

# OFFICE OF PERFORMANCE MANAGEMENT & OVERSIGHT

## FISCAL 2013 ANNUAL REPORT GUIDANCE

The Office of Performance Management & Oversight (OPMO) measures the performance of all public and quasi-public entities engaged in economic development. All agencies are required to submit an Annual Report, which includes all of the following information and demonstrates progress made against the Annual Plan submitted for the same year.

Based on review of Performance to Plan, the Office of Performance Management and Oversight will annually re-evaluate the goals and measures established by the agencies. The Office will recommend changes to goals and measures as appropriate to align with the statewide economic development policy and plan.

The annual reports of each agency will be published on the official website of the Commonwealth, and be electronically submitted to the clerks of the Senate and House of Representatives, the Chairs of the House and Senate Committees on Ways and Means and the House and Senate Chairs of the Joint Committee on Economic Development and Emerging Technologies.

### Filing Instructions:

The Fiscal Year 2013 report is due no later than **Friday, November 1, 2013**. An electronic copy of the report and attachments A & B should be e-mailed to [Anne.Struthers@state.ma.us](mailto:Anne.Struthers@state.ma.us).

### 1) AGENCY INFORMATION

<b>Agency Name</b>	Massachusetts Life Sciences Center
<b>Agency Head</b>	Susan Windham-Bannister, Ph.D
<b>Title</b>	President and CEO
<b>Website</b>	<a href="http://www.masslifesciences.com">www.masslifesciences.com</a>
<b>Address</b>	1000 Winter Street, Suite 2900, Waltham, MA 02451

### 2) MISSION STATEMENT

Please include the Mission Statement for your organization below.

The Massachusetts Life Sciences Center develops and offers creative programs that fund innovation-driven economic development initiatives in the Massachusetts life sciences ecosystem, but also may

have relevance for other “innovation” sectors.

Our mission:

- Serve as the “hub” of the Massachusetts life sciences ecosystem
- Encourage innovation through investments in good science and good business
- Strengthen and protect Massachusetts’ global leadership position in the life sciences
- Accelerate the commercialization of promising treatments, therapies and cures
- Create jobs and drive economic development

### 3) PERFORMANCE ON GOALS AND OBJECTIVES

Please provide details on the agency’s progress and accomplishments for Fiscal Year 2013 as it relates to the Fiscal Year 2013 Plan submitted by your agency. This information should be included as **Attachment A and should include prior year perspective**. In addition to your Performance to Plan Report, Questions 5 through 10 provides guidance on the specific information required under Chapter 240 of the Acts of 2010.

### 4) ACCOUNTING

Please provide financial information for your agency. Below please give a summary of *Receipts and Expenditures* during the fiscal year, and include the *Assets and Liabilities* at the end of the fiscal year. Please include the most recent audited financial report for the agency as **Attachment B**.

	AMOUNT
Receipts	\$ 69,621,079
Expenditures	\$ 62,985,939
Assets	\$62,872,933
Liabilities	\$33,176,922

### 5) INVESTMENTS OR GRANTS TO BUSINESSES OR INDIVIDUALS

Does your agency make **investments** and/or provide **grants** to businesses or individuals? **Yes X No** ☐

If **Yes**, please provide detailed information on investments and/or grants made during FY13 in the **Performance on Goals and Objectives** section of this report. Information should include the number, nature and amounts of investments made and grants awarded by your agency along with job, investment and/or other economic development impact. Please list the name(s) of the investment and/or grant programs offered by your agency in the space provided below:

Accelerator Loan Program, Capital Program, Cooperative Research Matching Grant Program, High School Equipment and Supplies Grant Program, International Program, Internship Challenge, Tax Incentive Program, MIIP

## 6) DEBT OR EQUITY INVESTMENT DETAILS

Is your agency involved in **debt** or **equity investments** for businesses? **Yes X** **No** ☐

If **Yes**, please provide detailed information on debt and/or equity investments made during FY13 in the **Performance on Goals and Objectives** section of this report along with job, investment and/or other economic development impact. Please list the name(s) of the debt and/or equity investments programs offered by your agency in the space provided below:

Accelerator Loan Program

## 7) LOAN DETAILS

Is your agency involved in **real estate loans**, **working capital loans**, or any **other type of loan** or **guarantee**? **Yes X** **No** ☐

If **Yes**, please provide detailed information on loan(s) and/or guarantee(s) made during FY13 in the **Performance on Goals and Objectives** section of this report along with job, investment and/or other economic development impact. Please list the types of loan(s) and/or guarantee(s) offered by your agency in the space provided below:

Accelerator Loan Program

## 8) OTHER FORMS OF FINANCING OR FINANCIAL ASSISTANCE?

If your agency provides any other form of financing or financial assistance, please include FY13 details in the **Performance on Goals and Objectives** section of this report along with job, investment and/or other economic development impact. Please list the types of other forms of financing offered by your agency in the space provided below:

**Capital Program (Grants), Cooperative Research Matching Grant Program, High School Equipment and Supplies Grant Program, International Program (Grant), Internship Challenge (Grant), Tax Incentive Program. PLEASE SEE A LIST OF ALL PROGRAM AWARDEES, ATTACHMENT A2. MLSC's Annual Report is Attachment C.**

## 9) PATENTS OR PRODUCTS

Does your agency track **patents** or **products** resulting from agency-funded activities? **Yes X** **No**

If **Yes**, please include details in the **Performance on Goals and Objectives** section of this report along with job, investment and/or other economic development impact. Please list the agency-funded activities of your agency that promote patent and product advancement in the space provided below:

Cooperative Research Matching Grant Program

## 10) TECHNICAL ASSISTANCE

If your agency provides technical assistance, please provide detailed information on technical assistance provided during FY13 in **the Performance on Goals and Objectives** section of this report along with job, investment, and/or other economic development impact. Please list the name(s) of the technical assistance programs offered by your agency in the space provided below:

**Through our information sessions, we offer guidance on the technical effort needed to become an applicant to any of our programs. We explain how to use our portal, how to file paperwork like the Certificate of Good Standing (with SOS and DOR) and we guide companies on how to register as a business in MA. We also provide feedback on applications that were not selected for our programs in hopes of a successful subsequent application.**

## Attachment 1A.

### Goals and Performance Measurements FY 2013

**NOTE: A list of all awardees referenced in the answers below is Attachment D.**

#### Goal 1. Advance Education and Workforce Development for Middle-Skills Jobs

##### **High School Equipment and Supplies Grant Program\***

The High School Equipment and Supplies Grant Program enables the purchase of equipment and supplies to train students in life sciences technology and research as well as addresses a funding gap in capital dollars for public vocational and technical schools, public schools in Gateway Cities, and not-for-profit workforce training and educational institutions. Eligible high schools, as well as community-based organizations that serve such high schools, can apply for up to \$250,000 in grant funding by completing an online application. Applicants seeking funding of greater than \$100,000 (but no more than \$250,000) are required to secure matching funds, in cash or as an in-kind donation, for any amount over \$100,000 from an industry partner.

- ***In FY 2013, MLSC expanded eligibility for this program to include public schools in Gateway Cities. Previously, it was open only to vocational-technical high schools. Schools and organizations continue to see the value in the Equipment and Supplies Program as seen by the increase in applications in FY 2013.***
- # of awards and total amount:
  - \$3.2 million in awards to 31 schools.
- Geographic distribution of awards:
  - *The 31 awards were well distributed across the Commonwealth. Awards were made to schools/organizations in Western MA (Pittsfield), the North Shore ( Lynn) Central MA (Fitchburg, Marlborough, and Worcester) and the Southeast/South Coast (Fall River).*
- *53 high schools and educational organizations from across Massachusetts applied to the competitive High School Equipment and Supplies program in FY 2013 --. a 23.26% increase from FY 2012 ( 43 applications received)*

Please note: More descriptive data regarding the FY 2013 awards will be available in FY 2014.

## Internship Challenge Program\*\*

The Massachusetts Life Sciences Center's Internship Challenge is a workforce development program focused on enhancing the talent pipeline for Massachusetts companies engaged in life sciences. The program facilitates the placement of students and recent graduates who are considering career opportunities in the life sciences in paid internships across the state.

Consistent with the MLSC's role as a catalyst in growing the talent needed by the life sciences industry, the program is designed to create hundreds of new internship opportunities each year by enabling small businesses to hire paid interns.

Objectives of the Internship Challenge include expanding the pool of prospective employees who have practical experience, enhancing opportunities for mentoring, enabling more students to explore career opportunities despite the challenging economic environment, and providing students interested in working in the life sciences a peer network through educational and informational networking events.

***The number of applicants to, and companies participating in, the Internship Challenge Program is growing as word spreads about the value of this resource. Promoting diversity in the life sciences is a priority for the MLSC in general and within this program and this is reflected in the mix of interns placed in FY 2013 vs. FY 2012.***

- # of applicants to the MLSC Internship Challenge Program:
  - 2,293
    - # of Applicants increased 72% over FY 2012 (1,333)
- # of interns placed:
  - 428 (18% of applicants)
  - This is an increase of 27.8% over FY' 2012 (309 interns placed).
- # of sponsor companies:
  - 222
    - Sponsor companies increased by 9.9% over FY 2012 (202)
- # of new sponsors for the Internship Challenge program:
  - 99
    - New sponsor companies increased by 7.6% over FY 2012 (92)
- # of repeat sponsors for the Internship Challenge program:
  - 123
    - Repeat sponsors increased by 78% over FY 2012 (69)
- # and type of academic institutions represented by interns
  - # of interns from private institutions – 272 (64%)

- FY 2012: 185 (60%)
    - # of interns from public institutions – 156 (36%)
      - FY 2012: 124 (40%)
    - # of interns from 2-year/certificate programs students – 50 (12%)
      - FY 2012: 39 (13%)
    - # of 4-year college/universities students – 265 (62%)
      - FY 2012: 198 (64%)
    - # of Master's students – 113 (26%)
      - FY 2012: 72 (23%)
  - Demographics of interns placed through the program:
    - Gender
      - # of female interns – 201 (47%)
        - FY 2012: 156 (50%)
      - # of male interns – 227 (53%)
        - FY 2012: 153 (50%)
    - Race/Ethnicity
      - # of Asian/South Asian/Asian-American interns – 109 (25%)
        - FY 2012: 72 (23%)
      - # of Black (African, African-American, Caribbean) interns – 20 (5%)
        - FY 2012: 18 (6%)
      - # of Caucasian interns – 228 (53%)
        - FY 2012: 178 (58%)
      - # of Hispanic/Latino interns – 20 (5%)
        - FY 2012: 13 (4%)
    - # of Multi-Racial/Other – 15 (4%)
      - FY 2012: 4 (1%)
- Interns' satisfaction with the internship experience:
  - 92% of survey respondents (135 out of 428 interns) indicated that their internship met or exceeded their expectation.
    - In FY 2012, 96% of survey respondents (82 out of 309 interns) indicated that their internship met or exceeded their expectation.
- # of interns who decide to pursue a career in life sciences
  - 85% of survey respondents indicated that their interest in working in a MA life sciences company increased.
    - In FY 2012, 81% of survey respondents indicated that their interest in working in a MA life sciences company increased.
- Sponsors satisfaction with interns selected and value received through the program

- 99% of survey respondents (75 of 222) indicated that their intern(s) met or exceeded their expectations. 100% of the companies surveyed would participate in the Internship Challenge Program again next round.
  - In FY 2012, 97% of survey respondents (63 of 161) indicated that their interns met or exceeded their expectations. 100% of the companies surveyed would participate in the Internship Challenge Program again in the next round.
- # of interns hired by sponsors for FT or PT jobs in MA following the internship:
  - FY 2013: 78 (18%)
    - More interns were hired for full or part time positions post internship in FY 2013 than in FY 2012. FY 2012: 61 (20%).

\*\*Internship program fiscal year was from May 1, 2012 to April 30, 2013.

#### STEM Discretionary Grants

- ***High quality Science, Technology, Engineering and Math (STEM) programs are an important part of producing the highly skilled and educated workforce that life sciences companies demand. MLSC is proud to participate in Governor Patrick's STEM Task Force and to fund innovative STEM-related programs throughout Massachusetts through the discretionary grants, as well as the Capital Grant Program, and the High School Equipment and Supplies Grant Program.***
- # of students served by STEM programs receiving MLSC grants:
  - MLSC awarded 8 organizations grants for STEM programs totaling \$308,950. The MLSC's intent is to encourage STEM education in K-12 with a focus on demographics that are underrepresented in STEM fields. While we estimate that over 2,000 students will take advantage of the programs that received funding from MLSC, we do not yet have the exact figures as some of the programs continued to develop their curriculum/project late into FY 2013.
    - In FY 2012, MLSC awarded 4 organizations a total of \$180,000 of STEM funding.

#### Goal 2. Support Innovation and Entrepreneurship, including Ecosystem

##### Accelerator Loan Program

The Accelerator Loan Program reflects the MLSC's ongoing commitment to supporting early-stage life sciences companies that will grow employment opportunities and stimulate innovation across the Commonwealth. The primary objective of the Accelerator Loan Program is to provide working capital to early stage life sciences companies with a high potential for technology

commercialization, rapid growth and private equity financing.

- ***The Accelerator Loan Program continues to be a critical resource to bridge young companies across the “Valley of Death.” MLSC provides feedback to applicants who are not successful during their first attempt at funding and has recently found that some of these companies are submitting successful applications for funding in subsequent rounds. In addition, the applicant pool for FY 2013 was more geographically diverse than in previous rounds.***
- # and geographic distribution of applicants to the MLSC Accelerator Loan Program
  - *MLSC held 2 rounds of the Accelerator Loan Program in FY 2013 and a total of sixty-six applications were received. Of these 66 applications, 15 companies applied to both the first and second rounds. Overall, 92% of the applications (61) were deemed eligible for review. Of these 61, about 10% (6) were awarded funding, totaling nearly \$6 million of investment. MLSC terminated the \$1 million award to one of these initial awardees.*
    - *In FY 2012, MLSC received 67 applications and about 9% (6) companies were awarded funding totaling \$3.1 million.*
  - *Of the 66 applications, half (33) were submitted by companies located in cities and towns west Rt. 128, such as Andover, Billerica, Hopkinton, Marshfield and Sudbury; of these, almost one-quarter (21%) were submitted by companies outside of Rt. 495, including companies in Amherst, Wilbraham, Worcester and Milford.*

## Miscellaneous

- # of Business Plan Competitions funded by MLSC
  - *MLSC co-sponsored 2 business plan competitions in FY 2013: the Center funded MassChallenge at the “Platinum Level” -- \$100,000 -- and the Massachusetts Institute of Technology was awarded \$10,000 for their business plan competitions, respectively.*
    - *In FY 2012, MLSC sponsored 2 businesses plan competitions as well: MassChallenge at the “Platinum Level” -- \$100,000 -- and the WPI Venture Forum for \$10,000.*
- # of new collaborations, consortia and/or partnerships initiated/funded by the MLSC
  - *Neuroscience Consortium. The Massachusetts Life Sciences Center (MLSC) launched the first Request for Proposals (RFP) funded by seven global biopharmaceutical companies that comprise the Massachusetts Neuroscience Consortium (the “Consortium”). The Consortium, the formation of which was announced in June 2012 at the Bio International Convention, is funding pre-clinical neuroscience research at Massachusetts academic and research institutions.*

*Participating companies include AbbVie, Biogen Idec, EMD Serono, Janssen Research & Development, Merck, Pfizer and Sunovion Pharmaceuticals. Each of the Consortium members contributed equally to the total available first-round project funding of \$1,750,000.*

*Consortium Members have pooled their resources to fund the identification and validation of novel targets for the symptomatic treatment and modification of chronic and debilitating neurological diseases. First-round proposals were solicited within the primary focus areas of Alzheimer's Disease, Multiple Sclerosis, Neuropathic Pain, and Parkinson's Disease. Nearly 100 proposals were submitted from universities, medical centers and research organizations from across the Massachusetts.*

*In July, 2013 (FY 2014) the MLSC announced the first seven awards under the consortium, including three focused on Alzheimer's, two focused on neuropathic pain, and one each focused on muscular sclerosis and Parkinson's Disease.*

*Massachusetts-Israel Innovation Partnership. The Massachusetts-Israel Innovation Partnership (MIIP) was first announced in June 2011 at the BIO International Convention in Washington, D.C., and the first joint solicitation for proposals was launched in September 2011 by MATIMOP, the Israeli implementation agency, on behalf of the Office of the Chief Scientist (OCS) in the Ministry of Economy, on the Israeli side and by the three participating Massachusetts agencies: the Massachusetts Life Sciences Center, the Massachusetts Technology Collaborative (MTC) and the Massachusetts Clean Energy Center (MassCEC). Massachusetts and Israeli companies that are engaged in cooperative industrial research and development projects, and that were selected for funding within the MIIP framework, were awarded R&D grants, respectively, by the Office of the Chief Scientist in Israel and the three Massachusetts agencies participating in the program during the first round of MIIP.*

*In June of 2013, MATIMOP and MLSC announced the second round of grants awarded under the MIIP. The funding authorities in both states recently approved two life sciences research and development (R&D) collaborations between Massachusetts and Israeli companies, with a total R&D budget of over \$2 million.*

- # of convening sessions, roundtables, etc. initiated/funded by MLSC.
  - *MLSC regularly meets with international delegations, convenes meetings with stakeholder groups and attends events that allow MLSC to market our programs. For example, for each round of Accelerator, International (IC-IP/MIIT) and Tax Credit program, MLSC holds information sessions at locations such as MassBio, MassMedic, the UMass campuses, and other colleges, universities and economic*

*development organizations throughout Massachusetts.*

- # of participants in MLSC Peer Review Panel
  - *We have 223 Peer Reviewers.*
- # of repeat participants in the MLSC Peer Review Panel
  - *Once someone volunteers to be a peer reviewer, they are in our system unless they ask to be removed. MLSC calls upon them on a “repeat” basis if their expertise is relevant to the programs we run and the applicants we attract efforts.*

### **Cooperative Research Grants**

The Cooperative Research Matching Grant Program is designed to promote industry-academic research collaborations, support translational research, and accelerate the commercialization of promising products and services. Not-for-profit academic/research institutions are eligible to apply for grant funding of up to \$250,000 per year over two years, provided that they have secured an industry sponsor for the research which will match MLSC funds on at least a 1:1 basis.

- ***Massachusetts’ world-class research institutions plan an important role in the life sciences ecosystem in Massachusetts --providing the highly skilled workforce that companies need, and entrepreneurs who are building the companies of the future. , In addition, global life sciences companies locate in Massachusetts to have access to our academic institutions. MLSC developed the Cooperative Research Grant to support industry-academic collaborations, which saw increase in applicants in FY 2013.***
- # of companies and academic institutions applying for Cooperative Research grants to develop technology for commercialization.
  - *MLSC received 24 applications for funding through the Cooperative Research Grant program. Four, 2 year Cooperative Research Grants of \$500,000 each were announced in June 2013.*
    - *This program was last offered in FY 2011 and 21 applications were received and 2 were funded. Applications for FY 2013 were up 8.7%.*

### **Small Business Matching Grant Program**

The primary objective of the Small Business Matching Grant Program (SBMG) is to provide grants to commercialization-ready life sciences and technology companies that have received at least the equivalent of a Phase II Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) grant from federal agencies such as the National Institutes of Health (NIH), National Science Foundation (NSF), Department of Defense (DOD), etc.

Target applicants are emerging life sciences companies whose products are production-ready and have high potential for market adoption and penetration, are poised for rapid growth that will create jobs in the Commonwealth, and are positioned for additional financing.

- ***MLSC is currently reviewing the SBMG program and tentatively planning to offer the program again in FY 2014 or FY 2015. Program offerings are based on feedback and demand from companies, as well as input from the MLSC Board and the Scientific Advisory Board.***
- # and geographic distribution of companies applying for SBMG grants
  - *MLSC did not run the SBMG program in FY 2013.*
    - *In FY 2012, 19 companies applied for SBMG grants. One company was granted an award of \$500,000.*

### Goal 3. Support Regional Economic Development through Infrastructure Investments

#### **Capital Grant Program**

The Capital Program provides grants for capital projects that enable and support life sciences workforce development and training, research and development, commercialization and/or manufacturing in Massachusetts. Applicants are academic organizations, research institutions, research hospitals, business incubators and other non-profit organizations. MLSC recognizes that investment in capital projects and infrastructure is required to create and sustain the attributes that make Massachusetts attractive to innovation clusters such as life sciences.

- ***MLSC's Capital Program fills critical capital infrastructure needs across the Commonwealth and builds regional capabilities that enable life sciences-driven economic development. The geographic reach of this program, particularly in FY 2013, is significant and the job creation, particularly in the trades, has been very positive. In addition, the creation of unique capital resources for life sciences research, development, commercialization and manufacturing contributes greatly to the life sciences ecosystem in Massachusetts.***
- # and type of applicants to the MLSC capital grant program
  - *41 entities (public and private colleges and universities, research institutions, hospitals, economic development groups, etc.) from across Massachusetts applied to the competitive Capital Grant program in FY 2013. Of these applications, MLSC's Board of Directors approved nine new Capital Program projects, eight new planning grants and one follow-on award to an existing project in FY 2013. In addition, funding was also approved for 4 earmarked projects. Capital funds awarded in FY 2013 totaled more than \$135 million, including more than \$100 million for projects located in Western Massachusetts.*

- *Applications increased 86% between FY 2012 and FY 2013. Part of this increase is due to the change in policy that allows previous awardees to compete for funding.*

#### Goal 4. Increase Ease of Doing Business

- ***Making sure Massachusetts is as business friendly as possible is important to MLSC and the life sciences sector. In order to attract companies, from small start-ups to large international companies, we seek to coordinate with state agencies and trade associations to speak with one voice and show companies that Massachusetts is a great place to do business.***
- # of collaborations with other quasi-public agencies, state agencies and stakeholder organizations that result in job creation in MA
  - *MLSC collaborates extensively with MOBD, Mass Development, MOITI, and Mass Econ. With these intense collaborations, we feel the “team Massachusetts approach” does enhance the likelihood of job creation. We also work with cities and towns throughout Massachusetts where the combined efforts most definitely increase the likelihood of company growth. We also work with the Massachusetts Technology Collaborative at the intersection of life sciences and ehealth. Finally, we work extensively with the trade associations such as MassBio and MassMedic which has further allowed us to create jobs in Massachusetts by showing that both the public and private sectors are working together towards the same goals.*

#### Goal 5. Address our Cost Competitiveness

##### **Tax Incentive Program**

In order to expand life sciences-related employment opportunities, promote health-related innovations and stimulate research and development, manufacturing and commercialization in the life sciences, the Massachusetts Life Sciences Center is pleased to announce that it is offering tax incentives in 2013 to companies engaged in life sciences research and development, commercialization and manufacturing in Massachusetts. The Life Sciences Initiative authorizes the MLSC to award up to \$25 million in tax incentives each year. The primary goal of the program is to incentivize life sciences companies to create new long-term jobs in Massachusetts. To qualify companies must receive certification from the MLSC and must demonstrate both the scientific and academic merit of their expansion plans.

- ***MLSC’s Tax Incentive Program has helped create and retain thousands of jobs in Massachusetts. At the same time, MLSC understands the need to protect public***

***resources. Therefore, to minimize risk, the Tax Incentive Program has strong recovery measures that return funds to the Commonwealth if a company does not create or sustain the jobs to which they committed.***

- # of companies applying for tax incentives:
  - *MLSC awarded \$23 million in tax incentives to 24 life sciences companies in FY 2013. Forty-four companies applied. Outcome of awards will not be known until January 2014. Generally, the cost per job is \$20,000 to \$25,000.*
    - *In FY 2012, MLSC awarded 26 companies a total of \$20.3 million in tax incentives.*

#### Goal 6. Create/Retain Jobs

##### **Overall Data**

- # of construction jobs\*\*\*
  - 425
- # of permanent jobs\*\*\*
  - 1,186
- Direct job creation in FY 2013:\*\*\*
  - Over 1,600 jobs

*\*\*\*These numbers are based only on direct investment by the Center and do not include the NAICS Code Analysis conducted by Barry Bluestone and Adam Clayton-Matthews in their report, "Life Sciences Innovation as a Catalyst for Economic Development," (Attachment C) which captured the broad impact of the life sciences initiative on job creation within Massachusetts. It also does not include 2012 Tax Program awardees' job growth or the jobs numbers for the Massachusetts Biomanufacturing Accelerator at UMass Dartmouth. In addition, jobs created in FY 2013 are likely a result of awards from FY 2012 or before.*

- MLSC dollars invested in FY 2013:
  - \$173 million, including the Tax Program.
- ROI to the Commonwealth (Tax Incentive Program only)
  - *While we do not have the data on ROI for FY 2013, according to the Bluestone/Clayton-Matthews report referenced above, in general, for every \$1.00 invested by MLSC through the tax program, \$1.66 is returned to the Commonwealth.*



## **Fiscal Year (FY) 2013 Annual Report**

**“Investing in the State of Innovation”**

# MASSACHUSETTS LIFE SCIENCES CENTER



**To:** Governor Deval Patrick  
Secretary of Administration and Finance Glen Shor  
Senate President Therese Murray  
Speaker of the House Robert DeLeo  
State Comptroller Martin Benison  
Clerk of the Senate William Welch  
Clerk of the House of Representatives Steven James

*By forward: House and Senate Committees on Ways and Means and the Joint Committee on Economic Development and Emerging Technologies*

**From:** Susan Windham-Bannister, Ph.D.

**Date:** September 27, 2013

**Re:** FY 2013 Annual Report of the Massachusetts Life Sciences Center

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The Massachusetts Life Sciences Center (MLSC) respectfully submits this Annual Report detailing our operations and accomplishments during FY 2013.

We are the hub of the Commonwealth's thriving life sciences community and proudly serve as stewards of the \$1 billion Massachusetts Life Sciences Initiative, which proposed by Governor Deval Patrick in 2007, and passed by the state legislature and signed into law in June 2008. At the mid-point of this initiative, thanks in large part to the investments made by the Center in scientific research, company formation and growth, workforce development and infrastructure, Massachusetts has emerged as the global leader in the life sciences. The life sciences sectors are the fastest-growing industry in our state, and we are adding jobs faster than any other state.

This report and the accompanying FY 2013 Audit Report are submitted in fulfillment of the requirements mandated by the General Court pursuant to the MLSC's enabling statute of the Massachusetts General Laws, Chapter 23I (formerly Section 7, now Section 15), as amended by Chapter 130 of the Acts of 2008. Financial statements are contained in the accompanying FY 2013 Audit Report by McGladrey LLP.

As always, we appreciate your continued interest and support.

Sincerely,

A handwritten signature in blue ink that reads "SR Windham-Bannister".

Susan R. Windham-Bannister, Ph.D.  
President & CEO

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## Massachusetts: The Global Leader in Life Sciences

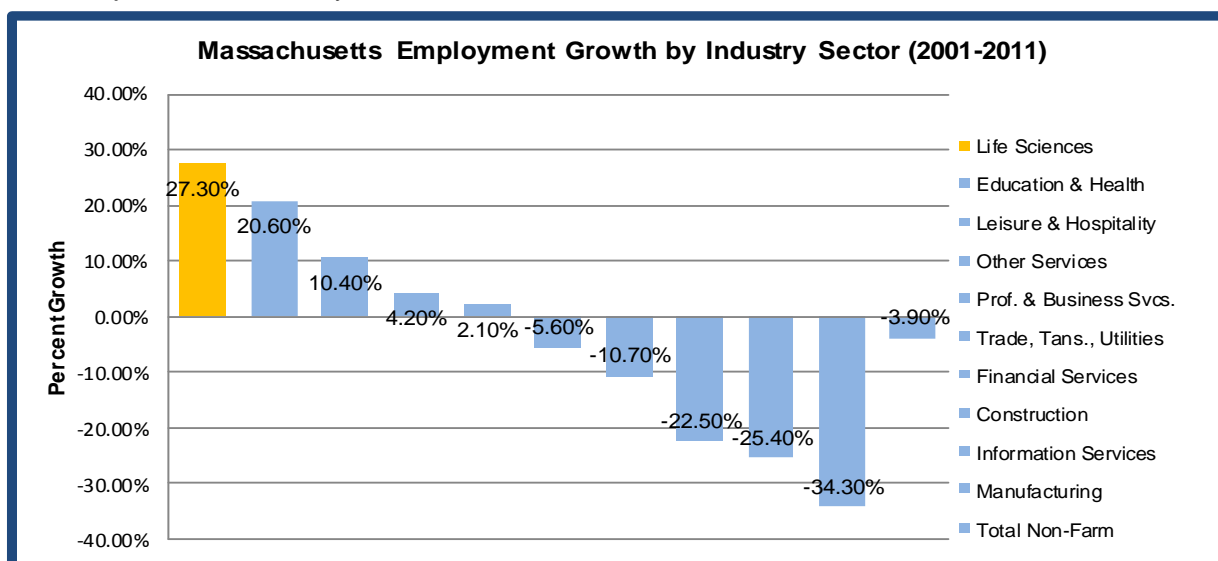
Five years ago Massachusetts was a recognized leader in the life sciences, but the state faced stiff competition, both domestic and international. Inaction would have diminished our leadership position – with negative repercussions for our state's reputation, as well as our economy.

At the 2007 BIO International Convention, Governor Deval Patrick took bold action by proposing the Massachusetts Life Sciences Initiative, a 10-year, \$1 billion investment to enhance the state's leadership in the life sciences, and to strengthen the life sciences as the engine for sustained growth in the Commonwealth. This initiative was enacted by our State Legislature in June 2008, and the Massachusetts Life Sciences Center (MLSC) was charged with its implementation.

Since then, the MLSC has become the hub for all sectors of the state's life sciences community – academic institutions, academic medical centers, and industry sectors that include biotechnology, pharmaceuticals, medical devices, medical diagnostics and bioinformatics.

The MLSC has not only been investing in innovation. It has also been *innovating* - developing new funding models, programs, tools and collaborative partnerships that spur economic growth, create jobs, catalyze innovation and accelerate the commercialization of promising treatments, therapies and cures that hold great potential for improving human health. In keeping with our role to help build a 21<sup>st</sup> century economy in Massachusetts, the MLSC has also been investing aggressively to prepare a diverse and inclusive workforce with the right skills to match the needs of our innovation sectors.

According to a recent Boston Foundation report released in March 2013, ***Life Sciences Innovation as a Catalyst for Economic Development: The Role of the Massachusetts Life Sciences Center***, authored by noted Northeastern University economists Barry Bluestone and Alan Clayton-Matthews, the MLSC has played a key role in making Massachusetts the recognized global leader in life sciences. At the mid-point of the 10-year Life Sciences Initiative, thanks in large part to the investments made by the MLSC in scientific research, company formation and growth, workforce development and infrastructure, the life sciences are the fastest-growing industry sectors in our state, and Massachusetts is adding life sciences jobs faster than any other state in the U.S.



Sources: B. Bluestone and A. Clayton-Matthews, *Life Sciences Innovation as a Catalyst for Economic Development: The Role of the Massachusetts Life Sciences Center* (March 2013)

## A Clean Sweep!

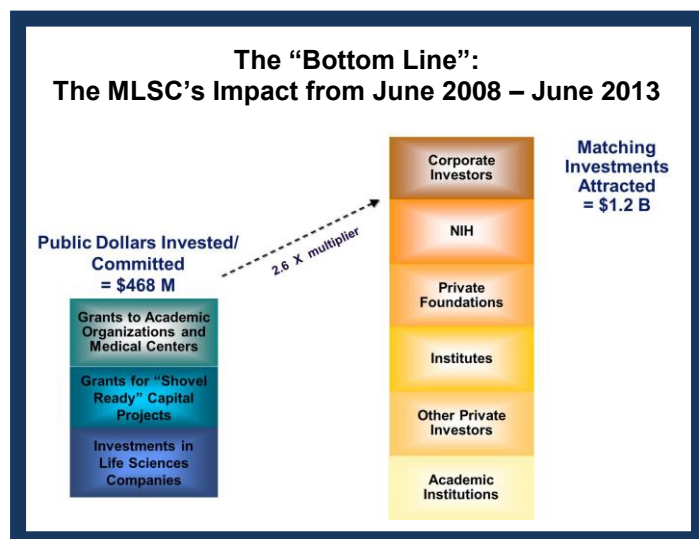
The Bluestone report also put forward a new growth theory for innovation-based economies, under which large companies are attracted to a region based on the presence of innovative, small, early-stage companies that they can acquire, partner with or license technologies from. Large companies want a front row-seat to the innovation that is happening in the early-stage environment. The report cited the MLSC's investments in early-stage companies as a critical factor in the MLSC's success at attracting major global companies to expand and invest in Massachusetts. This year marked a major milestone in those efforts -- with the announcement by Roche of plans to acquire Constitution Medical Investors and to make Boston their Center of Excellence in Hematology, all 10 of the world's largest biopharma companies now have a presence in Massachusetts. It's a clean sweep!

As Bluestone and Clayton-Matthews observe:

What is special about the Massachusetts Life Sciences Initiative is that it focuses explicitly on increasing the rate of innovation by encouraging a higher rate of research and development (R&D) in the life sciences and helping small firms in this supercluster convert basic research into marketable products and services. New growth theory posits this activity is the very fountain of economic growth.... And here is the key to understanding the central role of the MLSC. While the large firms can easily exist without the MLSC, the small life sciences firms need the Center...In this environment, the MLSC has become an important investment partner for smaller life sciences firms providing them with funds for translational research and development...This tends to help keep them in the Commonwealth and not chasing investment funds in other regions. Because these minnows stay here, Big Pharma has settled here from all over the world to be near them. The result has been extraordinary output and employment growth.

The MLSC's company recruitment efforts have continued to bear substantial fruit, with nearly 30 companies, large and small, announcing plans to expand within or into Massachusetts during FY 2013. Examples include Swiss pharma giant Roche, Israel-based medical device company ARGO, and Foundation Medicine, a native Massachusetts biotechnology and MLSC portfolio company. The MLSC partnered with many of these companies to support their integration into the state's life sciences community – hosting ribbon-cutting events, organizing press announcements, helping with networking, and generally promoting a high level of awareness.

## The Bottom Line



The MLSC's investment strategy is based on public-private collaboration and high leverage on public tax dollars. The Center uses a portfolio of investment programs to fill gaps across the cycle of life sciences innovation and commercialization, and incentivize matching private capital. Since 2008, the MLSC has directly invested or committed nearly \$468 million and leveraged over \$1.2 billion in third-party investment. In other words, for every \$1 of taxpayer money that the MLSC has invested, Massachusetts has attracted nearly \$3 in additional, outside investment – creating a portfolio of more than \$1.6 billion in public-private investments in the state's life sciences ecosystem that would not have existed without the Life Sciences Initiative.

The MLSC makes its awards based on competitive solicitations and a rigorous, transparent review process that draws on multi-disciplinary experts from the life sciences sectors across the state. This ensures that all investments are evaluated on the basis of merit and “relative best use” of the

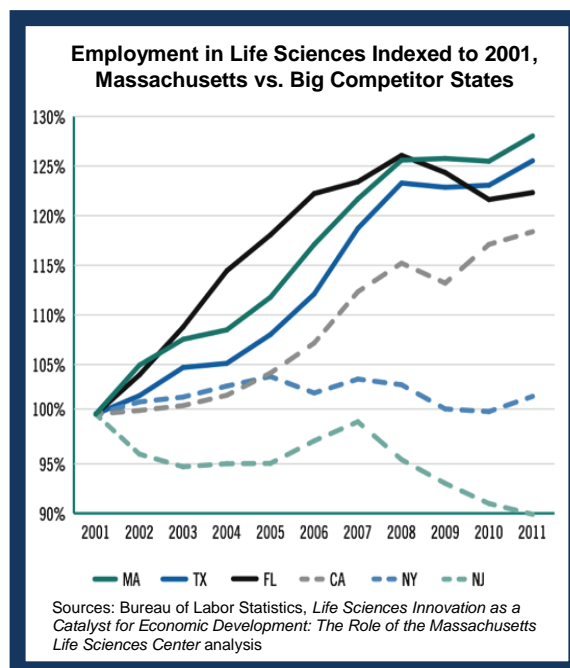
Commonwealth's funds. The broad scientific, investment, business and legal expertise that informs the MLSC's decisions enables us to make the types of smart, strategic investments that attract matching investment capital and highly leverage the public dollars that have been entrusted to the MLSC. Dr. Bluestone referred in his impact report to the role of experts in the MLSC's decision-making process as the MLSC's "secret sauce."

## Creating Jobs, Driving the Life Sciences Ecosystem's Growth

According to the Bluestone report, the MLSC's investments are making a measurable impact on job creation and economic growth for the life sciences sectors in the Commonwealth. The report confirms that the life sciences sectors are the fastest-growing industry cluster in Massachusetts. The researchers found that since the launch of the Life Sciences Initiative in 2008, Massachusetts has overtaken all competitor states in its rate of life sciences job creation.

As a result, The Commonwealth's life sciences sectors have risen to number one in the nation in terms of per capita employment, with close to 14,300 jobs for every one million residents. According to the Bluestone report, jobs in the life sciences carry an average salary of \$91,809.

The new jobs being created in the life sciences require diverse skills and educational attainment. According to the Bluestone report's findings, 74 percent of the jobs created through the MLSC's Tax Incentive Program in 2010 required a B.A. or less, including 26 percent that require less than a B.A. This validates the role that the life sciences play in creating broad economic opportunity, and further validates the Center's investments in workforce development at all skill levels and in all regions of the state.



## Investment Portfolio: An Overview



The MLSC's investment portfolio reflects the organization's strategy to ensure a strong supporting platform for innovation in Massachusetts. The MLSC's strategic targets for investment focus on academic institutions, the pipeline of early stage companies, workforce development, infrastructure and new models of collaboration.

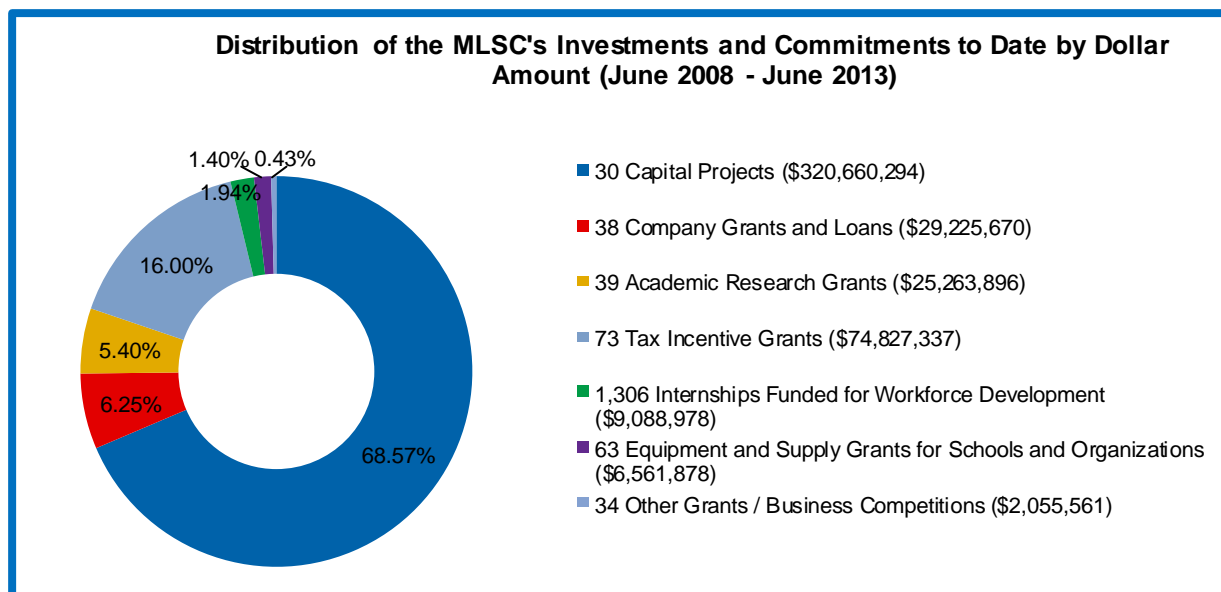
Highlights of the MLSC's new commitments in FY 2013 include nine new capital projects, grants or loans to eight early-stage companies and tax incentive awards to 24 companies. The MLSC currently manages a portfolio of over 450 individual grants, loans and tax incentives.

