Developing Common Wealth:
Workspaces for Innovation and Entrepreneurship in Massachusetts

Rachel Belanger
B.A. Environmental Studies
University of Chicago, 2011

Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements for the Degree of

Master in City Planning
at the
Massachusetts Institute of Technology

June 2017

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Signature of Author: __________________________________________________________

Department of Urban Studies and Planning
May 22, 2017

Certified by: ____________________________

Dr. Amy Glasmeier
Professor of Economic Geography and Regional Planning
Thesis Supervisor

Accepted by: ____________________________

Associate Professor P. Christopher Zegras
Chair, MCP Committee
Department of Urban Studies and Planning
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Abstract

Over the last two decades, Boston and Cambridge have generated some of the strongest and
most celebrated innovation districts – Kendall Square and the Seaport District – in which new
models of commercial and civic real estate support dense webs of relationships among high-
growth companies, academia, investors, mentors, and corporate R&D. Although beneficial for
the overall competitiveness of the region, the wealth generated by these start-up and tech
communities is not broadly shared, and the Commonwealth of Massachusetts’s economic
development policy, Opportunities for All, has focused on reducing disparities across the state.
Meanwhile, the state’s Gateway Cities present persistent challenges with lower than average
incomes and weak market conditions for real estate development. Since 2014, MassDevelopment’s
Transformative Development Initiative (TDI) has focused the state’s investment in Gateway Cities
on projects intended to generate follow-on private investment, including TDI Cowork grants for “collaborative workspaces,” broadly defined. In an effort to support communities of entrepreneurs across the state, TDI Cowork expanded into a state-wide
Collaborative Workspaces Program in 2016.

Despite this interest in using community-oriented workspaces to catalyze new economic
opportunities, policymakers, developers, and other economic development professionals in
Massachusetts lack a comprehensive picture of what spaces are currently available that aim to
support innovation and entrepreneurship. A new inventory of workspaces utilized three
categories from a previous list of innovation assets and found 50 “coworking spaces,” 51
“innovation centers,” and 20 “maker spaces.” Of the 121 spaces, approximately 70 opened in the
last three years and several others are expected to open in 2017. Survey data showed that spaces
in Boston, Cambridge, and Somerville differ from those in the rest of the state in several ways
that are significant for stakeholders aiming to catalyze economic development, including a higher
portion serving startup teams, providing access to corporate partners and investors, and
supporting members/users of digital products versus creative or professional services. Further
analysis of the innovation ecosystem in Worcester suggested opportunities to attract mid-stage
start-ups and mid-career entrepreneurs rather than focusing on undergraduate student retention
as an economic development strategy.

Thesis Supervisor: Dr. Amy Glasmeier
Title: Professor of Economic Geography and Regional Planning
Acknowledgements

Many thanks to my advisor, Dr. Amy Glasmeier, and reader, Dr. Elisabeth Reynolds, for sharing their wealth of expertise throughout this project;

To the dozens of leaders in Worcester, Boston, Cambridge, Somerville, and other cities and towns who shared their professional perspectives and personal stories and are a source of inspiration for this project and my career;

To my DUSP classmates, faculty and staff for creating a community that learns, organizes, and plays together;

To new and old friends – especially Becca, Elise, Sam, and Alex for the spontaneous dinners and talks; Kate, Lily, Hannah and Mira for adventures with food, nature, and infrastructure; Kate, Jacqui, and Steph for 22 years of listening; and Sarah for her spatial love;

To David, Debbi, and Dino, supporting me as family and as a friend;

And to my parents for a lifetime of support in too many ways to count.
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Chapter 1. Introduction and Executive Summary

Over the last two decades, Boston and Cambridge have generated some of the strongest and most celebrated innovation districts – Kendall Square and the Seaport District – in which new models of commercial and civic real estate support a dense web of relationships among high-growth companies, academia, investors, mentors, and corporate R&D. The Cambridge Innovation Center alone houses over 1,000 start-ups and has recently expanded to Miami, St. Louis and Rotterdam. Economic activity in these districts has helped secure the region’s leadership in industries such as biotechnology, software, and computation and suggests that the most innovative activity of the 21st century will take place in walkable urban districts rather than suburban office parks.

Although beneficial for the overall competitiveness of the region, the wealth generated by Boston and Cambridge’s start-up and tech communities is not broadly shared. In April 2017, the Boston metropolitan area ranked high on the “New Urban Crisis Index,” a measure of wage and income inequality, economic segregation, housing unaffordability. This growth has also widened the gap between economic opportunities in the Boston area and the rest of the state with the Baker-Politico administration’s economic development plan, Opportunities for All: Making Massachusetts Great Everywhere, explicitly acknowledging that, “for some Massachusetts residents, the high-flying economy of Boston’s Back Bay and Cambridge's Kendall Square can feel worlds away.” Expanding opportunities outside the Boston area is also seen as a potential release valve on the city’s tight housing market. As of April 2017, the median home price in Cambridge is $725,000, compared to $219,000 in Worcester and $256,000 in Lowell, and a wider gap than several years ago. Rents in Kendall Square have risen so quickly as to raise concerns about its ability to support the start-up activity that attracted larger corporation in the first place.

The potential for the Gateway Cities to expand their share of the “innovation economy” is of particular interest because the Gateway Cities simultaneously present some of the most stubborn redevelopment challenges in the state and the most promising opportunities for urban districts outside the Boston area to support innovation and entrepreneurship. The Gateway Cities are a set of 26 cities, first identified in 2007 based on populations of at least 35,000, high poverty rates, low educational attainment levels, and strong manufacturing heritage. Building off numerous reports by the Massachusetts Institute for the New Commonwealth (MassINC), Massachusetts Legislature established the Transformative Development Fund in 2014, which guided MassDevelopment’s investments in Gateway Cities into high-priority districts and established new resources for technical assistance, professional fellowships, and grant making. These programs, known as the Transformative Development Initiative (TDI), seek to overcome weak market conditions and generate follow-on private investment. Among other components, the “TDI Cowork” program was designed to “support the emergence and expansion of collaborative workspaces to support entrepreneurship and innovative activities that support business development.”

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1 Florida, “The Geography of the New Urban Crisis.”
2 “Opportunities for All: The Baker-Polito Strategy and Plan for Making Massachusetts Great Everywhere.”
3 “Boston MA Home Prices & Home Values.”
4 Ledford, “Start-Ups Fight for a Place in Boston’s Biotech Hub.”
5 Muro et al., “Reconnecting Massachusetts Gateway Cities: Lessons Learned and an Agenda for Renewal.”
6 “Transformative Development Initiative [TDI].”
7 “Transformative Development Initiative Annual Report 2014.”
Despite the interest in using community-oriented workspaces to catalyze new economic opportunities, policymakers, developers, and other economic development professionals in Massachusetts lack a comprehensive picture of what spaces are currently available that aim to support innovation and entrepreneurship outside of traditional commercial leases. This paper explores the growth of this “innovation infrastructure” at two scales. First, for Massachusetts as a whole, how many spaces exist today, when did they open, and is there a typical size? How are these spaces geographically distributed between Boston, Cambridge and Somerville, the Gateway Cities, and other cities and towns? How do spaces differ across the state, in the types of businesses and industries they support, the services they provide, and the reasons members/users leave? Then, this paper addresses the challenges and opportunities for Worcester, by comparing local perspectives on the innovation ecosystem with expansion strategies of Boston-area organizations such as MassChallenge, CIC, and Greentown Labs. This paper does not seek to evaluate the effectiveness or efficiency of TDI Cowork as a funding program but provides historical context for its activities and presents new data that may guide future initiatives at the state and local levels.

An underlying theme to this research is the pace of change in where and how innovative work takes place. In less than 10 years, the concept of coworking – a shared office space accessed through a membership fee rather than a lease – has unleashed new ways of thinking about workspace, in which workers prioritize flexibility, social interaction, amenities, and community identity. The most prolific coworking brand, WeWork, has expanded from its original SoHo location opened in 2011 to 138 locations in 19 U.S. cities and 13 other countries. Meanwhile, business incubators and accelerators concepts from the mid-twentieth century have expanded to a broad diversity of innovation centers that support early-stage companies and enable thought leaders to convene around emerging opportunities and challenges. Maker spaces also signal a trend towards rapid prototyping and de-centralized physical production with low barriers to entry.

Innovation Infrastructure: Trends across Massachusetts

In Chapter 5, this paper quantifies and describes trends in Massachusetts for three types of workspaces: coworking, innovation centers, and maker spaces. An inventory of “innovation assets” compiled by the Massachusetts Executive Office of Housing and Economic Development in 2016 was expanded and refined to approximately 120 spaces across these three categories. “Innovation Centers” is the broadest category in which many spaces include open work areas and shared equipment comparable to many coworking or maker spaces. More than half these spaces shared additional information on their development process, operations, and membership base through an online survey and interviews.

Prevalence and Growth

- 121 spaces are currently in operation: 50 Coworking spaces, 52 Innovation Centers, and 19 Maker Spaces.
- At least 13 more are in planning or development stages.
- Half of coworking spaces are located in Boston, Cambridge, and Somerville and approximately 30% are in Boston alone. Only 10% are in Gateway Cities.

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8 As of December 2016. https://www.wework.com/locations
• For innovation centers, 35% are in Boston, Cambridge, and Somerville and 42% are in Gateway Cities.
• Half of maker spaces are in Gateway Cities.
• At the start of 2017, there was at least 2.1 million square feet of innovation center space, 600,000 square feet of coworking space, and 123,000 square feet of maker space.
• Coworking spaces exist as small as 500 square feet and innovation centers as small as 1,000 square feet, yet both also exist over 100,000 square feet. Innovation centers have a median size of 13,250 square feet versus 5,500 for coworking spaces.

Survey Insights

• Compared to spaces in the rest of the state, spaces in Boston, Cambridge and Somerville, report higher levels of services and programming, especially business coaching/mentorship, investor meetings, and access to corporate partners.
• Spaces in the “coworking” category report providing programming and services at nearly the same levels as spaces in the “innovation centers” category.
• A higher portion of spaces in the Boston area target a specific industry, formally or informally.
• The majority of “innovation centers” serve workers in a specific industry, officially or unofficially.
• Over 80% of Boston-area spaces report serving start-up teams, versus fewer than 50% of spaces in the rest of the state.
• Across the state, 80% of coworking spaces report that self-employed individuals are one of their primary users.
• Users in the Boston area stay for less time and are more likely to leave for another city.
• Less than half of spaces support themselves with member/user fees, and a smaller portion are financially independent outside the Boston area.
• Outside the Boston area, more spaces own their buildings and those that rent typically pay under $20 per square foot.

Innovation Ecosystems: The Boston Area and Worcester

To begin exploring the implications of state-wide trends for the Gateway Cities, Chapter 6 presents a series of examples of spaces that aim to support innovation and entrepreneurship. Staff of MassChallenge in Boston, CIC in Cambridge, and Greentown Labs in Somerville provided insight on their organization’s expansion strategies and approaches to conducting ecosystem assessments. Recurring themes include the importance of mentor networks and corporate partners, accessibility in an urban area, and programming that creates an innovative community not limited to the startups using their workspace. Interviews in Worcester then focused on understanding the diversity of spaces in that smaller innovation ecosystem: who are the users, what are the strengths of Worcester they leverage, and what linkages exist among institutions and workspaces.

The successes and challenges of expanding an innovation ecosystem in Worcester will guide its broader revitalization agenda and provide lessons for other Gateway Cities. Worcester has many of the ingredients needed for an innovation-based economy: nine colleges and universities with a total of nearly 40,000 students, multiple hospitals, and a transit connection to
Boston. Downtown Worcester is ripe with signs of physical transformation, from new housing and retail, to refurbished office buildings, arts spaces and public realm infrastructure. This momentum is a promising trend but there is still a long way to go to secure Worcester’s position as a regional anchor of innovative economic activity.

**Going Forward: Strategies for Worcester and Beyond**

Increasing innovation and entrepreneurship in Worcester will require involvement from all sectors and industries – a collaborative spirit that already exists among the city’s leaders in government, other economic development organizations, academic leadership, and workspace operators. Drawing from the Worcester Regional Chamber of Commerce’s framework of “Recruit, Retain, Incubate,” I recommend a fourth strategic goal to **Connect** to the powerful innovation ecosystems in the Boston area. I also describe ways that strategies of “recruit,” “retain,” and “incubate” might better target companies and individuals at various life stages.

- **Connect:** Programming should actively direct young entrepreneurs towards the world-class resources that are a one-hour train or bus ride away in Boston, especially during early growth stages.

- **Recruit:** Incubators and collaborative workspaces in Worcester could more explicitly target mid-career entrepreneurs and mid-stage startups whose viability no longer depends on proximity to venture capital, mentors, and other resources.

- **Retain:** Although undergraduates are an important resource for the city, other groups of innovators and entrepreneurs such as faculty, graduate students, and mid-career professionals should not be overlooked as valuable contributors to an innovation ecosystem.

- **Incubate:** The City of Worcester, Worcester Public Schools, the Commonwealth of Massachusetts, private landlords, and local universities and hospitals should all embrace opportunities to be a startup’s first customer for hardware and software innovations.

These recommendations are drawn from observations and analysis of Worcester and are not necessarily transferable to other Gateway Cities. However, future economic development in each of the Gateway Cities will surely require a multi-pronged approach that leverages regional assets while finding opportunities for differentiation. This analysis of innovation infrastructure across the state and the description of innovation ecosystems in this report aim to advance discussion on the changing nature of economic opportunity across Massachusetts.
Chapter 2. Literature Review

Innovation and Entrepreneurship as Economic Drivers

Most literature on innovation and entrepreneurship starts from the belief that they are the source of economic growth. This common assumption stems from Joseph Schumpeter’s concept of “creative destruction” coined in 1942, which asserted capitalism leads to constant changes in the structure of the economy.9 This idea has resonated through the technological changes of different eras, in which one invention is superseded by another and production processes are reconfigured in ways that lose and create jobs.

In an increasingly globalized economy, “creative destruction” still describes the dynamics of job turnover that are not fully captured by employment and job creation statistics. For example, the Federal Reserve Bank of Dallas invoked the idea of “creative destruction” in a 1992 essay describing the emergence of high tech industries in the 1980’s and early 90’s when major companies cut thousands of jobs each. According to the essay, “[i]t is this churning of business enterprises and their workforces in a free enterprise economy that spurs income growth and creates wealth.”10 However, the optimism that innovation would fuel prosperity on a national or regional scale was accompanied by concern about its uneven distribution and those who get left behind. New jobs are often not replacements for old ones in terms of the training required and may be in different locations.

National policy and much economic development literature still remain strongly influenced by faith in innovation and entrepreneurship. In a 2004 report from the U.S. Economic Development Administration, Assistant Secretary for Economic Development David Sampson wrote:

“The focus of economic development should be on supporting innovation, increasing prosperity for American businesses and ensuring American workers have the skills to remain the most productive workforce in the world. Innovation will drive the growth of American industry by fostering new ideas, technologies and processes that lead to better jobs and higher wages – and as a result, a higher standard of living.”11

This belief was reinforced by the Kauffman Foundation’s finding that in 2007, firms in existence for less than five years accounted for two thirds of job creation despite the majority of jobs remaining in older firms. This research indicated entrepreneurship would be a key to post-recession economic recovery.12 “Innovation” was the eighth most common keyword in Economic Development Quarterly articles from 2003-2011, associated with seven percent of all articles.13 Additionally, entrepreneurship is seen as a promising response the loss of manufacturing jobs when “small businesses may be an even more critical pathway than ever to mobility and opportunity – not just for the business owner, but also for those who fill the jobs that business creates.”14

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9 Schumpeter, Capitalism, Socialism and Democracy.
10 “The Churn.”
14 Mills, “A Playbook for Making America More Entrepreneurial.”
Defining Entrepreneurship: Small Business vs. Innovation Driven Companies

In order to further study the role of entrepreneurship in economic growth, it is important to define what types of business activities are meant by “entrepreneurship.” In research sponsored by the Kauffman Foundation, Aulet and Murray (2013) distinguish between “Innovation Driven Enterprises” and “Small and Medium Enterprises.” They explain fundamental differences between new companies that intend to grow – either by creating a new technology or applying technology in a new ways – and those that will remain small because of the nature of their business – typically service-based with the intention of serving a local customer base.  

