Since the release of the 2014 paper, increased and deeper engagements with innovation districts across global regions have prompted the authors to offer new insights:⁴

FIRST, successful districts are reaching their full potential through the deployment of asset-based strategies that leverage a district's economic, physical, and social networking assets.

Most innovation districts begin organically through a collection of starting assets-economic, physical, and social networking assets-that constitute the raw materials of an emerging district. To realize their full potential, successful districts are leveraging all three assets to build an innovation ecosystem. In these cases, physical assets, for example, are used to strengthen the competitive advantage of a district, which is often considered a pure economic strategy. At the same time, economic assets are harnessed in ways to strengthen quality of place. This paper illustrates how districts are devising strategies where economic, physical, and social networking assets work in unison to create new synergies.

SECOND, successful districts rely on organizational strategies and structures, particularly a strong governance model and coordinated finance.

In cities like Houston, St. Louis, and Winston-Salem, the governance of innovation districts has evolved from the mere alignment of strategies to more sophisticated interventions around place-making, entrepreneurial support, and data collaboration. These cities and others are also using more sophisticated financing techniques and mechanisms to leverage their distinctive economic, physical, and networking assets. This paper describes these two organizational drivers in detail. FINALLY, innovation districts are contending with the challenge of linking innovation and inclusion, which is leading to the development of inclusion and social innovation strategies to guide their growth.

In the United States in particular, a country experiencing deep economic divides, local leaders and residents have questioned whether innovation districts could ameliorate or exacerbate this complex and longstanding challenge. In response, the imperative for meaningful inclusion—where districts work for everyone—will stimulate what is likely to be a new set of inclusion and social innovation strategies to guide districts in the future. This paper describes this evolution in greater specificity.

As a result of these observations and market demand, the authors and others established a global not-for-profit dedicated to innovation districts. The last four years have revealed that a growing list of local actors are seeking deeper empirically grounded research and benchmarking to evaluate and strengthen their work. It has also helped illustrate the extent to which district leaders—from Australia to Asia to the Americas—are seeking more robust practitioner-led exchanges to share ideas and insights. This level of interest has prompted a small but growing assembly of researchers and practitioners to come together to create a dedicated organization on innovation districts: The Global Institute on Innovation Districts. This paper concludes with more on The Global Institute including its evolving agenda.



To conclude, our research reaffirms the outsized economic, fiscal, and sustainability role innovation districts can play in advancing city and regional prosperity. Their contribution is even more critical given that entrepreneurial dynamism is slowing, national and state investments in cities in many countries are contracting, divisions by income and wealth are expanding, and efforts to mitigate climate change and embrace clean energy solutions face political pushback. We urge the leaders of innovation districts—be they aspiring, emerging, or maturing—to approach their work with deeper intentionality, place greater emphasis on cross-organizational and structural reforms, and to experiment creatively in approaching all aspects of this work.



Innovation districts are the physical manifestation of a changing time where the characteristics of the city are enablers of heightened knowledge exchange. *Photo Credit: Julie Wagner. The Central Innovation District in The Hague.*

WHO ARE THE GROWING LIST OF ACTORS?

As innovation districts have gained traction, the range of actors partially or wholly involved in their development has expanded. These actors include:

- Anchor institutions, such as advanced research universities and medical centers;
- Local, state, regional, and, increasingly, national governments;
- Community, civic, workforce development, and local-serving not-for-profit organizations;
- Anchor and growth companies, particularly those with research and development strengths;
- Start-ups, spin-offs, and scale-ups, which are increasingly eager to be engaged in the development of districts;
- Master developers and major land owners;
- Venture capitalists and other investors; and
- The growing number of intermediaries that work across actors or sectors.



INNOVATION DISTRICTS AND HOW THEY CAN ADVANCE REGIONAL PROSPERITY

A significant share of innovation districts emerging globally are adjacent to strong research institutionsuniversities, hospitals, and other research institutesgiven the high level of translational research under way in areas such as life sciences, engineering, and computer science. Certain institutions focus more heavily on translational research, which builds on basic research and "translates" research findings into products, processes, and services for the market. As this research can have monetary value, institutions define and protect their intellectual property and execute agreements such as license agreements and partnership contracts to transfer knowledge to companies. Companies and firms make conscious decisions to locate near these research institutions to strengthen how they obtain-formally and informally-new insights to drive new products and services for the market. Companies and firms also value proximity for their own competitive positioning, including closer collaboration with other firms, actors within their supply chain, and customers.

With all the various channels now needed to innovate, research institutions, companies, and firms are physically clustering to strengthen their ability to exchange highly complex, technical information. Compared to other types of economic activity, innovation activity requires the highest level of knowledge exchange.⁵ Research shows that R&D activity is far more concentrated than employment, and R&D labs are highly concentrated—research labs in more than one-third of manufacturing industries see colocation benefits at less than a quarter mile or .40 kilometers.⁶

As the network of companies, small firms, and institutions grows, the physical clustering of economic actors can, and often does, evolve into something far more powerful and intentional. Rather than just an "innovation play," the true potency of districts lies in their ability to advance local and regional prosperity. In a world of growing income disparity and discontent with the outcomes of market capitalism, innovation districts can become a powerful vehicle for transforming research strengths and ambitions into an engine that generates new jobs and new income for the region. From Sydney to Phoenix to London, innovation district leaders are now undertaking more deliberate work to think through how research can indeed spark new jobs for residents and future residents. As this paper outlines, the growing imperative to successfully link innovative growth to inclusive growth will stimulate what is likely to be a new set of inclusion and social innovation strategies to guide districts in the future.



Graph 1: Hyper Localization of Knowledge-Intensive Sectors



KEY OBSERVATIONS: REDEFINING DISTRICTS

n emerging geography of innovation that offers new opportunities and avenues for shared growth in cities and regions is a provocative proposition. It has gained considerable traction across a wide cross section of leaders who, for the most part, are still grasping the inherent complexities and challenges in realizing its true potential. This is in part because the model is nascent—still unfolding and maturing within unique cultural and political contexts.

As this model continues to develop, it also means that the growing network of practitioners, researchers, and policymakers leading the development of districts are, themselves, paving new pathways of innovative practice and policy reform. Districts, by their very nature, are living labs where creativity and experimentation intersect with the precision of science. Districts are places that fan the flames of organic, evolutionary growth but also drive intentional, deliberate change. For leaders on the ground, such nuance and seemingly contrasting approaches to growth can lead to confusion, enabling a process to be co-opted by overbearing egos or to slowly erode if not disappear altogether.

We have seen, and are therefore deeply cognizant of, these challenges in certain districts. It has, in turn, increased our sensitivity to innovative practice, processes, and policies and how those teachings can be scaled. Described in this section are three key observations to help districts advance with greater agility and focus.

Today, by conservative estimates, there are more than **100 innovation districts** emerging around the world.



FIRST OBSERVATION: Successful districts are reaching their full potential through the deployment of asset-based strategies that leverage a district's economic, physical, and social networking assets.

he 2014 paper contrasted the rise of innovation districts and earlier models of innovation geographies such as science parks and science corridors. One notable distinction is that innovation districts possess a combination of economic assets, physical assets, and social networking assets. Specifically:

Economic assets are the firms, institutions, and organizations that drive, cultivate, or support an innovation-rich environment.

Physical assets are the public and privately owned spaces—buildings, open spaces, technologies, streets, and other infrastructure designed and organized to stimulate new and higher levels of connectivity, collaboration, and innovation.

Social networking assets are the relationships between actors—such as between individuals, firms, and institutions—that have the potential to generate, sharpen, and/or accelerate the advancement of ideas. The relative strength of these assets in different communities varies considerably.



The simplicity of the above diagram, illustrating the relationship between these assets, continues to help local practitioners and policymakers understand the starting ingredients of a district. Since 2014, deeper empirical analysis of a handful of districts helped establish a process for local leaders to understand or "audit" their starting assets.⁷ An analysis of districts across several global regions has helped clarify how many aspiring or emerging districts simply do not understand which research and innovation strengths to leverage. Auditing assets in these districts is a useful, if not critical, first step.

At the same time, work with more advanced and successful districts revealed how they are becoming more sophisticated in devising strategies to strengthen their innovation ecosystem. Many of these districts are moving past pure "place-based" strategies or pure "innovation-based" strategies and are advancing at least five asset-based strategies that combine economic, place, and social networking assets. The strategies are: 1) creating a clear competitive advantage, 2) building critical mass, 3) facilitating convergence, 4) developing quality of place, and 5) orchestrating a "buzzing," connected community.





CREATING A CLEAR COMPETITIVE ADVANTAGE

clear competitive advantage sets the focus, alignment, and value proposition for how a district can differentiate itself from other districts and other geographies of innovation. This begins by identifying the strongest avenues for translating research into new products and services that improve the quality of life for residents and workers of the city and region, and, potentially, have a positive impact on people and places across the globe.