The MLSC also plays an important role as a convener, promoting collaboration within the state's life sciences community and between Massachusetts and national and

global life sciences communities. The MLSC brings members of the life sciences ecosystem together through new models of collaboration and partnership.

One of the MLSC's most exciting success stories is the creation of the Massachusetts Neuroscience Consortium. This is a pioneering model of collaboration designed to accelerate success in pre-clinical research by leveraging the strength of industry giants in the neurosciences and the rich research environment in Massachusetts. The Consortium was announced at the 2012 BIO International Convention. Charter sponsors of the Consortium are Abbott (Abbvie), Biogen Idec, EMD Serono, Janssen Research & Development LLC (Johnson and Johnson), Merck, Pfizer and Sunovion Pharmaceuticals Inc.(a Daiinippon Sumitomo Pharmaceuticals company). The Consortium announced its first solicitation for research projects in September of 2012, and received nearly 100 applications for funding. In June of 2013 the Consortium awarded its first seven grants to support pioneering neuroscience research in the areas of Alzheimer's, Parkinson's, Multiple Sclerosis and neuropathic pain.

The MLSC is very proud of its achievements during the first five years of the Life Sciences Initiative. The MLSC looks forward to further enhancing Massachusetts' life sciences community and to enabling Massachusetts' ongoing contributions to the health and well-being of the global community.



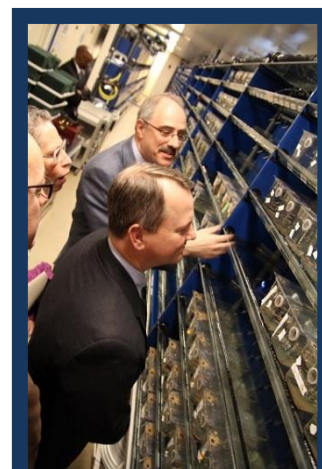
## Investing in Infrastructure

The MLSC is committed to ensuring that there is a strong supporting platform for innovation in Massachusetts. This includes funding the creation of novel resources that companies and researchers will be able to find only in Massachusetts. Half of the resources committed via the Life Sciences Initiative (\$500 million of the total \$1 billion) are dedicated to capital projects. The MLSC's investments in infrastructure are funded through the MLSC's capital fund, which expended \$53.9 million in FY 2013 as part of the state's overall capital plan.

In support of the MLSC's economic development mission, a key priority of the MLSC is to use capital dollars to accelerate life sciences-driven economic development across the Commonwealth by engaging and building on the strengths of the different regions. Many of the MLSC's capital projects are designed to ensure that institutions and regions across the state have the necessary infrastructure to be "life-sciences ready."

The MLSC's Board of Directors approved nine new Capital Program projects, eight new planning grants and one follow-on award to an existing project in FY 2013, totaling more than \$135 million, including more than \$109 million for projects located in Western Massachusetts, ordered below from the highest to lowest amount invested:

- **The University of Massachusetts Amherst** was awarded a grant of \$95 million, the MLSC's largest grant to date. The grant for UMass Amherst will fund construction to fit out and equip a substantial portion of the university's new \$157 million Life Sciences Laboratories. This building will house three new research centers led by faculty and dedicated to partnering with life sciences and precision manufacturing companies in Western Massachusetts to develop innovative products and services. The three centers are:
  - Personalized Health Monitoring, focused on developing nanotechnology and large dataset management to improve health care through low-cost, wearable, wireless sensors that analyze patient data continuously in real time. This center will bring bio-sensor technology, nanotechnology, new polymer and manufacturing techniques, "big data" and information technology together to design, develop and test the next generation of wearable bio-sensors and healthy lifestyle applications. Biomanufacturing firms, medical device makers, big data analysts and other health care industry partners will produce prototypes, test them and assess manufacturing feasibility.
  - Bioactive Delivery, focused on discovery and application of new drug, agricultural and "nutriceutical" compounds. This center will draw on discoveries and research by UMass Amherst faculty who, for example, develop synthetic molecules that can fight infection in new ways and design all-natural formulations for delivering oil-soluble vitamins and other nutrients in food products.
  - Models to Medicine, focused on translating basic protein research by UMass Amherst experts into new therapeutic targets. This center will capitalize on an explosion of discoveries over the past 10 years that suggest that a variety of protein dysfunctions play a role in Alzheimer's, Parkinson's, cancer and infectious diseases.
- **University of Massachusetts Dartmouth** was awarded a \$6 million grant in December 2012 to support the Massachusetts Accelerator for Biomanufacturing (MAB). The MLSC previously provided \$14.6 million in capital funding to the school to fund the MAB in 2011. The university will use the funds to increase the MAB's capacity, including the fitting-out of four independent production suites with equipment for client services and workforce development.
- **The Pioneer Valley Life Sciences Institute (PVLISI)** was awarded a grant of \$5.5 million to support a joint venture between Baystate Medical Center in Springfield and UMass Amherst. The grant for PVLISI, located adjacent to Baystate Medical Center's main campus in Springfield's North End, will support the development of a new Center of Innovation in Health Informatics and Technology, focused on advancing public/private-sector partnerships and incubating innovative technology solutions developed by start-ups and larger, more established vendor firms in areas such as population health management, health care quality, "big data" analytics and mobile health.
- **Harvard Medical School** was awarded a \$5 million grant to create a Laboratory of Systems Pharmacology that will serve as a multidisciplinary scientific incubator with the goal of providing better clinical trial information in the drug development process. The lab aims to tackle an incredibly important problem in a new way by using multiple measurements such as proteomics and advanced



*Dr. Len Zon and Dr. George Daly show Lieutenant Governor Timothy Murray and Massachusetts Life Sciences Center President & CEO Dr. Susan Windham-Bannister the zebrafish lab space at Boston Children's Hospital.*

imaging combined with extensive computational analyses and model building and testing to understand drug action. Visiting scientists from the FDA and local drug companies, together with investigators from Dana Farber, Massachusetts General Hospital, Brigham and Women's Hospital, Tufts, MIT and Harvard, will be involved in this novel effort.

- **LabCentral** was awarded a \$5 million capital grant to support the establishment of state-of-the-art facilities and services for emerging life sciences companies in Cambridge. LabCentral will use the grant funding to build a life sciences laboratory to facilitate the creation of startup biotech companies close to the centers of innovation located in Kendall Square. Startups will be able to rent small amounts of lab space in lieu of having to invest in their own larger-scale wet labs. LabCentral is projected to create more than 30 construction jobs and more than 500 new science jobs in startup companies operating at the facility over the next 10 years.
- **The Massachusetts Green High Performance Computing Center (MGHPCC)** was awarded \$4.5 million. This investment will build on an infrastructure for large-scale data analysis that is already in place in Holyoke and was created by a strong partnership among academia, industry and the Commonwealth. Boston University, Harvard University, MIT, Northeastern University and the University of Massachusetts have teamed with Astra-Zeneca, Pfizer, Merck, Merrimack Pharmaceuticals, EMC and IBM, among others, to create this computing resource. MLSC funding will allow the MGHPCC to create a cloud-based resource for data-driven biology.
- **The Forsyth Institute** was awarded a \$4.1 million capital grant for a newly-created Forsyth Center for Salivary Diagnostics (FCSD). The grant will support the construction and equipping of the FCSD, a facility that will seek to revolutionize the way disease testing is performed.
- **Boston Children's Hospital** was awarded a \$4 million grant. This grant will support the establishment of the Children's Center for Cell Therapy (CCCT), including new equipment and facility renovation that will allow additional cell culturing facilities and a robotics area designed to perform highly specialized chemical screening on stem cells. The CCCT will be a specialized center focused on developing novel stem cell therapies for untreatable or incurable diseases.
- **Holyoke Community College (HCC)** was awarded \$3.8 million in funding to expand its capacity for life sciences-related research and data analysis. It will use this money to support the renovation of 13,000 square feet of lab space and the creation of a Center for Life Sciences. This will include a clean room for the biological sciences, which will be the only clean room in Western Massachusetts to support training for students, faculty and industry partners.
- **Northern Essex Community College (NECC)** was awarded a grant of \$1.2 million. NECC plans to build a new lab at its Lawrence campus and to renovate lab spaces at both the Haverhill and Lawrence campuses. NECC offers an Associate's degree in Laboratory Science that is focused on training laboratory technicians to work in the analytical chemistry and biotechnology fields. Since the program's inception three years ago, enrollment has tripled. The Laboratory Science Program is currently supported by a National Science Foundation Advanced Technological Education grant that enabled the purchase of equipment and supplies, the fostering of collaborations with regional industry, and partnerships with regional K-12 schools.



- **Quinsigamond Community College**, located in Worcester, Massachusetts, was awarded \$310,000. QCC's grant will be used to update 2,000 square feet of outdated lab space. After renovations, this space will be equipped with new technologies to serve as a state-of-the-art scientific laboratory for the school's biotechnology and related programming. This new space will enable the college to increase its current program offerings and double the number of students enrolled in biotechnology and biomedical engineering courses from 100 to 200 over the next three years. This expanded capacity to serve students will allow Quinsigamond to better respond to local labor market conditions and employer needs.
- **Bunker Hill Community College (BHCC)** was awarded \$200,000 to support the expansion of its biotechnology program by expanding its laboratory capabilities and enriching its curriculum. "The equipment purchased with this generous grant will help train more students for high-demand jobs in the expanding biotechnology industry in Greater Boston. Our goal is to help meet regional workforce needs while ensuring that our students will be competitive in this critical job market," said BHCC President Mary L. Fifield.
- **Springfield Technical Community College (STCC)** was awarded \$150,000, which will be used to update its equipment and labs to align with the needs of life sciences companies. MLSC funding will allow STCC to conduct a study to identify the most appropriate equipment that will best deliver a life sciences education leading to employment in the field.
- **Quincy College** was granted \$100,000 to develop its new Certificate of Science program in Biotechnology and Compliance and purchase new state-of-the-art equipment for biomanufacturing.
- **Pittsfield Economic Development Authority (PEDA)** was awarded a \$55,000 planning grant to support a research project at the William Stanley Business Park in Pittsfield. The business park is the site of a proposed Berkshire Life Sciences Center, a 20,000-square-foot facility on former General Electric (GE) property that is managed by the Pittsfield Economic Development Authority (PEDA).
- **Bay Path College** in Longmeadow was awarded a planning grant of \$50,000. It will enable the college to engage key stakeholders from the life sciences industry, workforce development, and educational institutions to identify the capital needs and other resources needed to fully implement an initiative in the life sciences.
- **Middlesex Community College (MCC)** was awarded a \$50,000 planning grant. MCC plans to complete a comprehensive planning study to identify the best approach for expanding its biotechnology facilities. This will include a clean room to support increased enrollment and workforce development, education and training.
- **Regis College** was awarded \$50,000 to enhance the college's life sciences training programs. Regis College educates a highly diverse, first-generation student body challenged by higher education costs. This planning grant will enable the college to develop studies that will further identify what types of life sciences resources would be most beneficial for its students. MLSC funding will also allow Regis College to plan a much-needed transformation of its life sciences building into an efficient, state-of-the-art facility to prepare its students for employment in the life sciences industry.

The MLSC received 41 applications in FY 2013 for infrastructure projects from across the state through the Center's second annual competitive solicitation. In FY 2014, the Capital Project Matching Grant program will provide up to \$35 million in funding for life-sciences-related capital projects around the state.

FY 2013 Active Awards			
Project	Award Amount	Year of Award	Status at End of FY 2013
Framingham Wastewater and Pumping Station	\$12.9 million	FY 2009	Completed
Marine Biological Laboratory in Woods Hole	\$10 million	FY 2009	Completed
Tufts/Cummings School of Veterinary Medicine, NE Regional Biosafety Lab in Grafton	\$9.5 million	FY 2009	Completed
Albert Sherman Center at UMass Medical School	\$90 million	FY 2010	Completed
Worcester Polytechnic Institute/Gateway Park	\$5.15 million	FY 2010	Completed
UMass Boston/Dana Farber Center for Personalized Cancer Therapy	\$2 million	FY 2011	Ongoing
UMass Dartmouth Biomanufacturing Center	\$20.6 million	FY 2012	Ongoing
Dana Farber Molecular Cancer Imaging Center	\$10 million	FY 2012	Ongoing
Joslin Translational Center for the Cure of Diabetes	\$5 million	FY 2012	Ongoing
Museum of Science "Hall of Human Life"	\$5 million	FY 2012	Ongoing
UMass Lowell Emerging Technologies and Innovation Center	\$10 million	FY 2012	Ongoing
UMass Dartmouth Advanced Technology Manufacturing Center (ATMC)	\$11.4 million	FY 2012	Planned for FY15
LabCentral	\$4.96 million	FY 2013	Ongoing
UMass Amherst Life Sciences Laboratories	\$95 million	FY 2013	Ongoing
The Pioneer Valley Life Sciences Institute	\$5.5 million	FY 2013	Ongoing
Massachusetts Green High Performance Computing Center (HPCC)	\$4.54 million	FY 2013	Ongoing
Holyoke Community College (HCC)	\$3.8 million	FY 2013	Ongoing
Springfield Technical Community College (STCC)	\$150,000	FY 2013	Ongoing
Bay Path College	\$50,000	FY 2013	Ongoing
Quinsigamond Community College (QCC)	\$310,000	FY 2013	Ongoing
The Forsyth Institute	\$4.1 million	FY 2013	Ongoing
Northern Essex Community College (NECC)	\$1.24 million	FY 2013	Ongoing
Middlesex Community College (MCC)	\$50,000	FY 2013	Ongoing
Boston Children's Hospital	\$4 million	FY 2013	Ongoing
Harvard Medical School	\$5 million	FY 2013	Ongoing
Bunker Hill Community College (BHCC)	\$200,000	FY 2013	Ongoing
Quincy College	\$100,000	FY 2013	Ongoing
Regis College	\$50,000	FY 2013	Ongoing
Pittsfield Economic Development Authority (PEDA)	\$55,000	FY 2013	Ongoing

The MLSC's infrastructure investments have contributed to the creation of more than 1.2 *million* square feet of new life sciences research and manufacturing space across the Commonwealth, while creating more than 3,300 jobs in the building trades and in the life sciences.

## Propelling the Companies of the Future

### Accelerating the Growth of Early-Stage Companies

In FY 2013, the MLSC continued its commitment to building the pipeline of new life sciences companies in Massachusetts by committing nearly \$6 million in Accelerator Loans to six early-stage companies. The MLSC's Accelerator Loan Program provides working capital to early-stage life sciences companies at a

critical stage in their development. This program seeks to de-risk these companies for future – usually private - investors by funding the necessary steps to achieve critical milestones. Some of these companies may hold the promise of becoming the next Vertex or Boston Scientific, while others will be acquired by large companies that are increasingly depending on “external innovation” for growth. A large pool of creative entrepreneurs who are developing promising technologies makes Massachusetts an attractive and vibrant life sciences environment.

During FY 2013 the MLSC administered two rounds of the Accelerator Loan Program, receiving a total of 66 applications, of which 61 were eligible for review by experts selected from among the MLSC’s 200-plus *pro bono* volunteer peer reviewers. The MLSC’s peer reviewers recommended 43 of these applicants for review by the MLSC’s Scientific Advisory Board (see Appendix B). Sixteen companies were then recommended by the Scientific Advisory Board (“SAB”) for review by the Investment Subcommittee of the MLSC’s Board of Directors (see Appendix A). Six of these companies were approved for a loan by the full Board of Directors (“Board”) as indicated below:

Accelerator Loans in FY 2013			
Company	Location	Area of Development	Loan Amount
Arch Therapeutics	Natick	Advancing a novel approach to enhance the way surgeons stop bleeding (hemostasis), control leaking (sealant), and mitigate infection during surgery and trauma care.	\$1,000,000
Bio2 Technologies	Woburn	Applying CLM™, a proprietary Cross-Linked Microstructure fiber bonding process, to produce a range of biocompatible materials with broad application in musculoskeletal clinical practice.	\$1,000,000
Cytrellis Biosystems	Boston	Developing new products for dermatology, scar reduction and aesthetic medicine using technology that facilitates non-invasive directional tightening and moving of the skin.	\$1,000,000
ImmuneXcite	Watertown	Discovering new immunotherapies for cancer via the proprietary mAbXcite platform, applying a unique polysaccharide to coat cancer cells, signaling human neutrophils to attack the tumors.	\$984,500
Lumicell Diagnostics	Wellesley	Developing a novel intraoperative cancer detection system, including a cancer-specific imaging agent and a new hand-held imager to provide specificity and sensitivity during cancer removal surgery.	\$1,000,000
MedicaMetrix	Wayland	Developing a diagnostic tool, ProstaGlove™, that provides a quantitative measurement of prostate size with the goal of improving clinical outcomes and reducing healthcare costs.	\$1,000,000

From the Accelerator Loan Program’s inception through the end of FY 2013, the MLSC has funded or committed to lend a total of \$17.2 million in Accelerator Loans.<sup>1</sup>

In FY 2013, two companies, Avaxia Biologics and MoMelan Technologies repaid Accelerator Loans with interest early, after achieving significant success in private fundraising or the sale of the company. As of the close of FY 2013, a total of six companies have pre-paid their loans: two in FY 2013, two in FY 2012, and two in FY 2011.

<sup>1</sup> Two companies that have received Accelerator Loans in the past have ceased operations, including Aura Medsystems, Inc., a 2010 loan recipient, which ceased operations in the spring of 2013.

MoMelan Technologies, recipient of an Accelerator Loan in 2011, repaid its loan after being acquired by Texas-based Kinetic Concepts, Inc. MoMelan is a medical device company developing an innovative epidermal grafting solution utilizing donor site-sparing technology for enabling and standardizing the use of epidermal skin grafting that can be performed in the office or outpatient setting with minimal discomfort. Avaxia Biologics, recipient of an Accelerator Loan in 2010, prepaid its Accelerator Loan after raising \$6.4 million in private financing. To date, Accelerator companies have raised more than \$115 million in funding subsequent to receiving a loan from the MLSC.



The MLSC also supported entrepreneurship and company creation by co-sponsoring two important business plan competitions in FY 2013: MassChallenge was awarded a \$100,000 contribution for its international business plan competition, and Massachusetts Institute of Technology was awarded a \$10,000 contribution for its annual business plan competition.

## From Bench to Bedside: Academic Research Matching Grant Programs

The promise offered by innovation begins with “discovery,” usually in an academic setting. The MLSC’s key priorities include preserving the strong competitive position of Massachusetts’ academic institutions and medical centers, supporting translational research in the life sciences, and accelerating the discovery and transfer of technology out of academic settings. To accomplish these objectives, the MLSC has created three research matching grant programs. One of these programs, the Cooperative Research Matching Grant (CRMG) Program, launched its third round in FY 2013.

### Cooperative Research Grants

The MLSC’s Cooperative Research Grants encourage industry-sponsored research collaborations with Massachusetts academic institutions to accelerate translational research. Not-for-profit academic/research institutions and industry partners are eligible to apply for grant funding of up to \$250,000 per year over two years, provided that the industry sponsor matches the MLSC funds on at least a 1:1 basis. Funds to support these cooperative research projects are given as grants to the academic partner. Since 2008, the MLSC has awarded 12 grants under this program, totaling nearly \$6 million.

In June 2013, the MLSC's Board authorized four two-year awards of \$500,000 each under the third round of the program. The Principal Investigators who received grants and their research projects with industry sponsors are briefly described below:

- **Dr. Weining Lu of Boston Medical Center** will be addressing a major disease – chronic kidney disease -- that cannot be fully treated with existing pharmaceuticals. Chronic kidney disease is a major worldwide health problem with ineffective therapy options. The biological pathway that BMC is studying is an ideal, novel target for the development of renal protective therapy that can be used in conjunction with existing kidney disease drugs. **BMC's industry partner is Pfizer.**
- **Drs. Philip De Jager and Howard Weinder of Brigham and Women's Hospital (BWH)** are studying Multiple Sclerosis (MS) and the potential for personalized treatment of the disease. When MS is diagnosed, clinicians cannot predict if cases will be mild or severe, and often are left with arbitrary, sometimes ineffective treatment options for each individual patient. The BWH study will attempt to locate specific biomarkers for MS patients to allow for more individualized, effective treatment. **BWH's industry partner is Merck Serono.**
- **Dr. Xi He of Children's Hospital Boston** is studying the impact of modifying molecular pathways in bone growth as a potential treatment for osteoporosis. Osteoporosis is a large and growing problem with limited treatment available, and the pathway that Children's Hospital is studying is a novel way to approach the problem. If bone growth can be encouraged within the body, it could be possible to reverse osteoporosis. **Children's Hospital's partner is Pfizer.**
- **Dr. David Scadden of Massachusetts General Hospital (MGH)** will be testing a therapy in conjunction with another drug on the market in an attempt to reduce complications from bone marrow transplants, which often have complex and toxic side effects. This treatment aims to increase natural stem cell and red blood cell re-population after bone marrow donations, which would benefit donors and potentially recipients. When combined with an already-existing drug, this treatment could be a more efficacious way to make bone marrow transplantation available to a wider group of patients. **MGH's industry partner is GlaxoSmithKline.**

## Training the Next Generation of Life Sciences Experts

### Equipment and Supplies for High Schools Grant Program

In December 2012, the MLSC awarded \$3.2 million in grants to support the purchase of life sciences training equipment and supplies at vocational technical schools, public high schools in Massachusetts' Gateway Cities, and workforce training programs across the state. Awardees provide a breadth of training ranging from general STEM education curricula to biotechnology. The student population that will benefit from these equipment grants represents a diverse workforce, including workers seeking re-training and low-income individuals preparing for entry-level positions.

This grant program seeks to further the development of the state's life sciences workforce by providing funding of up to \$250,000 per institution for life sciences equipment and supplies. To be eligible for an award of greater than \$100,000, applicants must have secured matching funds or in-kind donations from an industry partner that supports the training program for which the equipment and supplies are needed. Industry sponsors have contributed more than \$350,000 in matching funds and in-kind donations as part of this year's program.

Former Lieutenant Governor Timothy Murray launched the first round of the MLSC Equipment and Supplies for High Schools Grant Program at the 7th Annual Science, Technology, Engineering and Math (STEM) Summit held in 2010. Building on the success of the first year of the program, Lieutenant Governor Murray in December visited the Nashoba Valley Technical High School, one of the recipients in this latest round, to award the vocational technical school with a \$96,665-grant to support the expansion

of their Engineering Academy to include biotechnical engineering and robotic fabrication. In addition to Nashoba Valley, 30 other schools and programs were also awarded grants:

<b>Schools and Organizations Awarded High School Equipment and Supplies Grants in FY 2013</b>		
<b>School/Organization</b>	<b>City/Town</b>	<b>Award Amount</b>
Assabet Valley Regional Technical High School	Marlborough	\$ 90,284
Blackstone Valley Regional Vocational Technical High School	Upton	\$ 99,984
Blue Hills Technical School District	Canton	\$ 100,000
Bristol-Plymouth Regional Technical School District	Taunton	\$ 99,940
Cape Cod Regional Technical High School	Harwich	\$ 77,738
Fall River Public Schools (Durfee High School)	Fall River	\$ 92,555
Greater Lowell Regional Vocational Technical High School	Tyngsboro	\$ 89,936
Haverhill High School	Haverhill	\$ 99,289
Holyoke Public Schools (Dean Tech & Holyoke High School)	Holyoke	\$ 195,019
Lynn English High School	Lynn	\$ 77,419
Massachusetts Biotechnology Education Foundation	Cambridge	\$ 249,777
Minuteman Regional Vocational Technical School District	Lexington	\$ 134,137
Montachusett Regional Vocational Technical School District	Fitchburg	\$ 248,274
Nashoba Valley Technical High School	Westford	\$ 96,665
Norfolk County Agricultural High School	Walpole	\$ 97,612
North Shore Technical High School	Middleton	\$ 99,999
Northeast Metropolitan Vocational School District	Wakefield	\$ 71,610
Quaboag Regional Middle High School	Warren	\$ 7,438
Quincy High School	Quincy	\$ 94,469
Revere High School	Revere	\$ 98,176
Rindge School of Technical Arts	Cambridge	\$ 100,000
Roger L. Putnam Vocational Technical Academy	Springfield	\$ 100,000
Shawsheen Valley Regional Vocational School District	Billerica	\$ 95,928
Smith Vocational and Agricultural High School	Northampton	\$ 100,000
South Shore Vocational Technical High School	Hanover	\$ 119,925
Taconic High School	Pittsfield	\$ 88,028
Taunton Public Schools	Taunton	\$ 99,384
The BioBuilder Educational Foundation	Cambridge	\$ 95,300
Westfield Public Schools	Westfield	\$ 44,333
Worcester North High School	Worcester	\$ 64,995
Worcester Technical High School	Worcester	\$ 99,982

### Internship Challenge Program

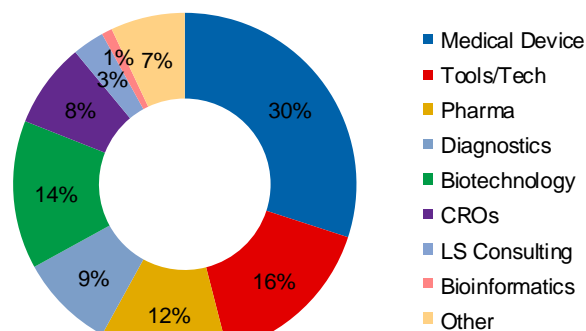
The Internship Challenge is the MLSC's flagship workforce development program, focused on enhancing the talent pipeline for life sciences companies in Massachusetts while simultaneously providing interns with practical, "hands-on" experience that prepares them to step into the workforce ready to meet the job requirements of life sciences employers. The program provides paid internships to undergraduate sophomores, juniors and seniors; community college students; Master's students; and recent college graduates. Since the program first launched in 2009, 1,306 internships have been established, with students representing 145 different colleges and universities placed with 356 companies across the state.

Through this program, host companies commit to providing a dedicated mentor and a meaningful internship opportunity related to the academic focus of eligible students. The MLSC provides a web-based interface to connect student candidates with host companies, students complete an online application, which includes a cover letter and their resume, and host companies review applications to match skills with their needs. Host companies can hire up to two interns per year, but have the option to hire an additional two interns that are enrolled in a community college. At the conclusion of the internship, the MLSC reimburses companies for intern stipends of up to \$7,200, which allows for 12 weeks of full-time work at the maximum reimbursable pay rate of \$15 per hour.

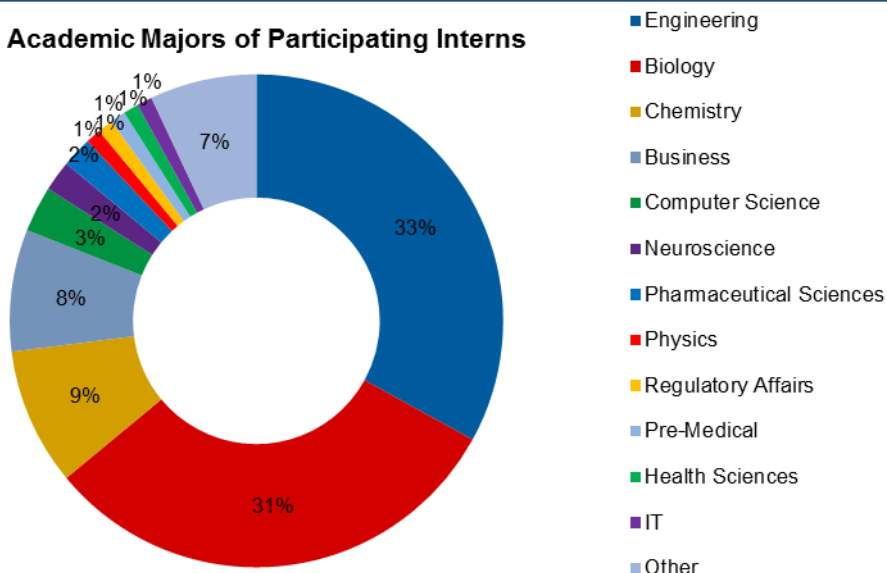
The Internship Challenge is designed to expand the pool of prospective employees who have practical experience, enhance opportunities for mentoring, enable more students to explore career opportunities, provide students interested in working in the life sciences with a peer network through educational and informational exchange events, and expose students to entrepreneurship.

The Internship Challenge is also a human-capital subsidy program for small and early-stage companies. The MLSC only reimburses intern stipends for companies with 100 or fewer employees in Massachusetts (and up to 250 globally). Larger life sciences companies and research institutions can access the program's database to recruit students, but cannot seek reimbursement for the interns that they hire. Because

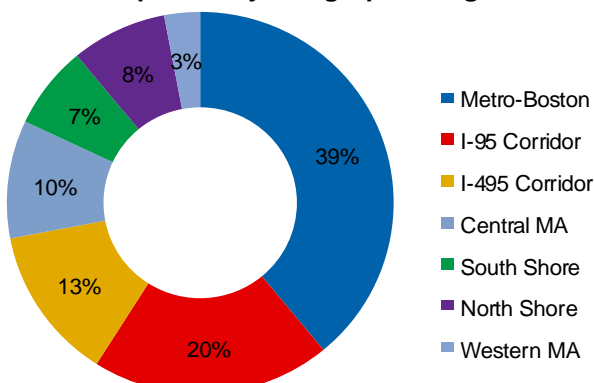
**Distribution of Internship Challenge Host Companies by Industry Sub-sector**



**Academic Majors of Participating Interns**



**Distribution of Internship Challenge Host Companies by Geographic Region**



participating interns work in smaller companies, they also receive exposure to the dynamic entrepreneurial environment.

FY 2013 saw the highest level of participation in the program since its inception. More than 2,000 students and recent graduates submitted applications for review by nearly 300 companies across Massachusetts. The program placed a total of 428 interns with 222 host companies (See Appendix C for a complete list of 2012-13 Internship Challenge host companies.) Interns were demographically diverse and represented 87 different colleges and universities. The Internship Challenge program is broadly inclusive, as the data above on participating interns and host companies illustrates.

### Feedback about the Internship Challenge Program

The MLSC conducts a survey of both interns and sponsors at the conclusion of each internship period because the Center believes that the Internship Challenge participants themselves provide the best evidence of the program's value and impact.

Surveys of participating interns show that nearly 30 percent of the interns that were entering the workforce (recent graduates) found immediate full-time employment as a result of their internships. In most cases, these interns were hired by the company that hosted their respective internships.

Western New England University graduate student and Internship Challenge intern Brian Dutra won first place in the Old Guard Oral Presentation Competition held at the 2012 American Society of Mechanical Engineers' (ASME) International Mechanical Engineering Congress and Exposition held in Houston, Texas. He claimed the top prize for his presentation on "Acoustophoretic Separation of Lipid Particles from Red Blood Cells," a process of removing microscopic impurities from blood using ultrasonic standing waves. Brian was a summer intern at FloDesign Sonics and ultimately became an employee of the Wilbraham-based company.



### MedTech IGNITE Program

The MLSC renewed its commitment to the Massachusetts Medical Device Industry Council's (MassMEDIC) MedTech IGNITE program in FY 2013 with a grant of \$50,000. The MLSC previously awarded MassMEDIC a \$50,000 grant in 2011 to support the business-coaching program, launched in 2007. The most recent funding awarded to MassMEDIC was used to jumpstart the Bay State Shadowing Program, a first-of-its-kind effort in Massachusetts designed to increase the number of successful medical device startups by focusing on clinical unmet needs and physician – industry collaboration at the earliest stage of company formation.

As part of the program, passionate, qualified entrepreneurs shadow leading physicians during typical daily rounds in the hospital with an eye to identifying areas in which the quality and cost of patient care could be significantly improved. Once a significant unmet need has been identified, the team will brainstorm on potential technology and business solutions that may enable the formation of successful new startups. MedTech IGNITE's new shadowing program is an innovative approach to identifying unmet medical needs that can be addressed by entrepreneurs in the medtech industry.

## Massachusetts Medical Technology Veterans Program (MassMVP)

On February 14, 2013, the MLSC and MassMEDIC sponsored a kick-off event for a medical technology mentoring program for U.S. military veterans residing in Massachusetts. The program selected 32 Massachusetts veterans to participate in training to enter the medical technology workforce as part of the Massachusetts Medical Technology Veterans Program (MassMVP). The training is being organized in partnership with the International Center for Professional Development (ICPD), an experienced provider of career development counseling using personalized mentoring, face-to-face experiential training and ongoing web-based support. The expanded program builds on the work that began last October with the launch of the Medical Technology Veterans Program (MVP) at *AdvaMed 2012: The Medtech Conference* in Boston and will provide veterans with training and networking opportunities within the medical device and diagnostics industries, including opportunities to exchange knowledge with industry experts.



*Group photo of the 32 participating veterans and their mentors at the February 14<sup>th</sup> MassMVP kick-off event. Front row, center are MLSC President & CEO Susan Windham-Bannister, Ph.D., and MassMEDIC President Tom Sommer to her left.*

## Supporting STEM (Science, Technology, Engineering and Math) Education and an Inclusive Workforce

The MLSC awarded grants totaling over \$250,000 to seven programs focused on STEM education and diversity in the life sciences workforce during FY 2013. The grants build upon the Patrick/Murray Administration's strategy for enhancing STEM educational opportunities across Massachusetts, and on the MLSC's commitment to ensuring an inclusive life sciences workforce. Dr. Windham-Bannister serves on the Governor's STEM Council.

The seven organizations that received grants focus on different strategies for enhancing STEM education and diversity:

- **Boston Children's Museum: "Maker Lab Program" (\$50,000 in FY 2013)** will utilize this grant to support a pilot project. The program will be a creative space where parents and children can tinker and explore various modular station-based labs which feature different topics, tools and techniques for exploration, with an emphasis on life science learning for children. This is an opportunity for the MLSC to support the museum's efforts to develop STEM skills through informal science programs.
- **Freedom House: Preparing Urban Students for Success in High School and Higher Education programs (PUSH - \$10,000 in FY 2013)** is an innovative program designed to address educational inequality and inequity by providing services to students in marginalized urban neighborhoods in Boston. Continued funding from the MLSC will be used to implement a STEM program that will expand the comprehensiveness of the educational programs and offer students additional educational and career opportunities.
- **Girl Scouts of Eastern Massachusetts (GSEM): Girls Building Self-eSTeEM and Event-based STEM opportunities (\$30,000 in FY 2013)** provides STEM-related activities to girls who are at-risk within underserved communities through the FaB Factor program. Continued funding from the MLSC allows them to bring programming to more girls by expanding their program offerings into the summer months. GSEM also offers a variety of STEM-related programming that directly ties into the Girl Scout Leadership Experience to all girls within GSEM's 178 communities.

- **Massachusetts Computing Attainment Network (MassCAN - \$50,000 in FY 2013)** will use the MLSC's grant to support a partnership of organizations collaborating to inspire and educate Massachusetts students in computing and to prepare them to lead and innovate in a future economy that will depend on and be driven by computer technology. MassCAN wants to make sure that Massachusetts plays a nation-leading role in providing all its students with the opportunity to be inspired and prepared for many of the most extraordinary computer science and computer science-enabled careers of the 21<sup>st</sup> century. In addition, MassCAN wants to make sure that the state actively develops the highly educated workforce necessary to sustain the nation's leading knowledge and information-based state economy.
- **Mass Technology Leadership Council: Big Data Project (MassTLC - \$50,000 in FY 2013)** will use its grant to support a Big Data project for the life sciences by: (1) convening a cohort of experts at the intersection of big data and the life sciences; (2) conducting a discovery process through a series of interviews; (3) synthesizing, reporting back, and validating results via survey, and (4) exploring opportunities and interventions through a facilitated roundtable of experts.
- **Science Club for Girls: *Girls with a Z* program and the pilot internship program for high school girls (SCG - \$50,000 in FY 2013)** will primarily utilize the MLSC's grant for: (1) the enhancement of the "Girls with a Z" program with the goal of exposing students to live organisms, stereomicroscopy, developmental biology and project-based learning; and (2) the development of a research internship experience for high school students through state-wide research-based vacation week and summer workshops similar to those conducted at the Broad Institute.
- **Youth Creating Impact Through Innovation, Entrepreneurship and Sustainability (Youth CITIES): MedTech Tinkering (\$18,950 in FY 2013)** exposes young people to the mindset and principles of entrepreneurship. The MedTech Tinkering program will provide experiential learning for students in all components of STEM that is informed by MedTech and expose students to technology-related projects that will allow hands-on "tinkering." The program will also foster career awareness by building relationships with industry professionals through mentoring, as well as encourage community well-being by directing students toward MedTech projects that improve human health and welfare.

The MLSC will continue to seek additional opportunities to expand access to STEM education and to ensure an inclusive life sciences workforce in the fiscal year ahead.

## Investing in Industry and Job Creation

### The Life Sciences Tax Incentive Program

In FY 2013, the MLSC awarded \$23 million in tax incentives to 24 life sciences companies under the MLSC's 2012 Life Sciences Tax Incentive program. The companies receiving tax incentive awards have committed to creating nearly 1,000 new jobs in the Commonwealth during calendar year 2013.

The Life Sciences Act authorizes up to \$25 million in tax incentives each year for companies engaged in life sciences research and development, commercialization and manufacturing. The primary goal of the program is to incentivize life sciences companies to create new long-term jobs in Massachusetts. Companies receiving incentives must commit to the creation of a specific number of net new jobs during the following calendar year and also to the retention of those jobs for a five-year period.