This same distinction is used in a February 2016 report from the MIT Innovation Institute, which shows only a small portion of new businesses experience the dramatic growth that drives the economy. Research on entrepreneurship has “by and large abstracted away from firms’ initial differences in growth potential—tracking the rate of entrepreneurship by either counting new firms… or selecting on achieving a performance outcome (such as the receipt of venture funding).” When controlling for firm age, it becomes apparent that young companies (start-ups) are responsible for the job creation benefits often associated with small business. Additionally, IDEs have a job multiplier effect, creating five jobs for every direct IDE job. However, SME can still be valuable to economic development given that “self-employment and SME creation are critical to moving people out of unemployment, particularly during periods of austerity.”

Urban Innovation Clusters and Ecosystems

Countless studies of innovation have noted its uneven geographic distribution and tendency to concentrate in cities, yet the implications of clustering and innovation ecosystems remain unclear for smaller cities. For example, Maryann Feldman’s 2002 book Institutions and Systems in the Geography of Innovation started from the assumption that innovation impacts an economy’s rate of growth, but that there is “a limited understanding of the sources of technical progress and the reasons that innovation varies across time and space.” Meanwhile, studies of global cities reinforce the idea that digital technology, rather than leveling the playing field for innovators in diverse locations, creates a newfound importance on being in centralized locations. “Telecommuting” and other opportunities to work remotely did not reduce the value of collaborating and interacting in physical spaces, and cities are thus valuable information centers in a globalized economy.

While high-paying jobs continue to concentrate in global cities, the concept of industry clusters provides some hope for smaller cities to stake out a new competitive advantage in the 21st century. The term concept of clusters emerged with Michael Porter’s influential 1998 paper on how global markets and new communications technology had not erased the phenomenon of

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15 Aulet and Murray, “A Tale of Two Entrepreneurs.”
17 Haltiwanger, Jarmin, and Miranda, “Who Creates Jobs?”
19 Aulet and Murray, “A Tale of Two Entrepreneurs.”
20 Feldman, Institutions and Systems in the Geography of Innovation.
21 Sassen, “The Global City.”
22 Stoltman, 21st Century Geography, 360.
cities having an exceptional concentration of jobs within a particular industry. According to Porter, clusters function,

“first, by increasing the productivity of companies based in the area; second, by driving the direction and pace of innovation, which underpins future productivity growth; and third, by stimulating the formation of new businesses, which expands and strengthens the cluster itself.”23

At the time, Porter recognized Boston as a cluster of mutual funds, biotechnology, software and networking, and venture capital, with Western Massachusetts home to a separate cluster in the polymers industry. However, identifying regional clusters does little to explain to what extent cluster formation is an organic process, or to what extent it can be planned and directed.

In the Boston region, the distribution of technology jobs in the last 30 years illustrates a broader trend in innovation activities returning to urban cores after decades of suburban growth. The Route 128 corridor and later I-495 are famous for the explosion of high-tech jobs in the 1980’s, with technology commercialization linked to MIT but new office developments located in quiet suburban areas. Annalee Saxenian’s 1996 *Regional Advantage*, which explained structural differences between Route 128 and Silicon Valley’s entrepreneurial communities, has been cited over 11,000 times, cementing Route 128’s role in the geographic history of innovation. Across the country, two-thirds of office facilities were located in “edge cities” by the early 1990s, and the vast majority of these had appeared in less than two decades.24

Today, the Route 128 corridor is still home to a significant number of jobs, but venture capital, startup offices, and accelerator programs are largely oriented towards the city. The Kendall Square area adjacent to MIT is recognized as the epicenter of the Boston region’s biotech community, in addition to being home to offices of Google, Microsoft, Amazon, Facebook, and other tech corporations. The re-urbanization of start-up activity can be attributed to both changing preferences – such as living and working in walkable neighborhoods – and practical benefits of working in close proximity to other entrepreneurs, investors, and researchers. Recent research suggests that the “the suburban model might have been an historical aberration, and that innovation, creativity, and entrepreneurship are realigning in the same urban centers that traditionally fostered them.”25

The phrase “innovation ecosystem” emerged in the last 20-25 years to underscore the value of relationships and information flows among innovative enterprises. Borrowing from ecological science, “an innovation ecosystem models the economic rather than the energy dynamics of the complex relationships that are formed between *actors or entities* whose functional goal is to enable technology development and innovation.”26 Some uses of “innovation ecosystem” describe factors impacting a specific product without focusing on a particular place27 while others focus on national- and international-scale systems.28 However, the “ecosystem” metaphor can also be used to describe the sense of community and relationships within a city or district: which organizations work together? How to innovators move from one company to another and learn together? From its analysis of the Kansas City startup community, the Kauffman Foundation found that “even in this digital age and with costless, powerful

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25 Florida and Mellander, “Rise of the Startup City.”
26 Jackson, “What Is an Innovation Ecosystem.”
27 Adner and Kapoor, “Value Creation in Innovation Ecosystems.”
communication tools such as Twitter, entrepreneurship is largely a local phenomenon using personal connections, and entrepreneurs primarily exchange information via word of mouth.”

Universities play a prominent role in literature on both clustering and innovation ecosystems, and their potential impact is important to understand for this thesis because they are an existing resource in many Massachusetts cities. With multiple roles in basic research, technology creation, and workforce development, “the university is the creative side of economic destruction” and “universities can also be important anchor tenants for regional clusters.” This role has evolved with public policy, as the federal Economic Development Administration described:

“Technology transfer became more formalized as a university function in the late 1970s, and is becoming increasingly important at universities across the country, as a source of revenue, a stimulus to the regional economy, and a method of bringing research into practical use.”

The concept of “spin-off” companies is related but distinct from technology transfer because it implies academics acting as entrepreneurs in addition to contributing inventions to a business community. “Anecdotal evidence suggests an important role for universities in generating clusters of innovative ‘spin-off’ companies, although econometric evidence on the presence of localized knowledge spillovers from universities is mixed.”

Physical space to support entrepreneurs on and off-campus is also important, since “university-based entrepreneurship ecosystems” often include incubators in addition to other efforts to provide access to university resources and coordinate research initiatives.

The Role of Government in Supporting Innovation and Entrepreneurship

In the U.S., policy aimed at supporting entrepreneurship dates back to the founding of the Small Business Administration in 1953. Following World War II, increased demands for national defense strengthened the relationship between government, private innovation, and academic research. Throughout the Cold War, the federal government played a key role in “the growth of new industries and regions by channeling resources to university labs to develop war-related technologies.” Then, in the 70’s and 80’s, many states’ cooperative technology initiatives marked a “new breed of state policies,” that fostered the development of resources within the state instead of working to attract existing industries to locate in their states. Technology initiatives also shifted from an emphasis on pure research that utilized university partnerships “in hopes of creating new knowledge that would then drive applied research and eventually commercialized products,” to a new focus on applied research when early initiatives did not produce clear financial returns.

Government programs aiming to support innovation and entrepreneurship have addressed the themes described above of clusters, innovation ecosystems, and university spin-offs. From

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29 Motoyama et al., “Think Locally, Act Locally.”
31 Chatterji, Glaeser, and Kerr, “Clusters of Entrepreneurship and Innovation.”
33 Agrawal and Cockburn, “University Research, Industrial R&D, and the Anchor Tenant Hypothesis.”
34 Fetters et al., The Development of University-Based Entrepreneurship Ecosystems.
36 Saxenian, Regional Advantage, 11.
37 Riggle and Stough, “Evaluating State Cooperative Technology Programs,” 642.
38 Ibid., 640.
2009-2015, federal government programs funded 56 cluster initiatives for industries such as green energy and defense contracting. However, “while arguments exist for and against policy support of entrepreneurial clusters, our understanding of what works and how it works is quite limited.” Although there are many possible programs to support entrepreneurs, “supporting a cluster of small-scale entrepreneurs allows policy makers to affect many entrepreneurs simultaneously, providing important scale to their policy interventions.”

Inspired by research on the economic benefits of industry clusters, it is thought that, “governments can help create innovation ecosystems that build on a given region’s entrepreneurial strengths.” Growing or strengthening an innovation ecosystem can mean fostering partnerships: “Business, government, research universities and community colleges all need to be involved, as well as the entrepreneurs themselves.” Another approach to supporting innovation ecosystems – strategically attracting anchor firms/tenants – may have less direct benefits for new companies but help to link innovation policy with older economic development strategies. Thus in negotiations to recruit large firms, “local governments need to know how much a large firm is worth to the local economy; thinking about the role of anchor tenants in mediating spillovers and shaping natural advantage may provide a useful framework for analysis.”

A common problem in innovation policy is to try to replicate the regions seen as the most innovative and entrepreneurial. As Feldman et. al (2005) say of efforts to mimic Silicon Valley, “Looking at a successful region in its full maturity, however, may not provide prescriptive information about how such regions actually develop.” The authors describe how in the Washington, D.C. region, the formation of a cluster is best traced to the efforts of individual entrepreneurs, rather than public policy or university relationships, illustrating that clusters can form through different trajectories.

Another common criticism of government innovation programs is that they have to pick winners and losers – either inequitably prioritizing some types of companies, or spreading resources thinly and without a clear strategy. One concern is that “when governments intervene to encourage the creation of new businesses, they stimulate more people to start new companies disproportionately in competitive industries with lower barriers to entry and high rates of failure.” Another problem is in how programs measure success:

“policies that aim to increase ‘shots on goal’ and implicitly treat all firms as equally likely candidates for growth are likely to expect ‘too much’ from the vast majority of new businesses, by focusing on a lever—new firm formation—that is only weakly related to economic growth.”

This issue is seen in programs that address “start-ups” and “small business” without distinguishing between the needs of companies with different growth trajectories. Around the world, “Various organizations’ enthusiastic efforts to support entrepreneurship fail to achieve the results they desire, precisely because they try to address SME and IDE entrepreneurship

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40 Chatterji, Glaeser, and Kerr, “Clusters of Entrepreneurship and Innovation.”
41 Ibid., 3.
42 Mills, “A Playbook for Making America More Entrepreneurial.”
43 Ibid.
44 Agrawal and Cockburn, “University Research, Industrial R&D, and the Anchor Tenant Hypothesis.”
45 Feldman, Francis, and Bercovitz, “Creating a Cluster While Building a Firm,” 137.
through a singular organization.”

Supporting SME’s seems to produce more immediate, visible results, yet when job creation data is studied at a more granular level, it is seen that net job creation is driven by IDE’s. This suggests that, “If job creation and economic prosperity are the goals for a government, IDE entrepreneurship must be a major element of government strategy and policymaking.” One response is that policy makers “need to think like venture capitalists and concentrate time and money on extraordinary entrepreneurs, and worry less about the typical ones.”

Public Policy Rationale for Subsidizing Incubators and Coworking Spaces

Debate about whether government should support business incubators stems from questions of how and to what extent incubators actually enhance entrepreneurship and economic development. In large-scale studies of business incubators around the world, three “generations” of business incubators are seen with progressively rich and targeted service offerings. The first generation focused on the provision of physical space and shared resources (generating economies of scale). The second generation offered business support when “It became clear that innovation and technology were becoming the cornerstones of economic growth and that new strategies were necessary to revitalize economies.”

The metrics used by business incubators to illustrate impact – graduation rates, long-term success rates, and job created – can be compelling but overlook the need for a control group: how would these businesses have fared in the absence of the incubator. For example, lower business failure rates associated with incubators could simply be due to their members being savvy entrepreneurs who seek out the lowest-rent space available. Recent criticisms and concerns include economist Scott Shane’s reaction to a 2012 proposal for the Business Incubator Promotion Act “Before Congress spends money on business incubators, it should first ask for convincing evidence that a market failure exist – that the private sector fails to provide incubation services – and for evidence that incubators cause companies to create jobs.”

However, studies of business incubator impact dating the mid-1980s and focus on the value of both physical space and the services, programming, and networking opportunities, where “Effective incubator organizations socialize would-be entrepreneurs to values, aspirations, and technical skills.” Mian’s 1996 study of “university technology business incubators” was the first to look systematically at their impact on “new technology-based firms” and found that companies benefitted from “university-related inputs such as university image, laboratories and equipment, and student employees.”

These studies of impact came about because providing incubator space for startups was “latest fad in economic development” and seen as a central part of a “home-grown economic development” strategy. In the mid-1980s, key characteristics of publicly supported small

48 Aulet and Murray, “A Tale of Two Entrepreneurs.”
49 Ibid.
51 Bruneel et al., “The Evolution of Business Incubators.”
52 Shane, “Why Congress Shouldn’t Fund Business Incubators (Opinion).”
53 Miller and Côté, Growing the next Silicon Valley, 63.
54 Mian, “Assessing Value-Added Contributions of University Technology Business Incubators to Tenant Firms.”
55 Miller and Côté, Growing the next Silicon Valley, 123.
business incubators that distinguished them from other office buildings and research parks were below-market rents, business development services, and entry/exit policies and procedures. Incubators were promoted by both state and local governments and faced several public policy issues: criticisms of creating unfair competition, the risk proposition of catering to short-term tenants, restricted versus open admissions policies, and unclear expectations about access to capital. Despite these policy issues it was accepted that incubators would be valuable public-private partnerships that “link a community’s assets and resources with the entrepreneurial culture.”

In the current climate of intense competition between start-ups, there is a renewed enthusiasm and optimism for coworking and incubators to create economic opportunity and jumpstart entrepreneurial communities. A 2016 *Atlantic* article claimed that incubators and accelerators “helped rebuild a city” in Post-Katrina New Orleans and that they are “increasingly recognized across the country as amplifiers of small-scale entrepreneurship and innovation.”

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57 Plosila and Allen, “Small Business Incubators and Public Policy.”
58 “Incubating Progress, One Small Business At A Time.”
Chapter 3: Policy Context

Past Studies of the Innovation Economy in Massachusetts

The Massachusetts Technology Collaborative has played a central role in tracking the evolution and performance of the state’s innovation economy in an annual index since 1997. By defining which sectors to analyze as part of the “innovation economy,” the indices have shown “the connection between research, development, technology, commercialization, and new industry growth.” In an era when economic policy and analysis typically focused on single industries, the Indices reframed public discussions to address a “system of innovation” more holistically.\(^{59}\) They have also influenced the ways that theories of innovation economies are applied to state policy; the introduction to the 2001 Index says directly that this analysis “based upon the premise that innovation is a critical factor in the growth of the state’s economy.”\(^{60}\)

The “2015/2016 Index of the Massachusetts Innovation Economy,” emphasized the economic impact of the state’s innovation economy, including the fact that job growth exceeded growth in the rest of the economy and wages are much higher. The annual index compares Massachusetts to other “Leading Technology States,” on numerous indicators and the 2015/2016 Index ranked Massachusetts above the other “Leading Technology States” on metrics such as innovation economy employment concentration, total innovation economy employment, and the number of key sectors in which it has an above average employment concentration.\(^{61}\)

While recent Indices have been optimistic and celebratory, several years point to the fact that Massachusetts’s current leadership in some industries was never guaranteed. For example, the 2004 Index was introduced with “a note of urgency because employment in the state’s Innovation Economy continues to shrink, led by losses in Information Technology-related industries.” At that time, the state’s largest industry clusters – Software & Communications Services and Computer & Communications Hardware – were impacted the most, while the life sciences sector appeared to gather strength and put Massachusetts “in a position to be a global leader in the life sciences.” The 2005 Index then held a cautiously optimistic tone while noting that “seven of nine Massachusetts Innovation Economy clusters continued to shed jobs in 2004, and at a rate faster than competitor Leading Technology States.”

