Nodal Economic Development: Building Life Sciences Capabilities in Gateway Cities

MIT DUSP Practicum

02/05/2018

MASSACHUSETTS LIFE SCIENCES CENTER

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BACKGROUNDS

Architecture and Design

Anthropology and Sociology

Environmental Policy

International Development

Transportation

Land Use

Workforce Development

Outline

1

INTRODUCTION

- Introduction to the Class
- Methods
- Life Sciences Cluster
- Gateway Cities

2

CASE STUDY

- Brockton
- Worcester

3

TYPOLOGY

- Gateway Cities Typology

4

NEXT STEPS

- Next Steps
- Acknowledgements

1

INTRODUCTION

Introduction to the Class

The Challenge of Inclusive Economic Development

At its core, the class is about the challenge of inclusive economic development and the potential to reverse the inequality of opportunity and outcomes that is visible across the state using one of its most successful economic clusters—life sciences. The will of political and business leaders to spread the wealth generated by (arguably) the state's most important economic cluster is certainly genuine, but there is currently no clear mechanism for systematically extending feasible opportunities to under- and disinvested areas.

Policy Problem-Based Practicum

The overarching goal or policy problem is to develop strategies that sustain the competitiveness of a world-class regional cluster like the life sciences in Boston-Cambridge-Route 128, while creating opportunities for economically challenged areas to benefit from the economic assets and spillover effects of policy commitments of the Commonwealth of Massachusetts.

The practicum examines the interplay between market pressures, regional and sub-regional geographies of life sciences activity, and the availability of supply factors such as industrial land, residential housing stock, transportation assets, and skilled labor.

Approach

Practical experience in managing planning processes including:

- Integrating varied data to understand and analyze a local or regional economy, develop an agenda and communicate the case for the agenda to stakeholders;
- Serving as an intermediary between different stakeholders and interests;
- Preparing a plan that summarizes the process, analysis, plan elements and implementation of strategy development.

Methods

Life Sciences Sector Research → **Data Collection /Analysis** → **Recommendations**

- ***Background Research***
  - *Information gathering*
  - *Cluster theory*
  - *Data inventory*
- ***Industry Research***
  - *Understanding life science sector*
  - *Stakeholder mapping*
- ***Interviews** with **62** individuals at **48** organizations in Brockton, Worcester, Boston and Cambridge:*
  - *Government/public sector*
  - *Community/nonprofit*
  - *Private sector (RE, banks)*
  - *Eds (universities, K-12)*
  - *Life Sciences (pharma, biotech, healthcare/meds)*
- ***Events***
  - *Action Plan for Biomanufacturing in Massachusetts meeting*
  - *Kendall square development seminars*
- ***Data Profiles***
- ***Strategies***
  - *Synthesize findings*
  - *Identify opportunities*
  - *Develop framework*
  - *Create strategies*
- ***Public Presentation***
- ***Final Report***

Life Sciences Cluster | Industries

Sub-Clusters

Drugs & Pharmaceuticals

- Medicinal and Botanical Manufacturing
- Pharmaceutical Preparation Manufacturing
- In-Vitro Diagnostic Substance Manufacturing
- Biological Product (except Diagnostic) Manufacturing

Medical Devices & Equipment

- Electromedical/Electrotherapeutic Apparatus Manufacturing
- Analytical Laboratory Instrument Manufacturing
- Irradiation Apparatus Manufacturing
- Surgical and Medical Instrument Manufacturing
- Surgical Appliance and Supplies Manufacturing
- Dental Equipment and Supplies Manufacturing
- Ophthalmic Goods Manufacturing
- Optical Instrument and Lens Manufacturing

Research, Testing, & Medical Laboratories

- Testing Laboratories
- R&D in the Physical, Engineering, and Life Sciences
- Medical Laboratories
- Research and Development in Biotechnology

Bioscience-related Distribution

- Medical, Dental, and Hospital Equipment and Supplies Wholesalers
- Drugs and Druggists' Sundries Wholesalers

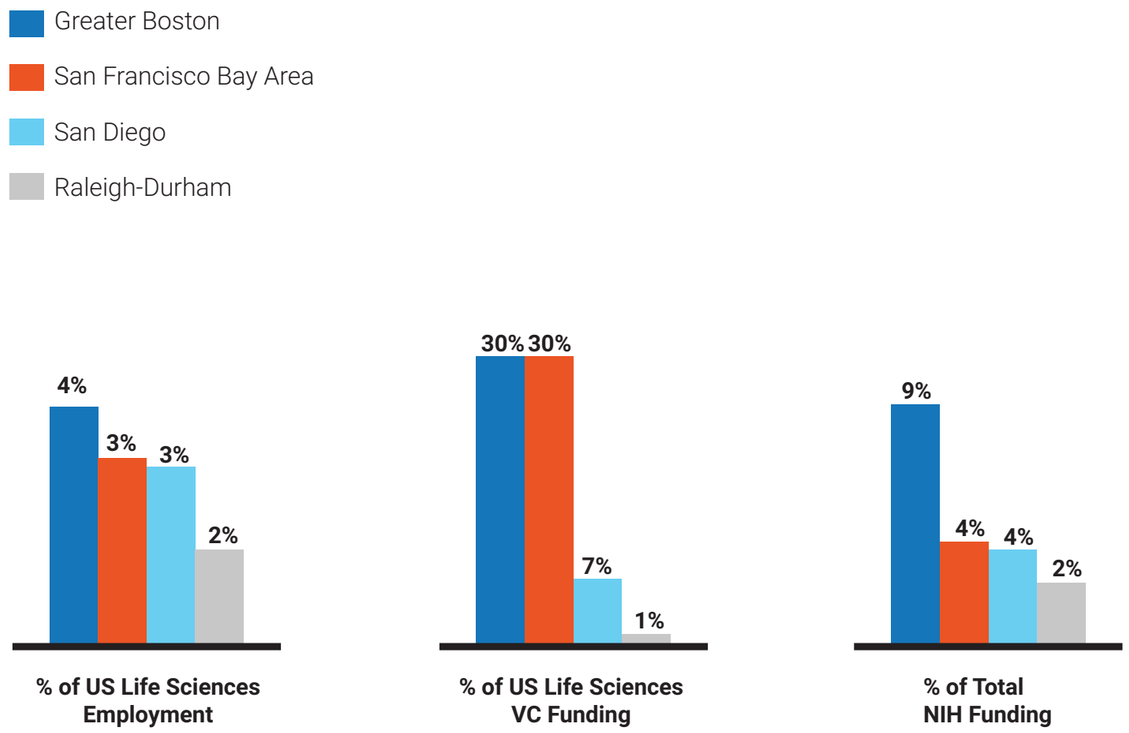
Source: Mass Economics

Life Sciences Cluster | National

"The common theme that brings them together is having a mixture of world-class academic institutions, top-notch research facilities and a tight-knit medical community."
-- JLL, Life Sciences 2017

- U.S. is the global leader in the life sciences
- Top U.S. clusters include Boston, San Francisco, San Diego, and Raleigh-Durham

Life Sciences Clusters in the US



Data source: JLL 2017, CBP

Life Sciences Cluster | Massachusetts

Jobs: **MA** has **100,000** jobs more than any other state except **CA** **275,000** jobs

Wages: avg **MA wage** is **$135,000** more than any other state except **NJ** **$148,000**

Growth: **MA** has added almost **30,000 jobs** since **2001**

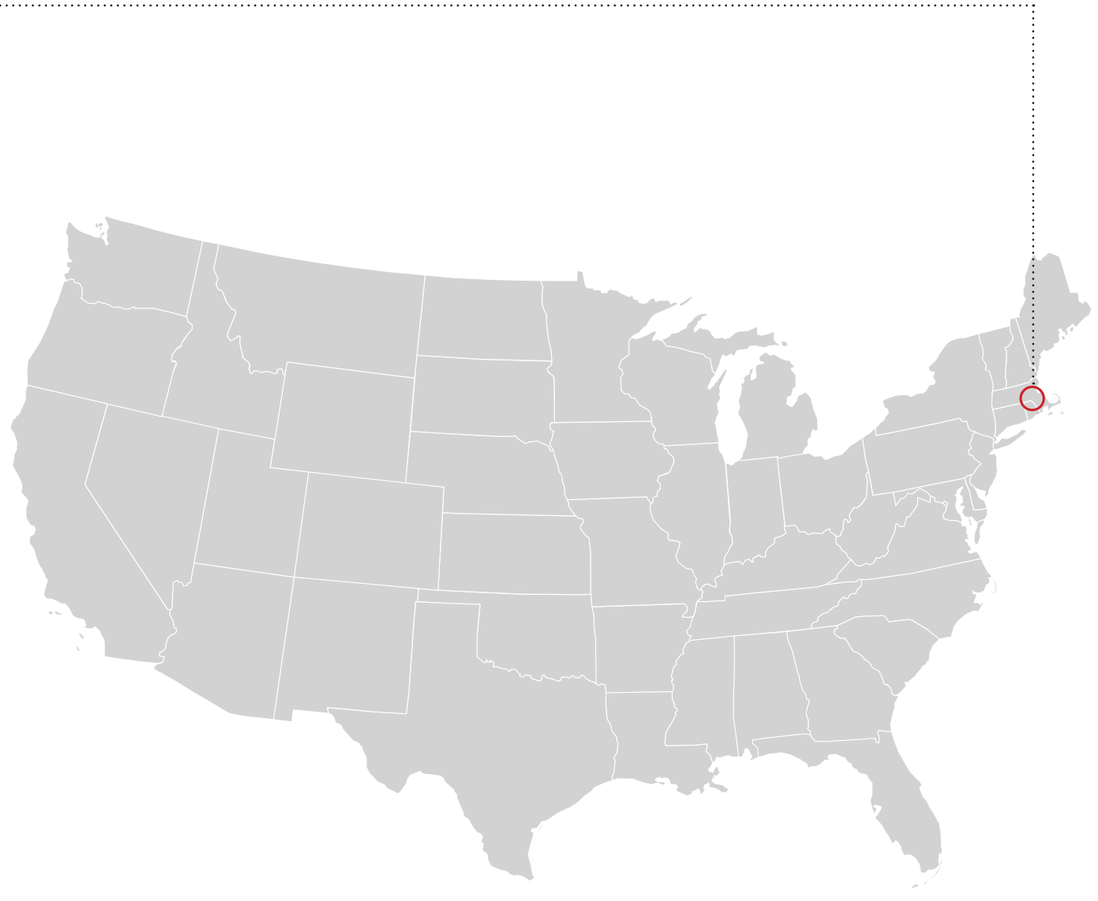
Strengths: Research, Testing & Medical Labs; Medical Devices; Drugs and Pharmaceuticals

Supports: **National leader** in venture capital, federal grants, patents, and university research

Source: Mass Economics

Kendall Square

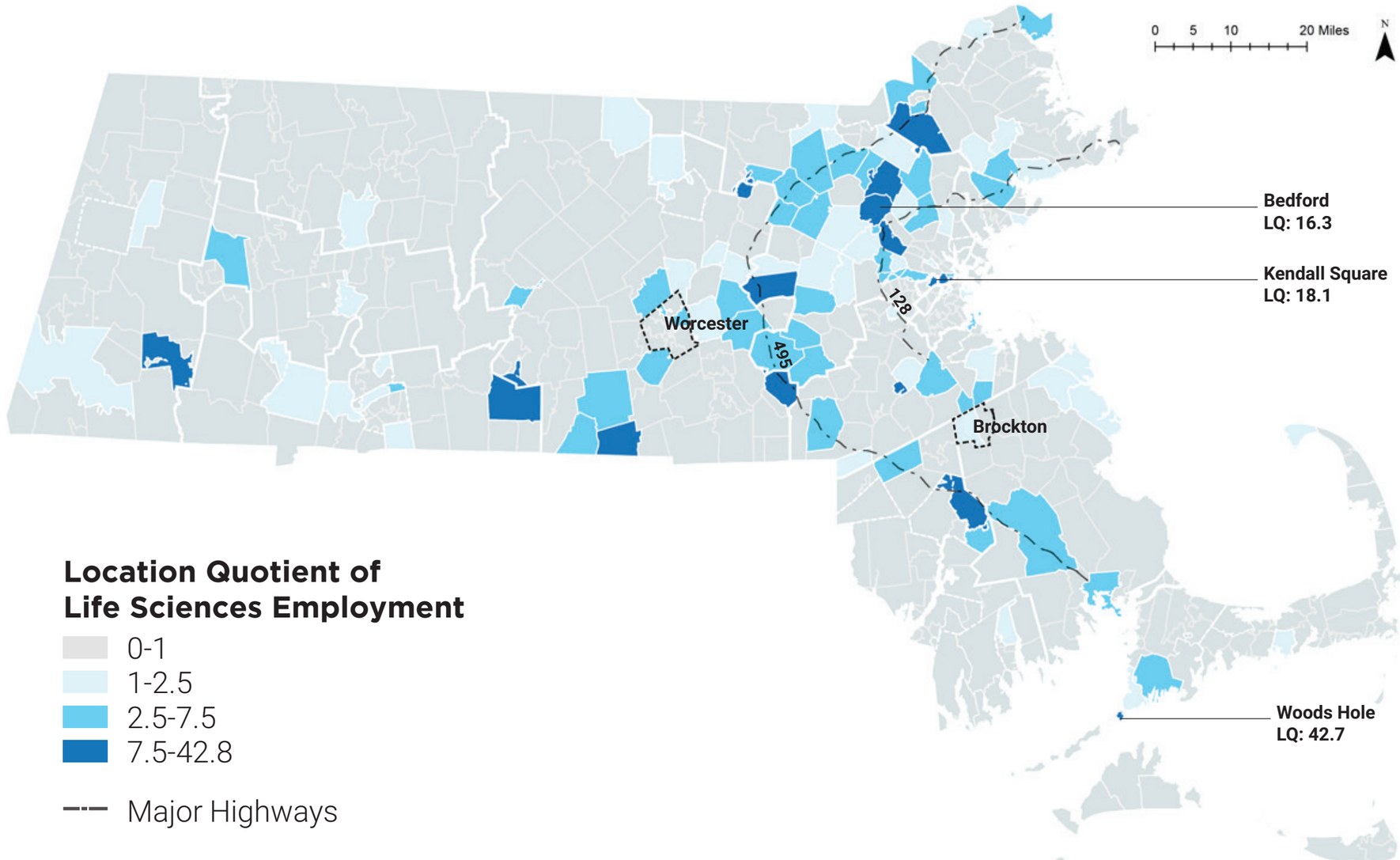
Kendall Square is anchored by MIT and Boston hospitals and has attracted global corporations to locate here because of **innovation and entrepreneurship**. The cluster also benefits from top-notch research facilities, significant NIH funding, and startups. The cluster is known for its work in **research and development**.



Greater Boston	Kendall
5 Tier 1 universities	**13 of 16** top biopharma employers
52 colleges + universities	**55,000** Life sciences-related employees
250,000 students	**43** acre development

Life Sciences Cluster | Regional Imbalance

- Life sciences employment is highly condensed in a few zip codes.
- Greater Boston has the largest concentration of life sciences researchers in the U.S. (JLL 2017).
- Beyond Kendall and outliers such as Bedford and Woods Hole, life sciences clusters follow footprint of major industrial corridors



Data source: Mass Economics UDP

Gateway Cities

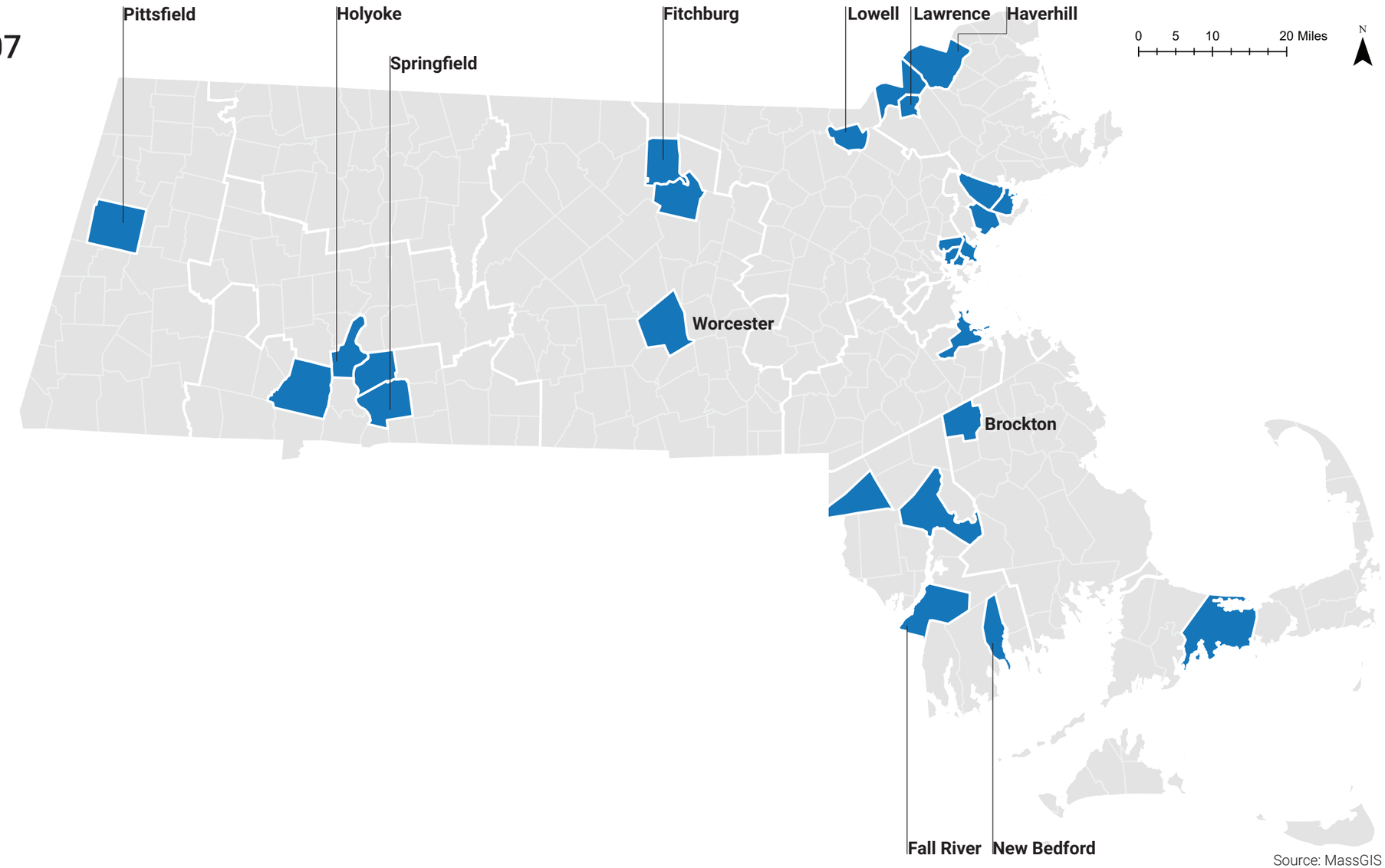
“Gateway Cities” coined in 2007 by MassINC and Brookings

- Mid-size urban centers that anchored regional economies
- Past manufacturing jobs have slowly disappeared

Originally 11 cities

New definition includes 26 cities:

- Population between 35,000 and 250,000
- Household income below state average
- Education levels (bachelor’s +) below state average

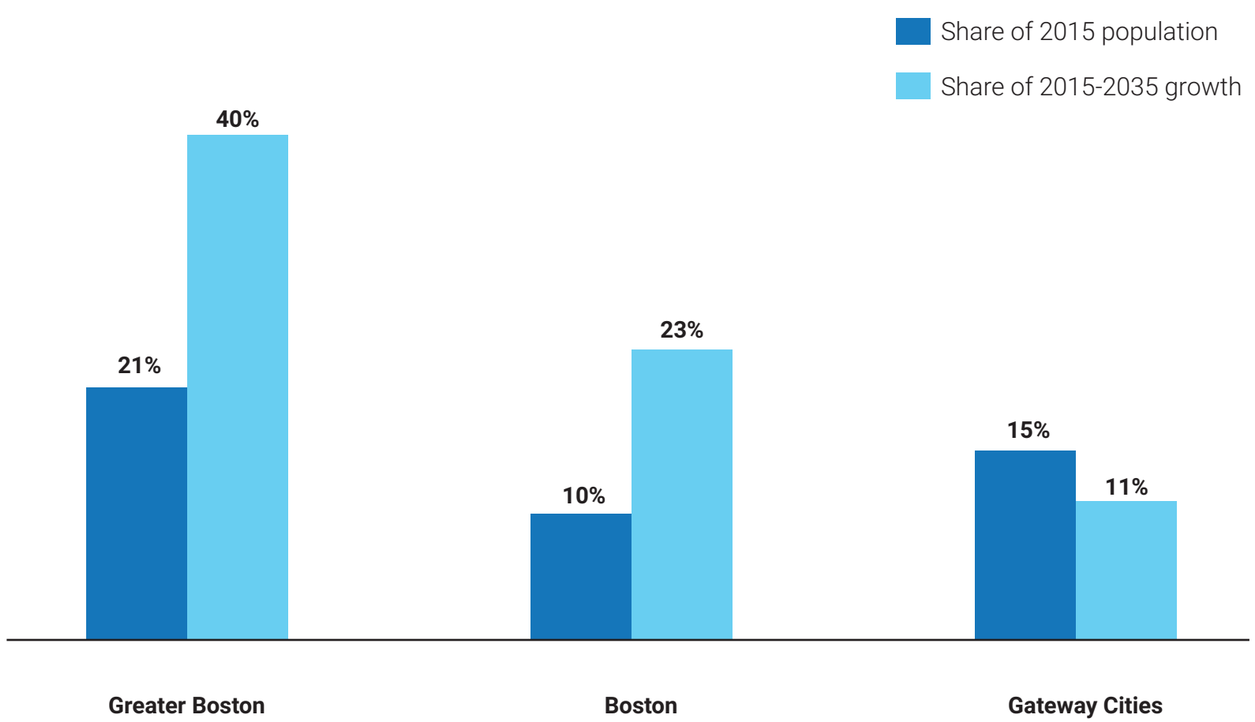


Source: MassGIS

Will life sciences growth in Boston and Kendall spillover to the Gateway Cities?