The 2012 round of the program featured 10 different incentives, which address the significant capital expenditures associated with the life sciences R&D cycle and the high costs of translating research into commercially viable products. A total of 44 companies applied for tax incentives in 2012. Details of the 24 tax incentive awardees are below:

Tax Incentives Awarded Under the MLSC's 2013 Life Sciences Tax Incentive Program			
Company	Location	Tax Incentive Amount Awarded	Jobs Committed
Aegerion Pharmaceuticals, Inc.	Cambridge	\$ 260,000	20
ARIAD Pharmaceuticals, Inc.	Cambridge	\$ 1,225,000	50
Biogen Idec MA, Inc.	Weston	\$ 5,512,500	225
bluebird bio, Inc.	Cambridge	\$ 294,000	12
Blueprint Medicines Corporation	Cambridge	\$ 245,000	10
Boston Heart Diagnostics Corporation	Framingham	\$ 450,000	35
Bruker Corporation	Billerica	\$ 1,347,500	55
DePuy Orthopaedics, Inc.	Raynham	\$ 1,715,000	70
Enzymatics, Inc.	Beverly	\$ 152,000	10
Epizyme, Inc.	Cambridge	\$ 416,500	17
Foundation Medicine, Inc.	Cambridge	\$ 450,309	25
Instrumentation Laboratory Company	Bedford	\$ 980,000	40
inviCRO, LLC	Boston	\$ 60,000	10
Merrimack Pharmaceuticals, Inc.	Cambridge	\$ 490,000	20
Moderna Therapeutics, Inc.	Cambridge	\$ 318,500	13
NinePoint Medical, Inc.	Cambridge	\$ 343,774	18
Nova BioMedical Corporation	Waltham	\$ 1,730,000	75
Pall Corporation	Westborough	\$ 127,500	10
PAREXEL International Corporation	Billerica	\$ 1,421,000	58
PerkinElmer, Inc.	Waltham	\$ 1,470,000	60
Quest Diagnostic LLC	Cambridge	\$ 1,225,000	50
Quintiles Transnational Holdings, Inc.	Cambridge	\$ 1,225,000	50
Shire Human Genetic Therapies, Inc.	Lexington	\$ 750,000	25
Synageva BioPharma Corporation	Lexington	\$ 784,000	32

The MLSC takes its stewardship of these resources seriously and has built in strong accountability measures to ensure that the program has “teeth.” The MLSC is carefully monitoring the performance of companies that have received tax incentives to ensure compliance with the tax incentive agreements they are required to execute with the MLSC. Headcount requirements must not only be met in the year following receipt of the award, but also maintained for the following five years. Under agreements by awardees, recipients of tax incentives are required to report job creation results to the MLSC by the end of the calendar year. Under the Life Sciences Act, the Department of Revenue has the authority to recover or “claw back” incentives from companies that the MLSC determines will not meet the minimum job creation threshold in their tax incentive agreement.

Summary of the Tax Incentive Program from Inception to June 30, 2013				
Program Year	Number of Awards Provided	Dollar Amount of Awards Provided	Number of Active Awards as of June 30, 2013	Dollar Amount of Active Awards as of June 30, 2013
2009	26	\$24,420,000	13	\$13,955,500
2010	24	\$24,390,292*	15	\$20,528,259
2011	26	\$20,340,884	21	\$17,350,995
2012	24	\$22,992,583	24	\$22,992,583
Total	100	\$92,143,759	73	\$74,827,337

\*In FY 2012, Shire HGT, Inc., of Lexington received an additional \$3.5 million of tax incentives under an existing tax commitment by the Commonwealth.

Some awardees have declined their awards due to changes in their business or general economic conditions. Some awardees have also determined that they were unlikely to reach their job creation commitment under the statutory guidelines and opted to voluntarily terminate their agreements, either by foregoing taking the tax benefits at all or by returning the benefits to the Commonwealth if they had already received them. Since inception, the MLSC has decertified two awardees for not achieving the statutory thresholds. Nineteen active companies have received two or more active awards, illustrating their continued commitment to grow their headcount in the Commonwealth.

In FY 2013, awardees from the 2009 through 2011 tax programs were required to report their headcount as of December 31, 2012. As of December 31, 2012, reporting awardees from the 2009 through 2011 programs had hired and maintained 3,065 employees, representing a 157 percent attainment of their commitment.

As of June 30, 2013, there were 49 active awards from the 2009 through 2011 program years, with a combined commitment of fulfilling or maintaining 1,882 new hires under the program.

The 2012 program awardees have committed to creating an additional 990 jobs within the Commonwealth in calendar year 2013. The results of these awards will be reported to the MLSC in January 2014. To date, the Tax Incentive Program has resulted in a combined net new hire commitment of more than 2,800 jobs among active awardees.

## Attracting Companies to Massachusetts



*State, community and company officials cut a ribbon to celebrate Canada-based Baylis Medical's new office opening in Burlington, Mass. (from left to right): Kris Shah, Baylis Medical, Executive Vice President & Chief Technology Officer; Tom Sommer, Massachusetts Medical Device Industry Council (MassMEDIC), President; Massachusetts State Representative Kenneth I. Gordon; Angus McQuilken, MLSC, Vice President for Communications and Marketing; and Frank Baylis, Baylis Medical, President.*

Massachusetts continues to be a magnet for growing companies, both domestic and international. The Commonwealth is a great place for life sciences companies to do business with world-class academic institutions, teaching hospitals and research institutes, access a talented workforce and a vibrant investment community, partner with existing industry leaders in all sectors of the life sciences, benefit from a healthy pipeline of innovative young companies, and enjoy a supportive environment for growth. The MLSC actively recruits new companies to the state through its extensive marketing efforts and portfolio of tools and programs, and supports the integration of these companies into Massachusetts' life sciences community.

FY 2013 was another active year for company attraction. In partnership with the state's industry associations, MassBio and MassMEDIC, and with sister agencies in state government, the MLSC continued to work with companies large and small from around the nation and across the world, helping to organize numerous grand openings and press announcements for new or expanding life sciences companies in Massachusetts:

- Bristol-Myers Squibb announced plans for a 350-person, \$250 million expansion of the company's large-scale biologics manufacturing facility in Devens, Mass.
- Roche, a Swiss-based drug and diagnostics company, joined the Massachusetts life sciences community when it acquired Consitution Medical Investors Inc., based in Westborough, Mass.
- Johnson & Johnson announced the opening of its Boston Innovation Center in Cambridge, Mass.; the center's goal is to advance healthcare by catalyzing collaborations in science and technology between regional innovators and the Johnson & Johnson family of companies across a diverse spectrum of early-stage opportunities.

- ZS Genetics announced the grand opening of a new facility in Wakefield.
- Boston Biomedical, Inc., the Oncology Division of Dainippon Sumitomo, celebrated the relocation of its headquarters to Cambridge with a grand opening ceremony.
- Z-Medica, a leading developer and marketer of hemostatic agents, established a new office in Boston.
- Mediso USA, distributor of the pre-clinical imaging portfolio of Hungarian company Mediso Medical Imaging Systems, opened a U.S. office in Boston.
- Canadian medical device company Baylis Medical strengthened its U.S. presence with new offices in Burlington.
- French biotechnology company Hemarina established its first U.S. office in Boston.
- Israeli medical device company NLT SPINE opened a new U.S. office in Dedham.
- Finnish company Pharmatest Services Ltd. announced the opening of a new U.S. sales office in Cambridge.
- German-based Leica Biosystems increased their presence in North America with the opening of a U.S. R&D laboratory in Massachusetts.
- ReproCell, Inc., a Japanese stem cell technology company, announced the opening of the company's first branch and U.S. office in Boston.
- Promedior, Inc., a clinical-stage biotechnology company developing novel biologic therapeutics for the treatment of fibrosis, opened its new office and laboratory space in Lexington, where the company's headquarters were relocated from Pennsylvania.
- U.K.-based Cambridge Consultants kicked off a U.S. recruitment effort to identify and attract new talent in the medical technology arena.
- BioSurplus announced the grand opening of its new 20,000-square-foot showroom and warehouse located at 57 Water Street in Watertown.
- Era7 Bioinformatics, a next generation sequencing provider based in Spain, expanded to the U.S. by opening an office in Cambridge.
- BioAxone BioSciences celebrated the official opening of its scientific and clinical headquarters in Cambridge.
- Japan-based Human Metabolome Technologies, Inc. opened its first U.S. office in Cambridge.
- ConforMIS, Inc. relocated its expanded headquarters to Bedford.
- Scottish company Arrayjet increased their presence in North America with the opening of the company's first U.S. sales office.
- Gov. Patrick joined NXStage Medical to open their new company headquarters in Lawrence.
- During the AdvaMed Conference in Boston on October 2012, Israel-based ARGO Medical Technologies, Dutch company Qserve Group and Sialix, Inc. announced plans to locate in Massachusetts.
- InVivo Therapeutics opened their new office, manufacturing and lab space in Cambridge.
- Norway-based Algeta celebrated the official opening of their U.S. subsidiary in Cambridge.
- U.K.-based company Alacrita established their U.S. headquarters in Cambridge.
- Japanese company SCIVAX USA, Inc., a 3D cell culture system provider, announced the launch of a sales office in Woburn.
- KeraFAST, Inc. celebrated the opening of its new headquarters in Boston.



*U.S. Army Veteran Theresa Hannigan demonstrates ARGO's ReWalk at the AdvaMed 2012 Massachusetts Pavilion; In background from left to right: Massachusetts Secretary of Veterans Affairs Coleman Nee, ARGO Board of Directors member Wayne Weisman, MassMEDIC President Tom Sommer, Massachusetts Life Sciences Center President & CEO Susan Windham-Bannister, Ph.D., Massachusetts Governor Deval Patrick, and ARGO CEO Larry Jasinski.*

A sampling of companies the MLSC has collaborated with to announce expansions within or into Massachusetts over the past five years is below:



The MLSC continues to engage companies across the nation and around the world to encourage them to invest and locate in Massachusetts. The MLSC anticipates many more announcements in FY 2014.

## Building Partnerships

### International Partnerships

In FY 2013, the MLSC received intense interest from international governments, companies and academic institutions that are eager to develop or expand relationships with Massachusetts. Through participation and interaction with numerous government and industry-focused delegations, trade missions and visits, the continuation of the bilateral partnership program with Israel, the creation of a new on-line partnering tool and the launch of a new international collaboration program, the MLSC has established global brand recognition for Massachusetts and the leadership role that the state plays globally in the life sciences.

### Participation in Global Trade Missions and Conferences

The MLSC promoted the visibility of the state's life sciences cluster to many regions of the world through its participation in trade missions to Panama, Chile, Colombia, and Northern Ireland, and participation in trade conferences in Germany, Japan and Israel. Fueling relationships such as the Northern Ireland Massachusetts Connection (NIMAC) through expanded conversations in the spring of 2013 has extended the ongoing collaboration to further integrate participants from Finland and Catalonia.

## Massachusetts Israel Innovation Partnership (MIIP) Round 2: Partnership Continues

The Massachusetts Israel Innovation Partnership (MIIP) has continued to encourage and support innovation and entrepreneurship between Massachusetts' and Israel's life sciences clusters. At the Biomed-IL conference in Tel Aviv in June 2013, the funding authorities in both states announced the awarding of two grants to support life sciences research and development (R&D) collaborations between Massachusetts and Israeli companies, with a total R&D budget of over \$2 million. The winning projects represented a commitment of \$450,170 from the MLSC to two Massachusetts companies:

MIIP Round 2 Awardees		
Companies	Project Description	Amount Awarded
Bio-Tree (Framingham) and Harlan (Israel)	Creating a new vascular toxicity and safety measure to vastly enhance existing drug toxicology assessment tools. The two companies will address the largely unmet area known as DIVI – Drug Induced Vascular Injury, a major cause of new compound failure late in clinical trials or after-market launch.	\$250,000
Cytonome S/T (Boston) and Orgenesis (Israel)	Combining a novel source of cells to be used in a self-replacement therapy technology with an efficient and reproducible separation and enrichment technology to create functional Autologous Insulin production cells.	\$200,170

## Launch of the International Partnership Assistant Portal (IP-ap)

In late November 2012, the MLSC launched an exciting new tool, the International Partnership Assistance Portal, (IP-ap) to provide the means — 365 days a year, 24/7 -- for international companies to identify potential partnerships with Massachusetts companies. The portal was also designed to facilitate partnerships between Massachusetts companies. Provided by the MLSC as a free, password-protected, cloud-based portal, the IP-ap is a growing global database of potential partners from a range of therapeutic areas and industry sectors within the life sciences.

At the close of FY 2013, the IP-ap database contained more than 140 international and Massachusetts company profiles, and dozens of international and local life sciences based agencies and institutions. More than 17 countries are currently represented in the database from four continents. Companies from more than 30 cities and towns from all across the Commonwealth have registered with business profiles.

The MLSC promotes the IP-ap at local, national and international conferences and workshops, information sessions for the Accelerator Loan and international programs, and as part of meetings with foreign delegations. At BIO 2013, a marketing campaign specific to the IP-ap was a huge success and attracted many new interested partners.



## Launch of the International Collaborative Industry Program (ICIP)

Building off of the interest in collaborating with Massachusetts that was established through MIIP, in FY 2013 the MLSC created and launched a new program called the International Collaborative Industry Program or ICIP. ICIP was announced at the 2013 BIO International Convention.

ICIP is based on our belief that knowledge creation occurs worldwide and global collaboration between life science companies has the potential to accelerate breakthroughs and fuel economic development, as well as drive manufacturing and commercialization in the life sciences. In identifying partner regions, the MLSC had more than 15 regions and countries express interest in participating in this program. Ultimately, the four global partners with Massachusetts for the pilot phase of ICIP are:

- The Alsace Region of France
- The Quebec Province in Canada
- The State of Victoria in Australia
- The Wallonia Region in Belgium



On April 22, 2013, at the BIO International Convention, the Massachusetts Life Sciences Center announced the launch of a new International Collaborative Industry Program (ICIP).

The program welcomes applications for projects in biotechnology, pharmaceuticals, medical devices, diagnostics and bioinformatics. Applicants represent two companies (one from Massachusetts and one from a region named above) working on a collaborative project in late stage R&D. In this inaugural round of ICIP, Massachusetts companies have an opportunity to win grants of \$100,000 (minimum) to \$500,000 (maximum) which will be awarded to the most promising life sciences projects on a competitive basis. Funding for the winning non-U.S. company will be provided by the sister agency in the related geography.

After a robust evaluation process including the Scientific Advisory Board of the MLSC and a scientific evaluation team in each of the regions, winners will be selected. The MLSC Board committed up to \$1.5 million to grant to the winners under this program. Expected awards will be announced by spring of 2014.

## The Massachusetts Neuroscience Consortium



Researchers awarded funding through the Massachusetts Neuroscience Consortium and project liaisons from consortium member companies join Massachusetts Life Sciences Center President & CEO Dr. Susan Windham-Bannister, EMD Serono President Jim Hoyes and MS patient Joann D'Amico Stone at the announcement on July 11, 2013.

The Massachusetts Neuroscience Consortium was launched in June 2012 at the BIO International Convention in Boston, and the first solicitation for project submissions was issued last fall. Consortium members reviewed and evaluated nearly 100 applications and selected seven pre-clinical projects to fund at Massachusetts academic and research institutions with a focus on Alzheimer's disease, Multiple Sclerosis, Neuropathic Pain and Parkinson's disease. Consortium members are AbbVie, Biogen Idec, EMD Serono, Janssen Research & Development, LLC, Merck, Pfizer and Sunovion Pharmaceuticals Inc. Through efforts that began in 2009, the MLSC used its convening power to bring these

companies together to form a unique model of industry collaboration and collaboration between sponsors and the research community in order to accelerate the pace of discovery in the neurosciences.

The seven participating member companies have each contributed \$250,000 to the Consortium during this round, for total initial funding of \$1.75 million. The MLSC and the Consortium announced in July 2013 that seven awardees will each receive up to \$250,000 in funding to further their respective neuroscience research projects. Additionally, every researcher has been assigned a project liaison from one of the Consortium member companies who will serve as the primary liaison between the investigator and the Consortium as a whole. Consortium members will share all data generated from each of the projects with all members.

The Neuroscience Consortium's first round of awardees is as follows:

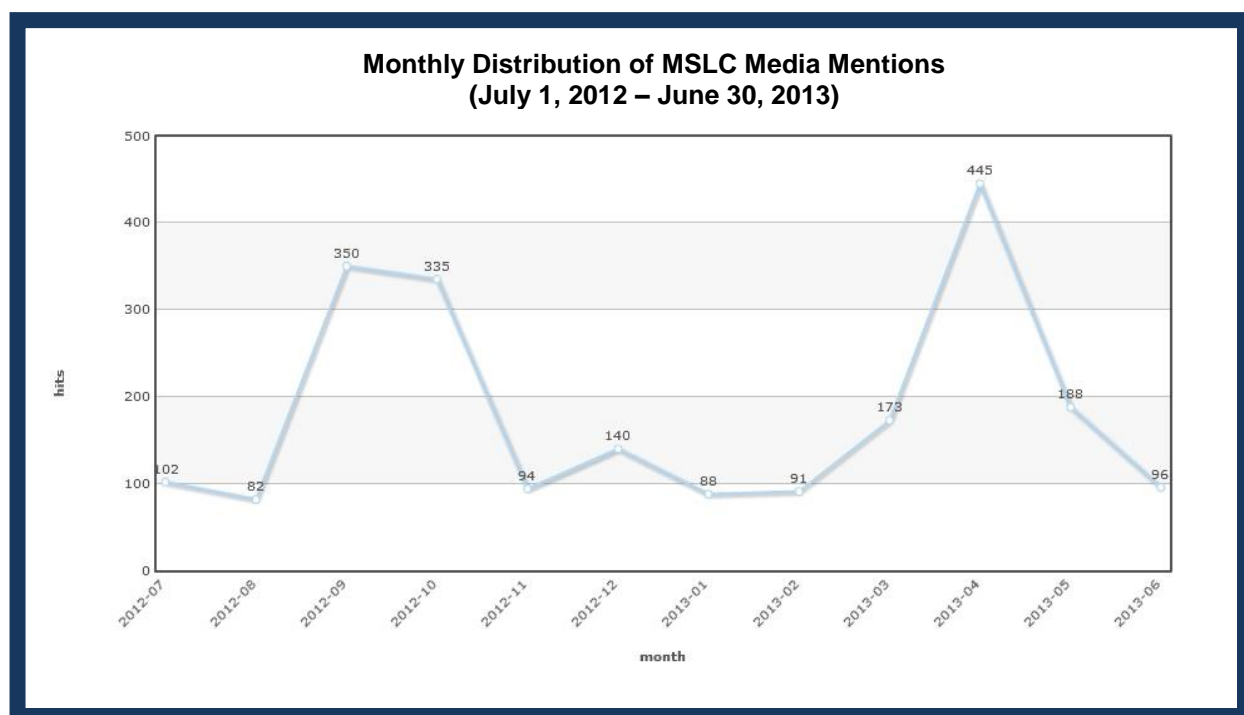
Neuroscience Consortium First-Round Awardees			
Primary Investigator (PI)	Institution	Disease Area	Project Liaison
David A. Harris, M.D., Ph.D.	Boston University School of Medicine	Alzheimer's	Biogen Idec
Bradley T. Hyman, M.D., Ph.D.	Massachusetts General Hospital	Alzheimer's	Janssen Research & Development, LLC
Benjamin Wolozin, M.D., Ph.D.	Boston University School of Medicine	Alzheimer's	EMD Serono
Wassim Elyaman, Ph.D.	Brigham and Women's Hospital	Multiple Sclerosis	Sunovion Pharmaceuticals Inc.
David Clapham, M.D., Ph.D.	Boston Children's Hospital	Neuropathic Pain	Merck
Clifford J. Woolf, M.D., Ph.D.	Harvard Medical School – Boston Children's Hospital	Neuropathic Pain	AbbVie
Ann M. Graybiel, Ph.D.	Massachusetts Institute of Technology	Parkinson's	Pfizer

## Staying Connected

The MLSC's communications and marketing program keeps stakeholders and the general public informed about the MLSC's investments of public dollars, promotes public accountability for the MLSC's progress in accomplishing its mission, and provides ongoing updates and information exchange with the life sciences community in order to encourage its involvement and input. Communication and outreach have been integral to the MLSC's success in attracting a robust and diverse pool of applicants for MLSC programs.

During FY 2013, the MLSC grew its email list from 3,900 to more than 4,600 contacts. The MLSC used its website as both a clearinghouse for information about the MLSC and a portal for applying to the MLSC's programs. The MLSC also ramped up its social media efforts, growing its Twitter follower base from over 100 to nearly 700, our LinkedIn followers to more than 100 and Facebook fans to 50.

The MLSC had nearly 2,200 media mentions during FY 2013. Publications across the nation and around the world covered the MLSC's activities. The chart below shows the monthly distribution of the MLSC's media coverage during FY 2013. Periods of greater coverage tended to coincide with the announcement of new programs or investments.



Source: Meltwater.com clipping service

During FY 2013, MLSC staff participated as presenters, speakers or panelists at more than 50 public events.

## The Way Forward

At the half-way mark of the 10-year Massachusetts Life Sciences Initiative, the MLSC's investments are having a measurable impact on the Massachusetts economy, while strengthening Massachusetts' position as the global leader in life sciences. However, the competition is fierce, and other states and regions are making substantial public investments in an effort to catch up. Rather than rest on our laurels, the MLSC will continue to invest strategically so that Massachusetts can continue to lead, and pull away from the competition.

The state budget calls for a FY 2014 investment fund appropriation of \$19.5 million, a \$4.5-million increase from FY 2013, contingent on the comptroller's declaration of a consolidated net surplus for FY 2013. The MLSC is appreciative and excited about this vote of confidence by Governor Patrick and his administration, and the State Legislature, under the leadership of Senate President Murray and Speaker of the House DeLeo. The MLSC looks forward to delivering another productive and impactful year.

## Appendix A - The Board of Directors of the Massachusetts Life Sciences Center as of June 30, 2013

- **Gregory Bialecki, Co-Chair**  
Secretary, Executive Office of Housing and Economic Development
- **Glen Shor, Co-Chair**  
Secretary, Executive Office for Administration and Finance
- **Edward J. Benz, Jr., M.D.**  
President and CEO, Dana-Farber Cancer Institute
- **Josh Boger, Ph.D.**  
Founder & CEO (retired), Vertex Pharmaceuticals
- **Robert L. Caret, Ph.D.**  
President, University of Massachusetts
- **Abbie Celniker, Ph.D.**  
CEO, Eleven Biotherapeutics, Inc.
- **Lydia Villa-Komaroff, Ph.D.**  
Director and Chief Scientific Officer, Cytonome/ST

## Appendix B - Massachusetts Life Sciences Center Scientific Advisory Board Members as of June 30, 2013

- **Harvey Lodish, Ph.D., Chair**  
Whitehead Institute for Biomedical Research and Professor of Biology and of Bioengineering, Massachusetts Institute of Technology
- **James Barry, Ph.D.**  
Executive Vice President and COO, Arsenal Medical
- **Kevin J. Bitterman, Ph.D.**  
Principal, Polaris Venture Partners
- **Dalia Cohen, Ph.D.**  
Chief Scientific Officer, Asterand, Inc.
- **James J. Collins, Ph.D.**  
Professor of Biomedical Engineering, Boston University
- **John M. Collins, Ph.D.**  
Chief Operating Officer, Center for Integration of Medicine & Innovative Technology (CIMIT)
- **Robert D'Amato, M.D., Ph.D.**  
Judah Folkman Chair in Surgery and Director, Center for Macular Degeneration Research, Children's Hospital, Boston
- **T. (Teo) Forcht Dagli, M.D.**  
Partner, HLM Venture Partners
- **Jonathan Fleming, M.P.A.**  
Managing General Partner, Oxford Bioscience Partners
- **Rainer Fuchs, Ph.D.**  
Chief Information Officer, Harvard Medical School
- **Glenn R. Gaudette, Ph.D.**  
Associate Professor, Biomedical Engineering, Worcester Polytechnic Institute
- **José-Carlos Gutiérrez-Ramos, Ph.D.**  
Senior Vice President, head of BioTherapeutics Research & Development, Pfizer Inc.
- **Henry Kay**  
U.S. Partner, Medica Venture Partners
- **Dale Larson**  
Director of Biomedical Systems, Draper Laboratory

- **Judith Lieberman, Ph.D.**  
M.D., Senior Investigator, Immune Disease Institute, Children's Hospital Boston and Professor of Pediatrics, Harvard Medical School
- **Lita L. Nelsen**  
Director, Technology Licensing Office, Massachusetts Institute of Technology
- **Barbara Osborne**  
Professor of Veterinary and Animal Sciences, University of Massachusetts Amherst
- **Carmichael Roberts, Ph.D.**  
Partner, North Bridge Venture Partners
- **Lauren Silverman, Ph.D.**  
Managing Director, Novartis Option Fund
- **Alan E. Smith, Ph.D.**  
Former Chief Scientific Officer, Genzyme Corporation
- **Allison Taunton-Rigby, Ph.D.**  
Co-founder, CEO and Director, RiboNovix, Inc.
- **Guillermo Tearney, M.D., Ph.D.**  
Professor of Pathology, Harvard Medical School
- **David Walt, Ph.D.**  
Robinson Professor of Chemistry and Howard Hughes Medical Institute Professor, Tufts University School of Medicine
- **Philip Zamore, Ph.D.**  
Professor, Biochemistry and Molecular Pharmacology, UMass Medical School

## Appendix C - FY 2013 Internship Challenge Host Companies

Company Name	Location		
BioSurfaces, Inc.	Ashland	Dental Photonics, Inc.	Walpole
BioTechnic Products, Ltd.	Worcester	Dentovations Inc	Boston
Biotrofix, Inc.	Waltham	Dermatopathology Consultations LLC	Boston
Blue Ocean Biomanufacturing, Inc.	Wellesley	Digilab, Inc.	Marlborough
Blue Sky Biotech	Worcester	DMI Dx, LLC	Cambridge
Blue Stream Laboratories, Inc.	Cambridge	DNA Medicine Institute	Cambridge
Boston Biomedical Associates	Northboro	DocBox Inc	Waltham
Boston MedTech Advisors	Dedham	Ekam Imaging, Inc.	Shrewsbury
Boston Microfluidics Inc.	Medford	EndoDynamix, Inc.	Salem
Boston Micromachines Corporation	Cambridge	EndoSim, LLC	Berlin
Boston Open Labs	Fall River	Energesis Pharmaceuticals, Inc.	Cambridge
Bridgemedica, LLC	Walpole	Ensemble Therapeutics Corporation	Cambridge
Cambridge Biomedical, Inc.	Boston	Enumeral Biomedical	Cambridge
Cellay, Inc.	Cambridge	EpigenDx, Inc.	Worcester
Celldex Therapeutics, Inc.	Fall River	Essential Life Solutions Ltd.	Stoughton
CellMosaic LLC.	Worcester	Eutropics Pharmaceuticals	Cambridge
Celltreat Scientific Products	Shirley	Excellims Corporation	Acton
Cephos Corp.	Pepperell	First Light Biosciences	Bedford
CeQur Corporation	Marlborough	Five Star Manufacturing, Inc.	New Bedford
ChemGenes Corp.	Wilmington	Five Star Surgical, Inc.	New Bedford
Clover Medical LLC	Dover	Flagship IP, P.C.	Boston
CMC Consulting Group	Framingham	FloDesign Sonics	Wilbraham
Constellation Pharmaceuticals	Cambridge	Flow Forward Medical, LLC	Lowell
Convergence Medical Devices, Inc.	Woburn	G&F Industries, Inc.	Sturbridge
Corindus, Inc.	Waltham	G&F Medical Inc.	Danvers
Court Square Group, Inc.	Springfield	Genoceas Biosciences, Inc.	Cambridge
Courtagen Life Sciences, Inc.	Woburn	Giner, Inc.	Newton
CreaGen Biosciences, Inc	Woburn	Ginkgo BioWorks, Inc.	Boston
CuriRx Inc	Wilmington	GlycoSolutions Corporation	Marlborough
Cytonome/ST, LLC.	Boston	Glycosyn Inc.	Medford
Daktari Diagnostics, Inc.	Cambridge	Global Business Support, Inc.	Fall River

Grove Instruments, Inc.	Worcester
Guided Surgery Solutions, LLC	Boston
Gweepi Medical Inc.	Cambridge
Harvard Apparatus	Holliston
Hemedex Inc.	Cambridge
Hepatochem, Inc.	Beverly
Hepregen Corporation	Medford
HighRes Biosolutions Inc	Woburn
Hstar Technologies Co.	Cambridge
HydroCision, Inc	North Billerica
Imagine Optic, Inc.	Cambridge
Imgen BioSciences, Inc.	Fall River
Immunetics, Inc	Boston
Immunotrex Biologics Inc.	North Andover
InCrowd, Inc.	Chestnut Hill
InfoBionic	Lowell
InfraReDx, Inc.	Burlington
Institute for Pediatric Innovation, Inc.	Cambridge
Integral BioSystems, LLC	Bedford
Interactive Motion Technologies	Watertown
inviCRO	Boston
InVivo Therapeutics Corporation	Cambridge
IonSense	Saugus
iQuartic, Inc.	Cambridge
Janus Biotherapeutics	Worcester
JEF Core, Inc.	Weston
JNK Healthcare Inc	Boston
KeraFAST	Boston
Kibur Medical	Boston
Knode Inc.	Cambridge
LaVoie Strategic Communications, Inc.	Salem
Lantos Technologies Inc	Cambridge
MagneMotion Inc.	Devens

Matrigen LLC.	Worcester
Maxiom Consulting Group Inc.	Waltham
Med Techna, Inc.	Dedham
MedChem Partners LLC	Lexington
MedPanel	Cambridge
Metis Manufacturing LLC	Beverly
Microbiotix, Inc.	Worcester
Microtest Laboratories, Inc.	Agawam
Most Corporation	Salem
MostMed, Inc.	Salem
Mouse Specifics, Inc.	Quincy
MSM Protein Technologies	Medford
MX Orthopedics	Billerica
Myomo, Inc.	Cambridge
Nemucore Medical Innovations, Inc.	Worcester
Neo-Advent Technologies, LLC	Littleton
New England Peptide LLC	Gardner
Nexcelom Bioscience LLC	Lawrence
NKT Therapeutics Inc.	Waltham
Northeast Biomedical, Inc.	Tyngsboro
NovoBiotic Pharmaceuticals, LLC.	Cambridge
Nuclea Biotechnologies, Inc.	Pittsfield
OC10, LLC	Boston
Ocean Genome Legacy	Ipswich
OnSite Therapeutics, Inc.	North Andover
Ora, Inc.	Andover
Orbit Research	Andover
PharmaHealth Clinical Research Services	Fairhaven
Pharmalucence, Inc.	Billerica
Phonologics, Inc.	Bedford
Phosphorex, Inc.	Fall River
Phylonix Pharmaceuticals, Inc.	Cambridge
pION INC	Woburn

Precision Fabricators Ltd	Stoughton
Pressure BioSciences, Inc.	South Easton
Privo Technologies	Cambridge
Progenika Inc.	Medford
Proveris Scientific Corporation	Marlborough
Quanterix Corporation	Cambridge
Reflectance Medical Inc.	Westborough
Relay Technology Management, Inc.	Boston
Respiratory Motion, Inc.	Lexington
ReSurfX LLC	Cambridge
S2N Health, LLC	Newton
SafePath Medical, Inc	Methuen
Safety Partners, Inc.	Burlington
Sage Science, Inc.	Beverly
Sample6 Technologies, Inc.	Boston
SBH Sciences, Inc.	Natick
Scientia Advisors, LLC.	Cambridge
Seeding Labs	Boston
Segterra Inc.	Lexington
Selecta Biosciences, Inc.	Watertown
SemiNex Corporation	Peabody
Senscio Systems, Inc.	Shirley
Sentien Biotechnologies, Inc.	Medford
Seventh Sense Biosystems	Cambridge
Sharp Edge Labs, Inc.	Beverly
Shaser, Inc.	Woburn
Sialix, Inc.	Newton
SonyaSoft	Cambridge

Sproxil, Inc.	Cambridge
STAR Analytical Services	Bedford
STC Biologics, Inc.	Cambridge
T2 Biosystems, Inc.	Lexington
Targeted Cell Therapies, LLC	Worcester
TDC Medical, Inc.	Marlborough
Tegra Medical	Dartmouth
Tetraphase Pharmaceuticals, Inc.	Watertown
Therapeutic Systems, LLC	Amherst
TheraTorr Medical, Inc.	Beverly
THINQ Pharma	Natick
Tissue Solutions, LLC	Marblehead
TRA360	West Newton
Two Square Science, LLC	Fall River
Union Biometrika, Inc.	Holliston
VasoTech, Inc.	Lowell
Vista Scientific LLC	Andover
VitaThreads Inc.	Worcester
VivoPath, LLC	Worcester
Vizio Medical Devices LLC	Lowell
WaterSep Technology Corp	Marlborough
WaveGuide Corporation	Cambridge
White Systems, Inc.	Hyannis
WorldCare Clinical, LLC	Boston
X-CHEM, Inc.	Waltham
Xtal BioStructures Inc.	Natick
ZeptoMetrix Corporation	Franklin

## Appendix D - List of Active Certified Life Sciences Companies as of June 30, 2013

Company	Location
Aegerion Pharmaceuticals, Inc.	Cambridge
AesRx, LLC	Newton
Alcyone Lifesciences, Inc.	Concord
Allurion Technologies, Inc.	Wellesley
Avaxia Biologics, Inc.	Burlington
Ariad Pharmaceuticals, Inc.	Cambridge
Bind Biosciences, Inc.	Cambridge
Bio2 Technologies, Inc.	Woburn
Biogen Idec MA, Inc.	Cambridge
Bio-Tree Systems, Inc.	Framingham
Bluebird Bio, Inc.	Cambridge
Blueprint Medicines Corporation	Cambridge
Boston Heart Diagnostics Corporation	Framingham
Bruker Corporation	Billerica
Cell Signaling Technology	Danvers
Christcot Medical, Inc.	Sudbury
Constellation Pharmaceuticals, Inc.	Cambridge
Cubist Pharmaceuticals, Inc.	Lexington
CytonomeST, LLC	Boston
DePuy Othopaedics, Inc.	Raynham
Dyax Corporation	Cambridge
Enzymatics, Inc.	Cambridge
Epizyme, Inc.	Cambridge
Eutropics Pharmaceuticals, Inc.	Cambridge
Foundation Medicine, Inc	Cambridge
Good Start Genetics, Inc.	Cambridge
Grove Instruments, Inc.	Worcester
Hepatochem, Inc.	Cambridge
InfraReDx, Inc.	Burlington
Instrumentation Laboratory Company	Bedford
inviCRO, LLC	Boston
InVivo Therapeutics, Inc.	Cambridge
Ironwood Pharmaceuticals, Inc.	Cambridge
LeMaitre Vascular, Inc.	Burlington
Lightlab Imaging, Inc.	Westford
MedicaMetrix, Inc.	Wayland
Merrimack Pharmaceuticals, Inc.	Cambridge
Mevion, Inc.	Littleton
Moderna Therapeutics, Inc.	Cambridge
Momenta Pharmaceuticals, Inc.	Cambridge
Myomo, Inc.	Cambridge
NinePoint Medical, Inc.	Cambridge
Nova Biomedical Corporation	Waltham

NxStage Medical, Inc.	Lawrence
OmniGuide, Inc.	Cambridge
Organogenesis, Inc.	Canton
Pall Corporation	Westborough
PAREXEL International Corporation	Lowell
PerkinElmer, Inc.	Waltham
Pharmalucence, Inc.	Bedford
Quanterix Corporation	Cambridge
Quest Diagnostics, Incorporated	Cambridge
Quintiles Consulting	Cambridge
Ra Pharmaceuticals, Inc	Cambridge
Sample6 Technologies, Inc.	Boston
Sanofi-Aventis, Inc.	Cambridge
SBH Sciences, Inc.	Natick
Shire Human Genetic Therapies, Inc.	Lexington
STD Med, Inc.	Stoughton
Strohl Medical Technologies, Inc.	Weymouth
Synageva BioPharma Corporation	Lexington
T2Biosystems, Inc.	Lexington
Valerion Therapeutics, Inc.	Boston
Valeritas, Inc.	Shrewsbury
Vertex Pharmaceuticals, Inc.	Cambridge
Wadsworth Medical Technologies, Inc.	Westborough
Wolfe Laboratories, Inc.	Watertown

# Life Sciences Innovation as a Catalyst for Economic Development:

The Role of the Massachusetts Life Sciences Center

*Prepared by:*

**The Kitty and Michael Dukakis Center for Urban and Regional Policy at Northeastern University**



Northeastern University  
*Kitty and Michael Dukakis Center  
for Urban and Regional Policy*

**The Boston Foundation**



**The Boston  
Foundation**

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## About the Boston Foundation

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## About the Kitty and Michael Dukakis Center for Urban and Regional Policy

The Kitty and Michael Dukakis Center for Urban and Regional Policy at Northeastern University conducts interdisciplinary research, in collaboration with civic leaders and scholars both within and beyond Northeastern University, to identify and implement real solutions to the critical challenges facing urban areas throughout Greater Boston, the Commonwealth of Massachusetts, and the nation. Founded in 1999 as a "think and do" tank, the Dukakis Center's collaborative research and problem-solving model applies powerful data analysis, a bevy of multidisciplinary research and evaluation techniques, and a policy-driven perspective to address a wide range of issues facing cities and towns. These include affordable housing, local economic development, workforce development, transportation, public finance, and environmental sustainability. The staff of the Dukakis Center works to catalyze broad-based efforts to solve urban problems, acting as both a convener and a trusted and committed partner to local, state, and national agencies and organizations. The Center is housed within Northeastern University's innovative School of Public Policy and Urban Affairs.

## About the Authors

**Barry Bluestone** is a Founding Director of the Kitty and Michael Dukakis Center for Urban and Regional Policy and former Dean of the School of Public Policy and Urban Affairs at Northeastern University, where he is also the Stearns Trustee Professor of Political Economy. Previously, Professor Bluestone spent 12 years at the University of Massachusetts at Boston and 15 years at Boston College, where he directed the University's Social Welfare Research Institute. At the Dukakis Center, he has led research projects on housing, local economic development, state and local public finance, and the manufacturing sector in Massachusetts. He regularly consults with trade unions, business leaders, and serves on Gov. Deval Patrick's Economic Development Strategy Council. Professor Bluestone was raised in Detroit and attended the University of Michigan, where he received his Ph.D. in economics.

**Alan Clayton-Matthews** is an Associate Professor in Northeastern University's School of Policy Studies and Urban Affairs and in the Department of Economics. He is a contributing editor of *Massachusetts Benchmarks*, a joint publication of the University of Massachusetts and the Federal Reserve Bank of Boston that presents timely information and analysis about the performance of the Massachusetts economy. He is also a Director of the New England Economic Partnership (NEEP), a group of economists and managers from academia, business, and government who study and forecast the regional economy. He serves as the Massachusetts forecast manager for NEEP. Professor Clayton-Matthews also is currently serving on Governor Deval Patrick's Council of Economic Advisors. His applied research interests include analyzing the Massachusetts economy, including its structure, development, and short and long-run growth trends. His academic research includes the development of statistical procedures and tools for economic index construction and forecasting, and the relationship between higher education and economic development. Professor Clayton-Matthews holds a Ph.D. in economics from Boston College.

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# Life Sciences Innovation as a Catalyst for Economic Development:

The Role of the Massachusetts Life Sciences Center

## Authors

Barry Bluestone  
Alan Clayton-Matthews

## Editor

Kathleen Clute, The Boston Foundation

The Kitty and Michael Dukakis Center for  
Urban and Regional Policy, Northeastern University

March 2013

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## Preface

In 2003, a distinguished group of university leaders, educators and business representatives came together for a unique and unprecedented summit, spearheaded by Harvard Business School professor Michael Porter and hosted by the presidents of MIT and Harvard, Susan Hockfield and Drew Gilpin Faust. This was the same year those two universities played a major role in the international team that cracked the human genome.

The summit's purpose was to discuss the state's life sciences "super cluster," meaning all of the many sectors that are involved in the life sciences. Everyone attending agreed that strengthening the life sciences was not only smart and played to our state's strengths, it was crucial to our future global competitiveness. It could mean jobs for hundreds of thousands and billions added to the Massachusetts economy.

While the summit was stimulating, there was no established vehicle to build on the momentum that it generated. And so, in 2005, the Boston Foundation provided a grant of \$125,000 to create the Massachusetts Life Sciences Collaborative. The Organizing Committee for the new group included the leaders of all of the Boston area's major universities, teaching hospitals, life-sciences companies and venture-capital firms.

