



UMASS DONAHUE INSTITUTE



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Choosing Massachusetts for Business: Key Factors in Location Decision-Making

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Executive Summary

Why do companies like General Electric, SanDisk, Dassault Systèmes, IBM, and a long list of others choose to locate to or expand in Massachusetts?

In a word: workforce. It's the workers with their deep knowledge, technical skills, and advanced education who attract companies to Massachusetts, and keep them here. Yet, even with a world-class workforce and a broader innovation economy ecosystem in place that reinforces this advantage, it's important that we not grow complacent about the Commonwealth's ability to retain and attract growing companies. The economic prosperity of Massachusetts depends upon it. Beyond the headlines, we need to understand the factors underlying company decisions about where to locate, expand and operate.

Focus of Study

That is the focus of this study – analyzing business expansion and relocation projects in Massachusetts over the last 12 years and trying to understand:

- What were the experiences of companies that expanded or located in Massachusetts? What factors were most critical in their location decision? How does this vary by industry and region?
- What are the experiences of these companies as they operate in Massachusetts? Would they choose the same location if faced with the same decision today?
- What do they view as the primary reasons to be located in Massachusetts and what is the overall value proposition of doing business in the state?

The goal of this report, commissioned by MassEcon and undertaken with the Economic and Public Policy Research group at the UMass Donahue Institute, is to apply the voices of the companies that have recently expanded to better understand what truly drives location decisions. The findings and recommendations in this report are intended to inform public policy decisions regarding economic development in the Commonwealth and provide a deeper understanding of the competitive strengths and weaknesses of doing business in Massachusetts.

Methodology

While significant data exist on the overall economy and the state's industries in the aggregate, much less information is readily available on business expansion and relocation projects in Massachusetts. These business expansion projects are central to the work and initiatives led by economic development professionals at the state, regional and local levels.

To conduct this economic development assessment, we were able to leverage and learn from a database of approximately 375 expansion and relocation projects in Massachusetts over the past 12 years – business expansions exemplified by job growth, facility expansion, and capital investment (see Figure 1). While there is no universal source of all business expansion and location projects in the state, these data represent the best available information on business expansion and relocation projects in Massachusetts.

This unique set of data led to an in-depth survey of about 75 companies focused on the importance of different site selection factors, the economic development process, and their experiences operating in Massachusetts. Moving beyond published competitiveness rankings and often outdated perceptions of state business

environments, we implemented a 30-question survey that allowed for in-depth responses across the full-range of competitiveness factors for location decisions.

In addition, we conducted in-depth interviews with 15 companies in all regions of the state to gain a deeper understanding of the dynamics of their decision to locate and grow in Massachusetts. The complete source document is available from the Economic Public Policy and Research Group at the UMass Donahue Institute.

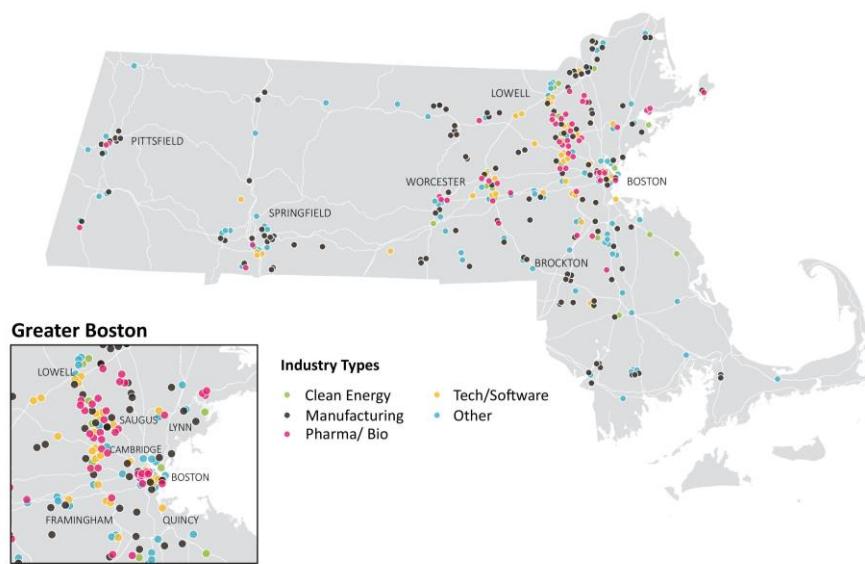
Findings Overview

What emerges from this work is a clear picture that companies come to Massachusetts, and choose to stay here, because of the high quality workforce. This is as true for a life sciences company deciding to be close to researchers at Harvard and MIT as it is for a technology company locating along the I-495 belt to access an experienced workforce, or a manufacturing company that establishes a base in the Pioneer Valley. Respondents noted the emphasis on workforce in several ways:

- More than 90 percent of the respondents cited the quality and the availability of workforce as top factors in their location decisions.
- The vast majority of companies surveyed said that if they were to make the decision again, they would choose Massachusetts.
- Industry clusters – and the specialized talent associated with these clusters – represent one of the top three strengths of doing business in Massachusetts.

There is still much work to be done. While companies tend to locate to be close to their labor force, maintaining proximity can become difficult if housing prices continue to rise. Related to that, an aging transportation infrastructure makes commuting difficult, and certain cost issues challenge our overall competitiveness. Policy makers and economic development officials at all levels will need to fix the vulnerabilities with an eye toward maintaining our strengths in workforce and innovation to keep attracting, retaining and growing companies.

Figure ES-1. Location of Business Expansion and Relocation Projects by Major Industry (2004-2015)



Source: MassEcon data on expansion and relocation projects, UMDI analysis

Key Study Findings

Expanding companies matter to the prosperity of our Commonwealth; we need to attract them, retain them, and help them thrive. These are the companies that employ our citizens and invest in our communities. And that was the focus of this study – hearing directly from companies about what mattered most when they decided to locate or expand their business in Massachusetts. Ultimately we want to know: would they choose the same location if faced with the same decision today? The vast majority's answer is a resounding "Yes."

The Commonwealth is known for its innovation economy and has created a world-class ecosystem for entrepreneurship. But a vibrant, dynamic economy needs both larger-scale growth companies and entrepreneurial start-ups and small businesses. Established mid to large-size companies are often dependent on the ideas that flow from the entrepreneurs (and the established companies sometimes acquire these start-ups); and the young growth companies seek the established companies as research partners and clients.

Using a never-before analyzed database of about 375 expansion and relocation projects, the research draws from the experience of actual companies in Massachusetts that have relocated or expanded. Our survey and interview findings provide a rare glimpse "under the hood" at business location decision-making – what works well, what factors are competitive strengths, and what areas need to be improved. This section provides a summary of key study findings, emphasizing both statewide strengths and challenges, as well as differences by region and key industry.

When asked if they would make the same business location decision again, over three-quarters of firms (77 percent) stated that yes they would, and 64 percent rated the Commonwealth as a "good" or "very good" place to do business. Exceptional strengths in workforce, world-class industry cluster eco-systems, and a number of other strengths contribute to the state's economic competitiveness. The Greater Boston area is a powerhouse economic engine, one of the strongest in the entire United States, and the state overall consistently ranks at or near the top of innovation and the knowledge economy competitiveness rankings.

Greater Boston area's strength contrasts with more modest economic growth in other parts of the state. The rest of Massachusetts does maintain industry cluster strengths in sectors like manufacturing, fishing, higher education, and health care, but trails the Boston area in higher-wage fields like life sciences, technology, R&D, and professional services. There are also a number of lingering concerns that relate to the long-term sustainability of our competitive position for economic success. These vary from foundational issues surrounding transportation, and more specifically the public transit system, as well as housing supply and affordability, and cost-specific business challenges for health care and energy. And despite our advantages in workforce and education, a number of companies are struggling to attract and retain younger employees, or find enough technically-trained "middle skills" workers. Addressing these issues in a meaningful and thoughtful way is critical to our long-term economic competitiveness.

Talent is our key asset – Access to a talented workforce is the most important factor in business location decision-making and the biggest competitive advantage for Massachusetts.

Over 90 percent of survey respondents said that the availability and quality of the workforce was important in their decision to locate or expand in Massachusetts. Additionally, 76 percent identified it as a strength of doing business in the Commonwealth. Company interviews revealed stories about "rock star" hires and "goldmines" of talent. Companies choosing to expand in-state repeatedly commented about how vital the existing, skilled workforce was in their decision-making process. Others commented on how much they depend on and partner with area universities to provide a pipeline of talent for new hires.

The power of clusters – The opportunity to participate in world-class industry clusters is essential to business expansion and attraction, especially in Greater Boston but also in other regions.

Especially for innovation-driven businesses in Greater Boston, the opportunity to be part of a regional industry cluster was a critical element of their location decision-making process. In particular, firms that considered multiple states for their location decision emphasized the value of being engaged in a successful industry cluster ecosystem providing them with access to a large pool of skilled workers, R&D partnerships with area universities, or venture capital firms with experience working in key industries (like life sciences or robotics). Based on our survey, industry clusters represent one of the top three strengths of doing business in Massachusetts overall, and were viewed as particularly important for life sciences and technology companies which tended to aggregate in Greater Boston.

Perhaps more subtly, company location projects in the rest of the state also reflected the strength of industry clusters, especially as it relates to skilled workforce. For example, a manufacturing company that established its first U.S. location in the Pioneer Valley expressly valued the existing precision machining cluster in that part of the state, and had confidence that the local workforce and training providers could generate a steady flow of trained workers. Similarly, a hardware technology company that located near I-495 specified that the biggest reason they expanded in that area was because of the skilled workforce they can attract from the Worcester and Metro West regions.

Transportation is both an asset and challenge – Transportation is critically important with a distinct set of assets and challenges.

The data from the surveys and interviews indicates that proximity to existing transportation (and infrastructure more broadly), and the quality and length of the commute are important to companies when assessing locations for their desirability. For example, over 80 percent of business respondents ranked infrastructure as an important aspect of their site location decision, over 70 percent noted highway proximity, and over 60 percent valued the length and quality of the commute. Companies in some parts of the state (such as the Pioneer Valley) view interstate connectivity as a real strength and allow firms to access customers and suppliers throughout the northeast. Another frequently cited asset is Boston's Logan International Airport, which offers hundreds of domestic flights, helps to connect multinational companies with European offices, and is growing the number of direct flights to global locations throughout the world.

However, transportation is also cited as a prominent challenge and weakness of doing business in parts of Massachusetts. Interviewees mentioned transportation constraints as a current and future concern especially as it relates to access to labor. Companies in Greater Boston keenly sense the impact of highway congestion, the lack of competitive public transit options outside the urban core, and MBTA reliability problems on their ability to attract and retain employees, especially younger workers. And there is a distinct sense from companies that not enough is being done to boost the transportation system to accommodate the economic and demographic growth that has been experienced in recent years.

Cost and supply of housing is a barrier to keeping talent – The availability and affordability of housing options is critical for economic development.

The availability and affordability of housing was a concern that was most strongly heard through company interviews. Essentially all interviewees mentioned housing as a challenge for Massachusetts statewide in terms of retaining and attracting workers. While housing costs may still be higher in the New York and San Francisco metro areas, the cost of housing is keeping some skilled workers from locating in Greater Boston, and limiting the housing options for low to middle income workers.

Housing is also closely linked to transportation and this important dynamic was mentioned in at least three ways. First, companies in the Boston urban core noted the very high costs of housing and how this can be challenging for their employees (especially as renters try to become home owners). This places even more pressure on the MBTA to deliver reliable public transit options. Second, companies along the I-495 corridor noted that younger workers typically prefer more urban, walkable residential areas and that transportation for reverse commutes is still a work in progress. Third, one major employer in the Berkshires noted that their challenges in attracting and retaining younger talent are directly related to a lack of walkable, mixed-use development areas in that part of the state and were looking for help to create more places where people want to live, work and play.

Roadmap needed to navigate economic development system – Economic development system gets good marks but greater clarity and coordination are needed.

Half of the businesses surveyed interacted twice or more per month with state and local economic development officials in the ramp-up to their expansion or relocation project, pointing to the importance of state and local officials in helping businesses choose and get established in Massachusetts. The majority of company respondents were solidly favorable about the effectiveness of development officials and the responsiveness to permitting and time to market issues, with just under half satisfied with the coordination of local and state officials, suggesting an area for improvement.

Interviewees received help from many different state and local economic development entities, and were quick to mention their appreciation for state incentives to help with expansion projects (in particular the Economic Development Incentive Program). But they also said that the system is too hard to navigate with its overlapping or similarly-named agencies. Some had great experiences, especially when guided step-by-step through a project process from a responsive local official, but others had difficulty accessing the “right” help from the start and hoped for a clearer roadmap of how best to work with local, regional and state development agencies.

Cost challenges vary by location and industry – Companies identify cost challenges in Massachusetts but the importance to location decisions varies.

Labor, health care, and energy costs, as well as taxes and fees, were all identified as significant costs challenges in the state. While these results would seem to validate conventional wisdom about Massachusetts as a relatively high cost state for doing business, an interesting finding is that companies that conducted multi-state searches were less likely to see the various cost issues as being a “major challenge” compared to companies that were already established here. These firms were more likely to locate in Greater Boston and were concentrated in knowledge-based industries like life sciences and software development – choosing access to talent, university partnerships, and participation in industry cluster ecosystems as the driving factors for their location decisions. In contrast, manufacturing firms, more widely represented across Massachusetts, expressed much more sensitivity to business cost challenges than other industries. And health care and energy costs were identified as a major challenge to doing business by a higher share of firms located outside of Greater Boston.

A tale of two states – Business location decision-making within and beyond Greater Boston.

Implied throughout these findings are the stark differences between Greater Boston and the rest of the Commonwealth. As most keen observers would expect, the survey revealed important differences between firms in Greater Boston and those in the remainder of the state in terms of industry clusters, sensitivity to cost factors, transportation assets and challenges, workforce requirements, housing costs, and the mix of business expansion projects. The concentration of the tech and life sciences clusters in Greater Boston is largely responsible for many of these differences as their location decisions are driven by access to highly skilled labor, partnership opportunities with institutions of higher learning, and R&D activities. Reflecting the relative concentration of manufacturing and other industry strengths, companies with expansion projects beyond

Greater Boston are generally more concerned about labor availability and the costs of energy, and less concerned with housing affordability. The firms located beyond the I-495 belt were considerably less sensitive to transportation proximity, consistent with a transportation system that is generally less congested and can provide an advantage for firms seeking access to Northeast markets.

Policy Implications

The ultimate goal of this report is to inform and help shape economic development policy and services in Massachusetts – at the state, regional, or local levels – to help the Commonwealth do all it can to help retain and attract companies that are growing jobs and private investment. Based on the key findings, a few policy-relevant implications are worth emphasizing:

BECAUSE ACCESS TO A TALENTED WORKFORCE IS SO IMPORTANT, THE STATE NEEDS TO CONTINUE TO PRIORITIZE AND FUND A FULL SPECTRUM OF EDUCATION, ADULT LEARNING, AND WORKFORCE TRAINING INITIATIVES. The education and workforce training systems are incredibly complex. Getting into the details of specific programs is beyond the scope of this report. That said, the findings of this report confirm the importance of the work of the state, regional employment boards, community colleges, career centers, and vocational and technical schools in providing the talent and skilled labor demanded by Massachusetts companies. Along with the number of top rated colleges and universities in the state, labor talent and skill remain a key strength for the region. Increased input and involvement from employers directly into training curriculum can serve to enhance this critical system. Plus, findings from company respondents confirm that the combination of quality and availability of workforce is the most important factor for business location decisions, with the direct implication that, if we are going to grow our economy and key industries, then we also need to grow our supply of quality of workers. One key aspect of this is immigration and international students, which has been a crucial source of population growth in Massachusetts for years and is increasingly important as we face an aging population.

HOUSING AND TRANSPORTATION ARE CLOSELY LINKED FOUNDATIONAL ASPECTS OF ECONOMIC DEVELOPMENT BUT ARE FEELING STRAINS, ESPECIALLY IN GREATER BOSTON. Transportation is clearly one of the most important factors for business decisions, and in some cases can be a real strength. This is particularly true for Boston-area companies that value Logan Airport and its growing number of domestic and international flights. This is also the case for companies located outside of I-495 near interstates that can leverage transportation to gain access to markets throughout the northeast. Moreover, the demand by millennials and other demographic groups to live in interesting urban places near their work is helping push a residential, multi-family building boom in and around Boston that has not been seen in decades. But, the population growth in Greater Boston is resulting in high housing costs in the region in general. This trend pushes some workers and families further outside of the city, placing additional strain on the highway and public transit systems. Policies that help increase housing production, including zoning reform to allow multi-family housing development where appropriate (e.g., near transit, or near existing town centers) can alleviate this issue over time. For transportation, the importance of maintaining and expanding this system is crucially important for future economic growth. Initiatives that can help link lower cost areas (e.g., New Bedford, Springfield) to the Boston market with fast, reliable transit are worth careful consideration.

ECONOMIC DEVELOPMENT COLLABORATION AND RESPONSIVENESS IS ESSENTIAL TO RETAIN GROWTH COMPANIES AND CAPTURE NEW BUSINESS ATTRACTION OPPORTUNITIES. Based on our business survey findings and interviews, it's clear that the responsiveness of economic development officials is critically important to companies looking to expand. We also heard that some companies feel that the system is too complex and hard to navigate. This can serve as a reminder about the critical role played by local, regional and state economic development leaders in successful business expansion projects. The numbers in our report show too many firms that were not satisfied with the economic development delivery system (and that does not include companies that considered Massachusetts but decided to locate somewhere else). The ease of permitting, along with competitive regulations and incentives, is also critical to business retention and

attraction, especially in areas outside of Greater Boston that do not have the same talent-driven cluster-based economic advantages.

Acknowledging that there are logical reasons (that span decades and administrations) that we have such a wide-range of economic development organizations in Massachusetts, the findings from this research highlight the importance of four characteristics of a successful economic development delivery system:

- 1) Responsiveness of development officials from start to finish of expansion and relocation projects;
- 2) Collaboration among development officials at all levels to create an integrated support structure for company expansions;
- 3) Market-ready development properties that are responsive to time-to-market imperatives; and
- 4) Speed and transparency of business permitting processes.

BOOSTING ECONOMIC AND INDUSTRY OPPORTUNITIES OUTSIDE OF GREATER BOSTON WILL REQUIRE

DIFFERENT PRIORITIES AND STRATEGIES. In many ways, the data results and interview findings in this report are a clear reminder about how starkly different Greater Boston is from the rest of the state. Outside of I-495, the key factors for location decisions, the industry mix (more manufacturing, less tech/life sciences), and the cost pressures are very different. Consequently, the right strategies to boost these regional economies are inherently different from Greater Boston and may require more public-private partnerships to catalyze investment and job creation. The Baker-Polito Administration's Economic Opportunities for All plan recognizes these differences, and provides specific programs to enhance these regional economies. As regional economies are enhanced, efforts to link economic activities among regions should be encouraged.

ENHANCING OUR INTERNAL AND EXTERNAL MARKETING TO CAPTURE BUSINESS EXPANSION AND

RELOCATION PROJECTS. Promoting the assets of Massachusetts and its regions should be a shared goal of state, regional, and local economic development leaders. Enhancing economic development marketing through establishing and disseminating a Massachusetts brand, strategically targeting key industries and prospects, and showcasing our many success stories will enable the Commonwealth to compete even more robustly for business expansion. Collaboration among economic development players is key, especially with the many creditable marketing efforts currently underway. Building on the existing marketing program and injecting fresh ideas can help close the state's economic gap with Greater Boston and ensure that Massachusetts makes the short list for companies seeking to expand.