- Securing life sciences jobs is one way to boost the Gateway Cities
- MA population expected to grow by more than 500,000 by 2035
- But growth expected to mostly concentrate within greater Boston
- Default projections show Gateway Cities growing more slowly (11% compared to 40% of Boston Metro)

Distribution of Projected Population Growth, 2015-2035



Source: MassINC

Life Sciences Cluster | Process

○ Brockton

○ Worcester

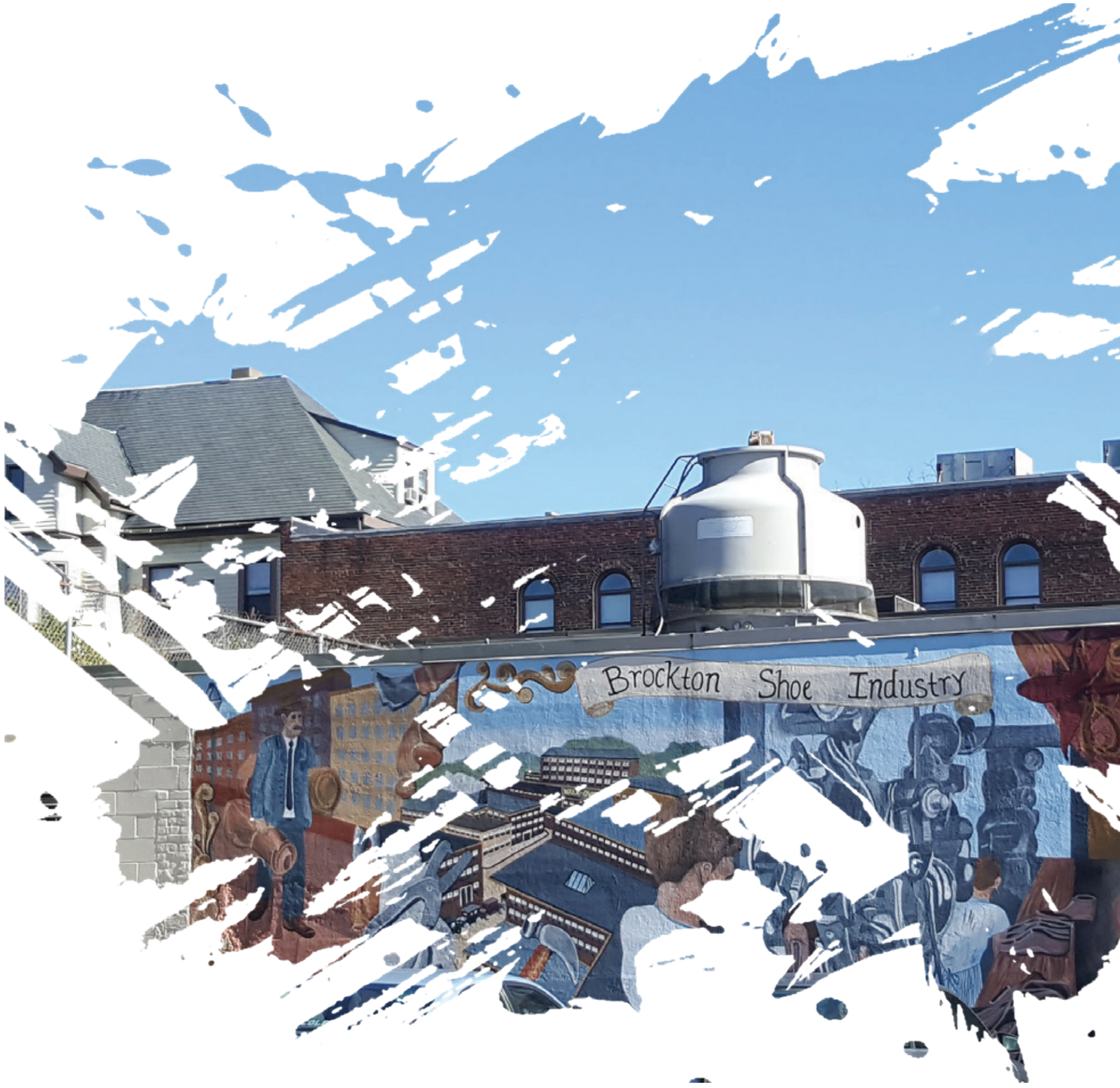
○ Boston,
Kendall Square

Asset Building → **Strategy Building** → **Operating**

2

CASE STUDIES

BROCKTON



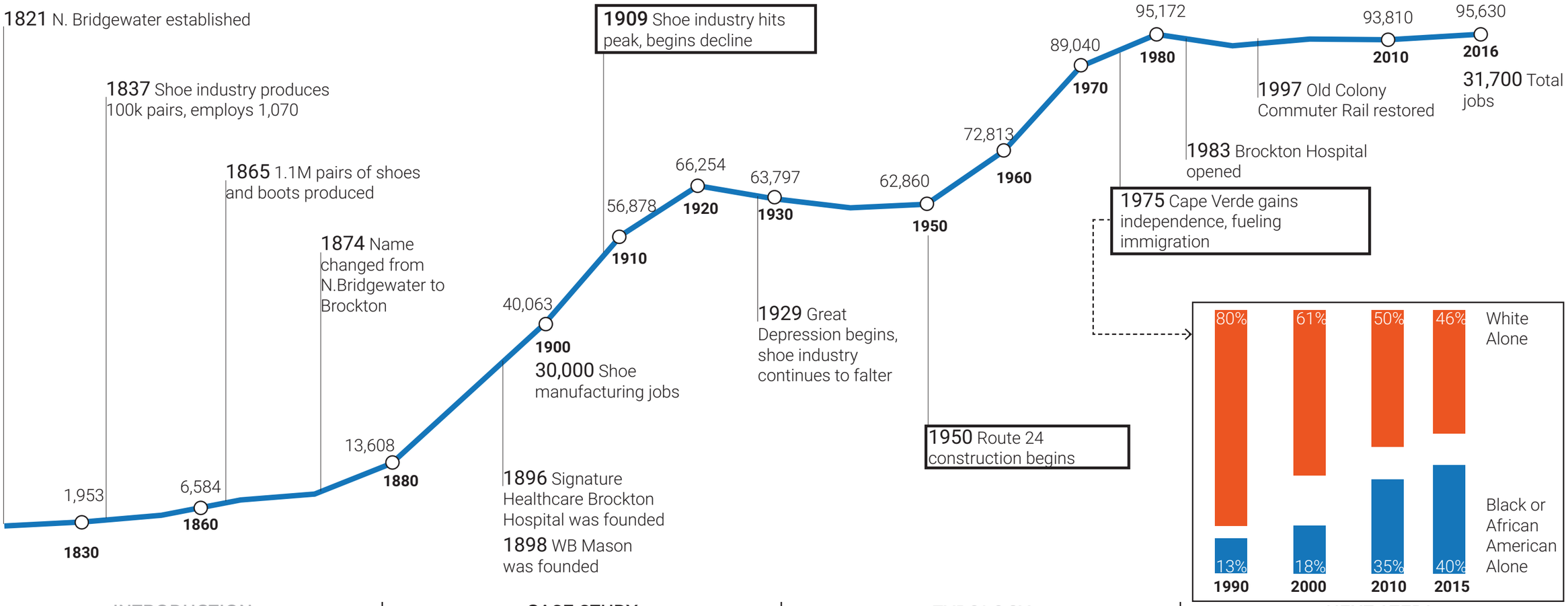
Population Change in the History of Brockton
(1830-2016)

Data source: Trends in Brockton:Population Trends, ACS

"Shoe City" → **"City of Champions"** → **"Two Brocktons"**

(late 1800s - early 1900s) — ***(1920s - 1980s)*** — ***(1970s to now)***

Manufacturing Growth — Industry Decline, Boxing Greats, Route 24 — Immigration, Desalination Plant, Commuter Rail



Stories We've Heard...

Access vs. Isolation

While Brockton has easy access to many resources both locally and in Greater Boston, stakeholders often function in isolation and do not connect to one another or the regional economy.

Opportunities vs. Action

Interviewees typically described Brockton as an attractive place to locate businesses, but many scratched their heads about how Brockton can look so good on paper but still have trouble "closing deals" to attract life sciences and other companies.

Existing Workforce vs. Desired Jobs

There is a perceived disconnect between the training level of the existing labor force inside Brockton and the ability to attract quality jobs from outside Brockton in high-skill industries like the life sciences.

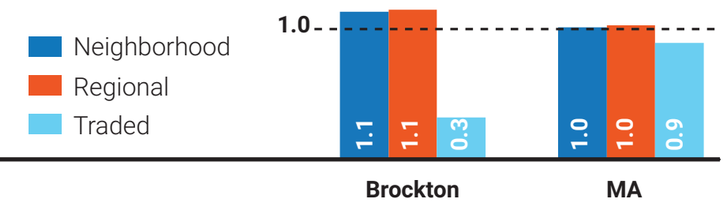
Old vs. New Brockton(s)

Many stakeholders commented on the divides between older, white residents who wield the most institutional and economic power and the immigrant community leaders and young professionals who are gaining influence.

Economy

- Food manufacturing concentration (3% of jobs), growing regional healthcare cluster (39%)
- Ongoing shift toward lower-education, lower-wage jobs
- Lacking base of traded cluster firms and activities

Location Quotient



Data source: County Business Patterns, Mass Economics

Job Gains and Losses by Industry, 2009-2015

Data source: County Business Patterns, Mass Economics

	Change	% Change		
	Brockton	Brockton	Adjacent Counties	MA
Largest Job Gains				
Healthcare and Social Assistance	+2,040	+20%	+21%	+13%
Management of Companies & Enterprises	+460	+110%	+22%	+10%
Retail Trade	+330	+7%	+6%	+7%
Wholesale Trade	+280	+30%	+3%	+4%
Largest Job Losses				
Professional and Technical Services	-850	-58%	+17%	+10%
Arts, Entertainment, and Recreation	-220	-52%	+8%	+10%
Information	-210	-43%	-2%	+12%
Other Services, Ex. Public Admin	-160	-10%	+11%	+4%

Workforce

- Resident education below (18% bachelor's) state (41%) and other Gateway Cities' average (24%)
- Easy access from Brockton to jobs in Boston Metro Area
- Accessible to large and educated regional workforce

Commute Time and Cost

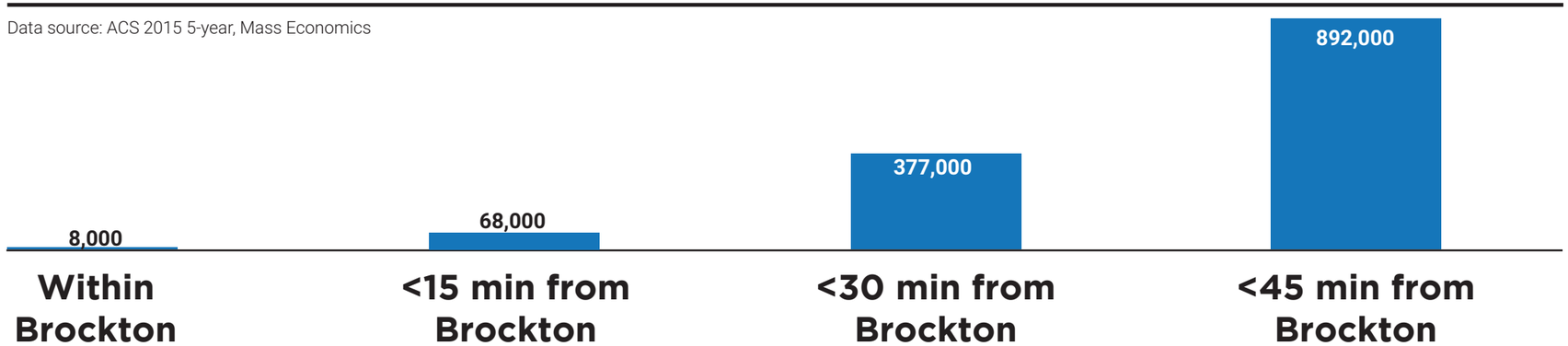
Downtown Brockton to Kendall Square, AM Peak

Data source: Google Map, MBTA, BAT, AAA

	Time	Cost
Driving	1h05min - 2h10min	$197 Operating $633 Total
Commuter Rail to Red Line	57 min	$263 w/out BAT $298 w/BAT
Brockton Area Transit to Red Line	1h38min	$145

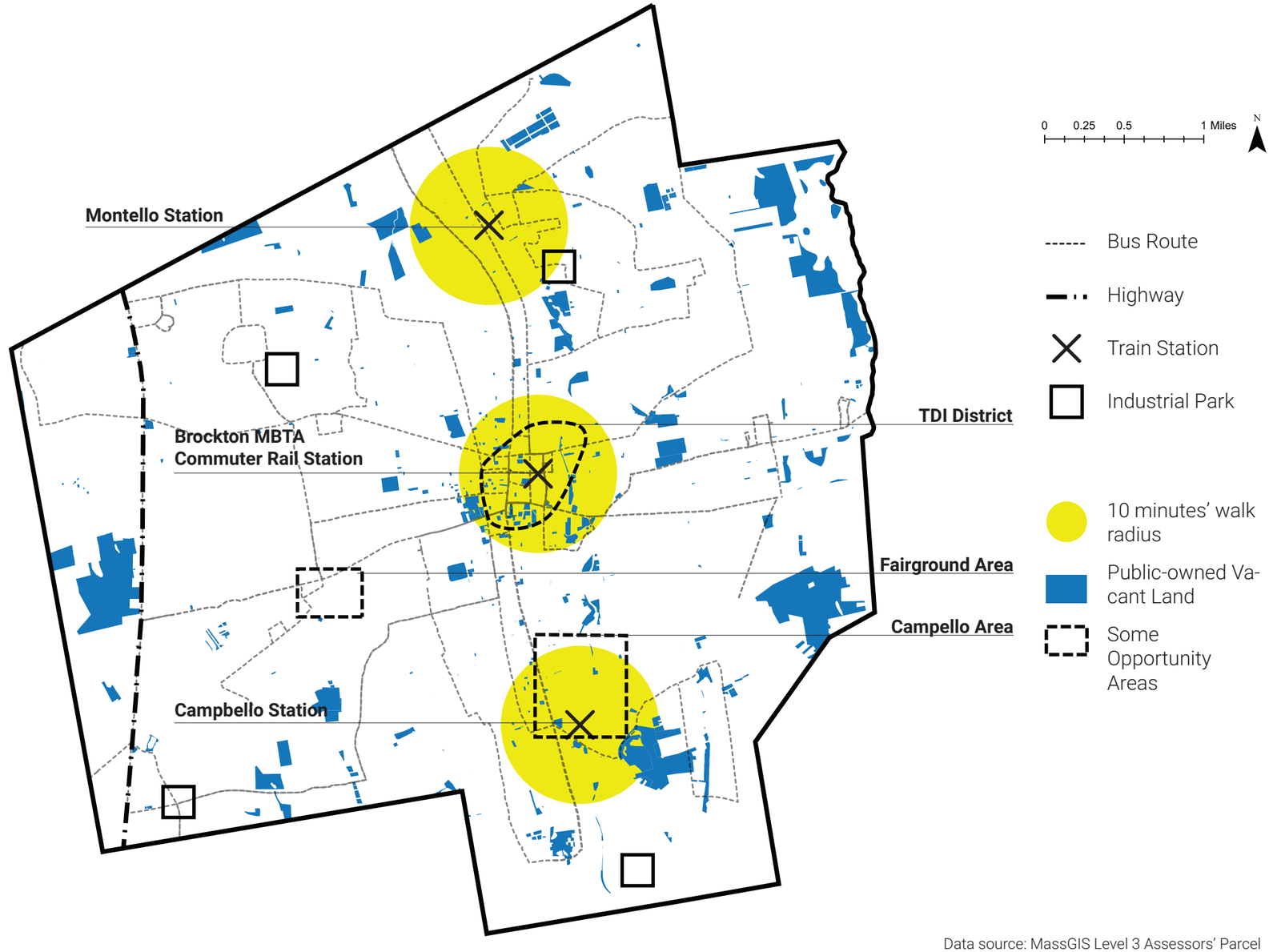
25-64 Year Olds With College Degree by Commute Time

Data source: ACS 2015 5-year, Mass Economics



Real Estate

- Inexpensive land and office space
- Several large sites identified in “Blueprint for Brockton”
- Below-average gas rates (-26%) and commercial electricity rates (-47%), median water rates for MA
- Third-highest commercial tax rate in the Metro South region ($32.94 in FY2017)



Data source: MassGIS Level 3 Assessors' Parcel Mapping data set, A blueprint for Brockton

Existing Life Sciences

- Concentration of medical and testing laboratories, but primarily for routine healthcare.
- Other life sciences activity small, but present.

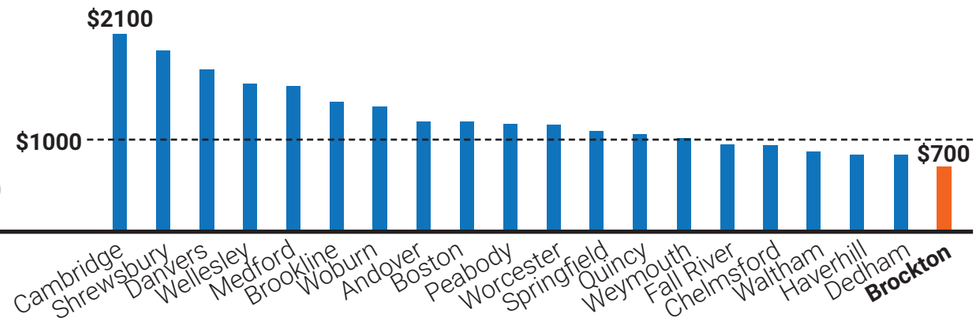
Brockton Life Sciences Jobs (2015) and Trends (2009-2015)

Data source: County Business Patterns, Mass Economics

	Jobs (2015)	Growth (2009-2015)	Location Quotient (2015)
Research, Testing, & Medical Laboratories	680	-50	2.7
Drugs & Pharmaceuticals	80	+80	1.3
Bioscience-related Distribution	70	+10	0.5
Medical Devices & Equipment	10	-	0.1
Total Life Sciences	840	+40	1.5

Average Weekly Wage*

Medical and Diagnostic Laboratories (2015)



Data source: MA ES-202
* Newton is an outlier, which has an average weekly wage of 5938.

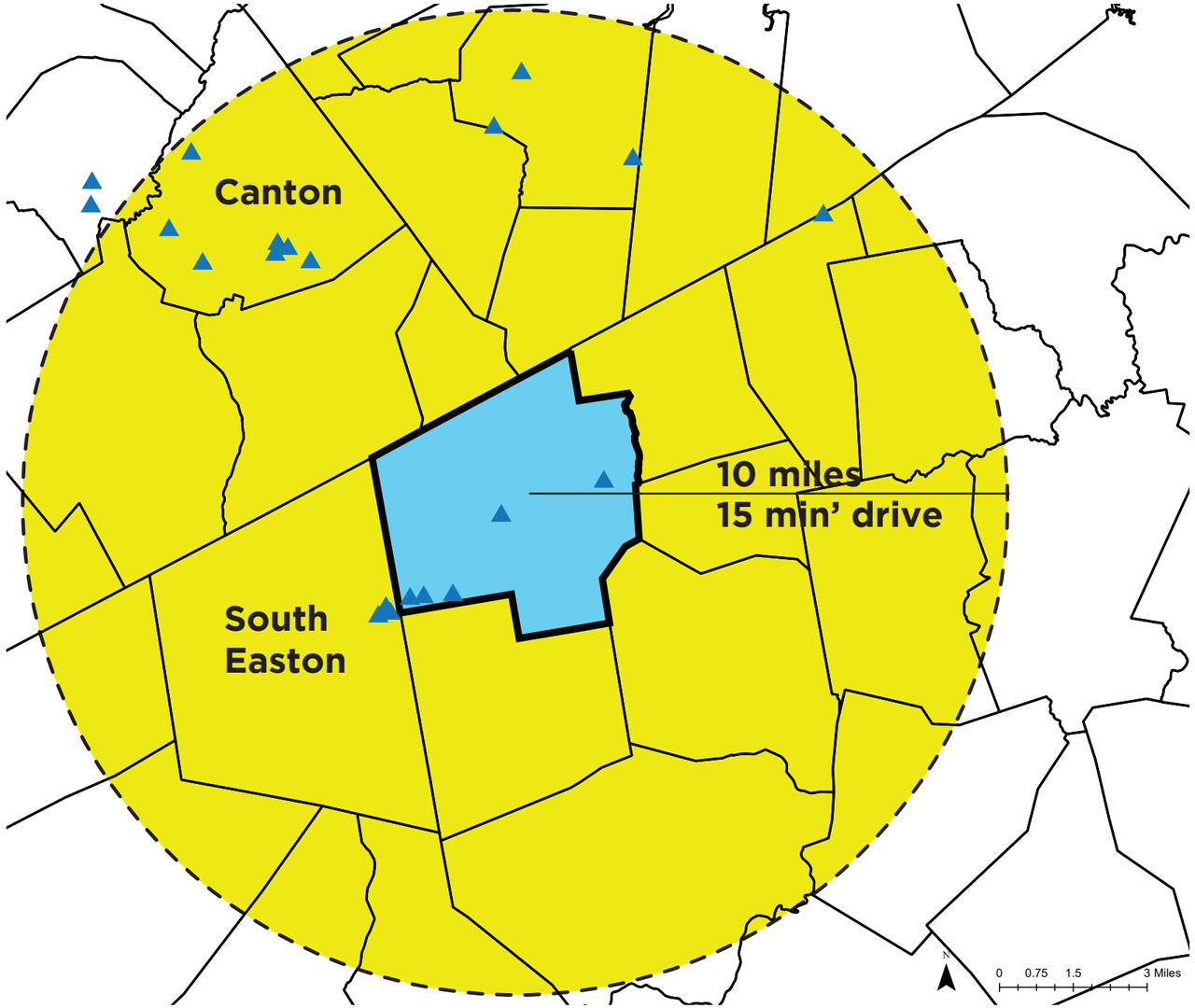
Existing Life Sciences Companies in the Region

Brockton

Companies	Main Activity
Lyne Laboratories	Develop and manufacture generic pharmaceuticals (liquid, semi-solid, powder)
Amphenol Alden Products	Develop and manufacture medical interconnects and cable assemblies
ACE Surgical Supply	Supply dental surgical instruments and supplies
Quest Diagnostics	Collect samples for medical laboratory testing
US Laboratories	Mobile testing services and medical laboratory testing
Boston Clinical Laboratories	Collect samples for medical laboratory testing

South Easton

Companies	Main Activity
Pressure Biosciences	Develop devices for laboratory research sample preparation
Pharmasol	Contract pharmaceutical development and manufacturing (aerosol, liquid, semi-solid)
Korsch America	Supply and service tablet compression machinery for pharmaceutical manufacturing



Data source: MassGIS Level 3 Assessors' Parcel Mapping data set

Institutions

Economic Development Organizations

City Hall

Brockton 21st Century Corp.