Although the annual indices focus on indicators across the state as a whole, 2001 and 2014 both explored regional strengths and disparities within the state as part of a “Special Analysis” section. According to the 2001 Index, booms in the 1980’s and 90’s saw the expansion of technology industries outside of Boston and past I-495. Yet, the 2001 index anticipates growing disparities:

> “the growth of the Innovation Economy in each region of the state hinges heavily on the ability of each region to upgrade the educational levels and skills of current residents, and the attraction of the region to outsiders who will bring new technical and entrepreneurial skills into a region’s industries.”

This analysis follows a similar format as the comparison of Massachusetts to other Leading Technology states; it focused on key metrics such as cluster employment and unemployment rates but does not delve into the specific assets and opportunities within each region. The 2014 Index was the next to compare regions within Massachusetts, again noting “the strengths that

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\(^{59}\) “10 Years of the Index of the Massachusetts Innovation Economy.”
\(^{60}\) “Index of the Massachusetts Innovation Economy 2001.”
make greater Boston an important node in the global economy are leveraged by the rest of Massachusetts along with regional strengths to drive cluster growth.” This analysis almost entirely focuses on legacy industries and the future of the paper industry in Central and Western Massachusetts as a promising transition to new production technologies and markets. However, in both these 2001 and 2014 analyses, the role of cities is overshadowed by an emphasis on regions, and it is not clear how urban centers outside the Boston area might contribute to the innovation economy.

The discussion of physical space for innovation has played a limited role in the annual Indices of the Innovation Economy. The annual indices for 2005-2008 used “Business incubators per 10,000 business establishments” as a key indicator, with Massachusetts ranked in the top two Leading Technology States with Virginia. The 2008, 2009, 2010 and 2011 indices define “innovation infrastructure” and mentioned, but did not measure, “physical spaces in which innovators work and interact, such as laboratories, incubators, and venues which allow innovators from across the economy to come together.” Then in 2012, it notes that, “The past few years have witnessed the emergence of new networks, incubators, accelerators, and competitions – either stand-alone efforts or new offerings from existing industry and technology organizations.” Then the 2013 and 2014 indices make no mention of incubators or innovation infrastructure except for an analysis of broadband in the more traditional sense of infrastructure.

The 2015/2016 Special Analysis focused on collaborative workspaces, which were further categorized into co-working, maker spaces, incubators and accelerators. This analysis presents a logic that echoes other studies on entrepreneurship: first, that new companies are responsible for net job growth; second, that start-ups face challenges becoming sustainable businesses; and third, that these challenges encompass access to physical space as well as business acumen. As a result, “Collaborative workspaces can be one way to support the pipeline of new firms in a regional economy.” Among the key findings of this study is that “[s]paces outside of Greater Boston face greater challenges in attracting funding and a critical mass of start-ups but nevertheless there is significant demand for collaborative workspaces outside of Greater Boston.” This study counts 33 coworking spaces, 25 maker spaces, 26 incubators, and 15 accelerators. Among these, North Shore Innoventures, the UMass Lowell Innovation Hub, and Greentown Labs in Somerville are featured as case studies.

The 2015/2016 Special Analysis on collaborative workspaces utilized an “Innovation Asset Mapping” inventory led by the Commonwealth’s Executive Office of Housing and Economic Development, most recently updated in February 2017. The Innovation Asset Mapping, developed to support in executing the Opportunities for All plan listed spaces, organization, programs and connections across the state – a total of 758 assets – and provided a count by region and municipality. Among the spaces, the inventory uses five categories: Innovation Centers, Maker Spaces, Artist Spaces, Collaborative Kitchens, and Coworking Spaces. About one-third of the assets listed were spaces (229), of which there were 51 coworking spaces, 35 innovation centers, and 34 maker spaces using the following definitions:

- “Innovation Centers: Spaces enable entrepreneurs and researchers to activate breakthroughs
- Maker Spaces: Spaces that provide shared tool for the use of members.
- CoWorking Spaces: Working spaces where individuals or small businesses work in shared spaces. (No shared tools)”

These broad categorizations suggest an opportunity to further define each type of space and how they function to support innovation and entrepreneurship. In addition, the list of assets suggests
that it may not be capturing a comprehensive count of assets, since it groups chains such as WeWork and Workbar into a single line.

Recent Massachusetts Economic Development Policy

Over the last decade, efforts to support innovation in Massachusetts have often focused on specific industries. For example, under Deval Patrick, the 2008 Life Sciences Act committed $1 billion over 10 years to secondary education, workforce development, academic research and commercialization, and businesses. The Act established the Massachusetts Life Sciences Center in Waltham, to implement the $1 billion investment. With the goal of supporting growth across the state, the act allocated funds towards spaces to support new businesses including some of the following in Gateway Cities: a life science incubator building at the William Stanley Business Park in Pittsfield, a new nano and biomanufacturing facility at the University of Massachusetts at Lowell, a life sciences incubator in Springfield, and a regional incubation center for life science initiatives in New Bedford.\footnote{General Court of the Commonwealth of Massachusetts, An Act Providing for the Investment in and Expansion of the Life Sciences Industry in the Commonwealth.} Through this 2008 act, it is evident that Massachusetts’ global leadership in the life sciences industry today cannot be solely attributed to organic growth and the presence of top research universities.

The policy focus on geographically distributed innovation and entrepreneurship continued to grow throughout the Deval Patrick administration (2007-2015). The 2014 “Act Promoting Economic Growth across the Commonwealth” committed a total of $80 million including $16 million to the Transformative Development Fund, of which up to $2 million could be used to promote collaborative workspaces. Per the 2014 Act, collaborative workspaces would “foster collaboration and linkages among innovative and creative enterprises by providing central locations for such businesses or individuals to work in an environment designed to promote sharing of resources, experience and expertise.” MassDevelopment, in administering the funds, should give preference to proposals with the following criteria: “redevelop at least 10,000 square feet in existing properties located in the downtown area of a gateway municipality; dedicate at least 25 per cent of accessible space to collaborative use; and support a cluster of at least 15 separate occupants.” The 2014 Act also included funds to establish business incubators in Northborough and Lancaster, support for the Massachusetts Medical Device Development Center at UMass Lowell, and $2 million for the Massachusetts Technology Collaborative to “create a talent pipeline to technology startups and innovation companies.”\footnote{An Act Promoting Economic Growth Across the Commonwealth.}

The Baker-Polito administration’s economic development plan, Opportunities for All: Making Massachusetts Great Everywhere, builds thematically on the Patrick administration’s 2014 legislation by emphasizing workforce development and the potential for innovation to reach all regions of the Commonwealth. The second policy priority, “Fostering a Culture of Innovation and Entrepreneurship,” claims that “small businesses and startups remain the backbone of the Massachusetts economy” and “business formation drives a state’s overall economic health.”\footnote{“Opportunities for All: The Baker-Polito Strategy and Plan for Making Massachusetts Great Everywhere.”} Among five strategic goals for that policy priority is to “support and improve the state's innovation infrastructure,” including co-working spaces, venture centers, maker and artist spaces, incubators and accelerators, classes, competitions, meet-ups and interactions with thought leaders.
Building off the Transformative Development Initiative fund, which is administered by MassDevelopment, the Commonwealth passed An Act Relative to Job Creation and Workforce Development in August 2016. This economic legislation renewed the Transformative Development Initiative and added a Community Innovation Infrastructure Fund that supports co-working spaces, venture centers, maker spaces and artist spaces. In addition, an Angel Investor Tax Credit “promotes startup activity and job creation in the Gateway Cities, by incentivizing investment in early-stage life sciences and digital health firms.” Upon signing this legislation, Governor Charlie Baker noted, “this legislation unleashes valuable opportunities for investments in the development of revolutionary new technologies and community-based innovation, connecting every region of the Commonwealth to the innovation economy.”

**TDI Cowork Program**

**Grant Recipients: 2014-2016**

Transformative Development Funds administered by MassDevelopment for collaborative workspaces, per Chapter 287 of the Acts of 2014, are documented in a series of annual reports. In the program’s first four months – August to December 2014 – MassDevelopment awarded $172,800 in grants, reviewed $510,000 in projects, and built a pipeline of 10-12 additional projects. The grants were categorized as early-stage Seed Grants or larger Fit-Out Grants and were awarded via a rolling Request for Proposals process. Five of the six grants were seed grants of $5,000 or less, and a single fit-out grant of $150,000 was awarded. The individual grants and their amounts are listed below in Figure 2.2.

In 2015, grants were still made in “seed” and “fit out” categories, but this time nearly all the funds – $640,000 out of $645,000 – were for fit out grants. These four fit-out grants ranged

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65 “Governor Baker Signs Economic Development Legislation.”
66 “Transformative Development Initiative Annual Report 2014.”
from $80,000 to $250,000, and the 2014 and 2015 grants accounted for nearly 50,000 square feet of space in eight Gateway Cities. The following criteria, defined in the Request for Proposals, broadly address the siting within Gateway Cities, physical characteristics of the space, and long-term operations and programming:

- “Locate in a central, visible area supported by other active uses/amenities that support the growth of the community of users;
- Demonstrate a real community of existing and potential users that their space operations planning (and equipment) would serve;
- Provide sufficient collaborative working areas and programming to promote interaction among members;
- Through design of the space and operations, have the potential to
  - foster the growth of the emerging innovation and creative economy in the Gateway Cities
  - enhance the stability/foundation of a growing community of entrepreneurs and enterprises
  - spur new enterprises;
- Help facilitate the rehabilitation of an underused building in a Gateway City; and
- Provide well-developed plans and organizational track record to operate the space, and grow the target community of distinctive identity and activities.”

Most of these criteria speak to the intent and aspirations of the space subjectively, rather than quantitative criteria for spaces of a certain size or membership level. The criteria also leave open for interpretation how impact will be measured over time.

In FY16 – up to June 30, 2016 – MassDevelopment approved an additional five Seed Grants and eight Fit-Out grants totaling $462,000. Although the total grant amount was less than the previous year, more organizations received grants, and the decline in grant size is seen in the median of $72,500 for fit-out grants. The FY16 report includes a summary of observations regarding grantee progress, program administration, and additional needs of coworking spaces. Among these observations were two related points that “Some spaces should focus more on a niche offering or strength as opposed to trying to be all things to all people” and “Some spaces will require a more defined focus to attract the right community of users and to ensure that the use of the space maximizes return to ensure sustainability.”

At the end of the 2016 TDI Cowork Annual Report, it was noted that MassDevelopment and EOHED would administer a combined “Collaborative Workspace Program” going forward, which would expand beyond the Gateway Cities. The first round of grants from this newest program was announced in December 2016 and comprised $952,000 for 23 grants, 11 of which were in Gateway Cities. Compared to the three years of the TDI Cowork pilot, the seed grants were significantly larger, with 11 of the 13 seed grants between $22,000 and $25,000 whereas most had been $5,000 in the past. The maximum fit out grants were $100,000, with a median of $60,000.

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68 “Transformative Development Initiative [TDI] Cowork Annual Report FY16.”
69 “Baker-Polito Administration Announces Collaborative Workspace Program Awards.”
### Figure 2.2. TDI Cowork 2014 Recipients

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
<th>Grant Type</th>
<th>Amount</th>
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<td>EforAll Lawrence</td>
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<td>Quincy Innovation Center</td>
<td>Quincy</td>
<td>Seed</td>
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<td>Gateway City Arts</td>
<td>Holyoke</td>
<td>Seed Feasibility</td>
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</tr>
<tr>
<td>Co Work Springfield</td>
<td>Springfield</td>
<td>Seed Feasibility</td>
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<tr>
<td>Groundwork Coworking Space</td>
<td>New Bedford</td>
<td>Fit-Out</td>
<td>$150,000</td>
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</table>

### Figure 2.3. TDI Cowork 2015 Recipients

<table>
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<th>Name</th>
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<td>Lowell Makes</td>
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<td>New Vestures</td>
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<td>Theater Zone</td>
<td>Chelsea</td>
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<td>$250,000</td>
</tr>
<tr>
<td>South Coast Innovators Lab</td>
<td>Taunton</td>
<td>Fit-Out</td>
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### Figure 2.4. TDI Cowork 2016 Recipients

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<td>South Coast Innovation Lab</td>
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<td>Cape Cod Culinary Incubator</td>
<td>Barnstable</td>
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<td>Daher CoWorking</td>
<td>Lawrence</td>
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<td>M.I.L.L. (Maker Innovation Lab Lawrence)</td>
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<td>NBEDC</td>
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<td>TheatreZone - Apollinaire Theatre Co-work Space</td>
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<td>Launchpad Cowork Space</td>
<td>Centerville</td>
<td>Fit-Out</td>
<td>$12,000</td>
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</tbody>
</table>

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70 “Transformative Development Initiative Annual Report 2014.”
72 “Transformative Development Initiative [TDI] Cowork Annual Report FY16.”
### Figure 2.5. 2016 Collaborative Workspace Program Awards

<table>
<thead>
<tr>
<th>Name</th>
<th>City</th>
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<td>The Record Company</td>
<td>Boston</td>
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<td>Fairmount Innovation Lab</td>
<td>Dorchester</td>
<td>Seed Award</td>
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<td>Bank Street Armory</td>
<td>Fall River</td>
<td>Seed Award</td>
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<tr>
<td>Framingham State University Entrepreneurial Innovation Center</td>
<td>Framingham</td>
<td>Seed Award</td>
<td>$25,000</td>
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<tr>
<td>Holyoke Workforce and Innovation Center</td>
<td>Holyoke</td>
<td>Seed Award</td>
<td>$25,000</td>
</tr>
<tr>
<td>The Revolution Factory</td>
<td>Maynard</td>
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<td>Launchspace</td>
<td>Orange</td>
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<td>Winthrop</td>
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<td>Makers’ Mill</td>
<td>North Adams</td>
<td>Seed Award</td>
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<td>Cook Test+Launch</td>
<td>Greenfield/ North Adams</td>
<td>Fit-Out</td>
<td>$100,000</td>
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<td>Stock Pot Malden LLC</td>
<td>Malden</td>
<td>Fit-Out</td>
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<td>Artisan’s Asylum</td>
<td>Somerville</td>
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<td>The WorcShop</td>
<td>Worcester</td>
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<td>The Maker Innovation Lab Lawrence</td>
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<td>UTEC Community Kitchen</td>
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<td>Worcester Clean Tech Incubator</td>
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<td>Greater Gardner Business Incubator</td>
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</table>

**TDI Cowork Strategy and Impact**

Interviews with two MassDevelopment staff provided further insight into the impetus for creating the TDI Cowork program and its evolution since 2014. TDI Director Anne Haynes refers to collaborative workspaces as “economic infrastructure” because ultimately it’s infrastructure that helps support the growth of different economic organizations.” The TDI Cowork grants, although investments in physical real estate, are more importantly an avenue for MassDevelopment to build relationships with entrepreneurs and support the growth of entrepreneurial communities. From the perspective of Ms. Haynes, “in Gateway Cities, there’s a lot of space but we want to really build these communities of entrepreneurs, which will longer-term be more important for those cities that anything else, not just the space.” Sean Calnan,

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“Baker-Polito Administration Announces Collaborative Workspace Program Awards.”
Senior Vice President of Predevelopment Finance, echoed the importance of supporting communities and not just development projects. Launching TDI Cowork as one of the first components of the Transformative Development Initiative “allowed [MassDevelopment] to start looking beyond buildings and started to allow us to look at more at businesses and people that were actually in the districts… bringing them together in a more effective way as a community.” By starting with grants to spaces within TDI Districts, high-priority areas within Gateway Cities, MassDevelopment was able to pilot a concept that could be expanded into the state-wide Collaborative Workspaces Program.