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- MetroWest/495 Partnership
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- Greater Worcester Chamber of Commerce
- North Central Chamber of Commerce
- West Mass Economic Development Council

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Introduction

MassEcon and the Economic and Public Policy Research (EPPR) group at the UMass Donahue Institute (UMDI) have conducted an economic development research project focused on business location decisions and an assessment of the competitive factors of Massachusetts as a place to do business. This analysis helps to identify the business site selection factors most critical to firms as they choose to locate and expand in Massachusetts, as well as the opportunities and challenges associated with doing business in the state. The findings and recommendations in this report are intended to inform public policy decisions regarding economic development in the Commonwealth, assist economic development professionals as they market their locations, and provide a deeper understanding of the value proposition of doing business in Massachusetts.

MassEcon has played a fundamental role in economic development and business attraction in Massachusetts. Founded in 1993 as an outgrowth of recommendations of the Governor's Council on Economic Growth and Technology, MassEcon serves as the state's private sector partner in promoting Massachusetts as the premier choice for business growth. Through its work, MassEcon has developed relationships with and tracked location data from companies that have chosen to expand in Massachusetts, allowing us to study and derive findings from actual business expansions. These "economic development" projects are central to the work and initiatives led by economic development professionals at the state, regional and local levels. This unique information source provides us with the opportunity to:

- Draw from a data-driven profile of actual business expansion and location projects over the past 10 to 12 years;
- Develop findings on the competitiveness factors driving business expansion and location decisions in Massachusetts; and
- Derive a set of policy-relevant findings to help guide economic development initiatives at all levels.

To conduct this economic development assessment, we completed research in the following areas:

- 1) Analysis of 12 years of MassEcon Economic Impact Awards data on business expansion and location projects. (See **Appendix B** for more information)
- 2) Comparison of these projects to broader industry trends and key industry initiatives in Massachusetts.
- 3) An extensive business survey of 74 firms that have expanded or relocated in Massachusetts over the past 10 years, focused on the importance of different site selection factors and the economic development process.
- 4) In-depth interviews with 14 of these companies to gain a deeper understanding of their relocation or expansion project and key decision factors.

Although companies in the study are not representative of the state as a whole, the research draws from the experience of actual companies in Massachusetts that have demonstrated operational success through job growth, capital investment or facility expansion. Because of the lack of a universal source of all business expansion and location projects, the data in this report represent the best available information in Massachusetts.



The following report has four main sections:

- An overview of the economic development projects in the study, with added context on key sectors trends in the Commonwealth.
- Business survey results that focus on the main factors that drove relocation and expansion decisions in Massachusetts, as well as the competitive advantages and disadvantages of doing business in the state.
- An analysis of in-depth interviews with selected business leaders regarding their experiences choosing and doing business in Massachusetts.
- Summary of findings and potential policy implications for the state.

The report also includes a number of appendices with information on the study design, research methodology, and additional data relevant to the report.

Business Expansion Projects and Industry Context

This study is focused on firms that have engaged in expansion or relocation projects in Massachusetts over the last 10-to-12 years.¹ While significant data exists on the overall economy and the state's industries in the aggregate, much less information is readily available on business expansion and relocation projects in Massachusetts. These "economic development" projects are central to the work and initiatives led by economic development professionals at the state, regional and local levels.

The study universe was initially derived from economic development projects nominated for the MassEcon Economic Impact Awards over the last 12 years. While there is no universal source of all business expansion and location projects in the state, the MassEcon Economic Impact Award nominees represent the best available information on economic development projects in Massachusetts. Companies in the study universe should be noted as having achieved some level of operational success, in that they recently underwent an expansion either through job growth, capital investment, and/or facility expansion.

Economic developments projects in this study are focused on a number of key industries in Massachusetts, including:

- Life sciences, bio-tech and medical devices
- Technology and software
- Manufacturing
- Clean Energy

Nearly 80 percent of the economic development projects nominated for the Economic Impact Awards over the last 12 years were in one of these three sectors of the Massachusetts economy. With that, these industries stand out as key in the study universe, both in terms of the surveys² and in-depth interviews conducted with business leaders. For more detail on the economic development projects nominated for the MassEcon Economic Impact Awards over the last 12 years, please see **Appendix B**.

Key Industry Initiatives and MassEcon Data Comparisons

The remainder of this section provides additional context and data on the four key industry sectors noted above. For a more detailed examination of industry trends in Massachusetts, including the following key sectors, please see **Appendix C**.

Life Sciences, Bio-tech and Medical Devices:

Large number of bio-tech expansion and location projects that extend beyond Kendall Square

Massachusetts is now known as having perhaps the world's strongest industry cluster for life sciences and bio-tech industries. Data from the 2015 Innovation Index (from the Massachusetts Technology Collaborative) estimate that annual wages for the biopharma³ and medical devices industry increased by 18 percent from 2009 to 2014, the fastest growth of the four broad technology sectors that they profiled. In addition, these sectors secured over \$2.1 billion in venture capital investment in 2014, about double the amount for software

¹ In the accompanying survey (included in **Appendix D**), respondents were asked to think about their "relocation or operational expansion in the past 10 years".

² Industry data in the later survey analysis are grouped slightly differently than the four sectors outline above, but generally cover the same sectors in the economy.

³ Biotechnology, biopharma and life sciences are commonly used interchangeably.

companies.⁴ Based on data collected by MassBio, Massachusetts has the largest bio-tech R&D sector of all U.S. states (larger than California) with just 30,000 jobs in 2014, reflecting growth of 21 percent since 2007.⁵

These kinds of very positive, high-growth trends are reflected in the MassEcon data that show 64 individual company location projects. These industry projects were generally more concentrated in the Boston area. The world-leading Kendall Square cluster of bio-tech firms is captured in some of these expansion and location projects, but the spread of the industry is clearly wider than that with significant projects reaching most areas of the Commonwealth.

Technology and Software:

One of the largest and highest-paying sectors in the state, with companies and projects concentrated in Greater Boston

While this industry is sometimes over-shadowed in Massachusetts by life sciences, and can be associated with smaller scale start-ups, Massachusetts has seen a number of impactful economic development projects over the last 10-12 years in technology and software development, including work in computer hardware and storage, wireless telecommunications, health care and “Big Data”, transportation and a wide range of fields. Thirty-four (34) of the 48 technology and software economic development projects were in Greater Boston or the Northeast region of Massachusetts, generally reflective of the state’s strengths in the inner core Boston/Cambridge area, as well as the Rt. 128 and I-495 corridors.

These identified company location projects are consistent with research conducted for the Massachusetts Technology Leadership Council (MassTLC) on the tech sector that found especially strong growth in tech services (including software). In particular, that research estimates that technology jobs (services and manufacturing) compose about 295,000 direct jobs statewide, larger than finance, biopharma, or clean energy. In addition, the software and communication services industries in Massachusetts obtained over \$1 billion in venture capital funding in 2014.

Manufacturing:

Aggregate data trends hide a hugely dynamic sector with numerous expansion and relocation projects throughout the Commonwealth

While manufacturing jobs in Massachusetts declined by about 20 percent over the last decade, they still represent 250,000 jobs statewide and are one of the largest contributors to both gross state product and international exports.⁶ As noted above, manufacturing jobs have essentially held steady over the past five-to-six years, and the many stories of manufacturing growth and contraction are often blurred together by the aggregation of statistics at the state level. In recognition of the economic importance of manufacturing in Massachusetts and the opportunities to link innovation, R&D, university research institutes and cutting-edge companies, the Commonwealth has created and sustained the Advanced Manufacturing Collaborative.⁷ Further, it’s been estimated that the Commonwealth will need to hire 100,000 new manufacturing workers over the next decade, largely because of retirements and job changes.⁸ And it is worth highlighting that the innovation-based focus on manufacturing in Massachusetts appears to be paying off as the Commonwealth has been selected as lead or a key supporting partner on three new manufacturing innovation institutes selected by the U.S. Department of Defense: revolutionary fibers and textiles (MIT), flexible hybrid electronics (UMass Amherst), and photonics (MIT).

⁴ http://masstech.org/sites/mtc/files/documents/InnovationInstitute/Index_2015_web_sml.pdf

⁵ <http://files.massbio.org/file/Industry-Snapshot-UPDATED-Jan-2016.pdf>

⁶ Manufacturing was the 3rd largest private sector contributor to gross state product in 2014 (see Exhibit A-36 in the Due Diligence Report: <http://www.massbenchmarks.org/statedata/data/DueDiligence.pdf>).

⁷ A good overview is captured in a recent MassBenchmarks article: <http://www.massbenchmarks.org/publications/issues/vol16i2/6.pdf>

⁸ <http://www.northeastern.edu/dukakiscenter/wp-content/uploads/2013/10/Staying-Power-II.pdf>

Manufacturing company projects represent 152 of the identified 373 expansion and relocation projects (41 percent), clearly a larger share than the industry comprises in the broader economy. So, even though the manufacturing sector may have experienced a slow-to-declining trend in total jobs over the past 12 years, that hides a hugely dynamic sector with significant expansion and relocation projects often offset by company layoffs in less technologically-advanced manufacturing fields.

Clean Energy:

Increasing number of company expansion projects mirrors growing strength in emerging industry

While challenging to measure neatly in standard industry codes, Massachusetts did experience a number of key clean energy / energy efficient company location projects over the past dozen years. These projects span a range of R&D efforts such as batteries and wind turbines, manufacturing (some of which admittedly failed over time), energy efficiency firms, and solar energy providers installers. The 2015 Massachusetts Clean Energy Center report on this industry estimated that this quickly emerging industry has expanded to almost 100,000 jobs (98,895) as of 2015, a very impressive increase of 64 percent since 2010. In August 2016, the Massachusetts legislature and Baker Administration passed a bill to expand renewable energy in the state which further benefits emerging opportunities like wind power.⁹

⁹ To learn more about the Mass Clean Energy Center, see <http://www.masscec.com/> and for the Marine Commerce Terminal: <http://www.masscec.com/marine-commerce-terminal-new-bedford>

Business Survey

A critical component of this economic development research project was to learn directly from Massachusetts businesses about their decisions to expand or relocate in Massachusetts, their experiences with the state's economic development delivery system, and the competitive factors that played a role (positive or negative) in their investment decisions and continuing operations. Moving beyond published competitiveness rankings and often outdated perceptions of state business environments, we implemented a survey that allowed for in-depth responses across the full-range of competitiveness factors for location decisions, with the results presented throughout this section of the report.

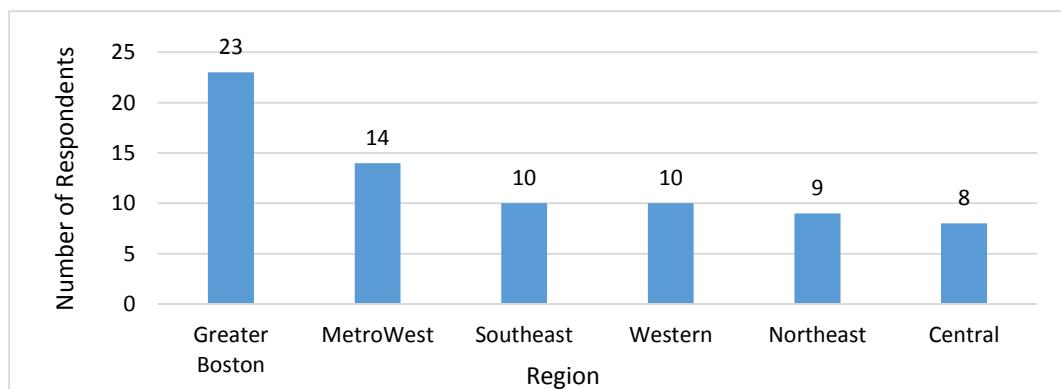
Survey Design and Respondents

UMDI and MassEcon created and deployed an online survey to businesses across Massachusetts that expanded or relocated in the past 10 years. The survey, which can be found in **Appendix D**, asks these businesses a series of questions regarding why they selected Massachusetts as a place to expand or relocate, their experience during the expansion process, and the advantages and disadvantages of conducting business in the Commonwealth.

The detailed survey resulted in 74 business respondents that represented a variety industries and business sizes across all regions of the Commonwealth. Respondents were allowed to choose more than one reason for their expansion or relocation. As a result, the aggregate of the percentages listed in most of the tables and figures will add up to more than 100%. In general, survey respondents were:

- Located across the Commonwealth, but mainly focused in Greater Boston and MetroWest (see **Figure 1** below).
- Primarily in manufacturing, research & development (including life sciences), and software development & technology (see **Table 1** on the next page).¹⁰
- Successful businesses expanding to accommodate employee growth, expand to new markets, and/or better connect with industry clusters (see **Table 2** on the next page).

Figure 1. Where are the surveyed businesses located?



Source: MassEcon business survey data, UMDI analysis

¹⁰ For both research & development (including life sciences) and software development & technology, we included related manufacturing as part of that sector. For example, pharmaceutical manufacturing companies were counted in the research & development group rather than the manufacturing group. This was done, in part, because in the interview phase of this research, key informants in these companies typically referred to themselves as being a part of the life sciences or software development & technology cluster rather than in manufacturing in general.

Table 1. What are the types of companies surveyed?

Industry	Number	Percent
Manufacturing	35	47%
Research and development, including life sciences and Manufacturing	16	22%
Software development and technology and Manufacturing	14	19%
Professional Services and Communications	6	8%
Other	3	4%
Total	74	100%

Source: MassEcon business survey data, UMDI analysis

Table 2. What drove their business expansion or relocation project?

Factor(s) that drove company's decision to expand or relocate	Number	Percent
Need to accommodate employee growth	41	55%
Expand market reach to new customers and clients	24	32%
Opportunity to locate in an industry cluster with suppliers, service providers, R&D partners, or other business partners	17	23%
Talent Attraction	8	11%
Other	6	8%

Source: MassEcon business survey data, UMDI analysis

Key Survey Findings

This summary of survey findings focuses on the statewide results, as well as differences in responses based on region, industry, and whether the companies conducted a multi-state search when considering their respective expansion or relocation project. Key themes that emerged from the survey include:

- **Workforce quality** and **workforce availability** were far and away the most important factors in choosing Massachusetts, with 96 percent of respondents identifying workforce quality as “important” and 93 percent for workforce availability.
- **Transportation and infrastructure** were also viewed as very important for location decisions, specifically proximity to major highways (ranked as important for 76 percent of businesses).
- **The top three strengths** of doing business in Massachusetts were **labor/workforce** (76 percent of respondents identified as a strength), the **community environment for workforce** (47 percent), and the presence of **industry clusters** (35 percent).
- **Cost and fees** were identified as the **biggest weakness** (61 percent).
- **Relatively low labor costs** and **housing affordability** stood out as particularly important factors for location decisions occurring outside of Greater Boston. **Energy costs** were a more significant challenge outside of Greater Boston, partly due to the large number of manufacturers in these areas.
- **Transportation and infrastructure** (such as access to Logan Airport) and **partnerships and industry clusters** were more important factors for locating in Greater Boston than outside of the region. **Transportation costs, taxes and permitting fees**, and **real estate costs** were more significant challenges in Greater Boston.

- **Companies engaging in multi-state searches** were more likely to identify potential partnerships and industry clusters as important factors in choosing their Massachusetts locations and less likely to identify costs as a significant challenge of doing business in the state.
- In addition, multi-state firms reported that **potential incentives offered in Massachusetts were not generally competitive** with other states.
- **Research & development and software development &technology firms** place greater importance on access to higher education and research institutions, engagement in local industry clusters, and proximity to public transit than Manufacturing firms.
- **Manufacturing firms** are more sensitive for business cost issues in the state than research & development and software development & technology firms, and place a higher importance on proximity to highways.

Statewide Analysis

Focusing first on the statewide analysis, several important themes emerge regarding why businesses choose Massachusetts, as well as some of the competitive advantages and disadvantages of doing business in the state.

Key Trend #1 – Workforce availability, quality, and skill, as well as infrastructure were the most important factors in choosing Massachusetts.

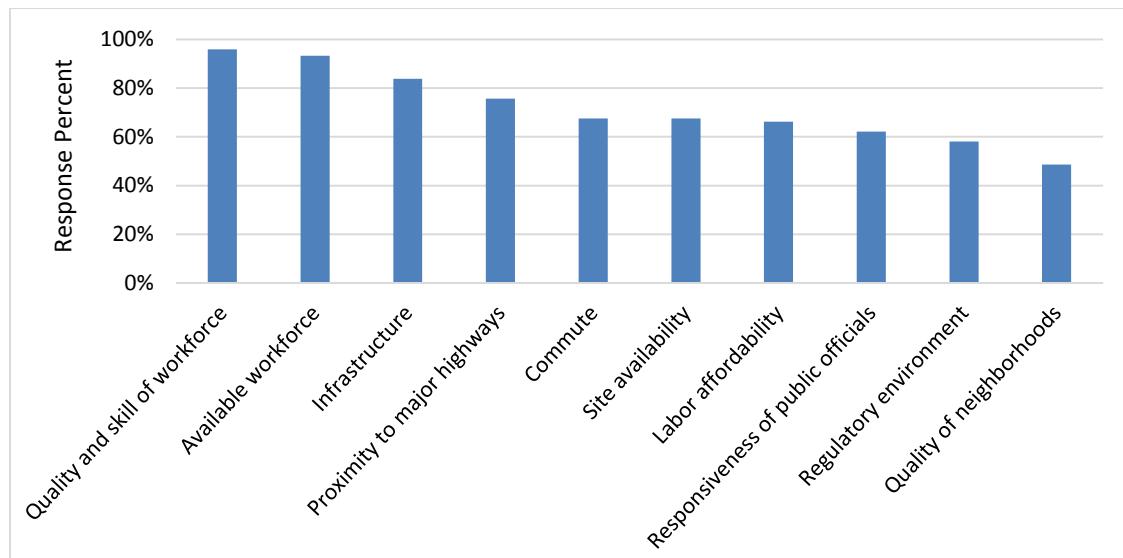
Respondents were asked to rate a wide-range of factors by their importance in determining their site location.¹¹ **Figure 2** below shows the top 10 factors rated on importance.

Nearly every respondent said workforce quality (96 percent) and availability (93 percent) were important factors in locating in Massachusetts. These two factors were far and away the most important in choosing Massachusetts locations. Interestingly, labor affordability, while ranking 7th on the list, was not nearly as important as workforce quality and availability. Massachusetts is known for having a well-educated and higher cost labor force in general. These data show that for companies that chose Massachusetts, the quality and skill of the available labor force outweighs concerns about labor affordability. That said, affordability remains an important factor overall.

Available infrastructure (84 percent) and proximity to major highways (76 percent) were the next two most important factors in choosing Massachusetts.

¹¹ Rating elements were split in to five main categories: labor/workforce, building/sites permitting and public process, transportation/infrastructure, partnerships with local clusters, and community environment. Each element was rated on a five-point scale (extremely important, very important, neither, very unimportant, and not at all important) of how important the factor was in determining their location. For the ease of reporting, **Figure 2** aggregates respondents' "extremely important" and "very important" ratings in to a single "importance" rating. The table shows the percentage of respondents that rated a factor as "important". A more detailed version of this table is available in **Appendix E**.

Figure 2. What was important in choosing Massachusetts?¹²



Source: MassEcon business survey data, UMDI analysis

Key Trend #2 – Labor and health care are the most significant operating cost challenges to business in Massachusetts.