A clear competitive advantage often means tightening an economic strategy from broad sectors to strong or emerging specializations. In 2016, for example, at least 54 nations boasted of possessing at least one biotechnology hub. North America alone has identified over 30 biotechnology hubs.⁸ A review of the leading hubs for bioelectrics or immunotherapy in transplant or orphan drug development, for example, yields a much smaller list. This exercise alone demonstrates the value of identifying unique specializations and niches within the field of biotechnology to develop a clearer competitive advantage.

To find the best avenue to compete, many districts begin by conducting a regional audit analysis to understand both their strengths and weaknesses.⁹ Several innovation districts, including Dublin, Milan, Oklahoma City, Philadelphia, and Pittsburgh, have recently employed such strategies to coalesce engagement and create a shared sense of purpose among actors, including research and development institutions, government officials, economic development professionals, innovation intermediaries and conveners, and private sector companies.

Fully leveraging a district's competitive positioning requires making important linkages between economic, physical, and social networking assets as illustrated below and on the next page.



Economic assets—specifically the district research and innovation strengths of institutions, intermediaries, companies, and firms—define a district's competitive advantage. Actors in one district could find their strength to be in precision nutrition while actors in another district could find their strength to be in machine learning.

An auditing process, which also evaluates the regional ecosystem, helps districts identify unique specializations, new processes for innovation and development, and/or technological platforms to advance. Physical assets—the aggregate of individual buildings, the range of public spaces, technology, and other infrastructure—underpin the ability of a district to strengthen its competitive advantage.

A clear competitive advantage in precision nutrition, for example, and high-precision parts for power facilities, demand entirely different building stocks with unique specifications, technologies, and other infrastructure. The growth of social networks ranging from informal networking to formal external partnerships—means leveraging people, their know-how, and their relationships to advance a competitive position.

Clarity on which specializations to advance will also help determine what kinds of partnerships and networks to support and strengthen.

CREATING A CLEAR COMPETITIVE ADVANTAGE: HOW ASSETS TRANSFORM INTO STRATEGIES

ECONOMIC ASSETS: With clarity on research and innovation strengths if not specializations, district leaders can identify and then implement specific strategies to strengthen their advantage. Examples of strategies to strengthen competitive advantage include:

- New alliances, partnerships between actors (e.g., institutions and industry);
- A pooling of resources to advance promising research;
- New intermediaries to advance promising areas of research;
- Linking district and/or regional start-ups to emerging specializations (e.g., mentorship programs, contracts); and
- Creating strong talent-growth strategies to create a new competitive position with local and regional residents.

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PHYSICAL ASSETS: Area actors will want to examine how place assets are strengthening the district's competitive advantage. This can include:

- Making key investments in specialized technologies;
- Ensuring close proximity among buildings and situating key researchers closer together;
- Opening up private labs to other district actors to expand their participation in competitive areas; and
- The mixing of uses, amenities, and highquality place-making strategies to make these places desirable and people-centered.

Another role of the physical is to create a vibrant, open, and connective environment that attracts talent, firms, and the diversity of people who live in the region. This is essential irrespective of the competitive play.



NETWORKING ASSETS: Similarly, building off a competitive advantage, districts will want to make sure social networking is aligned and uniquely tailored. Examples of strategies include:

> • Designing unique technological training courses and classes;

- Implementing tailored forums and structured work sessions to advance specializations;
- Creating network opportunities between top experts and start-ups and scale-ups;
- Orchestrating this alignment with workforce development programs; and
- Designing programs to help students (high school and college) learn/understand these specializations.



BUILDING CRITICAL MASS

chieving critical mass means creating a density of economic (innovation-oriented) actors, talent, and technologies. This density of assets enables districts to systematically grow and leverage partnerships and transform ideas into products, processes, and services for the market. Beyond traditional research and development, districts should also be places that grow a critical mass of actors and intermediaries that strengthen economic inclusion.

Emerging innovation districts should first identify their competitive advantage and then create a

critical mass around key specializations rather than compete against top districts on a general basis. Critical mass is built over time by first understanding the research and development focus of intellectual anchor(s) and/or major R&D companies, and then adding new economic actors, innovation infrastructure, and other investments essential to productive growth.

Building critical mass therefore requires making important linkages between economic, physical, and social networking assets as illustrated below and on the next page.



The collection of economic assets within the district must reach a sufficient threshold—well beyond the regional average—to more easily advance and commercialize research specializations. This issue of threshold varies significantly by specialization.

An inadequate level of critical mass, instead, can be enough to encourage companies, firms, and talent to re-locate elsewhere. On the most basic level, physical assets such as the underlying zoning define the density, proximity, and accessibility, which helps define how a district achieves critical mass.

A critical mass of actors and firms in short walking distance will help strengthen knowledge exchange between people and firms especially complex, highly tacit information.

A critical mass of physical assets also includes the necessary physical spaces (e.g., offices and laboratories), other innovation infrastructure, and technologies needed to advance specializations. A critical mass of networks relationships between people and firms—underpins a district's ability to reach its full potential. Physical proximity alone is often not enough.

A greater emphasis on growing and strengthening networks can transform a group of actors and buildings into an *innovation community*.

BUILDING CRITICAL MASS: HOW ASSETS TRANSFORM INTO STRATEGIES

ECONOMIC ASSETS: Once a district's competitive advantage is clear, analysis should determine what gaps exist in the value chain and also why actors will find strategic or operational value in physically locating in the district. This can set off highly tailored strategies such as:

- Creating a *private sector strategy* to motivate specific companies or R&D labs to move to the district;
- Designing an *institutional strategy* to lure institutions (e.g., satellite campuses) with a particular research strength;
- Orchestrating a *strategy around intermediaries* to attract or build those important cross-cutting actors;
- Devising a *talent attraction strategy* around unique specializations and niches;
- Shaping a *talent retention strategy* to ensure talent (and families) stay; and importantly,
- Designing a *talent growth strategy* to grow regional talent into these areas of specialization.

PHYSICAL ASSETS: Building off the strategies that strengthen the critical mass, physical strategies help reinforce this work and often include:

- Changing the underlying conditions of density and mixing (making possible higher concentrations of economic actors and a diversity of talent);
- Making key investments in innovation infrastructure (e.g., wet labs, dry labs, shared lab facilities) that match the needs the district;
- Opening restaurants and other amenities; and
- By means of both design and programming, creating shared and private meeting spaces that vary in size to accommodate a range of people and encourage a range of activities, including community events (organizations, citizen groups, private event users, regional businesses).

ECONOMIC ASSETS NETWORKING ASSETS NETWORKING ASSETS

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NETWORKING ASSETS: A critical mass of actors also means a critical mass of people and networks. This can often translate into developing a social networking strategy that engages this growing list of actors. This can include:

• Engaging people within the private sector with other actors such as institutions;

• Helping the range of researchers and thinkers work across institutions;

- Orchestrating efforts across intermediaries to be mutually supporting and not competing; and
- Creating programs and trainings to attract talent, grow talent, and retain talent. Dedicated efforts in these areas are often the only avenue to strengthen the connections between innovation actors and communities, residents, and local groups.



FACILITATING CONVERGENCE

he concentration of research and researchers in deep industry verticals undeniably strengthens the competitive advantage of innovation districts. Yet much of research driving new technology platforms, like next-generation energy, information technology, and new materials, is increasingly multidisciplinary.¹⁰ New drugs come from interactions between chemists, biologists, big-data specialists, and computer science—a process of convergence where disparate sectors and disciplines come together as a means to innovate. A team of researchers at the Massachusetts Institute of Technology (MIT), for example, put forward a report arguing that solving health challenges will come only from convergence—a research strategy that integrates disparate disciplines such as biomedicine, computing, and mathematical sciences.¹¹

Facilitating convergence means creatively encouraging multi-disciplinary approaches to problem-solving through informal and formal collaborations. This requires making important linkages between economic, physical, and social networking assets as illustrated below and on the next page.

ECONOMIC ASSETS

While convergence often occurs organically, districts can accelerate convergence through intentional strategies and partnerships between economic actors. PHYSICAL ASSETS

Physical assets facilitate convergence by creating new physical platforms for different actors and sectors to work horizontally as opposed to vertically. NETWORKING ASSETS

Social networks are the lifeblood for cross-sector work as convergence begins with new connections between people and firms across sectors. Sociologist Mark Granovetter described this as the development of "weak ties."¹²

FACILITATING CONVERGENCE: HOW ASSETS TRANSFORM INTO STRATEGIES

ECONOMIC ASSETS: Convergence can be supported through a range of economic strategies such as:

- Incentives to encourage institutions and industry to work together (e.g., changes in contracts);
- Intermediaries with the core mission to work across strong but disconnected sectors or specializations;
- Agreements across actors and sectors to work on cross-cutting initiatives (e.g., joint research agreements, pooling of resources); and
- Creative financial instruments that, for example, make possible the co-hiring of researchers between institutions and industry.