When thinking about measuring the impact of TDI Cowork and the Collaborative Workspaces Program, there is not one set of metrics that would applicable to all the grant recipients. According to Ms. Haynes, “from [MassDevelopment’s] investment perspective, the level of social infrastructure that’s built from these things, which is incredibly hard to quantify, is so much more important because it’s not about the one business that comes out of that collaborative workspace, … it’s the fifteen people that touched that business and started their own things.” Similarly, for Mr. Calnan, the grants’ impact “will be hard to measure on the short term because we’re still dealing with a relatively new phenomenon and the use of a program that we’re really just piloting at this point.” In the absence of a precedent for performance indicators, MassDevelopment is asking the grant recipients to share information such as new programs created, people attending events, new partnerships formed, and new client-customer relationships formed. With these new metrics and strategy for catalyzing economic development, the program remains vulnerable to future policy changes but aligns strongly with the Opportunities for All vision for fostering a culture of innovation and entrepreneurship.
Chapter 4: History of Spaces Supporting Innovation and Entrepreneurship

Although many terms encountered in this research such as coworking, incubators, accelerators, and maker spaces have some commonly recognized definitions, many spaces in Massachusetts cross categories and the distinction between them is sometimes subjective. These terms can refer to characteristics of the physical space, the business model, and/or the types of programming and services offered. For example, “coworking” typically refers to a membership-based workspace but is also used to refer to a flexible, open work area within a larger incubator or innovation center. Coworking spaces may or may not have a goal of fostering innovation and can simply reflect new models of remote work and self-employment. One the other hand, “incubators” and “accelerators” explicitly aim to support young businesses but could take various physical forms and may not even provide a physical workspace to participants. Maker spaces are distinguished by the presence of shared tools and equipment and range from educational spaces, such as in schools and public libraries, to hobbyist workshops and more commercial prototyping facilities.

This chapter elaborates on the definitions of each type of space and explains some of the ways in which they commonly overlap. From a historical perspective, coworking, incubators, accelerators, and maker spaces represent distinct growth patterns and relationships to public policy. These contrasting histories point to the various roles played by government programs, educational institutions, private investors, and entrepreneurs themselves in creating new types of workspaces.

Incubators

The term “business incubator” came into use nearly 60 years ago, and incubators have been directly influenced by federal policies supporting their growth in association with universities. The world’s first business incubator is credited as the Batavia Industrial Center in Batavia, New York, which has combined an offering of space for new businesses with shared services and consultation since it opened in 1959. Soon after, in 1964, the University City Science Center in Philadelphia formed as a non-profit organization of five Eds & Meds organizations. The Science center offered both lab and office space and considers itself “the nation’s oldest and largest urban research park.”

According to the National Business Incubation Association, there were only 12 incubators in the United States in 1980 and over 1,250 in October 2012, with about 7,000 worldwide. Today, over 90 percent of business incubators in North America are operated by nonprofit organizations focused on economic development and approximately half are in urban areas, one fourth in rural areas and one fourth in suburban areas. The National Science Foundation’s Innovation Centers Program, launched in 1973, was the first catalyst for the creation of business incubators across the U.S. From 1973-1981, the NSF awarded funds to launch nine innovation centers nationwide, each in partnership with a university, which then developed its own program structure and priorities. In addition providing insight into foundational ideas of boosting innovation for the benefit of the national economy, the history of the Innovation Centers program may help explain the divergent trajectories of

74 “Batavia Industrial Center.”
75 “University City Science Center Press Kit.”
76 “Business Incubation FAQ.”
Cambridge and Worcester, which were home to two of the nine sites. In a 1985 report prepared for the NSF, it was noted that Worcester Polytechnic Institute’s Center for the Management of Advanced Automation Technology chose to “focus on fostering innovation in existing medium to large businesses rather than encouraging entrepreneurial ventures.” According to the case study, “the Center more closely resembled a cooperative research Center than the other Innovation Centers…It had little interest in founding new businesses, nor in recouping initial investments through pay backs of royalty or equity.”

MIT, in contrast, had begun to establish its Innovation Center even prior to receiving NSF funding in 1973. The MIT Center was more rooted in education within the Engineering School and “students were encouraged to develop technological innovations that could be licensed to existing firms or serve as the basis for new company startups.” From 1979 forward, this mission evolved towards new product development for established firms, who acted as clients to the Center. “This strategic shift was, in effect, an effort to move the Center closer to the marketplace and further away from a basic research orientation.” Although the 1985 case study was too early to predict the growth of the Kendall Square innovation ecosystem, the MIT program’s emphasis on building collaborative partnerships may have helped set the course for a dynamic network of innovators to emerge near the campus.

The 1980’s were a pivotal decade for business incubators in the U.S. in which R&D spending by the private sector first surpassed that of the federal government. This trend was aided by multiple pieces of landmark legislation that supported the commercialization of research and enabled small businesses to access federal research grants. These included the 1980 Stevenson-Wydler Technology Innovation Act, the 1980 Bayh–Dole Act, and the 1982 Small Business Innovation Development Act. As early as 1985, researchers attempted to evaluate the impacts and policy implications of business incubators, noting that they were often linked to technological innovation programs.

**Accelerators**

Accelerators built on the concept of incubators by serving early-stage startups, but were structured to address the challenges of investors as much as the challenges of young companies. Starting with Y Combinator in 2005, seed accelerators became “a new breed of investment firms” and “a new institutional form in the entrepreneurial ecosystem.” According to Y Combinator founder Paul Graham, “The reason we began by funding a bunch of startups at once was not that we thought it would be a better way to fund startups, but simply because we wanted to learn how to be angel investors, and a summer program for undergrads seemed the fastest way to do it.”

From that summer program grew the concept of a short-term program in which a cohort of startups gains investment and intensive coaching in exchange for equity in the companies.

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77 Sheirer et al., “Innovation and Enterprise: A Study of NSF’s Innovation Centers Program.”
78 Ibid.
79 Mian and Plosila, “Science and Technology Based Regional Entrepreneurship in the USA: The Evolution of National and State Policies and Programs.”
80 Plosila and Allen, “Small Business Incubators and Public Policy.”
81 Stross, The Launch Pad.
82 Hochberg, “Accelerating Entrepreneurs and Ecosystems.”
Within a few years, “[the] core elements of the YC model introduced in 2005—the batch investing, the three-month residency, the culminating Demo Day—had been copied by dozens of seed funds for software startups that have sprung up around the world.”83

The time limit and competitive selection process for accelerator programs are key distinguishing factors from incubators. For Y Combinator and several other prominent accelerators, “the intensive ‘boot camp’ is intended to provide office space, access to successful entrepreneurs, mentors, and other technology experts, a place to socialize with other new venture founders, and a safe environment to share ideas or methods.”84 Filling a gap between incubators and angel investors, “accelerators disaggregate the financial resources and knowledge resources previously offered by incubators and angel investors, and provide more advice and less money than either one.”85 With this focus on investment, accelerators’ business models are typically based on earnings from the participant companies, unlike an incubator that typically collects rents.

Accelerators can have a localized or broader impact. While Y Combinator has focused its program at one location in Silicon Valley, another prominent accelerator, TechStars, has grown to a network of nearly 30 programs. In research by the Kauffman foundation, Y Combinator founder Paul Graham and Tech Stars founder David Cohen shared contrasting perspectives. For Mr. Graham, the required three-month residency in Silicon Valley is an opportunity for high-potential companies located anywhere, meaning, “There is already a Y Combinator in your town: Y Combinator.” For Mr. Cohen, “What the TechStars Network is really just saying is, ‘yes, you should clone this model (in your community), and here’s how.’”86 Each point of view presents different challenges for entrepreneurs in a smaller city, either to become competitive applicants to a major accelerator or to cultivate a local community that positions them to compete against alumni of major accelerators.

**Coworking**

In contrast to incubators, coworking is a much newer and faster growing segment of space for entrepreneurs. From 30 coworking spaces in 2006, Deskmag’s 2017 Coworking Forecast shows there are now an estimated 13,800 spaces globally — up from 8,700 just two years ago. This increase in the number of spaces has come with an even steeper increase in the number of coworking members — now 1.1 million worldwide — as the median number of members per space has doubled from 20 to 44 over the last five years. While more than half of spaces still serve less than 50 members, the portion of spaces with over 150 members grew significantly in the last year, from 13 to 19 percent. Of all spaces surveyed in the 2017 Forecast, 27 plan to expand their current locations within the next year, and 39 plan to open new locations.87

Despite significant variation in size and membership, there are a few key commonalities between spaces that market themselves as coworking. First, there is the concept of a membership model in which individuals pay to access the workspace and its amenities, rather than paying for space with a per-square-foot rent. Although amenities vary, office services such as high-speed internet, printers/copiers, kitchen or café areas, and lounge spaces are nearly

83 Stross, *The Launch Pad.*
84 Radojevich-Kelley and Hoffman, “Analysis of Accelerator Companies.”
85 Cohen, “What Do Accelerators Do?”
86 Primomiglio SGR, “Accelerators in US and Europe.”
87 “2017 Coworking Forecast.”
ubiquitous. Memberships are typically available to the public for purchase, rather than by application or competition, and are most often assessed at a monthly rate with no long-term contract.

Although coworking includes many spaces without mentoring, coaching, and other formal business support services, a social community seems to be central to many spaces offerings. The authors of the first book on coworking, *I'm Outta Here*, described the phenomenon as “a café-like community/collaboration space for designers, writers, and independents.” In other words, it is more important for them to share work styles than to belong to any particular industry. The workers need not identify as “innovators,” but many people drawn to the coworking model are involved in the creation of new products and services.

Whereas membership to a business incubator would be a single facility in a single city, coworking membership can open more geographic flexibility for where to work. The value of the coworking model as networks of multiple spaces is evident as early as 2008, when the owner of a coworking space in Portland, Oregon announced an informal reciprocity agreement with a space in Seattle over an online forum: “We see this move and ‘offer’ to our existing and future members as a message for how coworking spaces are connected and that mobile workers (mavericks) can have ‘home bases’ when they travel.” Among prompt responses from Silicon Valley, Des Moines, Toronto, Philadelphia, and beyond expressing interest in the concept, one user agreed that, “an affiliate network is an important added value.” Today, chains such as WeWork, Nextspace, and Workbar provide that type of flexibility for their members to work across locations in multiple cities.

**Maker Spaces**

The term “maker space” is being used in many types of workshop spaces for physical products, but typically refers to those with digital equipment such as 3D printers, CNC mills, laser cutters, and vinyl cutters. Even though many maker spaces are not used for commercial purposes, they have captured the attention of those wishing to position students to become innovators, as well as those bridging the divide between traditional manufacturing and high-tech industries. Maker spaces also regularly straddle a line with artist spaces. As Etsy puts it, makers “operate in gray areas between amateur and professional, business and worker, consumer and provider.” Etsy, which could be seen as a platform for hobbyists and professional artists, refers to makers as “micro businesses,” noting that workforce development programs have overlooked the value of self-employment and entrepreneurship.

Today’s maker movement has roots in “hackerspaces” which were nonprofit, community-oriented places that emphasized open source and shared methods. The forthcoming book, *Hackerspaces: Making the Maker Movement*, describes hacker and maker spaces as a reflection of broader social changes “arguing that excitement about the maker movement is not just about the availability of new technologies, but the kinds of citizens we are expected to be.” One of the first hackerspaces in the world, c-base, was founded in Berlin in the mid-1990’s, but spaces for hackers the U.S. to gather and work together did not emerge for another 10 years. *Make Magazine* launched in 2005 and the Maker Faire event series in 2006, a series of annual events that now

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88 Sundsted, Jones, and Bacigalupo, *I'm Outta Here*.
89 “West Coast Coworking Passport.”
90 “A Call to Action: Five Proposals to Support the Emerging Maker Economy.”
91 Davies, *Hackerspaces*. 
attract 50,000 to 125,000 people. Building off this momentum, TechShop opened in San José in 2006 and appears to be the first of its kind in emphasizing both technical and social resources: a “membership-based, do-it-yourself (DIY) workshop and fabrication studio that provides access to a vibrant community of creative makers and millions of dollars’ worth of facilities, equipment, tools and software in each location.” From its beginning, TechShop offered courses to enable amateurs to become makers.92

Dialogue about maker spaces captures conflicting values of democratization and commercialization. On one hand, “Makers tap into an American admiration for self-reliance and combine that with open-source learning, contemporary design and powerful personal technology like 3-D printers.”93 In the U.S. and globally, there is optimism about the Maker movement’s proposition that consumers can become producers too. Tim Bajarin wrote in Time in 2014 that “I know from history that when you give makers the right tools and inspiration, they have the potential to change the world.”94 And yet despite describing a revolution with democratizing effects, TechShop CEO Mark Hatch credits corporations and government sources such as Autodesk, DARPA, Ford, the VA, Lowe’s and GE as key partners in TechShop and the Maker Movement’s growth.

Maker spaces are adaptable to older urban buildings and require less capital expenditure for renovation than many other uses, and can grow incrementally as maker communities expand. Wired writer Dylan Tweney wrote in 2009 that, “Located in rented studios, lofts or semi-commercial spaces, hacker spaces tend to be loosely organized, governed by consensus, and infused with an almost utopian spirit of cooperation and sharing.”95 Ivan Rabodzeenko, founder of ChopShop in the UK, similarly sees the potential for new fabrication technology to integrate manufacturing in urban centers. Manufacturing processes enabled by digital fabrication technology “requires less staff, space and initial investment, and is much easier to manage.”96 This means that new small and medium-scale manufacturing companies “don’t have to be on the outskirts, or have large, new or expensive premises.”

Meanwhile, the creation of “fab labs” (fabrication laboratories) is attributed to the Center for Bits and Atoms at MIT, which launched in 2001 with a grant from the National Science Foundation. According to Fablabs.io, “the online social network of the international Fab Lab community,” there are over 1,000 Fab Labs worldwide as of February 2017. The U.S. is the country with the highest number (144) but France and Italy are close behind with 138 and 131, respectively.97 Equity and access have always been at the core of fab labs’ mission: “widespread access to modern means for invention.”98 In 2009, MIT’s work in the Center for Bits and Atoms to support the growth of an international fab lab network spun off as the Fab Foundation.99 Although support for entrepreneurs is aligned with its mission, the Fab Foundation primarily impacts businesses indirectly through education that lays the foundation for entrepreneurship and innovation.

“From community based labs to advanced research centers, Fab Labs share the goal of democratizing access to the tools for technical invention. This community is simultaneously a manufacturing network,

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93 Voight, “Which Big Brands Are Courting the Maker Movement, and Why.”
94 Bajarin, “Why the Maker Movement Is Important to America’s Future.”
95 Tweney, “DIY Freaks Flock to ‘Hacker Spaces’ Worldwide.”
97 “Fab Labs.”
98 Ibid.
99 “Fab Foundation – About Fab Foundation.”
a distributed technical education campus, and a distributed research laboratory working to digitize fabrication, inventing the next generation of manufacturing and personal fabrication.”

This sense of a global network is another way that Fab Labs distinguish themselves from previous generations of shop spaces.

Despite their commercial use still being limited, many are optimistic about the potential for maker spaces to transform industry. In 2012, Chris Anderson wrote in *Makers: The New Industrial Revolution* that “the collective potential of a million garage tinkerers is about to be unleashed on the global market as ideas go straight into production, no financing or tooling required.”100 In this sense, physical production is beginning to mimic web-based startups in that innovation in maker spaces can be rapid, highly iterative, and come from anywhere. The “Third Industrial Revolution,” Anderson claims is “the combination of digital manufacturing and personal manufacturing,” in which the Information Age is finally having a “democratizing and amplifying effect on manufacturing.”101

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100 Anderson, *Makers*.
101 Ibid.
Chapter 5: Analysis of Statewide Trends

Policymakers, developers, and other economic development professionals in Massachusetts lack a comprehensive picture of what spaces are currently available that aim to support innovation and entrepreneurship. This chapter illustrates the prevalence and geographic distribution of coworking spaces, innovation centers, and maker spaces across the Commonwealth. An inventory of all spaces shows the growth in these spaces over time, the portion of all these spaces that are in Gateway Cities, and the types of organizations that develop and operate them. The inventory is supplemented by survey data on the membership base, operations, and development of each space. Three categories of “coworking,” “innovation center,” and “maker space” are used for analysis of the inventory, and the survey shows how flexible, shared workspaces and maker equipment are increasingly common within larger spaces that services and programming to small businesses and start-ups.