Respondents were asked to rank a series of business costs as being either a major challenge, a minor challenge, or not a challenge. **Table 3** below shows that health care costs and labor costs were the most significant cost challenge for respondents. Nearly 90 percent of respondents suggested labor costs were a major or minor challenge. This observation is interesting coupled with the relative importance of labor affordability noted in the previous section. For companies that choose Massachusetts, labor affordability is an important factor, but is outweighed by labor quality. That, however, does not mean labor costs are not challenging. This suggests a possible delicate balance in Massachusetts between high skilled labor and the associated labor costs in the state. Currently, that “calculation” leads to many firms choosing the “high cost” labor in the state due to its skill and quality. However, this dynamic should be monitored by public policy makers and economic development officials as a potential concern for long term economic growth in the state.

Perhaps not surprisingly, a similar proportion of respondents (85 percent) suggested health care costs were a major or minor challenge in Massachusetts. High energy costs in Massachusetts (and most of New England) remain a key cost concern for a large number of businesses, though these cost concerns are less prevalent for certain industries (e.g., software development, life sciences).

¹² These factors were slightly reworded from the actual survey due to space considerations. For the sub-factors as they appeared in the survey, please see the Business Survey Questions in **Appendix D**.

Table 3. What costs are challenges to doing business in Massachusetts?

Cost	A major challenge		A minor challenge		Not a challenge	
	Number	Percent	Number	Percent	Number	Percent
Health care costs	38	51%	25	34%	11	15%
Labor costs	33	45%	32	43%	9	12%
Energy costs	32	43%	26	35%	16	22%
Taxes, permitting fees, etc.	29	39%	30	41%	15	20%
Real estate and/or land costs	29	39%	30	41%	15	20%
Transportation costs	13	18%	33	45%	27	37%

Source: MassEcon business survey data, UMDI analysis

Key Trend #3 – Available labor, community environment, and industry clusters were identified as the top three business strengths for Massachusetts. Costs and fees were identified as the biggest weakness.

Keeping in mind that survey respondents are all from companies that chose Massachusetts in their latest expansion or relocation project, it is not surprising to see labor and workforce identified as strengths of doing business in the state (see **Table 4** below). Massachusetts ranks first among U.S. states in terms of educational attainment, and the availability and quality of labor were the top two factors identified by respondents in determining their company's location for expansion or relocation.

Interestingly, building/sites, permitting and public process, and transportation/infrastructure were generally rated as important factors in site decision making, but received mixed reactions in terms of being a business strength or weakness in Massachusetts. Conversely, partnerships and industry cluster did not rate as high among our list of decision factors, but were identified as key business strengths for the state.

Table 4. Massachusetts Strengths and Weaknesses

Factor	Strengths		Weaknesses	
	Number	Percent	Number	Percent
Labor/Workforce	56	76%	14	19%
Community Environment for Workforce	35	47%	7	9%
Partnerships and Industry Cluster	26	35%	10	14%
Transportation/Infrastructure	19	26%	27	36%
Buildings/Sites, Permitting and Public Process	13	18%	27	36%
Costs and Fees	3	4%	45	61%

Source: MassEcon business survey data, UMDI analysis

Key Trend #4 – Local businesses count on educational partnerships to develop and maintain the workforce talent pipeline.

An important feature of the Massachusetts economic landscape is its institutions of higher learning. Respondents were asked to rate the importance of educational partnership factors in doing business in Massachusetts. **Table 5** shows that 93 percent of respondents felt educational partners were important in developing workforce talent. Also registering as significant was the opportunity to partner with academic researchers on R&D initiatives (73 percent), and over half of surveyed companies value the ability to license and commercialize university-developed technologies and research.

Table 5. Importance of Education Partnership Factors

Education Partnership Factor	Important %	Unimportant %	Neither %
Training/skills development of existing employees	60%	7%	33%
Developing a pipeline of talent with specific skills	93%	0%	7%
Partnering with academic researchers on R&D initiatives	73%	7%	20%
Licensing or commercializing university-developed technologies/research	53%	27%	20%

Source: MassEcon business survey data, UMDI analysis

Key Trend #5 – Local and state officials play an important role in supporting companies in choosing Massachusetts, with some mixed experiences working with economic development officials.

The vast majority of business (80 percent) interacted with state and local economic development officials at some point in the ramp-up to their expansion or relocation project, with half interacting more than once a month.

While the responses point to the importance of state and local officials in helping businesses choose and get established in Massachusetts, there were mixed reviews about the quality of experiences with local officials. For the most part, survey respondents appeared to be satisfied with the interactions with economic development officials. As shown in **Table 6** below, approximately 75 to 80 percent of respondents were at least “somewhat satisfied” with the coordination of local and state officials, with the responsiveness to permitting and other “time to market” issues, and the overall effectiveness of officials in supporting their respective projects. Conversely, 20 to 25 percent of respondents were not satisfied with those interactions.

Likewise, a plurality of respondents were at least “somewhat satisfied” with the number of available properties to consider and the quality of local incentive packages. On the other hand, of the surveyed companies who were presented incentive, infrastructure, and other development packages from both Massachusetts and other states (only about 60 percent of respondents), nearly half felt these packages were not competitive with other states. These raise some concerns for local officials and are potential areas for further examination for economic development officials in the Commonwealth.

Table 6. Experience with State/Local Economic Development System

Satisfaction in Working with State and Local Officials	Yes	Somewhat	No	Not applicable
Was there coordination between local and state officials?	47%	27%	25%	0%
Were development officials responsive with permitting and other “time to market” issues?	57%	21%	22%	0%
Were you satisfied with the effectiveness of development officials in support of your project?	55%	26%	19%	0%
Were there a sufficient number of available properties for you to consider?	35%	30%	16%	19%
Were potential incentives, infrastructure, and other development programs competitive with other states?	13%	19%	29%	39%

Source: MassEcon business survey data, UMDI analysis

Regional Analysis of Survey Results

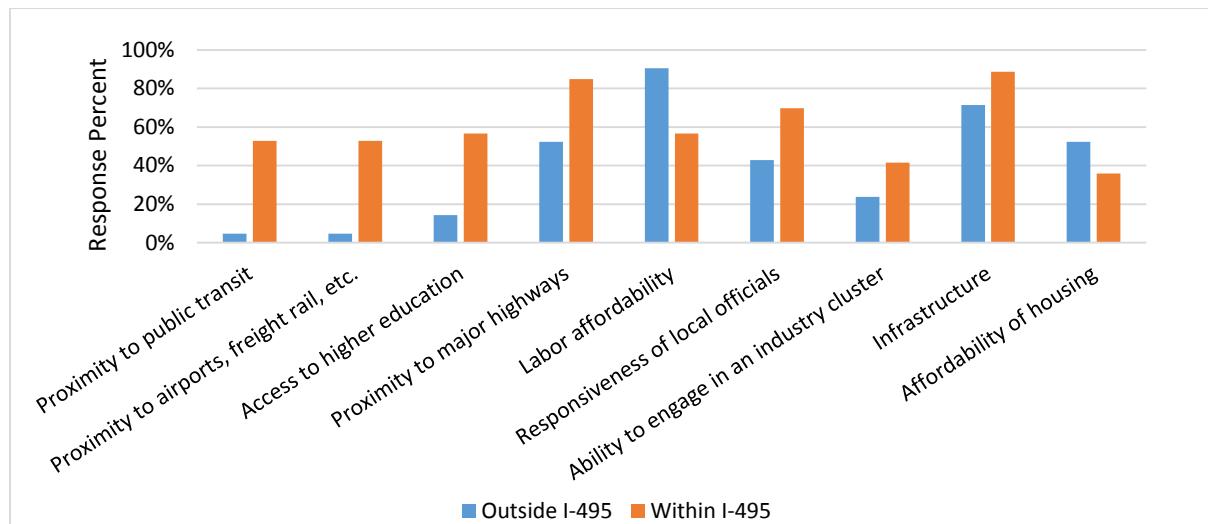
Although Massachusetts is a relatively small state, there are significant differences regarding regional economic activity, particularly relating to the Greater Boston region and the rest of the state. In order to consider how regional factors could influence expansion and relocation projects in the state, we divided responses for companies inside and outside of Interstate 495 (I-495). I-495 is a beltway that stretches from the northeast part of the state, wraps around the MetroWest region, and encompasses the southeast part of the state, excluding the cape and islands. The area inside of I-495 is one common way of defining the “Greater Boston” region. Of our 74 total respondents, 53 were inside of Greater Boston and 21 were outside of Greater Boston. The majority of firms surveyed outside of Greater Boston were in manufacturing (71 percent, compared to just 38 percent in Greater Boston). Survey respondents from Greater Boston were split between manufacturing, research & development, including life sciences (25 percent), and software development & technology (23 percent). In general, we observed significant regional differences in the decision making factors, cost issues, and the importance of educational partnerships.

Key Trend #1 – Factors most important for location decisions vary significantly between inside and outside of Greater Boston.

- **Greater Boston** – Transportation/infrastructure, responsiveness of local officials, and industry clusters are more important factors for businesses choosing to locate in Greater Boston.
- **Outside of Greater Boston** – Low labor and housing costs are more important factors for businesses choosing to locate outside of Greater Boston

Figure 3 shows the importance of site location factors by region. Labor costs and housing affordability were more important factors outside of Greater Boston than within Greater Boston. This makes sense as the cost of labor and cost of living in the Greater Boston region are significantly higher than the rest of the state. Companies choosing to locate within I-495 are accepting these elevated costs as part of doing business in the region. Meanwhile, lower costs outside of I-495 are generally competitive advantages for those regions. This theme also came up during our in-depth interviews as a reason some companies chose locations in parts of the state outside of Greater Boston. On the other hand, companies inside Greater Boston placed higher importance on the responsiveness of public development officials, transportation access and proximity, and partnerships and industry clusters. The importance of partnerships and industry clusters, as we will demonstrate later in this section, is particularly important for research & development (including life sciences) and software development & technology firms, which tend to be concentrated in Greater Boston. Infrastructure availability (e.g., water/sewer, telecommunications) was important throughout the state.

Figure 3. Top Regional Differences on Importance by Region of Massachusetts¹³



Source: MassEcon business survey data, UMDI analysis

Key Trend #2 – Key cost concerns starkly differ for regions of Massachusetts.

- **Greater Boston** – Labor, transportation, taxes and permitting, and real estate costs are the biggest challenges.
- **Outside of Greater Boston** – Energy and health care are biggest cost concerns.

Table 7 analyzes the cost challenges in different regions of the Commonwealth. Companies within I-495 think labor costs are more of a challenge than companies outside of I-495. This is not surprising as wages are higher in Greater Boston and, as we have seen in other sections of the survey analysis, lower labor costs are one of the attractive features of areas outside of Greater Boston. Similarly, real estate and land costs are a larger challenge within the I-495 region, with relatively low real estate and land costs an advantage outside of I-495. Energy costs outside of I-495 are a more significant concern among survey respondents, partly due to the greater proportion of manufacturing respondents in that part of the state.

Table 7. Business Cost Challenges by Region of Massachusetts

Costs	A major challenge	
	Outside I-495	Within I-495
Labor	38%	47%
Energy	57%	38%
Health care	57%	49%
Transportation	10%	21%
Taxes, permitting fees, etc.	33%	42%
Real estate and/or land	33%	42%

Source: MassEcon business survey data, UMDI analysis

¹³ These factors were slightly reworded from the actual survey due to space considerations. For the sub-factors as they appeared in the survey, please see the Business Survey Questions in **Appendix D**.

Multi-State Search Analysis of Survey Results

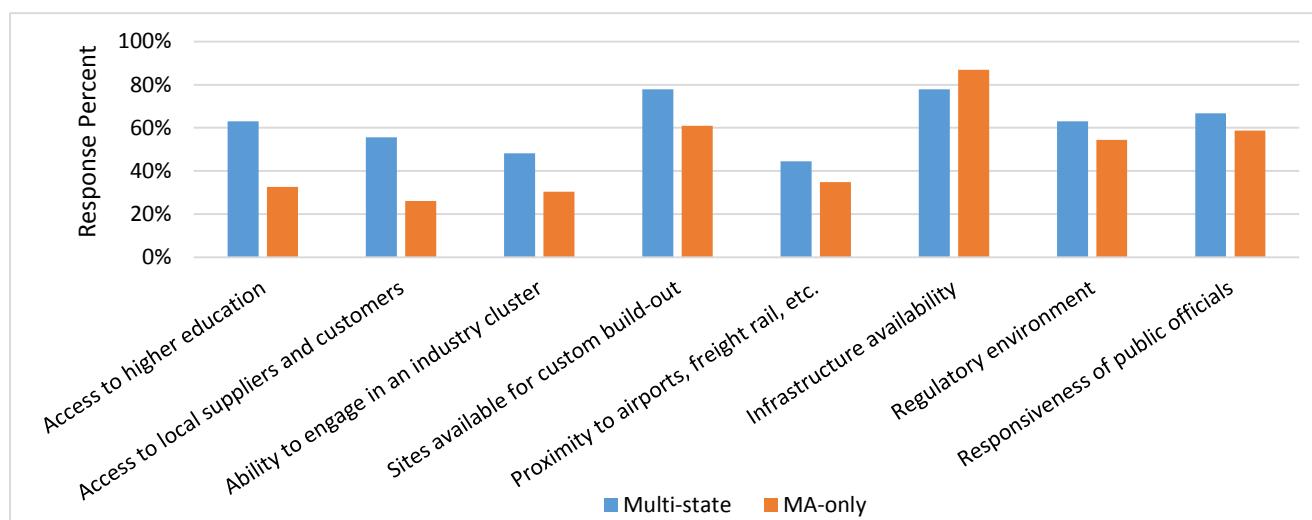
Massachusetts competes with other locations in attracting business. Of our 74 total respondents, 27 companies conducted a multi-state (and/or country) search, while 46 considered only Massachusetts locations.¹⁴ Firms that conducted multi-state searches were more likely to end up in Greater Boston than outside of the region. Additionally, research & development (including life sciences) and software development & technology companies were more likely to conduct multi-state searches than manufacturing companies. A list of other location states and countries considered by survey respondents is included in **Appendix E**.

Key Trend #1 – Companies that conducted multi-state searches placed great importance on educational partnerships and industry cluster factors.

Companies that conducted multi-state searches indicated greater importance in the partnership and industry cluster factors than companies that did not conduct a multi-state search. As demonstrated in **Figure 4** below, access to local suppliers and customer markets, access to higher education and research institutions, and the ability to engage in a regional industry cluster were all much more important to companies conducting multi-state searches. These data suggest that companies that are in a dynamic enough position to consider locations across the country (or world) place extremely high value on the relationship between industry clusters, educational intuitions, and doing business in the Commonwealth. There are regional and industry factors related to this as well as multi-state search firms tended to be in Greater Boston and in research & development (including life sciences) and software development & technology.

Of note, infrastructure availability, sites/buildings available for custom build-out, and responsiveness of public officials were also of key importance to companies comparing Massachusetts to other locations. The relatively lower importance of other factors (such as access to suppliers and customer markets) for companies that conducted MA-only searches may reflect companies already based in-state that were simply looking to expand into new buildings/sites within their existing market.

Figure 4. Most Important Factors in Determining Location by Type of Search¹⁵



Source: MassEcon business survey data, UMDI analysis

¹⁴ One company did not answer the multi-state search question, so the total here only equals 73 instead of 74.

¹⁵ These factors were slightly reworded from the actual survey due to space considerations. For the sub-factors as they appeared in the survey, please see the Business Survey Questions in **Appendix D**.

Key Trend #2 – Companies that conducted a multi-state search generally do not see business cost issues as a significant challenge.

Interestingly, companies that conducted multi-state searches were less likely to see the various costs issues as being a “major challenge” as compared to companies that did not do a multi-state search. As we see in **Table 8**, companies that did multi-state searches were clearly less concerned about costs related to energy, health care, and real estate and land than companies that searched only within state. This is likely related to industry mix differences as manufacturing firms are more concerned about cost issues in Massachusetts than research & development (including life sciences) and software development & technology firms. As we have noted, research & development (including life sciences) and software development & technology firms were more likely to conduct multi-state searches than manufacturing firms.

Table 8. Business Cost Challenges by Type of Search

Costs	A major challenge	
	Multi-state	MA-only
Labor	30%	54%
Energy	26%	52%
Health care	30%	65%
Transportation	19%	17%
Taxes, permitting fees, etc.	33%	41%
Real estate and/or land	33%	41%

Source: MassEcon business survey data, UMDI analysis

Industries Analysis of Survey Results

The following industry analysis focuses on manufacturing, research & development (including Life Sciences), and software development & technology.¹⁶ Of the 74 survey respondent, 65 were in one of these three general sectors.

Key Trend #1 – Manufacturers found labor costs, responsiveness of public development officials, and proximity to major highways as more important than other industries.

Manufacturing often requires larger facilities for operations, and siting new plants may entail complications regarding permitting and regulations. So, it is not surprising to see that responsiveness of local officials is especially important to manufacturing firms as they seek to expand into new locations. In addition, the need to transport goods makes proximity to highways important for the industry in general. While manufacturing generally pays higher average wages compared to the overall economy, they are often more sensitive to labor costs and typically pay less than the other two sectors in this analysis (R&D and software). Plus, manufacturing is more concentrated in sections of the state with lower labor costs. As we have seen elsewhere in this report, lower labor costs are a competitive advantage for areas outside of Greater Boston. Conversely, traditionally knowledge-based industries such as research & development and software development & technology firms place a lower emphasis on labor affordability, with more emphasis on highly advanced skills and education.

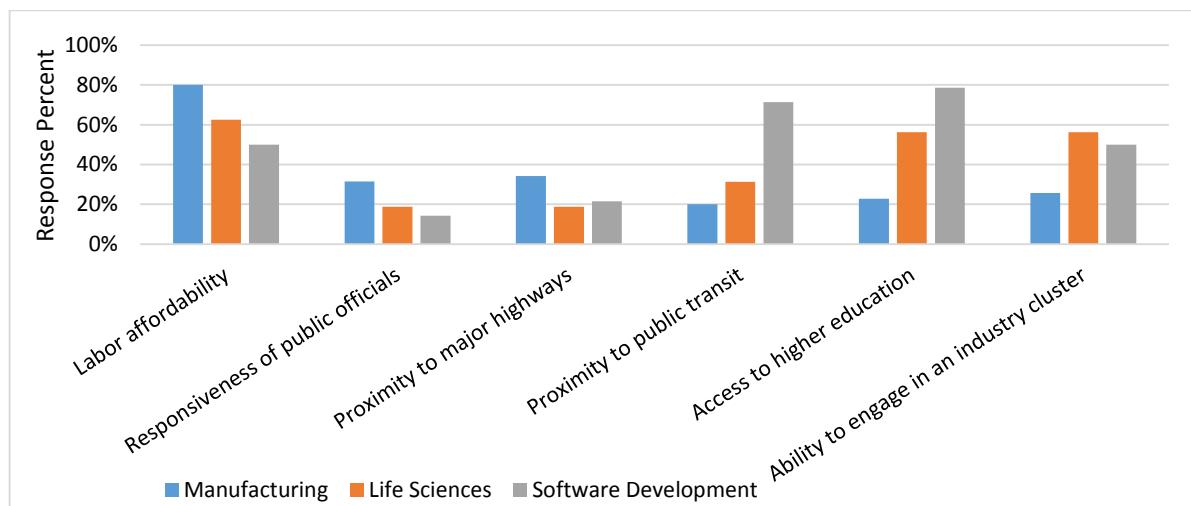
¹⁶ Companies were permitted to select multiple industry classifications. For analytical purposes, respondents that identified themselves as Research and Development and Manufacturing were included in the Research and Development group. The same was done for the Software Development and Manufacturing firms.

These companies are more likely to be in Greater Boston and are choosing the area because of other competitive advantages known to the region (namely labor quality and industry clusters).