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PHYSICAL ASSETS: Convergence can also be strengthened through placebased strategies. This can include:

- Changing the underlying conditions of density and mixing (which allow close proximity of firms and people);
- Physically co-locating a diversity of researchers to work on cross-cutting projects;
- Purchasing key technologies such as advanced computing;
- Creating open access to technologies for a range of stakeholders to use;
- Intentionally creating proximity between key buildings with a range of converging research activities; and
- Creating physical nodes or "hot spots" of convergence (e.g., a higher concentration of uses and activities within a one-block radius).



NETWORKING ASSETS: To facilitate convergence requires a number of social networking strategies. This includes:

- Well-designed programs that push disciplines together across the district;
- Informing researchers and others of the work under way in the district to help foster new connections; and
- Hiring a dedicated person to curate relationships across firms, institutions, and specializations.



DEVELOPING QUALITY OF PLACE

s described in the introduction, a fundamental distinction between innovation districts and other geographies of innovation is the physical landscape and the role it plays in advancing an innovation ecosystem. While enabling innovation is a central objective, the primal role is to *create quality places for people*. Innovation districts are a mix of uses and activities, including housing, neighborhoodserving retail, and community spaces, which make districts vibrant, open communities. The complexity inherent in "place" demands that the full range of assets contribute to what is an evolving process of place-building.

and feeling as a community. Their

design, and ground floor use of

individual decisions on architecture,

buildings can either contribute to a

district's quality of place or erode it.

As outlined in a recent article for the Brookings Institution, Wagner noted how it is challenging to find a consistent quality of place across most districts. Part of the reason is that many districts are still undergoing the process of transformation, and more work still lies ahead.¹³

Developing quality of place requires making important linkages between economic, physical, and social networking assets as illustrated below and on the next page.



in the development of quality ofthplace. Many districts undergooa master planning process anddengage master developers topcreate a more orchestrated builtseenvironment. Other districts take aemore incremental approach.b

Quality of place is also defined by those who can access and/or feel ownership in a space. People in a district who *feel connected* to other people within the district transform seemingly random buildings of real estate into a community.

DEVELOPING QUALITY OF PLACE: HOW ASSETS TRANSFORM INTO STRATEGIES

ECONOMIC ASSETS: Economic actors, including the community, have an important role to play in developing quality of place. This includes:

- Developers, individual owners, and prospective tenants demanding that buildings and the public realm contribute to quality of place and innovation porosity (e.g., the transparency of the skin of the building);
- Researchers and other workers being allowed, if not encouraged, to work in other spaces other than closed offices; and
- Engaging the public and district stakeholders in how to design and shape spaces to increase a feeling of ownership and usability.

PHYSICAL ASSETS: There are easily hundreds of large and small physical strategies necessary to create a quality of place that will attract a range of people to the district during different times of the day and on weekends.

Some of the driving principles that help guide these strategies:

- Strengthening accessibility within the region and within the district;
- Creating openness and porosity; making innovation more open and visible;
- Ensuring a high-quality walkable and "linger" experience;
- Providing a range of uses (e.g., housing) that draw a diversity of people;
- Avoiding cookie-cutter designs; and
- Valuing public spaces.



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NETWORKING ASSETS: A powerful way to transform real estate into an innovation community is through programming. This is often achieved by:

• Developing unique programs to unique spaces and places such as public innovation halls, open spaces;

• Re-thinking how to program specific lobbies and ground floors within and across the district;

- Thinking through a district-wide approach to social networking (which can make the district a destination) as much as thinking about how to design programs within a particular node or "hot spot" (e.g., within a one-block radius); and
- Designing programs for residents, local workers, and others aiming to access the innovation economy.



ORCHESTRATING A "BUZZING," CONNECTED COMMUNITY

ocial networks are an asset that defines innovation districts and for good reason. Research reveals how networks are increasingly valuable and prolific within innovation-driven economic clusters. Scholars cite numerous advantages of networks: They are important sources of new or critical information for new discoveries; they encourage experimentation and are a testing ground for ideas; they help firms acquire resources; they strengthen trust and collaboration within and across sectors; and they help firms enter new markets, including global markets.¹⁴ Yet a review of the allocation of time and other resources reveals that this important asset class is the least supported or advanced. This section, therefore, goes a bit deeper to illustrate how social network strategies are valued.

Practitioners of maturing innovation districts have conveyed how the growth and development of networks through programming has transformed their real estate into innovation communities. "It's all about programming, choreographing 'spontaneous opportunities' for smart people to interact with each other," shared one district leader.¹⁵ Interviews with architects and building managers revealed how today's innovation spaces are truly a seamless integration of design and programming.¹⁶ "It's more than just design that builds a community and collaborative environment. It's the balancing of the programming, of spaces, such as labs and general spaces, such as the kitchen, that really create a special environment," shared an applied science start-up space.¹⁷ For emerging districts, these innovation spaces become the beacon of an ecosystem in the making. It helps explain the power and potency of innovation centers such as District Hall in Boston, the Sydney Startup Hub in Sydney, and 1871 in Chicago. This value is particularly evident in St Louis, where the combined programming at Innovation Hall, the @4240 building, and Cortex Commons attracts approximately 800 to 1000 people a week.¹⁸

Over the past four years, district leaders are finding programming as essential as real estate and are hiring staff to design, manage, and implement such programs. The challenge has become ensuring a sustainable stream of funding for such programming without either overly burdening a building's operating costs or continually pursuing fundraising activities that detract from the power of programming. Some innovation district governance structures, such as the University of Maryland Research Park Corporation, University City Science Center, and Cortex, have chosen to implement an innovation district-wide charge against all square footage to be used for elements such as programming, community benefit, and other transformative programming.

Orchestrating a buzzing community can reach its true potential by making important linkages between economic, physical, and social networking assets as illustrated on the next page.



A critical mass of institutions, firms, start-ups, retail—and their people—are essential to create the "buzz."

Physical density and proximity of buildings lay the groundwork for creating a community of connections. Physical investments in high-quality buildings, infrastructure, and public spaces are just as potent in creating the platforms for connections.

PHYSICAL

ASSETS

NETWORKING ASSETS

Social networking assets—when orchestrated, designed, and well-financed—are the linchpin to creating a highly networked, buzzing, and inclusive community. Many relationships simply will not be forged without some level of support or encouragement.



ORCHESTRATING A "BUZZING," CONNECTED COMMUNITY: HOW ASSETS TRANSFORM INTO STRATEGIES

ECONOMIC ASSETS: Specific economic actors can play an outsized role in developing and cultivating networks. These actors include:

- Intermediaries, which can include accelerators and incubators;
- Workforce development centers, which focus on creating connections between residents and work opportunities;
- One-stop-shop centers, which can help streamline processes and create new connections between people and organizations;
- Centers of research excellence; and
- Specific instruments and incentives adopted by institutions and companies to encourage workers to engage outside their organization.

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PHYSICAL ASSETS: The design, layout, and overall relationship of buildings to the broader landscape play a critical role in creating a buzzing community. Physical strategies can often include:

- Building a public innovation hall and/or innovation centers (these require programs inside) to encourage networks;
- The development of concentrated nodes of programmed buildings (where there is high foot traffic) and adjacent public spaces;
- Buildings that can be easily reconfigured internally to empower people to use/change the spaces;
- The design of ground floors for open, community-oriented spaces or work; and
- Integrated public spaces, shaped by communities.



NETWORKING ASSETS: There are a range of strategies to strengthen "strong ties," which are more formalized networks and often within the same sector or discipline. These strategies include:

 Structured network events, training, targeted problem-solving sessions, targeted hack-a-thons, meetings with global experts, and much more.

There are also a range of strategies to strengthen "weak ties," which are networks of people who do not normally know each other and often have different experiences and education. These strategies include:

• Open, network events with guest speakers, technology training and new development workshops, cultural events, matching events, events between residents and researchers, and much more.

SECOND OBSERVATION: Successful districts rely on *organizational strategies and structures*, particularly a strong governance model and a coordinated finance structure.

he success or failure of innovation districts depends on key institutions and leaders governing with intentionality and unlocking and leveraging various forms of capital. This section explores these two essential organizational strategies: governance and finance. In both governance and finance, most of the models described are located in the United States as there are numerous models evolving out of a highly networked approach to leadership. In future papers, and as part of The Global Institute on Innovation Districts, new governance and finance models outside of the United States will be examined and explored.

GOVERNANCE

Over the last four years, one of the elements that has risen in importance and priority is governance. Innovation districts have distinct institutional and governance challenges that reflect their unique economic function, land use and ownership pattern, and socio-economic composition. Increasingly, stakeholders in mature and emerging districts are finding that they need strong organizations to a) leverage their economic, physical, and networking assets; b) maximize the inclusive potential of innovative growth; and c) create a sustainable funding model for non-economic elements such as public spaces and programming. Thus, the rise of innovation districts is catalyzing the formation of new (or reformed) institutions and governance models to carry out a range of functions that include real estate development, place-making, place management, and place marketing, as well as support for entrepreneurship, programming, and skills training.