Inventory Methodology

As described in Chapter 2, the Commonwealth of Massachusetts Executive Office of Housing and Economic Development (EOHED) has created an “Innovation Asset Mapping” dataset, which is intended to be an ongoing effort to list Spaces, Organizations, Programs, Connections, and Regional Organizations. I downloaded the September 2016 version of this dataset, which contains addresses, website URL’s, and some information on state funding for each asset.102 Within the “Spaces” asset category, I selected three asset sub-categories – “Coworking,” “Innovation Center” and “Maker space” – to begin expanding and refining a more complete inventory of spaces.

From EOHED’s list, I then used internet research – company websites, news articles, and social media – to confirm that each space was currently in operation and relevant to the topic of innovation and entrepreneurship as well as to add several data points: year opened, size, organization type, and membership fees. I added additional spaces that were open as of February 2017, and I separately took note of space that are expected to open later in 2017 or are in an earlier planning stage. I continued the use of EOHED’s sub-categories and elaborated on their definitions with more specific criteria when expanding and refining the inventory, shown in Figure 5.1. With these criteria, I made the following changes to EOHED’s list of Innovation Assets:

- Removed 57 assets that are not workspaces for innovation or entrepreneurship or were duplicates of other spaces, or are not currently open. Examples include the Massachusetts Green High Performance Computing Center in Holyoke, which does not contain workspace. Maker spaces such as MADE@MassChallenge and the Roxbury Innovation Center maker space were removed because they are under the same management as a larger “Innovation Center” that was already counted. Four of these spaces I felt should be in the “Artist Space” sub-category instead of coworking or maker space: Umbrella Tank, Holyoke Creative Arts, Flywheel Arts Collective, and Gateway City Arts. Four spaces on the list are still in planning or construction, and 11 have closed.

102 “Housing and Economic Development: Community-Based Innovation.”
• **Added** 52 spaces that are currently open. In addition to ones that opened very recently or were previously overlooked, I listed out each location for chains like Workbar and WeWork, which previously only appeared once in the list, in order to get a more accurate count of the actual number of spaces.

• **Recategorized** 13 of the spaces within the three sub-categories of interest for my project, primarily from Coworking to Innovation Center, based on a subjective judgment that they more comprehensive support services and mentoring instead of a simple monthly membership model.

This process brought the inventory to 121 spaces currently operating – 50 coworking spaces, 52 Innovation Centers, and 19 Maker Spaces – with at least 13 more in planning or development. Through the online research, I found the year opened for 119 of the 121 current spaces, square footage for 106 of 121 spaces (88%), and membership prices for 49 out of 50 coworking spaces.

**Figure 5.1 Detailed Definitions**

<table>
<thead>
<tr>
<th>Innovation Asset Sub-Category</th>
<th>EOHED Definition</th>
<th>Additional Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovations Centers</td>
<td>“Spaces enable entrepreneurs and researchers to activate breakthroughs”</td>
<td>• May encompass multiple uses, such as a coworking area, maker space or fab lab area, and other community/shared facilities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Business incubation, acceleration, and/or education is central to mission</td>
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<tr>
<td></td>
<td></td>
<td>• Excludes “centers” and “institutes” at universities that are used by researchers for non-commercial purposes or lack a physical workspace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Includes buildings with flexible or short term leases for creative or innovative businesses, even if there are no shared facilities</td>
</tr>
<tr>
<td>Maker Spaces</td>
<td>“Spaces that provide shared tool for the use of members.”</td>
<td>• May have a members, free public access, or fee-based programs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Excludes facilities at universities and K-12 schools that are only available to students (i.e. not necessarily available to entrepreneurs)</td>
</tr>
<tr>
<td>CoWorking Spaces</td>
<td>“Working spaces where individuals or small businesses work in shared spaces (No shared tools)”</td>
<td>• Office space accessible through a membership rather than a lease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Does not have specialized equipment or business support services as part of its official membership offerings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use of the space does not require participation in a formal program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Membership may be publicly-accessible or by application/ invitation only</td>
</tr>
</tbody>
</table>
Inventory Findings

Geographic Distribution and Growth

Half of coworking spaces are located in Boston, Cambridge, and Somerville (25 out of 50), approximately 30% are in Boston alone, and only 10% are in Gateway Cities. For innovation centers, 35% are in Boston, Cambridge, and Somerville and 42% are in Gateway Cities. Half of maker spaces are in Gateway Cities and 84% are outside of the Boston area.

At the start of 2017, there was at least 2.1 million square feet of innovation center space, 600,000 square feet of coworking space, and 123,000 square feet of maker space. These cumulative square feet numbers shown in Figures 5.4 and 5.5 are based on existing spaces and do not account for spaces that have closed; thus it shows the minimum amount of space that existed in each year. With closed spaces included, Figure 5.5 would go back to at least 1985 when Massachusetts Biomedical Initiatives was founded.

Coworking spaces are seen as small as 500 square feet and innovation centers as small as 1,000 square feet, yet both also exist over 100,000 square feet. Innovation centers have a median size of 13,250 square feet versus 5,500 for coworking spaces. Figure 5.3 shows that the dominance of innovation centers in cumulative square footage is due to Innovation Centers being larger than coworking spaces on average. In addition, the dominance of Boston, Cambridge and Somerville in Figure 5.4 is due its spaces being larger than those in the rest of the state; when looking at the cumulative number of spaces rather than square footage, the rest of the state is actually showing more rapid growth than the Boston area (see Figure 5.8).

Operators

Coworking spaces are dominated by independent for-profit companies with only one or two locations, although there are two chains – WeWork and Workbar – that account for one quarter of all coworking spaces. Universities and nonprofit organizations make up a much smaller share of coworking space operators. Innovation Centers are much more varied in their management: universities and nonprofits play a much larger role, and two spaces are even led by other corporations (Autodesk and Verizon). Including Maker spaces at universities and K-12 schools would show that most makerspaces in Massachusetts are operated by educational institutions for use by students. Of the makerspaces that are available to entrepreneurs in Massachusetts, all are run by nonprofits and independent companies.

Coworking Membership Pricing

Pricing was analyzed for the two most common membership options: a monthly “hot desk” membership, in which space is used on a first-come-first-serve basis, and monthly dedicated desks. Hot desks in Boston, Cambridge and Somerville range from $130-400 per month with a median of $350/month. In the rest of the state, the hot desks range from $85-500 per month with a median of $213/month. The median price for a hot desk membership in Gateway Cities is $200. Dedicated desks follow a similar pattern: in Boston, Cambridge and Somerville they range from $249-750 per month with a median of $450/month. In the rest of the state, the dedicated desks range from $125-630 per month with a median of $350/month. The median price for a hot desk membership in Gateway Cities is $260.
Figure 5.2 Relative Quantities of Each Space Category

Figure 5.3 Comparison of Coworking and Innovation Center Sizes
Figure 5.4 Estimated Growth of Coworking Space

Figure 5.5 Estimated Growth of Innovation Center Space
Figure 5.6. Number of Coworking Spaces per Municipality

Figure 5.7. Number of Innovation Centers per Municipality
Figure 5.8. Cumulative Number of Coworking Spaces

Figure 5.9. Cumulative Number of Innovation Centers

Figure 5.10. Cumulative Number of Maker Spaces
Survey Methodology

I distributed an electronic survey in February and March 2017 via email and online forms on websites for which email addresses were not available. I aimed to send the survey to all spaces in the inventory and made approximately 100 requests – less than the total number in the inventory because in some cases multiple spaces were managed by a single contact. In addition, a few email addresses were undeliverable, and requests were not made to several spaces added to the inventory after April 1. They survey had a response rate of over 60 percent. Request emails said that the survey was expected to take less than 10 minutes, and the actual median response duration was 8:15. All questions were optional, and respondents were given the option for information to remain confidential. The full list of survey questions is available in the Appendix.

Survey Insights

Survey responses indicate the following differences between spaces in Boston, Cambridge and Somerville and the rest of the state:

• Spaces in Boston, Cambridge and Somerville report higher levels of services and programming, especially business coaching/mentorship, investor meetings, and access to corporate partners (Figure 5.11).

• Over 80% of Boston-area spaces report serving start-up teams, versus fewer than 50% of spaces in the rest of the state (Figure 5.12).

• The majority of Boston-area spaces serve users working on digital products and prototypes, whereas creative services and other professional services are more common outside the Boston area (Figure 5.13).

• A higher portion of spaces in the Boston area targets a specific industry, formally or informally (Figure 5.14). Official industry focuses in the Boston area include the following: FinTech, Social Innovation, Edtech, Life Sciences, Robotics and IOT, Digital Health, and Architecture/Engineering/Construction. Unofficial focuses include: Creative or Social Enterprises and Software/eHealth. Examples of official industry focuses in the rest of the state include: Specialty Manufacturing, Life Sciences, Fashion/Textiles, and Health.

• Less than half of spaces across the state, and only one third outside the Boston area, support their operating expenses with member/user fees.

• More than a third of spaces – in both the Boston area and the rest of the state – used private equity to construct or renovate their space, but corporate sponsorships and foundation grants were more common in the Boston area. At least 20 percent of spaces respondents used personal resources. [Note: approximately half of the respondents who selected “other” noted a phrase like “personal funding,” “personal investment” or “self-financed,” so the “other” category is shown as two.]

• Outside the Boston area, a greater portion of spaces own their buildings – 24% compared to 6% – and those that rent typically pay under $20 per square foot.
Figure 5.11. Survey responses to “What types of programming and services do you offer? (click all that apply)”

Figure 5.12. Survey responses to “Which best describe your members or users? (select up to 3)”

Figure 5.13. Survey responses to “What are the main types of products and services members/users provide? (select up to 3)”
Figure 5.14. Survey responses to “Is the space targeted at businesses in a specific industry?”

a) Boston, Cambridge, Somerville

b) Rest of State

Figure 5.15. Survey responses to “Which of the following sources did you use to construct or renovate the space? (select all)”

Figure 5.16. Survey responses to “What is the current rent?” from respondents that currently lease their space
Limitations of Survey Questions

Survey responses and interviews suggested several questions that would have provided additional insight, such as the following:

- **What is the average age of your members?**
  One survey respondent suggested that it would be important to ask about the age of members, as serving as older demographic is key differentiating factor for his coworking space. Unlike many spaces that seem to cater to younger demographics (with branding, interior design, amenities), he has found a market for “late baby boomers who had enough of corporate world and decided to go out on their own as consultants.” Understanding these demographics better could help economic development professionals refine a strategy to attract mid-career entrepreneurs who aren’t as sensitive to transit and social amenities as recent university graduates.

- **How many members or users does your space support? Approximately what percent is this of your maximum membership?**
  Occupancy rates are not the right metric for a membership-based space, especially one with hot desks and part-time memberships. However, based on usage patterns, managers should have a projection of how many members there space could support. The survey asked for existing and potential membership numbers based on a range, but the ranges were too wide to provide insight into available capacity. For example, a space that reported 40-100 members and the capacity to serve 40-100 members may be full or could double its membership. “Occupancy” is an important indicator of the space market for public or private sector developers of new spaces.

- **How many staff are on the operations/management team?**
  Some spaces mentioned a dedicated “community manager” role, or the desire to hire someone who could focus on member relationships and programming in addition to an operations staff dedicated to the business and facilities operations. I hypothesize that community manager roles are more common Boston and Cambridge, and that added focus on customer service contributed intangibly to the vibrancy of the innovation ecosystem. This information could also be useful for new spaces in a planning stage working to establish an operating budget.

- **Did your space expand or move after first opening? If so, what was the original size? What lessons did you bring the first phase to the expansion?**
  Although it is seen that spaces exist in an extremely wide range of sizes, there may be hidden patterns in how individual spaces grow over time. Potential developers of spaces, especially in smaller cities, may learn from how other spaces have scaled and this information may also provide insight for grant makers into what levels of capital investment are needed at the outset.

- **Would you describe your rent as “market rate”?**
  Several interviewees mentioned that their business model depends on below-market rents or “rent-free leases.” Lower rents as compared to other office or retail spaces in the area in an indicator that the landlord sees social or strategic value in the space, such as that the
space will attract other market-rate tenants to the building. This phenomenon was seen in some interviews – in both Worcester and Boston – and would be informative at a large scale.

- Was the founder an entrepreneur who used the space as a workspace for his or her own business? Has he or she continued to operate the original business?
  There may be a fundamental difference between spaces that are created to fill customer demand or incubate new businesses versus spaces that were created to solve problems faced directly by the founders or founders themselves. An entrepreneur-founder brings a particular perspective to the needs of members and also makes a different financial calculation – the memberships offsetting the cost of an office rent versus needing to cover all operating expenses.
Chapter 6. Innovation Ecosystems in Massachusetts: The Boston Area and Worcester

Introduction

The inventory and survey data presented in Chapter 5 indicate that there are notable differences in the spaces that support entrepreneurs in the Boston area and in the rest of the state, and Gateway Cities have a disproportionately small share of this workspace, relative to their populations. However, despite nearly half the state’s coworking spaces being in Boston and Cambridge, coworking is a growing phenomenon across the state and is not limited to cities and towns of a certain size. “Innovation centers” are even more geographically distributed and illustrate numerous possible approaches to blending business incubation services, industry-specific supports, and programming that creates a sense of community. Maker spaces outside of educational contexts are relatively uncommon, but are nevertheless an important resource and indicator of communities poised to foster and attract entrepreneurs.

For smaller cities and towns seeking to boost entrepreneurship and an innovation economy, it is natural to look towards successful spaces and programs, many of which are in larger cities, and ask what aspects can be replicated or adapted. To what extent does their success — as defined by business starts and survival rates, or by softer metrics like event attendance — depend simply on the size of the city? What other factors are external to the organizations, such as transportation links, university communities, and amenities/quality of life? Where these ingredients seem to exist in cities, such as the Gateway Cities, what types of programming and physical infrastructure are needed to catalyze the growth of a more entrepreneurial community?

To begin exploring the implications of state-wide trends for Gateway Cities, this chapter presents a comparative study of spaces in the Boston area and in Worcester. Worcester is not representative of the Gateway Cities, but as the second largest city in New England, is a vital economic center whose continued revitalization could illustrate opportunities for small and mid-sized cities to grow their share of the innovation economy. In particular, its ability to leverage its dominant “Eds and Meds” sector could set a new precedent for public-private collaboration in expanding the economic impacts of anchor institutions.

The Boston, Cambridge and Somerville Ecosystem

Parts of Boston and Cambridge have shown striking growth and transformation in last several years, both in the composition of businesses and in the built environment. Kendall Square, adjacent to the MIT campus, is known for its concentration of biotech, pharmaceutical and other tech industries. The Seaport District, dubbed the “Innovation District” by former Mayor Thomas Menino, brought an infusion of startup activity into an area dominated by vacant piers, parking lots, and artist studios for decades. Somerville’s spaces such as Greentown Labs, Artisans Asylum, and Workbar are less distinctly identified as part of a district but form a small cluster of activity near Union Square.