Key Trend #2 – Research & development and software development & technology firms place greater importance on access to higher education and research institutions, local industry clusters, and proximity to public transit.

Engagement with the larger industry clusters, including institutions of higher education, is of critical importance for research & development and software development firms, and a key reason so many firms are concentrated in Greater Boston. It is interesting to see such a high importance placed on proximity to public transit for software development firms (See **Figure 5** below). While this may partly reflect the location of actual survey respondents in the core Boston/Cambridge urban area, this finding is consistent a trend of tech-based firms to increasingly choose more urban, walkable, transit-served office locations over more suburban office parks.

Figure 5. Important Factors by Respondents' Industry¹⁷



Source: MassEcon business survey data, UMDI analysis

Key Trend #3 – Manufacturing firms in Massachusetts are much more sensitive to business cost challenges than other industries.

Manufacturing firms saw all surveyed cost challenges as being a greater challenge than the other industry sectors focused on in this report. As **Table 9** below shows, the most notable differences were observed in concerns about health care, energy, and labor costs.

¹⁷ These factors were slightly reworded from the actual survey due to space considerations. For the sub-factors as they appeared in the survey, please see the Business Survey Questions in **Appendix D**.

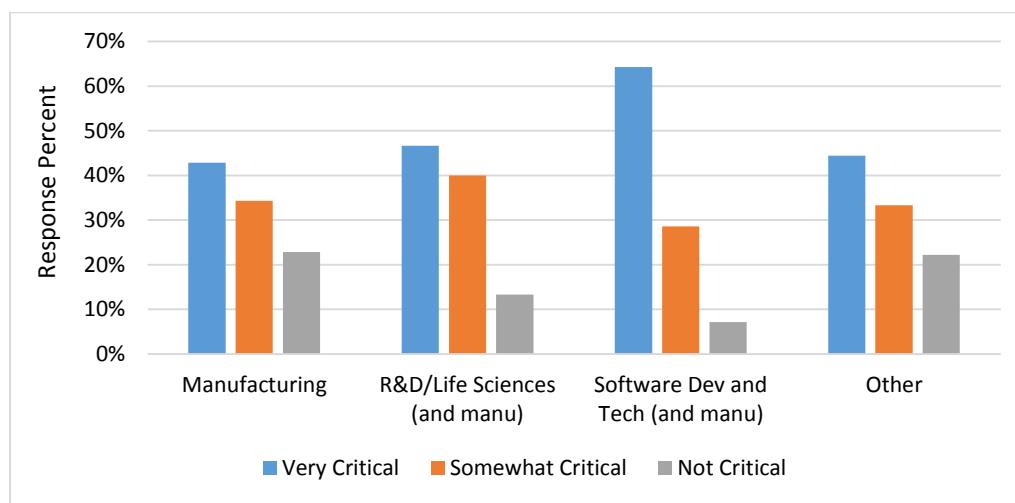
Table 9. Business Cost Challenges by Industry

Costs	A major challenge		
	Manufacturing	R&D	Software Development
Labor	54%	50%	29%
Energy	63%	31%	14%
Health care	74%	31%	36%
Transportation	26%	19%	7%
Taxes, permitting fees, etc.	46%	31%	21%
Real estate and/or land	43%	25%	36%

Source: MassEcon business survey data, UMDI analysis

Key Trend #4 – Job candidates with advanced education are of critical importance across all industry sectors.

It is not surprising to see that bachelor's level candidates are important to companies in research & development and software development & technology (See **Figure 6** below). Interestingly, and perhaps reflective of the strength of advanced manufacturing in Massachusetts, bachelor's level candidates are important for Manufacturing firms in the state as well. Interviews with leaders of manufacturing firms in this study revealed that changes in the manufacturing process today requires more on-site engineering and design help for customizing production, as well as some computer programming skills.

Figure 6. Bachelor's Candidates Desired by Industry

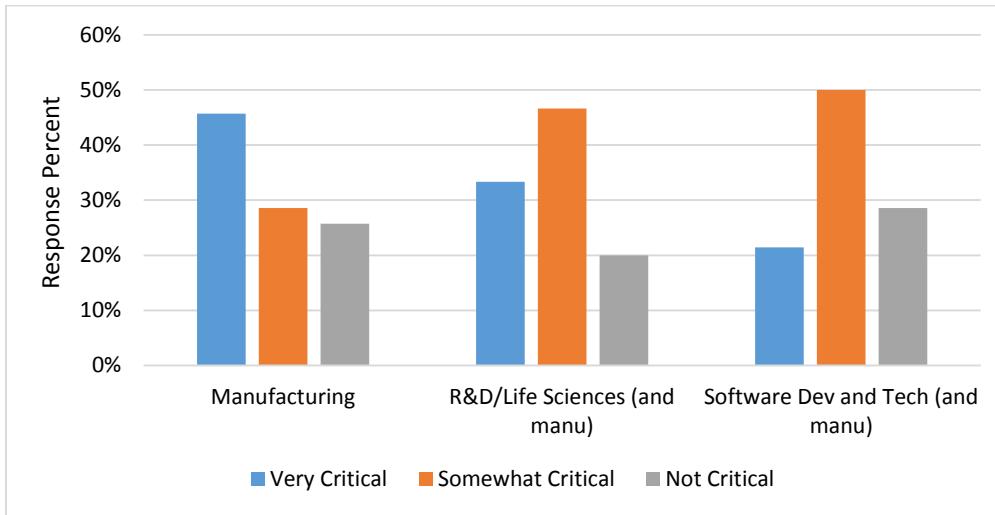
Source: MassEcon business survey data, UMDI analysis

Key Trend #5 – Job candidates with middle skills are of greater importance in manufacturing, but are also in demand at R&D and software firms.

Figure 7 shows industry responses regarding middle and technical skills. Middle and technical skilled labor is of greater importance to manufacturing firms. That said, both research & development and software development & technology firms noted some need for job candidates with less than a college education (e.g., technical or

vocational training). This points to potential employment and job training opportunities for less educated adults in the Commonwealth for these traditionally knowledge-based industries. It would be important for job training professional and local community colleges to work with employers in research & development and software development & technology to understand the needs for middle-skill positions in order to ensure a talent pipe for these roles, as well as position modestly skilled adults in the state for opportunities to work in these key industries.

Figure 7. Middle Skills/Technical/Vocational Skills Desired by Industry



Source: MassEcon business survey data, UMDI analysis

Business Interview Findings

To supplement the knowledge gained from the surveys and data analysis, the team conducted in-depth interviews with 14 companies that had recently undertaken expansion or relocation projects in Massachusetts. The 14 companies were chosen to provide representation across the Commonwealth and key industry sectors that were reflective of the overall study (e.g. manufacturing, software and technology, and life sciences). The objective of the interviews was to amplify our understanding of economic development in Massachusetts and, coupled with the survey results, provide a fuller picture of the opportunities and challenges of doing business in Massachusetts.

The team utilized an interview guide to ask a consistent set of questions of each company. The questions included background on the motivations and driving factors for the expansion/relocation project; what worked well (or not as well) during the process; any incentives or other public support received; workforce needs; suggestions for improving the competitiveness of Massachusetts; and the value proposition of doing business in Massachusetts. Findings from the interviews are summarized in this section. Additionally, a set of company-specific vignettes are presented throughout this report to provide tangible experiences of actual expansion and relocation projects.

Advantages

Retaining current workforce and ability to recruit new talent the most critical factor for expansion and relocation projects.

“This is where it’s at,” was the sentiment of one interviewee when asked why his life sciences company chose Massachusetts. Eastern Massachusetts is a “goldmine” of talent said a technology company. When asked about the value proposition of doing business in Massachusetts, time and again, the interviewees came back to the richness of specialized knowledge that has accumulated in the state because of its life sciences, technology, and, to a lesser extent, precision manufacturing clusters. In contrast, companies outside of these clusters were less effusive in their praise for the business climate in Massachusetts.

It is hard to over-emphasize the importance the interviewees, especially those in the life sciences and technology sectors, put on their ability to hire and retain exceptional employees. Many existing companies did evaluate other options, especially in Texas, California, Colorado, and North Carolina, as well as international locations, they cited the costs and disruption of losing their current employees as one critical factor that kept them in Massachusetts despite wide-ranging site selection processes. Firms new to the Commonwealth also undertook multi-state and international searches and also cited the talent pool as an advantage of locating in Massachusetts. Because these firms are essentially in the ideas business, motivated, educated, and experienced employees are a key factor in their continuing success and so companies are willing to shoulder higher costs in other areas to be in a region with access to high-quality labor. For example, one technology company called a recent group of 20 hires “absolute rock stars”. An insurance company summarized what many told the team by saying “Talent is everything.”

Closely-related companies place a high value on locating within strong industry clusters.

Many of the firms interviewed for this study are in the life sciences, technology, or precision manufacturing sectors. Not coincidentally, it is these same sectors that are frequently named as the most prominent in Massachusetts. Taken as a whole, as articulated in the interviews, most of the benefits and value derived from

being in Massachusetts can be attributed, directly or indirectly, to the agglomeration economies created by the existence of robust clusters.

Massachusetts is home to the most significant life sciences cluster in the U.S., if not the world. Companies in this field told the team that they were prepared to shoulder the high costs of doing business in the Commonwealth to be among the talent, research, and collaboration that this cluster makes available to them. One interviewee drew an analogy between professional basketball and life sciences saying, “The best basketball players in the world come to the U.S. to play. The same is true for life sciences. And, the place to be in the U.S. for life sciences is Cambridge. That is how you know you are on the map in the field.” All interviewees said they still would move here if they had to do it again despite the challenges.

When many similar firms locate in the same region, they all benefit much like in Wall Street or Silicon Valley. Clusters, by virtue of their size and buying power, create a concentration of specialized labor and supply chain firms which together improve the productivity and competitiveness of the whole cluster. These improvements lead to growing revenues which further reinforce the cluster through greater labor and input demand. Though costs of doing business are generally high in eastern Massachusetts, for firms benefiting from agglomeration economies, the higher productivity of available labor and the specialization of firms down the supply chain offset these costs and make the region a profitable place to do business.

By putting many similar firms together, clusters also provide an opportunity for firms to collaborate with each other to improve their individual businesses. These collaborations can take the form of shared investment in a common product, basic research, or development and marketing. One pharmaceutical company said that they “need to be near key players” and Boston-metro is home to “40% of the world’s IP in R&D.” Whether or not this statistic is exact, it highlights how important the Massachusetts life sciences’ cluster is to prominent players in the industry. The same company said the high cost of doing business in Massachusetts is “offset by collaborators.” Another pharmaceutical company specifically cited the large number of biotechnology firms as the primary driver of its decision to locate in eastern Massachusetts.

A complementary component to the industry clusters are the colleges and universities in Massachusetts, both in terms of providing training for high-skill workers and important synergies in research and development and product commercialization. Predictably, local colleges and universities provide an important talent pipeline for high-skill workers, at both the bachelor’s and graduate levels, for the life sciences and technology firms. Beyond that, though, local colleges and universities also play a critical role in training skilled machinists and other workers needed by the Commonwealth’s precision manufacturing sector. Many of the firms mentioned partnerships with local schools to provide entry-level workers. Other firms, such as those developing new drugs, that have a concentration of mid- to late-career employees, benefit more from research and development relationships with area universities than from the supply of recent graduates. Along similar lines, the Commonwealth’s many hospitals also function as centers of research and development in the life sciences and valuable partners to firms in this sector.

As confirmation of its attractiveness, Massachusetts continues to see new investments by companies seeking to locate or expand their local presence in bio-tech, pharmaceuticals, medical devices, and similar fields. A number of companies also spoke of Massachusetts as being a good place for life sciences entrepreneurs due to its incubators, universities, hospitals, and specialized venture capital ecosystem. While Silicon Valley is famous for its concentration of investors, the venture capitalists there are focused on consumer-facing technology and do not possess the life sciences industry knowledge that is found among VCs in Massachusetts. Their expertise makes them more willing to invest in the field and provide the guidance that nascent firms need. According to the PwC MoneyTree report, the biotechnology sector receives the most VC investment of any other in the Commonwealth at \$1.8 billion in 2014. The dynamic business environment also makes Massachusetts attractive to large firms seeking partnerships or acquisitions to grow their business.

On the technology side, companies were also firm in their commitment to Massachusetts. Though without the preeminence of the life sciences, the technology cluster in Massachusetts is large and vibrant enough to continue to attract fresh investment. For example, VC investment in software is second only to bio-tech at \$1.1 billion. Additionally because their costs of doing business are concentrated in labor and real estate, tech companies are less sensitive to the other high costs in the Commonwealth. Though high, these core costs are still less than market wages and rents in Silicon Valley which helps keep the Commonwealth attractive by offsetting some of the disadvantages of the smaller cluster in Massachusetts.

Companies in sectors outside of the two large clusters were more measured in their opinions of the value proposition of Massachusetts. Without the benefits of the agglomeration economies made possible by the clusters, the high costs of doing business in Massachusetts are not as easily overcome. Though none expressed regret, when asked if in retrospect they would again expand or locate in Massachusetts, many said they would take a longer look at the higher incentives and lower costs of other locations.

A diverse array of cultural and natural amenities contribute to a positive place to do business in Massachusetts regions.

Beyond the business environment, many companies are happy with the physical and cultural environment of Massachusetts. No matter the region they are in, interviewees in most of our case studies mentioned the Commonwealth's mountains, parks, lakes, and ocean and the outdoor activities they provide as benefits of living here for them and their families. Businesses in the Pioneer Valley and Boston area also mentioned the diversity of people, ideas, and cultural opportunities as contributing to personal enjoyment, business strengths, and quality of life for employees.

There was strong preference among existing companies to stay in Massachusetts. These companies were eager to continue to find ways to be profitable and growing without having to undertake the disruption and risk of relocation. Going beyond simple organizational inertia, some of these companies felt that Massachusetts was part of their identity. For them, the value proposition was not as important as was their history in the state and their investment in their current labor force and local community.

Though not the driving factor, available incentives and responsive economic development support were highly valued by companies.

Local companies feel that their past efforts at creating jobs should be rewarded with more attention than they feel that they currently receive from state and local officials. A few companies went so far as to say that the amount of the incentive they received was less important to them than the cooperation and attention displayed in the process. "It makes us feel wanted", one company said. Many said that a smooth and helpful incentive process was a sign that officials were "partners" and "invested" in the company's success. Beyond incentives, companies suggested that helping to connect them with similar businesses or those along the supply chain would be a helpful. For example, precision manufactures could benefit from collaborations with software development companies or those researching new medical devices. Lastly, while there is some benefit to the state's image from landing high-profile entrants, some companies expressed that the economic development system is more focused on attracting large companies than helping to develop existing or early-stage firms.

Transportation needs vary by company, but were important factors in location decisions.

One area that appeared in both the pro and con column throughout the interviews was transportation. While the next section will detail the ways the current transportation infrastructure creates challenges for firms, here it worth noting the benefits it provides. The interviewees mentioned highway access and Logan International Airport as critical pieces of the Commonwealth's transportation network. Firms have access to three important interstate links with 90, 91, and 95 all passing through the Commonwealth while being supplemented by other

interstates and federal and state highways. These highways provide a link to customers and shipping options for the Commonwealth's manufactures. A number of the companies interviewed have European headquarters or other operations. These companies all like the proximity of Massachusetts to Europe and the thousands of daily flights from Logan. For example, one company relies on the airport for streamlined access to its international staff, who frequent Boston for orientation and training. Another company, with wide-ranging international operations, relies on the airport for critical access to its foreign programs and European headquarters.

Challenges

Throughout the interviews, the challenges heard by the team essentially reduce to a few key themes: transportation and infrastructure, housing availability, high business costs, and the complexity of the economic development system. Every interviewee in eastern Massachusetts and many in the west independently, and without prompting from the team, mentioned these issues and the associated challenges they create. In addition, firms that conducted multi-state searches felt that incentive packages offered by Massachusetts were not competitive with other states.

High housing costs and housing availability are a major concern.

The challenges around housing fall into two broad categories: availability and cost. The growth in employment in eastern Massachusetts has not been met with a similar increase in new housing units. High demand coming up against limited supply has increased the cost of housing and caused people to look further afield in the search for affordable and available homes. In western Massachusetts, the primary problem for older employees is the availability and price of *quality* housing. There does not appear to be a shortage of housing in total but rather a shortage of housing they actually want at fair prices. Most interviewees also mentioned that the housing problem is especially acute for their younger workers who cannot afford the prevailing rents or cannot find housing with the amenities they seek (e.g. dynamic, walkable neighborhoods) near their place of work.

Difficult to attract and retain younger workforce in some areas of the state.

The interviewees and what has become conventional wisdom both say that today's young workers want to live in the city, do not want cars, and demand entertainment and cultural amenities in their neighborhoods. These combined wants have created problems attracting or retaining young workers for firms located outside Greater Boston. In Berkshire County, there is a lack of mixed-use developments and other attractive neighborhoods which leads to young workers spreading across the region such that there are no concentrations large enough to create a sense of community. In the suburbs of Boston and the 495 belt, where recent economic growth has been strong, it is also difficult to attract young workers. The companies there mainly cited transportation and transit constraints that make it difficult, if not nearly impossible, for carless workers to reliably commute to places like Avon, Littleton, Westborough, and Marlborough despite commuter line access to many of these communities. In addition, business leaders in the region expressed concern that the lack of amenities and local transit options keep young workers from choosing to live in these communities.

Highway congestion and lack of reliable transit service viewed as a negative by many eastern Massachusetts businesses.

While the young still prefer to live in Greater Boston even they are slowly moving further from the urban core. The move out of the city spurred by rising housing prices has also served to put even more pressure on an already overburdened transportation system. These network constraints have led to firms reporting trouble with attendance, attraction, and retention. To some extent a victim of its own success, the rapid employment growth in the Greater Boston region has brought about large daily commuter flows that tax the region's highways, commuter rail, subway, and bus system. Like with housing, transportation capacity has not kept pace with demand. Firms on the periphery complain about traffic and long commutes while those in Greater Boston

are acutely impacted by the poor reliability of the T. While some of this elevated concern could be a reflection of present bias for the difficult winter of 2014-2015, concerns about the long-term ability of the region's transportation network to meet future needs are commonplace among current policy and political conversations at the municipal, regional, and state levels.

Relatively high business costs, especially energy and health care, were cited as a challenge by most companies.

High housing prices are only one part of high costs generally. Businesses are facing the same land and space constraints as households. Not only is the space expensive but those firms that built or rehabilitated a building all said that their actual construction costs exceeded their estimates though none were ultimately unhappy with the result. High electricity costs, also shared with households, were cited by a number of firms, especially those technology companies with data centers. High costs of living and a competitive labor market have combined to push up wage costs, though for highly-skilled positions these wages do not yet seem problematic for companies. In fact, several companies noted that labor would be more expensive in Greater Boston than other locations in the U.S. (such as North Carolina), but that the cost was "worth it" to be a part of the larger industry cluster associated with the region.

The economic development and permitting processes and large number of organizations present a complex system that is difficult for many companies to navigate.

The team asked each of the interviewees about any incentives they received and how they compared to other states they may have considered. A number of the interviewees stated their companies benefited from either or both state and local programs such as those through the Economic Development Incentive Program (EDIP), tax increment financing (TIF), infrastructure improvements, or some other benefit. However, nearly all that conducted a multi-state search felt Massachusetts benefits packages were less generous than those in other states. The strength of the local industry clusters, quality of local labor, and in some case a company's longstanding history in the state proved more important than the size of the incentives offered by local and state governments.¹⁸

The incentive packages and other assistance programs for companies are administered by a variety of state and local governments, quasi-public agencies, and other industry advocacy groups. Entities such as MassEcon, MassDevelopment, MassBio, the Mass Technology Collaborative (MTC), the Massachusetts Office of Business Development, economic development councils, chambers of commerce, and town-level offices all participate, and in many instances overlap, in the economic development ecosystem of the Commonwealth. Many of the interviewees were confused by the "alphabet soup" of acronyms and agencies and were unsure where to start or whose assistance they should seek. In response, multiple interviewees suggested a roadmap or single resource that could guide businesses or coordinate services among agencies. Such a single source could also be a coordinator of advertising for Massachusetts as a business destination.