In March of 2007, Governor Deval Patrick spoke at one of the Collaborative's meetings about the importance of the life sciences to the Commonwealth. He previewed an announcement he would make publicly later that year about the creation of a new Massachusetts Life Sciences Initiative, which represented a 10-year, \$1 billion investment to enhance and strengthen the state's leadership in the life sciences.

The Boston Foundation was honored to play a major convening role in bringing together the stakeholders for those early discussions. And now we are proud to publish this first report on the Massachusetts Life Sciences Initiative and the work of the quasi-public agency charged with carrying out its mission.

We have published many reports researched by the lead author of this report, Barry Bluestone, Director of the Kitty and Michael Dukakis Center for Urban Affairs at Northeastern. Reports from the Dukakis Center are always thorough and compelling, but not all of them carry good news. This one does, especially when it comes to economic impact. The \$56.6 million Massachusetts awarded in tax incentives to life sciences firms between 2009 and 2011 has created 2,500 jobs, which should generate more than \$266 million in wages and salaries during the next five years. In fact, the Commonwealth's life sciences super cluster has risen to number one in the nation in terms of per capita employment, with close to 14,300 jobs for every one million residents.

These jobs are not just for workers with advanced degrees: at least one in five require no more than a two-year associate's degree and another 48 percent require just a bachelor's degree. For the Boston Foundation, this confirms our deep investment in supporting the full education pipeline and the importance of preparing college students for well-paying jobs in a field that will only grow.

Estimating the economic impact of this life sciences super cluster is within our grasp. Evaluating its broader value to society is daunting because of the almost limitless potential it has for improving the lives and well-being of people here in Massachusetts and around the world.



Paul S. Grogan  
President & CEO

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# Executive Summary

This report provides an up-to-date, independent evaluation of the \$1 billion, 10-year Massachusetts Life Sciences Initiative and the Massachusetts Life Sciences Center (MLSC) charged with the responsibility of carrying out its mission. The initiative was established in July 2008 by Governor Deval Patrick's Administration and the Legislature to encourage the growth of discovery and production in the life sciences, including biotechnology, pharmaceuticals, medical diagnostics, medical devices and bioinformatics in the Commonwealth. Based on the region's existing comparative advantage in life sciences research and development (R&D) emanating from the laboratories of its leading universities and medical institutions, this substantial infusion of public funds was undertaken with the ambitious goal of making this cluster of industry sectors the most successful in the world.

This evaluation comes at a propitious time, given the state of fiscal affairs in the Commonwealth and the nation. Virtually every unit of government is scrutinizing the use of each tax dollar to ensure that public revenue is being spent effectively and efficiently. Put simply, our goal in this evaluation was to gather as much data as possible to assess whether the Commonwealth's sizeable commitment of public resources is paying off in the form of a life sciences "super cluster" capable of attracting massive amounts of investment dollars, generating well-paying jobs for Massachusetts residents and yielding additional tax revenue for the Commonwealth.

## The Life Sciences Super Cluster and the MLSC

After it was created, the MLSC sought to develop as a key element of its strategy the creation of a collaborative "ecosystem" encompassing all aspects of the state's life sciences. It would do this by encouraging the development of a dense, highly connected community of scholars, entrepreneurs, industry leaders, venture capitalists and government officials who were all dedicated to the success of this sector. Unlike many narrowly focused state economic development initiatives, the Center has

chosen to guide its investments with a broad range of strategic priorities geared to enhance all aspects of the life sciences cluster. These include:

- funding translational research that converts new discoveries into marketable products and services
- investing in promising new technologies
- ensuring worker skill acquisition that aligns with the needs of life sciences industries
- creating new infrastructure with shared resources to accelerate life sciences innovation
- building partnerships among segments of the local and international life sciences communities

To accomplish these goals, the Center relies on a portfolio of seven distinct programs. These include:

**Cooperative Research Grants** to support industry-sponsored research at universities in order to facilitate scientific discoveries that lead to medical applications. These grants match industry contributions dollar for dollar.

**Internship Challenge Program** to provide funds for interns working at start-up and smaller Massachusetts life sciences companies.

**New Investigator Grants** to spur innovative research and advance the careers of new investigators working on cutting-edge research at academic research centers in Massachusetts.

**Life Sciences Accelerator Loan Program** to make loans available to early-stage companies and help leverage additional sources of capital.

**Small Business Matching Grant (SBMG) Program** to provide matching support to firms on the verge of commercializing new technologies developed with Phase II or Post-Phase II federal Small Business Innovation Research (SBIR) awards or federal Small Business Technology Transfer (STTR) grants.

**Life Sciences Tax Incentive Program** to offer a combination of 10 competitively awarded tax incentives available to companies that meet specified hiring goals.

TABLE 1  
Distribution of MLSC Investments by Dollar Amount  
(June 2008–June 2012)

Capital Projects (12)	\$186,950,000
Company Grants and Accelerator Loans (31)	\$22,907,000
Academic Research Grants (35)	\$23,346,344
Tax Incentives (56)	\$56,595,093
Interns Funded for Workforce Development (884)	\$6,903,164
Equipment and Supply Grants for Schools (32)	\$3,333,675
Other Grants/Business Plan Competitions	\$1,540,000
<b>TOTAL</b>	<b>\$301,575,276</b>

Source: Massachusetts Life Sciences Center, 2013

**Capital Projects Fund** to provide capital for equipment and supplies for high schools in Gateway Cities, vocational/technical schools, and community colleges; and for capital projects at academic/research institutions, business incubators, and other not-for-profit organizations.

Between 2008 and June 30, 2012, the Center directly invested or committed more than \$300 million in state funds that have leveraged more than \$1 billion in third-party investments by private businesses, the federal government and foundations, according to the MLSC *FY2012 Report*. **Table 1** provides a breakdown of these investments.

## Special Features of the Massachusetts Life Sciences Center

Our analysis revealed that, aside from its extraordinarily broad mandate, there are other factors that make the MLSC quite different from most government subsidy programs.

First, the MLSC operates under a Board of Directors that includes state government officials, but also industry CEOs, leaders from academia and medicine, bioscience researchers and others who have great knowledge of the life sciences.

Second, MLSC accelerator loans and other investments are reviewed by a panel of more than 200 specialists who advise the Center's Scientific Advisory Board (SAB), which itself is dominated by academic researchers, industry scientists, and private venture-capital experts who together can judge both the scientific and economic

potential of an MLSC investment. Accelerator loans are also reviewed by private venture-capital experts who can assess the economic potential of recipient firms.

And third, the Center insists on accountability in terms of private sector investment matches. The Center also retains the power (and has utilized it) to "claw back" tax incentives if and when specific job creation goals are not reached by grant recipients.

We discovered from our interviews with life sciences executives, trade association leaders and members of the MSLC Scientific Advisory Board that the high level of professionalism associated with the Center's expert-based review process has resulted in MLSC investments that appear to have a high rate of return for the Commonwealth. We will return to this point, but must first touch upon a finding even more important than the measured rates of return to specific MLSC programs.

## New vs. Old Growth Theory

To properly assess the value of the Life Sciences Initiative and the MLSC, it is useful to place its activities in the context of economic growth theory. What is now known as the "old growth theory" suggests that economic prosperity springs from the accumulation of ever greater stocks of the fundamental ingredients of production: capital, labor and natural resources. Those countries that find ways of increasing investment in plant and equipment, adding to labor supply and extracting more natural resources are the ones that will become more affluent.

While not completely discounting this approach to growth, a "new growth theory" has evolved that places technological progress at the very epicenter of growth dynamics—even more important than capital, labor and resource inputs. Advances in technology and interdependencies between new ideas and new investment provide the basis for entire new industries and products that generate additional wealth and raise living standards.

Innovation-based growth is so powerful because it avoids the classic problem of diminishing returns on any given investment. With this type of growth, once the fixed cost of creating a new technology has been incurred, the formula can be used over and over again at little or no cost. As such, there can be increasing returns paying enormous dividends to society.

Moreover, the new innovation-based growth theory

posits a strong reciprocity among the rate of skill acquisition by workers, investments in new capital and new inventions. Thus, programs that combine incentives for innovation along with resources to augment human capital should fuel rapid economic growth more than anything else society can do to promote prosperity.

What is special about the Massachusetts Life Sciences Initiative is that it focuses explicitly on increasing the rate of innovation by encouraging more research and development (R&D) in the life sciences and helping small firms in this super cluster convert basic research into marketable products and services. New growth theory posits that this activity is the very fountain of economic growth.

## Has the MLSC Been Successful?

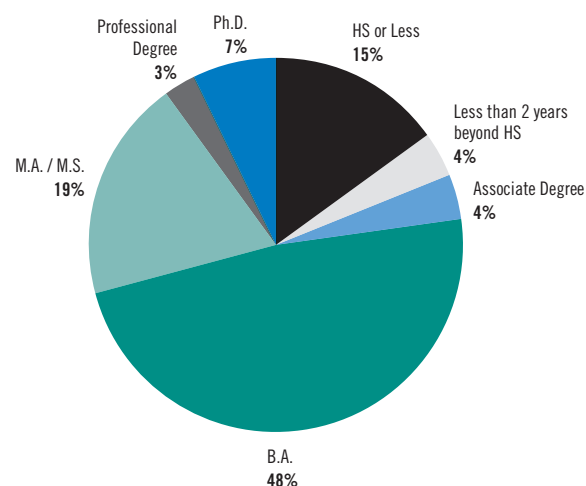
Unfortunately, keeping score on the success of innovation is difficult. Instead of a more-or-less certain return to a given infusion of capital under the old growth theory, under the new growth theory, innovation tends to deliver stronger long-term growth but it is “lumpy, discontinuous, and nonlinear.” There can be a long gap between the time a new innovation is first incorporated into production and the time that it pays off in terms of increased productivity, output and jobs. In the short term, it can be discouraging, as investments in fundamental innovation usually have little immediate payoff. It will take decades to realize the full benefits to humanity and the economy from the advances now being made in drug discovery, medical diagnostics and medical devices.

What we can do is measure the short-term direct benefits of MLSC investments and consider the views of experts as to whether the Center has indeed played a critical role in creating a life sciences “ecosystem” that attracts investment and generates jobs in this sector.

### Short-Term Benefits

As for the short-term benefits, we conducted a cost-benefit analysis of the Center’s tax incentive program. According to our analysis based on MLSC data, the total value of tax incentives outstanding to Massachusetts life sciences firms as of June 30, 2012 was \$56.6 million. Our best estimate is that a little over 2,500 jobs were created as a result of these incentives. Given the average \$105,000 salary of these jobs, we predict they will generate more than \$266 million in wages and salaries during the next five years. If

FIGURE 1  
Education Distribution of New Hires  
by 2010 MLSC Tax Incentive Awardees



Source: Dukakis Center for Urban and Regional Policy

our analysis proves correct, these workers will pay more than \$93 million in state personal income and sales taxes during that period. As such, assuming all of these jobs were directly related to the tax incentives and that these jobs last at least five years, every dollar of tax incentive will repay \$1.66 to state coffers, as **Table 2** reveals. This is an outstanding rate of return.

What is more, our analysis suggests that these jobs will go to a broad array of workers, not just those with advanced degrees. As **Figure 1** reveals, more than one in five jobs in life sciences firms require no more than a two-year associate’s degree and nearly another half (48%) require no more than a bachelor’s degree. Thus, the short-term benefits of MLSC tax incentives seem to have heavily outweighed the costs and the job benefits are broadly shared.

## The Unique Growth Pattern of Regional Life Sciences Clusters

The most important benefits stemming from MLSC activities, however, will come in the future. This is due to the unique growth pattern of highly innovative sectors like the life sciences. The regional concentration of life-sciences companies happens in a very different manner than in other industries. In the case of traditional industrial sectors such as auto, aircraft engine, financial services and the like,

TABLE 2  
Economic Return on the MLSC Tax Incentive Program

	Program Year 2009	Program Year 2010	Program Year 2011	3 Years of Incentives
Total Value of MLSC Tax Incentives (\$) Outstanding	\$15,245,500	\$20,672,638	\$20,340,884	\$56,259,022
Net New Jobs Created	901	721	915	2,537
Tax Incentive per Job (\$)				\$22,175
Annual Tax Incentive per 5-year job (\$)				\$4,435
Average Salary per Job (\$)				\$105,037
Total Salaries Generated per Year (\$)				\$266,479,399
State Income Tax Revenue per Job per year (\$)				\$4,937
Total State Income Tax per year (\$)				\$12,524,532
Average Sales Tax per Job (\$)				\$2,404
Total State Sale Tax per year (\$)				\$6,099,447
Total Income+Sales Taxes per year (\$)				\$18,623,979
Average Income+Sales Tax/Job per year				\$7,341
Total Income+Sales Taxes per 5-year Job				\$36,705
Total Income+Sales Taxes over 5 years				\$93,120,585
<b>Tax Revenue/Incentive Ratio over 5 years</b>				<b>1.66</b>
	Pharma	Medical Devices	Scientific Research	Total
Jobs	1,843	481	213	2,537
Average Salary (\$)	\$115,222	\$66,913	\$103,009	\$105,037
Total Salary (\$)	\$212,353,256	\$32,185,280	\$21,940,863	\$266,479,399
Share of Salary	0.7969	0.1208	0.0823	1.0000
State Income Tax By Sector (\$)	\$9,980,603	\$1,512,708	\$1,031,221	\$12,524,532
Sales Tax by Sector (\$)	\$4,860,554	\$736,689	\$502,204	\$6,099,447

Source: Dukakis Center for Urban and Regional Policy

a region becomes dominant in a particular cluster once a large anchor enterprise or a small number of them establish operations in that locale. Once the anchor enterprise is established, an array of smaller firms is attracted to that region to serve as part of the supply chain for the large anchor enterprise(s). Essentially, the small firms in the industry are dependent on the large ones.

For the life sciences and other highly innovative sectors, the reverse is true. The large companies that depend on the development of breakthrough innovations and sophisticated medical devices prosper by being near a concentration of small start-up firms. Even the largest of the life sciences companies, with substantial research budgets, do not have the resources to generate more than a handful of breakthroughs in the biosciences, genomics and similar fields. These big firms grow and prosper by carefully monitoring the scientific discover-

ies under way in university research laboratories and in the translational research carried out by small start-ups.

Those few start-ups that develop potential blockbuster drugs or devices become prime targets for acquisition by the larger firms. The secret to success in the acquisition process is being where the small firms are located. This permits the large companies to closely monitor the progress of smaller firms and buy the most promising ones before "Big Pharma" competitors or other medical device manufacturers can make a bid. To use a metaphor from nature, the large, globally important life sciences firms want to feed in the waters where the minnows are swimming.

Because Massachusetts has so many small life sciences firms, nine of the world's ten major drug companies have now set up shop in the Commonwealth. They are

investing billions in plant and equipment and creating thousands of additional jobs. These include Pfizer, Novartis, Johnson & Johnson, GlaxoSmithKline, Sanofi (which absorbed Genzyme), AstraZeneca, Abbott Laboratories, Merck and Bristol-Myers Squibb.

And here is the key to understanding the central role of the MLSC: While the large firms can easily exist without the MLSC's direct investments, the small life-sciences ventures need the Center to provide them with accelerator loans, research and development funds, and interns who can help them translate their ideas into commercially viable products. While the private venture capital market may provide some funds for this purpose, venture capitalists often demand a quicker return than can be obtained from this sector, which often has long lag times between initial research, proof of concept and a final product approved by the U.S. Food and Drug Administration.

In this environment, the MLSC has become an important investment partner for smaller life sciences firms that grow out of local research universities and medical centers. By providing funds for translational research and development, the MLSC can help keep these growing companies in the Commonwealth instead of losing them to investment funds in other regions. To revert to metaphor again, it's because these minnows stay here

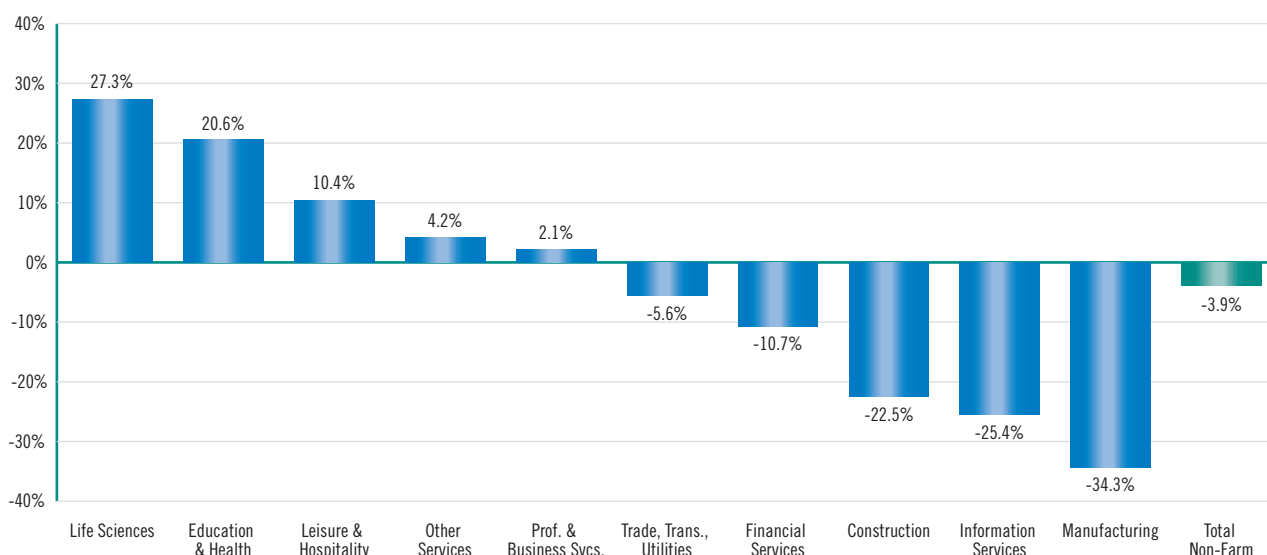
that Big Pharma has come to swim in this pond. In addition, Big Pharma benefits from the Center's investments in workforce development, shared infrastructure resources and cooperative research projects between industry and academia. The result has been extraordinary output and employment growth.

## The Massachusetts Life Sciences: A Record of Output and Employment Growth

The numbers are, indeed, impressive. As of 2012, according to the Massachusetts Biotechnology Council (MassBio), 1,198 life sciences companies were operating in New England and employing 103,006 workers. More than half of these firms are located in Massachusetts. Of all the Massachusetts firms listed in the 2012 MassBio directory, about half (514) are medical device companies; 232 are drug development firms; 147 are contract research and manufacturing enterprises and 146 produce research products and instrumentation for the life sciences.

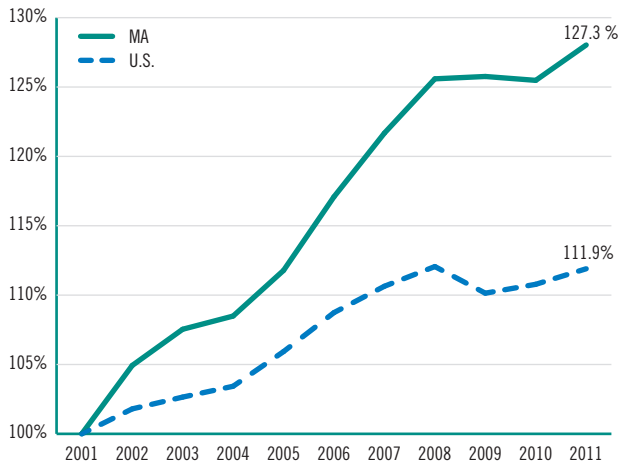
The rapid growth in employment in the life sciences in Massachusetts provides a strong indication of how rapidly this sector is expanding. As **Figure 2** reveals, the life sciences far outpaced all other industry sectors between 2001 and 2011.

FIGURE 2  
**Massachusetts Employment Growth by Industry Sector  
2001–2011**



Source: BLS, Author's Analysis

FIGURE 3  
Employment in Life Sciences Indexed to 2001,  
Massachusetts vs. the U.S.



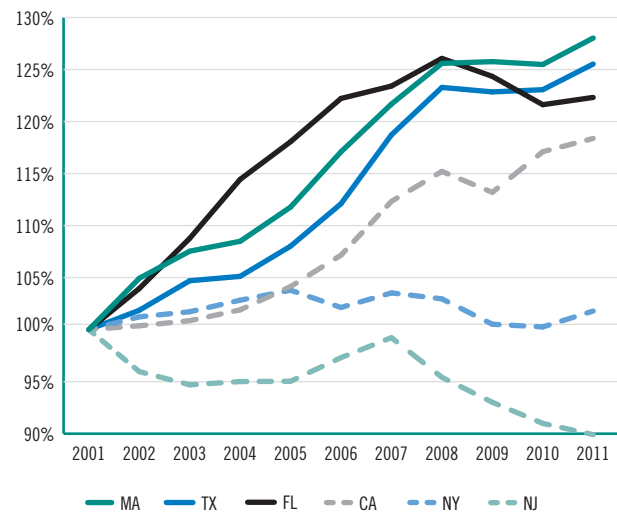
Source: Author's Analysis from BLS data

Even more impressive is the Boston-area super cluster's performance relative to the United States as a whole and to other states vying for supremacy in this rapidly evolving cluster of industries. The Commonwealth has indeed overtaken the rest of the nation in terms of employment growth in the life sciences, fulfilling an initial goal of the MLSC. **Figure 3** reveals the trend in life sciences employment in Massachusetts compared to that of the United States as a whole between 2001 and 2011. During this period, Massachusetts life sciences employment growth outperformed the nation by a factor of better than 2-to-1—growing by 27.3 percent vs. 11.9 percent for the nation.

The Commonwealth's main competitors in the life sciences are California, New Jersey, New York, Florida and Texas. But as **Figure 4** demonstrates, after 2008, the Commonwealth overtook all of these states in terms of the 2001-2011 employment growth rate.

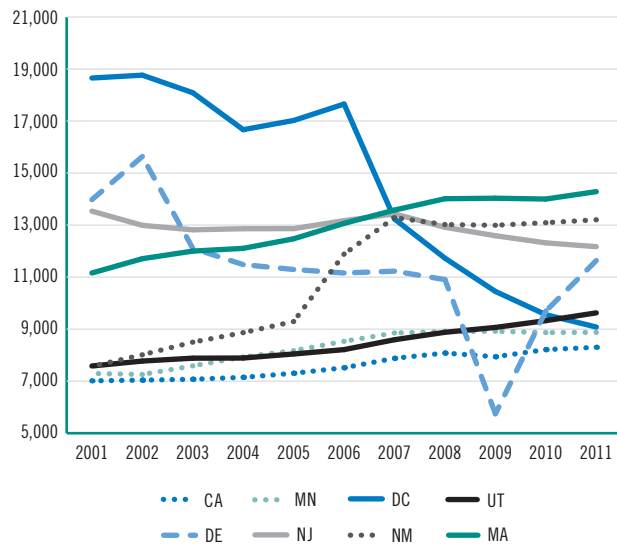
Moreover, when we control for population size, Massachusetts is the clear winner for the entire life sciences cluster of industries. In **Figure 5**, we have controlled for the size of population of each state by measuring the number of life sciences jobs per 1 million residents. By 2011, given its rapid growth rate, the Massachusetts cluster had risen to #1 in terms of per-capita life sciences employment. With nearly 14,300 life sciences jobs for every 1 million residents, Massachusetts eclipsed all other states on this measure.

FIGURE 4  
Employment in Life Sciences Indexed to 2001,  
Massachusetts vs. Big Competitor States



Source: Author's Analysis from U.S. Bureau of Labor Statistics (BLS) data

FIGURE 5  
Life Sciences Jobs per 1 Million 2010 Population  
Top 8 States in 2011, by Year



Source: Author's Analysis from BLS data

With this growth dynamic at work, Massachusetts appears well positioned to continue to attract new investment in the life sciences super cluster. In a 2011 analysis of the established life sciences clusters worldwide, the commercial developer Jones Lang LaSalle concluded that Boston had become the #1 region for the life sciences. The report noted the Boston area's concentration of high-tech research and hospital/medical employment, its many science and engineering graduate students, its plentiful funding from the National Institutes of Health and venture capitalists, its investment in R&D as a percentage of state GDP and its research facilities. Boston had a composite score of 7, ranking it #1 overall. New York/New Jersey was #2 with a composite score of 24, followed by the Bay Area and Los Angeles in California, each with a score of 25. Boston remained #1 in the developer's 2012 report, while San Diego, the San Francisco Bay area, Raleigh-Durham, N.C., and Philadelphia overtook New York/New Jersey and Los Angeles.

## Why Has the MLSC Been So Successful at Building the Life Sciences Ecosystem?

According to our interviews, the Center's successful record of investments in the life sciences is grounded in its reliance on a Scientific Advisory Board (SAB) along with a large panel of experts to guide the Center's Board of Directors in determining which firms show the greatest promise. This approach to distributing public funds has created credibility within the super cluster and its ecosystem. Over and over again, we heard adjectives like "rigorous" and "diligent" when our informants described the processes MLSC uses in selecting awardees and providing a platform for collaboration.

The interviews we carried out also suggested that the Center itself is being run quite effectively and efficiently and in a highly professional manner. Virtually all of our informants praised the management team and expressed special appreciation for the leadership's refusal to permit political considerations to trump scientific merit. Because the Scientific Advisory Board (SAB) selects awardees, "There is not an ounce of boondoggle in this agency," one informant told us. Another observed that the MLSC has "lots of moving parts" and all of them are working well. Several of the interviewees observed that the Center remains responsive to industry needs, meets its deadlines and stays focused on its mission. In its report on creating fiscally sound state tax incentives, the Pew Center on the

States singled out the Massachusetts Life Sciences Tax Incentive Program for its focus on annual cost controls and its reliance on scientific merit in making awards.

Still another informant noted that the MLSC is successful because its leadership is committed to working "at the speed of business" and therefore has become a valued partner in the expansion of the industry.

## Conclusions

All of our research suggests that the state will benefit from fully funding the remaining five years of the initiative in order to maintain the lead the life sciences super cluster has established in the Commonwealth. This is particularly important as other states ramp up their investments in hopes of creating their own life sciences ecosystems to entice the small and large firms Massachusetts has successfully attracted. California, Maryland, New Jersey, New York, Minnesota and Florida are not resting on their laurels, but continue to spend state funds on their own life sciences industries.

Over time, it should be possible for the Center to reach out to the private sector to help fund more of its initiatives, as it has done with the newly established Massachusetts Neuroscience Consortium. This consortium, established in September 2012, combines the efforts of the MLSC with seven global biopharmaceutical companies to jointly fund pre-clinical neuroscience research at Massachusetts academic and research institutions. Based on this model and with the plethora of larger, profitable firms coming to the state to expand their operations, one could imagine the Center funding more of its internships with private funds and having for-profit companies contribute to other programs (STEM: science, technology, engineering and math education, for example), allowing the Center to focus even more of its resources on accelerator loans and tax incentives for firms undertaking translational research.

We should also note that the success of the MLSC has lessons for other quasi-public entities in the Commonwealth. We can mention five of them here:

1. Long-term success in the use of tax incentives and business loans is most likely to occur when funds are focused on a cluster of firms and a set of technologies in a given industry, helping to create an industrial ecosystem which can attract new companies to the state.

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2. The use of expert panels to determine the awarding of loans assures that these funds will be well utilized. “Claw-back” provisions protect the taxpayers by requiring firms to repay funds advanced by the Commonwealth if they fail to meet hiring goals.
  3. A focus on encouraging firms in their early stage innovation activity is central to promoting economic growth and prosperity.
  4. Helping fund workforce development efforts for critical industries as part of the mandate of the quasi-public entity helps ensure a pipeline of skilled workers for the industry and this itself helps attract new firms to the region.
  5. Taking a “portfolio” approach to the entire range of activities in the life sciences—from investments in small innovative firms to helping train the future workforce to underwriting infrastructure—helps sustain the “ecosystem,” undergirding a virtuous cycle of discovery, innovation, investment, and employment opportunity.

In the end, we applaud the Governor and the Legislature for their foresight in creating the Massachusetts Life Sciences Center and the \$1 billion Life Sciences Initiative and we tip our hat to the MLSC for carrying out its public responsibilities in a most effective and efficient manner. The programs in place are fulfilling the goals set out in the original legislation and the Center’s leadership has ensured that these programs work to the full benefit of the Commonwealth and its residents.

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# Introduction

The Massachusetts Life Sciences Initiative, conceived by Governor Deval Patrick's Administration and passed into law by the Massachusetts Legislature in July 2008, is a bold 10-year, \$1 billion investment in the future of the state's economy. Based on the region's existing comparative advantage in the life sciences emanating from the laboratories of its leading universities and medical institutions, this substantial infusion of public funds was squarely aimed at making this cluster of industry sectors—including biotechnology, pharmaceuticals, medical diagnostics, medical devices, and bioinformatics—the most successful in the world. The Massachusetts Life Sciences Center (MLSC), founded two years earlier, was charged with the responsibility of implementing this bold experiment in public-private sector collaboration. If effective, the initiative was expected to boost investment and jobs in this evolving industrial sector, generating increased household income and tax revenue for the state.

In 2012, at the near halfway point of that 10-year initiative, the Dukakis Center for Urban and Regional Policy at Northeastern University was invited by the MLSC to measure the progress of the life sciences sector in Massachusetts and to carry out an evaluation of the Center's activities. We agreed to conduct such a study, but only under the condition that we would have full access to MLSC records, that our investigation would not be censored in any way by the MLSC staff, and that the staff of the Dukakis Center would have absolute control over the content of the final evaluation report. As a result, this report is being published by the Boston Foundation as part of its *Understanding Boston* series.

For the past year, Barry Bluestone, Director, and Alan Clayton-Matthews, Senior Research Associate at the Northeastern center, have carried out this evaluation. Both of us are economists who have extensive experience in industry studies and in program evaluation. Neither of us, however, was an expert on the life sciences sector when this evaluation project was first launched.

In the course of this research, we immersed ourselves in literature about the components of the life sciences industry cluster and about the role of public investment in innovation and economic growth. We analyzed existing employment data on each of the life sciences industries in the state; reviewed all of the annual reports of the MLSC; attended meetings of the MLSC Board of Directors where decisions over tax incentives and awards were made; and conducted lengthy interviews with leading executives of life sciences companies located in the state, industry trade association leaders, and members of the MLSC Scientific Advisory Board. This report is based on all of the data gathered over the year.

We began this research fully agnostic about what we might ultimately find, given the checkered record across the country of state industrial policy aimed at assisting other industries. But what we have found, based on our research, is that the Commonwealth's life sciences initiative is meeting, if not exceeding, the goals first established in 2008 by the Governor and the Legislature. Moreover, our interviews with key informants led us to the conclusion that the Massachusetts Life Sciences Center is executing its responsibilities in an effective, efficient, and professional manner. The initiative and the MLSC has performed exceptionally well in creating an *ecosystem* within which the cluster has prospered.

Moreover, we have concluded that the Center's mission, administration, and performance provide important lessons that can be applied to other state agencies charged with encouraging economic development.

This research could not have been carried out without the assistance of the staff of the MLSC and the many industry executives and experts who provided us with data and candid answers to our probing questions. We thank them all for their time and the information they afforded us.



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## CHAPTER ONE

# About the Massachusetts Life Sciences Center

In June 2006, the Massachusetts Legislature created a new quasi-public agency, the Massachusetts Life Sciences Center (MLSC), to promote the life sciences within the Commonwealth. It was tasked with “investing in life sciences research and economic development . . . by making financial investments in public and private institutions.”<sup>1</sup> Its mandate was broad: to encourage basic research, development, and commercialization in the biosciences; ensure the preparation of a skilled workforce to meet the needs of the state’s bioscience industry cluster, and build stronger collaboration between the sectors of the local and international life sciences community.<sup>2</sup>

A year later, in May 2007, Governor Deval Patrick revealed an ambitious plan for a 10-year, \$1 billion public initiative to enhance the Commonwealth’s existing competitive advantage in this rapidly evolving and critically important sector of the U.S. economy. This would provide the funding for a major expansion in the activities of the Life Sciences Center. In June 2008, the legislature enacted the Governor’s Massachusetts Life Sciences Initiative with the aspiration of building on the existing strengths of the state’s research universities, its world-renowned health care sector, and its emerging private sector life sciences firms to promote the Commonwealth as the foremost center for the life sciences in the world.

*With such a large commitment of state resources, how close has the Center come to meeting this goal? Has it helped attract life sciences companies to the Commonwealth, boosted R&D in the private life sciences arena, created job opportunities for Massachusetts workers and increased the state’s revenue base by boosting employment, household income, and corporate profits?*

This analysis of the MLSC comes at a propitious time. Massachusetts, along with most of its cities and towns—not to mention the nation as a whole—faces growing fiscal constraints. The economic recession that officially began in late 2007 and officially ended in 2009 has given way to an extended period of sluggish economic

growth. This has diminished tax revenue just when the swelling cost of health care and public pensions is generating structural deficits.<sup>3</sup> Without additional tax revenue from more vigorous growth, these potential deficits will require either raising taxes or cutting public services, or both.

In this new economic environment, virtually every unit of government is being forced to husband its resources and scrutinize its spending to assure that every tax dollar is spent effectively and efficiently. As such, it is not surprising that the nation, the Commonwealth, and most of its municipalities are considering ways to cut “unnecessary” or “wasteful” spending. At the same time, they want to preserve essential public programs that meet critical social needs and improve the targeting of incentives to the private sector to accelerate economic growth.

A prime target in this new era of public scrutiny is the extensive set of “subsidies” and “tax expenditures” that governments have traditionally used to encourage specific types of consumption or investment. Every tax dollar that a government agency transfers to a private business or individual in the form of a *subsidy* means a dollar less that can be used in the short-term for other purposes. Every dollar that a business or individual saves on its taxes is an “uncollected” dollar—a *tax expenditure*—that could have been used to pay for one or another public service.<sup>4</sup> Because of the short-run “opportunity costs” attached to every dollar spent, there is a growing demand to ensure that public dollars are not being wasted on programs that have little payoff. Each program must be judged on whether the *long-term* gain from issuing a tax incentive, government grant, loan guarantee, or subsidy outweighs the *short-term* cost to the treasury.

Adding to the demand for more accountability has been a recent series of high-profile cases of “failed” government incentive programs. Solyndra, a manufacturer of solar photovoltaic systems, became the poster child for “misspent” federal funds during the last presidential campaign when it filed for bankruptcy after receiving

\$535 million in U.S. Energy Department loan guarantees.<sup>5</sup> The same was true when A123, a manufacturer of lithium ion batteries for electric cars, went bankrupt after receiving a \$130 million federal grant to build a plant in Michigan. It was, according to a series of *Washington Post* reports, the fifth clean-energy firm the current Washington administration subsidized with loans or grants that filed for bankruptcy protection. During the campaign, Republicans claimed both Solyn-dra and A123 were prime examples of “cronyism” in President Obama’s stimulus program.<sup>6</sup>

Closer to home was the failure of Curt Shilling’s 38 Studios video-game firm. It closed its doors and laid off all of its employees after Rhode Island lured it from Massachusetts with a \$75 million loan guarantee. This case raised anew an old question. Under what circum-

stances should states use tax abatements, subsidies, and other inducements to encourage investment and create jobs in the private sector?<sup>7</sup>

As the Massachusetts Life Sciences Initiative approaches the halfway mark in its 10-year legislative life, it is altogether appropriate that this report attempt to ascertain whether, and to what extent, the Massachusetts Life Sciences Initiative has already produced tangible positive gains for the Commonwealth, and whether maintaining the initiative will likely produce even greater long-term benefits for the state’s residents and taxpayers.

For the purposes of this report, we define the Life Sciences cluster as consisting of sixteen (16) specific 6-digit NAICS industry sectors as shown in **Table 1**.<sup>8</sup> These include two research and development industries, two laboratory industries, two medical distribution

TABLE 1  
Life Sciences Sectors

Group	NAICS	Title
1	325411	Medicinal and Botanical Manufacturing
1	325412	Pharmaceutical Preparation Manufacturing
1	325413	In-Vitro Diagnostic Substance Manufacturing
1	325414	Biological Product (except Diagnostic) Manufacturing
2	334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
2	334516	Analytical Laboratory Instrument Manufacturing
2	334517	Irradiation Apparatus Manufacturing
3	339112	Surgical and Medical Instrument Manufacturing
3	339113	Surgical Appliance and Supplies Manufacturing
3	339114	Dental Equipment and Supplies Manufacturing
4	423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
4	424210	Drugs and Druggists’ Sundries Merchant Wholesalers
5	541711	Research and Development in Biotechnology
5	541712	Research and Development in Physical, Engineering, and Life Sciences (except Biotechnology)
6	541380	Testing Laboratories
6	621511	Medical Laboratories

Source: Battelle and the Biotechnology Industry Organization (June 2012)

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sectors, and ten different manufacturing industries.<sup>9</sup> The cluster also includes the life sciences departments in universities and medical institutions in the Commonwealth.<sup>10</sup>

As of 2012, according to the Massachusetts Biotechnology Council (MassBio), there were 1,198 life sciences companies operating in New England employing 103,006 workers, the vast majority of these firms located in Massachusetts. More than one-third of these New England firms were founded after 2004 and 80 percent are relatively small with sales under \$100 million a year. More than two out of five of these firms (43%) have annual sales of less than \$5 million. Of all the Massachusetts firms listed in the 2012 MassBio directory, about half (514) are medical device companies; 232 are drug development firms; 147 are contract research and manufacturing enterprises; and 146 produce research products and instrumentation for the life sciences.<sup>11</sup>



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## CHAPTER TWO

# The Size and Scope of Public Tax Expenditures and Public Subsidies

To begin our assessment, it is useful to put the Commonwealth's \$1 billion investment in the life sciences into perspective. According to the Congressional Research Service, at the federal level there are over 200 separate tax expenditures which taken altogether are projected to cost the U.S. Treasury more than \$1.1 trillion in FY2014.<sup>12</sup> The bulk of these take the form of exemptions, deductions, and exclusions from the personal income tax such as the mortgage interest deduction. These tax provisions are intended to encourage such "virtuous" behavior as home ownership, charitable contributions, and family saving.<sup>13</sup>

While piling in comparison to these personal tax expenditures, federal corporate subsidies cost the Treasury almost \$100 billion a year, according to research conducted by the Cato Institute.<sup>14</sup> A full quarter of these go to farmers in the form of agricultural subsidies and crop insurance, but other subsidies underwrite applied research and development under way at defense contractors, energy companies, housing developers, airlines, AMTRAK, universities and research labs, the National Institutes of Health, NASA, and small businesses.<sup>15</sup> In searching for ways in 2013 to cut federal spending in order to reduce federal deficits, one can be certain that some, if not many, of these tax expenditures and subsidies will be reviewed for possible modification or elimination.

States and municipalities have also provided the private sector with billions in tax expenditures and subsidies. In a recent series of articles, a trio of *New York Times* investigative reporters found that across the nation, states, counties, and cities dole out over \$80 billion in "business incentives" each year.<sup>16</sup> The key industries receiving such tax preferences and subsidies are manufacturing; agriculture; the oil, gas, and mining industries; and the film industry. Technology companies like Twitter and Facebook, according to the *Times* report, are not far behind.

The *Times* analysts collected data on all 50 states. In their review of Massachusetts, they found 48 state programs that provide nearly 1,500 grants or incentive packages to specific companies. The total annual cost to state and municipal governments for these programs was reported to be at least \$2.26 billion, equal to seven

percent of the state budget or \$345 per capita. Of this total, more than a third (\$786 million) take the form of corporation income tax credits, rebates, or reductions. Another \$130 million is paid out by the state treasury in the form of cash grants, loans, or loan guarantees.