The growth of chains Workbar and WeWork shows demand for shared workspace with a flexible membership model — a global trend of which Boston is no exception. WeWork, for example, has three locations in downtown Boston, which include the largest coworking spaces in Massachusetts at over 100,000 square feet, and a Central Square location opening soon. Yet, what stands out in Boston and Cambridge is the proliferation of spaces offering distinct
combinations of workspace, equipment, programming, and networking opportunities. In 2016 and early 2017 alone, several new spaces expanded access to top-of-the-line equipment and/or created hubs for specific industries to gather. Their diversity of developers and operators reflect the breadth of possible stakeholders in a space devoted to innovation and entrepreneurship. These include the following:

**Autodesk BUILD Space:** Autodesk is primarily known as a software company for the architecture, engineering and construction industries and is positioning itself as a leader in how digital design processes translate into physical building materials. The BUILD space features some of the most powerful shop equipment available and teams from universities, design firms, or other companies may apply to use the equipment and workspace for R&D projects. Located on the ground floor of the Design Building, below the Autodesk corporate offices and MassChallenge, it also functions as an advertisement for the innovative activities taking place inside.

**PULSE@MassChallenge:** MassChallenge opened its first industry-specific space in 2016, 8,000 square feet in the Fenway that hosts a six-month accelerator for digital health startups. Along with TechSpring in Springfield, PULSE is one of two programs in Governor Baker’s Digital Health Initiative. The 31 startups in the first cohort were each matched with a “champion” such as AARP, Boston Children’s Hospital, the City of Boston and Pfizer. Some participants are alumni of MassChallenge’s main accelerator program, but the 430 applications represented 30 states and 20 countries. PULSE is part of a “hub and spoke” model for Mass Challenge described below in more detail.

**The Engine:** In October 2016, MIT announced the creation of “an accelerator specially geared to serve new ventures based on cutting-edge science and technology,” addressing the shortcomings of venture capital to support breakthroughs that take more time to develop. Although run as a separate entity from MIT and located in Central Square, it will functionally be part of the campus community and MIT President Rafael Reif’s announcement described the space as one of the ways that “MIT is investing extensively in the infrastructure of innovation.”

**LearnLaunch:** On its 11,000 square foot campus, LearnLaunch offers a coworking space, accelerator program, and training resources for “edtech” startups – creators of education technology that facilitates learning. Through the accelerator program, there are 35 edtech-focused companies housed on the LearnLaunch Campus, and more than 150 active mentors providing expertise and connections. In addition to accelerator participants who get free workspace, other edtech startups may use the space for a monthly membership fee.

103 “Massachusetts’ Digital Health Initiative.”
104 Martin, “PULSE@MassChallenge Just Revealed the 31 Startups in Its 1st Digital Health Cohort.”
105 Email to MIT Community
106 LearnLaunch, “LearnLaunch Accelerator Companies Collectively Raise More Than $10 Million in the First Quarter of 2017.”
MassRobotics: Opened it February 2017, MassRobotics is “an independent, non-profit organization serving as the innovation hub for robotics and connected devices.” MassRobotics’ 10,000 square foot space in the Seaport is a 10-minute walk from MassChallenge and the Autodesk BUILD Space in the Design Center, and CIC is among the founding partners. Nine resident companies use six private offices and shared workspace, and MassRobotics is already renovating a second larger area, located on the 2nd floor.\textsuperscript{107}

Flex Innovation Center: Singapore-based Flex (formerly known as Flextronics International) opened its 17,000 square-foot “concepting, design, and production facility that supports startups and large multi-national customers” in November 2016.\textsuperscript{108} Located in the Boston Innovation and Design Building, “The space is split between typical office desk and conference rooms, and a concrete-floored area containing hundreds of thousands of dollars worth of high-tech manufacturing equipment.”\textsuperscript{109}

This growing concentration of resources within small areas of the city – mainly Kendall Square and the Seaport District – is in parallel to efforts to democratize access to space and resources through neighborhood-based spaces. For example, the Fairmount Innovation Labs is a “unique, cross-sector lab, incubator, and accelerator for elevating, launching and growing creative enterprises along the Fairmount Indigo corridor and adjacent communities” that opened in 2015 and moved to a larger location in January 2017 owned by the Dorchester Bay Economic Development Council. The Roxbury Innovation Center includes Venture Cafe, a sister-nonprofit to CIC, provides events supporting the area’s small business entrepreneurs, specifically focusing on how to start and grow a company. “Fab Lab Roxbury,” a digital fabrication laboratory containing tools such as a laser cutter and 3D printer, was added to the Roxbury Innovation Center in 2016.

To learn more about what is driving this momentum in the core urban area, I conducted interviews with staff of three of the highest-profile organizations: CIC (formerly known as Cambridge Innovation Center), Greentown Labs, and MassChallenge. These organizations and their spaces are not representative of the landscape as a whole but rather provide unique points of view into the needs of entrepreneurs and strategies for fostering a community conducive to start-up success. All three are in the midst of expansion and have been established for several years, so that they have witnessed and participated in the growth of a network of spaces around them and have already gone through multiple stages of growth. Each is also driven by a mission other than creating a profitable real estate deal, and thus provides insight into how privately-owned spaces, corporate partners, nonprofits, and state and local government can partner in various ways to advance an economic development agenda. Interviews focused on criteria and strategies for expansion sites, and in the process, explored the trajectory of businesses using those spaces, evolving needs of users, and approaches to building community.

\textsuperscript{107}“MassRobotics | Facilities and Residents.”
\textsuperscript{108}“Flex Boston Innovation Center.”
\textsuperscript{109}“Inside Flex’s New Smart Manufacturing Lab in the Boston Innovation and Design Building.”
Figure 6.1. Map of Workspaces for Innovation and Entrepreneurship in Boston Area
Formerly known as the Cambridge Innovation Center, CIC is a network of spaces that started in Kendall Square in 1999 and now includes a second Cambridge location, Boston, Rotterdam, Miami, and St. Louis with the goal of expansion to other cities. Together, these locations house over 1,000 client companies and other organizations and specialty spaces including Venture Café, Cambridge Coworking Center, Impact Hub, and Design Town. Clients pay monthly fees for dedicated workspace and access to CIC’s amenities and programming. Nearly all clients are high-growth, high-potential start-ups despite it not being an incubator or accelerator. CIC started as a shared workspace for its founders start-ups and has evolved to a business that deals both in real estate and community building. Of the spaces studied, CIC uses the language of “innovation ecosystem” most explicitly in its mission and expansion strategy. Its mission today is “to change the world through innovation by developing ecosystems that allow exceptional entrepreneurs to create new products and companies better and faster.”

Expansion involves identifying and prioritizing opportunities at the scale of the city, district and then building. According to Expansion Project Lead Amelia Aboff, CIC is looking for “cities that already have strong concentrations of talent, … some existing corporate tech presence, or more often a really strong university base – a highly-educated, highly training workforce where there is some underlying interest in innovation already.” Research for new locations takes the form of an innovation ecosystem assessment in which the expansion team tries to understand factors such as the level of maturity of the ecosystem, the success rates of that ecosystem, what resources successful startups there are using, existing venture capital, the existing number of innovation-related events, the existing number and capacity of coworking spaces, and, whether there are any that have closed recently. Within cities, central locations are important to CIC for so that clients have access venture capital, transit, and corporate offices, among other amenities. CIC also looks for collaborative building owners, with Ms. Aboff noting that, “while CIC is a for-profit company, it’s a mission-driven for-profit company and we can make a lot of decisions based on making sure we’re reflecting that.”

With its emphasis on community, CIC’s process of expansion includes multiple approaches to building community in and around its spaces. Every new CIC locations involves Venture Café, and for Ms. Aboff, "CIC and Venture Cafe have similar missions, and different tools at their disposal to accomplish them, so we think about them jointly when we’re thinking about building networks and partnerships… we have the same vision of strengthening the ecosystem by trying to fill gaps and providing whatever programming or resources don’t currently exist.” Although some clients might choose between CIC and a coworking space, Ms. Aboff sees competition in the conventional real estate market as a bigger factor than coworking spaces. In general, “The other coworking space providers aren’t ever providing the level of service or connection to support resources that we have at CIC. It’s more likely that a company who was seeking this environment would wind up subleasing a space and trying to create their own version of a community and draw connection to folks who are in their immediate geography.”

Although historically MIT has been the driver of R&D and source of talent in Kendall Square, “CIC has been a big part of that engine over the last 20 years” according to Ms. Aboff. West Coast-based companies such as Facebook, Google, Apple, and Amazon that now have offices in Kendall Square all had space in CIC first, an indicator of the value of flexibility and community. Those companies, which certainly have the resources for a conventional office lease “first put their feet in the water on the East Coast here and then have tried to stay very close
because they understand how the hub works and this is where they’re going to hire their next people from.” The network of informal and formal partnerships between CIC and other spaces in Cambridge and Boston is a “densely connected web, compared to what you see in other cities,” including a significant role in developing LabCentral.

**Greentown Labs**

Greentown Labs is the largest “clean tech hardware incubator” in the U.S., located in Somerville’s Union Square neighborhood. Formed in 2011 by four start-up founders looking for affordable prototyping space, it has grown to support 50 companies and is in the midst of an expansion from 33,000 square feet to nearly 100,000 square feet. Greentown is exclusively dedicated to hardware startups – companies that have prototyping and physical production needs – and offers a coworking area, event space, and shop space. In addition to the workspace and programming, Greentown provides support through a Manufacturing Initiative and a Strategic Partnership Initiative.

Unlike CIC and MassChallenge, Greentown is expanding adjacent to its current location in Somerville rather than seeking locations in other cities. The expanded campus will open in late 2017 as the Global Center for Clean Tech Innovation, adding desks for more than 400 employees, a 24-bench wet lab, and 10,000 SF of prototyping lab space for smaller-sized startups. The existing headquarters building will be converted to lab space for mid- to larger-sized startups, and a third location down the street will serve the most established startups. According to Real Estate Advisor Peter Scanlon, who is overseeing the campus expansion, this stratification is intentional with the idea that “the smallest and newest companies should be closest to the middle of the hub, closest to where the event space is, closest to where the majority of the staff are.” The “Series A” companies envisioned for the third ring would be those with the size and stability to lease an office space but that want to remain part of the Greentown community.

Discussions about expansion started about two years ago when the current space was almost full. According to Mr. Scanlon, member companies were growing at approximately 25 percent per year and “Greentown needed more space because members needed more space and they want to stay here.” The campus expansion utilized a variety of sources, with the majority covered by a loan from East Boston Savings Bank and smaller amounts from the Boston Community Loan Fund, a City of Somerville economic development loan, and the Mass Clean Energy Center. Debt financing enabled the expansion to move forward more quickly – fundraising would have taken a couple years – but Mr. Scanlon saw that more fundamentally, “Greentown wanted to do [the expansion] on its own merits” based on existing demand and expected growth.

From Mr. Scanlon’s perspective, the growth of Greentown does not simply reflect a strong business model, but rather the location and the resources of the local ecosystem. When looking at potential sites for expansion, Mr. Scanlon saw that in addition to public transit,

> “the coolness factor of Somerville is a big draw. You’ve got to have a brewery nearby. You need a place to work out after work. I think at least 60% of Greentown companies have either MIT or Harvard ties. For those folks, mid-to-late 20’s, they’re ‘sticky,’ they like the neighborhoods they’re in… We think this is actually a better spot than the Seaport.”

That stickiness poses a challenge for organizations wishing to replicate Greentown’s model in a less dense or trendy location. Mr. Scanlon suggested that an incubator will not necessarily activate an old mill building a couple hours from Boston, and “in places that don’t have the
benefit of being the back door of MIT or Harvard, there is some chicken and egg problem… What’s going to be the magic magnet that a community forms around?”

Greentown has significant corporate sponsorship, which creates additional financial capacity but is also integral to building community and fostering the exchange of ideas. The “wall of sponsors” is part of what Greentown markets to potential members and the entrepreneur community is also a huge draw for potential sponsors. According to Mr. Scanlon, the 15 or so corporate sponsors who meet quarterly as an advisory board, “don’t really come to tell Greentown what to do next; they come to listen to each other and what the other ones are doing.” Community event space is a major component of the new headquarters building with the intention of being “a resource not just for the people that are inside the organization but the outside people who realize they could have an event at Greentown and expose their company or members or group to what's happening at Greentown.”

With its success in Somerville, Greentown is exploring what economic impact it can have on Massachusetts more broadly through the Manufacturing Initiative, which was founded in late 2014 in collaboration with the Massachusetts Manufacturing Extension Partnership. Micaelah Morrill, Director of the initiative, connects startups at Greentown and elsewhere in the region with Massachusetts-based manufacturers who can bring prototypes to larger-scale production. From an economic development perspective, Ms. Morrill is seeing that the Manufacturing Initiative may be able to keep startups in the state, but it will not resolve the workforce development problems for many manufacturers. When the Manufacturing Initiative began, “The thesis was, if you connect startups and manufacturers, you will help save manufacturing jobs…What really ended up happening … is we really educated startups on how to work with manufacturers and what they needed to know to be good customers.” Speaking to the strengths of Massachusetts, Ms. Morrill adds that the Manufacturing Initiative “works here because we are in probably one of the most concentrated areas for startups across the board… and we happen to have, still, some of the best manufacturing capabilities in the country.”

MassChallenge

The nonprofit MassChallenge ran its first accelerator program in 2010, and as of 2016, has accelerated over 1,200 startups estimated to create 60,000 direct and indirect jobs. The accelerator program is a four-month competition for early-stage startups that draws applicants from around the world, and differs from most accelerator programs in that it takes no equity in participants’ companies. In 2016, 376 finalists were selected from 4,269 applications from 81 countries. Its 30,000 square foot headquarters in the Seaport District in the Design Building at 23 Drydock Ave has 300 desks in an open working area (including desks for the headquarters staff), an event space for approximately 300 seats and up to 500 total, and MADE@MassChallenge, a maker space available to all members.

Over the last two years, MassChallenge has expanded both regionally and internationally: PULSE@MassChallenge in the Longwood Medical Area, the Newton Innovation Center in partnership with CIC, and locations in Israel, Mexico, Switzerland and the UK. Describing the recent expansions, Director of Special Projects Lindsay Simeone says, “We have a vision around the values we need to incorporate into ecosystems and into different locations for office launches, but we understand the need for local adaption and tailoring the program to make it make sense in each location.” With the goal of operating in 12 locations by 2020, MassChallenge

is “choosing cities strategically that aren’t in Silicon Valley” in order to show the potential for startup communities in other cities.

MassChallenge’s organizational model is dependent on rent-free leases, corporate sponsorship, and government support. The organization has been able to negotiate three-to-five year leases with the expectation that they will help attract new companies to the building, with Reebok, Autodesk, and Continuum as examples in the Innovation and Design Building. For the first location on Fan Pier, Former Mayor Menino’s office helped negotiate a lease, in order for MassChallenge to be an anchor in the emerging “Innovation District.” With corporate sponsorship, Ms. Simeone notes that MassChallenge typically works with strategic or innovation teams, rather than corporate social responsibility staff; corporations want to get involved when they see that MassChallenge is “driving innovation in sectors [they’re] not as familiar with, or [MassChallenge] is attuned to what’s up and coming.” Thus, sponsorship is perceived as joining a club more so than a charitable contribution.

Regional expansion is guided by a “hub and spoke model” that seeks to create additional locations around Boston and across Massachusetts that enhance what’s happening at the Boston headquarters space. For example, PULSE@MassChallenge aligned with Governor Charlie Baker’s vision to make Massachusetts a “center of digital health excellence,” and was strategically located near the Longwood Medical Area instead of closer to the Seaport headquarters. PULSE@MassChallenge has a partnership with TechSpring in Springfield, extending its reach rather into the state. The creation of PULSE@MassChallenge, which is geared towards mid-stage startups, also points to the need for a pipeline of spaces. According to Ms. Simeone, “We had a ton of entrepreneurs in the healthcare space who were graduating MassChallenge and didn’t have a perfect place to go.” PULSE@MassChallenge fills a demand that isn’t met by existing incubators, CIC, or WeWork.