¹⁸ It should be noted, however, that all the companies interviewed in this study had decided to expand or relocate to Massachusetts. While their reasoning is illustrative for this study, a natural extension to this work would be to discuss these same factors with companies that either chose to leave Massachusetts or passed over Massachusetts for locations in other states or countries.

Summary of Findings and Implications for Policymakers

During the course of this research, a few central themes emerged which should be of interest to policymakers seeking to enhance economic development in the Commonwealth, particularly around workforce, transportation, housing, regional industry clusters, and the cost of doing business. These findings are also intended to inform local, regional and state-level economic development efforts to boost business retention, expansion, and attraction initiatives. Statewide business leaders participating in the survey and interviews expressed a mix of competitive advantages and concerns on both micro-level, site-specific decision making factors, as well as more macro-level, overarching economic development issues. The combination of these factors speak to the short- and long-term advantages and challenges to doing business and economic development in Massachusetts.

Key Study Findings

Workforce – Access to a talented workforce is the most important factor in business location decision-making and the biggest competitive advantage for Massachusetts.

According to our business survey, 90 percent of respondents said that the availability and quality of the workforce was important in their decision to locate or expand in Massachusetts. Additionally, 76 percent identified it as a strength of doing business in the Commonwealth. These findings are consistent with the results of the interviews where stories about “rock star” hires and “goldmines” of talent were heard. Companies choosing to expand in-state repeatedly commented about how vital the existing, skilled workforce was in their decision-making process. Others commented on how much they depend on and partner with area universities to provide a pipeline of talent for new hires.

Companies choosing to expand in-state repeatedly commented about how vital the existing, skilled workforce was in their decision-making process. Massachusetts is first in the country in the educational attainment of its workforce which matches well with companies’ stated needs – bachelor’s degrees were seen as the most critical type of skilled labor followed by graduate degrees and other highly specialized workers. Maintaining a pipeline of qualified talent was seen as the most important role of universities, even more so than as R&D partners (which also ranked highly).

The survey also reveals some disparity in the way companies perceive labor affordability: 66 percent of survey respondents cited labor costs as important in their location decision while considerably more of the same group (88 percent) identified it as a cost challenge. Deciphering these findings, the survey data suggest that businesses that choose Massachusetts are concerned about the cost of labor in general, but are placing greater importance on the availability of highly-skilled labor in the state. This was particularly true for knowledge-based industries (such as life sciences) in the Greater Boston area. Conversely, company expansion projects in the rest of the state appear to value relatively lower labor costs in those areas, while still placing high importance on a mix of technical skills and education.

Industry Clusters – Strong industry clusters in Greater Boston are a key driver of statewide economic success but their geographic concentration contrasts with other parts of the Commonwealth.

The opportunity to be part of a regional industry cluster was especially important to companies that conducted multi-state searches and/or are located inside I-495. In other words, firms considering non-Massachusetts locations generally had a different set of criteria when determining a location compared to businesses already well-established in state and simply looking to expand. These decisions were generally consistent with the

strengths of the state's industry clusters, and less sensitive to cost. Based on our survey of businesses, industry clusters represent one of the top three strengths of doing business in Massachusetts overall, and of particular importance for life sciences and tech/software companies. The influence of the cluster is also partly responsible for the continued aggregation of skilled workers and knowledge creation in Massachusetts. This was particularly the case in the life sciences where several interviewees cited the local cluster (including the talent pool, potential collaborators, and access to funding) as a critical reason for choosing Massachusetts.

Additional industry cluster findings from this research on economic development projects includes:

- There were a large number of **bio-tech** expansion and location projects in Massachusetts and they extend beyond Kendall Square.
- One of the largest and highest-paying sectors in the state, the **software development and technology** sector had numerous expansion projects, mostly concentrated in Greater Boston.
- Aggregate data trends hide a hugely dynamic **manufacturing** sector with numerous expansion and relocation projects throughout the Commonwealth.
- The increasing number of **clean energy** company expansion projects mirrors growing strength in this fast-emerging industry.

The Commonwealth's clusters have helped drive the recent robust economic growth but because the technology and life sciences clusters are heavily concentrated in Greater Boston, it results in disparities with other parts of the state that maintain lower growth industry clusters in sectors like manufacturing, fishing, higher education, and health care. In manufacturing, it is estimated that Massachusetts could need to replace up to 100,000 workers over the next decade due to retirement and job changes, which represents 40% of the current workforce.¹⁹ Simultaneously, the industry is undergoing a shift from labor- to capital-intensive production methods which lowers the overall demand for employees. Also during this time, the higher education sector is preparing for a drop in the number of college-age adults as the large millennial generation ages out of its college years and is followed by a much smaller cohort.

Transportation – Ranked as highly important by virtually all companies, transportation concerns (primarily about the MBTA) contrasted with strengths such as Logan Airport and access to international markets.

The data from the surveys and interviews indicates that proximity to existing transportation (and infrastructure more broadly), and the quality and length of the commute are important to companies when assessing locations for their desirability. For example, over 80 percent of business respondents ranked infrastructure as an important aspect of their site location decision, over 70 percent noted highway proximity, and over 60 percent valued the length and quality of the commute. However, transportation is also cited as a prominent challenge and weakness of doing business in parts of Massachusetts. Other than companies from Western Massachusetts, interviewees mentioned transportation constraints as a current and future concern especially as it impacts access to labor. Though businesses rely on highways and airports for access to markets – particularly noteworthy is the strength of Logan Airport in connecting multinational companies with European offices – companies in Greater Boston keenly sense the impact of highway congestion, the lack of competitive public transit options outside the urban core, and MBTA reliability problems on their ability to attract and retain employees, especially younger ones.

¹⁹ <http://www.northeastern.edu/dukakiscenter/wp-content/uploads/2013/10/Staying-Power-II.pdf>

Housing – The success of companies’ talent attraction and retention efforts is tied to the availability and affordability of diverse housing options.

Closely linked to the issues facing transportation and broader quality of life, the availability and affordability of housing was a concern that was most strongly heard through the interviews. In the survey, less than 50 percent of firms ranked quality of neighborhoods, schools, and recreation and the affordability of housing as important in making location decisions. However, essentially all interviewees mentioned the affordability and availability of housing as an area of concern for Massachusetts in general. Workers often do not live in the same town or city where they work so the local housing market is less important than the regional one. However, as workers search farther and wider for the housing they want and can afford, the pressure grows on transportation networks to accommodate the commuters.

Housing and its linkage to transportation was mentioned as an important dynamic in Massachusetts in at least three ways. First, companies in the Boston urban core noted the very high costs of housing and how this can be challenging (especially as renters try to become home owners) for their employees. This puts more pressure on the MBTA to deliver reliable public transit options. Second, companies along the I-495 corridor noted that younger workers typically prefer more urban, walkable residential areas and that transportation for reverse commutes is still a work in progress. Third, one major employer in the Berkshires noted that their challenges in attracting and retaining younger talent are directly related to a lack of walkable, mixed use development areas in that part of the state and were looking for help to create more places where people want to live, work and play.

Economic Development System – Though companies are generally satisfied, their interactions with and relationship to the Commonwealth’s economic development ecosystem could be improved.

The business survey respondents and interviewees painted a mixed picture of the economic development delivery system in Massachusetts. On one hand, 80 percent of the survey respondents said that they maintained at least monthly contact with state and local economic development officials during their expansion or relocation. And 75 to 80 percent of respondents were at least “somewhat satisfied” with the coordination of local and state officials, the responsiveness to permitting and “time to market” issues, and overall effectiveness. But that still leaves 25 percent that thought there was not adequate state/local coordination, 22 percent that were not responsive to permitting, and only 35 percent that said “yes” there were sufficient available properties. Further, a minority of respondents said incentives and economic development programs were competitive with other states.

Interviewees received help from many different state and local economic development entities, and were quick to mention their appreciation for state incentives to help with expansion projects (through the Economic Development Incentive Program). But they also said that the system is too expansive and hard to navigate with its overlapping or similarly-named agencies. Some had great experiences, especially when guided step-by-step through a project process from a responsive local official, but others had difficulty accessing the “right” help from the start and hoped for a more clear roadmap of how best to work with local, regional and state development agencies.

A few business leaders suggested that state economic development leadership is too focused on incentive packages to attract new businesses to the state rather than helping young (or old) firms already established in Massachusetts expand. One suggestion by a local business leader was for the state to do more in helping connect businesses with potential partners in the state (e.g., connecting life sciences and health care-related firms with local manufacturers).

Cost Implications – Companies continue to identify cost challenges in Massachusetts but the Commonwealth may not be as costly in relation to its peer states as conventional wisdom may suggest.

Labor, health care, and energy costs, as well as taxes and fees, were all identified as significant costs challenges in the state. Specifically, when asked about business cost challenges (major or minor), survey respondents' most common answers were labor costs in two forms: direct labor and health care at 88 percent and 85 percent of respondents, respectively. It should be noted that of all options health care had the highest percentage of respondents who found it a major challenge (51 percent) while labor had the lowest percentage of respondents claiming it was not a challenge (12 percent). Other cost concerns included energy, taxes and fees, and real estate and land, all at around 80 percent of respondents.

While these results would seem to validate conventional wisdom about Massachusetts as a costly state for doing business, an interesting finding is that companies that conducted multi-state searches were less likely to see the various cost issues as being a "major challenge" compared to companies that did not do a multi-state search. These firms were more likely to locate in Greater Boston and were concentrated in knowledge-based industries like life sciences and software development – choosing access to talent, university partnerships, and participation in industry cluster ecosystems as the driving factor for their location decisions. In the interviews, some tech companies said that while Massachusetts has high labor and real estate costs, it is still considerably less expensive than Silicon Valley. In contrast, manufacturing firms, more widely represented across Massachusetts, are much more sensitive to business cost challenges than other industries.

Regional Dynamics – Regional variations in location criteria and cost concerns reflect the unequal distribution of industries sectors and population across Massachusetts

The survey revealed important differences between firms inside the Interstate 495 corridor (essentially Greater Boston) and those outside. The concentration of the tech and life sciences clusters in Greater Boston is largely responsible for some of these differences. In general, the survey revealed that firms in Greater Boston place more weight on the benefits of the industry clusters located there. These firms were much more interested in engaging with and having access to other firms, R&D activities, related manufacturing, and institutions of higher learning. Outside I-495, firms were generally more sensitive to the cost and availability of labor and the affordability of housing (where lower housing costs are a comparative advantage). The generally lower price level of the areas outside of Greater Boston is sometimes used as a selling point for these communities. By locating in lower-cost areas outside of Boston, firms can build their business models on the expectation of labor and real estate savings. With some mixed success, state economic development leaders have tried to use this pitch to help Boston area firms locate back-office and call center activities in other regions of the state.

Reflecting the relative concentration of manufacturing in these areas, companies with expansion and relocation projects beyond Greater Boston are more concerned about the costs of energy than elsewhere in the state. Somewhat surprisingly, the firms outside the 495 belt were considerably less sensitive to proximity to all types of transportation suggesting that outside of I-495, the transportation system is less congested and can provide an advantage for firms seeking access to broader Northeast markets (when located near interstate highways). In addition, 48 percent of firms outside of I-495 said that transportation was not a cost challenge of doing business in Massachusetts compared to 32 percent of firms inside. Nevertheless, during the interviews firms both inside and outside I-495 were clear that they anticipate having trouble attracting and retaining younger workers due to transportation and housing issues.

Policy Implications

The ultimate goal of this report is to inform and help shape economic development policy and services in Massachusetts – at the state, regional, or local levels – to help the Commonwealth do all it can to help retain and attract companies that are growing jobs and private investment. Based on the key findings, a few policy-relevant implications are worth emphasizing:

Because access to a talented workforce is so important, the state needs to continue to prioritize and fund a full spectrum of education, adult learning, and workforce training initiatives. The education and workforce training systems are incredibly complex. Getting into the details of specific programs is beyond the scope of this report. That said, the findings of this report confirm the importance of the work of the state, regional employment boards, community colleges, career centers, and vocational and technical schools in providing the talent and skilled labor demanded by Massachusetts companies. Along with the number of top rated colleges and universities in the state, labor talent and skill remain a key strength for the region. Increased input and involvement from employers directly into training curriculum can serve to enhance this critical system.

Housing and transportation are closely linked foundational aspects of economic development but are feeling strains, especially in Greater Boston. Transportation is clearly one of the most important factors for business decisions, and in some cases can be a real strength. This is particularly true for Boston-area companies that value Logan Airport and its growing number of domestic and international flights. This is also the case for companies located outside of I-495 near interstates that can leverage transportation to gain access to markets throughout the northeast. Moreover, the demand by millennials and other demographic groups to live in interesting urban places near their work is helping push a residential, multi-family building boom in and around Boston that has not been seen in decades. But, the population growth in Greater Boston is resulting in high housing costs in the region in general. This trend pushes some workers and families further outside of the city, placing additional strain on the highway and public transit systems. Policies that help increase housing production, including zoning reform to allow multi-family housing development where appropriate (e.g., near transit, or near existing town centers) can alleviate this issue over time. For transportation, the importance of maintaining and expanding this system is crucially important for future economic growth. Initiatives that can help link lower cost areas (e.g., New Bedford, Springfield) to the Boston market with fast, reliable transit are worth careful consideration.

Economic development collaboration and responsiveness is essential to retain growth companies and capture new business attraction opportunities. Based on our business survey findings and interviews, it's clear that the responsiveness of economic development officials is critically important to companies looking to expand. We also heard that many companies feel that the system is too complex and hard to navigate. This can serve as a reminder about the importance of collaboration of local, regional and state economic development leaders. The numbers in our report show too many firms that were not satisfied with the economic development delivery system (and that does not include companies that considered Massachusetts but decided to locate somewhere else). The ease of permitting, along with competitive regulations and incentives, is also critical to business retention and attraction, especially in areas outside of Greater Boston that do not have the same talent-driven cluster-based economic advantages.

Boosting economic and industry opportunities outside of Greater Boston will require different priorities and strategies. In many ways, the data results and interview findings in this report are a clear reminder about how starkly different Greater Boston is from the rest of the state. Outside of I-495, the key factors for location decisions, the industry mix (more manufacturing, less tech/life sciences), and the cost pressures are very different. Consequently, the right strategies to boost these regional economies are inherently different from Greater Boston and may require more public-private partnerships to catalyze investment and job creation. The Baker Administration's *Economic Opportunities for All* economic development policy plan recognizes these differences and the 2016 economic development bill provides specific programs (including more Gateway City-

focused funding) to address regional needs. Like the ambitious Upstate Revitalization Initiative in New York, more bold thinking and commitment is likely needed to help other Massachusetts regions close the economic gap with Greater Boston.

Enhancing our internal and external marketing to capture business expansion and relocation projects is essential. Promoting the assets of Massachusetts and its regions should be a shared goal of state, regional, and local economic development leaders. Enhancing economic development marketing through establishing and disseminating a Massachusetts brand, strategically targeting key industries and prospects, and showcasing our many success stories will enable the Commonwealth to compete even more robustly for business expansion. Collaboration among economic development players is key, especially with the many creditable marketing efforts currently underway. While external marketing is important, it is no less important for companies within Massachusetts to understand the value of expanding here; through marketing across regions, the company that does its research in Cambridge will know that it can do its manufacturing in Worcester or Springfield or Fall River. Indeed, the majority of companies of companies surveyed for this study represented expansions of businesses already located in Massachusetts. The seeds for a powerful marketing program are here - through MassDevelopment's Ampitup!, MassEcon's ReadyMA 100 portfolio, Speaker DeLeo's Bay State Business Link initiative, and www.massitsallhere.com, among others. Building on these and injecting fresh ideas can help close the state's economic gap with Greater Boston and ensure that Massachusetts makes the short list for companies seeking to expand.

Appendix A: Study Design and Limitations

All the components of the study draw from the experiences of actual companies in Massachusetts that have relocated or expanded. The study universe was initially derived from economic development projects nominated for the MassEcon Economic Impact Awards. The Economic Impact Awards profiles also helped inform high level observations regarding economic development projects in the state, as well as the industry and regional distribution of projects. The businesses from the Economic Impact Awards nominees also helped generate a list of companies to participate in the business survey. The survey was designed to identify and rank the advantages and disadvantages of conducting business in Massachusetts. Only businesses that have expanded or relocated to Massachusetts could participate in the survey. All of the participating companies have significantly contributed to the Massachusetts economy through investments in building facilities and workforce expansion and retention. The in-depth interviews were conducted with a sub-set of these firms to get more information and direct examples of what worked well for businesses that expanded or relocated in Massachusetts.

It is important to keep in mind that the information and data collected do not represent precise industry and economic development conditions for the state as a whole. Rather, the data on location/expansion projects, and the identification of businesses for the survey and interviews was gleaned from data provided by MassEcon and some of their regional partners. In other words, because of the lack of a universal source of all business expansion and location projects, this represents the best available information in Massachusetts. But like any data set or survey effort, there are limitations. For example, MassEcon Impact Awards are organized by region and nominations for awards are made through a combination of sources (individual companies, chambers of commerce, economic development organizations, etc.). Although the data sources may be somewhat limiting, the assessment reflects hundreds of businesses across all regions of the state, as well as wide coverage of all industries.

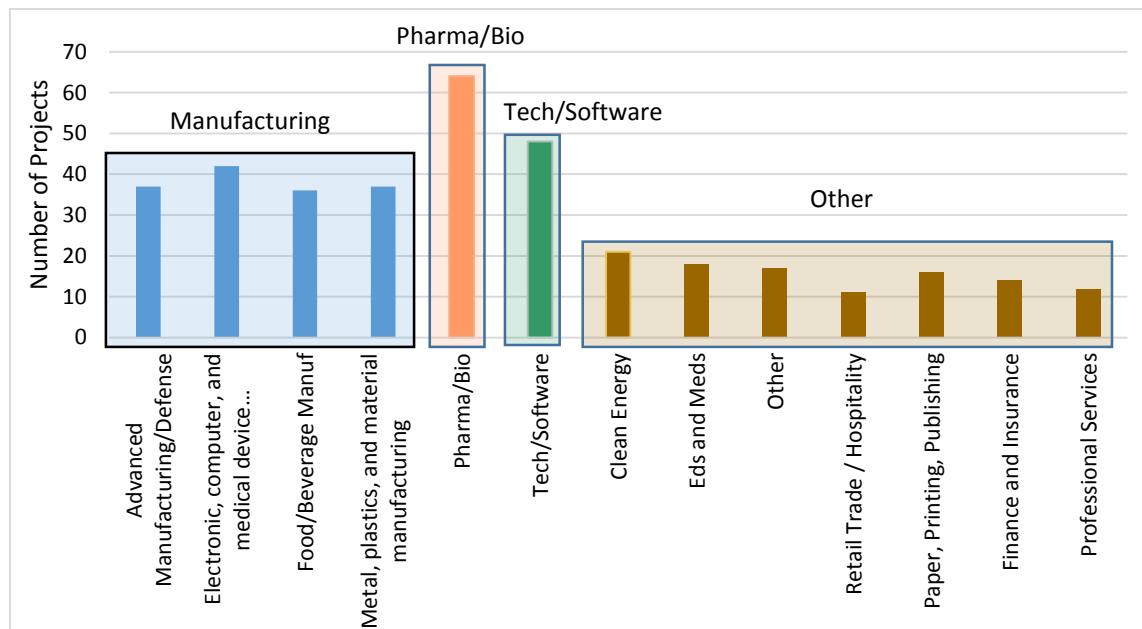
Appendix B: Economic Development Projects-Data Profile

Data Profile of Economic Expansion Projects in Massachusetts

Annually, MassEcon honors selected businesses across the Commonwealth that contributed to the economy through investment and/or job creation, called the Economic Impact Awards. MassEcon's wide-range of local and regional partners nominate Massachusetts companies across all regions, all industries, and all sizes. MassEcon provided UMDI with historical data on award nominees from 2004 to 2015 (a total of 12 years). UMDI is the first research team to conduct an analysis of these economic development projects in the state. UMDI also used the universe of award nominees for additional components of this report, such as the business survey and the in-depth interviews.