The *Times* reporters listed a group of 94 Massachusetts companies that received nearly \$165 million in grants, tax incentives, and subsidies between 1994 and 2011. Of this total, 26 were life sciences companies accounting for \$48.7 million or nearly 30 percent of the total. Among the companies receiving these funds were Vertex Pharmaceuticals, Organogenesis, Shire Human Genetics Therapies, Sanofi, and Cubist Pharmaceuticals. The company receiving the largest state subsidy, however, was Liberty Mutual, an insurance company. Between 2006 and 2009 alone, the Massachusetts Film Office doled out nearly \$150 million in tax credits to film companies.<sup>17</sup>

States like Alaska, West Virginia, Texas, and Michigan spend two to three times as much per capita as Massachusetts on such business incentives, but other states including New Hampshire (\$30), North Carolina (\$69), California (\$112), South Carolina (\$194), New York (\$210), Florida (\$212), Oregon (\$226), Connecticut (\$241), and Ohio (\$281) spend less.

Obviously, in a time of tight fiscal budgets, such expenditures of tax revenue need to be carefully evaluated as elements of what is known as "industrial policy"—government support of private business.

*To assure that this assessment of the Massachusetts Life Sciences Center is placed in proper context, we need to begin by considering the ways in which government can encourage private sector economic development in an efficient and effective way. In doing this, we need to pay particular attention to understanding the role of government-induced innovation in spurring economic growth.* This foray into these theoretical issues will provide us with guidance as to what types of government tax expenditures and subsidies are more likely to yield positive benefits for society and thereby help us to assess the value of the MLSC.



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## CHAPTER THREE

# Industrial Policy: Pros and Cons

For decades, economists have debated the role of government in the promotion of private industry. At various times in our history, the federal government has helped to establish industries that went on to be central to our economy. The growth of the nation's aircraft industry was aided by the U.S. Post Office, which subsidized airlines with lucrative air-mail contracts in the early days of air travel. In the aftermath of Sputnik, the federal government invested billions of research dollars into perfecting solid state guidance systems and software for rockets and missiles, helping to create what today is our high-tech universe of cell phones, the Internet, iPads, GPS devices, and a dizzying array of gadgets based on the integrated circuit and the software that runs them.

Yet, as a recent Center for Economic and Policy Research working paper put it, "For the past generation, the dominant view among economists was that giving businesses a free hand—that is, little regulation and low taxes—was the most important contribution governments could make to encourage productive investments. The corollary to this view was that, as much as possible, overall investments in the economy should be undertaken by the private sector, as opposed to any sort of government entity."<sup>18</sup>

The argument *against* a public "industrial policy" is that governments are not capable of "picking winners" and therefore too often waste tax dollars. The conservative Cato Institute claims that government subsidies inevitably distort economic activity and "create even larger failures than might have existed in the marketplace."<sup>19</sup> By aiding some businesses, others are placed at a disadvantage either by reason of having to pay higher taxes or having to compete with subsidized firms. Hence, diverting resources from businesses preferred by the market to those preferred by policy makers leads to losses for the overall economy."<sup>20</sup>

The argument *for* public investment in the private sector is that rather than "crowding out" private capital, public investments actually "crowd in" private investment and can be used to "incubate new technologies and help

private businesses bring these innovations to the stage where they can be effective in the marketplace."<sup>21</sup> In brief, well-placed public funds in the private sector can yield large long-term gains at relatively modest short-term cost.

But what makes for "well-placed" public funds? A good part of the answer lies in whether the funds contribute significantly to a growing economy and increasing numbers of jobs.

### New vs. Old Growth Theory

In economics, there are two fundamentally different views about what contributes most to growth. What is now known as the "old growth theory" suggested that economic prosperity emanates from the accumulation of ever greater stocks of the fundamental ingredients of production: capital, labor, and natural resources. Those countries that find ways of increasing investment in plant and equipment, adding to labor supply, and extracting more natural resources are the ones that will become more affluent. Just consider the United States or Saudi Arabia versus poor countries in Africa or Southeast Asia. Clearly, without capital, labor, and natural resources, output cannot be produced.

While not completely discounting this approach to growth, a "new growth theory" has evolved that "places technological progress at the very epicenter of growth dynamics, rather than capital investment per se."<sup>22</sup> Advances in technology and interdependencies between new ideas and new investment provide the basis for entire new industries and products that create new wealth and raise living standards. "In the new model, technology provides the engine for sustained growth in the face of the diminishing productivity associated with additions to the stock of physical and human capital."<sup>23</sup>

In addition to avoiding diminishing returns, innovation-based growth has an additional salutary feature relative to other ingredients in the growth equation: Once the fixed cost of creating a technology has been incurred,

the formula can be used over and over again at little or no cost. Indeed, this *spillover* property is taken to be the defining characteristic of technology. As Paul Romer, one of the founders of new growth theory puts it, “The idea behind the transistor, the principles behind internal combustion, the organizational structure of the modern corporation, the concepts of double-entry bookkeeping—all these pieces of information and many more like them have the property that it is technologically possible for everybody and every firm to make use of them at the same time without additional costs.”<sup>24</sup> As such, instead of diminishing returns to investment, there can be increasing returns.

Moreover, the new growth theory posits a strong reciprocity between the rate of skill acquisition among workers and the growth dividend society obtains from new capital and new inventions. *Thus, programs that combine incentives for innovation along with resources to augment human capital should, according to this theory, fuel rapid economic growth more than anything else society can do to promote prosperity.*

But here is the rub. Keeping score on the success of innovation is difficult. Instead of a more or less certain return to a given infusion of capital under the old growth theory, innovation under the new growth theory tends to deliver faster and stronger long-term growth, but it is “lumpy, discontinuous, and nonlinear.”<sup>25</sup> There can be long lags between the time a new innovation is first incorporated into production and the time that it pays off in terms of increased productivity, output, and jobs. The introduction of the steam engine in the mid-18th century did not pay off in terms of improved productivity until the early 19th century.<sup>26</sup> In the short term, it can be discouraging, as investments in fundamental innovation usually have little immediate payoff.

To be productive, innovation needs to be perfected and diffused, and this takes time. According to a study of 265 major and minor innovations over the past couple of centuries, it took a typical new innovation forty-one years, on average, to move from the 10 percent to the 90 percent diffusion level.<sup>27</sup> The diesel locomotive, for example, was clearly superior to the steam locomotive, yet twenty years after the first diesel was introduced in 1925, there were still nearly ten steam locomotives in service for every diesel-powered engine. The first integrated computer circuits were introduced in the 1960s,

but it was not until the 1990s that the full productivity premium of the computer generation was finally realized.<sup>28</sup> It will take decades to realize the full benefits to humanity and the economy from the advances now being made in drug discovery, medical diagnostics, and medical devices.

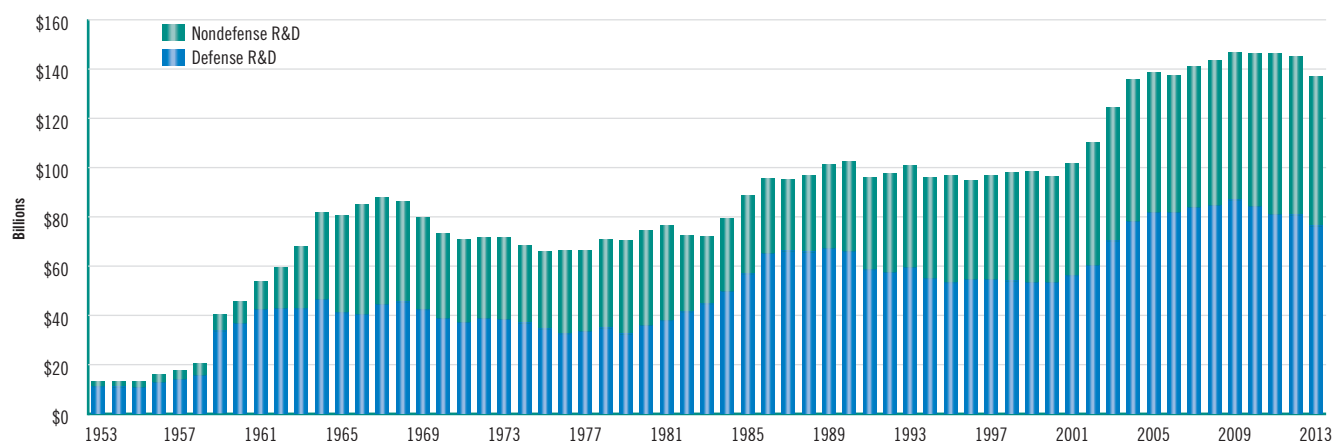
Unfortunately, in an era of intense concern over short-term deficits, it is often hard to marshal the patience needed to invest sufficiently in technological innovation or the firms that create it. As a corollary, investments made today in research and development (R&D) are often risky propositions from the perspective of the short-term balance sheet. Yet without massive infusions in R&D, continuous breakthrough innovation cannot occur. Nowhere is this truer than in the life sciences.

## Public Investment in R&D

Worldwide, no country spends more than the United States on R&D, and this investment has played an important role in the nation’s economic development, at least since World War II.<sup>29</sup> According to the Battelle Institute, total R&D spending in the U.S. reached \$436 billion in 2012, of which about 29 percent (\$126 billion) was supplied by the federal government while 64 percent (\$280 billion) was provided by private industry. The remainder came from foundations and other non-profits (\$14.5 billion), university-owned funds (\$12.3 billion), and a tiny amount from state and local governments (\$3.8 billion).<sup>30</sup>

Despite its smaller share of overall R&D funding relative to the private sector, the importance of the federal government in spurring innovation should not be underestimated. Without government investment, it is likely that private firms would underinvest in R&D, particularly basic research. The reason is that the social rate of return to investment in basic research often exceeds the private rate. Unlike investments in tangible capital such as machinery, the ideas flowing from R&D are, in the words of economists, “nonrival” and not fully “appropriable.” *Nonrival* means that my learning of a new innovation does not prevent you from using it. When returns are not fully *appropriable*, the original innovator cannot gain all the profit that flows from the eventual application, especially the commercialization, of the new process or product.<sup>31</sup> In this case, firms will often wait for others to do the innovating. As Federal Reserve Bank Chair-

FIGURE 1  
**Federal Spending on Defense and Nondefense R&D**  
 Outlays for the conduct of R&D, FY 1953–2013, billions of constant FY 2012 dollars



Source: American Association for the Advancement of Science

man Ben Bernanke recently reminded an audience at a Washington, D.C. conference, “James Watson and Francis Crick received a minute fraction of the economic benefits that have followed from their discovery of the structure of DNA.”<sup>32</sup> Without government-sponsored basic research, society loses out on innovation.

Public sector R&D also encourages private sector R&D spending. Research reveals that there is a strong positive correlation between the trajectory of private R&D spending in a given year following public expenditures a year earlier.<sup>33</sup>

## The Trend in Federal R&D Spending

Given (1) the importance of innovation as the prime driver of economic prosperity, (2) the role of R&D in promoting innovation, and (3) the fact that without public funding of R&D total research investment would be suboptimal because of the inability of private investors to fully appropriate its monetary benefit, how much has the federal government invested in this vital factor?

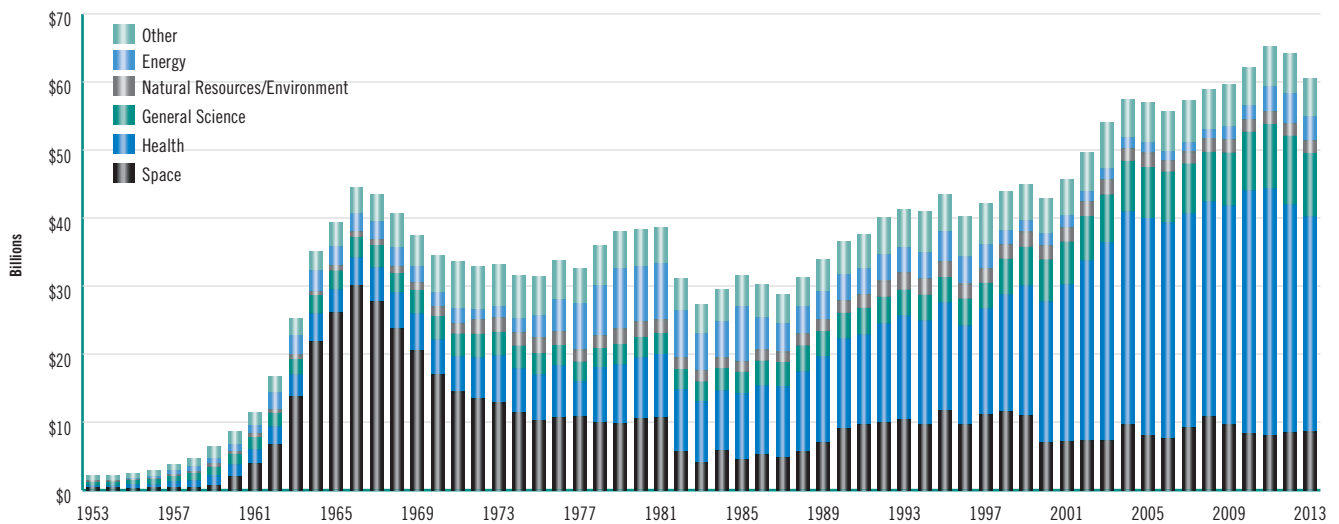
As **Figure 1** reveals, federal spending on defense and nondefense R&D (in inflation-adjusted FY2012 dollars) rose sharply between 1953 and 1965 from less than \$15 billion to more than \$80 billion before dipping back to just over \$60 billion in 1976. Spending was back to more than \$100 billion by 1989 and remained flat through 2001. It rose sharply after that, increasing to

over \$140 billion by 2009. In FY 2013, under pressure to reduce federal spending, total federal R&D spending once again declined.<sup>34</sup>

As **Figure 2** demonstrates, virtually *all* of this growth in non-defense federal R&D spending has been in the health field, mainly through the National Institutes of Health. While federally sponsored health research only accounted for about seven percent of total non-defense federal R&D spending in 1965, by 2013 it accounted for more than half (52%). Much of this basic public investment is going into the life sciences, and of all fifty states, Massachusetts trails only California in NIH funding. In 2011, California institutions received \$3.5 billion in NIH funding; those in Massachusetts received \$2.5 billion.<sup>35</sup> Yet, on a per capita basis, the Commonwealth swamps all other states in NIH funding, obtaining four times as much as the Golden State.

This growth in federally sponsored R&D seems impressive, but as a share of the nation’s Gross Domestic Product (GDP), the federal government’s role is roughly half of what it was in the early 1960s (see **Figure 3**). Spending rose rapidly in the 1950s and 1960s, surpassing 1.9 percent of GDP in 1964, up from just 0.7 percent in the early 1950s.<sup>36</sup> Much of this was in direct response to the Soviet Union’s launching of Sputnik and President John F. Kennedy’s goal of sending a man to the moon before 1970. After reaching its nadir of just 0.67 percent in 2000, it has slowly climbed back to 0.85 percent today.<sup>37</sup>

FIGURE 2  
**Trends in Nondefense R&D by Function, FY 1953–2013**  
 Outlays for the conduct of R&D, billions of constant FY 2012 dollars



Source: American Association for the Advancement of Science

As we have seen, new growth theory suggests that our nation's prosperity is intimately tied to the rate of innovative activity. If innovation slows down, growth will suffer. Hence, the big question is whether the United States can maintain its rate of innovation activity into the future and thereby sustain economic prosperity and full employment.

## The Role of R&D Investment at the State Level

As noted above, states have historically played a minor role in funding research and development. Their \$3.8 billion spent in FY2012 amounted to less than 1 percent of total spending on R&D and no more than 3 percent of government-sponsored R&D. Indeed, given that the full benefits from basic research cannot be easily appropriated by the funder, it might seem foolish that an individual state would spend its own revenue on investments that can be appropriated by entities in other states.

*So why should a state invest anything in R&D?*

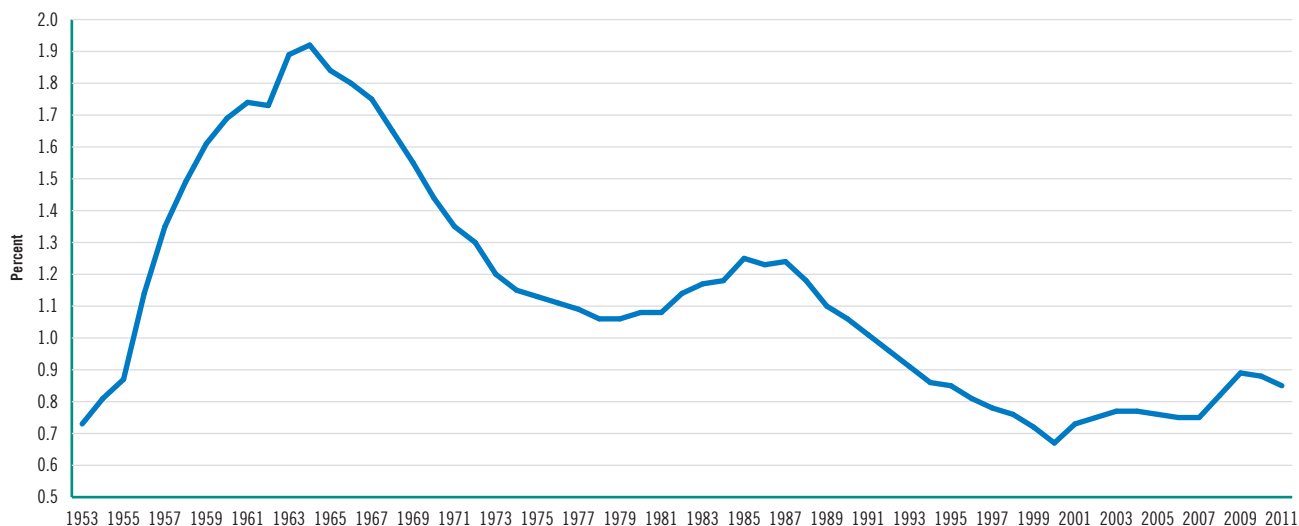
Invested in the appropriate industries, public funds can help encourage the growth of an industrial cluster in a given region that, once incubated, can maintain a self-sustaining locational advantage that provides a magnet for new private investment in the region's

cluster. Such locational advantages are called *agglomeration economies* and refer to the benefits, savings, or cost reductions resulting from the clustering of economic activities.<sup>38</sup> The clustering of such industries can give rise to an "industrial climate" or "ecosystem" that is self-perpetuating as the result of a regional congregation of specialized facilities, labor pools, education and training institutions, and specialized legal, accounting, and financial services.

Such agglomeration economies explain the economic success of most metropolitan areas. In New York City, for example, the cluster of financial industries and advertising is responsible for much of the growth in wealth. The birth of the early auto industry in and around Detroit in the early part of the 20th century would ultimately allow Detroit to take advantage of agglomeration economies and blossom into the world's "Motor City" by the end of World War II. By 1949, the median family income of Detroiters was higher than that of any other city in America except Chicago (whose residents enjoyed a 1949 median family income exactly one dollar higher), and 29 percent above the national figure.<sup>39</sup> Chicago's prosperity was built on being the transportation hub for America. Seattle became the center for jet aircraft production.

In the postwar period, the most successful new indus-

FIGURE 3  
Federal Spending on R&D as Percent of GDP  
FY1953–FY2012



Source: National Science Foundation "Science and Engineering Indicators 2012"

trial cluster was built in Silicon Valley in and around Palo Alto, California. Beginning in 1939 with the founding of Hewlett-Packard—the brainchild of two Stanford graduate students—the valley would attract a host of firms that would ultimately build the modern computer industry and make this region one of the wealthiest in the world.<sup>40</sup>

In the case of Detroit, local, state, and the federal governments essentially subsidized the auto industry through the public provision of streets, roads, and highways. Chicago's prosperity was underwritten by public subsidies to the railroads. Seattle's aircraft industry has benefited not only from the early airmail contracts but from massive defense spending that provided most of the resources needed to develop both military and then commercial jet airframes and jet engines.<sup>41</sup> While private venture capital has played a major role in the success of Silicon Valley, the federal government has played a significant role as well. From less than \$10 million in 1960, federal research funding of computer science climbed to almost \$1 billion by 1995, while the U.S. expenditure on research in electrical engineering (which includes semiconductor and communications technologies) has fluctuated between \$800 million and \$1 billion since the 1970s. According to the National Research Council, such funding "has constituted a

significant fraction of all research funds in the computing field, particularly underwriting academic research. Federal support has constituted roughly 70 percent of total university research funding in computer science and electrical engineering since 1976."<sup>42</sup>

*The lesson is that the prosperity of many metropolitan areas has been stimulated in large measure by public investments in particular industry clusters. Given an early start in an industry, public funds can help build the agglomeration economies that in turn cement a single region's leadership in that industry nationally and globally. The Massachusetts Life Sciences Center was established precisely to this end. How successful has it been?*



## CHAPTER FOUR

# The Emergence of the Massachusetts Biotechnology Super Cluster

In 2010, four scholars at the Massachusetts Institute of Technology (MIT) developed a schematic to explore the complement of elements needed to produce a successful American biotechnology cluster.<sup>43</sup> This schematic is summed up in **Table 2**. The schematic includes three innovation stages and four critical factors. Based on this matrix, the team was able to describe all of the aspects of what they called the Massachusetts Biotechnology Super Cluster.

A thriving science-based cluster must take basic research and transition it into commercial products and services. To do this requires funding, skilled labor, a legal framework that protects intellectual property (IP), and a diverse set of industries that includes both new innovative firms as well as established ones. As the authors suggest, “inadequacies in any area can threaten the cluster.”<sup>44</sup>

As a whole, the U.S. biotechnology cluster benefits from access to both public and private sources of funding. These include, on the public side, NIH, the Department of Defense (DOD), Small Business Innovation Rewards

(SBIR) to support basic research; foundation support from private nonprofits; and, on the for-profit side, angel and venture capital (VC) investors who provide funds for translating basic research into new products and services. The cluster is also supported by public and private customers for its end products, which at times are subsidized through tax expenditures and subsidies.

The talent pool for this sector ranges from creators and craftspeople who play the role of principal investigators on research grants and contracts, entrepreneurs who form new firms to commercialize the output of the sector and workers who range from those with just a high school diploma to those with Ph.Ds.

To be successful, the cluster must also enjoy a legal system that protects intellectual property through patents and licenses and IP enforcement in the courts.

Long-term success for the cluster also requires a diverse set of “tradable agglomerating” companies comprised of new innovative enterprises that can power future

TABLE 2  
**The Prototypical American Biotechnology Cluster**

Critical Factors		Innovation Stages		
		Basic Research	Translation	Commercialization
Funding	Public	NIH	DOD, SBIR	Payers, Tax Policy
	Private	Foundations	Angel, VC, Industry	Customers
Talent	Creators	PIs	Entrepreneurs	Senior Execs
	Craftspeople	Grad Students	BA/MS/PhD	HS - PhD
Laws & Norms	Intellectual Property	Bayh-Dole	Patentability & Scope	IP Enforcement
	Experimentation	New Field Encouragement	Independence Over Security	Reinvention
Diversity	Tradable Agglomerating	Stem Cells	RNA, Interventional Imaging	Biologics
	Tradable Converging	Bio-processing	Molecular Diagnostics	Biomanufacturing
	Local Sustaining	Medical Centers	Science Parks	

Source: Trusheim, Berndt, Murray, and Stern, 2010

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growth through the development of breakthrough products, “tradable converging” firms which remain globally competitive in existing products, and a set of local entities including medical centers and science parks that provide local services to the cluster.

A good deal of this requires a collaborative form of industrial policy with both the federal and state government playing major roles in the emergence of the cluster. In the 1950s, the federal government continued its funding of R&D in the biosciences as part of its Cold War strategy. The VC model was invented and the first high-tech firms founded. In the 1970s, the federal government declared a “War on Cancer” with NIH funding, while the first recombinant DNA experiments were undertaken in university laboratories and private research firms.

In 1980, the Bayh-Dole Act was adopted, giving universities IP ownership of the output from federally funded research while the first recombinant DNA products hit the market. In the Commonwealth, the Massachusetts Biotechnology Council was created in 1985, one of the first in the nation. In the 1990s, the first genomics companies were founded, led initially by Millennium Pharmaceuticals (established by a former Genentech executive).

Much of this early work came to fruition in the first decade of the 21st Century. During this period, the human genome was sequenced and the George W. Bush administration committed itself to doubling the NIH budget.

Here in the Commonwealth, a final piece of the cluster puzzle was put in place with the founding of the MLSC, followed by the state’s funding of the Life Sciences Initiative to help cement the region’s lead in this important cluster and maintain that lead into the future. With all of the other parts of the matrix in place in Massachusetts, the state became a magnet for Big Pharma.

By the end of the first decade of the 21st Century, Massachusetts was home to 9 of the top 10 major drug companies in America, surpassing New Jersey. Pfizer, Novartis, GlaxoSmithKline, Genzyme’s successor Sanofi, Astra-Zeneca, Abbot Laboratories, Merck and Bristol-Myers Squibb had all committed to operations in the Bay State. The largest of these big firms, in order of employment, are Genzyme (Sanofi), Pfizer, Biogen Idec, Novartis, Shire, Thermo Fisher Scientific, EMD Millipore, Vertex, Parexel International, and Hologic.<sup>45</sup> Only the Swiss

pharmaceutical giant, Roche—the world’s third-largest biopharma firm—has not moved into Massachusetts.<sup>46</sup>

According to a separate comprehensive analysis of the global life sciences cluster completed in 2011, the commercial developer Jones Lang LaSalle concluded that Boston had become the #1 region for the biosciences based on its concentration of high tech research and hospital/medical employment, its number of scientific and engineering graduate students, its level of NIH and venture-capital funding, its investment in R&D as a percentage of state GDP, and its thousands of square feet of academic and research institute facilities. Boston had a composite score of 7 ranking it #1 overall. New York/New Jersey was #2 with a composite score of 24, followed by the Bay Area and Los Angeles each with a score of 25.<sup>47</sup>

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## CHAPTER FIVE

# The Massachusetts Life Sciences Center

What role does the MLSC play in the MIT schematic? Beginning with its creation, the MLSC took as its strategic mission the role of pulling together all of the parts of the matrix into a life sciences ecosystem, creating a dense, highly connected community of scholars, entrepreneurs, industry leaders, venture capitalists, and government officials dedicated to the success of the life sciences super cluster in the Commonwealth. Unlike many state economic development initiatives, the Center has a broad range of strategic priorities geared to enhance all aspects of the life sciences cluster. These include:

- funding translational research—research that converts basic research into marketable products and services
- investing in promising new technologies
- ensuring worker skill acquisition that aligns with the needs of the life sciences industries
- creating new infrastructure from shared resources that accelerates innovation
- building partnerships between sectors of the local and international life sciences communities

To accomplish these goals, the Center relies on a portfolio of seven distinct programs.<sup>48</sup> These include:

**Cooperative Research Grants**—Supports industry-sponsored research at universities and facilitates scientific discoveries that lead to medical applications. These grants of \$250,000 per year for up to two years match industry contributions dollar for dollar.

**Internship Challenge Program**—Provides up to \$7,200 in funds for interns working at Massachusetts companies with fewer than 100 employees and fewer than 250 globally.

**New Investigator Grants**—Spurs innovative research and advances the careers of new investigators who are working on cutting-edge research at Massachusetts academic research centers with grants of \$100,000 per year for up to three years.

**Life Sciences Accelerator Program**—Provides financing of up to \$1 million for early-stage companies to help leverage additional sources of capital.

**Small Business Matching Grant (SBMG) Program**—Provides matching support capped at \$500,000 per company to firms on the verge of commercializing new technologies developed using Phase II or Post-Phase II Small Business Innovation Research (SBIR) awards or Small Business Technology Transfer (STTR) grants from the federal government.

**Life Sciences Tax-Incentive Program**—Issues a combination of 10 competitively awarded tax incentives available to companies that meet specified hiring goals. These include:

- A refundable 10% investment tax credit<sup>49</sup>
- A refundable in-state research tax credit
- A refundable job creation tax credit (50+ jobs)
- A refundable FDA user fee credit
- Extension of net operating losses to 15 years
- Deduction of orphan drug clinical testing
- Elimination of the sales factor throwback provision
- Special sales tax exemption
- Life sciences research credit for out-of-state costs
- Construction sales tax exemption

**Capital Projects Fund**—Provides capital for equipment and supplies for high schools in Gateway Cities, vocational/technical schools, and community colleges; and for capital projects in academic/research institutions, business incubators, and other not-for-profit organizations in the Commonwealth.

Between 2008 and June 30, 2012, the Center had directly invested or committed over \$300 million that has leveraged more than \$1 billion in third-party investment, according to the MLSC's report for fiscal year 2012. If none of that investment would have been made in Massachusetts in the absence of the MLSC commit-

ments, each dollar of taxpayer money spent by the Center resulted in the attraction of \$3.40 in additional, outside investment creating a public-private investment fund of more than \$1.3 billion.<sup>50</sup>

There are four factors that make the MLSC quite different from most government subsidy programs:

- Instead of simply providing tax benefits to a few private firms to lure them to the Commonwealth, the MLSC has a portfolio of investment tools that include direct investments in life sciences companies; grants to academic organizations and medical centers and grants for “shovel ready” public and non-profit sector capital projects that help influence the location decisions of life sciences companies.
- The MLSC operates under a Board of Directors that includes state government officials, industry CEOs, leaders from academia and medicine, bioscience researchers and others who have great knowledge of the life sciences.
- Investments are reviewed by a panel of more than 200 experts who send their recommendations to the Center’s Scientific Advisory Board, which itself is dominated by academic researchers, industry scientists and private venture capital experts who together can judge the scientific and economic potential of an MLSC investment.
- The Center insists on accountability in terms of private sector investment matches and specific job creation goals and retains the power to “claw back” tax incentives and other investments when these goals are not reached by grant recipients.<sup>51</sup>

In the four-year period between June 2008 and June 2012, the Center invested nearly \$190 million in 12 capital projects, provided 31 company grants and loans worth nearly \$23 million, issued 35 academic research grants with a value in excess of \$23 million and 56 tax incentives (still outstanding) valued at close to \$57 million, invested \$7 million to fund 884 interns as part of the Center’s mission to help develop the life sciences workforce, provided more than \$3.3 million in equipment and supply grants to schools and spent \$1.5 million on other grants including the funding of business plan competitions. As of June 30, 2012 the Center was managing a portfolio of approximately 200 grants, loans, and tax incentives.<sup>52</sup>

Examples of *infrastructure activity* as listed in MLSC’s FY2012 report include:

- \$5 million in support of the construction of the Joslin Center’s Translational Center for the Cure of Diabetes
- \$10 million to the Dana Farber Cancer Institute to support the expansion of its \$20 million Molecular Cancer Imaging Facility
- \$5 million to the Boston Museum of Science for the construction of its “Hall of Human Life,” which helped leverage \$11 million in private financing
- \$14.6 million to the University of Massachusetts Dartmouth to build its new Massachusetts Biomanufacturing Center in Fall River
- \$10 million to UMass Lowell to equip laboratories within its new Emerging Technologies and Innovation Center
- \$14.3 million to help build the Framingham Wastewater and Pumping Station that will allow bioscience firms to operate in that community

Examples of accelerator loans awarded in FY2012 to provide working capital to early stage life sciences companies include:

- \$750,000 to Allurion of Wellesley for developing a novel medical device for inducing weight loss in obese patients
- \$750,000 to Alcyone Lifesciences, Inc. for the development of a micro-catheter for treating neurological conditions
- \$245,000 to Strohl Medical for the creation of a medical device for accelerating the treatment of stroke victims

Subsequent to receiving accelerator loans, early stage firm recipients have raised more than \$100 million in either private or public funding to grow their firms or in acquisition proceeds. Already six firms that have received accelerator loans have paid them off early, permitting the MLSC to construct a revolving fund, thus expanding the resources the Center has for this purpose.

In addition to the accelerator loans, the MLSC has begun a Small Business Matching Grant Program (SBMG), which complements funds received by firms from NIH, the National Science Foundation (NSF), and DOD. In 2012, the Center awarded a \$500,000 grant to Firefly BioWorks, Inc. of Cambridge after full review by the

MLSC Scientific Advisory Board. The company has already been able to launch its first commercially viable product for help in diagnosing cancer, neurological disorders, and other diseases.

Examples of matching grants for academic research include:

- \$5.1 million in grants to early career investigators working in research institutions within the Commonwealth which have in turn helped generate over \$13 million in federal government, foundation, and private company research grants
- \$4.8 million in cooperative research grants (between 2008 and 2011) to encourage industry-sponsored research at Massachusetts institutions, resulting in more than \$8.6 million in research grants from other sources

Examples of the \$20.6 million in 2011 program tax incentives to 26 life sciences companies include \$3 million to Shire HGT, Inc.; \$2.45 million to Vertex; \$2.3 million to AVEO Pharmaceuticals; and \$1.84 million to Biogen Idec MA, Inc. Smaller tax incentives of less than \$500,000 went to such firms as Blueprint Medicines Corporation in Cambridge and T2 Biosystems, Inc. in Lexington. Under the Life Sciences Act, the Department of Revenue has the authority to “claw back” incentives from companies that the Center determines have not met the minimum job creation thresholds in their tax-incentive agreements.

In addition, the MLSC Internship Challenge Program has placed more than 1,000 interns in more than 290 companies across the state where host companies provide dedicated mentors to help expand the pool of prospective life sciences workers for the future. Those college students receiving MLSC internships are majoring in biology, engineering, chemistry, business, computer science and physics and end up interning in companies that produce medical devices, pharmaceutical products, diagnostic services, and biotechnology research. In FY2012, the Center also awarded \$180,000 to four programs to encourage science, technology, engineering and math (STEM) education, especially for women and minorities.

**Table 3** provides a summary of the investments made by the MLSC between June 2008, when the Life Sciences Initiative funding first became available, and June 2012.

TABLE 3  
**Distribution of MLSC Investments by Dollar Amount  
June 2008–June 2012**

Capital Projects (12)	\$186,950,000
Company Grants and Accelerator Loans (31)	\$22,907,000
Academic Research Grants (35)	\$23,346,344
Tax Incentives (56)	\$56,595,093
Interns Funded for Workforce Development (884)	\$6,903,164
Equipment and Supply Grants or Schools (32)	\$3,333,675
Other Grants/Business Plan Competitions	\$1,540,000
<b>Total</b>	<b>\$301,575,276</b>

Source: Massachusetts Life Sciences Center, 2013

This comprehensive approach to an entire industry cluster differs significantly from other federal, state, and local incentive programs that target a single company or, at best, a single industry.

We can now ask: “*Has this approach, and the investments made through the MLSC, paid off?*”

We begin to answer this question by tracking output and employment in the life sciences cluster and consider the results in terms of the creation of the Center in 2006.

But given what we have learned about the role of innovation in spurring economic growth, we can ask a more fundamental question. “*Has the creation of the Center and the Life Sciences Initiative paid off in terms of nurturing a rich ‘ecosystem’ within which the entire life sciences super cluster can flourish now and in the future, providing a platform for further growth in economic opportunity for Massachusetts residents?*”



## CHAPTER SIX

# Output and Employment in the Massachusetts Life Sciences Super Cluster

The life sciences super cluster began to benefit the Commonwealth by the middle of the last decade, even before the MLSC was established. By 2006, publicly traded companies in Massachusetts were already generating \$30 billion in sales, an increase of nearly 50 percent in just four years. With \$7.5 billion in exports, the Massachusetts life sciences sector accounted for 30 percent of total state exports.<sup>53</sup> Between 2001 and 2006, employment in Massachusetts life sciences industries increased by 13,000—more than 16 percent. The life sciences were generating jobs during a period when total non-farm employment in Massachusetts was actually *declining* by 2.8 percent. While total employment in the life sciences in 2006 accounted for just 26 out of every 1,000 jobs in the state, this sector was growing faster than any other, including education and health services (See **Figure 4**).

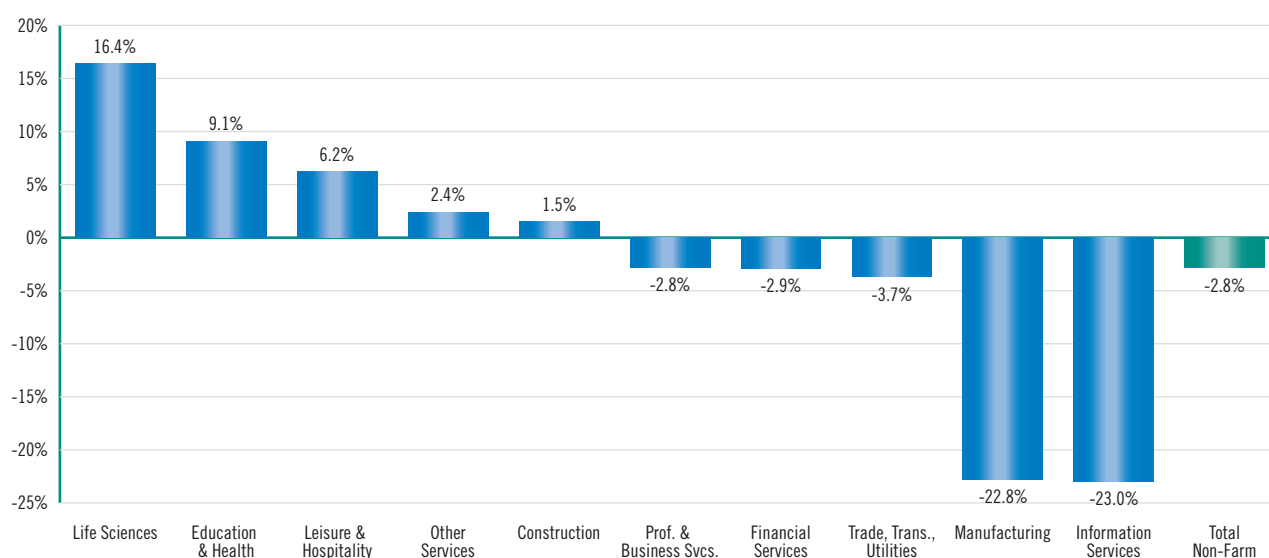
As **Figure 5** reveals, the life sciences cluster continued to generate jobs between 2006 and 2011, but not quite as rapidly as during the previous five years. However,

it was still faster than every other sector save education and health services. The national recession that began at the end of 2007 weighed on the life sciences sector, as it did most other industries. Life sciences remained a small sector in terms of overall non-farm state employment, but given its faster growth, accounted for nearly 30 jobs out of every 1,000 in the Commonwealth by 2011.

Taking the entire decade (2001–2011) as a whole, the life sciences far outpaced all other industry sectors in terms of its employment growth rate as shown in **Figure 6**.