Brockton Redevelopment Authority

Brockton Area Workforce Investment Board

Metro South Chamber of Commerce

Community Organizations

Cape Verdean Association

Boys and Girls Club of Brockton

Old Colony YMCA

Brockton Interfaith Community

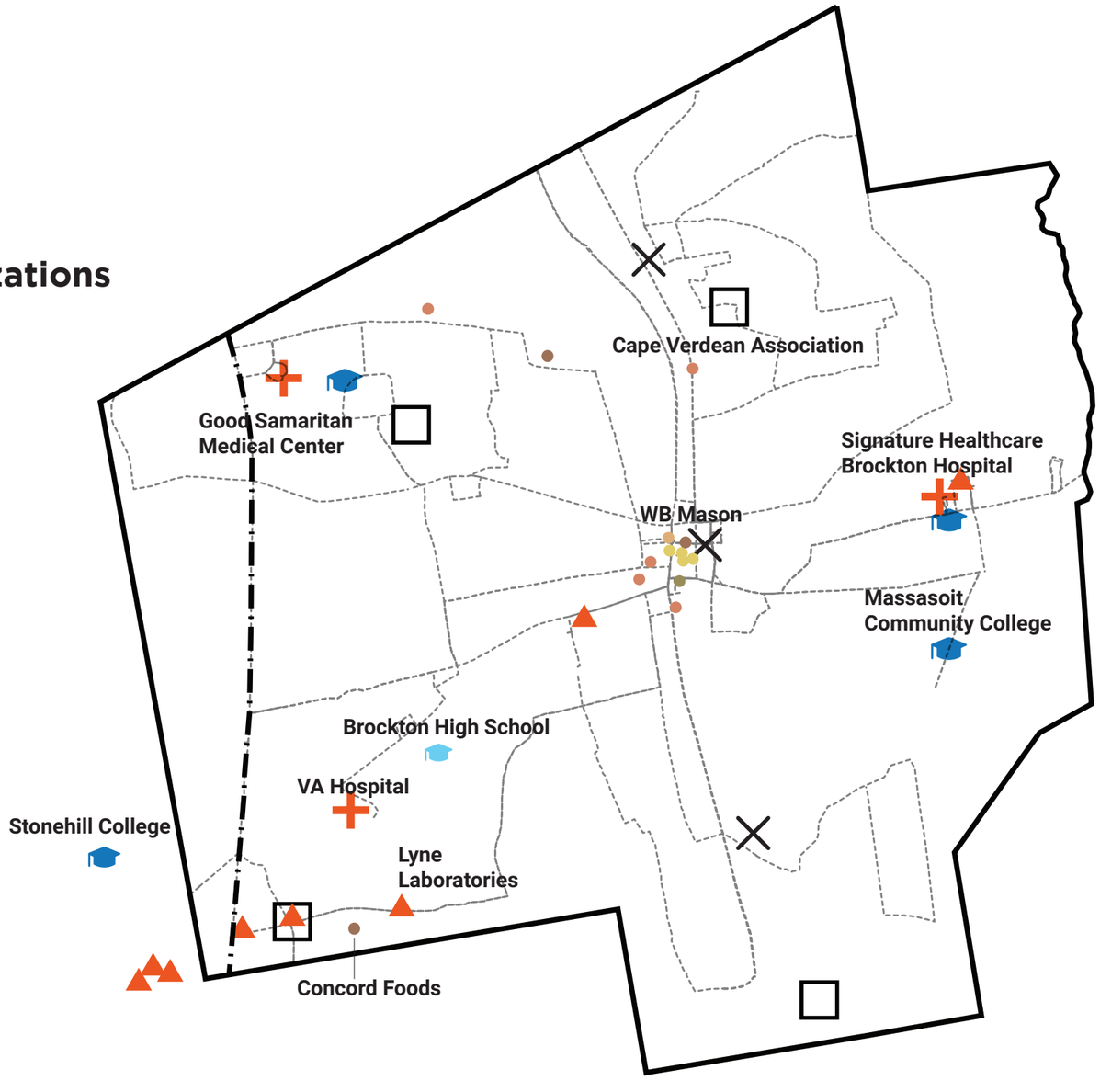
Fuller Craft Museum

Private Employers

W. B. Mason

Concord Foods

Crown Uniform & Linens



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Infrastructure

- Bus Route
- Highway
- Train Station
- Industrial Park

Healthcare and Life Sciences

- Hospital
- Life Sciences Companies
- Healthcare Organizations

Education Resources

- College
- Brockton High Schools

Data source: MassGIS Level 3 Assessors' Parcel Mapping data set

Strategies Summary

1
Invest in Real Estate Expertise

Create a Gateway Cities Life Sciences Fellow

2
Augment Local Workforce Planning

Develop workforce training targeting regional life sciences occupations

3
Create Coordination Council

Create new coordinating council for life sciences in Greater Brockton

4
Improve Processes & Strengthen Relationships

Workforce planning leads to strong connections among stakeholder groups

Invest in Real Estate Expertise

1

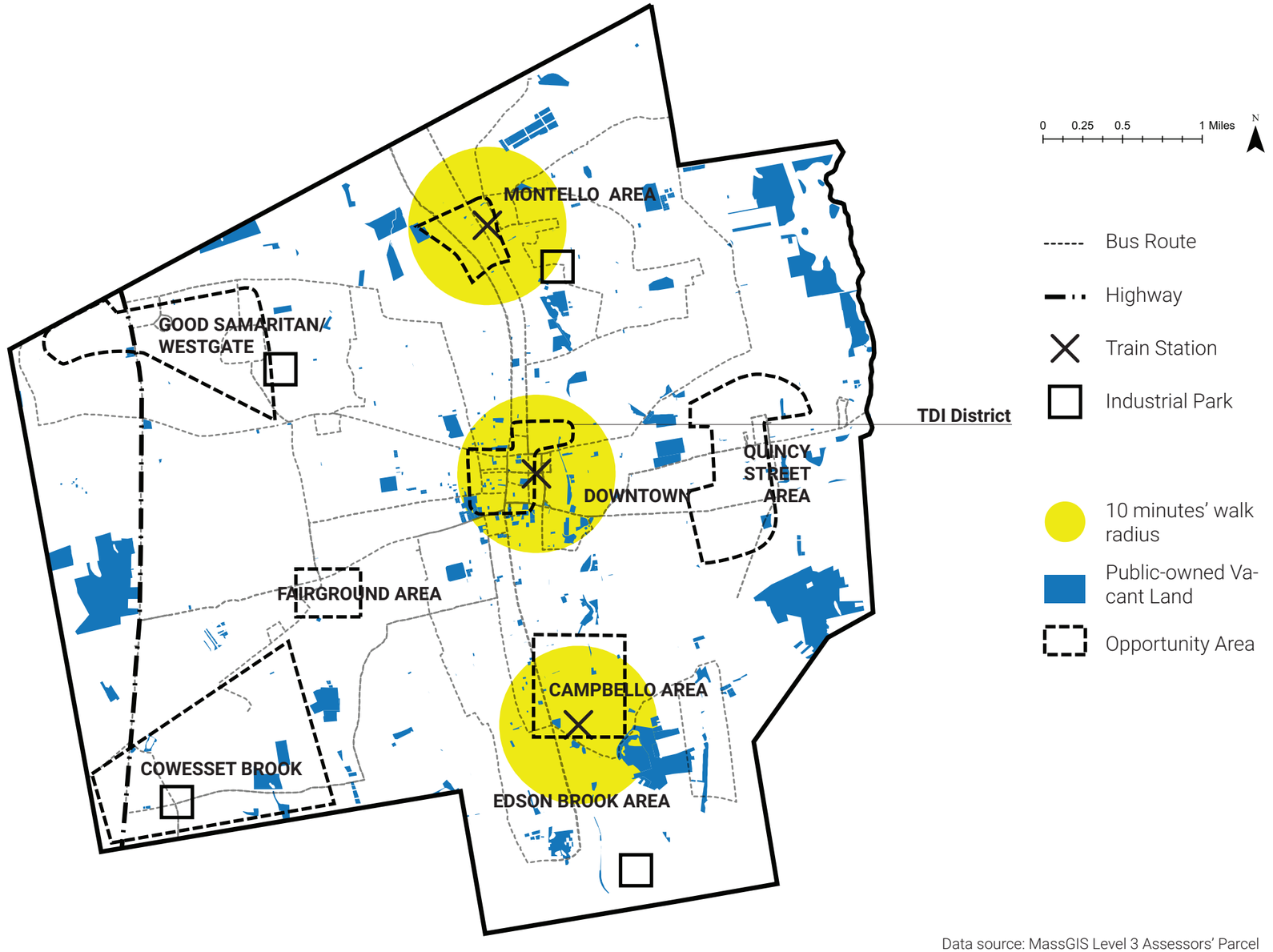
Invest in Real Estate Expertise

*"Canton is seeing benefits from being Platinum [in the MassBio rankings]. Organogenesis heard about governor's MLSC initiative, and reaching out to ask about site locations in the Metro South. They said to look at Canton! … **Brockton has a hold-up without pre-permitted sites.**"*

Invest in Real Estate Expertise

Motivation

- 98% of Brockton has been developed, limiting options for new development to reuse of the previously.
- Potential for redevelopment of large sites
- Additional lab space needed to expand STEM education and improve workforce development in Brockton.



Data source: MassGIS Level 3 Assessors' Parcel Mapping data set, A blueprint for Brockton

Takeaway

Create a Gateway Cities Life Sciences Fellow

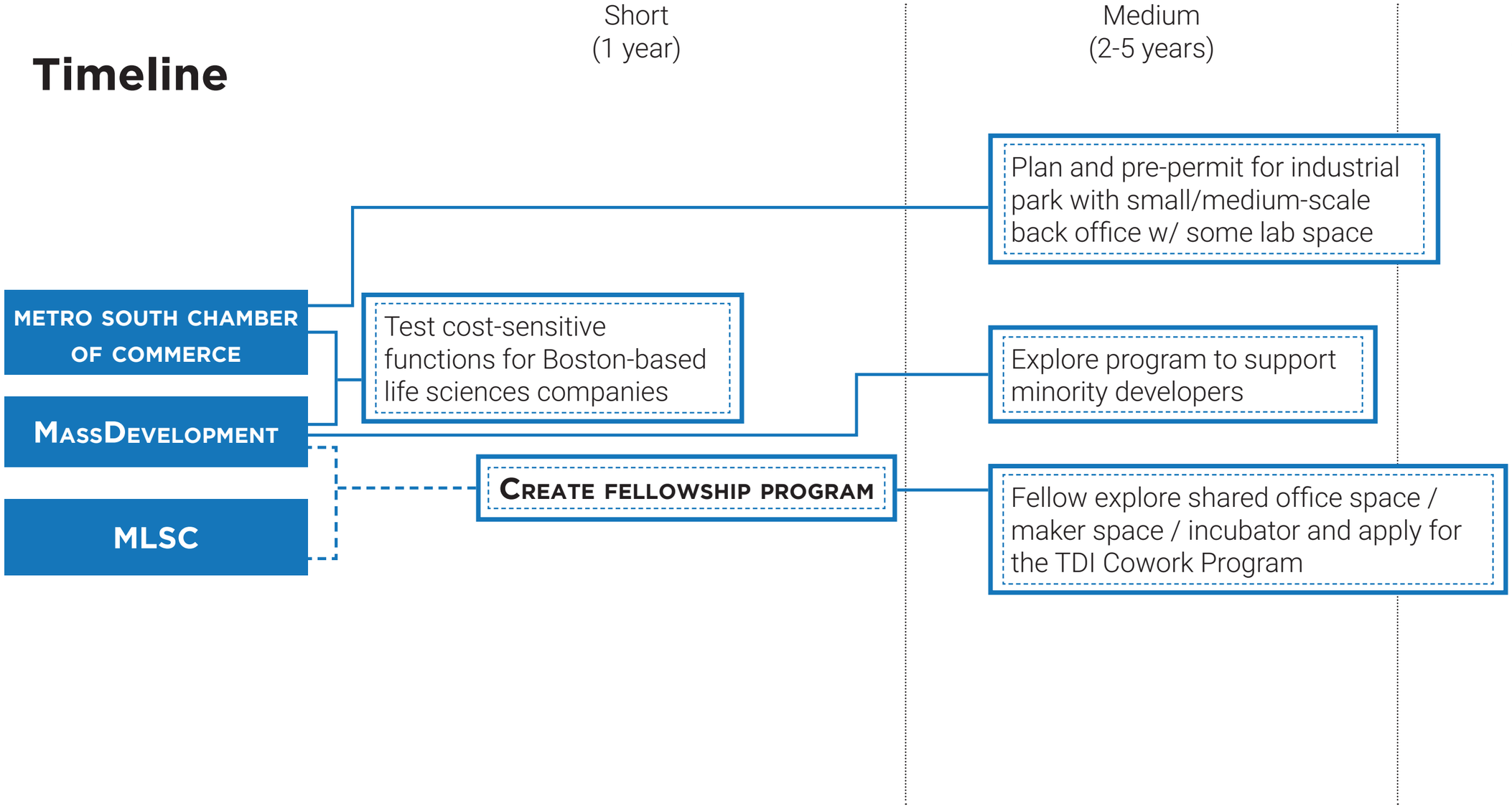
- **Research and document particular real estate sites for target uses**
  - Work with coordinating council (to be discussed in strategy three), go to their meetings and provide insights;
  - Network with life sciences site selectors to learn about needs (not to sell sites).
- **Help shepherd properties through rezoning and pre-permitting processes**
  - Focus on sites with potential: see Blueprint for Brockton “Opportunity Areas”;
  - Devise strategies to attain Bio-Ready Platinum ranking from MassBio.

Further Ideas

- **Plan and pre-permit for industrial park with small/medium-scale back office with some lab space**
  - Fairgrounds Study: “Well-designed business park can have market ready, pre-permitted sites for range of uses”
- **Should test cost-sensitive functions for Boston-based life sciences companies**
  - Existing example in Brockton: back office needs of Pressure Biosciences
  - Projected regional growth in biomanufacturing + life sciences
- **Explore the creation of a program to support minority developers**
  - Consider modeling after Capital Impact Partners and JP Morgan Chase’s Equitable Development Initiative in Detroit to offer training, mentorship, and access to capital
  - Eastern Bank launched a similar growth fund for small businesses in June 2017
- **Fellow explore shared office space / maker space / incubator and apply for the TDI Cowork program**
  - Equipment funded by MLSC to be used by students and startups, and shared spaces to encourage interactions between them

Invest in Real Estate Expertise

Timeline



2

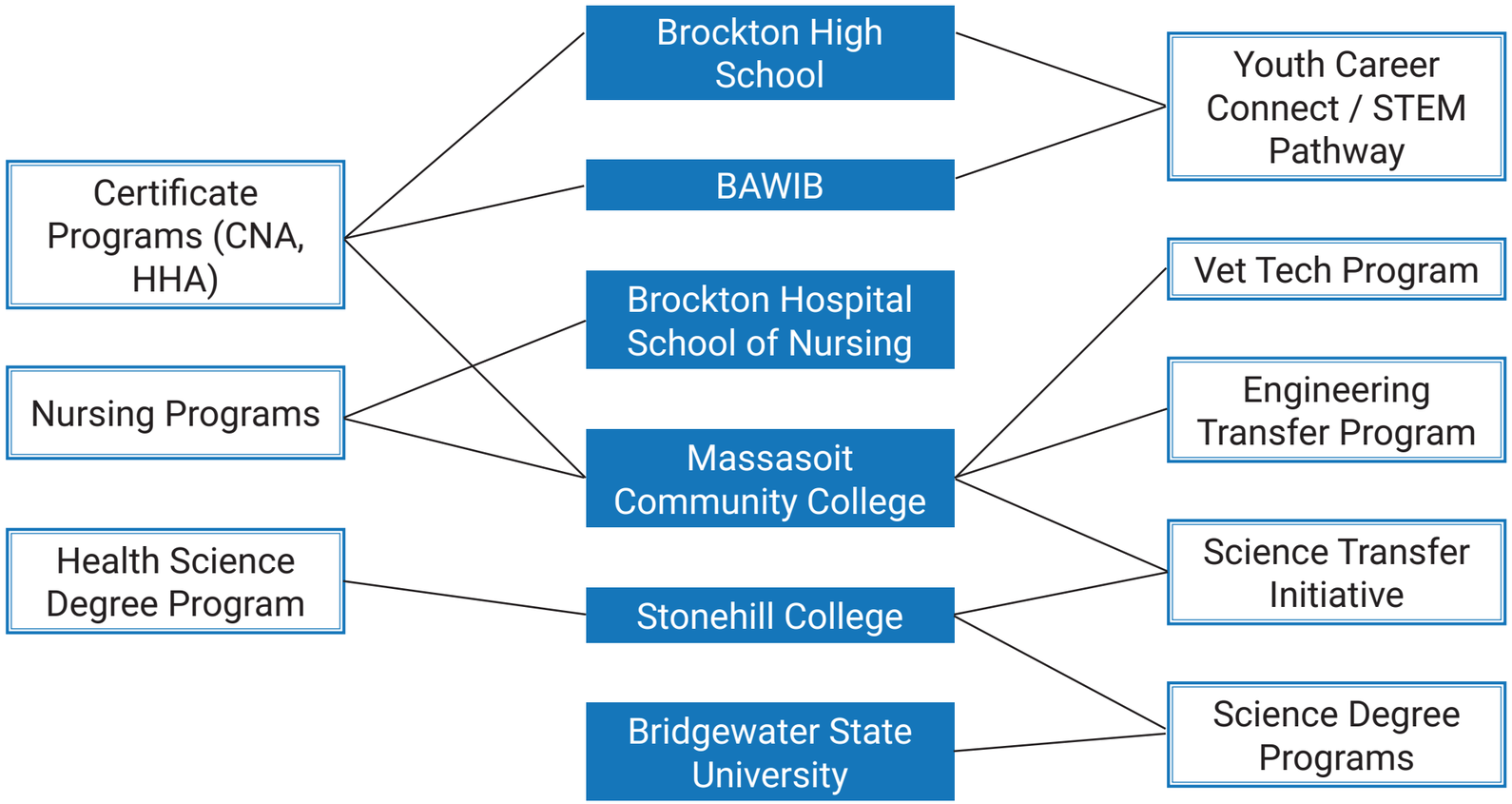
Augment Local Workforce Planning

"We stick with what we see live and what people come to us with… I hear that we need the land and the labor to interest life sciences company, and I think the labor is the hardest part – people with associate degrees and some knowledge on the bio side."

Augment Local Workforce Planning

Motivation

- Strong connections between local schools and workforce programs
- Clear and widely-used pipeline toward work in the healthcare sector
- Brockton organizations do not provide programs with support for workforce development in the life sciences
- The path to access higher-paying jobs in the life sciences industry remains unclear



Augment Local Workforce Planning

Takeaway

Develop a workforce training program that specifically targets life sciences occupations

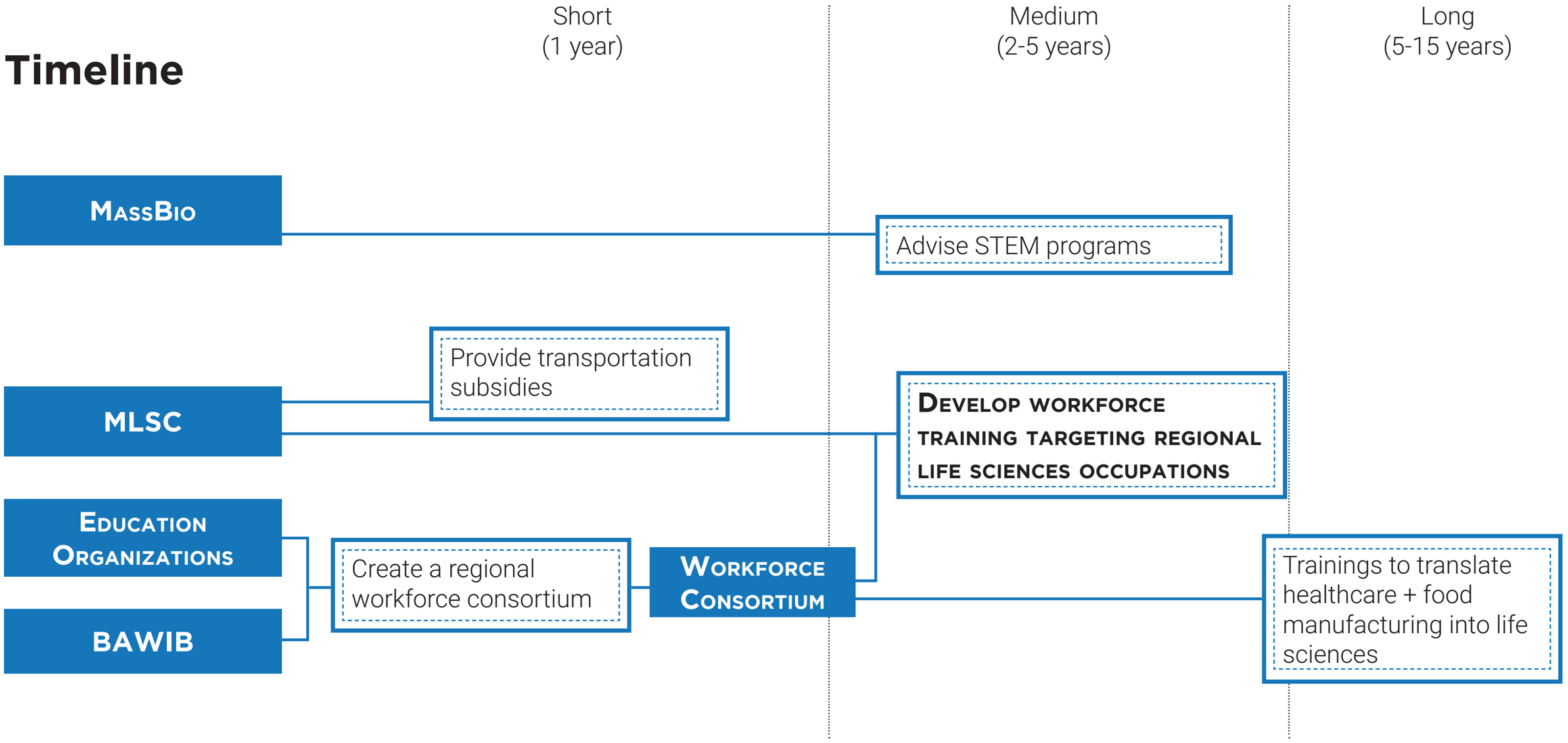
- **The training should be proactive and driven by industry forecasts** for future employment needs.
- **Leverage relationships with regional WIBs to offer regional life sciences occupational training**
  - Regional WIBs: Greater New Bedford, South Shore, Bristol, Cape Cod - already partnering on Southeastern Massachusetts Advanced Manufacturing Consortium
- **Training should be designed for entry level positions in the life sciences cluster that:**
  - Typically require an associate degree or lower
  - Are projected to grow
  - Example positions: Document Control Specialist, Laboratory Technician, with starting median salaries of ~$40K
- **As first step, connect job seekers to other life sciences training opportunities**
  - Biotech manufacturing training by Quincy College
  - Phlebotomy training in Stoughton and Fall River (from MA Job Quest website)

Further Ideas

- Direct job seekers to the **new MLSC online map of life sciences opportunities**
- Offer **transportation subsidies for students wishing to pursue life sciences internships in Boston or elsewhere outside of Brockton**
- Connect life sciences companies with local Brockton STEM programs to **provide industry advice** and guidance in creating a helpful life sciences curriculum
- In the longer-term, **develop a training program for healthcare workers** looking to transition into select occupations like lab technician that require similar skills

Augment Local Workforce Planning

Timeline



3

Create Coordination Council

"We have water, expressway exits, three train stations, community college partnerships.... If we got our act together, we'd be dangerous."

Create Coordination Council

Motivation

- Many local and regional strengths could help attract life sciences.
- But, under-awareness of **certain locational advantages** and **existing life sciences activity.**
- Lack of funding, coordinating capacity, and social networks for industry-targeted advertising.

Locational Advantages

- 1 hour from Kendall Square by car or transit.
- **892,000** college-educated workers within 45 min.
- Diverse local workforce.