> Innovation districts, such as the Buffalo Niagara Medical Campus, can range quite considerably in size. While Buffalo is 142 acres or 57 hectres, others are easily twice this size. Variations in size mean these districts have to think differently about how to create critical mass.

Getting Started

In many cities, the first step toward establishing an innovation district is to pull together public, private, civic, and university actors which already have a presence in the area. Sometimes the national, state, or local government takes the lead in convening an initial gathering of key actors. This was the case for Australia's Sydney Technology and Innovation Precinct, for example, where the New South Wales state government organized a formal task force comprising a range

Buffalo Niagara Medical Campus (BNMC) Buffalo, United States

Top Research / Innovation Strengths:

· Genomics, big data & the microbiome

- AI & machine learning
- Next-generation technologies in vascular medicine

Key Anchor Institutions:

Roswell Park Comprehensive Cancer Center; University at Buffalo (UB) Centers of Excellence in Biotech and Life Sciences, Material Informatics, and Computational Research; Buffalo General Medical Center; UB Jacobs School of Medicine and Biomedical Sciences; Kaleida Health's Oishei Children's Hospital; Hauptman-Woodward Institute; Buffalo Medical Group; and Buffalo Hearing and Speech Center.

Number of companies and start-ups:

More than 150 private companies, including a dynamic and growing cluster of technology, life sciences, bioinformatics, energy, and social innovation companies, and not-for-profit organizations.

Housing:

Significant existing housing (all income levels) within three adjacent neighborhoods. Limited amount of market rate housing and low-income housing is found within district. Proposed student/ workforce apartment units within the district.

Public transportation: Connected by the NFTA Metro Rail with two stations in the district and five bus routes through the district. Recently completed \$500M transit-oriented development.

Amenities:

57 hectares

or

142 acres

BNMC has over 20 restaurants, over 10 pieces of outdoor public art, a hotel, and urban greenspace. The district also has over 25 electric vehicle charging stations, and secure bike parking. of government agencies, universities and medical institutions, industry, and a range of civic and non-profit organizations.¹⁹ In the United States, the catalyst for convening is often the leading business organization and research institutions.²⁰ Other districts in Europe, organize themselves through the triple-helix or quadruple-helix model, where leaders across institutions, industry, government, and community come together to engage.

Putting regional variations aside, what fundamentally matters is that leaders-those with the clear mandate and ability to make key changes in policy, programs, and finance-are supportive of this new model of collaborative growth. Intensive work with dozens of innovation districts around the world reveals that many aspiring and emerging districts are getting mired in process. Large meetings or the wrong meetings are being held where decisions are simply not being made. A review of how mature innovation districts advanced in their initial stages reveals that early meetings included just a few top leaders to discuss a new "collaborate to compete" model and what this means for each leader and organization. To create a shared agenda, for example, could mean a sharing of research, a sharing of researchers, new intermediaries to assist, and shared investments in technological platforms. Deep conversations with leaders to discuss this approach simply cannot be skipped.

The goal of this initial organizing phase is often to conduct an assessment of the area's disparate economic, physical, and networking assets to ascertain the organic strength and distinctiveness of the innovation district and logical next steps forward. For districts backed by advanced research institutions, such assessments can be quite extensive and involve the hiring of consultancies or think tanks with deep expertise in innovation districts in general or particular economic sectors.²¹ It is critical to understand the innovative strength, sectoral focus, and commercialization potential of university and corporate R&D, since the location of these economic assets will often drive the physical configuration of the district (along with other starting points like the existence of retail, residential, recreational, and cultural amenities).

It is tempting for government officials to designate and declare an area of a city an innovation district in hopes of attracting companies and activity to an underserved area or an area needing economic revitalization. Similarly, developers have flocked to old warehouses or factories, added co-working space, and quickly labeled these investments as innovation districts. The downside of these approaches is that they often focus exclusively on the physical development of real estate and miss the deeper dynamic that sets these districts apart from conventional office spaces found in a central business district or the suburban office park.

Advanced Manufacturing Innovation District (AMID)

Sheffield, United Kingdom

Top Research / Innovation Strengths:

• Advanced materials with specializations in metals, composites, light weighting, and Industry 4.0.

• Energy generation, storage, management, and security

Key Anchor Institutions:

The Advanced Manufacturing Research Centre (AMRC) with Boeing, AMRC Light Weighting Facility, AMRC Casting, Factory 2050, Royce Translational Centre (RTC), Nuclear AMRC, Energy 2050, 1500 hectares AMP Technology Centre, or 3700 acres Dynamics Laboratory for Verification and Validation (Dynamics LVV), Integrated Civil Infrastructure **Research Centre** (iCAIR), Advanced Wellbeing Research Centre

(AWRC), and Centre for Child Health Technology.

Number of companies and start-ups:

100 companies across the research campus; more than 135 advanced manufacturing businesses across the wider AMID.

Housing: The AMID is

situated adjacent to the residential site of Waverley where over 4,000 new homes have been approved for construction. Public transportation: The AMID has 11 bus stops and three bus routes. Nearby tram connecting Sheffield and Rotherham.

Amenities: Café, conference/meeting facilities, Kidz@Work Nursery, and hotel.

• Healthcare

technology

All innovation districts, such as Sheffield's Advanced Manufacturing Innovation District (AMID), possess unique innovation specializations. While the AMID has specializations in advanced materials and energy, other districts are strong in life sciences, such as genomics or immunology.



Naming, Alignment, Development, and Marketing

s innovation districts take shape, the next logical step is to go from the informal to the formal and establish a mission-focused organization. This generally requires the creation of a governance structure that includes the key stakeholders, consensus around a core set of principles and functions, and the hiring of staff, particularly a CEO or executive director, with core competencies. Organizational functions generally include, at a minimum: a) naming an official innovation district; b) designing and delivering joint activities around programming and knowledge sharing; c) outlining a strategy and process for real estate development; and d) promoting or marketing the innovation district. Over the past several years, cities as diverse as Austin, Cincinnati, Oklahoma City, and Pittsburgh have created new entities to act as conveners and marketers in advance of the development of innovation districts.²² In the case of the Melbourne Innovation District in Australia, this responsibility is jointly shared by the city of Melbourne, the University of Melbourne, and RMIT.23

As new innovation district organizations emerge, it is clear that realizing the full potential of a district differs from prior urban revitalization strategies or economic development initiatives. On one hand, the aim of an innovation district is to build an innovation community, not just a collection of buildings. Every district decision should, therefore, answer the fundamental question of how it contributes to growing an innovation community. On the other hand, even with a new approach to growth, it still requires staying focused on traditional real estate development activities such as master planning, setting design standards, outlining suitable use criteria, and establishing strong streets and good walkability as these functions contribute to the density, connectivity, and activation that promote a sense of place and community.

> To grow and thrive, the institutions, firms, and other organizations that comprise an innovation district need to have access to other actors in the regional innovation ecoystem. A range of public transportation options, which can be found in the Melbourne Innovation District, unlocks this potential.

... the aim of an innovation district is to build an innovation community, not just a collection of buildings.

At the same time, one of the most compelling and challenging dynamics of innovation district strategies is the notion that, unlike past cluster strategies, the identification of the core area of technological competitive advantage has to at least some degree not be prescribed up front but rather emerge from the organic interactions that the district facilitates. Innovation districts embody a natural tension between some degree of upfront targeting and analysis of technical strengths with a continuous discovery model that evolves and iterates over time.



include 1900 student

apartments.

Building Out a District

n a select number of districts, two discrete models have emerged to take an innovation district to a more sophisticated state. As noted earlier, the majority of these models are found in the United States. One possible reason for this is the extent to which innovation districts are conceived and led by non-governmental organizations, including universities, non-profit organizations, and/or a broad cross section of economic actors.

The "Dominant Player" Model

In several cities, one large anchor institution dominates land ownership and use in the innovation district, facilitating a streamlined approach to governance. Sometimes governance happens within the anchor institution via internal offices of real estate, facility management, or tech transfer. Purdue University, for example, first created the Purdue Research Foundation (PRF) in 1930 to facilitate getting the discoveries of the university into the hands of industry. Today, PRF manages a research park, several technology incubators, and its emerging innovation district, Discovery Park, located on its main campus in West Lafayette, Indiana. The PRF model is exceptionally comprehensive in that it includes all elements of innovation, from discovery disclosure to technology transfer, business creation and incubation, corporate engagement, and innovation place-making and programming, within its purview.²⁴ Other similar successful models include the Stanford Research Park, Imperial College London's White City Campus, and King Abdullah University of Science and Technology in Jeddah, Saudi Arabia.²⁵

> Innovation districts, such as the Wake Forest Innovation Quarter, offer a range of housing choices for residents. Housing helps create an important mix of people and creates the 24/7 activity that makes districts thrive.