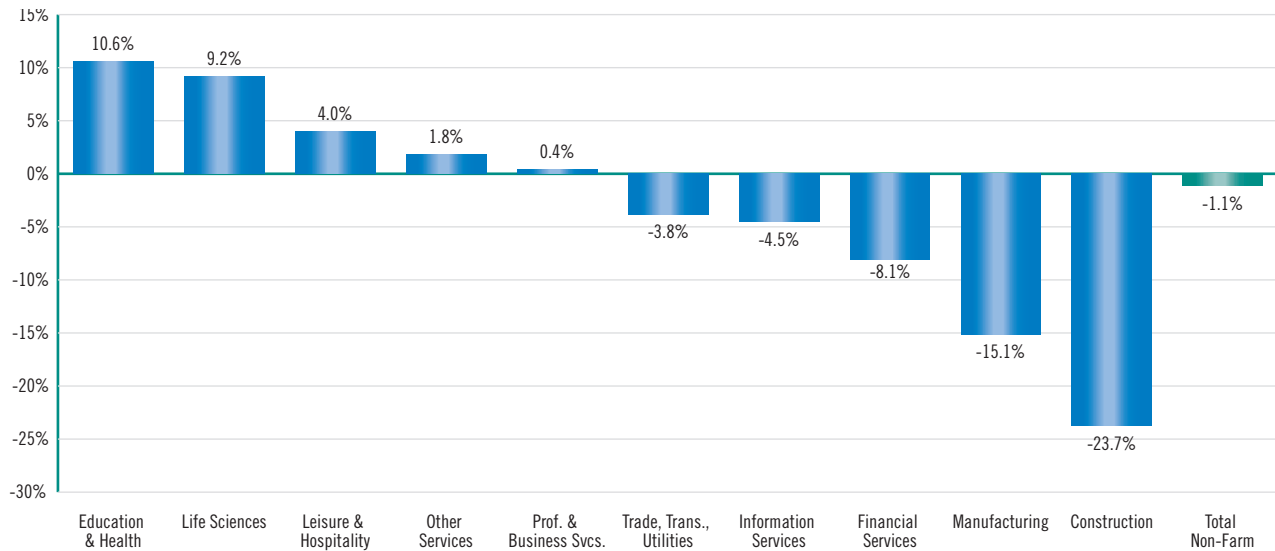
Within the cluster, however, the growth in employment has varied greatly across individual industry segments as shown in **Table 4**. During the entire period between 2001 and 2011, employment in research, testing, and medical laboratories increased by more than 50 percent, nearly twice as fast as the life sciences cluster as a whole (and 2½ times as fast as education and health services). Yet the production of medical devices—the

FIGURE 4  
Massachusetts Employment Growth by Industry Sector  
2001–2006



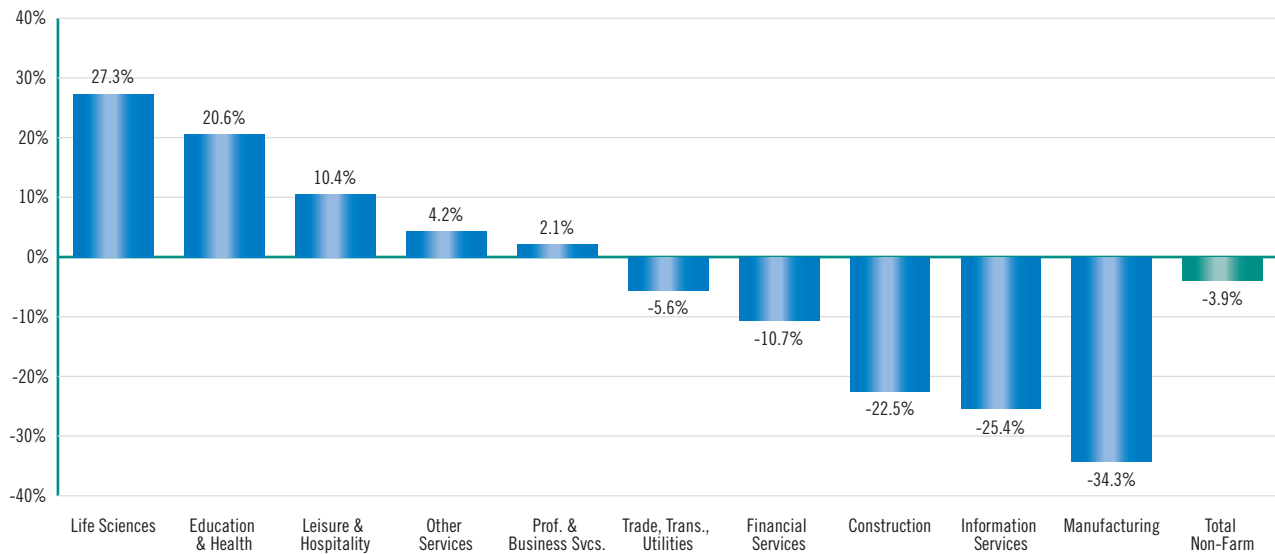
Source: Bureau of Labor Statistics, Author's Analysis

FIGURE 5  
Massachusetts Employment Growth by Industry Sector  
2006–2011



Source: Bureau of Labor Statistics, Author's Analysis

FIGURE 6  
Massachusetts Employment Growth by Industry Sector  
2001–2011



Source: Bureau of Labor Statistics, Author's Analysis

key *manufacturing* segment of the life sciences cluster —remained nearly constant over this period, increasing by just 0.2 percent.

What is notable, however, is that the employment growth rate actually *increased* in the second period (2006–2011) for both the pharmaceutical industry and

TABLE 4  
Employment Change by Life Sciences Cluster Segment

	2001	2006	2011	% $\Delta$ 2001–2006	% $\Delta$ 2006–2011	% $\Delta$ 2001–2011
Drugs & Pharma	7,794	7,944	8,537	1.9%	7.5%	9.5%
Medical Devices & Equipment	22,835	21,645	22,882	–5.2%	5.7%	0.2%
Research, Testing, & Medical Labs	34,849	47,072	52,819	35.1%	12.2%	51.6%
Bioscience-Related Distribution	9,607	10,877	11,377	13.2%	4.6%	18.4%
<b>Total</b>	<b>75,085</b>	<b>87,538</b>	<b>95,615</b>	<b>16.6%</b>	<b>9.2%</b>	<b>27.3%</b>

Source: Bureau of Labor Statistics, Author's Analysis

medical device manufacturing, despite recession conditions nationally and regionally. Indeed, all four sectors in **Table 4** exhibited increased employment during this difficult economic period.

## Life Sciences Employment Trends: Massachusetts vs. the United States

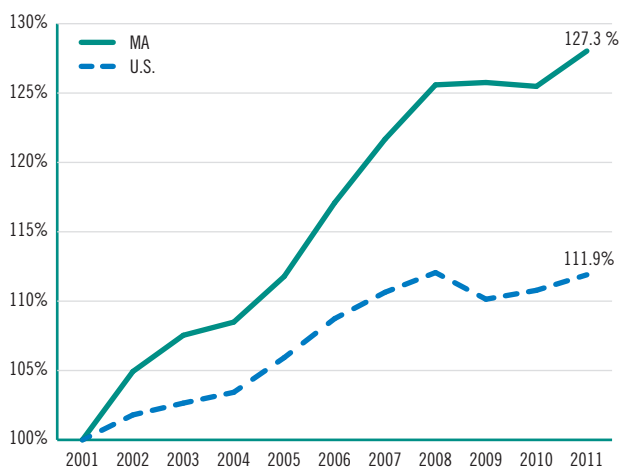
The capacity of the Commonwealth's life sciences to create jobs at a faster pace during the past decade than all other major Massachusetts industries is one indicator of the successful development of this sector. Even more important is how the state's life sciences have performed relative to the country as a whole and other states vying for supremacy in this rapidly evolving cluster of industries. The data we have gathered on

employment trends reveal that the Commonwealth has indeed overtaken the rest of the nation in terms of employment growth in the life sciences, fulfilling the initial goal of the MLSC.

**Figure 7** reveals the trend in life sciences employment in Massachusetts compared to that of the nation as a whole between 2001 and 2011. During this period, Massachusetts life sciences employment growth outperformed the nation by a factor of better than 2-to-1—growing by 27.3 percent vs. 11.9 percent for the nation.

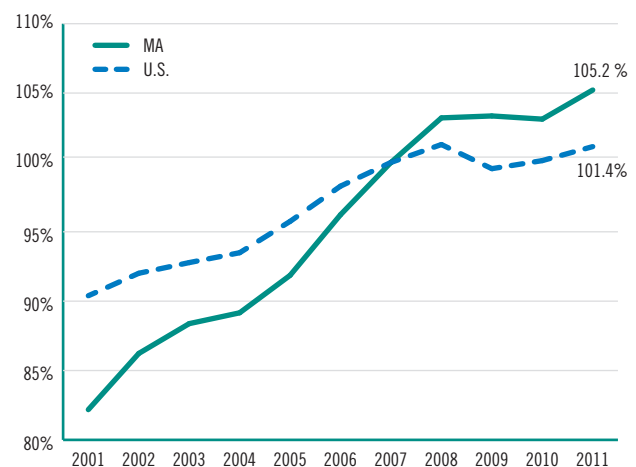
**Figure 8**, which indexes employment growth to 2007, reveals how the Commonwealth's life sciences cluster grew at a faster clip than the nation's, surpassing the nation and now remaining firmly ahead of it in terms of employment growth.

FIGURE 7  
Employment in Life Sciences Indexed to 2001,  
Massachusetts vs. the U.S.



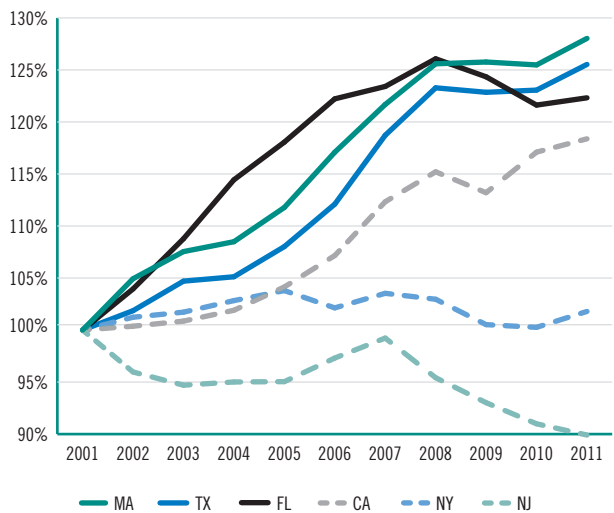
Source: Author's Analysis from BLS data

FIGURE 8  
Employment in Life Sciences Indexed to 2007,  
Massachusetts vs. the U.S.



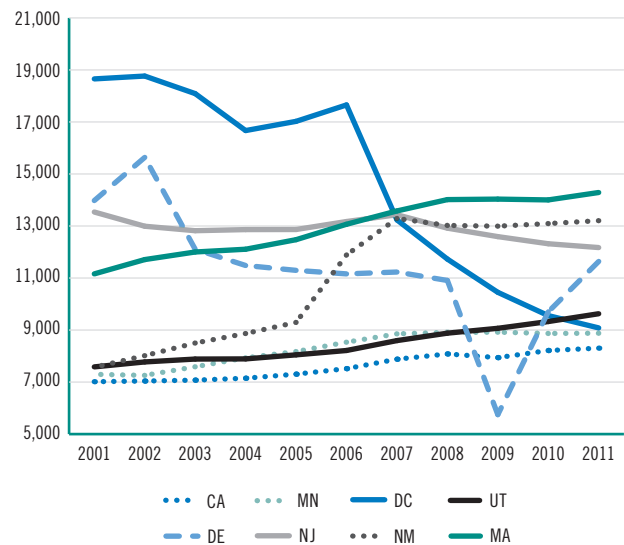
Source: Author's Analysis from BLS data

FIGURE 9  
Employment in Life Sciences Indexed to 2001,  
Massachusetts vs. Big Competitor States



Source: Author's Analysis from BLS data

FIGURE 10  
Life Sciences Jobs per 1 Million 2010 Population  
Top 8 States in 2011, by Year



Source: Author's Analysis from BLS data

The Commonwealth's main competitors in the life sciences include California, New Jersey, New York, Florida, and Texas. But as **Figure 9** demonstrates, after 2008 the Commonwealth overtook all of these states in terms of its 2001–2011 employment growth rate. Florida's nascent life sciences sector had been growing faster, but has fallen behind the Bay State during the past four years. Texas has been trying to catch up, but still trails Massachusetts. Over the decade, California's life sciences employment grew by just 18.4 percent compared with the Commonwealth's 27.3 percent. The growth rate in New York has been anemic, adding only 2 percent to its life sciences workforce while New Jersey, once the pharmaceutical capital of the nation, has seen its life sciences cluster decline sharply since 2007.

Even with Massachusetts's #1 position in the life sciences employment growth rate, it is not surprising that other states still have a larger absolute number of life sciences jobs. Of the top six states, Massachusetts ranked 5th in 2011, as **Table 5** reveals. California leads the pack with nearly 310,000 life sciences jobs.

Yet even as a much smaller state in total population, Massachusetts now leads all other states in the number of jobs in the vital biotechnology R&D sector within

the life sciences super cluster. In 2011, the Commonwealth boasted more than 28,000 jobs, exceeding second place California (22,600) and third place Pennsylvania (11,200).<sup>54</sup> Since 2007, this particular sector grew faster in the Commonwealth than in any other state, adding more than 3,500 jobs.

When we control for population size, Massachusetts is the clear winner for the entire life sciences cluster of industries. In **Figure 10**, we have controlled for the size of population of each state by measuring the number of life sciences jobs per 1 million residents. In 2001, the District of Columbia actually had the highest per capita number of life sciences jobs, presumably because of the physical presence of the National Institutes of Health. Delaware ranked second followed by New Jersey. California actually lagged Minnesota, Utah, and New Mexico on this measure. Massachusetts ranked #4.

But by 2011, given its rapid growth rate, the Massachusetts cluster had risen to #1 in terms of per capita life sciences employment. With nearly 14,300 life sciences jobs per 1 million people, Massachusetts had eclipsed New Jersey (12,171) and continued to far outstrip California (8,300).

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TABLE 5  
**States with Largest Life Sciences Employment (2011)**

California	309,344
New York	109,750
New Jersey	107,007
Texas	96,969
Massachusetts	95,615
Florida	83,836

Source: Author's Analysis from BLS data

Clearly, the life sciences cluster has enjoyed stellar growth in the Commonwealth over the past decade, and it appears that after the MLSC was created, the pace of growth outdistanced all of Massachusetts's rivals.

Clearly, the life sciences are flourishing in Massachusetts and the timing of the sector's employment growth suggests at least a correlation between the creation of the MLSC and the ability of the state's life sciences super cluster to overtake the rest of the nation.

*But what evidence do we have of causation rather than simply correlation? What role has the MLSC played in the stellar growth of this set of industries? Here we find the interviews we conducted with key informants provided additional information on the role MLSC has played in this 21st-Century story of industrial success.*



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## CHAPTER SEVEN

# The Key Role of the MLSC: What We Learned from the Interview Data

To obtain a firsthand view of what part the MLSC may have played in the emergence of the Commonwealth's life sciences ecosystem, we conducted a series of "key informant interviews" with executives in the industry, with leaders of related trade associations, and with a number of scientists who have an intimate knowledge of the range of activities of the Center. In order to obtain an honest and unbiased assessment of the \$1 billion initiative itself and the functioning of the Center, we assured each of our informants strict confidentiality. Interviews were carried out with executives in both large and small companies in the industry, with those mostly devoted to research and development, and with those whose companies are now involved with the manufacture of scientific and medical products.

While we probed on many fronts, we asked each informant to consider a fundamental "counterfactual": *Would the life sciences in Massachusetts be much different from what they are today if the MLSC had never been created and the state had not committed long-term funding to assist the array of universities, research institutes, and companies that make up the life sciences super cluster?* What we learned provided us with a vital and deeper understanding of the critical role the MLSC has played.

Here are our key findings.

### The Development of the Life Sciences "Ecosystem"

The leaders of large firms told us that given the scale of their operations, the MLSC plays at best a *minor direct role* in their own development, but an *immense indirect role* that helped to attract them to Massachusetts. The term that surfaced in virtually all of our interviews is "ecosystem," and that the MLSC has been central to the creation of the life sciences ecosystem that has made the Commonwealth more attractive than competing regions.

According to our interviews, the MLSC has indeed been instrumental in bringing together a tight-knit

community of life sciences institutions including universities, research hospitals, small start-up bioscience firms, medical device manufacturers, and Big Pharma. These stakeholders all interact on a regular basis to assist each other in the promotion of their activities. The ecosystem includes the nurturing of small firms through the MLSC's accelerator-loan and tax-incentive programs, assistance to the life sciences research labs in the state's public higher education system, the provision of funds for student interns in relevant fields, and countless opportunities for executives, scientists, and industry employees to meet and explore opportunities for expanding the life sciences super cluster in the Commonwealth. The Center has been critical, according to our key informants, in helping to build a "platform" for the entire sector and cultivate a "collaborative gene" among all of its separate parts.

As one recent example of this role, the MLSC helped create the Massachusetts Neuroscience Consortium, announced at the 2012 BIO International Convention in Boston. With charter sponsors including Abbott Labs, Biogen Idec, EMD Serono, Janssen Research & Development LLC, Merck, Pfizer, and Sunovion Pharmaceuticals, Inc., the consortium provides an arrangement whereby companies that normally compete with each other collaborate on funding preclinical neuroscience research under way at academic and research institutions throughout the state. With leadership provided by the MLSC, each of the founding sponsors has pledged \$250,000 toward this effort, and the Center will administer the funds.<sup>55</sup> The research results will be shared with all participants and all companies and academic researchers will have access to any tools developed as a result of these investigations. Without the Center playing this convening role, it is unlikely that such a consortium would have come into existence.

The Center has also been responsible for helping to nurture international cooperation among life sciences firms and academic institutions. The Center provided a \$300,000 grant to the Northern Ireland Massachusetts Connection (NIMAC) for a new multinational research

study on non-invasive procedures to detect pre-malignant lesions. Finland and Catalonia have joined NIMAC as well. MLSC is also helping to develop alliances between Massachusetts companies and Israeli firms through the Massachusetts-Israel Innovation Partnership (MIIP). The Center has contributed \$300,000 to this effort so far, funding two Massachusetts firms working in partnership with Israeli firms. A second round of funding for this program is pending.

All of these efforts are part of building an ever larger life sciences ecosystem based in the Commonwealth.

## The Unique Growth Pattern of Regional Life Sciences Clusters

The most important lesson we derived from our interviews, however, was the unique growth pattern of the life sciences cluster. The regional concentration of life-sciences companies happens in a very different manner than in other industries. In the case of traditional industrial sectors such as auto, aircraft engine, financial services and the like, a region becomes dominant in a particular cluster once a large anchor enterprise or a small number of them establish operations in that locale. Once the anchor enterprise is established, an array of smaller firms is attracted to that region to serve as part of the supply chain for the large anchor enterprise(s).

Once Detroit became home to Henry Ford's car company and General Motors and Chrysler built huge auto assembly facilities in Michigan, hundreds of small parts plants, design studios, and small engineering facilities opened their doors nearby in order to easily serve the industry's "Big Three." The same is true of the aircraft engine industry in New England dominated by Pratt & Whitney in East Hartford, Connecticut, and General Electric's Aircraft Engine facility in Lynn-Everett, Massachusetts. These massive facilities attracted hundreds of aircraft engine parts suppliers to New England, making the region one of the core jet-engine manufacturing centers in the United States. *Essentially, the small firms in the industry are dependent on the large ones.*

For the life sciences, the reverse is true. For companies that crucially depend on the development of breakthrough innovations and sophisticated medical devices, *the large firms prosper by reason of being proximate to a*

*panoply of small start-up firms.* The reason for this is that despite their substantial research budgets, even the largest of the life sciences companies do not have the resources to generate more than a handful of breakthrough innovations in the biosciences, genomics, and other sophisticated fields. These large firms grow and prosper by carefully monitoring the scientific discoveries under way in university research laboratories and in the translational research carried out by small start-up firms. Those few start-ups that end up with potential blockbuster drugs or devices become prime targets for acquisition by the larger firms. Only a fraction of the long-term revenue generated by Big Pharma and the largest biotech and medical device companies has its origin in their own research labs. The majority comes from the absorption of successful smaller firms.

The secret to success in the acquisition process is being where the small firms are located. This permits the large firms to closely monitor the progress of smaller firms and buy the most promising ones before other Big Pharma or other competitors can make a bid. To use a metaphor from nature, the large, globally important life sciences firms want to feed in the waters where the minnows are swimming.

Pfizer, for one, has moved operations into Cambridge from other locations for this purpose.<sup>56</sup> In 2010, it announced that Cambridge would become one of Pfizer's worldwide research and development hubs, and it relocated approximately half of the current employees from its BioTherapeutics R&D organization to Kendall Square. A year later, Pfizer announced plans to move two existing research units, Cardiovascular Medicine (CVMed) and Neuroscience from Groton, Connecticut, to Cambridge, leasing 180,000 square feet of lab and office space from MIT to house these two research units.

In June 2011, Pfizer opened the Boston Centers for Therapeutic Innovation (CTI), an entrepreneurial network of partnerships with leading academic medical centers. According to the company, "these partnerships reduce the time and cost of drug discovery and development by accessing leading translational researchers."<sup>57</sup> Boston is also the global headquarters for the CTI network, which has established partnerships in New York City and San Francisco. The richness of the Massachusetts life sciences ecosystem prompted Pfizer to expand still further in the Commonwealth, with the company's newest building in Cambridge scheduled to be completed in 2013.

Over the past three years, Massachusetts is the only state where Pfizer has added jobs, not California, Connecticut, New Jersey, or New York. As an executive of this company told us in one interview, “Innovation between the big, the small, and the in-between is what makes the industry succeed.” Another Pfizer executive noted that while his company has not taken a dollar from the MLSC, the Center has helped the firm by creating a “mentality” about the life sciences that has permeated the state right down to the local level, making it possible to speed local permitting and rezoning where necessary.

Executives at Sanofi-Aventis SA, which acquired Genzyme in 2011 in a \$20 billion deal, have relied on the MLSC to “act as a bridge” between the company and such research institutions as the Cummings School of Veterinary Medicine at Tufts University and the University of Massachusetts Medical Complex in Worcester. Like Pfizer, Sanofi is expanding in Cambridge in order to have a “front row seat” for acquisitions.<sup>58</sup>

And here is the key to understanding the central role of the MLSC. *While the large firms can easily exist without the MLSC, the small life sciences firms need the Center to provide them with accelerator loans, research and development funds, and interns who can help them translate their ideas into what could be commercially viable products. While the private venture capital market may provide some funds for this purpose, venture capital often requires a quicker return than can be obtained from this industry, which often has long lag times between initial research, proof of concept, and a final FDA-approved product.*

In 2012, according to data gathered by PricewaterhouseCoopers, venture capital investments in biotech and health-care startups fell to their lowest level since 1995.<sup>59</sup> Investment in biotech firms in the Boston area dropped to \$869 million in 2012, a 24 percent reduction from 2011 levels. Regulatory uncertainty facing the health-care industry is making this “a more challenging time for life sciences companies to raise money,” according to Terry McGuire, general partner of Polaris Venture Partners, a Waltham-based VC firm with about half its portfolio invested in health-care companies.<sup>60</sup> Another reason biotech investments may be dwindling is that new software companies are on the rise and the return on investments in these firms tends to be much more “capital-efficient,” paying off relatively rapidly.

The lack of easy access to VC funds has worried small life sciences firms about the “valley of death”—the gap in funding needed to move basic research into commercial products. In this environment, the MLSC has become an important investment partner for smaller life sciences firms, providing them with funds for translational research and development. These smaller firms may grow out of local research universities and medical complexes, but they can then turn to the MLSC for investment assistance. This tends to help keep them in the Commonwealth instead of losing them to investment funds in other regions.

In a number of cases, we found that smaller companies were being lured to relocate to other states, but according to their executives, the MLSC moved quickly to narrow the interregional cost differential and keep these firms in the Commonwealth. They did this through tax incentives and investment credits. And because these “minnows” stay here, Big Pharma has come from all over the world to swim in this pond. By helping to attract small life sciences companies to Massachusetts as well as incubating new ones begun in the state, the MLSC has created a well-stocked fishing ground for Big Pharma. In 2012 alone, a large array of small- and medium-sized domestic and international firms chose to establish operations in Massachusetts, including Era7 Bioinformatics, Algeta U.S., QServe, Scivax USA, ReproCELL, Inc., Human Metabolome Technologies, Inc., Alacrita, Arrayjet, ARGO Medical Technologies, BioAx-one, BioSurplus, Promedior, and KeraFAST.

By the end of 2012, nine of the ten major drug companies in the world had set up shop in Massachusetts.<sup>61</sup> To house these firms, 3.4 million square feet of biotech-related office and laboratory space is now under construction across Massachusetts with massive buildings now being completed for Pfizer and Novartis. This adds to the 2.4 million square feet of commercial lab space erected between 2007 and 2011.<sup>62</sup> The other Big Pharma firms with major investments in Massachusetts are Johnson & Johnson, GlaxoSmithKline, Sanofi (which absorbed Genzyme), AstraZeneca, Abbott Laboratories, Merck, and Bristol-Myers Squibb. A decade ago, none of these global firms had a significant presence or any presence at all in the state, according to Mass Bio, the state’s life sciences trade group.<sup>63</sup> Only Roche, the Swiss company and third largest biopharmaceutical firm in the world, has yet to establish a presence in the Commonwealth.

With this growth dynamic at work, Massachusetts appears well positioned to continue to attract new investment in the life sciences cluster.

## The MLSC “Modus Operandi”

In the course of this study, many of those interviewed commented on the protocols that the MLSC follows in carrying out its activities. According to these sources, the Center’s success in funding firms is grounded in its reliance on a Scientific Advisory Board (SAB) to guide the Center’s Board of Directors in determining which firms show the greatest promise of economic and scientific success. The Center has established a competitive process for securing assistance and the SAB has made certain that the process is transparent. Over and over again, we heard in our interviews words like “rigorous” and “diligent” when describing the processes MLSC uses in selecting awardees.

It should be noted that other states that have created similar life sciences initiatives have had a less-than-stellar record of maintaining a process free of political considerations. In early 2013, the Texas Legislature essentially defunded the state’s Cancer Prevention and Research Institute (CPRIT), which had been established by referendum in 2007. This followed the resignation of the agency’s chief scientific officer, along with many of the institute’s high-profile grant reviewers, in protest over how the independent peer review system had been disrespected.<sup>64</sup> According to the chair of the MLSC’s Scientific Advisory Board, here in the Commonwealth the Center has been scrupulous in following the recommendations of the Center’s Board of Directors and the SAB.

This has apparently contributed to the Center’s exceptional record of assisting firms that ultimately succeed and grow. Accountability measures implemented by the Center have also contributed to the success of the Center’s tax program. As **Table 6** reveals, the Center had

TABLE 6  
Firms Receiving Tax Incentive Funding (Program Years 2009-2011)—Active Awards

		Hiring Goal	Hiring Actual	% of Goal	Hiring Potential
2009	Shire	150	153	102%	153
2009	Cubist	58	60	103%	60
2009	Biogen	50	235	470%	235
2009	Merrimack	50	53	106%	53
2009	Lightlab	29	32	110%	32
2009	Constellation	26	21	81%	26
2009	Sepracor	25	108	432%	108
2009	InfraReDX	21	25	119%	25
2009	OmniGuide	18	10	56%	18
2009	Organogenesis	15	26	73%	26
2009	Dyax	15	23	153%	23
2009	Still River	10	18	180%	18
2009	Nova	10	25	250%	25
2009	Infinity	18	14	78%	18
2009	STD Med	10	54	540%	54
2010	Shire	150	141	94%	150
2010	Sanofil	100	101	101%	101
2010	Vertex	90	136	151%	136
2010	NX Stage	50	27	54%	50
2010	Merrimack	50	37	74%	50

TABLE 6  
Firms Receiving Tax Incentive Funding (Program Years 2009-2011)—Active Awards (*continued*)

		Hiring Goal	Hiring Actual	% of Goal	Hiring Potential
2010	Ironwood	37	56	151%	56
2010	Instrumentation Laboratory	30	30	100%	30
2010	Valeritas	18	10	56%	18
2010	Organogenesis	17	44	259%	44
2010	Bluebird	10	13	130%	13
2010	Bind	10	8	80%	10
2010	NormOxys	10	-5	-50%	10
2010	LeMaitre	19	43	226%	43
2010	Foundation Medicine	40	25	63%	40
2010	Lightlab	14	45	321%	45
2010	Nova	10	10	100%	10
2011	Shire	100			100
2011	Vertex	100			100
2011	AVEO Pharma	94			94
2011	Biogen Idec	75			75
2011	Ironwood	75			75
2011	DePuy Orthopaedics	50			50
2011	Momenta Pharma	50			50
2011	PerkinElmer	50			50
2011	Organogenesis	35			35
2011	Aegerion Pharma	27			27
2011	Lightlab	26			26
2011	Cell Signaling Tech	20			20
2011	Quanterix Corp	19			19
2011	NinePoint Medical	15			15
2011	Pharmalucence	12			12
2011	Metamark Genetics	11			11
2011	New England Biolabs	10			10
2011	Nova	10			10
2011	T2Biosystems	10			10
2011	Boston Heart Diagnostics	31			31
2011	Ra Pharma	10			10
2011	Blueprint Medicines	15			15
2011	PAREXEL International	32			32
2011	Moderna Therapeutics	13			13
2011	Courtagen Life Sciences	13			13
2011	Knome	12			12
2009-2011 Awardees		1,160	1,578	136%*	2,639**

Source: Massachusetts Life Sciences Center

\* Proportion of hiring goal for 2009-2010 active awardees only; no data available on 2011 awardees at this time

\*\* Minimum total jobs created if, on average, all firms meet or exceed hiring

31 outstanding tax incentive packages from the 2009 and 2010 programs as of June 30, 2012.

In a number of cases, hiring targets were exceeded by a factor of four or greater. In only one case did a firm receiving an award actually reduce its staff. As of June 30, 2012, the currently active 31 awards from the 2009/2010 program have produced 1,578 new jobs, exceeding the aggregate hiring goal of 1,160 by 36 percent. Adding in the 2011 program awards for which we do not yet have data on hiring, the potential number of new hires could exceed 2,600 if all firms, on average, meet or exceed hiring goals.

As noted above, the accelerator loan program is also meeting with success, with six of the 20 firms that received such loans already repaying them in full.

**Table 7** provides additional data on the outstanding awards to firms from the 2009 program, the first year

of the program. The outstanding amount of the tax incentive awards as of June 30, 2012 amounts to \$15.25 million. Fifteen firms received tax incentive awards in that year totaling \$15.25 million. They ranged in size from \$6.3 million to Shire Human Genetic Therapies to \$121,000 to STD Med, Inc. In 2009, these firms had a base headcount of 5,427. The target headcount associated with these awards was 5,932—an increase of 505 hires. By the end of 2011, 12 of these firms had met or exceeded their hiring targets.

What adds to the efficiency of these awards is a “claw-back” feature requiring firms that fail to meet their approved hiring goals to return to the Center the funds they were provided. A number of firms have done just that when they were unable to meet their specified minimum job-creation targets.

TABLE 7  
**Annual Report: 2009 Tax Incentive Program Results—for annual reporting period ending December 31, 2011**

		Per Agreement				Actual	2011	Actual	
		\$ Award Provided	Base Hdct	Adds	Targeted	12/31/2011 Hdct	Actual Growth (from base)	% of Adds (from base)	Achieved or exceeded target
COMPANY									
Active awards									
1	Shire Human Genetic Therapies, Inc.	\$6,277,057	986	150	1136	1280	294	196%	Yes
2	Cubist Pharmaceuticals, Inc.	\$1,740,000	355	58	413	415	60	103%	Yes
3	Biogen Idec MA, Inc.	\$1,500,000	1899	50	1949	2134	235	470%	Yes
4	Merrimack Pharmaceuticals, Inc.	\$1,500,000	124	50	174	214	90	180%	Yes
5	LightLab Imaging, Inc.	\$188,951	64	29	93	141	77	266%	Yes
6	Constellation Pharmaceuticals, Inc.	\$513,252	41	26	67	62	21	81%	No
7	Sepracor Inc. / Sunovion	\$750,000	601	25	626	709	108	432%	Yes
8	Infraredx, Inc.	\$630,000	60	21	81	85	25	119%	Yes
9	OmniGuide, Inc.	\$ 540,000	62	18	80	72	10	56%	No
10	Infinity Pharmaceuticals, Inc.	\$ 540,000	172	18	190	186	14	78%	No
11	Organogenesis Inc.	\$ 245,240	241	15	256	311	70	467%	Yes
12	Dyax Corp.	\$ 100,000	94	15	109	117	23	153%	Yes
13	Mevion (formerly Still River Systems), Inc.	\$ 300,000	73	10	83	91	18	180%	Yes
14	Nova Biomedical Corporation	\$ 300,000	498	10	508	533	35	350%	Yes
15	STD Med, Inc.	\$ 121,000	157	10	167	211	54	540%	Yes
TOTALS		\$ 15,245,500	5427	505	5932	6,561	1,134		

Source: Massachusetts Life Sciences Center

Based on wage and salary data from the companies receiving tax-incentive awards between 2009 and 2011, we carried out an economic analysis of the cost and benefit of this MLSC program. The results are found in **Table 8**. Our analysis suggests that as of June 30, 2012, the Center had \$56.3 million in outstanding tax incentives. Altogether, the firms receiving these incentives added more than 2,500 jobs by 2012. The vast majority (1,843) of these were in pharmaceutical firms with the remainder generated by medical device companies (481) and scientific research enterprises (213). The average annual salary of these jobs exceeded \$105,000. As such, these new jobs generated a total of over \$266 million in wages and salaries each year.

Based on estimates from the Massachusetts Department of Revenue, we estimate that, on average, the added workers employed by these firms paid more than \$4,900 in income taxes to the Commonwealth and \$2,400 in sales taxes.<sup>65</sup> Assuming that each of these jobs lasts on average just five years, the added state revenue generated by these workers over that period is close to \$37,000 per worker or a total of \$93 million in tax revenue.

*Compared with the total cost of the incentive program, each dollar in awards will generate \$1.66 to the state in added tax revenue. This represents an extraordinary rate of return on this public investment.*

TABLE 8  
**Economic Return on the MLSC Tax Incentive Program**

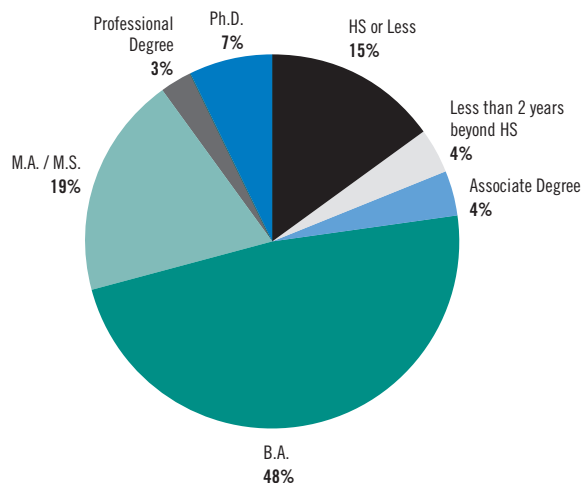
	Program Year 2009	Program Year 2010	Program Year 2011	3 Years of Incentives
Total Value of MLSC Tax Incentives (\$)	\$15,245,500	\$20,672,638	\$20,340,884	\$56,259,022
Net New Jobs Created	901	721	915	2,537
Tax Incentive per Job (\$)				\$22,175
Annual Tax Incentive per 5-year job (\$)				\$4,435
Average Salary per Job (\$)				\$105,037
Total Salaries Generated per Year (\$)				\$266,479,399
State Income Tax Revenue per Job per year (\$)				\$4,937
Total State Income Tax per year (\$)				\$12,524,532
Average Sales Tax per Job (\$)				\$2,404
Total State Sale Tax per year (\$)				\$6,099,447
Total Income+Sales Taxes per year (\$)				\$18,623,979
Average Income+Sales Tax/Job per year				\$7,341
Total Income+Sales Taxes per 5-year Job				\$36,705
Total Income+Sales Taxes over 5 years				\$93,120,585
Net State Revenue Gain (5 years) (\$)				\$36,860,872
Ratio of Tax Revenue/Incentive over 5 years				1.66

	Pharma	Medical Devices	Scientific Research	Total
Jobs	1,843	481	213	2,537
Average Salary (\$)	\$115,222	\$66,913	\$103,009	\$105,037
Total Salary (\$)	\$212,353,256	\$32,185,280	\$21,940,863	\$266,479,399
Share of Salary	0.7969	0.1208	0.0823	1.0000
State Income Tax By Sector (\$)	\$9,980,603	\$1,512,708	\$1,031,221	\$12,524,532
Sales Tax by Sector (\$)	\$4,860,554	\$736,689	\$502,204	\$6,099,447

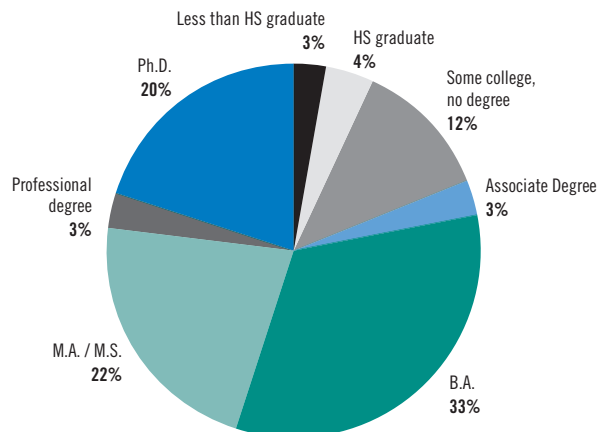
Source: Dukakis Center for Urban and Regional Policy

FIGURE 11  
Education Distribution of New Hires  
by 2010 MLSC Tax Incentive Awardees



Source: Dukakis Center for Urban and Regional Policy

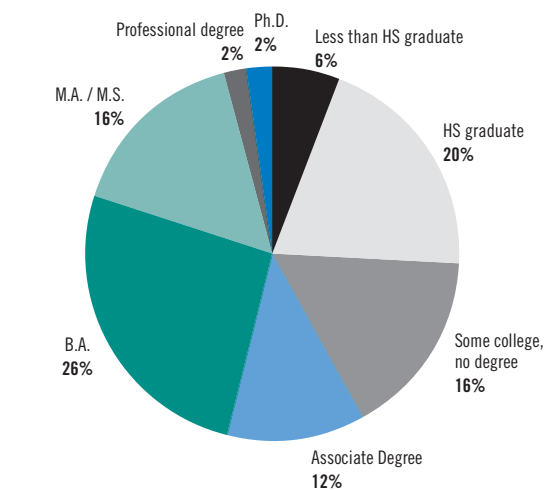
FIGURE 12  
Education Distribution—Pharma



Less than B.A.: 22%

Source: Dukakis Center for Urban and Regional Policy

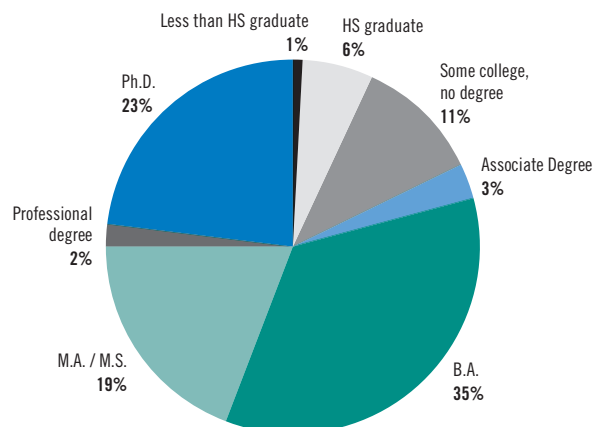
FIGURE 13  
Education Distribution—Medical Devices



Less than B.A.: 54%

Source: Dukakis Center for Urban and Regional Policy

FIGURE 14  
Education Distribution—Diagnostics, Tools,  
and Related Products and Services



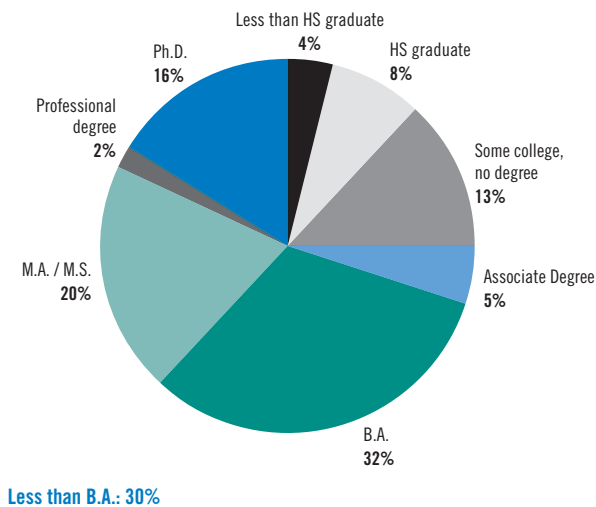
Less than B.A.: 21%

Source: Dukakis Center for Urban and Regional Policy

Of course, it is possible that these firms would have generated some or perhaps even many of these jobs without the MLSC award. But given the importance of the life-sciences ecosystem created in the Commonwealth, at least partly as a result of Center activity, it is reasonable to suggest that many of these jobs and their associ-

ated tax revenue would not have been created without the help of the Center. Moreover, our estimates do not consider any “multiplier” effects. The added spending of these new hires in the Commonwealth helped generate additional jobs as these workers spent money in the state, creating jobs in a wide range of industries.