As shown in **Figure 8**, these economic development projects are largely concentrated in a few key industries. Of the 373 projects, 41 percent were in some form of manufacturing (152 projects). Bio-tech/pharma represented 17 percent and the technology/software industry represented 13 percent of the total economic development projects.²⁰

Figure 8. Number of Economic Development Projects by Industry, 2004-2015



Source: MassEcon Impact Award Nominee data, UMDI analysis

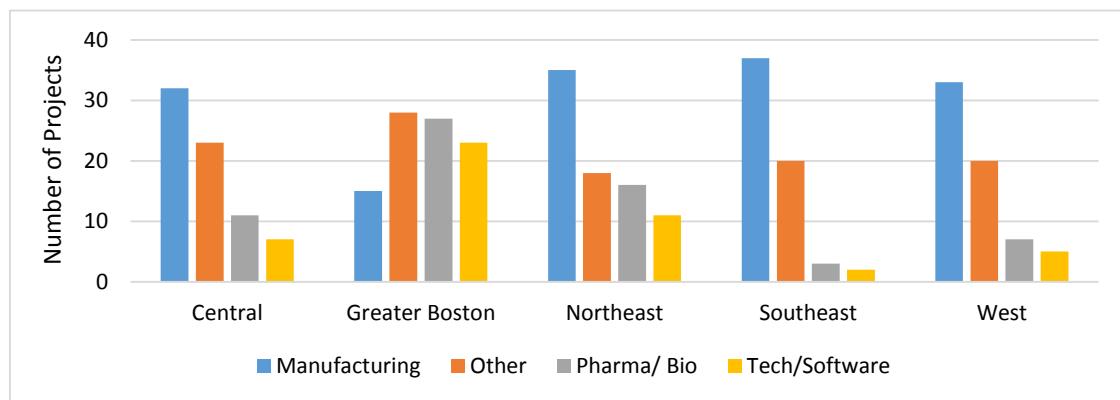
As noted earlier, these business expansion and location projects span across all regions of the state. That said, the industry mix varies quite a bit by region. As we see in **Figure 9**, most regions of the Commonwealth, the largest number of projects is represented within manufacturing sectors. This is particularly true for the Northeast, Southeast, and Western parts of the state as demonstrated through job growth, capital investment

²⁰ Note that these data are not representative of the Massachusetts economy. For example, manufacturing, bio/pharma, tech/software industries make up around 70 percent of all the projects, whereas, according to the Massachusetts Department of Labor and Workforce Development, together these industries make up around 18 percent of the jobs in the state

and facility expansion. The Central region is also led by manufacturing, but a bit more balanced with other types of projects (mainly in insurance and health care), as well as bio-tech/pharma and technology/software projects.

The Greater Boston region, on the other hand, has significant concentrations of bio-tech/pharma and technology/software projects, as well as professional services and clean energy. Although not quite as prominent, the Northeast region was home to a significant number of technology/software and bio-tech/pharma projects, partly representing clusters near I-495 and Rt. 128.

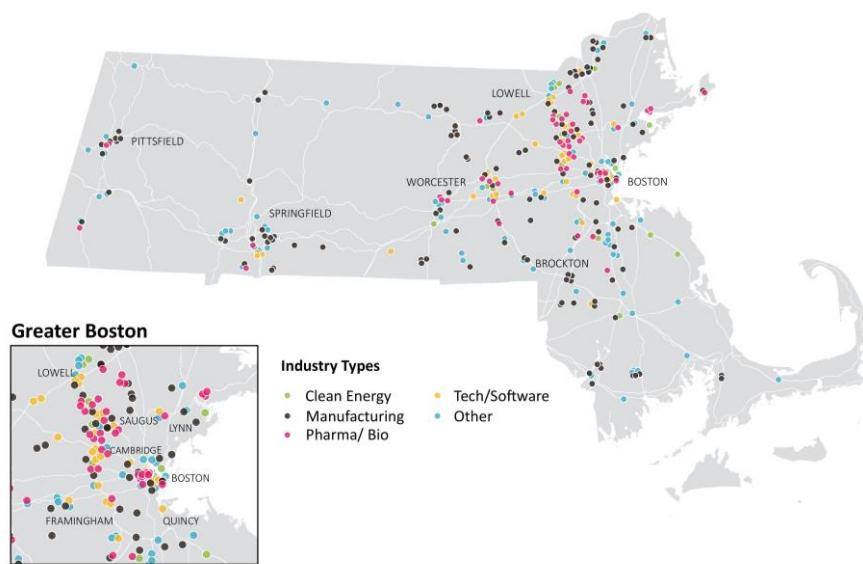
Figure 9. Number of Projects by Region and Industry



Source: MassEcon Impact Awards data, UMDI analysis

To further illustrate these expansion and location projects visually, **Figure 10** presents a map of the MassEcon impact awards by location and major industry. We see significant concentration of pharma/bio and tech/software in the eastern part of the state, particularly in the Greater Boston region. Manufacturing projects are scattered in other parts of the state, including significant concentrations in the Northeast, Southeast, and West.

Figure 10. Location of MassEcon Impact Award Business Expansion and Relocation Projects by Major Industry



MassEcon Impact Awards, UMDI analysis

Appendix C: Industry Trends, Initiatives and Expansion Projects

Massachusetts is home to a dynamic and diverse economy. Overall, the state fared well and recovered quickly following the Greater Recession. Key over-arching themes in the Massachusetts economy over the last several decades include:

- For multiple decades, growth in the Massachusetts economy has been led by the education, health care, finance, and technology sectors, with more recent strengths having emerged in areas like life sciences and biotechnology, and clean energy.
- The manufacturing sector, while declining in total jobs, is still a vital industry to the state economy and one of the leading generators of exports and value-added. It has been experiencing a lengthy shift towards “advanced manufacturing” with greater use of technology, and fewer lower-skilled jobs.
- The incredibly high-skilled, highly-educated workforce in Massachusetts tends to create and grow higher-paying jobs in fields like research and development (R&D), professional services (engineers, architects, consultants, lawyers, etc.) and information technology.
- The Greater Boston area is a powerhouse economic engine, one of the strongest regions in the entire United States. But, its strength contrasts with more modest economic growth in other parts of the state that maintain industry cluster strengths in sectors like manufacturing, fishing, higher education, and health care but tend to trail the Boston area in higher-wage fields like life sciences, technology, R&D, and professional services.

That said, the data profile of the MassEcon Economic Impact Awards over the past 12 years provides a unique opportunity to compare and contrast the 373 economic development projects in the Commonwealth with broader industry trends and target industry initiatives. In particular, we can step back and examine how location and expansion projects have varied by industry and region to ask:

- Do the expansion and location projects align with the fastest growing and largest industry sectors in Massachusetts?
- Are industries that may not be growing in terms of jobs (e.g., manufacturing) still contributing significant private investment through expansion and location projects?
- Do we see notable expansion and location projects aligned with target industry programs initiated in recent years (e.g., Massachusetts Life Sciences Center, Massachusetts Clean Energy Center)?

As discussed in greater detail below, the answer to these questions is generally YES.

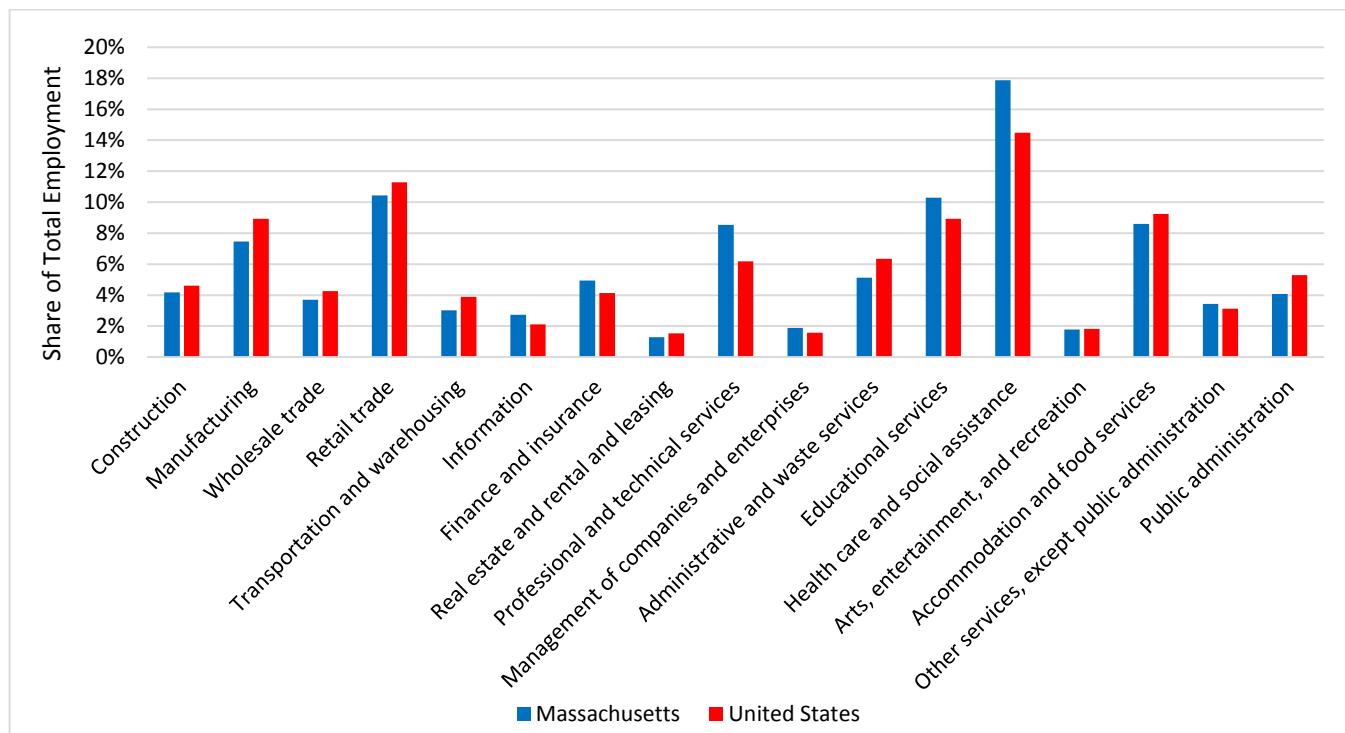
Recent Industry Trends and Concentrations

To provide the latest data on major industry trends and concentrations, **Figure 11** and **Table 10** display statewide industry employment growth trends from 2009 to 2016, and the share of jobs by industry in Massachusetts compared to the U.S. Over this time period, total statewide jobs grew by 10 percent as the state economy recovered from the Great Recession of 2008-2009, and went on to expand to its highest level of employment ever experienced.

Not surprisingly, the health care and education sectors are the largest industries in Massachusetts in terms of jobs, with an even bigger share of employment than at the U.S. level. Together, health care and education

services expanded by over 88,000 jobs from October 2009 to January 2016, the biggest increase in terms of total jobs. Another big gainer in terms of job growth (number and growth rate) was professional and technical services. This industry category includes the bulk of R&D activity in various technical fields like bio-tech, defense research, and energy – representing a large share of Impact Award companies. Professional and technical services compose nine percent of all Massachusetts jobs compared to six percent nationally, and expanded by 19 percent over the past seven years. This industry also provides relatively high wages - \$113,620 compared \$64,166 across all sectors.

Figure 11. Share of Total Employment by Industry for Massachusetts and the United States, 2015



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

The only industries declining over this time period were natural resources and mining (a very small industry in Massachusetts) and manufacturing. After years of decline, contracting from over 320,000 jobs in 2004 to about 250,000 jobs in 2016, manufacturing has largely held steady since the recession, demonstrating a highly dynamic and competitive industry. While the manufacturing industry continues to face contractions in the state, there is a wide array of expansion and new location projects as the manufacturing in Massachusetts continues to evolve towards emerging aspects of the sector, including leading-edge advanced manufacturing. It is interesting to connect the large number of expansion and location projects for manufacturing companies in this report to these kinds of industry dynamics and the frequency that economic development professionals are engaged in manufacturing expansion and re-location projects.

Other industry strengths in Massachusetts (compared to U.S. averages) include information, finance and insurance, and a mix of other services. Software publishers and telecommunications are included within the information sector, critical to the Massachusetts strength in technology and innovation, and another key sector for Impact Award companies. The fastest growing sector since the depth of the recession has been construction, expanding by 42 percent. This largely represents a recovery as construction was severely impacted by the recession. Within the “other” category of Impact Awards are a number of construction-related companies – some of which manufacture and/or distribute various building products and a few are directly involved in the construction of buildings and facilities.

Table 10. Massachusetts Job Growth by Industry since the Recession

Industry Sector	Employment at Beginning of Recovery (August 2009)	Employment in Most Recent Month (December 2016)	Employment Change	Employment Percentage Change
Natural Resources and Mining	1,300	1,100	-200	-15%
Construction	108,100	153,600	45,500	42%
Manufacturing	254,500	251,300	-3,200	-1%
Trade, Transportation and Utilities	538,200	567,600	29,400	5%
Information	85,400	88,400	3,000	4%
Financial Activities	218,300	225,600	7,300	3%
Professional and Business Services	453,400	557,200	103,800	23%
Education and Health Services	677,400	796,000	118,600	18%
Leisure and Hospitality	299,700	358,100	58,400	19%
Other Services, Excl. Government	118,600	136,700	18,100	15%
Government	438,000	454,800	16,800	4%
Total Non-farm Employment	3,192,900	3,590,400	397,500	12%

Source: Massachusetts Executive Office of Labor and Workforce Development (EOLWD), Current Employment Statistics (CES-790), UMDI analysis

Key Industry Initiatives and MassEcon Data Comparisons

The remainder of this section provides additional context and data on four key industry sectors highlighted above in the data profile of Massachusetts economic development expansion and relocation projects: 1) life sciences, bio-tech and medical devices; 2) technology and software companies; 3) manufacturing; and 4) clean energy.

Life Sciences, Bio-tech and Medical Devices:

Large number of bio-tech expansion and location projects that extend beyond Kendall Square

Massachusetts is now known as having perhaps the world's strongest industry cluster for life sciences and bio-tech industries. Data from the 2015 Innovation Index (from the Massachusetts Technology Collaborative) estimate that annual wages for the biopharma and medical devices industry increased by 18 percent from 2009 to 2014, the fastest growth of the four broad technology sectors that they profiled. In addition, these sectors secured over \$2.1 billion in venture capital investment in 2014, about double the amount for software companies.²¹ Based on data collected by MassBio, Massachusetts has the largest bio-tech R&D sector of all U.S. states (larger than California) with just 30,000 jobs in 2014, reflecting growth of 21 percent since 2007.²²

Recognizing the state's inherent strength and opportunities in this area, the Patrick Administration and statewide leaders established the Massachusetts Life Sciences Center (MLSC) in 2008 and committed to \$1 billion in investment "to create jobs in the life sciences – biotechnology, pharmaceuticals, medical devices, diagnostics and bioinformatics — and support vital scientific research that will improve the human condition."²³ An evaluation of this statewide initiative by the Boston Foundation and Northeastern University estimated that the initial \$56.6 million in tax incentives from the MLSC had generated 2,500 new jobs in life sciences, leading to \$266 million in wages over five years. The Baker Administration continues this focus on life sciences with investments targeted for capital programs, business-specific investments, internships, and other initiatives.

²¹ http://masstech.org/sites/mtc/files/documents/InnovationInstitute/Index_2015_web_sml.pdf

²² <http://files.massbio.org/file/Industry-Snapshot-UPDATED-Jan-2016.pdf>

²³ <http://www.masslifesciences.com/about/>

These kinds of very positive, high-growth trends are reflected in the MassEcon data that show 64 individual company location projects. These industry projects were generally more concentrated in the Boston area as shown earlier (see Figures 2 and 3) with 27 of these in Greater Boston and another 16 projects in the Northeast region of Massachusetts. The world-leading Kendall Square cluster of bio-tech firms is captured in some of these expansion and location projects, but the spread of the industry is clearly wider than that with significant projects reaching most areas of the Commonwealth.

Technology and Software:

One of the largest and highest-paying sectors in the state, with companies and projects concentrated in Greater Boston

Technology and software was the third largest industry category in terms of location and expansions projects with 48 tech sector company projects. While this industry is sometimes over-shadowed in Massachusetts by life sciences, and can be associated with smaller scale start-ups, this data shows numerous impactful company location and expansion projects over the last 10 years. Individual company projects reflect a diverse mix of software development, computer hardware and storage, wireless telecommunications, and firms poised to capture “Big Data” initiatives in health care, transportation and a wide range of fields.²⁴ Thirty-four (34) of the 48 technology and software company projects were in Greater Boston or the Northeast region of Massachusetts, generally reflective of the state’s strengths in the inner core Boston/Cambridge area, as well as the Rt. 128 and I-495 corridors.

These identified company location projects are consistent with research conducted for the Massachusetts Technology Leadership Council (MassTLC) on the tech sector that found especially strong growth in tech services (including software). In particular, that research estimates that technology jobs (services and manufacturing) compose about 295,000 direct jobs statewide, larger than finance, biopharma, or clean energy. And technology jobs are estimated to have grown by almost 12 percent since 2009, ahead of statewide job growth trends. Reflective of this strength, software and communication services industries in Massachusetts obtained over \$1 billion in venture capital funding in 2014.

Manufacturing:

Aggregate data trends hide a hugely dynamic sector with numerous expansion and relocation projects throughout the Commonwealth

While manufacturing jobs in Massachusetts declined by about 20 percent over the last decade, they still represent 250,000 jobs statewide and are one of the largest contributors to both gross state product and international exports.²⁵ As noted above, manufacturing jobs have essentially held steady over the past five to six years, and the many stories of manufacturing growth and contraction are often blurred together by the aggregation of statistics at the state level. In recognition of the economic importance of manufacturing in Massachusetts and the opportunities to link innovation, R&D, university research institutes and cutting-edge companies, the Commonwealth has created and sustained the Advanced Manufacturing Collaborative.²⁶ Further, it’s been estimated that the Commonwealth will need to hire 100,000 new manufacturing workers over the next decade, largely because of retirements and job changes.²⁷ And it is worth highlighting that the innovation-based focus on manufacturing in Massachusetts appears to be paying off as the Commonwealth has been selected as lead or a key supporting partner on three new manufacturing innovation institutes selected by the U.S. Department of Defense: revolutionary fibers and textiles (MIT), flexible hybrid electronics (UMass Amherst), and photonics (MIT).