In some cases, it makes sense for an institution to charter a new entity for governance. For example, in 1998 the Wake Forest Baptist Medical Center partnered with civic and business leaders in Winston-Salem, N.C. to envision a biotechnologyfocused innovation district on the edge of downtown. Initially named the Piedmont Triad Research Park, and today known as Innovation Quarter, it consisted of a building owned by the medical center. However, the entity was a perfect conduit for R.J. Reynolds to donate their tobacco factory buildings and 38 acres to create an innovation district of scale and impact. Today the Innovation Quarter consists of 1.9 millionsquare-feet of lab and office space, a conference center, park, and over 1100 units of housing with another 600 under construction.²⁶ The build-out of Harvard University's Allston campus could follow a similar route.27



American produce: Balley Park, a 1.0-acre publicity accessible green space for hosting community events; the Long Branch Trail, a 1.7-mile paved trail that connects to the city's 30 miles of greenway system; Coal Pit, a 14,000-square-foot entertainment venue behind the renovated Bailey Power Plant; five restaurants within the district; and 116 restaurants/bars/clubs within walking distance.

The "Multi-Stakeholder" Model

When multiple anchor institutions co-locate, intermediaries have emerged to design and deliver collaborative efforts on activities that enhance the performance of the district as a whole. Some of these intermediaries have been in existence for several decades and have evolved over time to take on new responsibilities. One of the first organizations to undertake this was the University City Science Center in Philadelphia, Penn. First established in 1963 by the University of Pennsylvania, Drexel University, Children's Hospital of Philadelphia and 27 other research and educational institutions, today it governs a 24-acre innovation district, named uCity Square, which is part of the larger University City District. It comprises 16 buildings, and manages several entrepreneurial assets and programs, including the Quorum, Phase One Ventures, and First Hand, a community-oriented STEM program.²⁸

This is also what has occurred at Houston's Texas Medical Center, where an entity originally created with a narrow purview (overseeing parking) has now taken on more expansive innovation-related activities (e.g., forging a data collaborative across multiple health research institutions, working with Rice University on a new innovation campus in Midtown Houston, and establishing a series of accelerator programs at TMC-X and with Johnson & Johnson's JLabs).²⁹

As innovation districts evolve, stakeholders are creating new organizations to manage, market, and oversee the development of substantial sub-geographies. Like Philadelphia's Science Center, these organizations can have an outsized economic impact, especially in secondary cities. The Cortex Innovation Community in St. Louis is one of the best examples of these organizations at scale. The district's origin and evolution are recounted in the original 2014 district paper by Katz and Wagner and in *The New Localism: How Cities Can Thrive in the Age of Populism.*³⁰

In 2002, a group of anchor institutions—Washington University, Saint Louis University, the University of Missouri-St. Louis, BJC HealthCare and the Missouri Botanical Gardens—collectively established a non-profit corporation to oversee the development of a 200-acre innovation district in the heart of St. Louis. The district is known as the Cortex Innovation Community (Cortex is an acronym for the Center of Research, Technology and Entrepreneurial Exchange). The state and the city granted the corporation several critical powers: the power of eminent domain, the power to abate taxes, and the power to approve or reject building plans.

In 15 years, Cortex has become the St. Louis area's largest innovation hub, generating 4,200 tech-related jobs and more than \$550 million in investment. Taking advantage of the proximity of major research universities, Cortex has leveraged the creative mix of university talent, mature companies, start-up firms, and research labs.



Number of companies and start-ups:

415 start-ups, established corporations, and ancillary retail and professional service organizations. Since 2010, 380 additional tech-related businesses and support organizations are in the district.

Housing:

The core district has 1,000 existing and proposed multi-family units with over 20,000 multi-family and single family units in the surrounding neighborhoods.

Public transportation:

Connected by the MetroLink commuter rail line with a station in the center of the district and multiple Metro Bus lines. Amenities:

The district has 11 restaurants in and immediately adjacent to the district. There are three hotels, and over 40 restaurants and bars in the surrounding neighborhoods.

Innovation districts, such as Cortex, are shaped by anchor institutions, which develop cuttingedge research and can play a leadership role in advancing district goals. Anchor institutions are research-intensive universities, hospitals, and other research-oriented institutions. In particular, Cortex has created six innovation centers, each with its own community and programming; in several cases, Cortex has attracted nationally known intermediaries such as the Cambridge Innovation Center to base facilities in the district.

16 Tech in Indianapolis, Ind. and Cleveland's Health Tech Corridor are two innovation districts that have the capacity to follow the Cortex model.³¹

Irrespective of the selected model, several observations emerge from the pace of institutional transformation under way in innovation districts. Given the range of potential functions that institutions must perform, strong organizations must have internal capacity, as well as public sector relationships, community standing, and private sector credibility, to effect change. This is particularly true given the growing imperative to complement innovation moves with inclusion strategies.

Given the complexity of discrete functions and the multi-phase, multi-year timeframes, some institutions are choosing to import expertise by partnering with organizations that have proven track records. Cortex (St. Louis), uCity Square, which is part of the University City District (Philadelphia), and Innovation Quarter (Winston-Salem) have partnered with private developers to provide innovative real estate strategies and development.

We anticipate seeing a number of new models conceived in Europe, Israel, and Australia that build off a common governance structure, such as a development corporation, and expand its mission and purpose to developing and financing important aspects of growing innovation ecosystems.





FINANCE

his section covers the finance structures being employed by a number of districts. Like governance, the majority of models are based in the United States. Future research aims to uncover new finance models evolving in other countries as part of The Global Institute on Innovation Districts.

Realizing the full potential of an innovation district entails leveraging the economic, physical, and networking assets that a district possesses. This requires investments in a broad range of activities and projects, each of which has a distinct financing convention. However, they all are still subject to the laws of economics, especially when it comes to the development of the real estate that comprises their physical places.

Leveraging economic assets, for example, requires angel, seed, and venture investments in companies, as well as capital and operating expenses for intermediaries that provide mentoring and other support.

Leveraging physical assets, for example, necessitates access to layered finance (debt, subsidy, and equity) for real estate development (particularly when it entails the adaptive reuse of historic properties) as well as capital for infrastructure improvements (e.g., transit, bike lanes, complete streets, parks). And as more innovation districts are becoming mixed-use in nature, each asset class—lab/office, innovation/co-working, housing, hospitality, retail, amenity, public space may utilize a different capital stack.

Leveraging networking assets requires the financial ability to activate public spaces as well as provide constant and relevant programming. More often than not, these elements are not financially sustainable without a significant degree of public subsidy, private philanthropy, or cross-subsidization.

Therefore, financing such a broad and disparate range of activities and projects is a complex enterprise and requires a blend of public, private, and civic capital as well as mature financing mechanisms. The nature of the mix is dependent on several factors, including the size and robustness of the local real estate market (e.g., weak, moderate, or strong); the balance sheets and financing sophistication of the anchor institutions and development community, the strength and risk appetite of local investors, the capacity of local government and philanthropy, and the existence of stable funding mechanisms that can raise revenue and capture value for key investments.

Anchors hold outsized sway in this environment. Many universities have extensive real estate holdings adjacent to their campuses or in other desirable urban and suburban locations. In a strong market, the anchor can ease the cost of land acquisition, making the project more affordable for innovation uses that support their mission (as opposed to high-end condominiums), and in weaker markets the institution can leverage its space needs to act as a catalyst to get a project started. For instance, Duke University is widely credited with acting as the stimulus for the rebirth of downtown Durham; the same can be said of Arizona State University in downtown Phoenix and Imperial College London in White City.³²



Innovation districts, such as the Amsterdam Innovation District Zuidas, are not just centers of innovation; they are also walkable locales where people can eat, shop, play, and relax. Quality of place and place-making are important attributes of districts, and a core strategy for districts. Since market dynamics, building type, use and condition, programming, community engagement, and other elements of an innovation district can vary widely from market to market, practitioners must be adept at understanding and applying a variety of financing mechanisms to achieve financial viability.

Government, at all levels, plays critical roles across the financing spectrum. In the United States, for example, federal and state governments often provide foundational support for basic science and applied research, the platform for transformative innovation, as well as various forms of financing and tax incentives for start-up companies.

On place-making, federal programs in the United States (such as Historic Preservation Tax Credits, Low-Income Housing Tax Credits, New Market Tax Credits, and Opportunity Zones) bring with them vehicles for new sources of capital to facilitate creating community benefit such as affordable housing, community centers, or innovation spaces. Many states and provinces have specific programs to assist with adaptive reuse of historic structures. For example, North Carolina's Mill Credit program made it feasible to redevelop 1.2 million square feet of former R.J. Reynolds Tobacco factory buildings in Winston-Salem, thereby saving these beautiful buildings while providing a unique sense of place for the Innovation Quarter. Similar programs have been successfully employed in Durham, N.C., Providence, R.I., Pittsburgh, Pa., and Cleveland, Ohio.