FIGURE 15  
**Education Distribution—Life Sciences Cluster  
 Pharma/Medical Devices/Diagnostics, Tools,  
 and Related Products and Services**



Source: Dukakis Center for Urban and Regional Policy

A concern that one might have about the employment generated by the life sciences super cluster is that the jobs created all go to the most educated workers in the state, leaving behind those who have not had the benefit of a college degree or post-graduate education. But based on the hiring records of a number of firms in the industry, it turns out that like other industries, life sciences firms need to hire workers who have a range of skills. In addition to Ph.D. scientists and other highly

educated workers, these firms need laboratory technicians and clerical staff, and they employ a range of other workers in occupations that require a good deal less education. **Figure 11**, based on these hiring data, reveals that less than a third (29%) of those working in the life sciences have a Master's degree, professional degree, or Ph.D. Nearly half (48%) have the B.A. or B.S. as their highest level of education, while nearly a quarter (23%) of the workforce has no more than an associate's degree, often from a community college.

Using national data from the 2010 *American Community Survey* (ACS) available from the U.S. Census Bureau, we were able to estimate the education distribution for the individual sectors within the life sciences super cluster. As **Figures 12–15** demonstrate, the proportion of workers in each of the cluster segments needing less than a B.A. (or B.S.) ranges from 21 percent in diagnostics, tools, and related products and services and 22 percent in pharmaceutical firms to more than half in medical devices. According to these national estimates, the total workforce in the super cluster requiring less than a 4-year college degree is 30 percent, a bit higher than the 23 percent in Massachusetts. Essentially, with such a highly educated workforce in the Commonwealth, firms here are able to insist on somewhat higher educational credentials for their employees.

What adds to the value of the life sciences labor market in the Commonwealth are the high wages paid in this sector. As **Table 9** reveals, based on an analysis of Census data, the average annual wage in the state's

TABLE 9  
**Estimated Annual Earnings for Life Sciences Workers  
 (2006–2010)**

	Pharma	Medical Devices	Scientific R&D	Total
Less than High School graduate		\$35,142	\$51,685	\$36,702
HS graduate	\$42,966	\$33,250	\$71,418	\$44,225
Some college, no degree	\$62,745	\$46,684	\$61,816	\$55,386
Associate's degree	\$96,171	\$61,400	\$53,712	\$61,285
Bachelor's	\$95,147	\$98,853	\$85,080	\$92,033
Master's	\$102,851	\$114,019	\$102,045	\$105,143
Professional school degree	\$150,264	\$118,399	\$182,999	\$161,195
Doctorate	\$171,596	\$249,332	\$112,626	\$134,195
<b>Total</b>	<b>\$102,961</b>	<b>\$78,498</b>	<b>\$96,379</b>	<b>\$91,805</b>

Source: Dukakis Center Analysis of American Community Survey (Census) data

life sciences varies from \$78,500 in medical devices to nearly \$103,000 in the pharmaceutical industry.<sup>66</sup> Those with a Ph.D. earn, on average, nearly \$250,000 in the medical-device sector and well over \$100,000 in other sectors within the cluster. But even those who have not completed high school average nearly \$37,000 a year, the equivalent of more than \$18.00 an hour. High school graduates average more than \$44,000 and those with an associate's degree, more than \$61,000.

Compared with other industries, the life sciences provide some of the highest paying jobs in the Commonwealth. With an average annual salary of nearly \$92,000, this sector rewards its workforce with higher pay than those who work in manufacturing as a whole, construction, real estate, education, government, health care, and transportation. The average salary in the life sciences industries in the Commonwealth exceeds the all-industry Massachusetts average by 68 percent.<sup>67</sup>

## The Long-Term Impact of the Commonwealth's Life Sciences Initiative

Based on all of the data we collected about the MLSC and its activities, the analysis we conducted on the expansion of the life sciences industries in the Commonwealth, and the information we gleaned from the interviews, our overall conclusion is that because of its unique comprehensive approach to an entire industry super cluster and its reliance on scientific peer-reviewed procedures for awarding grants, the Commonwealth has reaped a substantial return on its life sciences initiative investment. Moreover, given the number of firms that have been attracted to the state, in large measure because of the ecosystem the Center has helped nurture, the benefits from the state's investment in this initiative are likely to pay off bountifully in the years to come.

Many of our informants for this report noted that by 2018, when the \$1 billion Life Sciences Initiative sunsets, the state will still need an agency that encourages innovation among smaller life sciences firms. Innovation, they note, must be a continuous process for the region to remain prosperous. This will be particularly important as China, India, Singapore, and other foreign countries compete for a share of this expanding super cluster by offering massive incentives to life sciences start-ups.

The big question is whether Massachusetts can continue to lead the nation in the evolution of this critical industry or whether other regions of the country will be able to capture this industry and the jobs that go with it. Massachusetts was once the premier textile center of the nation until the south captured much of the industry in the early part of the 20th century. The Commonwealth led in the development of the commercial computer industry in the 1970s and 1980s with the growth of Digital Equipment Corporation (DEC), Data General, Prime Computer, and Wang, but lost out to Silicon Valley in California and companies like Dell in Texas. Today, other states including New Jersey, California, New Mexico, Utah, and Minnesota are all vying to expand their life sciences clusters. The state's concentration of globally prominent "eds and meds" has clearly been critical to the evolution of the life sciences in the Commonwealth.

One area where the MLSC might wish to pay more attention in the years to come is the medical-device industry. As noted earlier in this report, employment in this component of the life sciences cluster has been stagnant. According to our interviews, other states including Indiana, Michigan and Minnesota are targeting this sector with state funding. Unlike Big Pharma, which can be more patient in the marketplace and worry less about cost pressures, medical-device firms need to move quickly in the market to commercialize their products and they need to be vigilant about reducing costs. To the extent that the MLSC can assist these firms, Massachusetts could remain a center for this sector and employment growth could ensue.

But overall, based on the state's continued commitment to the life sciences, we fully expect to see further growth in the size of private-sector investments in the state's life sciences industries and further increases in employment opportunity.

## Assessment of the MLSC Staff

The interviews we carried out also suggested that the Center itself is being run quite effectively and efficiently and in a highly professional manner. Virtually all of our informants praised the management team and especially appreciated the leadership's reliance on peer review and its refusal to permit political considerations to trump scientific merit. As one expert informant noted, the MLSC has "lots of moving parts" and all of them are working well and the Center remains responsive to

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industry needs, meeting deadlines, and staying focused on its mission. As another informant put it, with the reliance on the Scientific Advisory Board (SAB) to select awardees, “there is not an ounce of boondoggle in this agency.” In its report on creating fiscally sound state tax incentives, the Pew Center on the States singled out the Massachusetts Life Sciences Tax Incentive Program for its focus on annual cost controls and its reliance on scientific merit in making awards.<sup>68</sup>

Still another informant noted that the MLSC is successful because its leadership is committed to working “at the speed of business” and therefore has become a valued partner in the expansion of the industry.



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## Conclusions

All of our research suggests that the state will benefit from fully funding the remaining five years of the initiative in order to maintain the lead the life sciences have established in the Commonwealth. This is particularly important as other states ramp up their investments in hopes of creating their own life-sciences ecosystems to entice the small and large firms Massachusetts has successfully attracted. California, Maryland, New Jersey, New York, Minnesota, and Florida are not resting on their laurels, but continue to spend state funds on their own life-sciences industries.

Over time, it should be possible for the Center to reach out to the private sector to help fund more of its initiatives, as it has done with the Massachusetts Neuroscience Consortium. With the plethora of larger, profitable firms coming to the state to expand their operations, one could imagine the Center funding more of its internships with private funds and having private firms contribute to other programs (STEM education, for example), allowing the Center to focus even more of its funding on accelerator loans and tax incentives for firms undertaking translational research.

We should also note that the success of the MLSC has lessons for other quasi-public entities in the Commonwealth. We can mention five of them here:

1. Long-term success in the use of tax incentives and business loans is most likely to occur when funds are focused on a cluster of firms and a set of technologies in a given industry, helping to create an industrial ecosystem which can attract new companies to the state.
2. The use of expert panels to determine the awarding of loans assures that these funds will be well utilized. “Claw-back” provisions protect the taxpayers by requiring firms to repay funds advanced by the Commonwealth if they fail to meet hiring goals.
3. The focus on encouraging firms in their early-stage innovation activity is central to promoting economic growth and prosperity.
4. Helping fund workforce development efforts for critical industries as part of the mandate of the quasi-public helps assure a pipeline of skilled workers for the industry and this itself helps attract new firms to the region.
5. Taking a “portfolio” approach to the entire range of activities in the life sciences—from investments in small innovative firms to helping train the future workforce to underwriting infrastructure—helps sustain the “ecosystem,” undergirding a virtuous cycle of discovery, innovation, investment, and employment opportunity.

In the end, we applaud the Governor and the Legislature for their foresight in creating the Massachusetts Life Sciences Center and the \$1 billion Life Sciences Initiative. The structure put in place is fulfilling the goals set out in the original legislation and the Center’s leadership has continually assured that the structure works effectively and efficiently.



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# Endnotes

## Chapter One

1. The Massachusetts Life Sciences Center, “About the Center,” [www.masslifesciences.com/mission.html](http://www.masslifesciences.com/mission.html).
2. Massachusetts Life Sciences Center, *Fiscal Year (FY) 2012 Annual Report*, “Outpacing the Competition,” Cover Letter, September 28, 2012.
3. According to an analysis prepared by the Massachusetts Budget and Policy Center, the Commonwealth faces at least a \$1.2 billion deficit in FY2014. This is based on current tax rates and expected spending. See Massachusetts Budget and Policy Center, “A Preview of the FY2014 Budget,” January 10, 2013.
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5. Joe Stephens and Carol D. Leonnig, “Solyndra: Politics Infused Obama Energy Program,” *Washington Post*, December 25, 2011.
6. Carol D. Leonnig, “Battery Firm backed by Federal Stimulus Money files for Bankruptcy,” *Washington Post*, October 16, 2012.
7. Jason Schwartz, “End Game,” *Boston Magazine*, August 2012.
8. The specific life sciences industry sectors used in this report are based on the non-agricultural 6-digit NAICS (North American Industry Classification System) as reported in the *Battelle/Bio State Bioscience Industry Development 2012 Report* produced jointly by the Battelle Institute, the Biotechnology Industry Organization (BIO), and MPM Public Affairs Consulting, Inc. (June 2012).
9. This set of NAICS industries omits perhaps 50 percent of the growth in life sciences jobs in Massachusetts because it omits life sciences in research in hospitals and universities. These jobs are not counted in the Battelle report because the NAICS industrial coding system cannot distinguish between research jobs in hospitals and other jobs in hospitals such as physicians and nurses, and life sciences research jobs in universities and other jobs such as English and social science professors.
10. It is important to note that because we could not break out faculty, staff, and students involved in the life sciences departments and research institutes from all others employed at universities and hospitals, this report does not include an analysis of the educational attainment, earnings, and occupations for those working in these institutions. Clearly, if we could have done this, our estimates of the number of those employed in the life sciences in Massachusetts would be much greater.
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12. Jane G. Gravelle and Thomas L. Hungerford, “The Challenge of Individual Income Tax Reform: An Economic Analysis of Tax Base Broadening,” Congressional Research Service, 7-5700, March 22, 2012.

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## Chapter Two

13. The largest of these include the exclusion from taxable income of employer contributions for medical insurance premiums and medical care; the net exclusion of contributions to 401(k) pension plans, Individual Retirement Accounts (IRAs), and Keogh plans; the deductibility of home mortgage interest on owner-occupied homes, the deductibility of charitable contributions, and the preferential tax rates on long-term capital gains.
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15. Ibid., Table 1, pp. 3–5.
16. See Louise Story, Tiff Fehr and Derek Watkins "As Companies Seek Tax Deals, Governments Pay High Price," *New York Times*, December 1, 2012, p. 1; "Lines Blur as Texas Gives Industries a Bonanza," *New York Times*, December 2, p. 2; "Michigan Town Woos Hollywood, but End Up with a Bit Part," *New York Times*, December 3, p. 1.
17. MA Film Office, "Mass Film Tax Credit by the Numbers," <http://www.mafilm.org/mass-film-tax-credit-by-the-numbers>

## Chapter Three

18. Robert Pollin and Dean Baker, "Public Investment, Industrial Policy and U.S. Economic Renewal," Center for Economic and Policy Research, Working Paper Series Number 211, December 2009, p. 2.
19. DeHaven, op. cit., p. 6.
20. DeHaven, op.cit., p. 6
21. Pollin and Baker, op. cit., p. 3
22. Barry Bluestone and Bennett Harrison, *Growing Prosperity: The Battle for Growth with Equity in the 21st Century* (New York: Houghton Mifflin Company and The Century Foundation, 2000), p. 207.
23. Bluestone and Harrison, op. cit., p. 207.
24. Paul Romer, "The Origins of Endogenous Growth," *Journal of Economic Perspectives*, Vol. 8, No. 1 (Winter 1994).
25. Bluestone and Harrison, op. cit., p. 210.
26. See Jeremy Greenwood, "The Third Industrial Revolution," Paper prepared for the American Enterprise Institute, October 25, 1996.
27. See B. Jovenovic and S. Lach, "Product Innovation and the Business Cycle," *International Economic Review*, February 1997.
28. See a series of papers by Erik Brynjolfsson and Lorin M. Hitt including "Computers and Productivity Growth: Firm-Level Experience," MIT Sloan School of Management, January 1997; "Information Technology as a Factor of Production: The Role of Differences among Firms," *Economics of Innovation and New Technology*, Vol. 3, No. 4 (1995); and "Paradox Lost: Firm-Level Evidence on the Returns to Information Systems Spending," *Management Science*, Vol. 42, No. 4 (April 1996).
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30. Battelle Institute, op.cit, p 6.
31. Bluestone and Harrison, op.cit., p. 216.
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33. See Martin Bailey, "Trends in Productivity Growth," in Jeffrey C. Fuhrer and Jane Sneddon (eds.), *Technology and Growth: Conference Proceedings*, Federal Reserve Bank of Boston, Conference Series No. 40, June 1996.

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34. Matt Hourihan, "The Federal R&D Budget: Process and Perspectives," Presentation before the AAAS Leadership Seminar in Science and Technology Policy, American Association for the Advancement of Science, November 12, 2012.
  35. MassBio "Biopharma Industry Snapshot, 2012," p. 22 based on data from the National Institutes of Health and the U.S. Census.
  36. Congressional Budget Office, "Federal Support for Research and Development," June 2007.
  37. National Science Board, *Science and Engineering Indicators 2012* (Washington, D.C.: National Science Foundation, January 2012).
  38. See Economic Geography Glossary, <http://faculty.washington.edu/krumme/gloss/a.html>.
  39. Steven J. K. Walters, "Unions and the Decline of U.S. Cities, *Cato Journal*, Vol. 30, No. 1 (Winter 2010), p. 119.
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44. Trusheim, Berndt, Murray, and Stern, op.cit., p. 13.
45. MassBio "Biopharma Industry Snapshot, 2012," p. 23 based on MassBio membership reports and the *Boston Business Journal Book of Lists*, 2012.
46. See Greg Turner, "Boston is a Big Force in Pharma, *Boston Herald*, December 14, 2012.
47. Jones, Long LaSalle, "Life Sciences Cluster Report: Global 2011," p. 16. Boston ranked #1 on each component of the composite score with the exception of venture capital funding where it ranked #2.

## Chapter Five

48. MassBio, "Massachusetts Life Sciences Incentives," Fact Sheet, September 2012.
49. "Refundable" tax credits are payments made to a taxpayer by the Internal Revenue Service or the Commonwealth's Department of Revenue. Such payments can offset other tax liabilities or in the case of no tax liability are a form of "negative" tax.
50. Massachusetts Life Sciences Center, *Fiscal Year (FY) 2012 Annual Report*, p. 4.
51. According to an MLSC memo to the Secretary of Administration and Finance, "The MLSC Tax Incentive Program has enforcement mechanisms, including strict monitoring and reporting requirements for recipient companies. Within 30 days of the end of each calendar year following the award, awardees are required to provide an annual report to the Center that permits the Center to determine whether the awardee's job targets have been met. The statute provides for 'clawback' provisions for companies that are found not to be fulfilling their job creation commitments to the state. Companies that fail to achieve at least 70% of their job targets at the end of any annual reporting period are subject to an investigation to determine the cause of this 'material variance.'" In cases where it is found that the company cannot meet its requirements, the Center

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notifies the Massachusetts Department of Revenue so that the department can initiate claw-back procedures to recover the tax value any award provided. If a company has met at least 70% of its goal, the Center may permit the company a second year to fully meet this requirement before notifying the DOR. See memo to Jay Gonzales, Secretary, Executive Office for Administration and Finance from Susan Windham-Bannister, President and CEO of the Massachusetts Life Sciences Center, August 27, 2012.

52. Massachusetts Life Sciences Center, *Fiscal Year (FY) Annual Report*, op. cit., p. 6.

53. UMass Donahue Institute, *Growing Talent: Meeting the Evolving Needs of the Massachusetts Life Sciences Industry* (Cambridge, MA.: Massachusetts Life Sciences Center and Massachusetts Biotechnology Council, 2008), p. 15.

54. U.S. Bureau of Statistics, *Quarterly Census of Employment and Wages* as reported in MassBio “Biopharma Industry Snapshot, 2012,” p. 4. These statistics are for NAICS Code 541711.

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55. See D.C. Denison, “Drugmakers, Mass. Form Consortium,” *The Boston Globe*, June 20, 2012, p. B1.

56. Pfizer: Science at our Core, “R&D Locations: Cambridge, MA.” [http://www.pfizer.com/research/rd\\_works/cambridge.jsp](http://www.pfizer.com/research/rd_works/cambridge.jsp).

57. Pfizer: Science at our Core, op. cit.

58. See Jeanne Whalen and Mimosa Spencer, “Sanofi wins Long-Sought Biotech Deal,” *Wall Street Journal*, February 17, 2011.

As a case in point, on January 29th, 2013 Sanofi announced the launch of LeGoo, a biopolymer gel that allows surgeons to temporarily stop blood flow during surgery without the use of clamps, elastic loops or other conventional occlusion devices that may risk trauma to blood vessels. LeGoo was developed by Pluromed, a young company that was one of the first to receive a loan through the Center’s Accelerator Loan Program in 2009. The Accelerator Loan provided support for Pluromed at a critical stage in the development of LeGoo. Pluromed repaid its loan with interest to the Center following its acquisition by Sanofi.

59. See Michael B. Farrell, “Startup Funding Declines Across US,” *The Boston Globe*, January 18, 2013, p. B5.

60. Michael B. Farrell, “Startup Funding Declines Across US,” op. cit., p. B9.

61. See Greg Turner, “Boston is a Big Force in Pharma,” *Boston Herald*, December 13, 2012.

62. MassBio “Biopharma Industry Snapshot,” 2012, p. 9.

63. Greg Turner, “Boston is a Big Force in Pharma,” op.cit.

64. Monya Baker, “Texas Cancer Institute gets no Funds for new Grants in Proposed Budget,” *Nature.com*, January 16, 2013.

65. According to estimates prepared by the Mass DOR from recent annualized tax revenue data, state income tax revenues in the Commonwealth average 4.7% of wage and salary income and sales tax revenues average 48.7% of income tax revenues.

66. These estimates are based on data for 2010 from the American Community Survey (ACS).

67. See Barry Bluestone, et. al, *Staying Power II: A Report Card on Manufacturing in Massachusetts 2012*, Dukakis Center for Urban and Regional Policy, September 2012, Table 1.10, p. 32 based on data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

68. “Avoiding Blank Checks: Creating Fiscally Sound State Tax Incentives, Pew Center on the States, December 2012, Table 1, p. 5 and p. 14.





**Massachusetts Life Sciences Center**  
(A Component Unit of the Commonwealth  
of Massachusetts)

**Financial Statements**

Years Ended June 30, 2013 and 2012

**Massachusetts Life Sciences Center**  
(A Component Unit of the Commonwealth of Massachusetts)

FINANCIAL STATEMENTS  
Years Ended June 30, 2013 and 2012

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## INDEPENDENT AUDITOR'S REPORT

To the Board of Directors of the  
Massachusetts Life Sciences Center  
Waltham, Massachusetts

### **Report on the Financial Statements**

We have audited the accompanying financial statements of the Massachusetts Life Sciences Center (the "Center"), a component unit of the Commonwealth of Massachusetts, which comprise the statement of net position as of June 30, 2013, and the related statements of revenues, expenses and changes in net position, and cash flows for the year then ended and the related notes to the financial statements.

### **Management's Responsibility for the Financial Statements**

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

### **Auditor's Responsibility**

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### **Opinion**

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Massachusetts Life Sciences Center as of June 30, 2013, and the results of its operations and its cash flows for the year then ended in accordance with accounting principles generally accepted in the United States of America.

### **Other Matters**

The financial statements of the Center, as of and for the year ended June 30, 2012, were audited by other auditors whose report dated September 26, 2012 expressed an unmodified opinion on those statements.

### *Required Supplementary Information*

Accounting principles generally accepted in the United States of America require that the Management's Discussion and Analysis on pages 3–6 be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

*McGladrey LLP*

Boston, Massachusetts  
September 23, 2013

# Massachusetts Life Sciences Center

(A Component Unit of the Commonwealth of Massachusetts)  
 Management's Discussion and Analysis (unaudited)  
 June 30, 2013 and 2012

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As the Board of Directors of the Massachusetts Life Sciences Center (the "Center") we offer the following narrative overview and analysis of the financial activities of the Center for the fiscal years ended June 30, 2013, 2012 and 2011. This unaudited management discussion and analysis should be read in conjunction with the audited financial statements and the notes thereto, which follow this section.

The Center was created on June 24, 2006 in the Economic Stimulus Bill, Chapter 123, Section 24 of the Acts of 2006 and codified in the Massachusetts General Laws, Chapter 23I. The Center is a body politic and corporate. Exercise of the powers conferred by Chapter 23I is considered to be the performance of an essential governmental function. The purpose of the Center is to promote the life sciences within the Commonwealth of Massachusetts (the "Commonwealth"). It is tasked with investing in life sciences research and economic development initiatives. This work includes making financial investments in public and private institutions growing life sciences research, development and commercialization, as well as building ties between sectors of the Massachusetts life sciences community.

On June 16, 2008, the Life Sciences Act enacted by the Massachusetts Legislature was signed into law by Governor Deval Patrick. The Commonwealth committed to investing \$1 billion over a ten year period to create jobs, drive innovation and promote biomedical breakthroughs that improve people's lives. The Center is the steward of the \$1 billion and uses three statutory funding vehicles to achieve the Commonwealth's mission: the Life Sciences Investment Fund (the "Investment Fund"), the Capital Program and the Life Sciences Tax Incentive Program.

The Life Sciences Investment Fund is to be used in making appropriations, allocations, grants or loans to leverage development and investments in life sciences in Massachusetts. The Capital Program is for municipalities and institutions for buildings, equipment, upgrades to roads, sewer lines and other infrastructure that supports growth in the life sciences sector. The Life Sciences Tax Incentive Program allows the Center to award tax incentives to companies at every stage of development.

The Center is governed by a seven member Board of Directors (the "Board of Directors") consisting of: the Secretary of Administration and Finance or her/his designee; the Secretary of Housing and Economic Development or his/her designee; the president of the University of Massachusetts or his/her designee; and four members appointed by the Governor, one of whom is a physician licensed to practice medicine in Massachusetts and affiliated with an academic medical center, one of whom is a CEO of a Massachusetts-based life sciences corporation that is a member of the board of directors of the Massachusetts Biotechnology Council, one of whom is a researcher involved in the commercialization of biotechnology, pharmaceuticals or medical diagnostic products and one of whom has significant financial experience in the life sciences sector.

## Using the Financial Statements

The basic financial statements are prepared in accordance with accounting principles generally accepted in the United States of America ("GAAP") as promulgated by the Governmental Accounting Standards Board ("GASB"). The Center's annual report includes three basic financial statements: the statement of net position; the statement of revenues, expenses and changes in net position; and the statement of cash flows.

The statement of net position presents the financial position of the Center as of June 30, 2013. It provides information about the nature and the amount of resources (assets), obligations (liabilities) and net position.

The statement of revenues, expenses and changes in net position presents the changes in net position over the course of the year ended June 30, 2013. The change in net position may be useful in assessing whether the financial position improved or deteriorated for the year.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Management's Discussion and Analysis (unaudited)  
 June 30, 2013 and 2012

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Using the Financial Statements...continued

The statement of cash flows presents the cash activities segregated by four major cash flow categories; operating activities, noncapital financing activities, capital and related financing activities and investing activities. This statement may be useful in determining the changes in liquidity and in understanding how cash and cash equivalents were used during the year ended June 30, 2013.

Financial Highlights

Fiscal year 2013 is the fifth year of the initiative and reflects a year of significant operating activities of the Center as grants were made both from the Investment Fund and Capital Programs and a fourth round of awards under the Life Sciences Tax Incentive Program were granted.

Investment Fund

Section 24 of Chapter 123 of the Acts of 2006 established the Massachusetts Life Sciences Investment Fund to be administered by the Center to finance its activities. The Life Sciences Act of 2008 contemplates an annual appropriation from the legislature totaling \$250 million over 10 years. The Investment Fund is also to be used to support the administrative expenses and investment in property and equipment of the Center.

The legislature appropriated \$15 million in fiscal year 2013, \$10 million in fiscal year 2012 and \$10 million in fiscal year 2011.

In fiscal year 2013, the Board of Directors authorized \$6.4 million in commitments as compared to \$5.1 million in fiscal year 2012 and \$4.5 million in fiscal year 2011. The commitments were for research grants, workforce development programs, and programs that support innovation in life sciences. The increase in fiscal year 2013 commitments from fiscal year 2012 is due to one additional program in fiscal year 2013 offset by funding for a prior investment. The increase in fiscal year 2012 from fiscal year 2011 is due to an expansion of existing programs and a new international innovation program. In fiscal year 2013, the Center incurred \$4.4 million of grant expense compared to \$6.8 million in fiscal year 2012 and \$6.6 million in fiscal year 2011. The decrease of expense from fiscal year 2013 to 2012 is due to the timing of both new awards and the fulfillment of prior awards. The slight increase in expense in fiscal year 2012 from fiscal year 2011 is due to the timing of programs. Remaining payment commitments as of June 30, 2013 on the outstanding grants are approximately \$9 million.

In fiscal year 2013, the Board of Directors authorized \$6 million for early stage company loans under the Life Sciences Accelerator Loan program for fiscal year 2014. The loan program provides working capital to early stage companies at a critical stage of development. From prior year authorizations, the Center awarded \$6 million in fiscal year 2013 and \$3.15 million in fiscal year 2012. Of the \$6 million in investment funds awarded in fiscal year 2013, approximately \$4 million have not been disbursed as of June 30, 2013.

# Massachusetts Life Sciences Center

(A Component Unit of the Commonwealth of Massachusetts)  
Management's Discussion and Analysis (unaudited)  
June 30, 2013 and 2012

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## Capital Programs

The Capital Program was created by the Life Sciences Act and is for municipalities and institutions for buildings, equipment, upgrades to roads, sewer lines and other infrastructure that supports growth in the life sciences sectors. The Life Sciences Act provides for \$500 million to the Capital Program over 10 years. The Capital Program is funded by the Commonwealth of Massachusetts. In fiscal year 2013, the Center entered into 19 new commitments for \$135.1 million. In fiscal year 2013, the Center incurred \$52.4 million of grant expense compared to approximately \$42.5 million in fiscal year 2012 and \$29.1 million in fiscal year 2011. The increase in fiscal year 2013 from 2012 is due to payments for qualifying expenses relating to grants awarded in prior years together with new fiscal year 2013 projects. The increase in fiscal year 2012 from fiscal year 2011 is due to prior commitments incurring greater expense in fiscal year 2012. The Life Sciences Act also provides for a Life Sciences Education fund for providing grants for purchasing or leasing equipment to train students in life sciences and research. In fiscal year 2011, the Center made 32 grants for a new program to vocational/technical high schools, community colleges and other workforce development programs totaling nearly \$3.4 million and incurring expense of \$2.9 million. In fiscal year 2012, no new awards were made and the Center incurred \$483,000 of grant expense under the program from prior year awards. In fiscal year 2013, the Center made 31 grants for under the program totaling nearly \$3.2 million and incurring expense of \$1.6 million.

The Life Sciences Act also provides for a small business matching grant fund under the Capital Program. Under the program companies that have received Phase II or later small business innovation research ("SBIR") grants can receive up to \$500,000 in grants from the Center to assist the awardee with commercializing their product. The program was not offered in fiscal year 2013 and in fiscal year 2012, the Center made one award totaling \$500,000 under the program. In fiscal year 2013, The Center recovered \$39,991 from a prior awardee.

## Life Sciences Tax Incentive Program

The Life Sciences Tax Incentive Program was created by the Life Sciences Act and allows the Center to award tax incentives to companies at every stage of development. The Center has the ability to award ten different tax incentives with a cumulative cap of \$25 million per year for 10 years. The tax incentives have no financial impact on the Center. The Center awarded \$23 million to 24 companies in fiscal year 2013, \$20.3 million to 26 companies in fiscal year 2012, and \$20.9 million to 24 companies in fiscal year 2011.

## Investment Income

Investment income in fiscal year 2013 was \$58,000 compared to \$73,000 in fiscal year 2012 and \$86,000 in fiscal year 2011. Investment income relates to interest earned throughout the fiscal year on the Center's cash and cash equivalent balance. The decrease in fiscal year 2013 from fiscal year 2012 is due to lower interest rates. The decrease in fiscal year 2012 from fiscal year 2011 is due to a lower average balance. The decrease in fiscal year 2011 from fiscal year 2010 is due to a lower average balance.

## Massachusetts Life Sciences Center

(A Component Unit of the Commonwealth of Massachusetts)

Management's Discussion and Analysis (unaudited)

June 30, 2013 and 2012

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### Administrative Expenses and Investments in Property and Equipment

In accordance with the Act, administrative expenses and purchases of property and equipment are provided by the Investment Fund. In fiscal year 2013, the Center incurred approximately \$2.7 million of administrative expenses and purchases of property and equipment. In fiscal year 2012 and 2011, the Center incurred approximately \$2.2 million of administrative expenses. The increase in expenditures in fiscal year 2013 from fiscal year 2012 is due to higher staffing costs due to new hires and communications programs. The same level of expenditures in fiscal year 2012 from fiscal year 2011 is due to higher staffing costs as a result of a full year of costs for open positions filled during fiscal year 2011 offset by lower fiscal year 2012 communications programs, professional fees and administrative expenses. For the fiscal years ended June 30, 2013, June 30, 2012 and June 30, 2011, the headcount of the Center was fourteen, ten, and nine, respectively.

### Liquidity of the Investment Fund

From inception through June 30, 2013, the Investment Fund has received appropriations from the Commonwealth of \$85 million. In addition, the Center has earned investment income of approximately \$2.1 million and collected approximately \$5.3 million through loan repayments, sponsorship, insurance proceeds, and corporate consortium revenues for total inflows of approximately \$92.4 million. The Center reserves all the funds required for a grant or loan commitment at the time of the Board of Directors' authorization. From inception through June 30, 2013, the Center has disbursed or reserved approximately \$88.1 million resulting in approximately \$4.3 million of available funds as of June 30, 2013.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Statements of Net Position  
 June 30, 2013 and 2012

	2013	2012
<b>ASSETS</b>		
Current assets:		
Cash and cash equivalents	\$ 32,671,311	\$ 27,513,436
Accounts receivable	61,906	-
Grant reimbursement from Commonwealth of Massachusetts	27,741,371	17,464,289
Interest receivable, net	594,183	351,674
Assets held on behalf of Neuroscience Consortium	1,750,143	-
Prepaid expenses and other current assets	54,019	49,646
Total current assets	<u>62,872,933</u>	<u>45,379,045</u>
Noncurrent assets:		
Loans receivable, net	4,166,000	2,503,500
Property and equipment, net	32,916	31,683
Total noncurrent assets	<u>4,198,916</u>	<u>2,535,183</u>
Total assets	<u>\$ 67,071,849</u>	<u>\$ 47,914,228</u>
<b>LIABILITIES</b>		
Current liabilities:		
Accounts payable and accrued expenses	\$ 287,050	\$ 201,371
Grants payable and accrued grant expense	31,118,651	20,466,488
Total current liabilities	<u>31,405,701</u>	<u>20,667,859</u>
Noncurrent liabilities:		
Other liabilities	21,078	44,791
Agency obligations payable to Neuroscience Consortium	1,750,143	-
Total liabilities	<u>33,176,922</u>	<u>20,712,650</u>
<b>NET POSITION</b>		
Invested in capital assets	32,916	31,683
Unrestricted	33,862,011	27,169,895
Total net position	<u>33,894,927</u>	<u>27,201,578</u>
Total liabilities and net position	<u>\$ 67,071,849</u>	<u>\$ 47,914,228</u>

See notes to financial statements.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Statements of Revenues, Expenses and Changes in Net Position  
 Years Ended June 30, 2013 and 2012

	2013	2012
Operating revenue:		
Capital program revenues from Commonwealth of Massachusetts	\$ 53,932,867	\$ 43,500,000
Grant revenues	205,359	-
Sponsorship / Corporate Consortium	38,980	131,300
Interest income	388,623	392,911
Other revenues	55,250	-
Total operating revenue	54,621,079	44,024,211
Operating expenses:		
Grant expense	58,294,078	50,265,235
Salary and related employee expenses	1,573,275	1,438,984
Professional and consulting fees	336,985	180,152
Communications programs, sponsorships and contributions	300,304	224,874
General and administrative expenses	423,569	368,248
Loan loss reserve expense	2,037,500	616,000
Depreciation	20,228	73,386
Total operating expenses	62,985,939	53,166,879
Operating loss	(8,364,860)	(9,142,668)
Non-operating revenues:		
Investment income	58,209	73,147
Total nonoperating revenues	58,209	73,147
Loss before capital contributions	(8,306,651)	(9,069,521)
Contributions from the Commonwealth of Massachusetts	15,000,000	10,000,000
Increase in net position	6,693,349	930,479
Net position:		
Beginning of year	27,201,578	26,271,099
End of year	\$ 33,894,927	\$ 27,201,578

See notes to financial statements.

**Massachusetts Life Sciences Center**  
(A Component Unit of the Commonwealth of Massachusetts)  
Statements of Cash Flows  
Years Ended June 30, 2013 and 2012

	2013	2012
Cash flows from operating activities:		
Receipts for reimbursements from the Commonwealth	\$ 43,655,785	\$ 45,750,711
Payments for grants	(47,641,914)	(52,516,708)
Payments for salary and related employee expenses	(1,558,089)	(1,424,832)
Payments for professional consulting fees	(316,767)	(161,574)
Payments for general and administrative expenses	(438,376)	(389,814)
Payments for communication programs, sponsorships and contributions	(263,874)	(295,091)
Receipts for grant revenues	144,018	-
Receipts for interest income	146,114	239,363
Receipts for sponsorships	38,980	64,900
Receipts for other liabilities	55,250	6,300
Net cash used by operating activities	(6,178,873)	(8,726,745)
Cash flows from non-capital and related financing activities:		
Receipt of contributions from the Commonwealth of Massachusetts	15,000,000	10,000,000
Net cash provided by capital and related financing activities	15,000,000	10,000,000
Cash flows from investing activities:		
Purchase of property and equipment	(21,461)	(5,051)
Issuance of loans	(4,825,000)	(2,207,000)
Repayment of loans	1,125,000	1,100,000
Receipt of investment income	58,209	73,147
Net cash used in investing activities	(3,663,252)	(1,038,904)
Net increase in cash and cash equivalents	5,157,875	234,351
Cash and cash equivalents:		
Beginning of year	27,513,436	27,279,085
End of year	\$ 32,671,311	\$ 27,513,436
Reconciliation of cash flows from operating activities:		
Operating loss	\$ (8,364,860)	\$ (9,142,668)
Adjustments to reconcile net operating loss to net cash used in operating activities:		
Depreciation expense	20,228	73,386
Loan loss reserve	2,037,500	616,000
Loan interest reserve	228,051	215,599
Changes in assets and liabilities:		
Accounts receivable	(61,906)	64,900
Grant reimbursement from Commonwealth	(10,277,082)	2,250,711
Interest receivable	(470,560)	(369,147)
Prepaid expenses and other current assets	(4,373)	(11,129)
Accounts payable and accrued expenses	85,678	(30,067)
Grants payable and accrued grant expense	10,652,164	(2,251,473)
Deferred rent	(23,713)	(17,857)
Other current liabilities	-	(125,000)
Total adjustments	2,185,987	415,923
Net cash used in operating activities	\$ (6,178,873)	\$ (8,726,745)

See notes to financial statements.

# Massachusetts Life Sciences Center

(A Component Unit of the Commonwealth of Massachusetts)  
Notes to Financial Statements  
Years Ended June 30, 2013 and 2012

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## 1. ORGANIZATION

On June 24, 2006, the Commonwealth of Massachusetts (the "Commonwealth") enacted Section 24 of Chapter 123 of the Acts of 2006, creating the Massachusetts Life Sciences Center (the "Center") and establishing the Massachusetts Life Sciences Investment Fund (the "Investment Fund") to financially support its activities.

On June 16, 2008, the Life Sciences Act enacted by the Massachusetts Legislature was signed into law by Governor Deval Patrick. In that legislation, the Commonwealth committed to investing \$1 billion over a ten year period to create jobs, drive innovation and promote biomedical breakthroughs that improve people's lives. The Center is the steward and administrator of the \$1 billion and uses three statutory funding vehicles to achieve the Commonwealth's mission: the Life Sciences Investment Fund (the "Investment Fund"), the Capital Program and the Life Sciences Tax Incentive Program.