Existing Life Sciences Activities

- Several existing **local life sciences companies**
- **10 miles from Canton** life sciences concentration
- Convenient to **southeast MA advanced manufacturing**

Low Cost

- **Inexpensive** land and office space
- Gas rates **26%** below MA avg
- Commercial electricity rates **47%** below MA avg
- **3** large sites identified by City for redevelopment

Proximity to Major Players

- Access to **major local community health** cluster
- Existing local **food manufacturing** cluster
- Local **community college & private college**
- Nearby **state university**
- Seat of regional **WIB** and **Chamber of Commerce**

Create Coordination Council

Takeaway

Create new coordinating council for life sciences in Brockton

- **Goals**
  - Build capacity for industry-targeted economic development
  - Develop a unified life sciences promotional strategy based on local and regional strengths
  - Coordinate execution of promotional strategies and specific company “deals”
- **Key Actors and Roles**
  - Chamber of Commerce - chief convener and regional business networks
  - City of Brockton - integration with city plans and permitting
  - Local Life Sciences Companies / MLSC - industry knowledge and networks
  - BAWIB - regional workforce knowledge and job matching
  - Community Organizations (e.g. Cape Verdean Association) - local workforce strengths and community needs
  - Brockton Partnership - local private sector connections

Further Ideas

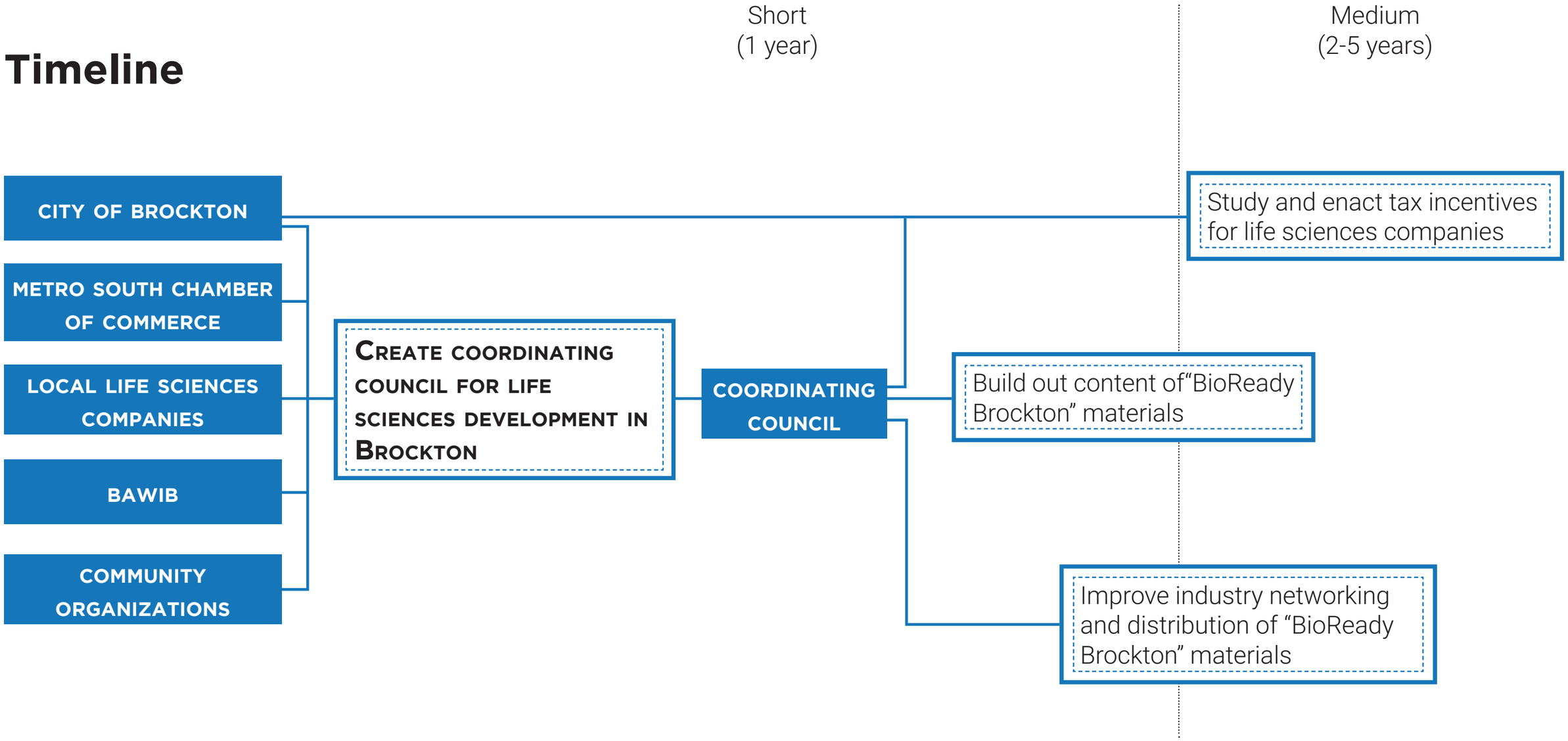
- **Build out content of “BioReady Brockton” materials**
  - Collect spatial data and stories on existing life sciences companies and employment in Brockton
  - Inventory of real estate opportunities for both large sites and smaller “back-office” sites
  - Achieve “Platinum” BioReady status from MassBio

- **Improve industry networking and distribution of “BioReady Brockton” materials**
  - Send Brockton representative to statewide industry events and networking opportunities
  - Keep MassBio and MLSC up-to-date on existing life sciences companies and new real estate opportunities

- **Study and enact tax incentives targeting life sciences companies**

Create Coordination Council

Timeline



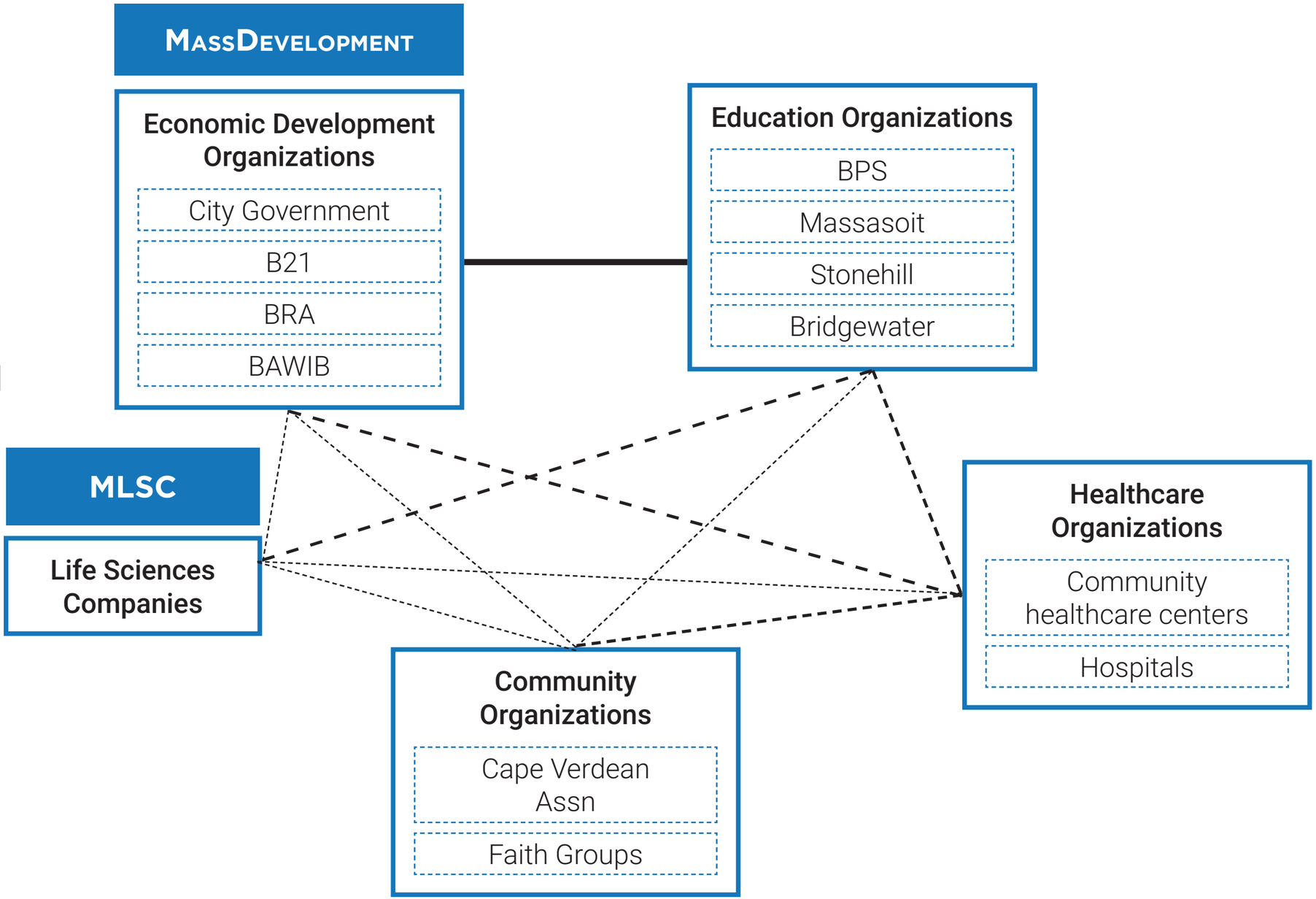
4

Improve Processes & Strengthen Relationships

"Old Brockton is still in the driver's seat. If you're in there, it's easy to complain about everything… New Brockton hasn't mobilized completely around what we envision for the city."

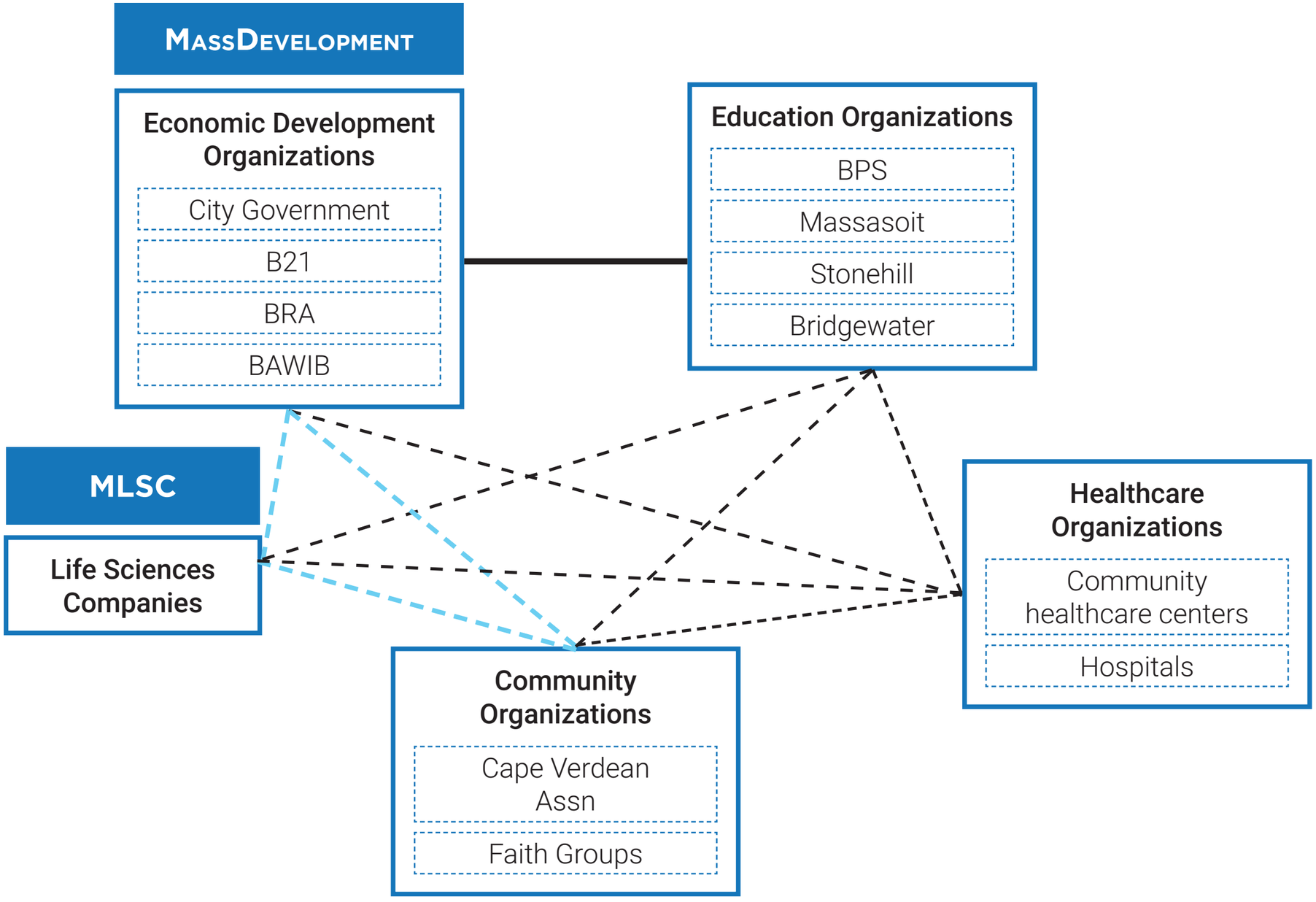
Improve Processes

- Good connections between some stakeholders
- Not enough connections between City and Industry
- Goal: turn all of the dashed lines to **solid strong connections**



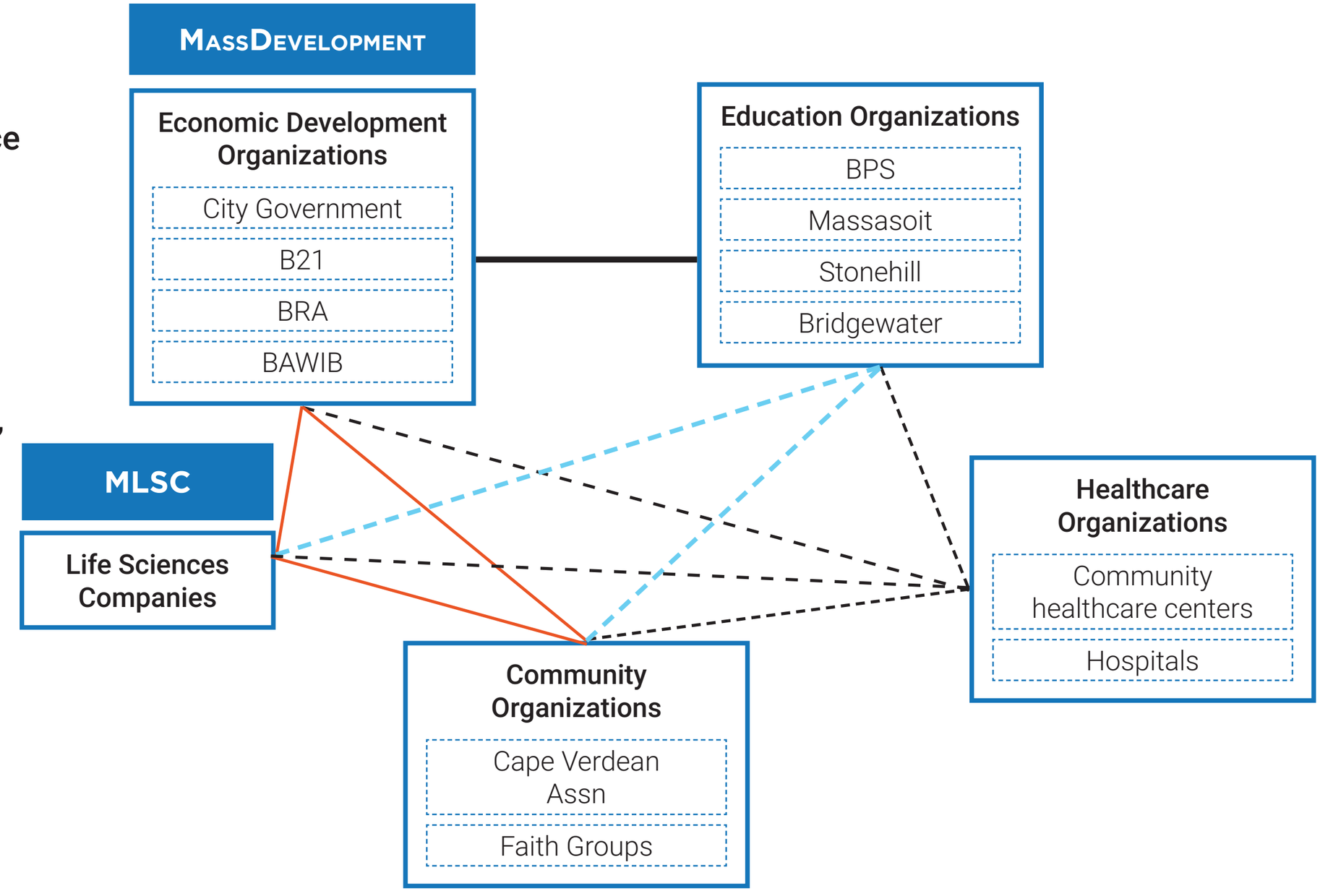
Improve Processes

- **"Invest in Real Estate Expertise"** will primarily strengthen the connections between Brockton economic development organizations and the life sciences sector
- Fosters inclusion and support for community organizations



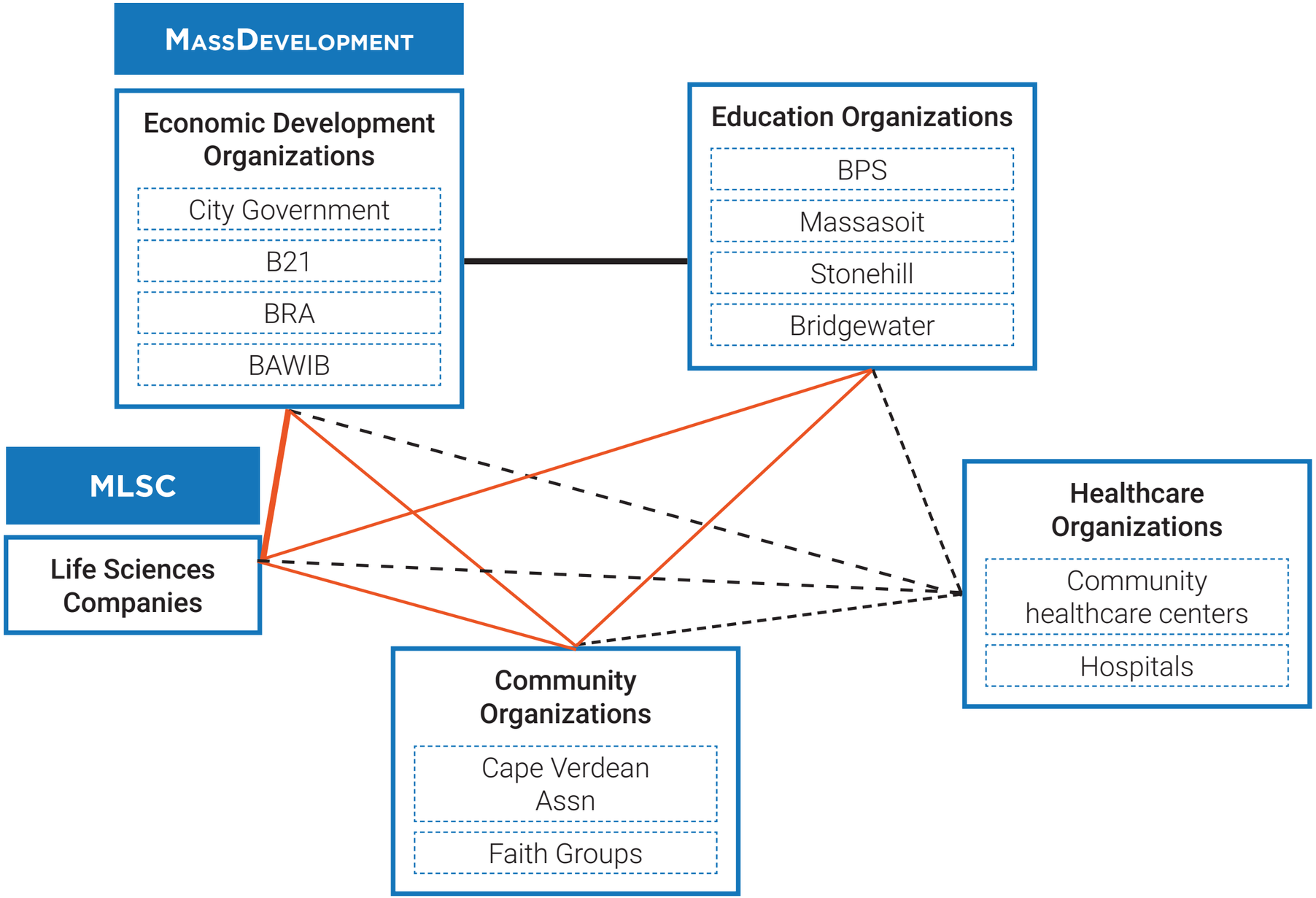
Improve Processes

- **"Augment Local Workforce Planning"** leads to strong connections between Brockton economic development organizations, the education sector, community organizations, and the life sciences industry.



Improve Processes

- **"Create Coordination Council"** strengthens links between Brockton economic development groups, the life sciences sector, and community organizations.
- Improve relationships between organizations within Brockton immigrant communities and education organizations like Brockton Public Schools.