Helping create state-wide connectivity and opportunities is not just part of MassChallenge’s core mission to help entrepreneurs start companies, but is seen as a responsibility given the level of state government support received for the Boston locations. From Ms. Simeone’s perspective, “Our biggest challenge for westward expansion and trying to connect some of the dots there is transportation… it’s not perfect here either, but it’s important for us when we choose offices that we are accessible.” Ultimately, a startup’s decision of whether to locate in Boston or elsewhere in Massachusetts is also about growth stage: “if you’re so early-stage, and you don’t know what you really need yet, it’s better to be as close to the resources as possible, and the truth is the resources right now are in Boston and Cambridge.”

From Ms. Simeone’s perspective, MassChallenge pursues new locations with an emphasis on being collaborative rather than competitive. Key ecosystem criteria are: 1) educational institutions, 2) the presence of other incubators and accelerators, 3) corporate presence and recent expansion and 4) an existing community of entrepreneurs. MassChallenge regularly works with other accelerators and incubators and sees these programs as a good sign that MassChallenge can add something rather than a sign that demand is already met. Corporate expansion is important not just for potential sponsorship but because it indicates companies have already done research finding that the new location is a place that innovative and entrepreneurial people want to live.
Innovation and Entrepreneurship Spaces in Worcester

Despite persistent challenges, the region’s second-largest city – Worcester – has sustained modest population growth in an era when many of the nation’s former industrial hubs are struck by massive population decline and disinvestment in the physical city. Today, downtown Worcester is ripe with signs of physical renewal, from new housing and retail to refurbished office buildings, arts spaces and public realm infrastructure. City Square, a 2.2 million square foot multi-phase development adjacent to Union Station and the Common, is replacing a 1970’s superblock mall with transit-oriented commercial, medical, retail, entertainment, and residential space.

Worcester’s resilience to global economic change is at least partly due to an abundance of universities and hospitals. In addition to providing jobs and bringing students to the city, some universities have proactively contributed to revitalization and real estate development, such as Clark University’s University Park Partnership and Worcester Polytechnic Institute’s Gateway Park. UMass Medical School, the only public medical program in the state, opened in Worcester in 1970, and the 470,000 Worcester Biotech Research Park, now known as UMass Medicine Science Park, developed next to the medical campus in the late 1980’s. The Medical School has been credited with Worcester’s relative stability, for both the high-paying professional jobs and lower-paying service jobs it generates.111

Worcester is home to several spaces that are notable within the state, as well as some that are more representative of broader trends, such as the coworking space Running Start and the maker space Technocopia. Of the 10 spaces identified in the inventory, I made site visits and/or conducted interviews at six. As in Boston, the interviews I conducted in Worcester did not comprehensively reach the leaders and spaces where innovative activity is taking place, but rather illustrate the diversity of organizations that can create space for innovators and entrepreneurs.

111 Davidson, “What Happened to Worcester?”
Figure 6.2. Worcester Spaces for Innovation and Entrepreneurship, Universities, and Hospitals
Massachusetts Biomedical Initiatives

Massachusetts Biomedical Initiatives (MBI) was founded in 1985 as a “public/private partnership for accelerating health and life science commercial development.” MBI provides lab and office space to startups through agreements that enable companies to move to larger spaces as their needs change and space is available, rather than be tied to a lease for a specific unit. MBI also provides some shared equipment and health and safety services that may be cumbersome for small companies to arrange on their own. According to Chief Operations Officer Jon Weaver, MBI’s value proposition is much more clear than a coworking space targeting software companies; biomedical companies simply can’t do lab work in their garage or living room so affordable professional facilities are attractive.

MBI currently operates three facilities: 7,500 square feet at Gateway Park that opened in 2007; 10,000 square feet at Gateway II in 2012; and 8,000 square feet that opened at Barber Ave. in 2000. The first facility was located at 1 Innovation Drive in Worcester, adjacent to UMass Medical, from 1989-2013 and there were two other past Worcester locations – Winthrop Street from 2000-2007 and Redstone Center from 2011-2016, as well as a location in Roxbury. MBI’s next location will be in the Worcester Biomanufacturing Park, for which the Worcester Business Development Corporation was announced as the developer in September 2016.

From Mr. Weaver’s perspective, rising costs in Cambridge “have been positive for Worcester in that Worcester and a lot of the other cities can now get a look from startups.” As an ecosystem, Worcester provides many supports and institutional resources comparable to what is found in Cambridge, such as the potential to rent time on specialized equipment at WPI and UMass Medical’s core facilities. Rather than looking towards Cambridge for new models, Mr. Weaver has focused on making operational decisions based on tenant requests and concerns. For example, MBI’s tenants have expressed that private bench space is preferable to the open bench models available in Cambridge, which pose challenges in terms of contamination and intellectual property protection.

Although academic institutions are a major asset in Worcester, they are not providing a pipeline of potential entrepreneurs to MBI; 95 percent of MBI’s companies do not come from the academic sector. The majority of MBI entrepreneurs have significant industry experience, due to the capital requirements of a biomedical company and investors want to see a proven track record in commercialization. When companies move out – the average stay in 38 months – 89 percent stay in Massachusetts and 29% stay in Worcester. MBI’s spaces have been 98 percent occupied for two years, and capacity is the main reason they’ve had to turn companies away.

Despite its high occupancy, MBI’s model of providing affordable lab space requires below-market rents. To gain access to space, MBI has positioned itself as an anchor in new redevelopment projects that can attract other tenants and raise rents. According to Mr. Weaver, MBI been the first tenant in all life sciences projects in Worcester, with the expectation that they will move once a building is fully stabilized and rents reach a level that no longer works for them. For the Worcester Biomanufacturing Park, MBI hopes for its facility to “show the marketplace that there is momentum…there is construction going on and also some support systems around there, like conference rooms that anyone in the park could use.” That said, there may be limits on the extent to which an incubator can be a catalyst for other development. When thinking about the value proposition of an incubator, “There has to be some existing market for

112 “History.”
people in the area. It’s great to say that you are going to put an incubator space in there, but
there has to be some foundation and some industry that you’re building it around.”

Worcester Clean Tech Incubator

The nonprofit Worcester Clean Tech Incubator (WCTI) was founded in 2009, around the
same time as Greentown Labs, with congressional funds secured by Congressman Jim
McGovern to cultivate the “green economy” and green manufacturing jobs. WCTI initially
operated from an office on the Clark University campus, with a focus on organizing events and
making connections in the region, rather than providing a workspace. When Joe Bush, the
current Executive Director joined in 2015, he began looking for a physical location and assessing
the resources already available to startups in Worcester, such as WPI’s Tech Advisor Network
and Venture Forum.

Mr. Bush chose the Printers Building at 44 Portland Street for WCTI’s first physical
location at the suggestion of Technocopia, a maker space that was in the process of moving to
the Printers Building as well. The two organizations now have a formal partnership, with WCTI
paying a retainer that gives its members access to the maker space while providing Technocopia
a stable income stream. At least as important as access to physical equipment, co-location with
Technocopia provided an opportunity for community building; from the perspective of Mr.
Bush, “they had that spark of activity that is critical for any sort of innovation or
entrepreneurship community.” The 3,000 square foot space is slated to grow to 11,000 square
feet, and Mr. Bush credits the Printers Building’s owner, the Davis Family, for making that
incremental growth possible. The landlord not only charges a lower rent than they would charge
other tenants but is holding the whole floor for WCTI’s growth, only charging as they grow, and
making capital investments in the building systems. “Typically a landlord would not give below-
market rent and do significant upgrades at the same time… they have been an incredible asset,
ally, partner, sponsor, etc.”

Like Greentown, WCTI is faced with the challenge of defining “clean tech,” with Mr.
Bush noting that clean tech is not an industry of its own but “really a lens through which you
could look at any industry… material science, electrical engineering, computer coding, policy.”
Whereas Greentown branded itself as a space for hardware startups – companies that, by
definition, prototype physical products – WCTI is open to serving both hardware and software
companies and is considering the Internet of Things as a possible focus to refine its value
proposition and build a more unified community.

With two full-time staff, WCTI can’t provide a depth of programming, nor does it want to
fill every role in educating aspiring entrepreneurs on the fundamentals of starting a business.
Partnerships and other ecosystem players are critical for filling the gaps, such as WPI’s Tech
Advisor network which is already undertaking the time-consuming work of building and
maintaining a network of mentors. Companies have many common needs in accountants, legal,
HR, payroll, and marketing issues, but Mr. Bush has found it to be more productive to offer
“office hours” with these consultants rather than trying to provide curriculum for new
businesses. In addition, “The goal of the larger events from my perspective is to get industry
experts along with entrepreneurs, who are also industry experts but not as established, on the
stage together, talking about relevant issues.” In other words, incubation is not just about
training and physical workspace, but about raising the profile of early stage companies through
mutually beneficial exchanges.
WCTI is financially dependent on corporate sponsorship and grant funding and expects to be for the foreseeable future. Currently, about half of WCTI’s revenue comes from one grant through the Mass Clean Energy Center, another 25% is coming from national Grid, and the remaining 25% from other memberships and a couple smaller sponsors. That’s not as diversified as Mr. Bush would like and he is “actively trying to increase participation with our board of directors and other community partners” and expand membership revenue to cover 50 percent of operating costs. Moving towards more financial stability, one of the biggest opportunities for growth for WCTI is in “aligned industry resources.” For example, National Grid’s sponsorship includes the potential for access to its Millbury Training Facility, a grid demonstration center with control technologies, so that “If anybody has technology where they want to test on a real grid scenario, that can provide a really valuable piece of the commercialization puzzle.” For another sponsor, Columbia Tech, Mr. Bush feels the key was Columbia “seeing a strategic investment in the region and seeing it wasn’t a charity handout but an investment in the space that is going to have returns on multiple fronts.”

Running Start

Running Start is a coworking space that started in 2012 with 400 square feet and moved into its current 5,000 square-foot space in 2013. Located at 95 Prescott Street, in an old warehouse building just north of Gateway Park, it is on the outskirts of downtown, an approximately 25-minute walk to Union Station. The space includes eight private offices, open workspace, a conference room, and phone booths. A second Running Start location opened in Oxford in 2016 with just 1,000 square feet in a classroom of a former school building.

Founder Ryan Leary described his path into creating a coworking business “by accident.” He and his business partner originally “saw this as a way to funnel business towards our consulting, so the business model changed quite a bit from that first version, and it took a year and a half to get towards purely ‘coworking’ as a service.” When they were at their original location on Lincoln Street, the owner of the Prescott Street building reached out and despite the need for significant renovations, “it was the right location with Gateway Park and MBI right down the street, WPI and Clark not far, on the outskirts of downtown, and the price was right.” Of the spaces studied in Worcester, it is one of the two “gym membership model” coworking spaces, the other being Clearly Coworking. Current rates are $35 for a day pass, $100 for five days per month, $200 per month, $225 for dedicated desk, and private offices starting at $500. Members range from nonprofits, hardware companies, app developers, videographers, and graphics/branding firms. Programming and services are not part of the membership offerings, but user-generated events are common, such as monthly Meetups for gaming professionals held in the space. Business support and mentorship happen informally: “We’ve brought people together that end of working on a product… or with a mentor-mentee set up. There have been side projects that popped up, but nothing that we’ve really arranged.” Running Start has hosted the StartUp Worcester program led by the Chamber of Commerce, through which local college students and recent graduates get a mentor and access to workspace at Running Start. Relationships with other spaces such as MBI are informal – such as referring businesses to the other space when it’s a better fit. Running Start has also has members that didn’t need lab space but were working with other businesses at MBI.

As Running Start’s business model evolved in its first couple years, Mr. Leary gained more insight into the actual demand for workspace in Worcester and how to keep the business
personally sustainable. Describing his original vision for a “community innovation center” he says, “I knew we couldn’t manage an incubator-type business model and the coworking model at the same time.” Running Start had a Community Manager staff member for some time, and with that role open for the last few months, his focus has been even more on encouraging user-generated events. The composition of members also came as a surprise: “When we started, I was promoting so heavily to startups, I wasn’t thinking of freelancers, or established companies or remote workers,” which are now many of the members.

The conflation of “coworking” with “incubators” was a challenge in explaining Running Start’s model to potential members, but Mr. Leary has found that coworking is more commonly understood now than when he first opened. However, the term “incubator” is still used incorrectly to describe Running Start, and Mr. Leary worries that misuse of the term could turn someone away from Worcester who is familiar with incubator and accelerator models in larger cities.

Continued expansion is a goal and will involve deeper assessment of different markets. Reflecting on the limitations of the Prescott Street location, Mr. Leary says, “I would probably spend more time looking for a better combination of right location and right price” and also suggests “Getting a more boots-on-the-ground view of what’s going on first, rather than trying to read through economic development reports.”

Idea Lab

The Idea Lab is a 3,200 square foot “collaborative workspace” on the ground floor of 20 Franklin Street, a building redeveloped by the Worcester Business Development Council in 2015 as the “Worcester Innovation Center.” The Idea Lab is operated by Worcester-based nonprofit Action!Worcester, which envisions the next generation of coworking to be more deeply rooted in its community. The Idea Lab’s membership model includes four sets of rates for individuals, nonprofits, corporate memberships, and universities, with the primary criteria being that members are interested in engaging in discussions about how their work impacts the community.

Creating inclusive development is at the core of Action!Worcester’s mission and its approach to the Idea Lab. Free community access on Wednesday enables access to the space for people for whom cost is a barrier to entry, or they are unsure of what they can gain from it, as well as capturing people who would not buy memberships but contribute activity to the space, such as a high school group project or a freelance writer passing through town. Another strategy for boosting inclusion is to promote the Idea Lab as a space for “projects” instead of “start-ups.” The messaging is that you don’t need to have a company and you can use the space on a more ad hoc basis for any type of creative or entrepreneurial pursuit.

Cofounder Josh Croke’s training and experience as a design researcher is reflected in the operations and evolution of the space. Action!Worcester took over operations of the space and launched the Idea Lab identity in January 2016, but only launched its current membership model in March 2017. That time enabled Action!Worcester to learn from discussions with potential users and hone in on distinct types of users. With corporate memberships, Action Worcester’s value proposition is an environment that sparks new ideas. With the vision of hiring a full-time Community Manager, Mr. Croke envisions offering consulting services that are different from entrepreneur education or other incubation services. What if Hanover Insurance could send a

Kane, “New Worcester Innovation Center in Old T&G Building ‘Critical’ to Downtown Revitalization.”
team over to the Idea Lab for a facilitated “design thinking” workshop around a new product or service offering? It could function as a retreat rather than a replacement for a corporate office.

As for many spaces, the space’s financial stability depends on a collaborative relationship with the building owner – the Worcester Business Development Corporation – and other funding sources. Membership needs to grow for financial stability and to support a staff member funded through the operations. Gaining full buy-in from local universities has been a gradual process, and stretches Mr. Croke’s capacity to market the space while leading a nonprofit and a design consultancy. Events and classes are a revenue stream and a marketing tool that generates exposure among new audience and the sense that the Idea Lab is a community Space. Growing membership will also help secure corporate sponsors who want to see a critical mass of people in the space before contributing.

Technocopia

Technocopia is a 7,000 sq. ft. maker space with common work space, rental bays, and a variety of tools for digital fabrication/prototyping, electronics, metalworking, and woodworking. Two of Technocopia’s founders, Nick Bold and Kevin Harrington, have strong ties to local schools: Mr. Bold is the manager of the brand new Quinsigamond Community College (QCC) FabLab, which opened in 2016, and Mr. Harrington runs robotics labs at WPI. The space received an $84,000 TDI Cowork Fit Out Grant in 2016. Technocopia is organized as a 501(c)(3) non-profit, and as of November 2016, was led by volunteers, without paid staff. Mr. Bold mentioned that the lack of grants available for operating costs is a challenge while he and others work to grow Technocopia’s membership.