On networking, the federal government and many states also provide funding for strengthening local innovation ecosystems. At the federal level, the Economic Development Administration provides funding for enhancing capacity; states like Missouri provide support for both incubators and innovation programming on an annual basis through the Missouri Technology Corporation (MTC).33

Municipalities also have a role to play through incentive programs such as TIF districts, tax abatements, and PILOT programs; all of these can be utilized to help innovation districts develop elements and amenities that might not be market viable, but nonetheless are essential to the quality of place and program.

As with competitive advantages, innovation districts have distinct starting points on investment capacity and potential. Research universities, for example, are not created equal in the size of their endowments or in their access to conventional (e.g., bonding authority, bank debt) or unconventional (e.g., alumni gifts) funding. Innovation district institutions, likewise, have different abilities to raise reliable funding and different levels of discretion to deploy such funds.



The University of Milan, The Human Technopole Research Institute.

Number of companies and start-ups:

MIND is planned to develop spaces for over 100 companies and start-ups. This will include dozens of new laboratories and imaging facilities.

Housing:

The current plan anticipates 3500 residents, who will live in a range of housing types and densities. This includes 1100 student housing beds and 1000 units of housing.

Public transportation:

Connected by the M1 Metro light rail line with one stop located in the District.

Amenities:

Retail restaurants coffee shops, a small grocery store, and other amenities are planned.

Innovation districts, such as the Milan Innovation District, are working hard to create a mix of activities and users right from the start. In this case, Milan is looking to create new innovation spaces, housing, retail, and new parks within steps of each other. This "magic in the mix" is what many mature innovation districts have achieved.



THIRD OBSERVATION: Innovation districts are contending with the challenge of linking innovation and inclusion, which will lead to the development of *inclusion and social innovation strategies* to guide their growth.

he rise of innovation districts is occurring during a period of dramatic demographic transformation and economic restructuring, which are combining to create enormous income, wealth, and health disparities both within and across cities in the United States and beyond. The goal of the "inclusive city"—a city that expands educational and employment opportunities, creates wealth, shares prosperity, and engages residents as cocreators and problem solvers—is becoming more and more elusive. As a result, innovation districts are increasingly subject to heightened political and community scrutiny, requiring closer links between innovation and inclusion to be articulated. designed, financed, and delivered.

Innovation districts have the potential to drive inclusive outcomes for multiple reasons. First, innovation districts can create employment opportunities for disadvantaged residents who live in or near the target area. Second, innovation districts can provide increased tax revenues for local governments, which can then be reinvested in projects and services that directly benefit disadvantaged people and places. Finally, innovation districts can bring innovative practices and new players and resources to bear on challenges that have systemically bedeviled low-income communities (e.g., absence of neighborhood-serving businesses, high unemployment, underperforming schools, and endemic health and wealth disparities).

At the same time, mixing top-down and bottom-up approaches to innovation, scientific, technological, and cultural/artistic activities, while facilitating exchange between newcomers and surrounding communities to enhance levels of collective wealth and well-being, can advance the attraction and competitiveness of innovation districts.

The interplay between innovation and inclusion has a particular geographic intensity in the United States. Unlike traditional U.S. research or business parks, which tended to be situated in rural and suburban areas, innovation districts are disproportionately located in the cores of cities, often surrounded by neighborhoods challenged by economic disenfranchisement and high unemployment. The physical proximity between innovation activities and economically disadvantaged communities is not nearly as stark in Europe or Australia, although economic disparity indeed exists and is an important area of discussion and public policy debate. The new spatial geography of innovation offers intriguing opportunities to be seized and serious threats to be averted. Innovation has the potential to be inclusive and enhance the living conditions and livelihoods of places and people without the downside consequences of displacement that many times accompany gentrification. Similarly, inclusion can be innovative, creating new ways of tackling traditional problems via technological advancement and entrepreneurial dynamism.



Linking innovation and inclusion draws heavily from the theory and practice of social innovation that has emerged over the past decade. President Obama established The White House Office of Social Innovation and Civic Participation when he took office in 2009. In 2010 the European Union launched its

The new spatial geography of innovation offers intriguing opportunities to be seized and serious threats to be averted.

Europe 2020 strategy, with social innovation being defined in the Innovation Union Flagship Initiative as "an important new field which should be nurtured. It is about tapping into the ingenuity of charities, associations, and social entrepreneurs to find new ways of meeting social needs which are not adequately met by the market or the public sector. It can also be about tapping into this same ingenuity to bring about the behavioral changes which are needed to tackle the major societal challenges, such as climate change. As well as meeting social needs and tackling societal challenges, social innovations empower people and create new social relationships and models of collaboration. They are thus innovative in themselves and good for society's capacity to innovate."34

The application of social innovation in innovation districts is still in a nascent, experimental phase. There are, in general, more declarations of aspiration and intent than actual models and initiatives ripe for replication and adaptation. Many innovation districts tend to focus on one or two aspects of inclusion, rather than designing and deploying a comprehensive response.

Yet two early frameworks for positive intervention are emerging that deserve serious focus and attention, by researchers and practitioners alike. On one hand, cities are slowly inventing a practice of inclusive innovation to ensure that innovative growth advances inclusive outcomes, particularly for residents living in or near an innovation district. At the same time, cities are experimenting with multiple forms of innovative inclusion, to bring new kinds of community-led, anchor-supported (as well as technology- and entrepreneurial-driven) problem-solving to lowincome communities.



OPEN LABS at Science Gallery Trinity College Dublin is part exhibition, part experiment – showcasing DIY culture across design, research, technology, and activism. It examines both "exploring and disrupting processes" where a lab can be set up in the kitchen, the forest, the bedroom, or the street. *Courtesy of Science Gallery Dublin.*

INCLUSIVE INNOVATION

nclusive innovation aims to share the benefits of the innovation economy broadly. It seeks to create pathways to labor market participation with specialized education and customized job training. It strives to build wealth via expanding the ownership of homes and businesses. And it tries to create a new model of responsible neighborhood regeneration, where neighborhood improvement can occur without displacement.

Labor Demand/Job Growth: Innovation districts can use the economic power of anchor institutions to drive job growth in areas of deprivation and catalyze the formation of community businesses, minority-owned businesses, and social enterprises. Since the early 2000s, for example, there has been increased focus on using the purchasing power of anchor institutions to create stable demand for the creation or growth of minority-owned businesses.³⁵ In Cleveland, for example, the Evergreen Cooperative Initiative was established in 2008 to create living-wage jobs in the low-income neighborhoods surrounding the University Circle area, home to Case Western Reserve University, the Cleveland Clinic, and University Hospitals. One initiative-the Evergreen Cooperative Laundry-serves the aggregated laundry needs of several hospitals and medical

buildings in the area and provides a replicable model for a minority-worker-owned cooperative business. The Evergreen model, therefore, both grows incomes by giving local residents decent jobs and builds wealth by giving them an equity stake in new companies.³⁶

Labor Supply/Education and Skills:

Innovation districts have a unique potential, particularly in the United States given the localization of education and many skills initiatives, to focus on giving residents who live either within or near these hubs the ability to access existing and future employment opportunities. The educational requirement for many industries continues to increase and it is still estimated that less than half of the jobs in the economy will require an associate degree or less; in life sciences and health districts, the percentage approaches 50 percent.³⁷ This dynamic opens up opportunities to work with communities to create pathways to these wellpaying, middle-skilled jobs. At the same time, access to first-class education institutions and more informal learning opportunities offered through programming activities can strongly contribute to broadening access to higher education and better job opportunities for disadvantaged communities.



The West Philadelphia Skills Initiative is one example of a place-based workforce training program. *Photo Credit: Ryan Collerd, courtesy of University City District.*

Community College Co-Location: In Baltimore, Maryland, the University of Maryland Baltimore, Wexford Science and Technology, and the office of Senator Barbara Mikulski worked together to expand the Baltimore City Community College's Life Sciences Institute and relocate it in the UMB BioPark. The program works with the Baltimore Public School system, the University of Maryland, and both established and start-up companies throughout the BioPark to ensure every student has internship opportunities and a pathway to employment after graduation. It is interesting to note that the average age of students is 29, which is a function of both young adults entering after high school and older adults working to train for new economy jobs created in the BioPark.38

Secondary Schools: In a growing number of cities, anchor institutions have taken responsibility for opening elementary or secondary schools that have special curricula designed around STEM (Science Technology Engineering and Math) in general or specific sectors in particular. Phoenix has a Biomedical High School in the Phoenix Biomedical campus that works with both the University of Arizona and Arizona State University;³⁹ there is also Bravo Medical Magnet School in East Los Angeles, adjacent to the USC Health Science Campus, that USC works with on numerous programs.⁴⁰ In St. Louis, Cortex has created the Collegiate School of Medicine and Bioscience, a magnet high school.⁴¹ Students come from all over the region, representing the largest spread of ZIP codes of any regional public school.