Strong connections

Moderate connections

Weak connections

Improve Processes

- **Need to identify opportunities for greater engagement by immigrant communities and advertise opportunities through culturally-specific channels**
  - Under the leadership of community organizations
  - Communicate through different channels (e.g. local cable networks, etc.)
  - Prepare multi-lingual materials
- **Ensure representation of immigrant communities on regional life sciences coordinating council**
- **Increase diverse representation in life sciences workforce development**
  - Recruit first- or second-generation immigrant educators (e.g. BHS teachers, trainers)
  - Invite minority LS industry representatives into educational/workforce programs

Actionable Recommendations

Create Life Sciences Real Estate Fellow to support development in Gateways

Create life sciences economic development coordination council

MLSC

- Convene life sciences industry
- Share industry insights, needs
- Fund training programs

MassDevelopment

- Connect with other development efforts (e.g. TDI)
- Provide technical support on financing, infrastructure

Local Leaders

- Convene local stakeholders
- Monitor and report progress on life sciences development

Create new training programs targeted for the life sciences

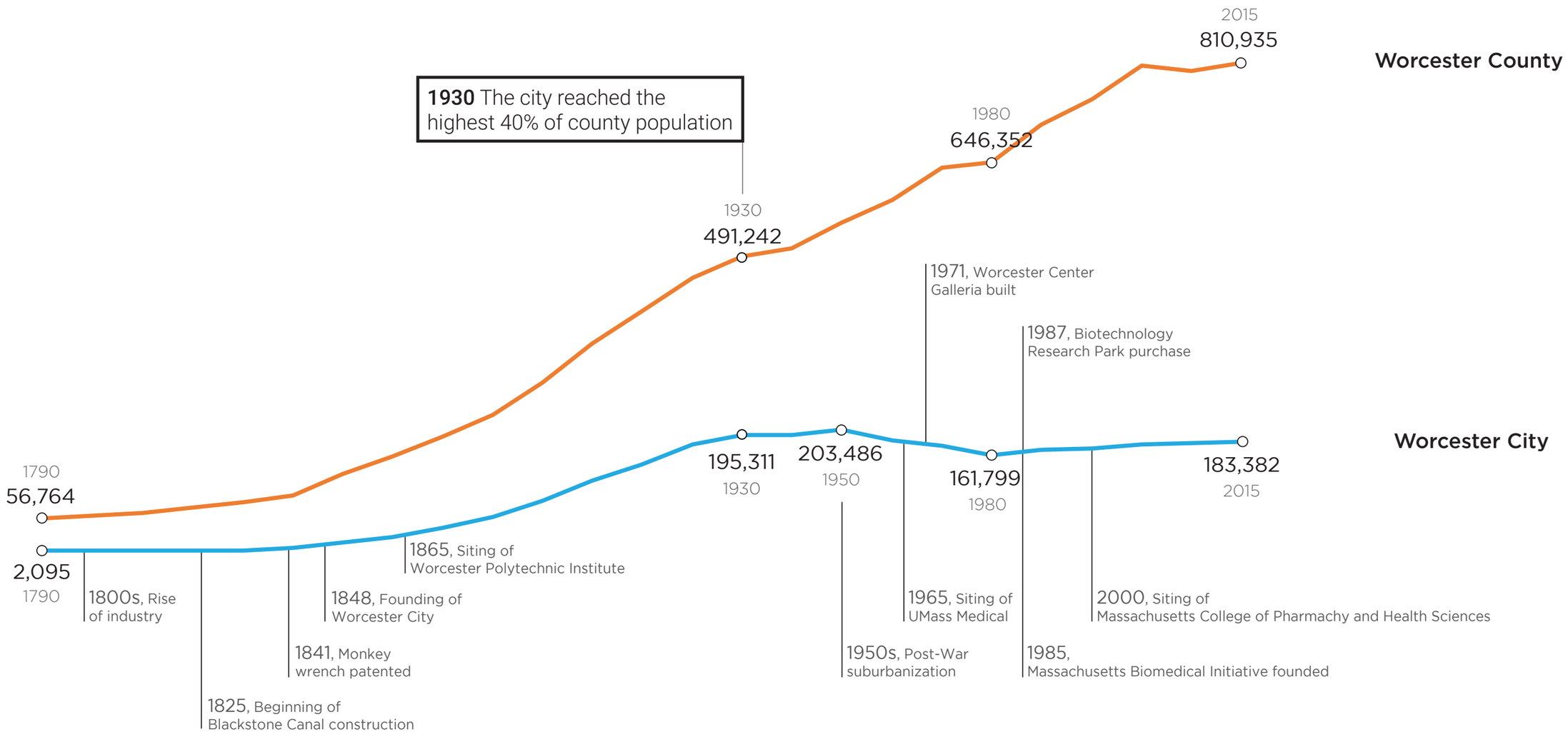
WORCESTER

Worcester History

History

Rise of Industry → **Growth of Eds & Meds** → **Urban Renewal & Revitalization**

Late 18th century - 1950 | 1960s - 1990s | 1990s - Present



Stories We've Heard...

Reality vs. Perceptions

Discrepancy between city and industry leaders' perceptions of Worcester's readiness for activity in the life sciences, which impedes the city's ability to develop a distinct life sciences identity.

The "Collaborative Gene"

Community members questioned whether or not collaborations among economic development organizations accurately reflect the needs of Worcester's present and future populations.

Neglect for the Commons

Prominent educational institutions fail to realize their joint potential to address citywide concerns including, but not limited to, K-12 and STEM education.

Innovation without Infrastructure

Interviewees highlighted research developments, real estate investments, and neighborhood revitalization, but also lamented the lack of physical connectivity in both the city and the region.

Population

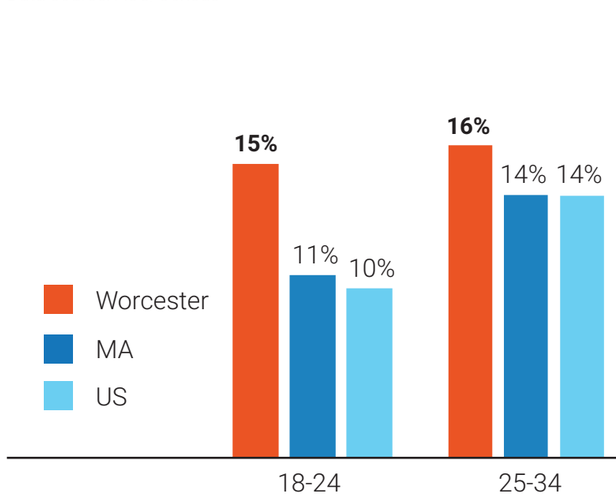
Younger population compared to the state and the US

High percent of Worcester population has **only a high school diploma** (30%) relative to the state (25%)

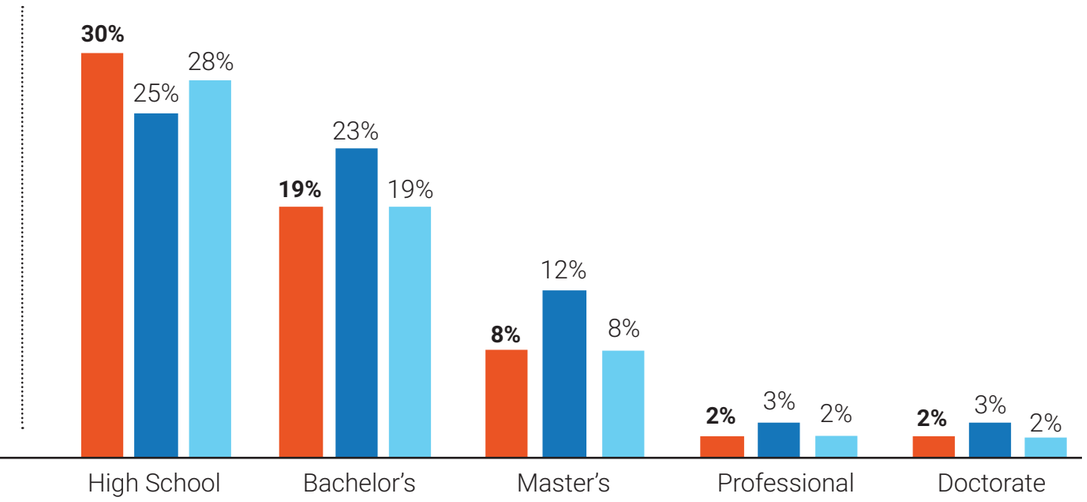
Increase in non-white population from 1990 (16%) to 2015 (40%)

Young Population, 2015

Data source: ACS/Census

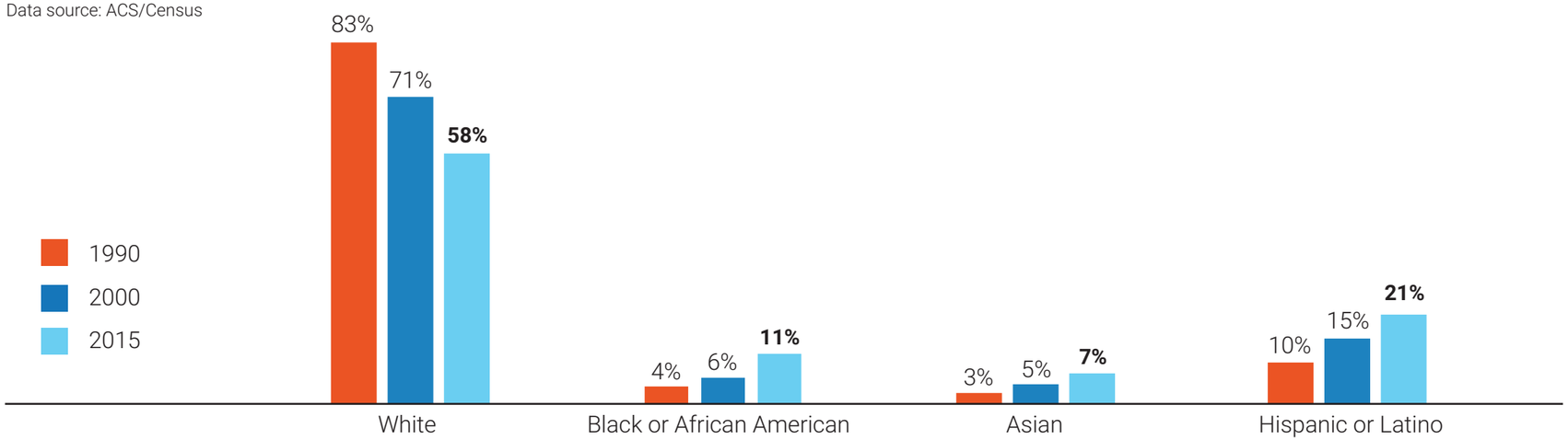


Educational Attainment, 2015



Population Change by Ethnicity

Data source: ACS/Census



Employment

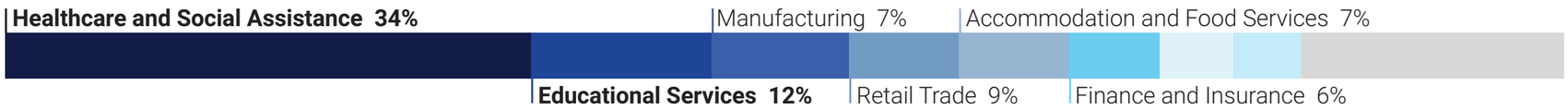
Top industries are Healthcare and Social Assistance (34%) and Educational Services (12%)

Higher **job gains in Educational Services** from 2009-2015 in Worcester (20%) than in the state (12%)

Higher unemployment rate in Worcester (10%) than in the state (4%)

Employment by Sector, 2015

Data source: ACS/Census



Job Gains and Losses by Sector, 2009-2015

Data source: County Business Patterns, Mass Economics

	Change	% Change		
	Worcester	Worcester	County	MA
Largest Job Gains				
Educational Services	+4,160	+70%	+44%	+13%
Healthcare and Social Assistance	+1,470	+5%	+7%	+13%
Admin and Support & Waste Mgmt. and Remediation Services	+810	+25%	+7%	+8%
Accommodation and Food Services	+290	+5%	+4%	+12%
Wholesale Trade	+160	+7%	+1%	+4%
Largest Job Losses				
Finance and Insurance	-1580	-24%	-7%	-13%
Manufacturing	-1400	-19%	-2%	-8%
Transportation and Warehousing	-540	-22%	-2%	+7%
Information	-460	-21%	+20%	+12%
Arts, Entertainment, and Recreation	-180	-14%	+7%	+10%

Institutions

Education
Nine universities/colleges: WPI, UMass Medical, Clark

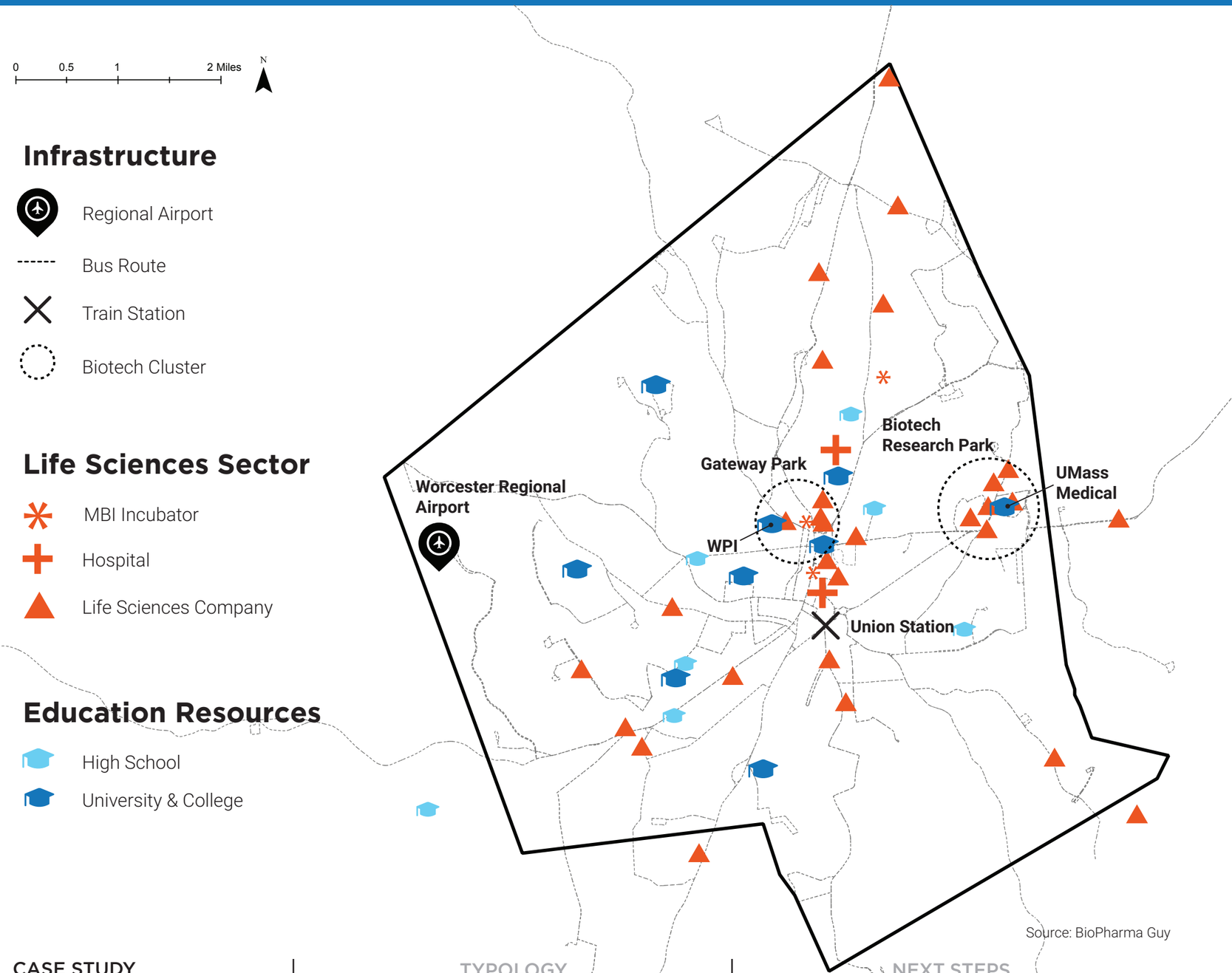
Seven high schools: Nationally acclaimed technical school

Meds
Two hospitals: Saint Vincent, UMass Memorial

Life Sciences
Thirty companies in the city

Two research clusters: Biotech Park, Gateway Park

One biotech incubator (MBI) with three locations



Source: BioPharma Guy

Downtown Revitalization

$2B total in dedicated development funds for projects completed or underway, such as:

$31M restoration of Hanover Theatre (2002-2008)

$570M to CitySquare District Improvement Financing (DIF) projects (2005-present)

$96M committed for 20 year renovation plan for downtown

1,300 full-time jobs anticipated after redevelopment

365

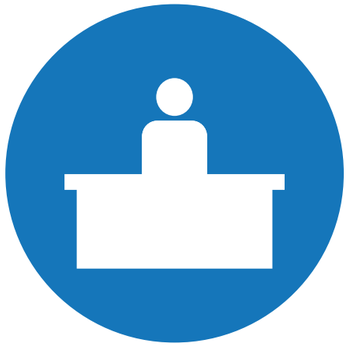
new housing units upon project completion

2.3M sf

commercial / residential space upon project completion

$2B

redevelopment investment



1,300

new jobs anticipated

Source: Chamber of Commerce, Worcester

Life Sciences Assets: Education

Major universities awarded **400 life sciences-related degrees** in 2016

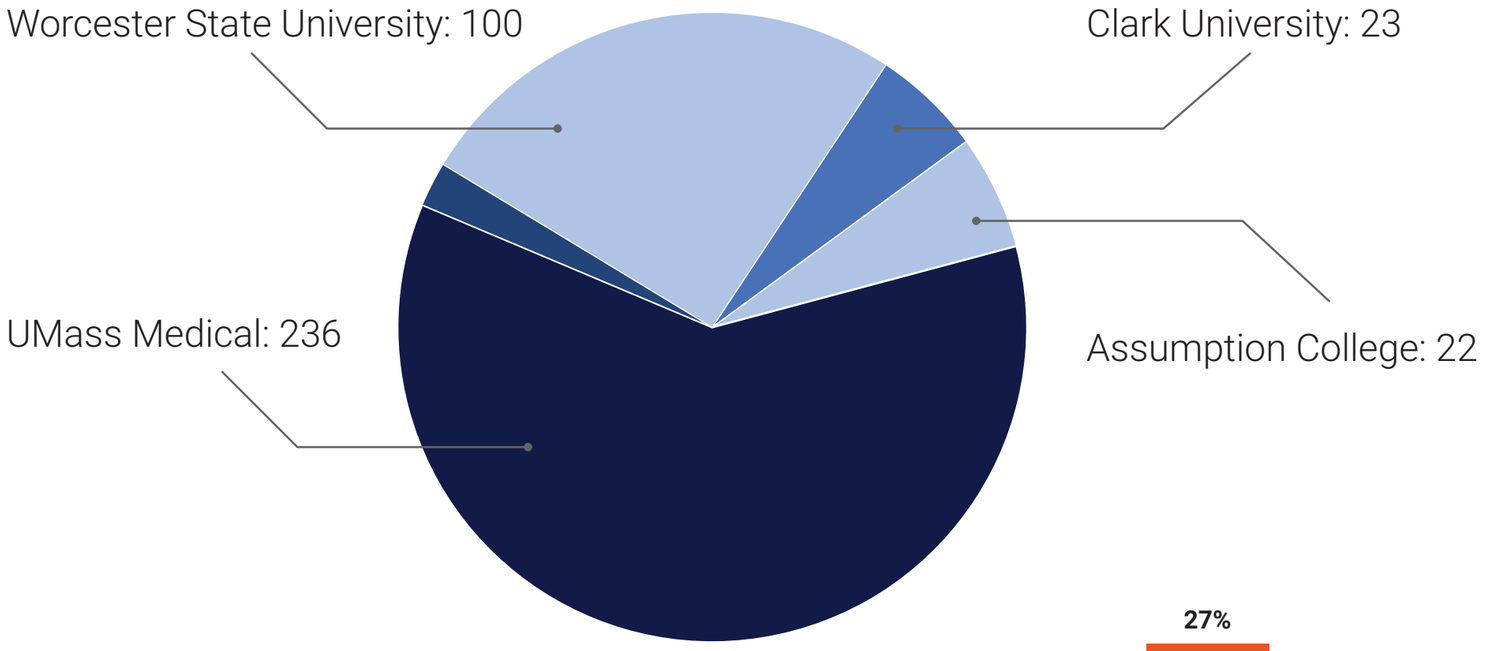
Higher proportion of life sciences graduate degrees awarded (27%) than the US (21%)

Biotechnology program at Worcester Technical High School

Industry-education partnerships (MBI/WPI, WTHS/LakePharma)

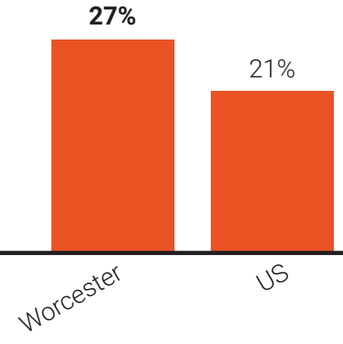
Life Sciences Graduate Degrees at Major Institutions, 2016*

Data source: County Business Patterns, Mass Economics
* Biological and Biomedical Sciences; Health Professions and Related Programs



% Graduate Degrees in Life Sciences, 2016*

Data source: NCES
* Biological and Biomedical Sciences; Health Professions and Related Programs



Life Sciences Cluster Comparison

Life Sciences Assets: Employment

National advantage in research, testing, and medical laboratories

Total life sciences LQ indicates activity but no advantage

Low life sciences employment concentration (1.6%) and yearly growth (1%) compared to other clusters

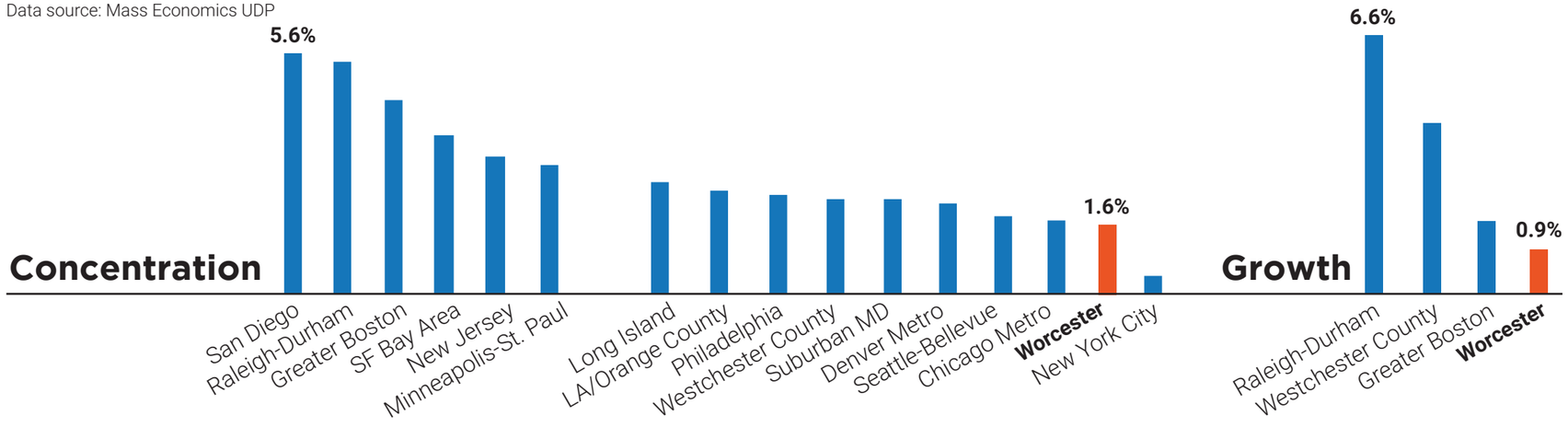
Worcester Life Sciences Jobs + Location Quotient (LQ) (2015)

Data source: County Business Patterns, Mass Economics

	Jobs (2015)	Worcester LQ	Cambridge LQ
Bioscience-related Distribution	50	0.1	5.4
Drugs & Pharmaceuticals	10	0.06	0.9
Medical Devices & Equipment	10	0.04	0.2
Research, Testing, & Medical Laboratories	1390	2.0	16.6
Total Life Sciences	1460	1.0	9.2

Life Sciences Employment Concentration, 2015 / Growth by Year

Data source: Mass Economics UDP



Life Sciences Assets: Biomanufacturing Future

WBDC investment of **$1M to redevelop 42-acre site**

WBDC to develop **seven sites with 350K sf** for biomanufacturing facilities, **500 new jobs**