The WorcShop

The WorcShop is “one of the most comprehensive maker spaces in the world” serving those “looking for an economical way to incubate your business, prototype a new design, pursue a hobby, or learn new skills.” Located in a manufacturing district approximately three miles south of downtown, the WorcShop opened in 2016 and occupies 18,000 square feet with plans to potentially take over an additional 13,500 square feet. There are 10 private studios available to full-time members, two shared studios with printing and textiles equipment, and a large warehouse space with shop equipment. Many members work in metal fabrication, machining, design, prototyping, and other industrial applications, and woodshop space may potentially be accommodated in an expansion.

The WorcShop’s three founders are artists and entrepreneurs who are integral its operations. Executive Director Angela Pasceri pursued the concept of the WorcShop Co-founder as a studio space for herself in addition to the goal of enabling others to try creative projects and explore new media without big upfront investments. Co-founder Randol Garder’s company Eternity Ironworks currently accounts for about two-thirds of the WorcShop’s rent, and another co-founder Stephen Cornie had an advanced composites company that provided the WorcShop with equipment.

Angela Pasceri and Randol Garder see the decision to be a for-profit organization as strategic and not in conflict with the desire to be a community-oriented and educational space.

115 “Technocopia Worcester.”
116 “The WorcShop.”
The WorcShop’s leaders can make decisions about how to expand and operate without the need for approval by a Board of Directors, such as making deals for discounted memberships at their own discretion. The WorcShop has received donations of equipment worth hundreds of thousands of dollars despite donations not being tax deductible. Being zoned as a manufacturing space was also advantageous in allowing the space to begin operating with minimal capital upgrades.

The WorcShop’s business model faces economies of scale – from this stage where they have already broad range of equipment, the business can expand in terms of space and membership without additional equipment costs. At the same time, the membership model creates a tradeoff in how space is used internally. Studios and bays are active income generators, for which the WorcShop charges $2 per square foot in the warehouse, versus costs of $0.75-0.80 per square foot for space that isn’t allocated to a specific member.

Although open to hobbyists, the scale of the space and level of equipment is conducive to commercial production in a way that doesn’t seem to compete with Technocopia’s offerings. For example, one member company is shifting its production from China to the WorcShop for rapid prototyping, better quality control, and a lower carbon footprint on shipping products to customers in the U.S. Ms. Pasceri hopes to expand collaboration with Technocopia and offer a dual membership that markets “the idea of being part of both communities.” In contrast to maker spaces at WPI, the WorcShop has nearly the same range of equipment, but without the restriction that WPI would own intellectual property rights for products developed on their facilities.
Chapter 7. Recommendations to Reinforce Worcester’s Innovation Ecosystem

Reflections on Worcester’s Innovation Infrastructure

The last five years have marked a visible shift in types of workspaces available to entrepreneurs and innovators in Worcester, with the emergence of every space studied except for Massachusetts Biomedical Initiatives’ facilities. Most of these spaces are within walking distance of downtown, and their development has coincided with other physical revitalization, such as new market-rate apartments, hotels, retail and streetscape improvements. New spaces can both fulfill latent demand and induce additional demand, and multiple interviewees suggested that Worcester’s community of entrepreneurs is at a scale where new spaces or programming might detract from spaces that still have capacity. None of the organizations I studied have direct competitors within the city, and instead seem to be competing with other cities or providing opportunities for people who would have otherwise worked at home or shared resources informally. The study of these spaces illustrates that by locating downtown, innovative workers and entrepreneurs can contribute to the overall revitalization of the city, but that growing Worcester’s innovation ecosystem requires a multi-pronged approach to better market and position the city’s strengths. This section summarizes some of the key themes from interviews and comparisons to Boston-area spaces.

Entrepreneur Demographics

Worcester’s nine universities and total student population of 36,000 are often noted as an asset to be leveraged in the future economic development of the city. Increasing student retention is a goal for the Worcester Regional Chamber of Commerce, which created a role for Higher Education-Business Partnerships in 2014, including working with businesses to more actively recruit from Worcester universities and leading the Startup Worcester program. Although retention isn’t necessarily a new goal, it is supported by statistics such as the “Central Massachusetts Talent Retention Project” that found approximately one third of students who leave the area identified “Lack of job opportunities in my field” as a factor that contributed to their decision. However, similar numbers (and perhaps some of these same students) selected “Wanted to move closer to friends and family in another region” and “I do not consider the area a desirable place to live,” so this finding does not clearly indicate how many students might be compelled to stay in Worcester for a job opportunity.

More importantly, Worcester’s student population may be limited in its potential to generate startup founders, given that undergraduates dominate the population. Even if more students were to choose to stay in Worcester, and to feel a stronger connection to the city, undergraduates and graduate students have distinct needs and potential to become successful entrepreneurs upon finishing school. In the experience of WCTI’s Joe Bush,

“Graduate students and postdocs form a critical linkage for passing the baton from academic research to commercialization. They spend five years becoming the world experts on the technology, have more bandwidth to look at the broader industry incentives and ecosystem, so it’s more of a challenge when dealing with undergraduates who lack industry exposure.”

Thus, WCTI sees an opportunity to students and the “corporate refugees” who already live in Worcester’s attractive suburbs. MBI’s Jon Weaver also noted that very few companies in MBI’s
space come directly from academia because of the nature of biomedical startups and level of industry experience needed to effectively commercialize a product or process.

**Differentiation and Visioning**

Although biotechnology and healthcare are clear strengths of Worcester’s economy, local interests in strengthening industry clusters are not entirely reflected in programs at the state level. For example, Massachusetts Digital Health Initiative, announced by Governor Baker in January 2016, currently supports two workspaces: TechSpring in Springfield and PULSE@MassChallenge in Boston. Worcester will also gain a share of the digital health industry through PracticePoint, a multi-million initiative at Worcester Polytechnic Institute to give companies the space to test digital health care innovations, but TechSpring may make it harder for the city to establish leadership in digital health.\[^1\] Another example is that several interviewees mentioned robotics as a potential industry cluster, but few mentioned how Worcester might leverage or differentiate from MassRobotics, a nonprofit whose space opened in the Seaport in February 2017. TechSpring and MassRobotics do not necessarily detract from opportunities in Worcester but indicate the speed at which it must work to capture a share of new state-wide initiatives that could set the course for future cluster development.

Establishing and promoting a vision for the future economy of the city is not the responsibility of any one organization. It may be outside the bounds of city government to lead projects that could be seen as favoring one industry over another, and the capacity of economic development staff is certainly finite. Worcester’s redevelopment activity today is not simply the result of market forces, but of public-sector investment and cross-sector collaboration. Several interviewees mentioned an “economic development coordinating committee” that meets weekly with members that include staff of the City of Worcester, Worcester Business Development Corporation, The Chamber of Commerce, and Mass Biomedical Initiatives. This collaboration enables the committee to identify potential opportunities for more formal partnerships and positions each organization to act more boldly.

**Regional Integration**

By focusing on connections within the city, I may have overlooked relationships between spaces in Worcester and other cities and towns. A few interviewees mentioned comparisons to Boston-area spaces (WTCI to Greentown and Technocopia to Artisans Asylum) but formal relationships to Boston-area organizations were not a focus. When discussing whether Worcester-based entrepreneurs might regularly participate in programming in Boston or Cambridge, interviewees suggested that it is simply too far and disconnected, especially because start-up founders tend to be time-constrained. Transit is a challenge for everyday or occasional commuting – the Peter Pan bus to Boston is faster than the MBTA Commuter Rail, and the “Heart to Hub” express train that launched in 2016 is only once per day.

Nearly every interview included some discussion of quality of life as a selling point for Worcester, including the affordability of housing and strong location within the state. As with the “Central Massachusetts Talent Retention Project,” more research is needed to understand the tradeoffs that young entrepreneurs are willing to make. Rents are certainly lower in Worcester, but how many potential residents compare a new one-bedroom in Worcester to a

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\[^1\]“State, GE Funding New Digital Health Research Center at Worcester Polytechnic Institute.”
shared, un-renovated three-bedroom in Somerville? If they don’t already own a car, the financial costs of moving to Worcester are not insignificant, not to mention social considerations. Unlike in Cambridge and Somerville, where many entrepreneurs choose to live within walking or biking distance of work, entrepreneurs in Worcester may not be choosing to live in the city, with a few mentioning the quality of public schools as a factor, or already have suburban homes and choose Worcester as an alternative to commuting into Boston. Thus, efforts to boost entrepreneurship in the city are not having the full economic impact they would if a higher portion of new workers also lived within city limits.

A Framework for Local Strategy

City government, other economic development organizations, academic leadership, business leaders, and workspace operators have complementary roles to play in increasing innovation and entrepreneurship. Worcester’s continued revitalizations will require involvement from all sectors and creative partnerships that create value where others might be inclined to compete. The Worcester Regional Chamber of Commerce’s strategy of “Recruit, Retain, Incubate,” reflects the need for a multi-pronged approach to business growth that recognizes existing strengths and potential opportunities. I propose a fourth strategic goal to Connect to the powerful innovation ecosystems in the Boston area, especially for entrepreneurs focused on scalable products rather than local services. In addition, the strategies of “recruit,” “retain,” and “incubate” might better target companies and individuals at various life stages, focusing equally on people and businesses as vital components of an economic development strategy.

- **Connect**: Start-ups in Worcester must be prepared to compete with companies launching in more dense innovation ecosystems and with alumni of top accelerators. For examples, StartUp Worcester should not be seen as an alternative to MassChallenge but could prepare local students to be more competitive MassChallenge applicants or could serve startup teams having already gone through an accelerator. In addition, limiting the program to students and recent graduates may miss opportunities for early- and mid-career entrepreneurs to partner and learn from each other. In the long run, a start-up that leaves Worcester and is successful will be a better advocate for the city than one that fails because it didn’t leverage mentor and investor networks concentrated in Boston.

- **Recruit**: Benefits of living and working in Worcester such as lower traffic, a central location within the state, and lower real estate prices may not be enough to sway recent graduates and young professionals to choose Worcester over Boston, Cambridge or Somerville. Mid-career entrepreneurs and mid-stage startups should not be overlooked as valuable contributors to an innovation ecosystem, and investment should be made in public schools to increase the portion of entrepreneurs living within city limits.

- **Retain**: Faculty, graduate students, and mid-career professionals are potential entrepreneurs overlooked in discussions of undergraduate student retention. While an undergraduate student can certainly have an impact as a start-up founder, these more mature groups have industry and professional experience that makes a business idea more likely to succeed. The “Central Massachusetts Talent Retention Project” should conduct a separate study of graduate students to understand if their priorities for job opportunities
and quality of life differ from the broader student population. Local universities dedicated to growing the innovation ecosystem could, over time, expand graduate programs and support for faculty entrepreneurs to grow this pipeline of talented residents committed to living and working in the city.

- **Incubate:** New, innovation-driven companies need more than low-cost workspace and guidance on business strategy; they often need opportunities to pilot products. The City of Worcester, Worcester Public Schools, the Commonwealth of Massachusetts, private landlords, and local universities and hospitals all have opportunities to be a startup’s first customer. Reframing procurement metrics to allow for more experimentation could not only increase the profile of local start-ups but also improve outcomes (such as health, education, or resource conservation) and help market Worcester as a city that embraces innovation. One of the major factors preventing organizations from preventing pilot opportunities – risk – could be overcome through agreements that provide discounts to beta testers or by establishing a revolving fund that compensates for ineffective pilots.

**Implications for Massachusetts Leadership**

State grants through the Collaborative Workspaces Program should continue to be available to organizations across the state, and not just in Gateway Cities. Grants are typically evaluated for the impact of each dollar invested, but in the case of collaborative workspaces, the funding program is also a mechanism for building relationships and gathering information. Given the rate of change in new workspaces, and lack of another data source for “market research” into coworking, innovation centers and maker spaces, this insight into local innovation ecosystems is valuable for state-wide economic development leaders.

The opportunities for state government to support innovation and entrepreneurship across the state extend outside the Executive Office of Housing and Economic Development. Transit investment must be a greater priority to strengthen connections between Massachusetts’s cities – not just Worcester, but all those with existing rail connections. Given the negative externalities of vehicle traffic, a train trip from Worcester to Boston should be faster and/or less expensive than a bus trip, and the “Heart to Hub” concept needs to provide more commute times. Aid for K-12 public schools is another persistent challenge for the state, but one that cannot be ignored to attract entrepreneurs with families into strong cities across the state.

A collaborative approach across the state will continue to leverage organizations that bridge public and private sector stakeholders. Massachusetts Technology Collaborative, Massachusetts Clean Energy Center, Massachusetts Life Sciences Center are among the organizations that bring industry-specific expertise and can amplify the efforts of government staff to identify new levers for supporting entrepreneurs across the state. These and other organization’s mission to bolster innovation in specific industries must not be at odds with a holistic approach to Massachusetts’ economic development that generates opportunities across geography, age, race, and gender.
Works Cited


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Appendix: Survey Questions

Survey: Spaces for Innovation and Entrepreneurship in Massachusetts

The following questionnaire is part of my Master of City Planning thesis research on the development and operations of spaces in Massachusetts that aim to support innovation and entrepreneurship. It is expected to take less than 10 minutes. Any question may be skipped and your response will be kept anonymous if you prefer. Thank you for your time!

Contact: Rachel Belanger, belang@mit.edu

Name of Space

City or Town

What year did it open?

How large is the space (square feet)?

Which of the following does your space include? (click all that apply)
- Coworking: shared or dedicated desks in an open area
- Makerspace or Fab Lab: shared tools and equipment
- Private offices
- Private manufacturing or shop space
- Conference and/or meeting rooms
- Event space
- Shared wet labs
- Private wet labs
- Other

What types of programming and services do you offer? (click all that apply)
- Business coaching and mentorship
- Legal services
- Investor meetings or pitch days
- Networking events
- Access to corporate partners
- Professional development courses or trainings
- Other
Is the space targeted at businesses in a specific industry?
- Yes
- Not
- Not officially, but many of our members work in:

Approximately how many members or users do you currently have?
- Fewer than 10
- 10-40
- 40-100
- 100-200
- Over 200

How many members or users could the space support?
- Fewer than 10
- 10-40
- 40-100
- 100-200
- Over 200

Which best describe your members or users? (select up to 3)
- Self-employed individuals
- Start-up founders working alone
- Start-up teams
- Established small businesses choosing to work in a collaborative or shared environment
- Employees of established companies working remotely
- Students
- Families

How long do members typically stay?
- Less than 1 year
- 1-2 years
- 2-4 years
- Longer than 4 years
- My space opened too recently to know

Which are most common reasons for members leave? (select up to 3)
- Prefer another coworking or innovation space
- Prefer conventional office lease
- Can't afford membership fees
- Need larger space
- Moving business to another city
- Business was acquired
- Changes in production technology or processes
- Unsure
What are the main types of products and services members/users provide? (select up to 3)
- Digital products such as software and apps
- Prototypes of products to be fabricated elsewhere
- Creative services, such as writing, design or media
- Other professional services, such as legal or accounting
- Physical products for local sale
- Physical products for regional or national sale

Which of the following sources did you use to construct or renovate the space? (check all that apply)
- Private equity
- Bank loan
- MassDevelopment grants or loans
- Other Commonwealth of MA grants or subsidies
- Corporate sponsorships
- Foundation grants
- Municipal support
- Other

What was the approximate hard cost per square foot to build or renovate the space?

What is the current land use zoning?
- Commercial
- Light Industrial or Manufacturing
- Mixed Use Commercial and Residential
- Institutional
- Other

If you charge a membership or usage fee, have these fees covered operating expenses over the last year?
- Yes, more than 100% of operating expenses
- No, 75-100% of operating expenses
- No, 50-75% of operating expenses
- No, less than 50% of operating expenses

Do you own or lease your space?
- Own
- Lease

What is the current rent?

May I mention your organization by name in my thesis?