Workforce Development: In Philadelphia, Pennsylvania, the University City District ("UCD"), a partnership of anchor institutions, small businesses, and residents, has evolved from its original mission of making the area "clean and safe" to providing skills training to local residents. UCD established the West Philadelphia Skills Initiative ("WPSI") to help resolve a complex challenge: "too many unfilled or high-turnover jobs at some of Philadelphia's largest employers and too many unemployed West Philadelphians." Employers in West Philadelphia partner with WPSI when they need to resolve recruitment, high-turnover, or performance quality issues. WPSI then creates training cohorts of eligible residents and designs a customized curriculum that responds to specific hiring needs. Since 2011, the initiative has connected 93 percent of its graduates to employment and generated \$15.4 million in wages for previously unemployed West Philadelphians.42

Construction and community

engagement: In Milan, Italy, Lendlease, the developer of the Milan Innovation District (MIND), has created an initiative to train and employ ex-offenders for construction jobs, in close partnership with local, national, public, and private stakeholders. A socio-economic impact framework has been designed to monitor the outcomes of the initiative with a view of making it sustainable and scaling it up from 2021 onward. At the same site, MIND Education was launched by Arexpo in 2017 and is now supported by all the anchor institutions.43 The initiative aims at engaging students-from primary schools to universities-to designing MIND according to their needs and priorities and/or to coming up with solutions for urban regeneration and project-specific challenges. These may include communicating the project, bringing together scientific activities with artistic and creative approaches, managing the use of water, or building magnetic public spaces. At the same time, students are provided with new skills such as project management, creativity, and critical thinking, as well as with training opportunities and career advice for secondary and tertiary education students.44

Neighborhood Revitalization: In Buffalo, N.Y., the Buffalo Niagara Medical Campus has been involved in efforts to partner with residents and community organizations in adjoining neighborhoods to address issues such as "housing density, neighborhood sustainability, transportation and parking, and economic opportunity."45 The city government has also taken steps to mitigate gentrification and avoid displacement in the adjoining Fruit Belt community by transferring vacant lots to the community-led Fruit Belt land trust.46 The University of Maryland Baltimore and the University of Southern California are working with their respective cities to implement neighborhood home ownership programs adjacent to their innovation districts.

INNOVATIVE INCLUSION

hile inclusive innovation increases access to the benefits of the innovation economy, innovative inclusion empowers whole communities to solve problems in a different way. This approach is a function of both proximity and the fact that grand challenges and hackathon style activities are a common tactical feature of innovation districts, given their value in catalyzing cross-disciplinary, open innovation, and system integration breakthroughs. These kinds of tactical interventions are well suited to tackling longstanding social and economic challenges.

Civic Engagement: In Philadelphia, Pennsylvania, Drexel University has embraced a vision to become the most civically engaged university in the United States. The university has created the Dornsife Center for Neighborhood Partnerships as an "urban extension center: It offers various programs to place Drexel students, faculty, and staff alongside community members to solve problems in West Philadelphia."47 Drexel has brought the same long-term focus to both market development and social innovation. The university's signature physical development, the \$3.5-billion Schuylkill Yards innovation campus, will be built out over 20 years, creating thousands of highquality jobs. That gives the university 20 years to make sure that a child born today in the nearby high-poverty Mantua community is able to get those jobs. To that end, the university has laid out an ambitious "cradle to career" pathway for children and their parents, striving to link its place-based, innovation, and community work into one coordinated effort.

Minority Entrepreneurs: The low share of minority entrepreneurs and minority-owned businesses remains a serious challenge to wealth building. To that end, the growth in entrepreneurial support intermediaries in innovation districts has also naturally led to efforts to extend the services offered for tech start-ups (e.g., mentoring and legal, accounting, and financing advice) to local, minority-owned businesses, as well as providing outreach for local students. In Miami, for example, Overtown Connect, a program of Venture Café Miami, works to leverage the social network of Venture Café to create new connections among minority entrepreneurs and the business and support community and provide access to talent, capital, and resources for local entrepreneurs in this historic minority community. Other replicable examples include MORTAR in Cincinnati, the Youngstown (Ohio) Business Incubator, and Innovation Depot in Birmingham (Alabama).

Health Disparities: Many innovation districts, particularly in the United States, have competitive advantages in the bioscience sphere, given clusters of hospitals, health care institutions, and advanced research institutions. These areas are often surrounded by communities that exhibit the highest health disparities in their city and region, as measured by multiple metrics. Finding new ways to reduce health disparities at scale is a logical area for extensive investment and experimentation. Innovation districts in Buffalo and Philadelphia have been leaders on this score.⁴⁸



Advancing minority entrepreneurs at CIC Miami through strong programs, access to capital, and other resources. *Photo credit: Alexia Fodere.*

It should be noted that a growing number of efforts around innovative inclusion are occurring outside formal innovation districts but can be captured and codified for replication and

... innovative inclusion empowers whole communities to solve problems in a different way.

adaptation. In Santiago, Chile, for example, IF (the Ideas Factory) has spawned a series of entrepreneurial companies that are designed to solve pressing challenges facing low-income families and neighborhoods (e.g., the high cost of food) through new businesses and market mechanisms.⁴⁹ In Louisville, Ky., Village Capital and Access Ventures have invested equity in and provided loans for a growing number of minority owned businesses as part of a comprehensive economic development strategy that builds wealth. These firms and others are actively pursuing expanding these investment strategies as part of the recently enacted Opportunity Zone tax incentives.⁵⁰

In Europe, interesting experiments are ongoing to support artists and small creative firms and cultural organizations by encouraging multi-disciplinary, open innovation processes. With a festival, a prize, a laboratory, and a museum, Ars Electronica involves the whole city and has been instrumental in turning Linz into a UNESCO city for New Media Arts. The FutureLab, working with private companies, is the research and development motor of Ars Electronica that attracts corporate funds to think creatively about the challenges posed by innovation, presenting them in the form of prototypes, art-pieces, and installations which are then showcased and used by the festival and the museum.⁵¹

The Science Gallery, pioneered by Trinity College Dublin and now a network which will include eight cities by 2020, is a platform of universities, which fosters collaboration between scientists, designers, artists, and entrepreneurs to engage 15- to 25-year-olds with science via exhibitions and educational activities. The themes of the exhibitions are selected based on online feedback with the help of the "Leonardo group," a group of around 50 artists, scientists, designers, and entrepreneurs who are appointed every two years to act as a brain trust of the Science Gallery. The galleries are supported by a mix of public funding, grants, and corporate sponsorships.⁵² At the policy level, the European Commission is supporting these collaborations through its STARTS (Science, Technology and Innovation + the Arts) program.53



At FutureLab, "SimLinz" is an interactive data pool that links historical and current city maps, statistical data, and photos. Linz's central supply lines—electricity grids, district heating, public transport lines, and much more—are also becoming visible. *Photo Credit: rubra, courtesy of FutureLab.*



AMBITIONS MOVING FORWARD: A NEW GLOBAL INSTITUTE

he rise of innovation districts indeed continues—in absolute numbers, in the number of actors engaged in their development, and in the range of challenges they ambitiously take on. They embody both the preferences and conditions of the early 21st century, which, interestingly if not ironically, place great weight on physical contact and connection between people and firms during a time of increased digitization, automation, and the machine.

The arc of this paper offers a helpful narrative about the evolution of both practice and research on the rise of innovation districts thus far. Initial observations outlined in 2014 have become sharper through deeper analytics and on-the-ground practice. Innovative practice in a subset of districts is now pushing the paradigm forward, offering a useful guide for governance and finance. And finally, shifting global trends and changing imperatives will likely lead to an important re-make of the innovation district paradigm, offering new inclusion and social innovation drivers. The evolution of districts, in other words, continues to unfold as we-the practitioners, researchers, and policymakers—work to both realize and globally scale this innovation framework. It also marks a turning point where greater empirical grounding and intentionality are warranted.

With more than 100 innovation districts emerging across the globe, and the potential for easily 200 more, the demand to have stronger empirically grounded metrics that define and differentiate districts will become more pertinent for practitioners and policymakers. With the growing network of government, philanthropic, and private sector leaders engaged in developing districts, the demand for robust, sophisticated exchanges will grow. And with shifting trends and changing imperatives, the demand for new insights and innovative practice will expand. These and other anticipated trends have armed and aligned a small, but growing, group of practitioners and researchers to establish a new global non-profit dedicated to innovation districts: **The Global Institute on Innovation Districts**. The scope of The Global Institute is to:

- Identify and monitor the growth of innovation districts across global regions
- Capture and dissect their main challenges as well as their successes
- Provide detailed evidence-based strategies and data to accelerate their work
- Support communication and shared learning across districts; and
- Foster collective engagement on top priorities—such as access to capital or IP protections—creating norms around growth, finance, and governance

The Global Institute is driven by a clear ambition to help cities and metropolitan regions grow and advance their local and regional economies. Local decision makers—elected officials and heads of large and small companies, local universities, philanthropies, community colleges, neighborhood councils, and business chambers would be wise to unleash them. Global companies and capital would be smart to embrace them. States and national governments should support and accelerate them. And now, a growing network of innovation districts will be further armed to advance them.