Biotech firm recently signed lease for **27K sf of biomanufacturing space**

Life Sciences Assets: Employment

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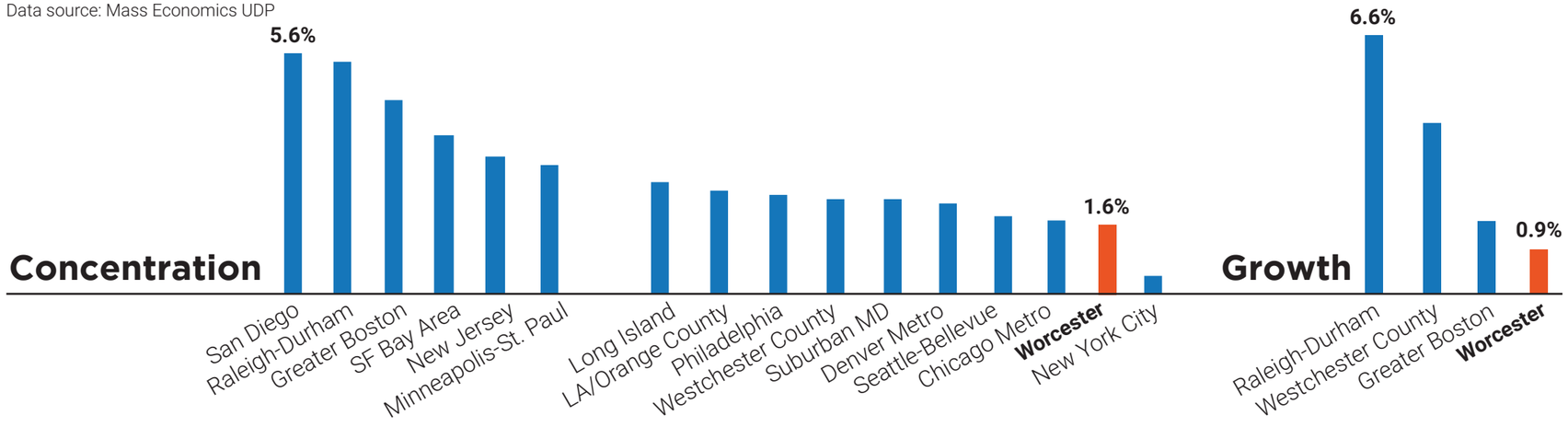


Life Sciences Assets: Employment

National advantage in research, testing, and medical laboratories

Total life sciences LQ indicates activity but no advantage

Low life sciences employment concentration (1.6%) and yearly growth (1%) compared to other clusters

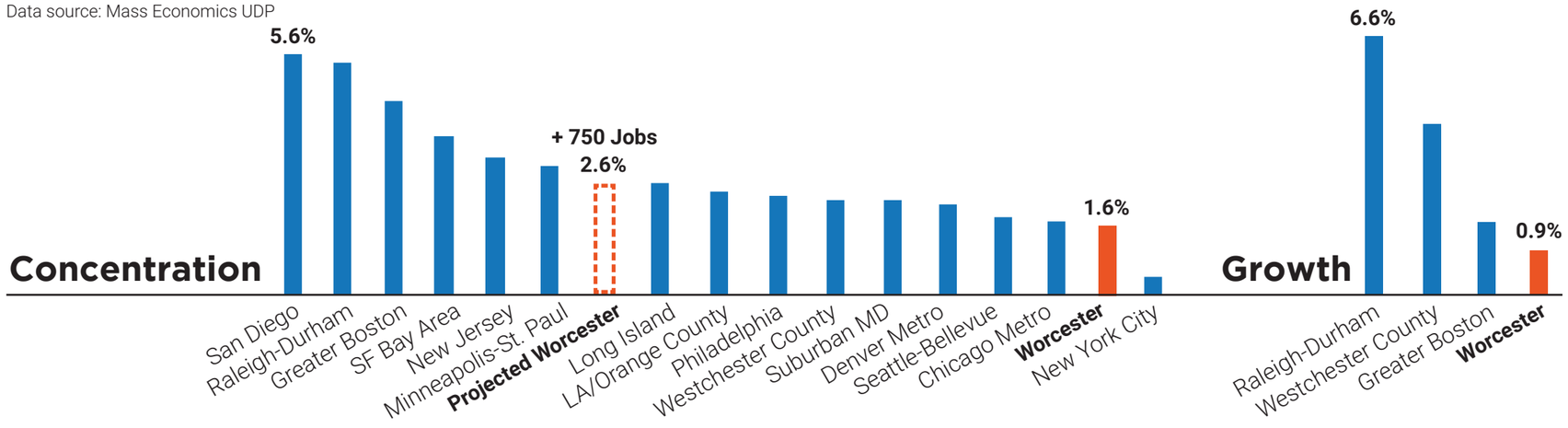
Worcester Life Sciences Jobs + Location Quotient (LQ) (Projected)

Data source: County Business Patterns, Mass Economics

	Jobs after	Worcester before LQ	Worcester after LQ	Cambridge LQ
Bioscience-related Distribution	50	0.1	**0.1**	5.4
Drugs & Pharmaceuticals	10 **+ 750**	0.06	**4.5**	0.9
Medical Devices & Equipment	10	0.04	**0.04**	0.2
Research, Testing, & Medical Laboratories	1390	2.0	**2.0**	16.6
Total Life Sciences	1460 **+ 750**	1.0	**1.5**	9.2

Life Sciences Employment Concentration, 2015 / Growth by Year

Data source: Mass Economics UDP



Life Sciences Assets: Patents and Funding

Share of total NIH funding (0.6%) comparable to other small clusters

Awards concentrated at UMass Medical

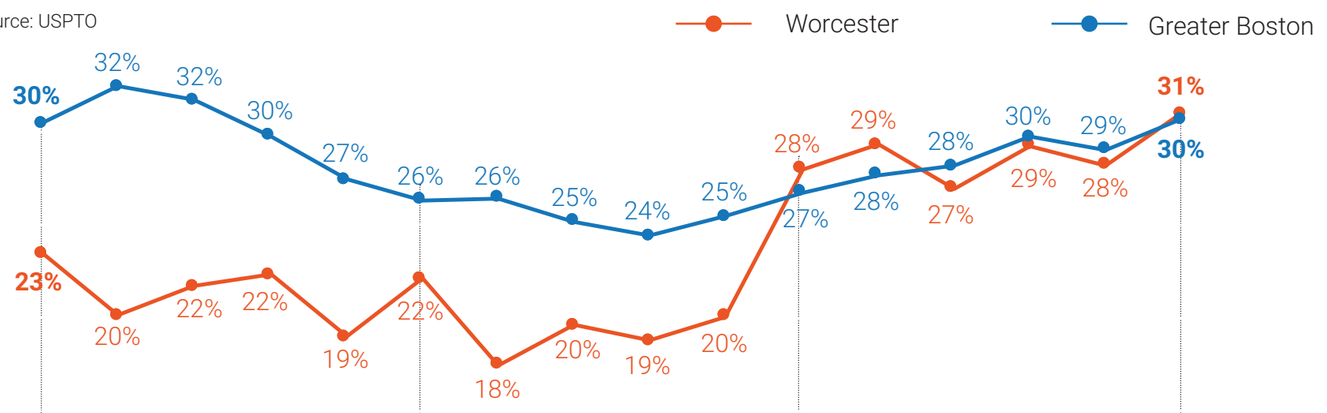
Life sciences share of patents shows potential for innovation

197 life sciences-related patents in 2015

$300M in total venture capital funding in 2017, but only one deal

Life Sciences Patents as a Share of Total Patents, 2000-2015

Data source: USPTO



Worcester NIH Funding Awardees, 2017

Data source: NIH

	Total Funding	Awards
Biomedical Research Models	$527,800	2
Clark University	$450,900	1
Microbiotix, Inc	$4,175,500	9
Nirogyone Therapeutics, LLC	$300,000	1
Signablock, Inc	$224,700	1
UMass Medical	$152,964,400	328
WPI	$4,107,600	13
Zata Pharmaceuticals, Inc.	$587,900	1
Total	$163,338,800	356

Strategies Summary

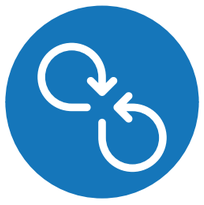
1

Invest in Sector and Real Estate Expertise

Create a Gateway Cities Life Sciences Fellow

2

Encourage Nine-Postsecondary Institutional Alignment



Cultivate a STEM educational pipeline that fosters collaboration and community investment across Worcester Public High Schools and higher educational institutions

3

Create Life Sciences Master Plan and Coordinating Body

Create independent coordinating organization and embark of participatory planning process for the life sciences

4

“Reimagine” the Transportation System

Reduce physical and social distances between life sciences companies, institutions, and neighborhoods through improved infrastructure; emphasize major regional assets like Union Station and the Worcester Regional Airport

1

Invest in Sector and Real Estate Expertise

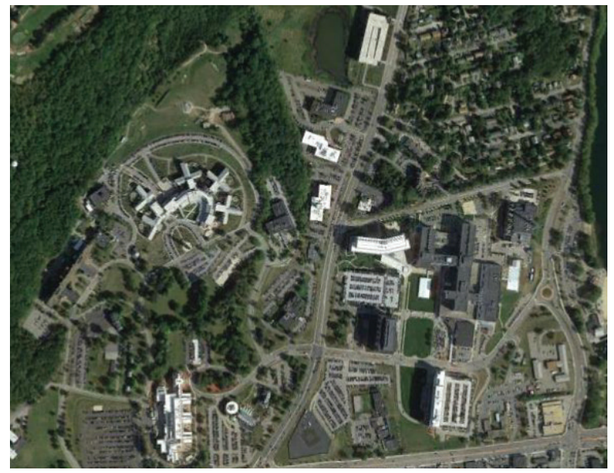
"Worcester is positioned really well to be a destination...the biggest drawback is still perception and that's changing"

Invest in Sector / Real Estate Expertise

Motivation

- With high real estate prices in Kendall, Worcester can leverage land as an asset, both in the city and county
- Understanding sector needs is crucial to developing expertise that is complementary to Kendall's
- Life sciences companies want ready-to-use lab space and other industry-specific amenities

Gateway Park



Biotech Park

Takeaway

Create a Gateway Cities Life Sciences Fellow

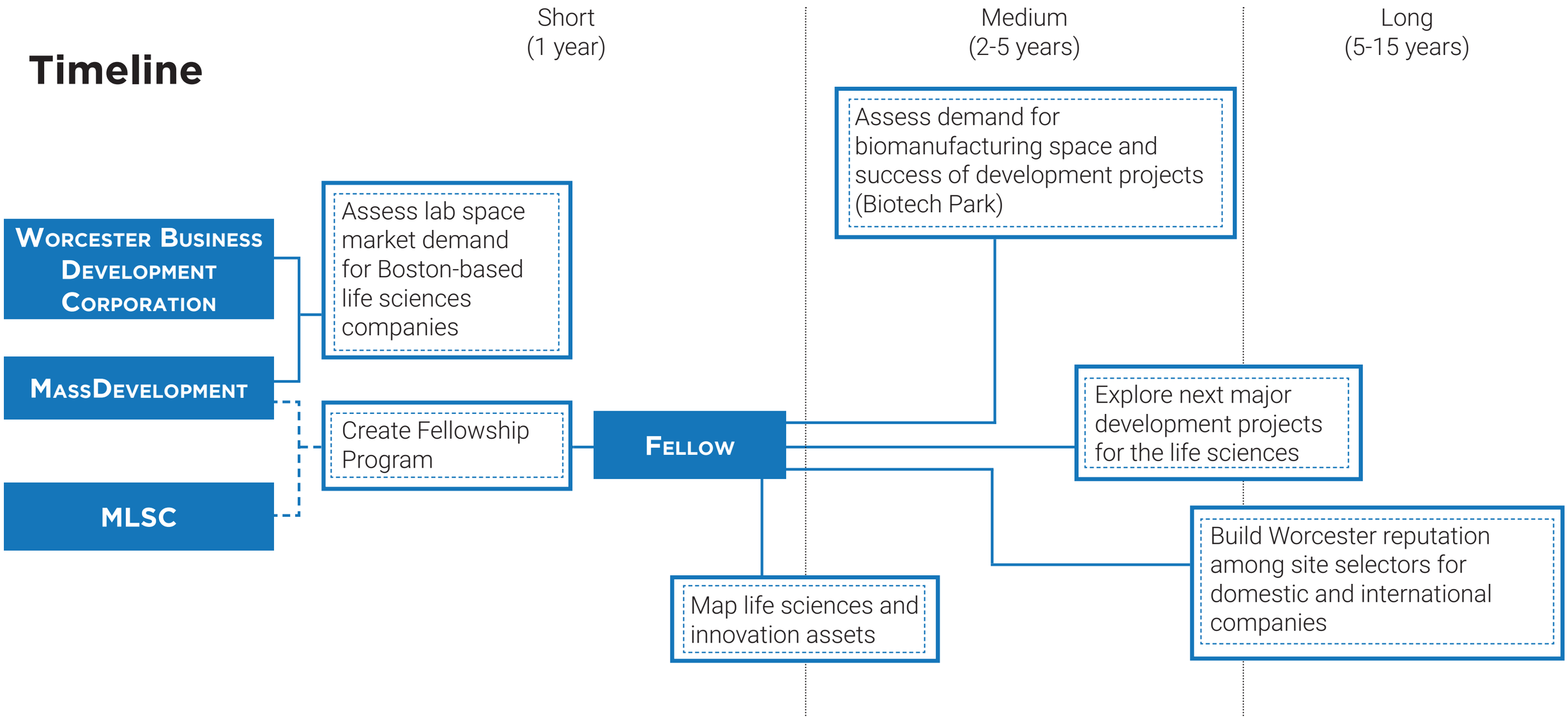
- **Acts as informed liaison between Worcester stakeholders and professionals across the life sciences**
  - Networks with life sciences site selectors to learn about sector needs
  - Devises strategies for engaging statewide and national industry associations, understanding current trends and opportunities for development in Central MA
- **Researches and documents particular real estate sites and other regional assets**
  - Collaborates with the Central MA Regional Planning Commission to expand purview to surrounding areas of opportunity that link with life sciences supply chains (e.g., agriculture, transportation infrastructure)
  - Conducts mapping of current innovation ecosystem and regional assets, including incubator and makerspaces, arts and creative businesses, and university research centers

Further Ideas

- **Coordinate with the EDCC; attend meetings and provide insights where possible**
  - Build on research and industry knowledge to develop Worcester's niche in the life sciences
- **Dedicate a quarter of time in Kendall/Cambridge networking with industry**
  - Leverage position to improve connections between Worcester and Kendall life sciences sectors and understand industry needs
- **Survey existing life sciences facilities to improve efficiency of use**
  - Identify space at universities and high schools for off-hours training or certification programs

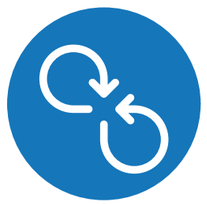
Invest in Sector / Real Estate Expertise

Timeline



2

Encourage Nine-Postsecondary Institutional Alignment



"I think some people don't move here because we have a level 4 [lowest performing] school district, putting us in the bottom percentile of schools across the state. ***If Worcester really wants to start supporting its community, the school system is a significant area to address****."*

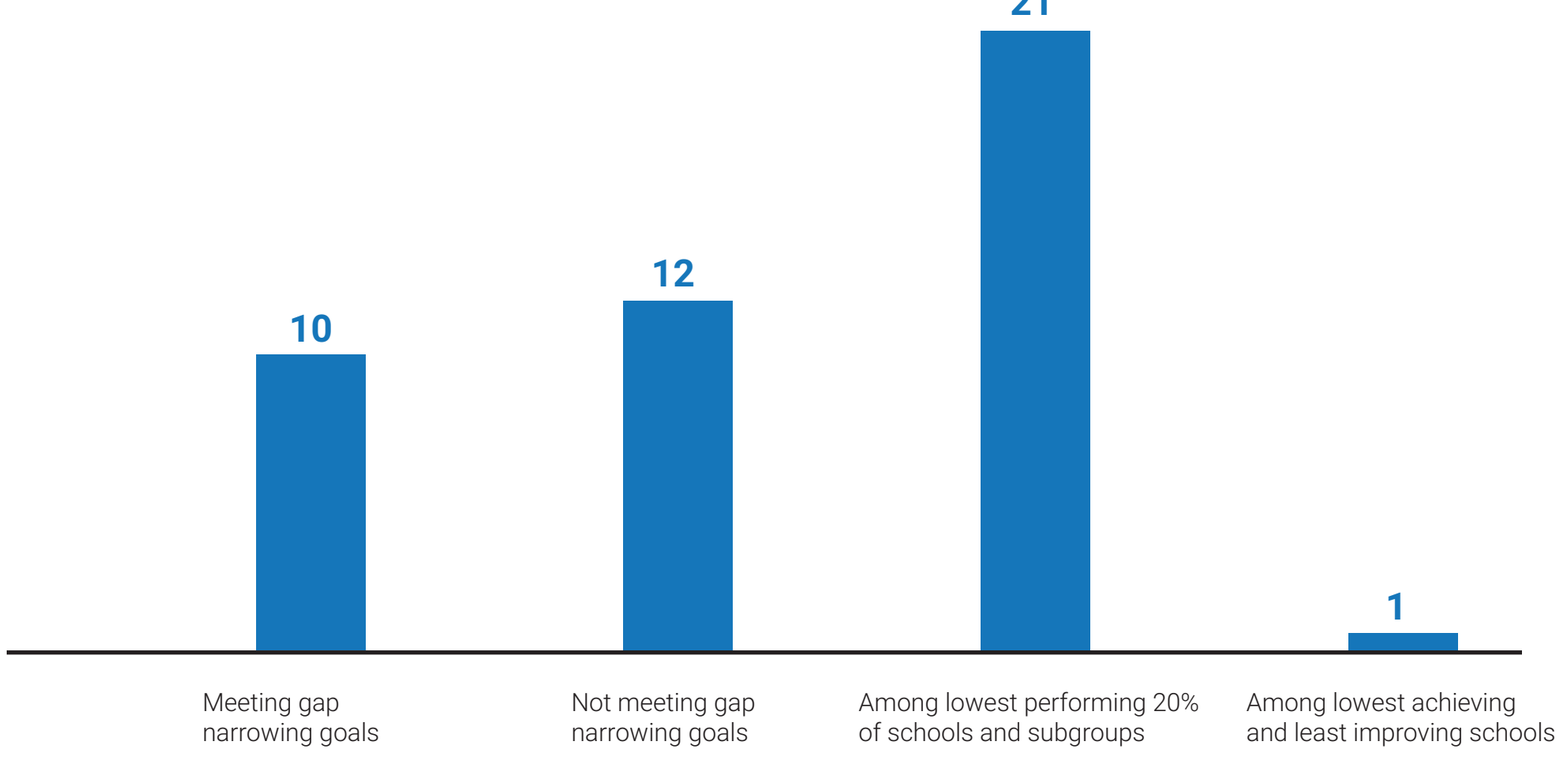
Motivation

- High concentration of higher educational institutions
- Lack of unified place-based identify across schools
- Worcester Public Schools are undergoing a strategic planning process
- High performing vocational high school offers a model to link life sciences sector and public school education

"There are 13 colleges and universities in the area...They **should have an impact!** You should have a visual **cultural** and **social impact!**"

Worcester Public School Ratings (K-12)

Date source: Massachusetts Department of Elementary and Secondary Education. 2016



Takeaway

Cultivate a STEM education pipeline that fosters collaboration and community investment

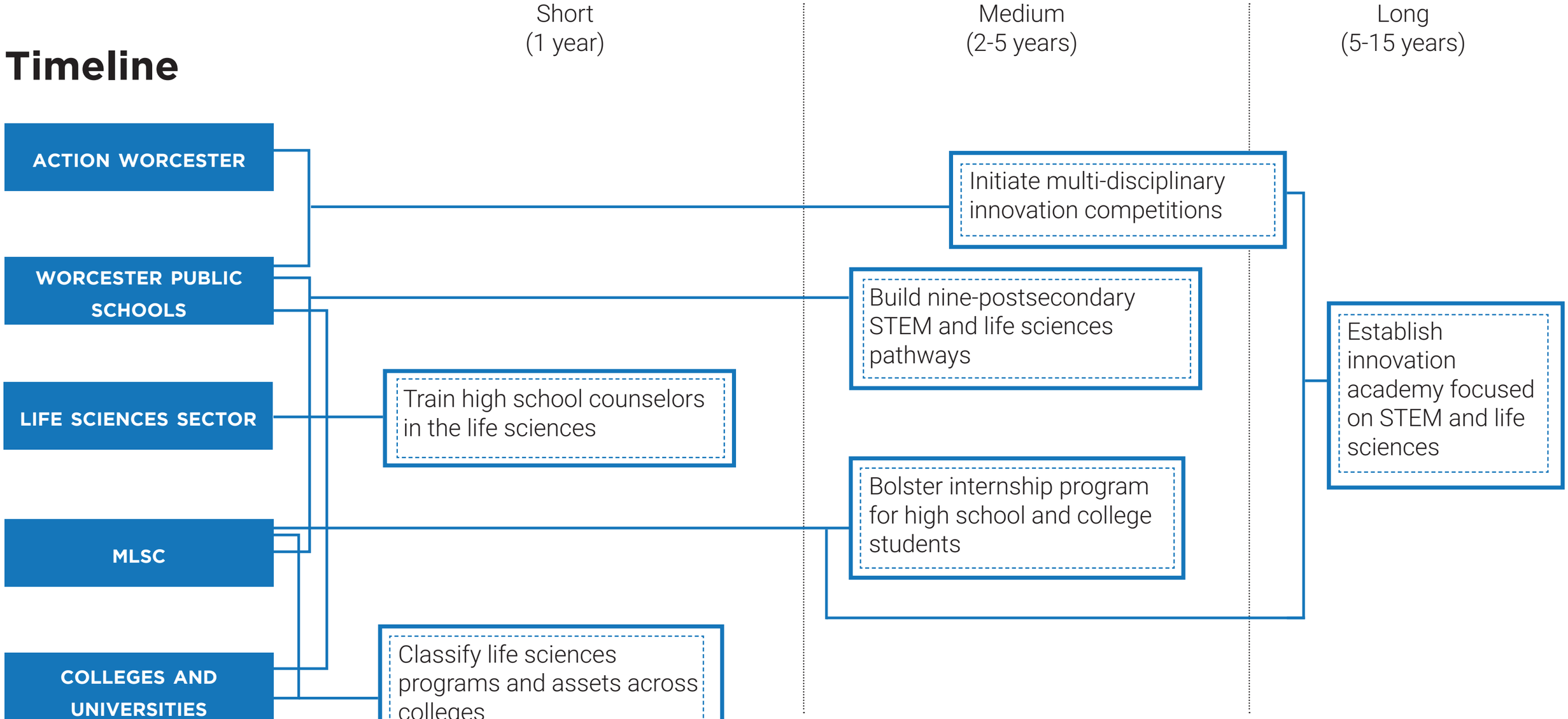
- **Classify life sciences assets across the colleges**
  - Analyze degree programs and faculty research areas to discover opportunities for collaboration
- **Create plan of action in conjunction with current Worcester Public School Strategic Plan**
  - Expand nine-postsecondary credit-bearing and credential pathways in STEM or life sciences fields
- **Bolster student internship program opportunities**
  - Create paid internship and research program for high school students
  - Expand college internships in life sciences companies
- **Create competition and challenge programs to encourage students to generate innotative solutions**
  - Programs can incentivice and mobilize interdisciplinary teams, with industry and academic experts serving as mentors

Further Ideas

- **Create innovation academy for high school students**
  - Bring young people into the innovation ecosystem while also exposing them to the possibilities in STEM and the life sciences
  - Encourage industry leaders and entrepreneurs to act as mentors for students
- **Offer professional development program for high school and university counselors**
  - Provide training for counselors to guide students with more nuanced knowledge of opportunities in the life sciences
- **Hold summit or workshops to build trust among leaders of higher educational institutions, and between institutions and Worcester Public Schools**
  - Introduce mandate for educational institutions to support local nine through postsecondary pipeline