²⁴ For more on the Mass Big Data Initiative, see <http://www.masstech.org/innovation-institute/projects-and-initiatives/mass-big-data-initiative>

²⁵ Manufacturing was the 3rd largest private sector contributor to gross state product in 2014 (see Exhibit A-36 in the Due Diligence Report: <http://www.massbenchmarks.org/statedata/data/DueDiligence.pdf>).

²⁶ A good overview is captured in a recent MassBenchmarks article: <http://www.massbenchmarks.org/publications/issues/vol16i2/6.pdf>

²⁷ <http://www.northeastern.edu/dukakiscenter/wp-content/uploads/2013/10/Staying-Power-II.pdf>

Manufacturing company projects represent 152 of the identified 373 expansion and relocation projects (41 percent), clearly a larger share than the industry comprises in the broader economy. So, even though the manufacturing sector may have experienced a slow-to-declining trend in total jobs over the past 12 years, that hides a hugely dynamic sector with significant expansion and relocation projects often offset by company layoffs in less technologically-advanced manufacturing fields. And one reason that economic developers have long-focused on manufacturing is that manufacturers are almost always “exporters” to national and global markets, thus adding to the economic base with larger multiplier effects than traditional service-based firms.

Clean Energy:

Increasing number of company expansion projects mirrors growing strength in emerging industry

While challenging to measure neatly in standard industry codes, Massachusetts did experience a number of key clean energy / energy efficient company location projects over the past dozen years. These 21 projects span a range of R&D efforts such as batteries and wind turbines, manufacturing (some of which admittedly failed over time), energy efficiency firms, and solar energy providers installers. The 2015 Massachusetts Clean Energy Center report on this industry estimated that this quickly emerging industry has expanded to almost 100,000 jobs (98,895) as of 2015, a very impressive increase of 64 percent since 2010. Key occupations within this target industry include sales and distribution professionals (28 percent), and installation and maintenance workers (24 percent of jobs). While there is a growing clean energy industry cluster centered on Boston (including GE’s energy company Current), this sector spans the entire state. In August 2016, the Massachusetts legislature and Baker Administration passed a bill to expand renewable energy in the state which further benefits emerging opportunities like wind power.²⁸

²⁸ To learn more about the Mass Clean Energy Center, see <http://www.masscec.com/> and for the Marine Commerce Terminal: <http://www.masscec.com/marine-commerce-terminal-new-bedford>

Appendix D: Business Survey Questions

What is the name of your company? (Your company name and responses are entirely confidential).

Has your company had a relocation or operational expansion in Massachusetts in the past 10 years (job growth, facility expansion, capital investment, etc.)?

- a. Yes
- b. No

MassEcon records indicate that your company has had a relocation or operational expansion in the past 10 years. Are you sure your company has not had a relocation or operational expansion in the past 10 years?

- a. Yes (will terminate survey)
- b. No

Where is your company located in Massachusetts?

Approximately, how many people does your company employ in 2015 (regardless of part time or fulltime status)?

What are the principal products or services of your Massachusetts operations? (Please choose all that apply).

- Manufacturing
- Research and development, including life sciences
- Software development and technology
- Health care and hospitals
- Finance and insurance
- Transportation, warehousing, distribution, logistics
- Educational services
- Energy
- Retail trade
- Wholesale trade
- Other

Please indicate your company's primary manufacturing operations.

- Machinery/manufacturing equipment
- Electronics, sensors, computers, telecommunications
- Aerospace or defense
- Medical devices
- Pharmaceuticals and biotechnology
- Metal fabrication
- Plastics
- Other (please specify)

Where in Massachusetts has your company had an expansion of operations in the past 10 years (new employees, facilities, or capital investment)? (Please provide valid Massachusetts city or town name(s)).

At existing location in: _____

At new location in: _____

If your company relocated or expanded from another state or country within this period, please specify the state(s) or country(s).

What factor(s) drove your company's decision to expand or relocate? (Please choose all that apply).

- Need to accommodate employee growth
- Opportunity to locate in an industry cluster with suppliers, service providers, R&D partners, or other business partners
- Expand market reach to new customers and clients
- Other (please specify)

Did your company conduct a multistate or international location search?

- a. Yes
- b. No

What other state(s) or country(s) did you consider for your search?

In what year was your most recent company expansion or relocation in Massachusetts?

The next set of questions focuses on different factors related to your company's decision to expand or relocate.

Below, please indicate the importance of each factor in determining your Massachusetts location. Please rank the factors on a scale from not important at all to extremely important.

How important was Labor/Workforce in determining your Massachusetts location?

- a. Available workforce
- b. Quality of workforce and skills/education
- c. Labor affordability

How important was Buildings/Sites, Permitting and Public Process in determining your Massachusetts location?

- a. Building/sites available for custom build-out
- b. Permitting process regulatory environment and public process
- c. Responsiveness of public development officials

How important was Transportation/Infrastructure in determining your Massachusetts location?

- a. Proximity to major highways
- b. Proximity to public transit
- c. Proximity to other transportation (airports, freight rail, seaports)
- d. Infrastructure availability (water, sewer, high speed internet/broadband)

How important were Partnerships and Industry Clusters in determining your Massachusetts location?

- a. Access to local suppliers and customer markets
- b. Access to higher education and research institutions
- c. Ability to engage in a regional industry cluster with suppliers/vendors/service providers/R&D/OEM relationships, etc.

How important was the Community Environment for Workforce in determining your Massachusetts location?

- a. Quality of neighborhoods/schools/recreation
- b. Affordability of housing
- c. Quality/length of commute

The cost of doing business is often an important consideration for business location decisions. Please rank the following components of business costs in terms of the challenge they present to your business in Massachusetts.

- a. Labor costs
- b. Energy costs
- c. Health care costs
- d. Transportation costs
- e. Taxes, permitting fees, etc.
- f. Real estate and/or land

Of the factors listed below, which do you see as relative strengths of doing business in Massachusetts?

- a. Labor/Workforce
- b. Buildings/Sites, Permitting and Public Process
- c. Transportation/Infrastructure
- d. Partnerships and Industry Cluster
- e. Costs and Fees
- f. Community Environment for Workforce

Of the factors listed below, which do you see as relative weaknesses of doing business in Massachusetts?

- a. Labor/Workforce
- b. Buildings/Sites, Permitting and Public Process
- c. Transportation/Infrastructure
- d. Partnerships and Industry Cluster
- e. Costs and Fees
- f. Community Environment for Workforce

In the ramp up to your expansion, how often did you interact with state and local development officials?

- a. Never
- b. Less than Once a Month
- c. 2-3 Times a Month
- d. More than 3 Times a Month

Please answer the following questions regarding your experience working with development officials on your new (or expanded) site.

- a. Was there coordination between local and state officials?
- b. Were development officials responsive with permitting and other “time to market” issues?
- c. Were you satisfied with the effectiveness of development officials in support of your project?

Other issues or comments on the process of working with public development officials?

Please answer the following questions regarding site availability and location incentives.

- a. Were there a sufficient number of available properties for you to consider?
- b. Were potential incentives, infrastructure, and other development programs clearly presented?
- c. Were potential incentives, infrastructure, and other development programs competitive with other states?

Was a partnership with one or more higher education institution (universities, community colleges, etc.) an important aspect of your relocation or expansion project?

- a. Yes
- b. No
- c. Not sure

Please rate the following factors with respect to your company's partnership with higher education institutions.

- a. Training/skills development of existing employees
- b. Developing a pipeline of talent with specific skills
- c. Partnering with academic researchers on R&D initiatives
- d. Licensing or commercializing university developed technologies/research

Access to skilled labor and a reliable pipeline of talent is typically an important factor for location decisions. What types of skilled labor are most critical to your business operations in Massachusetts?

- a. Highly specialized labor with graduate degrees and direct relevant experience
- b. Bachelor's degree holders in relevant fields
- c. Middle skills/technical/vocational candidates
- d. Candidates with HS degree and basic job ready skills

If your company has important relationships with other companies (ex., supplier/vendor, partner, customer, etc.) in different regions of Massachusetts, please indicate which regions. (Please choose all that apply).

- West
- Central
- MetroWest
- Greater Boston
- Northeast
- Southeast
- Cape and Islands
- Not Applicable

If faced with the same expansion or relocation decision today, would you have chosen the same location for your company?

Please explain why or why not.

Since the completion or implementation of your relocation or expansion, how would you rate Massachusetts as a place to do business?

- a. Very Good
- b. Good
- c. Fair
- d. Poor

Appendix E: Additional Survey Results

Statewide

Table 11. Interaction with Local Government Officials

In the ramp-up to your expansion, how often did you interact with state and local development officials?	Number	Percent
More than 3 Times a Month	12	16%
2-3 Times a Month	25	34%
Less than Once a Month	22	30%
Never	15	20%
Total	74	100%

Source: MassEcon business survey data, UMDI analysis

Table 12. Massachusetts Business Rating

MA Rating	Number	Percent
Very good	17	23%
Good	30	41%
Fair	20	27%
Poor	7	9%
Total	74	100%

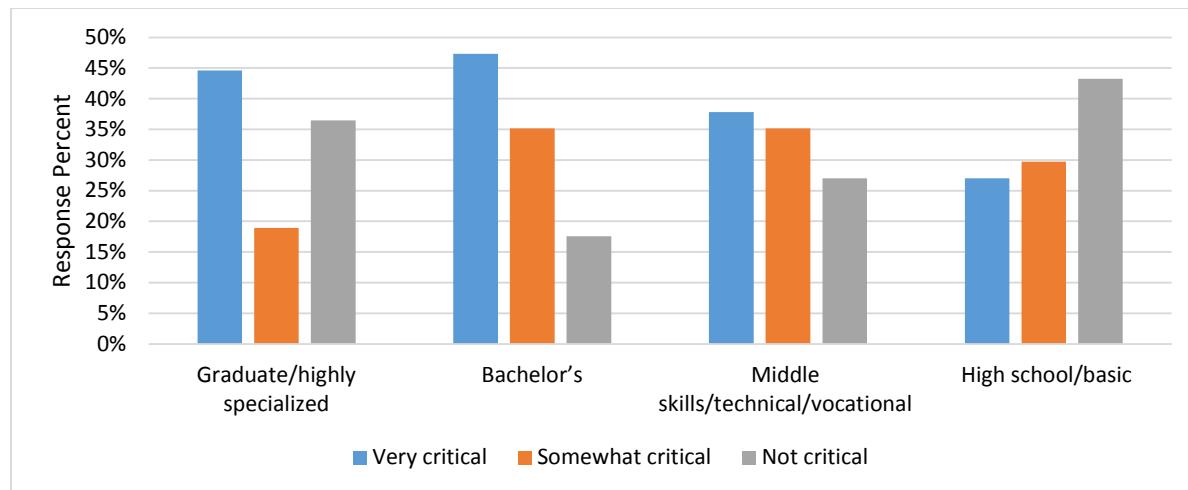
Source: MassEcon business survey data, UMDI analysis

Figure 12. Choosing the Same Location Again



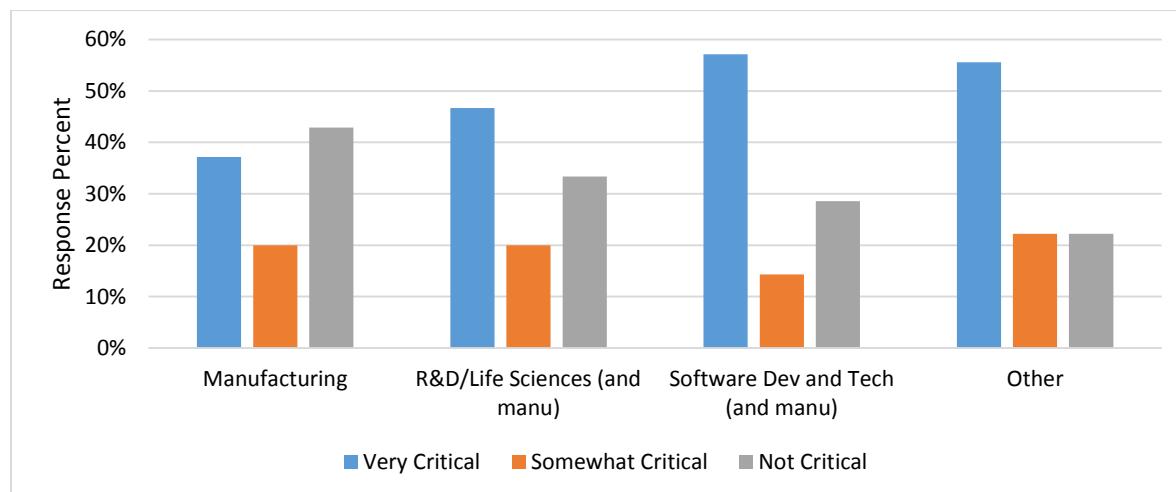
Source: MassEcon business survey data, UMDI analysis

Figure 13. Criticalness of Desired Skilled Labor Levels



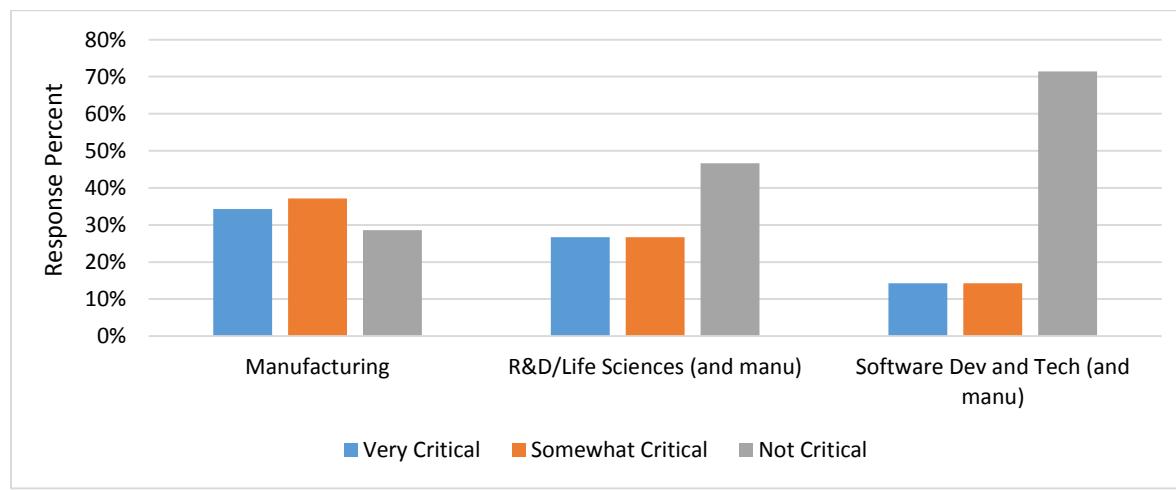
Source: MassEcon business survey data, UMDI analysis

Figure 14. Graduate/Highly Specialized Labor Desired by Industry



Source: MassEcon business survey data, UMDI analysis

Figure 15. High School/Basic Skills Desired by Industry



Source: MassEcon business survey data, UMDI analysis

Regional

Table 13. Most Important Factors in Determining Location by Region of Massachusetts (expanded)

Factors	Sub-Factors	Most Important %		Difference in Percentage Points
		Outside I-495	Within I-495	
Labor/Workforce	Available workforce	100%	91%	9pp
	Quality of workforce and skills/education	100%	94%	6pp
	Labor affordability	90%	57%	34pp
Buildings/Sites, Permitting and Public Process	Building/sites available for custom build-out	67%	68%	1pp
	Permitting process - regulatory environment and public process	57%	58%	1pp
	Responsiveness of public development officials	43%	70%	27pp
Transportation/Infrastructure	Proximity to major highways	52%	85%	33pp
	Proximity to public transit	5%	53%	48pp
	Proximity to other transportation (airports, freight rail, seaports)	5%	53%	48pp
	Infrastructure availability (water, sewer, high speed internet/broadband)	71%	89%	17pp
Partnerships and Industry Clusters	Access to local suppliers and customer markets	33%	40%	6pp
	Access to higher education and research institutions	14%	57%	42pp
	Ability to engage in a regional industry cluster with suppliers/vendors/service providers/R&D/OEM relationships, etc.	24%	42%	18pp
Community Environment for Workforce	Quality of neighborhoods/schools/recreation	52%	47%	5pp
	Affordability of housing	52%	36%	17pp
	Quality/length of commute	62%	70%	8pp

Source: MassEcon business survey data, UMDI analysis

Table 14. Business Cost Challenges by Region of Massachusetts (expanded)

Costs	A major challenge		A minor challenge		Not a challenge	
	Outside I-495	Within I-495	Outside I-495	Within I-495	Outside I-495	Within I-495
Labor	38%	47%	48%	42%	14%	11%
Energy	57%	38%	19%	42%	24%	21%
Health care	57%	49%	24%	38%	19%	13%
Transportation	10%	21%	43%	45%	48%	32%
Taxes, permitting fees, etc.	33%	42%	29%	45%	38%	13%
Real estate and/or land	33%	42%	29%	45%	38%	13%

Source: MassEcon business survey data, UMDI analysis

Multi-State

Table 15. Most Important Factors in Determining Location by Type of Search (expanded)

Factors	Sub-Factors	Most Important %		Difference in Percentage Points
		Multi-state	MA-only	
Labor/Workforce	Available workforce	93%	93%	1pp
	Quality of workforce and skills/education	93%	98%	5pp
	Labor affordability	70%	63%	7pp
Buildings/Sites, Permitting and Public Process	Building/sites available for custom build-out	78%	61%	17pp
	Permitting process - regulatory environment and public process	63%	54%	9pp
	Responsiveness of public development officials	67%	59%	8pp
Transportation/Infrastructure	Proximity to major highways	74%	76%	2pp
	Proximity to public transit	41%	37%	4pp
	Proximity to other transportation (airports, freight rail, seaports)	44%	35%	10pp
	Infrastructure availability (water, sewer, high speed internet/broadband)	78%	87%	9pp
Partnerships and Industry Clusters	Access to local suppliers and customer markets	56%	26%	29pp
	Access to higher education and research institutions	63%	33%	30pp
	Ability to engage in a regional industry cluster with suppliers/vendors/service providers/R&D/OEM relationships, etc.	48%	30%	18pp
Community Environment for Workforce	Quality of neighborhoods/schools/recreation	52%	48%	4pp
	Affordability of housing	41%	39%	2pp
	Quality/length of commute	67%	67%	1pp

Source: MassEcon business survey data, UMDI analysis

Table 16. Business Cost Challenges by Type of Search (expanded)

Costs	A major challenge		A minor challenge		Not a challenge	
	Multi-state	MA-only	Multi-state	MA-only	Multi-state	MA-only
Labor	30%	54%	56%	35%	15%	11%
Energy	26%	52%	44%	30%	30%	17%
Health care	30%	65%	44%	26%	26%	9%
Transportation	19%	17%	46%	43%	35%	39%
Taxes, permitting fees, etc.	33%	41%	44%	39%	22%	20%
Real estate and/or land	33%	41%	37%	43%	30%	15%

Source: MassEcon business survey data, UMDI analysis

Table 17. Top State and Country Competitors

Top Competitors	Number
California	7
North Carolina	6
New Hampshire	5
New York	5
Rhode Island	5
Texas	5
Connecticut	4
India	3
Colorado	2
Ireland	2
Maine	2
Pennsylvania	2
Vermont	2