APPENDIX 1.

CURRENT LIST OF INNOVATION DISTRICTS

his appendix offers an initial and incomplete list of innovation districts across several global regions. Note that this list does not distinguish between emerging and maturing innovation districts as there is currently no set of defined variables to make this determination. Deeper research under way has identified approximately 160 innovation districts world-wide although not all districts have been confirmed. Please reach out to iozeran@giid.org to help contribute to this list.

The United States:

- Albuquerque, New Mexico: Innovate ABQ (https://innovateabq.com)
- 2. Atlanta, Georgia: Tech Square ATL (http://www.techsquareatl.com)
- Austin, Texas: Capital City Innovation (https://www.capitalcityinnovation.org)
- Baltimore, Maryland: University of Maryland Biopark (http://www.umbiopark.com)
- 5. Birmingham, Alabama: Birmingham Innovation District
- Buffalo, New York: Buffalo Niagara Medical Campus (https://bnmc.org)
- Cambridge, Massachusetts: Kendall Square/ MIT (https://kendallsquare.mit.edu/)
- Chattanooga, Tennessee: Innovation District of Chattanooga (https://www.chainnovate.com)
- 9. Chicago, Illinois: Fulton Market Innovation District
- 10. Chicago, Illinois: Illinois Medical District (http://medicaldistrict.org)
- 11. Cincinnati, Ohio: Uptown Innovation Corridor (https://www.uptowninnovationcorridor.com)
- 12. Cleveland, Ohio: Cleveland Health-Tech Corridor (https://www.healthtechcorridor.com)
- Durham, North Carolina: Durham Innovation District (http://durhamid.com)
- 14. Erie, Pennsylvania: Erie Innovation District (https://www.erieinnovationdistrict.com)

- 15. Houston, Texas: Texas Medical Center (http://www.tmc.edu)
- Madison, Wisconsin: University Research Park (https://universityresearchpark.org)
- 17. New York City, New York: Brooklyn Navy Yard (https://brooklynnavyyard.org)
- Oklahoma City, Oklahoma: OKC Innovation District (http://www.okcinnovation.com)
- 19. Philadelphia, Pennsylvania: University City District (https://www.universitycity.org)
- 20. Phoenix, Arizona: PHX Core (http://phxcore.com)
- 21. Pittsburgh Pennsylvania: Pittsburgh Innovation District (https://www.pittsburgh-id.com)
- 22. Portland, Oregon: Portland Innovation Quadrant (https://www.portlandiq.org)
- 23. Providence, Rhode Island: Providence Innovation & Design District (https://www.195district.com)
- 24. Raleigh, Durham, Chapel Hill, North Carolina: The Research Triangle Park (https://www.rtp.org)
- 25. San Francisco, California: Mission Bay
- 26. St. Louis, Missouri: Cortex Innovation Community (https://cortexstl.com)
- 27. Winston-Salem, North Carolina: Wake Forest Innovation Quarter (https://www.innovationquarter.com)

APPENDIX 1. Current list of Innovation Districts

Canada:

- 28. Kitchener: Kitchener Innovation District (http://www.kitchenerinnovationdistrict.com)
- 29. Montreal: Quartier De L'Innovation (http://quartierinnovationmontreal.com)
- 30. Toronto: MaRS Discovery District (https://www.marsdd.com)
- 31. Vancouver: North Shore Innovation District (https://www.nsidlands.ca)

Latin America:

- 32. Buenos Aires, Argentina: Distrito Tecnologico Parque Patricios (https://www. buenosaires.gob.ar/economiayfinanzas/ distritoseconomicos/distritotecnologico)
- 33. Medellin, Colombia: Distrito de Ciencia,
 Tecnología e Innovación de Medellín
 (http://www.distritomedellin.org)
- 34. Monterrey, Mexico: DistritoTec (http://distritotec.itesm.mx)
- 35. San José, Costa Rica: Ciudad Tec T24 (https://www.tec.ac.cr)

Europe including the UK:

- 36. Amsterdam: Kenninskwartier VU
- 37. Barcelona: 22@(http://www.22barcelona.com/)
- Copenhagen: Frederiksberg Science City (https://frederiksbergsciencecity.dk)
- 39. Copenhagen: Lyngby-Taarbæk Vidensby City of Knowledge (http://vidensby.dk/en/home/)
- 40. Copenhagen: Ørestad Innovation City (https://oicc.dk/en/)
- 41. Copenhagen: Copenhagen Science City (https://copenhagensciencecity.dk)
- 42. Dublin: Grand Canal Innovation District (https://www.tcd.ie/innovation-district/)
- 43. Galway: Galway City Innovation District (http://www.galwaycity.com)
- 44. Glasgow: Glasgow City Innovation District (https://www.strath.ac.uk/workwithus/ glasgowcityinnovationdistrict/)

- 45. Hamburg: HafenCity
 - (https://www.hafencity.com)
- 46. Helsinki: Smart Kalasatama
- (https://fiksukalasatama.fi/en/)
- 47. Liverpool: Knowledge Quarter Liverpool (https://www.kqliverpool.co.uk)
- 48. London: Here East (https://hereeast.com)
- 49. London: Imperial College London White City Campus (https://www.imperial.ac.uk/ white-city-campus/)
- 50. London: Knowledge Quarter (http://knowledgequarter.london)
- 51. Lyon: Lyon Confluence District (http://www.lyon-confluence.fr/en/index.html)
- 52. Manchester: Oxford Road Corridor (http://www.oxfordroadcorridor.com)
- 53. Milan: MIND Milano Innovation District (http://www.mindmilano.it)
- 54. Newcastle: Newcastle Helix (https://newcastlehelix.com)
- 55. Paris: Paris Saclay Innovation Playground (https://paris-saclay.business)
- Porto: Porto Innovation District (https://web.fe.up.pt/~studyresearch/life-atfeup/innovation_district/)
- 57. Rotterdam: RDM Rotterdam Innovation District (https://www.rdmrotterdam.nl)
- 58. Sheffield: Sheffield Advanced Manufacturing Innovation District
- 59. Stockholm: Kista Science City (http://www.kista.com/)
- 60. Stockholm: Stockholm Science City (https://ssci.se)
- 61. The Hague: Den Haag Central Innovation District (https://www.ciddenhaag.nl)

APPENDIX 1. Current list of Innovation Districts

Australia:

- 62. Adelaide: Tonsley Innovation Precinct (https://tonsley.com.au)
- 63. Liverpool: Liverpool Innovation Precinct (https://www.liverpoolinnovation.com.au)
- 64. Melbourne: Melbourne Innovation District (https://mid.org.au)
- 65. Melbourne: Fishermans Bend (https://www.fishermansbend.vic.gov.au/ precincts/general-motors-holden-catalyst)
- 66. Melbourne: Melbourne Biomedical Precinct (https://www.melbournebiomed.com)
- 67. Monash: Monash Science Technology and Research Innovation Precinct
- 68. Sydney: ANSTO Innovation Precinct (https://innovation.ansto.gov.au)
- 69. Sydney: Macquarie Park Innovation District (http://mpid.com.au/)
- 70. Sydney: Sydney Innovation and Technology Precinct (https://www.industry.nsw.gov.au/ business-and-industry-in-nsw/innovationand-research/tech-precinct)
- 71. Sydney: UNSW Innovation Precinct
- 72. Sydney: Westmead Innovation Precinct (http://www.westmeadproject.health.nsw.gov. au/precinct/westmead-precinct)



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a global property and infrastructure group

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Committee, which includes the above Founding Partners, with Bruce Katz representing Drexel University, David Rolls representing Lendlease, and Wilkingson (Will) Germain representing Ventas. The Steering Committee also includes select innovation districts that are guiding the development of The Global Institute's research agenda and network. These districts also participate in a research effort that includes measuring and evaluating their growth and evolution. The growing list of district leaders serving in this role include: Matt Enstice, Buffalo Niagara Medical Campus in New York; Dennis

We want to acknowledge our Steering

measuring and evaluating their growth and evolution. The growing list of district leaders serving in this role include: Matt Enstice, Buffalo Niagara Medical Campus in New York; Dennis Lower, Cortex Innovation Community in St. Louis; Sean Luther, Pittsburgh Innovation District; Graydon Pleasants, Wake Forest Innovation Quarter in Winston-Salem; Marcel van Heemert, Amsterdam Innovation District Zuidas; and Julie Wells, the Melbourne Innovation District (City North). Other members of the Steering Committee include Miquel Barceló, Catalonia Politecnical University; Carrie Kolasky, The Atlantic Council; Thomas Osha, Wexford Science + Technology; and Pamela Puchalski, The American Assembly.

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THE GLOBAL INSTITUTE ON INNOVATION DISTRICTS



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