Nine-Postsecondary Alignment

Timeline



3

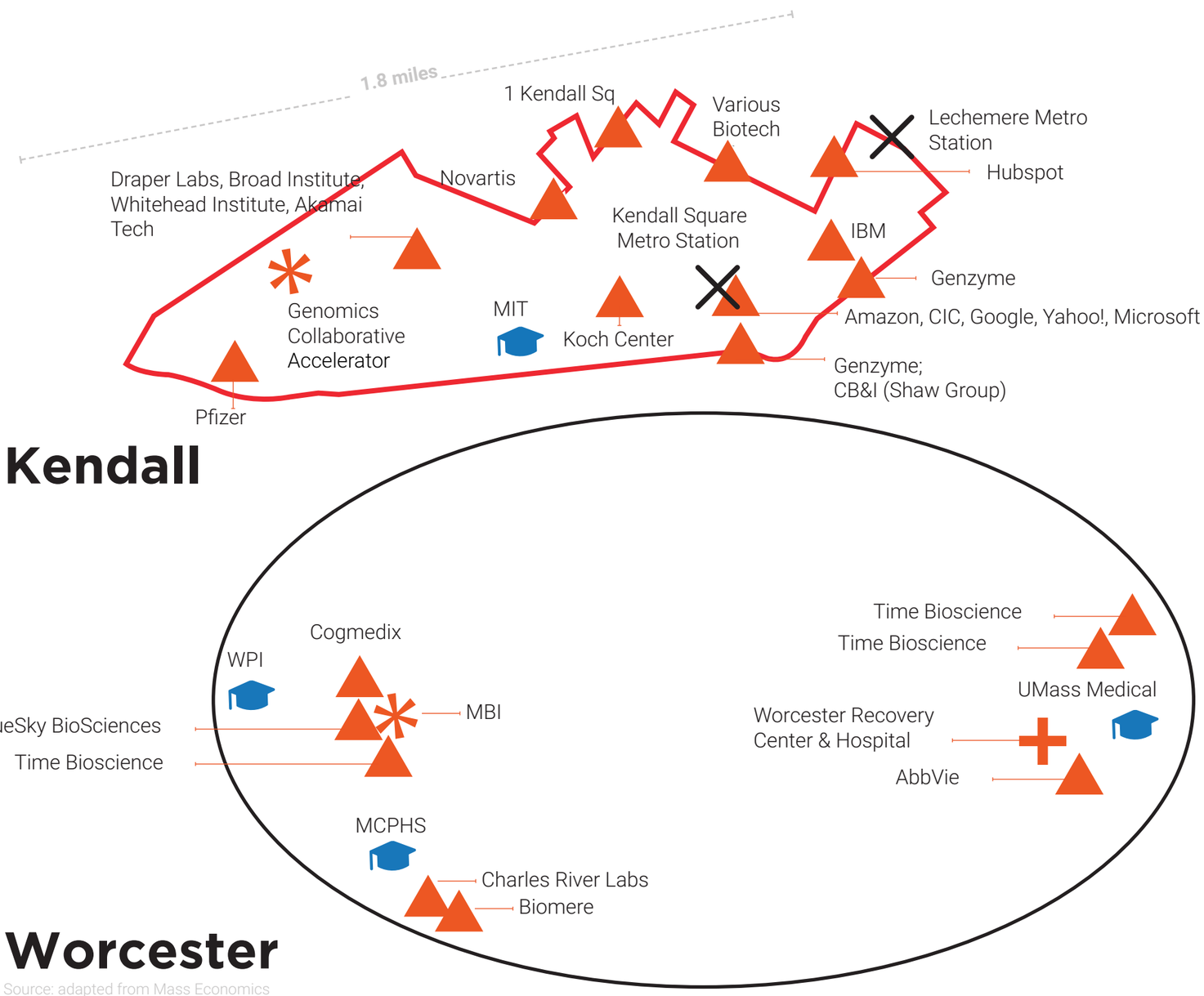
Create Life Sciences Master Plan and Coordinating Body

"The network in Worcester around biotech is not there, it's not strong at all."

Motivation

- Proximity to Boston is not as much an advantage as some believe it to be
- Unclear how Worcester communities stand to benefit and be integrated into future development in the life sciences
- City visioning too concentrated

"Worcester lacks a real inclusive growth strategy. I think they can make a good case study where a city can be future-focused and thoughtful about how incoming opportunities would transform the existing communities."



Takeaway

Create independent coordinating organization and initiate a participatory process with the final goal of a life sciences master plan

- **Assemble Worcester visioning advisory council**
  - Invite partners across civil society, public education, higher education, business, public sector, and the life sciences to scope objectives and outcomes for a life sciences innovation economy
- **Appoint an intermediary organization to facilitate ongoing planning and engagement process**
  - Draw on the work being done by the Life Sciences Fellow
  - Organization can cultivate cooperateive efforts among relevant parties and make known available local physical and infrastructural assets
- **Establish formal entity with a broad-reaching mandate to operationalize the master plan**
  - Implement strategies for a life sciences ecosystem that is rooted in place and based on intermediary's community engagement process

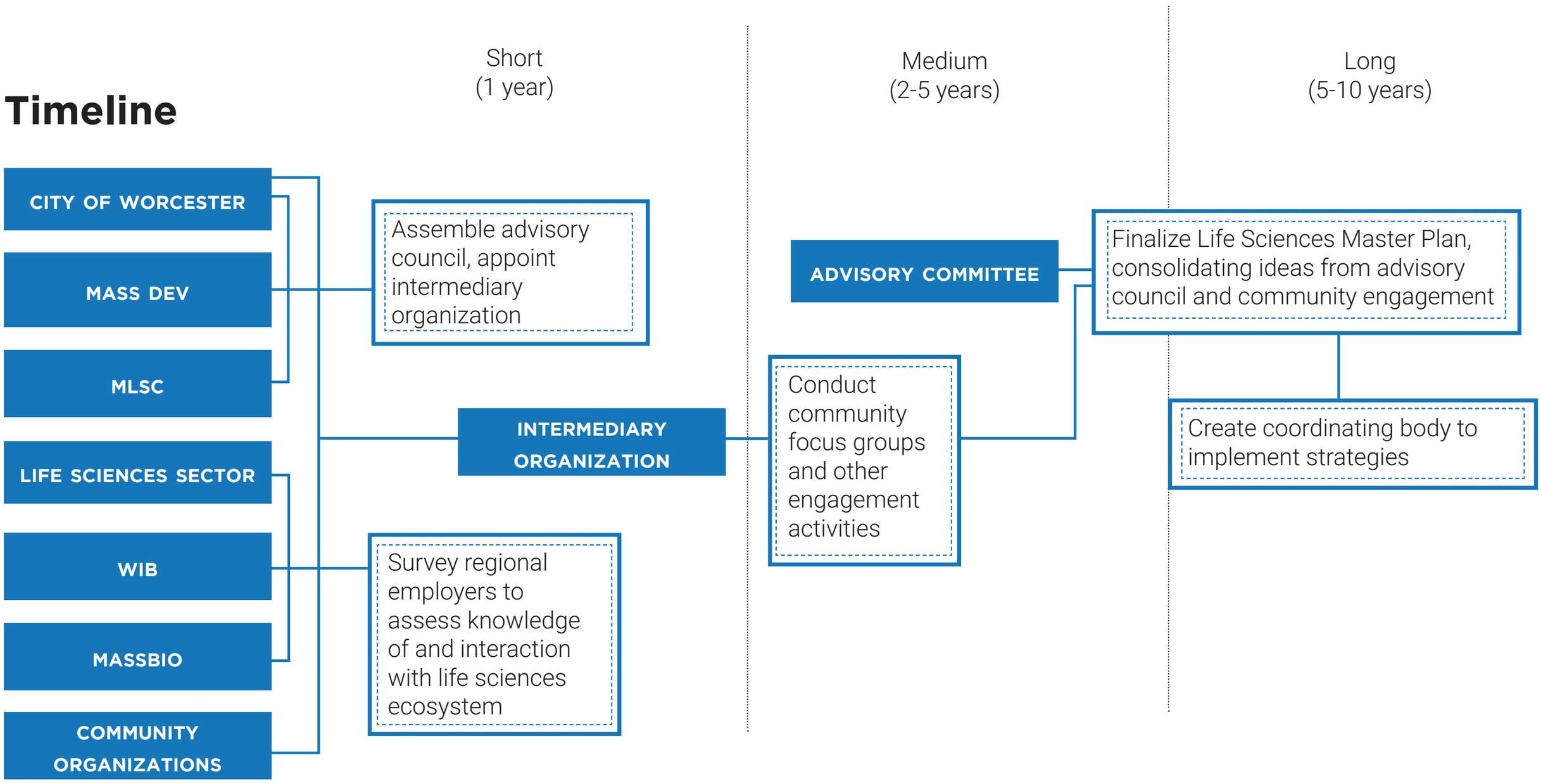
Further Ideas

- **Conduct community focus groups and networking sessions to solicit additional ideas**
  - Understand outcomes community members might want from a life sciences-based economic development agenda
  - Include college students, parents of Worcester Public School students, and community and social service organizations

- **Survey regional businesses to assess their knowledge of and interaction with the life sciences ecosystem**
  - Assign Life Sciences Fellow a coordinating role
  - Solicit ideas for integrating existing businesses into the ecosystem

Create Life Sciences Master Plan

Timeline



4

“Reimagine” the Transportation System

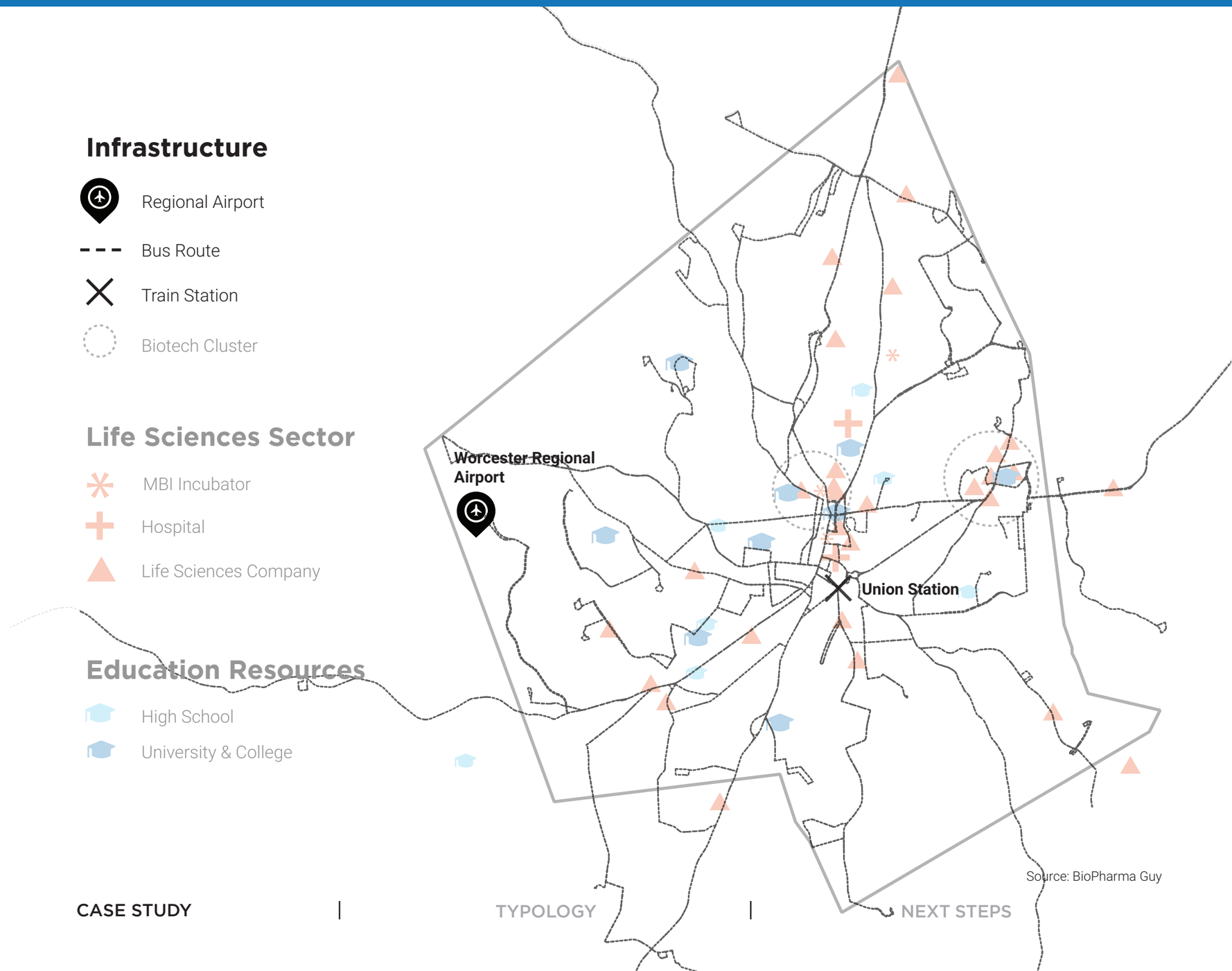
“You have to have a car in this area...there’s no walkability around the stations. That’s why Grafton put in a TOD overlay!”

“Reimagine” the Transporation System

Motivation

- Few bus routes have frequent service (majority every 15-minutes)
- Limited flights out of Worcester Regional Airport (JFK and Fort Lauderdale)
- Spatial separation of key institutions exaggerated by minimal crosstown transportation options

Existing Transportation Infrastructure



Source: BioPharma Guy

Takeaway

Reduce physical and social distances through improved infrastructure; emphasize the airport

- Update the transit plan, with a focus on crosstown connecting routes and increasing frequent service
- Investigate the potential for partnerships to improve connections that might be beyond the scope of the WRTA, such as late night subsidized service with transportation network companies (TNCs)
- Assess the market demand for specific destinations and identify potential opportunities for increased connections
- Work with life sciences sector to determine what industry purposes the airport can serve as part of the Life Sciences Master Plan

Further Ideas

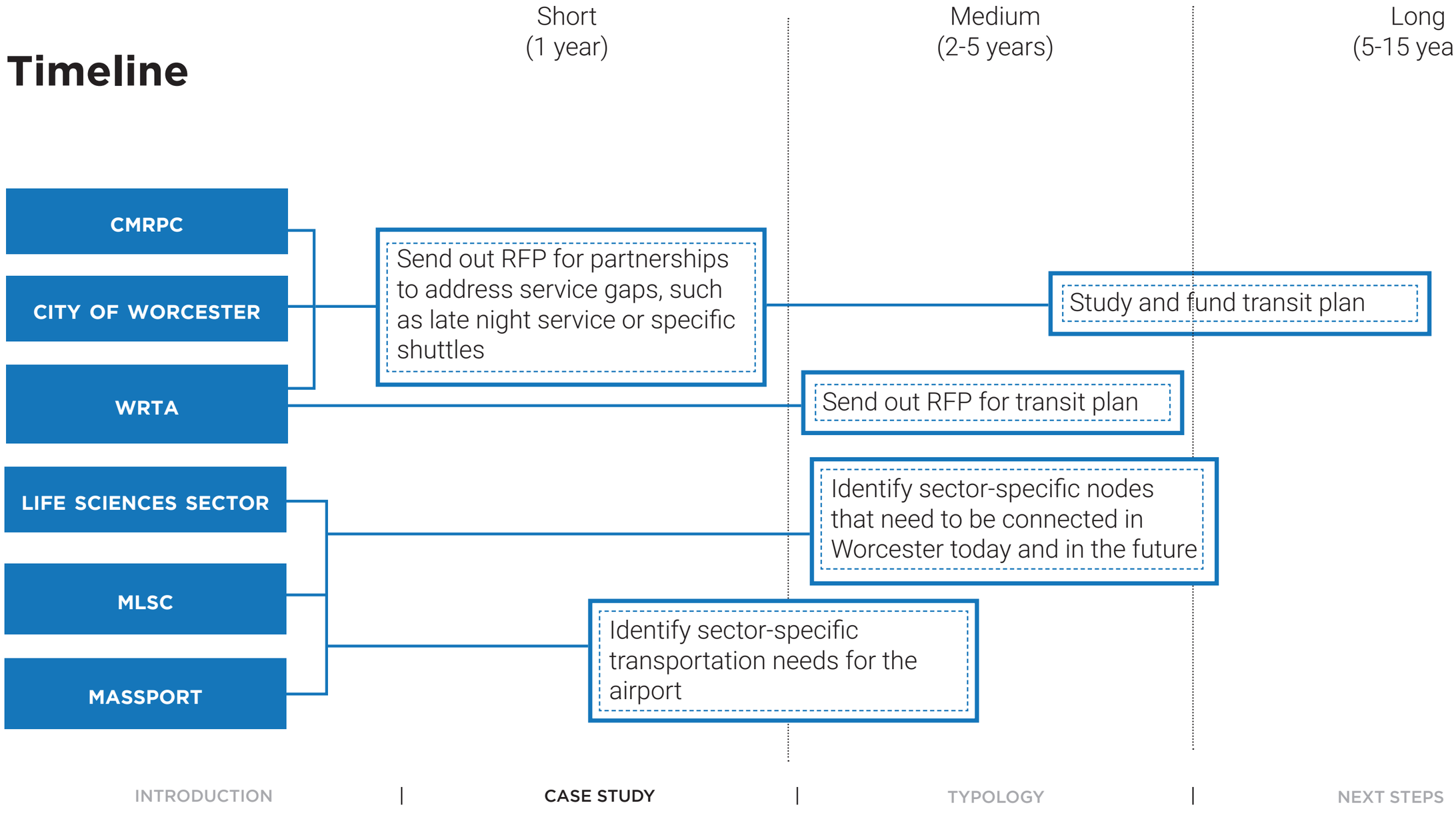
- **Create a life sciences shuttle conncting key areas of the industry**
  - Industry leaders pay in, like a business improvement district, to increase accessibility for workers

- **Initiate transportation partnerships between TNCs and Meds for non-emergency rides**

- **Study potential taxes, grants and land use strategies to encourage non-single vehicle occupancy**
  - Federal Transit Administration (FTA) offers grants for public transportation innovation as well as standard grants for urbanized areas
  - Decreasing parking requirements and increasing density around transit hubs complements improved public transportation system to encourage usage