Source: MassEcon business survey data, UMDI analysis

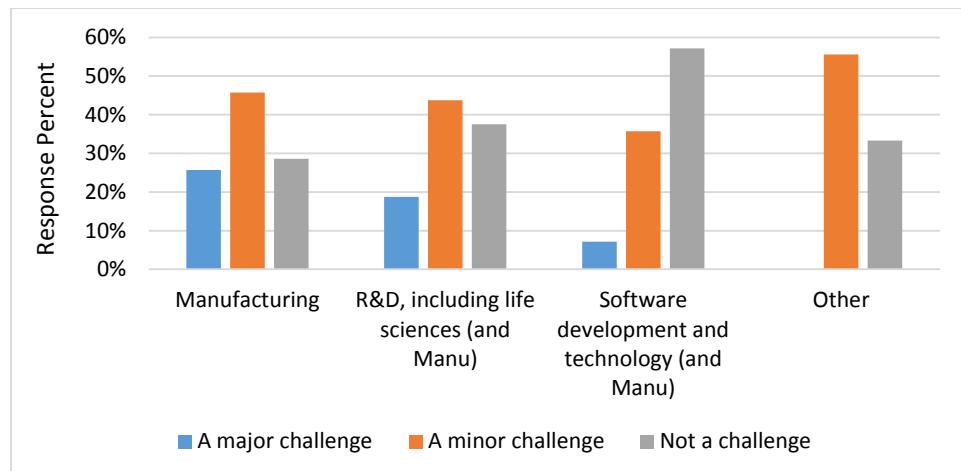
Industry

Table 18. Important Factors in Determining Location by Industry (expanded)

Factors	Sub-Factors	Most Important %		
		Manufacturing	Life Sciences	Software Development
Labor/ Workforce	Available workforce	97%	88%	93%
	Quality of workforce and skills/education	97%	94%	100%
	Labor affordability	80%	63%	50%
Buildings/Sites, Permitting and Public Process	Building/sites available for custom build-out	69%	75%	79%
	Permitting process - regulatory environment and public process	63%	56%	57%
	Responsiveness of public development officials	31%	19%	14%
Transportation/ Infrastructure	Proximity to major highways	34%	19%	21%
	Proximity to public transit	20%	31%	71%
	Proximity to other transportation (airports, freight rail, seaports)	26%	50%	50%
	Infrastructure availability (water, sewer, high speed internet/broadband)	83%	88%	93%
Partnerships and Industry Clusters	Access to local suppliers and customer markets	40%	38%	36%
	Access to higher education and research institutions	23%	56%	79%
	Ability to engage in a regional industry cluster with suppliers/vendors/service providers/R&D/OEM relationships, etc.	26%	56%	50%
Community Environment for Workforce	Quality of neighborhoods/schools/recreation	49%	56%	43%
	Affordability of housing	43%	50%	36%
	Quality/length of commute	69%	69%	79%

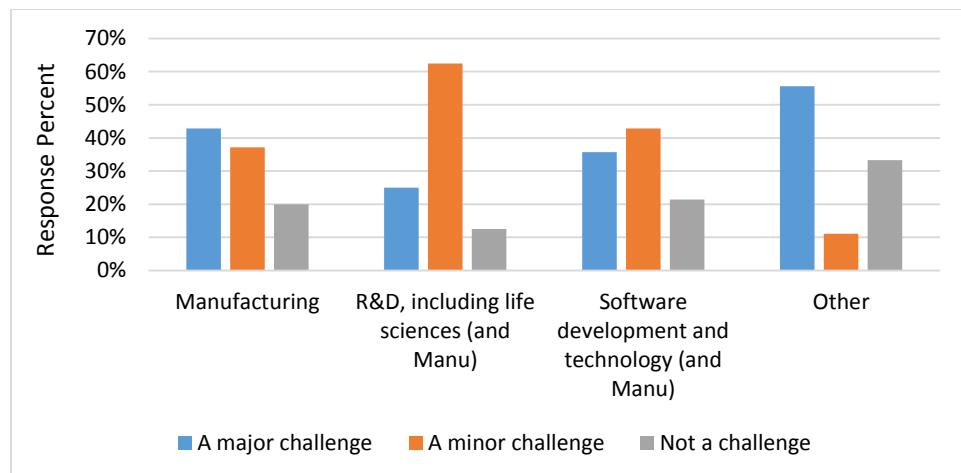
Source: MassEcon business survey data, UMDI analysis

Figure 16. Challenge of Transportation Costs by Industry



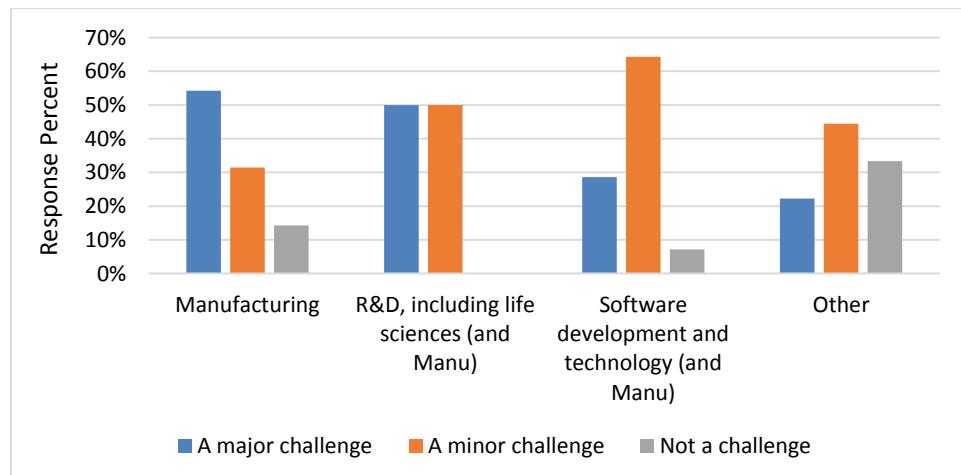
Source: MassEcon business survey data, UMDI analysis

Figure 17. Challenge of Real Estate and/or Land Costs by Industry



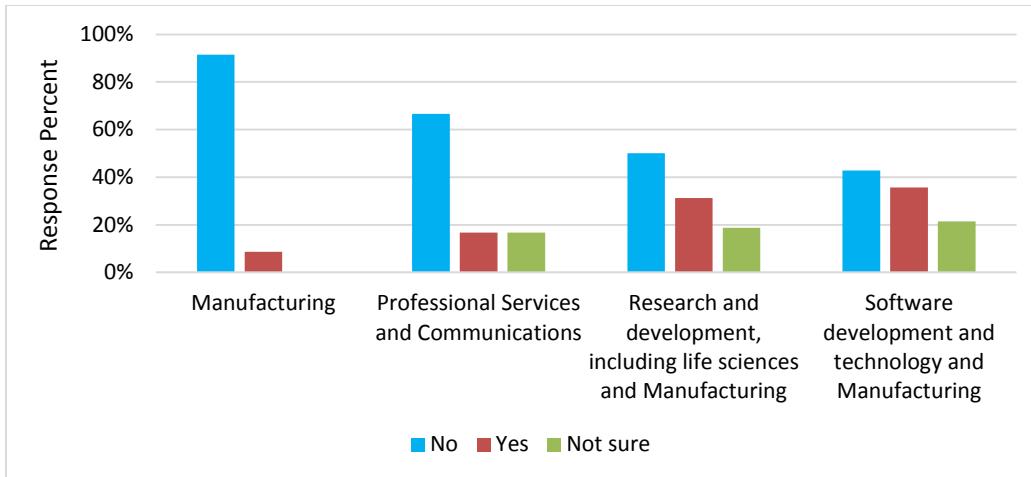
Source: MassEcon business survey data, UMDI analysis

Figure 18. Challenge of Labor Costs by Industry



Source: MassEcon business survey data, UMDI analysis

Figure 19. Importance of Educational Partnerships by Industry



Source: MassEcon business survey data, UMDI analysis

Appendix F: Interviewed Companies

Table 19. Interviewed Companies

Company	Sector	Region
Carbonite	Software Development	Greater Boston
Dassault	Software Development	Greater Boston
Shire	Bio-tech/Pharma	Greater Boston
SanDisk	Software Development	MetroWest
Menck Windows	Precision Manufacturing with CNC equipment	Pioneer Valley
IBM	Software Development	MetroWest
eClinicalWorks	Healthcare Software	Central
EMD Serono	Bio-tech/Pharma	Southeast
General Dynamics	Defense Manufacturing	Berkshire
EF Education First	Educational Services	Greater Boston
Asahi/America	Plastics Manufacturing and R&D	Northeast
<i>Anonymous</i>	<i>Anonymous</i>	Greater Boston/Pioneer Valley
GE Healthcare	Bio-tech/Pharma	MetroWest
Accurounds	Precision Manufacturing	Southeast

Source: MassEcon business survey data, UMDI analysis

Appendix G: Company Profiles

AccuRounds – Avon

AccuRounds is a contract manufacturer of precision-machined cylindrical components such as shafts, pins, and bushings for companies in fields like medicine, aerospace, and defense. Based in Avon, AccuRounds is a second-generation family company with 75 employees. Two years ago, it saw an opportunity to grow and subsequently expanded into additional space and was able to experience significant growth in revenues and employment. As AccuRounds determined it needed to expand to meet its growth potential, it focused on locating in a modern and larger facility to increase the transparency and collaboration of its work environment. But it also wanted to make sure that it did not greatly disrupt the commute of existing employees. The company searched in Avon and nearby towns but did not find any suitable properties. Eventually, the company decided to build an 18,000-square-foot addition to its existing facility of 27,000 sq. ft. The construction of new space did lead to some problems and cost overruns, but was completed on-time by the contractor. Other challenges included delays with the tax incentives, and slow communication and information-sharing between AccuRounds, the state, and the town. Ultimately, a tax increment financing (TIF) incentive was approved to lower property taxes, though that process also presented some challenges.

Avon has been home to AccuRounds since its founding in 1976. The company continues to see value from this location due to high quality of life, easy highway access, access to labor, and active relationships with area education partners. The most common training pipeline for the company is vocational schools, which provide the machinists that comprise the core of the company's workforce. As the company has transformed its business, AccuRounds has increased its number of engineers to seven which has led it to develop relationships with local universities and colleges.

Looking to the future, the biggest concerns of AccuRounds are the rising costs of living, energy, and health insurance, and the decline of the supply chain in the region. The supply chain challenge for AccuRounds extends in both directions to the companies that supply AccuRounds and the companies it sells to. As these supplier and client companies fall victim to high costs or the relocation of their customers, they close. In the short-term, these closures provide a rich source of qualified workers, but in the long-run with fewer suppliers and OEMs, AccuRounds worries that its business could become difficult in Massachusetts.

Carbonite – Boston

Carbonite provides cloud backup and disaster recovery services to consumers and businesses. When the company needed more space to expand, it did not look outside of its native Boston. With the help of a good project manager and willing landlord, Carbonite found a space that it is happy with. Located in Downtown Crossing, the new office is home to approximately 280 employees who have seen their collaboration and cohesiveness improve as the move resolved the space and office layout constraints present in their previous location.

Boston's quality of life and rich talent pool were the primary reasons Carbonite did not consider leaving the city during its search for a new office. The diversity of Boston in both its population and businesses was attractive and provided a vibrant environment for views and ideas that are beneficial to the workers and company. A competent and hardworking talent pool provides a "goldmine" for companies that depend on intellectual capital. Other businesses in the region provide networking and collaboration opportunities, though they can also provide competition in increasingly constrained labor markets.

Both real estate and electricity costs were singled out as issues for Carbonite. The frequent complaint against the transportation system being overtaxed and unreliable was repeated here. The expanding economy and insufficient housing are impeding Carbonite's ability to find enough workers who reside locally. Its staff come from New Hampshire, Rhode Island, and across Massachusetts. Ultimately, the company believes that without coordinated policy effort there will be a shortage of the type of workers that the eastern Massachusetts economy is built on.

GE Healthcare – Marlborough

GE Healthcare's Life Sciences is a \$4 billion business with over 11,000 employees operating in more than 100 countries. It provides tools for drug discovery and biomanufacturing, as well as a suite of diagnostic pharmaceuticals to help drug manufacturers, researchers, and clinicians accelerate precision medicine. GE Healthcare Life Sciences' North American headquarters is based in Marlborough, Massachusetts. When the business decided to consolidate its northeastern operations into one site, it considered multiple states. In the end, the company found the state's life sciences cluster to be the most compelling reason to locate in Massachusetts due to the workforce, and the large amount of National Institutes of Health (NIH) funding, venture capital, research hospitals, and universities.

While searching for a Massachusetts location, GE Healthcare met with and received advice from many state agencies and economic development organizations, and singled out Marlborough's Economic Development Corporation and local government for their help finding a site and rendering assistance for this relocation project.

The benefits of the Massachusetts life sciences cluster have been most obvious in finding and hiring skilled talent. Since moving to Marlborough, GE Healthcare has hired more than 250 employees who, according to senior leaders at the company, have been "outstanding." Overall, the company says that even though it came in with high expectations, recruiting has been easier and the quality of hires even better than expected. Like other companies interviewed, they see transportation challenges and high housing costs as two long-term issues for the Commonwealth.

IBM – Littleton

IBM set out with the goal of consolidating multiple Massachusetts locations into a single campus in the state for its software development teams. Ultimately, the company identified a former Hewlett Packard (HP) building in Littleton that could – with some adjustments – provide the space and amenities it needed. IBM strongly preferred to remain in Massachusetts, in large part because of the state's highly talented workforce. Thanks to a strong collaborative effort by state and local officials, IBM had no need to look at relocation options in other states.

The Littleton location met the company's basic requirements, but was not without its challenges. The scale of accommodation and cooperation between IBM, the state, town, and others was the most extensive of the interviews conducted in this study, partly because IBM's employment base in the state exceeds any of the other companies interviewed. State and local government combined to provide tax incentives for the relocation project, and these state and local partners also collaborated to address the site's power and transportation needs. For example, a second power line was built to provide greater reliability for IBM's control center, which is relied upon by systems around the world. In addition, the commuter rail schedule was modified to provide a viable "reverse commute" option for IBM's workers. Generally, IBM feels that the public-sector efforts show that it is wanted and appreciated in the region which gives it more assurance for future investments. Beyond public-sector support, IBM sees other advantages of its location in Massachusetts. In particular, the technology and health care clusters in Massachusetts help provide a deep pool of highly-skilled talent, and opportunities for collaboration and sales, especially for its Watson platform. IBM can also rely on the region's multiple universities to replenish the talent pool with workers with the diverse and specialized credentials needed for its different business units, such as doctorates for the research group or MBAs for the business consulting side.

IBM points to similar challenges as the other eastern Massachusetts companies. Even with modifications to the train schedule and its location outside of the core urban area, IBM still has difficulty ensuring the daily presence of its staff. Management and staff have had to adjust to the transportation problems by relying more on telecommuting. Despite the commuter rail, young workers are difficult for IBM to recruit because they prefer to live in the city and cannot easily get to Littleton. IBM anticipates that it will have an easier time attracting talent to its new Watson Health headquarters opening in Cambridge.

Jarvis Surgical – Westfield

Jarvis Surgical is a fifth-generation family-owned business in Westfield that manufactures large joint medical devices and components for hip, knee, shoulder, and ankle assembly. The company began work in 1901 in Connecticut and expanded its operations in Westfield, Massachusetts in 1994. After considering space in Connecticut and Massachusetts, Jarvis Surgical decided to remain and expand in Westfield where it doubled its footprint to 35,000 square feet and hired 15 new employees in 2016.

The company selected Westfield due to tremendous support from the local and state government, tax benefits from the state and town, and ease of the expansion process. Jarvis Surgical worked with local vendors, including a local construction company who was efficient, and worked within budget and time frame to complete the expansion. Westfield was also an attractive location due to the local workforce. The area's vocational high school produces a millennial talent pool from which Jarvis Surgical has hired several employees. Jarvis Surgical is a draw for young workers because they can make a good living as a machinist, and cost of living is affordable in the western part of the state. Most of the company's 70 employees live in Westfield and neighboring communities of Ludlow and Chicopee.

In addition to its 2016 expansion, the company recently opened another business within the same building, Echelon Industries Corporation, which has an AS9100 accreditation and focuses on manufacturing devices for the aerospace industry. Echelon Industries also purchased a welding company which is housed within the same building as Jarvis Surgical and Echelon. Looking to the future, Jarvis Surgical plans to keep hiring and expanding, eventually passing the company down to the daughters of the company's President and CEO, Clayton Jarvis.

Shire – Cambridge

Shire, which combined with Baxalta in 2016, is the leading global biotechnology company focused on serving people with rare diseases and other highly specialized conditions. Shire's mission is to develop and deliver breakthrough therapies for the hundreds of millions of people in the world affected by rare diseases and other high-need conditions, and who lack effective therapies to live their lives to the fullest. Massachusetts is home to more than 3,000 of Shire's 22,000 employees.

Shire's current Massachusetts footprint includes almost 2 million square feet of lab, manufacturing and corporate space in Cambridge, Lexington, Waltham, Burlington, North Reading, and Milford. Most recently, Shire announced that it has leased an additional 343,000 square feet of space in Kendall Square.

Before the combination of Shire and Baxalta, both companies had a number of options – both in the US and Europe - for locating their facilities. In 2014, Shire announced that Massachusetts would be home to its US Operational Headquarters. In 2016, Baxalta announced that they would be housing their new R&D center in Cambridge. The city's role as the leading cluster for the bio-tech industry in the U.S. was and is an important factor when Shire considers where to locate and expand. The life sciences "ecosystem" was critical to their decision as they seek to leverage the area's specialized labor, venture capital, hospitals, universities, and range of small bio-tech firms. Even in the face of generous incentives from other states, the strength of this cluster was enough to sway the final location decision.

Like other companies interviewed in the Cambridge/Boston area, Shire's challenges focus on traffic and MBTA service that can make the daily commute challenging, as well as the high costs of living, and high real estate costs.

About the UMass Donahue Institute

The UMass Donahue Institute (UMDI) is the public service outreach and economic development unit of the University of Massachusetts President's Office. Established in 1971, the UMDI coordinates multi-campus initiatives that link UMass, other public and private higher education, and other external resources with the needs of government agencies, corporations, and nonprofit organizations. UMDI provides significant economic and public policy analysis, organizational development, training, education, financial management education, research, and evaluation to federal and state agencies, nonprofits, industry associations, and corporations. UMDI draws on its unique position within higher education to serve as a bridge between theory, innovation, and real-world applications.

The Economic and Public Policy Research (EPPR) group is a leading provider of applied research, helping clients make more informed decisions about strategic economic and public policy issues. EPPR produces in-depth economic impact and industry studies that help clients build credibility, gain visibility, educate constituents, and plan economic development initiatives. EPPR is known for providing unbiased economic analysis on state-level economic policy issues in Massachusetts and beyond, and has completed a number of industry studies on IT, defense industries, telecommunications, health care, and transportation. Their trademark publication is called MassBenchmarks, an economic journal that presents timely information concerning the performance of and prospects for the Massachusetts economy, including economic analyses of key industries that make up the economic base of the state. Please visit <http://www.donahue.umassp.edu> for more information.

About MassEcon

MassEcon, founded in 1993, is a non-profit, non-partisan entity that champions Massachusetts as the best place to start, grow, or locate a business. Bringing the public and private sectors together, we work to create a supportive culture, enhance business growth, promote investment in communities, and spread prosperity throughout the state.

Our services include the state's only Site Selection Service, which helps expanding and relocating companies find a home in the Commonwealth; the Research & Information Service, which provides companies with the information they need to evaluate the Commonwealth as a location to grow; and the Massachusetts Ambassadors, a network of civic and corporate leaders who help market Massachusetts as a place to do business. Under the Team Massachusetts banner, MassEcon celebrates the achievements of Massachusetts companies from all regions of the state through our annual Economic Impact Awards; takes the Massachusetts story on the road through selected trade show and business development missions; and serves on the board of the Massachusetts Marketing Partnership. You can find out more about us at massecon.com.