“Reimagine” the Transporation System

Timeline



Strategies Summary

INCREASED CAPACITY AND EXPERTISE

Invest in Real Estate Expertise

Brockton

Invest in Sector / Real Estate Expertise

Worcester

COORDINATION

Create Coordination Council

Brockton

Create Life Sciences Master Plan and Coordinating Body

Worcester

WORKFORCE & EDUCATION

Augment Local Workforce Planning

Brockton

Encourage Nine-Postsecondary Institutional Alignment

Worcester

IMPROVED CONNECTIVITY

Improve Processes & Strengthen Relationships

Brockton

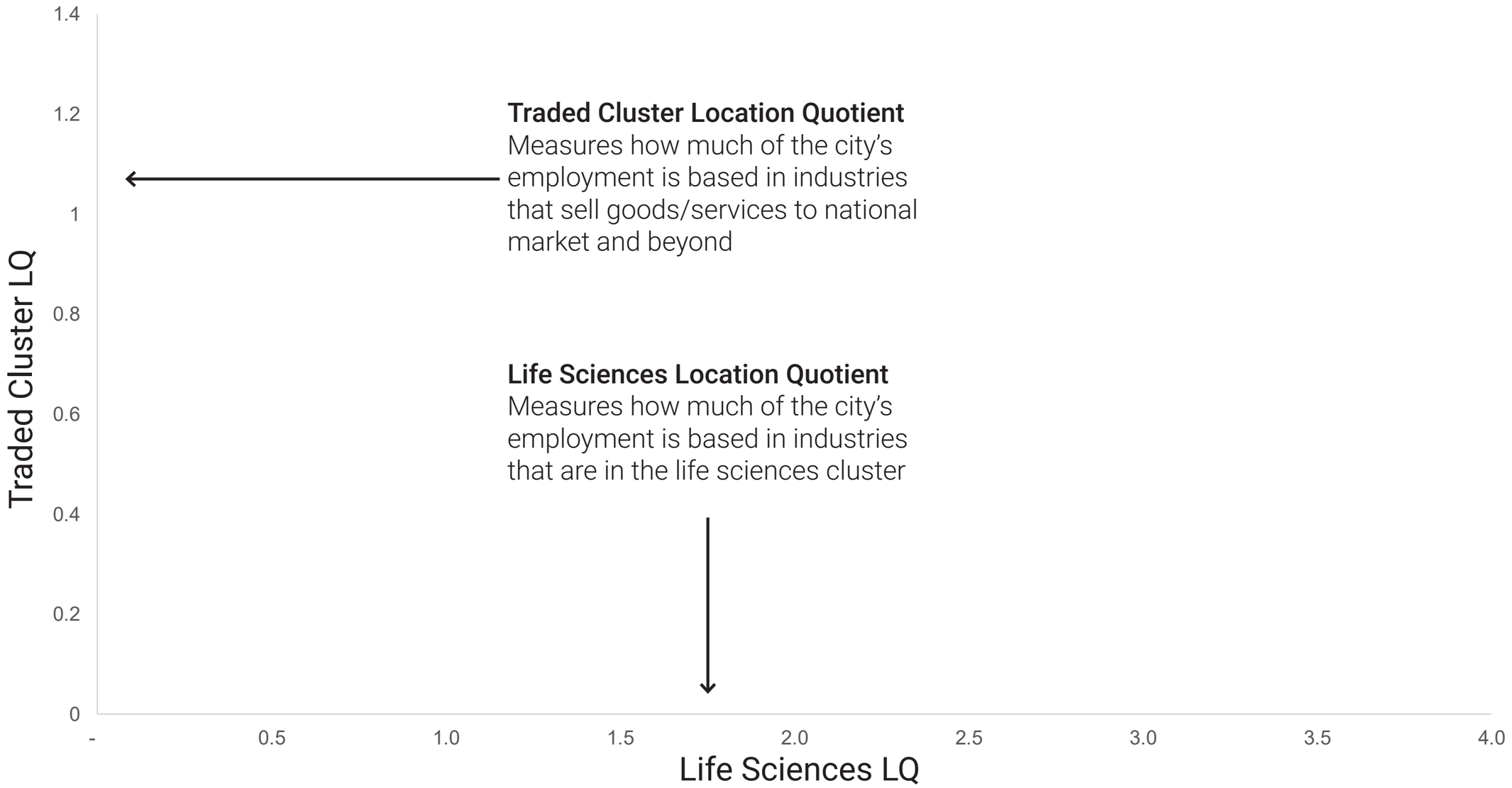
"Reimagine" the Transportation System

Worcester

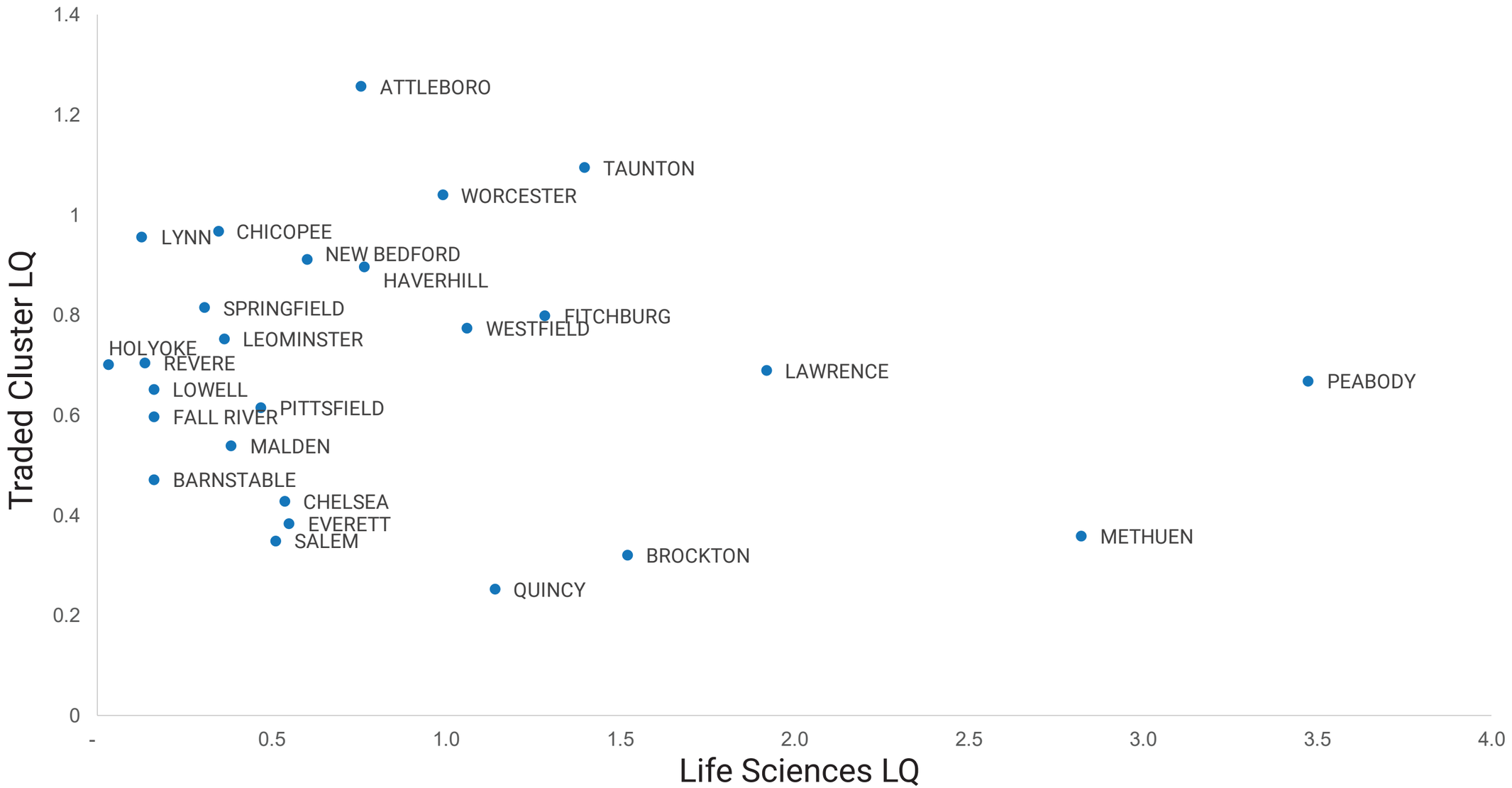
3

TYPOLOGY

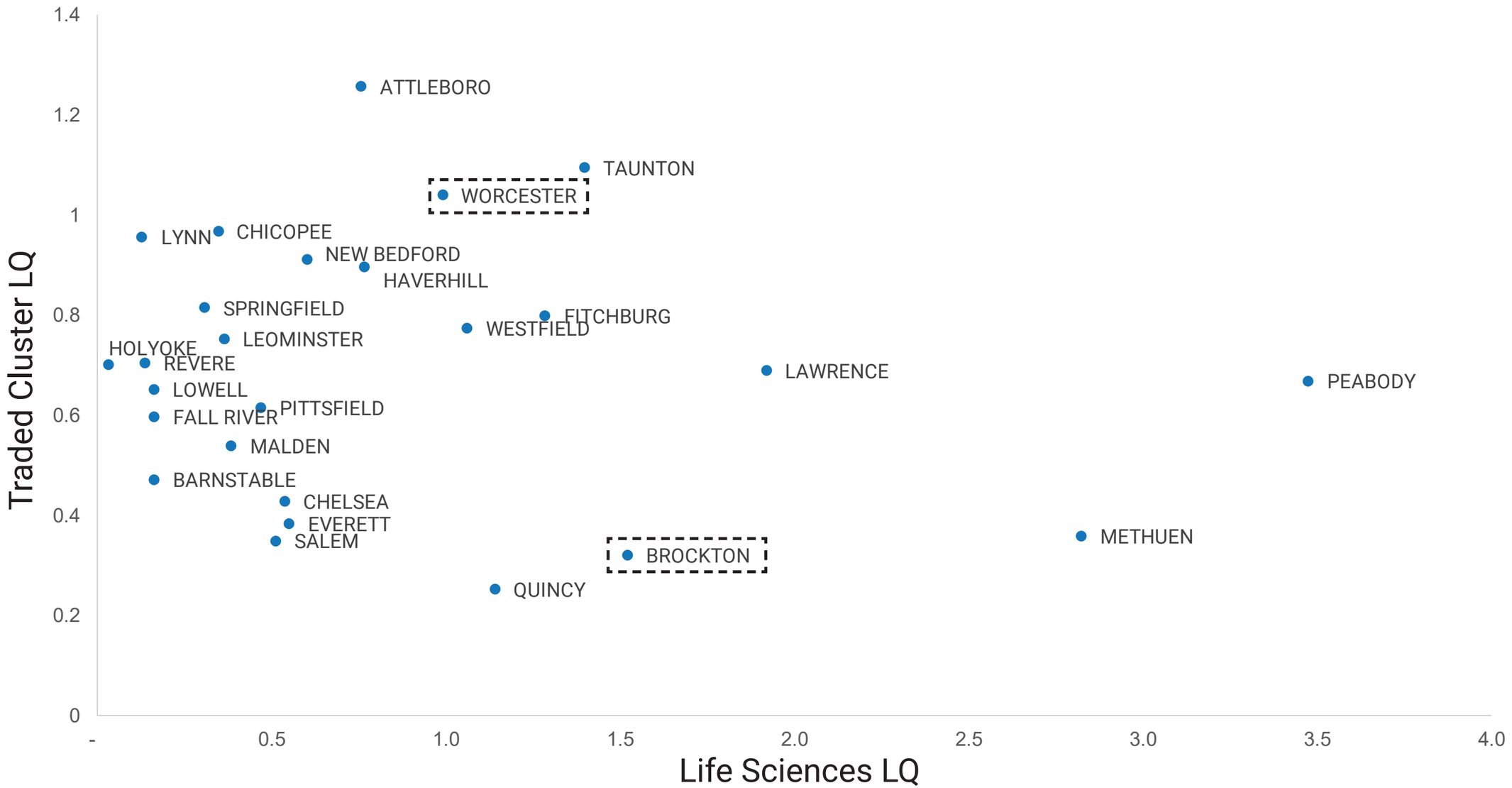
Gateway Cities Typology



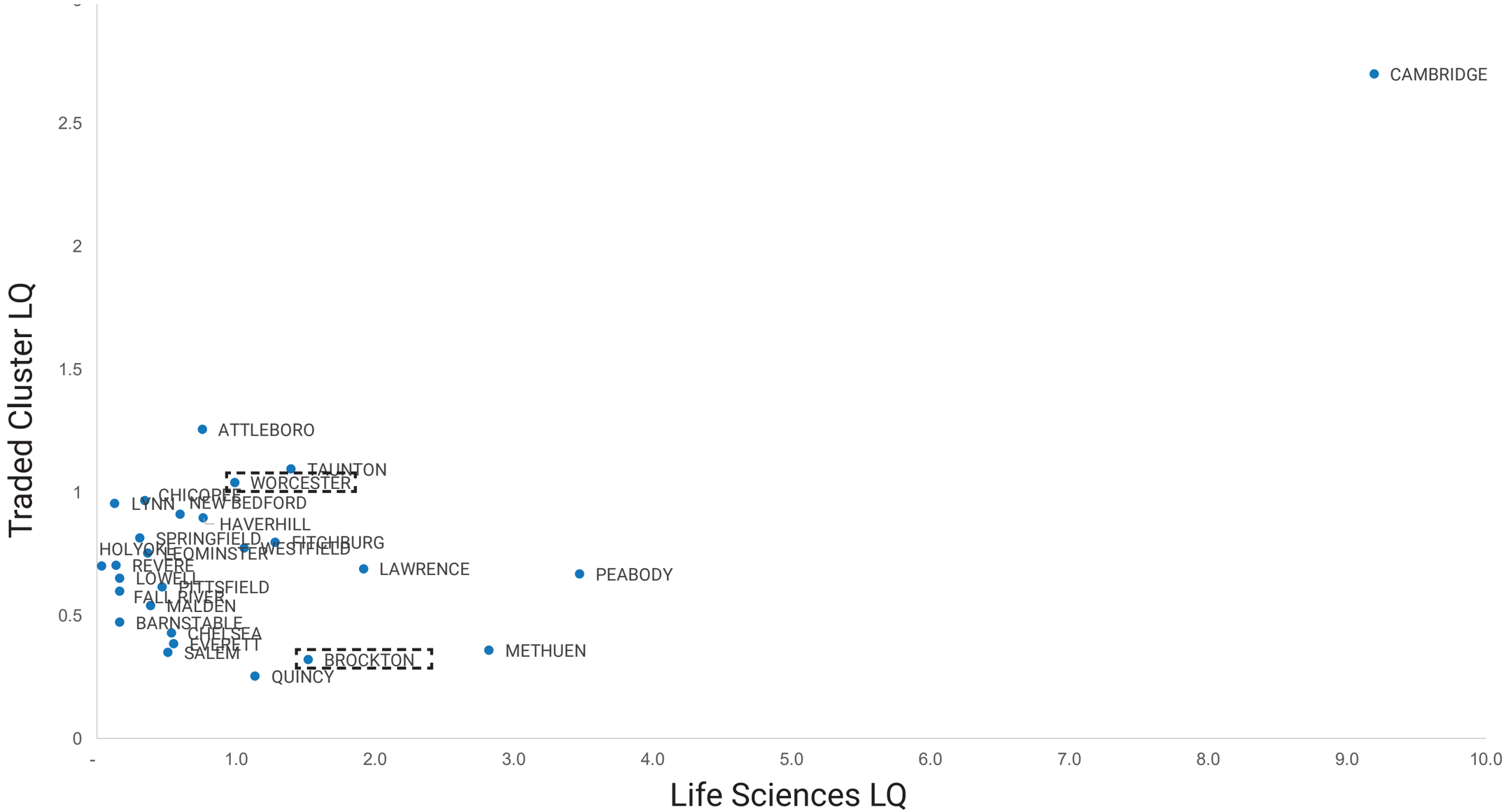
Gateway Cities Typology



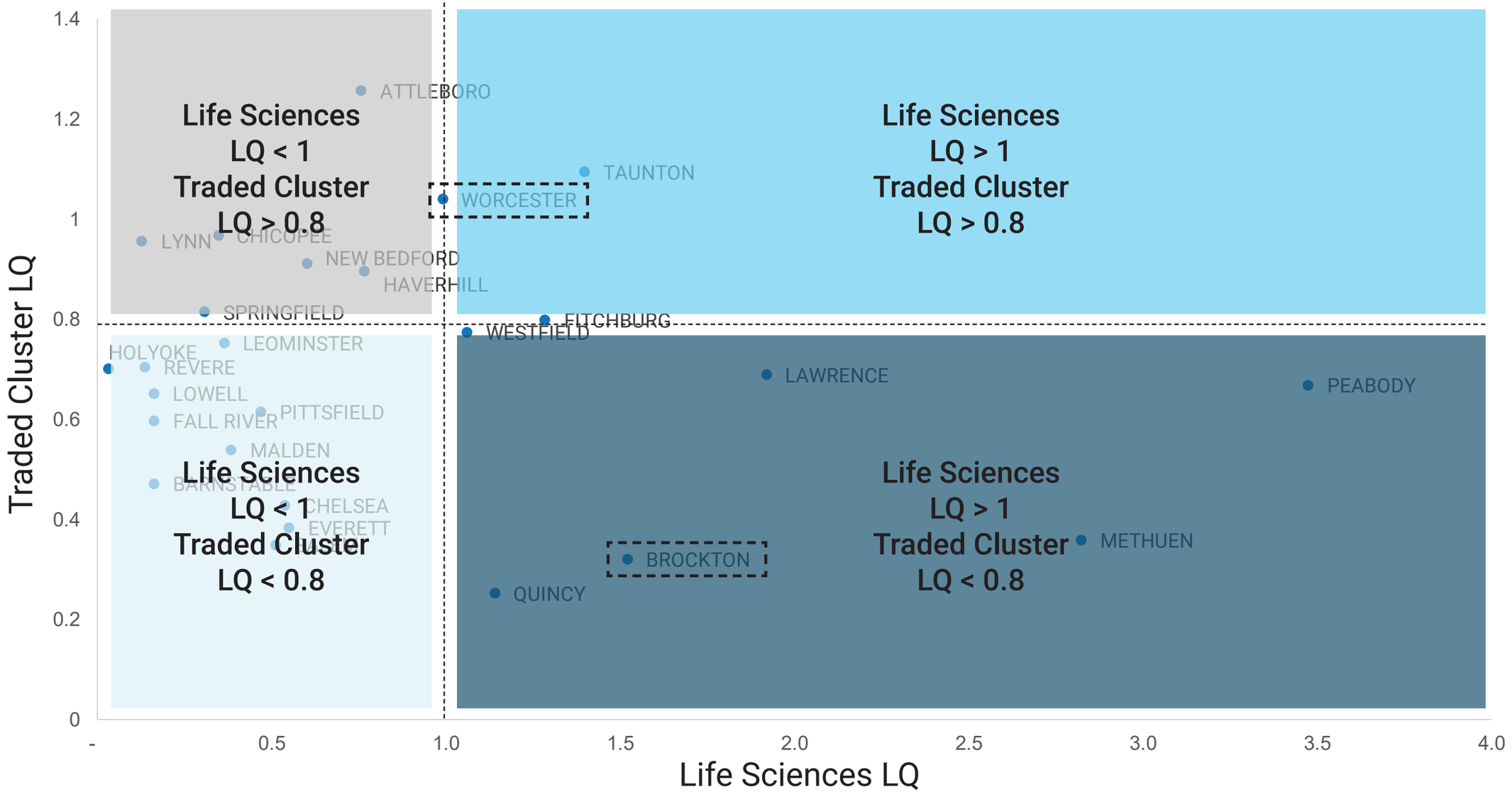
Gateway Cities Typology



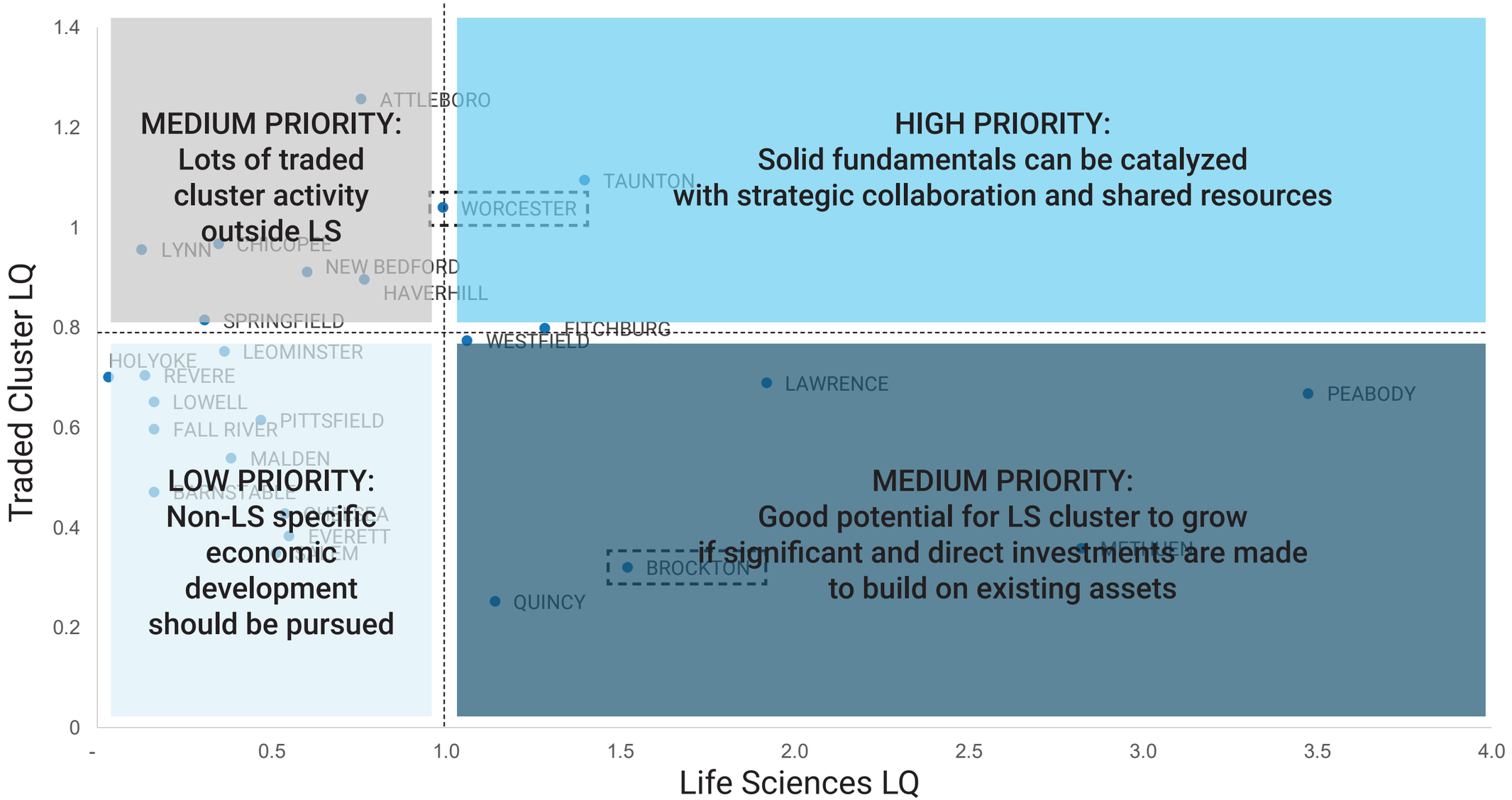
Gateway Cities Typology



Gateway Cities Typology



Gateway Cities Typology



Gateway Cities Typology

High Life Sciences, High Traded Cluster

Taunton **Worcester**

High Life Sciences, Low Traded Cluster

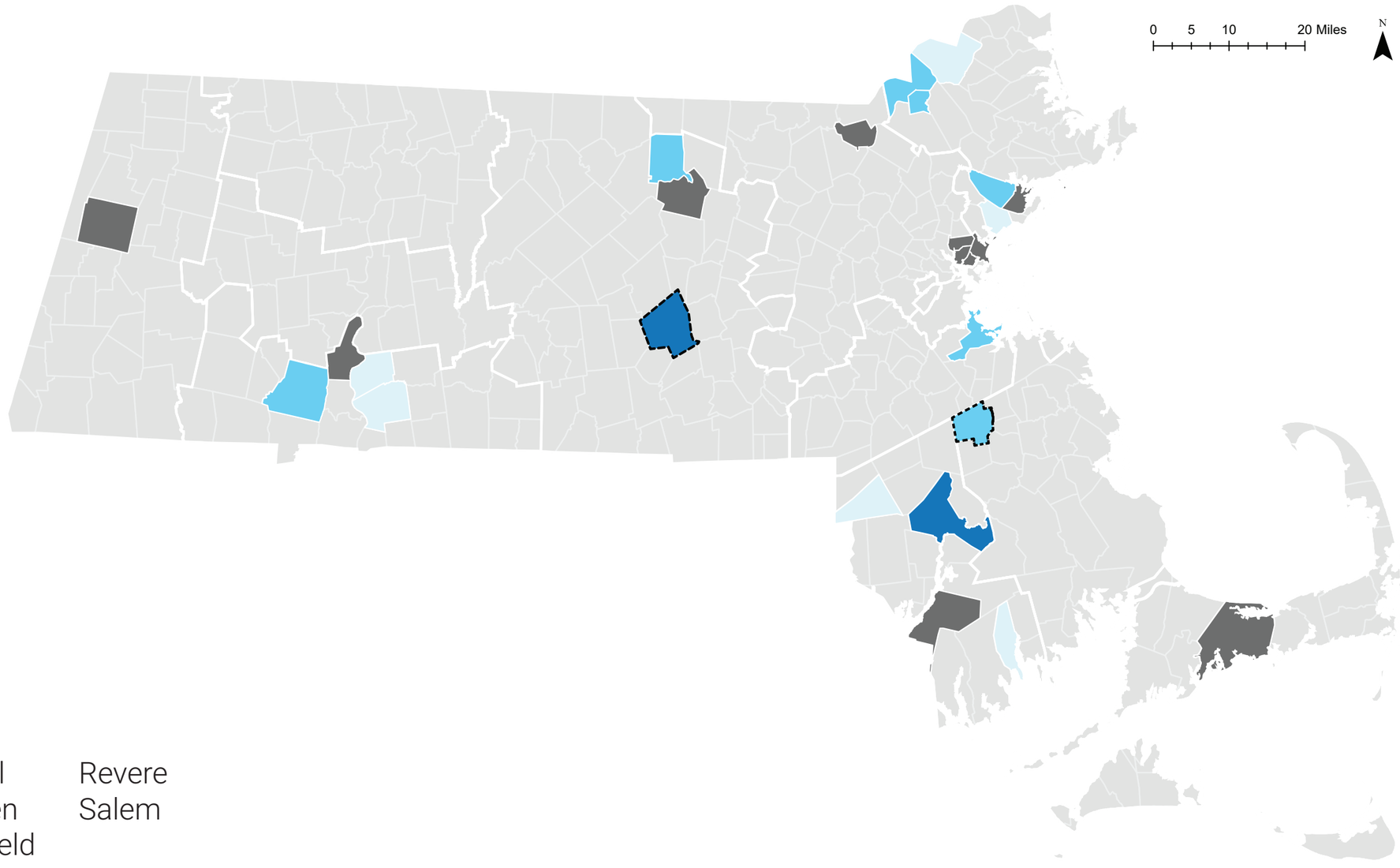
Brockton
Fitchburg
Lawrence
Methuen
Peabody
Quincy
Westfield

Low Life Sciences, High Traded Cluster

Attleboro
Chicopee
Haverhill
Lynn
New Bedford
Springfield

Low Life Sciences, Low Traded Cluster

Barnstable
Chelsea
Everett
Fall River
Holyoke
Leominster
Lowell
Malden
Pittsfield
Revere
Salem



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NEXT STEPS

Acknowledgments

MIT
Amy Glasmeier

Mass Economics
Teresa Lynch

MLSC
Travis McCready

MassDevelopment
Anne Gatling Haynes
Noah Koretz

Brockton/Worcester
Stakeholders

Thank You

MASSACHUSETTS LIFE SCIENCES CENTER

MassDevelopment

DUSP MIT