The Life Sciences Investment Fund is to be used in making appropriations, allocations, grants or loans to leverage development and investments in life sciences in Massachusetts. The Capital Program is for municipalities and institutions for buildings, equipment, upgrades to roads, sewer lines and other infrastructure that supports growth in the life sciences sector. The Life Sciences Tax Incentive Program allows the Center to award tax incentives to companies at every stage of development.

All grants and awards to be made by the Center require approval by its Board of Directors.

The Center is governed by a seven member Board of Directors (the "Board of Directors") consisting of: the Secretary of Administration and Finance or her/his designee; the Secretary of Housing and Economic Development or his/her designee; the president of the University of Massachusetts or his/her designee; and four members appointed by the Governor, one of whom is a physician licensed to practice medicine in Massachusetts and affiliated with an academic medical center, one of whom is a CEO of a Massachusetts-based life sciences corporation that is a member of the board of directors of the Massachusetts Biotechnology Council, one of whom is a researcher involved in the commercialization of biotechnology, pharmaceuticals or medical diagnostic products and one of whom has significant financial experience in the life sciences sector.

In accordance with the requirements of GASB Statement No. 14, *The Financial Reporting Entity*, and GASB Statement No. 39, *Determining Whether Certain Organizations Are Component Units - an Amendment of GASB Statement 14*, the financial statements must present the Organization and its component units. The Center has no component units. The Center, however, is considered a component unit of the Commonwealth and, accordingly, its financial statements are incorporated into the financial statements of the Commonwealth.

## 2. SIGNIFICANT ACCOUNTING PRINCIPLES

### Accounting and Reporting Standards

These financial statements have been prepared in accordance with accounting principles generally accepted in the United States of America, as prescribed by the Governmental Accounting Standards Board ("GASB"), codification section 2100.

**Massachusetts Life Sciences Center**  
(A Component Unit of the Commonwealth of Massachusetts)  
Notes to Financial Statements  
Years Ended June 30, 2013 and 2012

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**2. SIGNIFICANT ACCOUNTING PRINCIPLES...continued**

Accounting and Reporting Standards...continued

The GASB defines the basic financial statements of a business type activity as the: statement of net position, statement of revenues, expenses and changes in net position, the statement of cash flows, and management's discussion and analysis as required supplemental information. The statement of net position is presented to illustrate both the current and noncurrent balances of each asset and liability. All revenues and expenses are classified as either operating or nonoperating activities in the statement of revenues, expenses and changes in net position. Operating activities are those that support the mission and purpose of the Center. Nonoperating activities represent transactions that are capital, investing, legislative or regulated in nature.

The GASB requires that resources be classified into three categories of net position. Net position represents the residual interest in the Center's assets after liabilities are deducted and consist of: invested in capital assets, net of related debt; restricted; and unrestricted. Those assets are defined as follows:

Invested in Capital Assets, Net of Related Debt

Invested in capital assets, net of related debt, includes capital assets, net of accumulated depreciation and outstanding principal balances of debt attributable to the acquisition, construction or improvement of those assets.

Restricted

Restricted net position represents the portion of net position subject to externally imposed stipulations that can be fulfilled by actions of the Center pursuant to those stipulations or that expire by the passage of time. At June 30, 2013 and 2012, the Center does not maintain any restricted net assets.

Unrestricted

Unrestricted net position represents the portion of net position that is not subject to externally imposed stipulations. Unrestricted net position may be designated for specific purposes by action of management or the Board of Directors or may be otherwise limited by contractual agreements with outside parties. The Center's unrestricted net position includes appropriations received from the Commonwealth that are to be used for the general purposes of the Center. Per its enabling legislation, the Center may not expend more than fifteen percent of the amounts to be expended from the Life Sciences Investment Fund for the fiscal year for administrative expenditures and property and equipment.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**2. SIGNIFICANT ACCOUNTING PRINCIPLES...** continued

Cash and Cash Equivalents

Cash and cash equivalents consist of amounts on hand and highly liquid interest investments with maturities of three months or less at acquisition.

Revenue Recognition

Investment income is recognized as earned. Sponsorship revenues represent fees collected from companies for providing tradeshow booths and other space at industry trade shows. Sponsorship revenues are recognized when earned upon occurrence of the event. Consortium revenues are fees paid by corporations to sponsor and participate in the Center's small business matching grant and accelerator loan programs. Fees are for a specific time period. Revenues are recognized over the specified time period.

Interest income on loans is recognized as earned. Interest income is reported net of any interest income loss reserve.

Capital program revenues are amounts due to the Center from the Commonwealth for related capital program expenditures by grantees of the Center. Capital program grantees submit requests for reimbursement to the Center after funds have been expended. The Center then bills the Commonwealth for these grantee expenses and recognizes the corresponding revenue.

Contributions from the Commonwealth are recognized when received from the Commonwealth.

Loans Receivable and Interest Receivable, Net

Loans receivable, net, consists of loans issued by the Center to facilitate research, development, manufacturing and commercialization in life sciences by early stage companies. The loans have repayment terms of the earlier of 5 years or a qualified financing greater than \$5,000,000. The stated interest rate on each loan is 10% compounded annually.

As of June 30, 2013, \$17,191,500 of loans receivable has been authorized and \$13,207,000 has been disbursed. During fiscal year 2013, the Center funded \$4,825,000 million in new loans and two borrowers repaid their loans in full with a combined repayment of principal of \$1,125,000. Due to the nature of the loans made under this program, reserves are established at the time the loans are granted at a rate commensurate with management's estimate of historic loan loss. On a periodic basis, the Center assesses the collectability of each loan and records adjustments to those reserves based on an assessment of the financial condition of the borrower and loan performance. As of June 30, 2013, \$8,732,000 of loans receivable are outstanding and \$4,566,000 has been reserved for losses, resulting in net loans receivable of \$4,166,000. In June of 2013, the Center wrote off a loan receivable in the amount of \$750,000. This loan was fully reserved in fiscal year 2013. The Center had no write-offs or recoveries in fiscal year 2012.

As of June 30, 2013, the gross interest receivable balance was \$1,374,167. On a periodic basis, the Center assesses the collectability of the interest receivable and establishes a loss reserve in a manner consistent with loss reserves for loans receivable. As of June 30, 2013, \$779,984 has been reserved resulting in net interest receivable of \$594,183. Interest is due at the end of the loan term or upon repayment of the loan due to a qualified financing of these companies of greater than \$5,000,000.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**2. SIGNIFICANT ACCOUNTING PRINCIPLES...continued**

Property and Equipment, Net

Property, equipment, and leasehold improvements are all stated at cost. Depreciation is recorded over the estimated useful lives of the assets by the straight line method. Expenditures for maintenance and repairs are charged to expense as incurred. Depreciation expense totaled \$20,228 and \$73,386 for the years ended June 30, 2013 and 2012, respectively. Estimated useful lives used for computing depreciation on property, equipment and leasehold improvements are as follows:

Computer equipment and software	3 years
Office equipment	3 years
Office furniture	3 years
Leasehold improvements	Shorter of the remaining Term of lease or asset life

Grant Expense and Grants Payable

Grant expenses represent the current period cost of qualifying grant expenditures pursuant to the terms of each grant program. The Center had grant expense of \$58,294,078 and \$50,265,235 for fiscal year 2013 and 2012, respectively. As of June 30, 2013 and 2012, \$31,118,651 and \$20,466,488, respectively, was recorded as grants payable and accrued grant expense, representing grant expense incurred but not yet paid.

Income Taxes

Pursuant to Massachusetts General Laws chapter 231 §6(a), the operations of the Center constitute the performance of an essential government function and are therefore exempt from taxation by and within the Commonwealth.

Defined Contribution Plan

All employees of the Center participate in either the Commonwealth of Massachusetts State Retirement systems or the statutorily prescribed optional defined contribution plan provided by the Center. The Center makes no contributions for employees participating in the Commonwealth of Massachusetts State Retirement systems' pension plan. In fiscal year 2010, as provided by the 2008 Statute, the Center established the optional defined contribution plan. The Center annually contributes an amount equal to 12% (5% statutorily mandated) of an employee's annual gross salary less the cost of life and disability insurance. Total optional defined contribution expense by the Center for the years ended June 30, 2013 and 2012 was \$105,347 and \$94,715, respectively. Vesting is immediate upon contribution. The Center pays administrative expenses of the Plan for the plan participants and ING is the custodian of the plan's assets. The balances of the plan are not included in the financial statements of the Center.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**2. SIGNIFICANT ACCOUNTING PRINCIPLES...continued**

Related Party- Massachusetts Neuroscience Consortium

In June 2012, the Center announced the formation of a separate initiative, the Massachusetts Neuroscience Consortium (the "Consortium"), a collaboration between seven global pharmaceutical companies. The Consortium will fund pre-clinical neuroscience at Massachusetts academic and research institutions. Each Consortium member has agreed to contribute \$250,000 to the Consortium for the first year membership contribution. The Center is not a member of the Consortium and makes no financial contribution to the Consortium. The financial burden and administrative control does not reside with the Center. The designated members of the Consortium are responsible for all decisions regarding disbursement of funds. The Center acts solely as a custodian of the Consortium funds which are segregated in a separate bank account, the Center does not receive any fees for custodial services provided. In fiscal year 2013, the Consortium received \$1,750,000 plus interest from membership contributions to date held within the segregated bank account of the Center. The balances of the Consortium are included in the financial statements of the Center as of June 30, 2013. If the Consortium was to terminate, all remaining funds would be due back to the contributing members on a pro-rata basis.

Budgets and Appropriations

Annual operating budgets are developed on a basis consistent with GAAP. The Center's annual operating budgets are developed through an internal process and reviewed and modified as appropriate by the Center's executive management. The annual operating budget is presented to the Center's Board of Directors for final approval and adoption. The budget approved by the Board is used for purposes of management accountability. The budget passed by the Board is not, however, considered a legally adopted budget and, therefore, is not presented as required, supplemental information to the financial statements.

Recent Accounting Pronouncements

During the year ended June 30, 2013, the Center adopted GASB No. 63 – *Financial Reporting of Deferred Outflows of Resources, Deferring Inflows of Resources, and Net Position*. GASB No. 63 improves financial reporting by standardizing the presentation of deferred outflows of resources and deferred inflows of resources and their effects on the entities net position. The adoption of this standard did not have a significant impact on the Center's financial statements.

In March 2012, the GASB issued GASB No. 65 – *Items Previously Reported as Assets and Liabilities*. GASB No. 65 provides clarification regarding the classification of deferred inflows and outflows of resources. The topics discussed in the standard are refunding of debt, nonexchange transactions, sales of future revenues, debt issuance costs, leases, acquisition of insurance costs, lending activities, mortgage banking, regulated activities, governmental fund revenue recognition and deferred revenue, major fund criteria and other items. For the Center, the amendments in GASB No. 65 are effective beginning with the periods beginning after December 15, 2012. Early adoption of the standard is permitted. The Center is currently evaluating the impact of adoption of the standard will have on its financial statements.

**Massachusetts Life Sciences Center**  
(A Component Unit of the Commonwealth of Massachusetts)  
Notes to Financial Statements  
Years Ended June 30, 2013 and 2012

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**2. SIGNIFICANT ACCOUNTING PRINCIPLES...continued**

Recent Accounting Pronouncements...continued

In March 2012, the GASB issued GASB No. 66 – *Technical Correction – 2012* GASB No. 66 clarifies implementation issues that were presented in GASB No. 62 – *Codification of Accounting and Financial Reporting Guidance Contained in Pre-November 30, 1989 FASB and AICPA Pronouncements*. The standard provides clarification that the purchase price of loans is to include the amount paid to the seller plus any fees paid, less any fees, received. For the Center, the amendments in GASB No. 66 are effective beginning with the periods beginning after December 15, 2012. Early adoption of the standard is permitted. The Center is currently evaluating the impact of adoption of the standard will have on its financial statements.

In June 2012, the GASB issued GASB No. 67 – *Financial Reporting for Pension Plans*. GASB No. 67 replaces requirements of GASB Statements No. 25 and No. 50, related to pension plans administered through trusts or similar arrangements. The standard uses existing framework for financial reports of defined benefit pension plans, including a statement of fiduciary net position and a statement of changes in fiduciary net position. The standard enhances note disclosures and required supplementary information for both defined benefit and defined contribution pension plans. In addition, the standard requires the presentation of information about annual money-weighted rates of return in the notes and in 10-year required supplementary information schedules. For the Center, the amendments in GASB No. 67 are effective beginning with the fiscal year beginning after June 15, 2013. Early adoption of the standard is permitted. The Center is currently evaluating the impact of adoption of the standard will have on its financial statements.

In June 2012, the GASB issued GASB No. 68 – *Accounting and Financial Reporting for Pensions*. GASB No. 68 replaces requirements of GASB Statements No. 27 and No. 50, related to pension plans administered through trusts or similar arrangements. The standard requires governments providing defined benefit pensions to recognize their long-term obligation for pension benefits as a liability, and to more comprehensively and comparably measure the annual costs of pension benefits. In addition, the standard adds revised and new note disclosures and required supplementary information. For the Center, the amendments in GASB No. 68 are effective beginning with the fiscal year beginning after June 15, 2014. Early adoption of the standard is permitted. The Center is currently evaluating the impact of adoption of the standard will have on its financial statements.

In January 2013, the GASB issued GASB No. 69 – *Government Combinations and Disposals of Government Obligations*. The standard establishes accounting and financial reporting standards related to government combinations and disposals of government operations. The term government combinations include a variety of transactions referred to as mergers, acquisitions, and transfers of operations. GASB No. 69 is effective for government combinations and disposals of government operations occurring in financial reporting periods beginning after December 15, 2013, and should be applied on a prospective basis. Earlier application is encouraged. This standard is not expected to have a significant impact on the Center's financial statements.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**2. SIGNIFICANT ACCOUNTING PRINCIPLES...continued**

Recent Accounting Pronouncements...continued

In April 2013, the GASB issued GASB No. 70 – *Accounting and Financial Reporting for Nonexchange Financial Guarantees*. The standard requires a government that extends a nonexchange financial guarantee to recognize a liability when qualitative factors and historical data, if any, indicate that it is more likely than not that the government will be required to make a payment on the guarantee. It requires a government that has issued an obligation guaranteed in a nonexchange transaction to report the obligation until legally released as an obligor. It also requires a government that is required to repay a guarantor for making a payment on a guaranteed obligation or legally assuming the guaranteed obligation to continue to recognize a liability until legally released as an obligor. The provisions of this standard are effective for reporting periods beginning after June 15, 2013. Earlier application is encouraged. This standard is not expected to have a significant impact on the Center's financial statements.

**3. RELATED PARTY TRANSACTIONS**

Certain of the Center's Board of Director's members have relationships with institutions that have received grants from the Center. Absent any statutory exemptions to the conflict of interest law, in circumstances where approval of such votes would create a conflict of interest, the Center's Board members are required to recuse themselves.

**4. CASH AND CASH EQUIVALENTS**

The Board of the Center is empowered under Chapter 23I of the MGL, which shall have all powers necessary or convenient to carry out and effectuate its purposes, including, without limiting the generality of the foregoing, the powers: to invest any funds held in reserves or sinking funds, or the Massachusetts Life Sciences Investment Fund, or any funds not required for immediate disbursement, in such investments as may be provided in any financing document relating to the use of such funds, or, if not so provided, as the board may determine. During fiscal year 2013 and 2012, these assets were majority allocated to short-term investments/money market accounts which qualify as cash equivalents and are carried at amortized cost.

Custodial Credit Risk - Deposits

Custodial credit risk for deposits exists when, in the event of failure of a depository financial institution, the Center's deposits may not be recovered. The Center does not have a policy for custodial risk. At June 30, 2013, bank deposits were \$6,014,068 which excludes the amount held in the Massachusetts Municipal Depository Trust ("MMDT" or the "Trust"). The Center invests some of its funds in the MMDT, an investment pool for political subdivisions of the Commonwealth designed as a legal means to invest temporarily available cash. The state treasurer serves as trustee of MMDT, and has sole authority pertaining to rules, regulations and operations of the Trust. A participant's holdings in the Trust are not subject to creditors of the Commonwealth, nor will the Trust itself be affected by the financial difficulties of any participant. Amounts held at MMDT are uninsured and uncollateralized. At June 30, 2013 The Center's deposits with MMDT totaled \$26,657,243. A copy of the financial statements of MMDT can be obtained from the Office of the State Treasurer, 1 Ashburton Place, Boston, MA 02110.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

**4. CASH AND CASH EQUIVALENTS...continued**

Custodial Credit Risk – Deposits...continued

The following summarizes the cash and cash equivalents of the Center and identifies certain types of investment risk as defined by GASB Statement No. 40, *Deposit and Investment Risk Disclosures*, at June 30, 2013 and 2012.

	<u>2013</u>	<u>2012</u>
Cash deposits	\$ 6,014,068	\$ 2,913,399
Massachusetts Municipal Depository Trust ("MMDT") Cash Portfolio	<u>26,657,243</u>	<u>24,600,037</u>
	<u>\$ 32,671,311</u>	<u>\$ 27,513,436</u>

**5. PROPERTY AND EQUIPMENT, NET**

Property and equipment, net, at June 30, 2013 and 2012 consisted of the following:

	<u>2013</u>	<u>2012</u>
Computer equipment	\$ 101,603	\$ 96,803
Office furniture	136,853	133,561
Leasehold improvements	<u>86,828</u>	<u>73,459</u>
	325,284	303,823
Accumulated depreciation	<u>(292,368)</u>	<u>(272,140)</u>
Property and equipment, net	<u>\$ 32,916</u>	<u>\$ 31,683</u>

**6. ACCOUNTS PAYABLE AND ACCRUED EXPENSES**

As of June 30, 2013 and 2012, accounts payable and accrued expenses totaled \$287,050 and \$201,371, respectively. Those expenses primarily accounted for accrued salary, professional and consulting fees and marketing expenses.

**7. GRANTS AND COMMITMENTS**

Investment Fund

The following grants were made out of the Massachusetts Life Sciences Investment Fund (the "Investment Fund"):

In October 2007, the Board of Directors voted to approve two grants for the University of Massachusetts Medical School: 1) \$570,000 for funding for a stem cell registry; and 2) \$7,665,000 for a stem cell bank. In June 2009, the Board of Directors voted to approve an additional \$695,000 for the stem cell registry. In September 2010, the Board of Directors voted to approve an additional \$440,000 for the stem cell registry. In January and May 2012, the Board of Directors voted to approve an additional \$950,000 for the stem cell bank. In May 2013, the Board of Directors voted to approve an additional \$270,000 for the stem cell registry. For the year ended June 30, 2013, the Center expensed \$536,098 of which \$116,725 was not paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. For the year ended June 30, 2012, the Center expensed \$994,149. Remaining commitments under the authorized grants are \$310,244 as of June 30, 2013.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**7. GRANTS AND COMMITMENTS...continued**

Investment Fund...continued

In July 2008, the Board of Directors voted to approve \$6,918,378 in funding for two research matching grant programs to attract top scientific talent, spur new research opportunities and increase industry-sponsored research. Specifically, the Board of Directors awarded five new faculty grants totaling \$3,750,000 to various Massachusetts universities. The Board of Directors also awarded eleven new investigator grants totaling \$3,168,378 to a variety of research centers. For the year ended June 30, 2013, the Center expensed \$403,813 of which \$353,084 was not paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. For the year ended June 30, 2012, the Center expensed \$1,558,045. Remaining commitments under the authorized grants are \$979,809 as of June 30, 2013.

In December 2008, the Board of Directors voted to approve \$3,786,867 for six cooperative research grants over a three-year period to foster collaborations between scientists, academic institutions and industry. In fiscal year 2012, one of the awards was mutually terminated due to a change in focus by the industry sponsor. The amount remaining on the terminated grant was \$658,779. For the years ended June 30, 2013 and 2012, the Center expensed \$ 30,413 and \$1,061,638, respectively. As of June 30, 2013, \$231,870 was not paid and is included in grants payable and accrued grant expense on the statement of net position. Remaining commitments under the authorized grants are \$231,922 as of June 30, 2013.

In April 2011, the Board of Directors voted to approve \$1,000,000 for two cooperative research grants. For the year ended June 30, 2013, the Center expensed \$293,658, of which \$272,317 was not paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. For the year ended June 30, 2012, the Center expensed \$127,897. Remaining commitments under the grants are \$850,763 as of June 30, 2013.

In June 2013, the Board of Directors voted to approve \$2,000,000 for four cooperative research grants. No expenses have been incurred on the grants as of June 30, 2013. Remaining commitments under the authorized grants are \$2,000,000 as of June 30, 2013.

In December 2012, the Board of Directors authorized \$3,200,000 for the 2013 Internship Challenge Program, which is a year round program. For the year ended June 30, 2013, the Center expensed \$918,696, all of which was not paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. Remaining payments under the authorized program are \$3,200,000. In December 2011 and June 2012, the Board of Directors authorized \$3,200,000 for the 2012 Internship Challenge Program which was also a year round program. For the 2012 program, the Center expensed \$1,573,275 in fiscal year 2013, of which \$150,297 was not paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. For the year ended June 30, 2012, the Center expensed \$949,876 under the 2012 program. Remaining payments under the authorized program are \$150,297. In the winter and spring of 2011, the Board of Directors authorized up to \$2,200,000 for the expenditures for the 2011 Internship Challenge Program. For the 2011 program \$1,327,048 was expensed in the fiscal year 2012. There are no remaining commitments under the authorized program.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**7. GRANTS AND COMMITMENTS...continued**

Investment Fund...continued

In June 2009, the Board of Directors voted to approve \$1,380,256 for seven new investigator grants to various research centers. For the year ended June 30, 2013, the Center expensed \$50,967, of which \$41,203 was not paid as of June 30, 2013 and is included in grants payable and accrued grant expenses on the statement of net position. For the year ended June 30, 2012, the Center expensed \$210,597. Remaining commitments as of June 30, 2013 under the authorized program are \$ 41,203.

In July 2009, the Board of Directors voted to approve \$600,000 for three new investigator matching grants. For the year ended June 30, 2013, the Center expensed \$3,921, of which \$14,044 was not paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. For the year ended June 30, 2012, the Center expensed \$144,606. Remaining commitments as of June 30, 2013 under the authorized program are \$ 14,044.

Other Grants

The Center has made grants to various business plan competitions, workforce development and educational programs to foster company development and collaboration between Massachusetts and international organizations and expand life sciences education and workforce within the Commonwealth. For the fiscal years ended June 30, 2013 and June 30, 2012 the Center had \$983,970 of active discretionary grants. In fiscal year 2013 the Center expensed \$278,919 of which \$89,444 was unpaid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position as of June 30, 2013. For the year ended June 30, 2012, the Center expensed \$354,586. Remaining commitments under the authorized grants are \$397,188 as of June 30, 2013.

In May of 2012, the Center made one award of \$300,000 to the Massachusetts Eye and Ear Infirmary under the Northern Ireland Massachusetts Connection Program, which has a goal of creating biotech research and business collaborations between Massachusetts, Northern Ireland and Europe. In fiscal year 2013, the Center made two awards totaling \$450,170 under the Center's Massachusetts Israeli Innovation Partnership Program to foster international collaboration on early-stage life sciences projects. For the year ended June 30, 2012, the Center made two awards under the program totaling \$300,000, one of which will not be funded due to the awardee's inability to comply with requirements of the program. For the year ended June 30, 2013 the Center expensed \$270,000 related to these international programs, of which \$146,849 was unpaid and is included in grants payable and accrued grant expense on the statement of net position as of June 30, 2013. For the year ended June 30, 2012, the Center had no expenses under international programs. Remaining commitments under the authorized grants are \$811,019 as of June 30, 2013.

In fiscal year 2012, the Center made an additional \$50,000 grant to the Massachusetts Life Sciences Collaborative to launch and develop a formal Massachusetts Biomanufacturing Roundtable to support and promote the retention and growth of biomanufacturing in Massachusetts. The total amount of awards provided to the Massachusetts Biomanufacturing Roundtable is \$100,000. For the year ended June 30, 2013, the Center expensed \$1,451 of which all was paid as of June 30, 2013. For the year ended June 30, 2012 the Center expensed \$36,792. Remaining commitments under the authorized grant are \$11,757 as of June 30, 2013.

Total remaining commitments for all Investment Fund grants as of June 30, 2013 are \$8,998,246

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**7. GRANTS AND COMMITMENTS...continued**

Capital Program Grants

The following grants were made under the Capital Program:

In October 2008, the Board of Directors voted to approve \$5,200,000 for the replacement of a wastewater pump station that will help support the expansion of Genzyme Corporation's manufacturing facility in Framingham, Massachusetts. This grant is the first installment of approximately \$12,900,000 that has been allocated to the Framingham project in connection with the Life Sciences Statute. In October 2009, the Board of Directors voted to approve the second installment of \$7,700,000 for the \$12,900,000 grant. In May 2011, the Board of Directors voted to approve an additional \$1,400,000 for the town of Framingham. The project was completed in fiscal year 2012 at a total cost of \$12,860,534. For the year ended June 30, 2013, the Center had no expense. For the year ended June 30, 2012, the Center expensed \$4,328,321. There are no remaining commitments as of June 30, 2013 under the authorized grant.

In September 2009, the Board of Directors voted to approve \$90,000,000 for the design, construction, development and related infrastructure improvements for an advanced therapeutics cluster to be constructed at the University of Massachusetts Medical School in Worcester. The payments are to be paid over four fiscal years beginning in fiscal year 2010 and concluding in fiscal year 2013. For the year ended June 30, 2013, the Center expensed \$16,635,747, of which all was paid as of June 30, 2013. For the year ended June 30, 2012, the Center expensed \$34,196,102. There are no remaining commitments as of June 30, 2013 under the authorized grant.

In February 2010, the Board of Directors voted to approve \$6,600,000 towards the next phase of development of Gateway Park in Worcester. The grant was subsequently reduced to \$5,150,000 due to a reconfiguration of the project. The grant supports the development of WPI's Biomanufacturing Education and Training Center ("BETC") and a new incubator for Massachusetts Biomedical Initiatives ("MBI"). For the year ended June 30, 2013, the Center expensed \$2,210,768, of which \$1,409,650 was not paid as of June 30, 2013 and is included in grants payable and accrued grants expense on the statement of net position. For the year ended June 30, 2012, the Center expensed \$2,447,395. Remaining commitments under the grant are \$1,523,951 as of June 30, 2013.

In January 2011, the Board of Directors voted to approve \$2,000,000 for the purchase of state-of-the-art equipment, renovations and related expenses to support the Center for Personalized Cancer Therapy at the University of Massachusetts at Boston and the Dana-Farber/Harvard Cancer Center. For the year ended June 30, 2013, the Center expensed \$232,910, of which none was paid as of June 30, 2013 and is included in grants payable and accrued grant expenses on the statement of net position. For the year ended June 30, 2012, the Center did not incur any expense or make any payments under the grant. Remaining commitments under the grant are \$2,000,000 as of June 30, 2013.

In February 2011, the Board of Directors voted to approve \$3,466,158 for thirty-two equipment grants for purposes of providing grants for purchasing or leasing equipment to train students in life sciences technology and research. For the year ended June 30, 2013, the Center incurred no expense under the program. For the year ended June 30, 2012, the Center expensed \$482,780 under the program. There are no remaining commitments as of June 30, 2013 under the authorized grant.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**7. GRANTS AND COMMITMENTS...continued**

Capital Program Grants...continued

In January 2012, the Board of Directors voted to approve \$14,600,000 for the construction of the Bio-Manufacturing Center at the University of Massachusetts at Dartmouth to enable companies to set up small scale manufacturing operations for bio-processing operations. In December 2012, the Board of Directors voted to approve an additional \$6,000,000 for Bio-Manufacturing Center. For the year ended June 30, 2013 the Center expensed \$13,813,460, of which \$11,769,727 has not been paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. For the year ended June 30, 2012 the Center expensed \$971,003. Remaining commitments under the grant are \$17,585,264 as of June 30, 2013.

In January 2012, the Board of Directors voted to approve \$20,000,000 to three awardees under the Center's FY12 Capital Project Matching Grant Program. These grants will be used to fund the Molecular Cancer Imaging Facility at the Dana Farber Cancer Institute which systematically examines patient tumors and matches targeted therapy to specific molecular changes in cancer cells; the Transitional Center for the Cure of Diabetes at the Joslin Diabetes Center, which focuses on the acceleration of basic discoveries into clinical research and care; and the Hall of Human Life Exhibit at the Museum of Science Boston, allowing the public a view into the innovative work being carried out in the life sciences community and inspire the next generation of researchers. For the year ended June 30, 2013 the Center expensed \$11,880,054, of which \$6,411,676 was not paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. For the year ended June 30, 2012 the Center expensed \$574,400. Remaining commitments under the grants are \$13,957,222 as of June 30, 2013.

In April 2012, the Board of Directors voted to approve \$10,000,000 to construct and equip Nanomedicine and Nanobiomedical laboratories within the Emerging Technologies and Innovation Center at the University of Massachusetts at Lowell to be utilized for hands-on student learning, research, development and industry partnership activities. For the year ended June 30, 2013, the Center expensed \$4,549,910, of which none was paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. For the year ended June 30, 2012, the Center did not incur any expense or make any payments under the grant. Remaining commitments under the grant are \$10,000,000 as of June 30, 2013.

In April 2012, the Board of Directors voted to approve \$11,400,000 for the benefit of the University of Massachusetts at Dartmouth for the acquisition of land, improvements and related parking for the Advance Technology Manufacturing Center in Fall River from the Massachusetts Development Finance Authority in fiscal year 2015, pursuant to the Life Sciences Act. For the years ended June 30, 2013 and 2012, the Center did not incur any expense or make any payments under the grant. Remaining commitments under the grant are \$11,400,000 as of June 30, 2013.

In May 2012, the Center's Board of Director awarded \$500,000 in a Small Business Matching grant to one life sciences company in Massachusetts. To qualify for the program, companies must have received a Phase II or Post Phase II small business innovation research ("SBIR") or small business technology transfer ("STTR") grant from federal agencies such as the National Institutes of Health ("NIH"), National Science Foundation ("NSF"), or Department of Defense ("DOD"). The Center did not offer the program in fiscal year 2013. The Center did recover \$39,991 from a prior awardee under the program in fiscal year 2013. For the year ended June 30, 2012 the Center expensed \$500,000. There no remaining commitments under the grant as of June 30, 2013.

# Massachusetts Life Sciences Center

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Notes to Financial Statements

Years Ended June 30, 2013 and 2012

## 7. GRANTS AND COMMITMENTS...continued

### Capital Program Grants...continued

In September 2012 and May 2013, the Board of Directors voted to approve \$95,000,000 for the construction and fit out of Life Sciences Laboratories at the University of Massachusetts in Amherst to create three unique translational science Centers for personalized health monitoring that will catalyze the precision manufacturing cluster in Western Massachusetts, protein homeostasis to reveal new drug targets for intractable diseases, and a bioactive delivery bridge that will integrate polymer, chemical, animal, food, and analytical sciences. For the year ended June 30, 2013, the Center expensed \$308,000, of which none was paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. Remaining commitments under the grant are \$95,000,000 as of June 30, 2013.

In December 2012, the Board of Directors voted to approve \$3,228,203 for 31 equipment grants for purposes of providing grants for purchasing or leasing equipment to train students in life sciences technology and research. For the year ended June 30, 2013, the Center expensed \$1,610,527, of which \$1,370,767 was not paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. Remaining commitments under the grant are \$2,988,443 as of June 30, 2013.

In January 2013, the Board of Directors voted to approve \$27,684,761 to 7 awardees under the Center's FY13 Capital Project Matching Grant Program. These grants will be used to fund a variety of projects supporting the life sciences in the Commonwealth. The Board of Directors also voted to approve \$910,000 to 7 awardees for planning grants related to future capital projects. For the year ended June 30, 2013 the Center expensed \$2,731,482, of which none was paid as of June 30, 2013 and is included in grants payable and accrued grant expense on the statement of net position. Remaining commitments under the grants are \$28,594,761 as of June 30, 2013.

In May 2013, the Board of Directors voted to approve \$5,500,000 to Baystate Medical Center in Springfield for the creation of the Baystate Healthcare Informatics & Technology Innovation Center to incubate and accelerate healthcare technology start-ups and big vendor solutions reliant on validations against near real-time Big Data and an integrated delivery system environment. For the year ended June 30, 2013 the Center had no expense under the grant. Remaining commitments under the grant are \$5,500,000 as of June 30, 2013.

In June 2013, the Board of Directors voted to approve \$55,000 for a planning grant towards the design, construction and development for a life science incubator building at the William Stanley Business Park in the City of Pittsfield. This grant is the first installment of approximately \$6,500,000 that has been allocated to the Pittsfield project in connection with the Life Sciences Statute. For the year ended June 30, 2013 the Center did not incur any expense or make any payments under the grant. Remaining commitments under the grants are \$55,000 as of June 30, 2013.

Total remaining commitments for all capital program grants as of June 30, 2013 are \$188,604,641, which is contingent upon the Commonwealth fulfilling their funding obligations to the Center.

**Massachusetts Life Sciences Center**  
 (A Component Unit of the Commonwealth of Massachusetts)  
 Notes to Financial Statements  
 Years Ended June 30, 2013 and 2012

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**7. GRANTS AND COMMITMENTS...continued**

Facility Lease

In December 2008, the Center entered into a 5 year noncancelable operating lease through March 2014 for its facilities in Waltham, Massachusetts. In June 2013, the Center renewed its lease with expansion space to be occupied in October 2013. The renewed lease is through March 2019. The original lease agreement provides for certain months of nonpayment of rent ("free rent") and includes escalating rent payments. Rent expense is recorded on the straight line basis, and therefore, as of June 30, 2013 and 2012, deferred rent in the amount of \$21,078 and \$44,791, respectively, has been recorded. Rent expense under the operating lease was \$159,743 for the year ended June 30, 2013 and \$159,256 for the year ended June 30, 2012.

Future minimum lease payments under all operating lease agreements are approximately:

2014	\$ 240,000
2015	263,000
2016	263,000
2017	263,000
2018	263,000
Thereafter	<u>197,000</u>
	<u>\$ 1,489,000</u>

**8. SUBSEQUENT EVENTS**

Management has evaluated subsequent events through September 23, 2013.

In July 2013, the Center disbursed \$984,500 to one of the December 2012 Accelerator loan program awardees.

## **MLSC Capital Grant Awards in FY'13**

### **Applicant Organization**

Bay Path College  
Baystate Medical Center  
Bunker Hill Community College  
Children's Hospital  
City of Pittsfield Massachusetts  
Harvard University  
Holyoke Community College  
LabCentral  
MA Green High Performance Center  
Middlesex Community College  
Northern Essex Community College  
Quincy College  
Quinsigamond Community College  
Regis College  
Springfield Technical Community College  
The Forsyth Institute  
University of Massachusetts Amherst  
University of Massachusetts Amherst  
University of Massachusetts Dartmouth - MAB

## **MLSC High School Equipment and Supplies Grants in FY 2013**

### **School/Organization**

Assabet Valley Regional Technical High School  
Blackstone Valley Regional Vocational Technical High School  
Blue Hills Technical School District  
Bristol-Plymouth Regional Technical School District  
Cape Cod Regional Technical High School  
Fall River Public Schools (Durfee High School)  
Greater Lowell Regional Vocational Technical High School  
Haverhill High School  
Holyoke Public Schools (Dean Tech & Holyoke High School)  
Lynn English High School  
Massachusetts Biotechnology Education Foundation  
Minuteman Regional Vocational Technical School District  
Montachusett Regional Vocational Technical School District  
Nashoba Valley Technical High School  
Norfolk County Agricultural High School  
North Shore Technical High School  
Northeast Metropolitan Vocational School District  
Quaboag Regional Middle High School  
Quincy High School  
Revere High School  
Rindge School of Technical Arts  
Roger L. Putnam Vocational Technical Academy  
Shawsheen Valley Regional Vocational School District

Smith Vocational and Agricultural High School  
South Shore Vocational Technical High School  
Taconic High School  
Taunton Public Schools  
The BioBuilder Educational Foundation  
Westfield Public Schools  
Worcester North High School  
Worcester Technical High School

#### **MLSC STEM Grants in FY'13**

Boston Children's Museum  
Freedom House  
Girl Scouts of Eastern Massachusetts  
Mass Technology Leadership Council  
Science Club for Girls  
Youth Creating Impact Through Innovation, Entrepreneurship and Sustainability  
Massachusetts Computing Attainment Network

#### **MLSC Accelerator Loans in FY'13**

##### **Applicant**

Immunexcite, Inc.  
MedicaMetrix, Inc.  
Cytrellis Biosystems, Inc. \*\*\*\* award cancelled  
Lumicell Diagnostics, Inc.  
Arch Therapeutics  
Bio2 Technologies

#### **MLSC Cooperative Research Matching Grants in FY'13**

##### **Applicant Organization**

Boston University Medical Center  
Brigham and Women's Hospital  
Children's Hospital Boston  
Massachusetts General Hospital

#### **MLSC Tax Incentive Awards FY'13**

##### **Applicant Organization**

Aegerion Pharmaceuticals, Inc.  
ARIAD Pharmaceuticals, Inc.  
Biogen Idec MA, Inc.  
Bluebird bio, Inc.  
Blueprint Medicines Corp  
Boston Heart Diagnostics Corporation  
Bruker Corporation  
DePuyOrthopaedics, Inc.  
Enzymatics, Inc.  
Epizyme, Inc.  
Foundation Medicine, Inc.

Instrumentation Laboratory Company  
inviCRO, LLC  
Merrimack Pharmaceuticals, Inc.  
Moderna Therapeutics, Inc.  
NinePoint Medical, Inc.  
Nova Biomedical Corporation  
Pall Corporation  
PAREXEL International Corporation  
PerkinElmer, Inc.  
Quest Diagnostic LLC  
Quintiles Transnational Holdings, Inc.  
Shire Human Genetic Therapies, Inc.  
Synageva BioPharma Corp

#### **MLSC MIIP Awards FY'13**

##### **Applicant Organization**

Bio-Tree  
Cytonome S/T

#### **MLSC Neuroscience Consortium\***

##### **Institution Awardee**

Boston University School of Medicine  
Massachusetts General Hospital  
Boston University School of Medicine  
Brigham and Women's Hospital  
Boston Children's Hospital  
Harvard Medical School - Boston Children's Hospital  
Massachusetts Institute of Technology

\*The MLSC does not provide funding for this program. All funding is provided by private donors.

\*\* Funding is determined on achievement of project milestones.

City	Program	Year	Amount Awarded
Longmeadow	Capital	2013	\$50,000.00
Springfield	Capital	2013	\$5,500,000.00
Boston	Capital	2013	\$200,000.00
Boston	Capital	2013	\$4,014,031.00
Pittsfield	Capital	2013	\$55,000.00
Cambridge	Capital	2013	\$5,000,000.00
Holyoke	Capital	2013	\$3,800,000.00
Cambridge	Capital	2013	\$4,955,515.00
Holyoke	Capital	2013	\$4,540,000.00
Lowell	Capital	2013	\$50,000.00
Haverhill	Capital	2013	\$1,242,000.00
Quincy	Capital	2013	\$100,000.00
Worcester	Capital	2013	\$310,000.00
Weston	Capital	2013	\$50,000.00
Springfield	Capital	2013	\$150,000.00
Cambridge	Capital	2013	\$4,133,215.00
Amherst	Capital	2013	\$94,692,000.00
Amherst	Capital	2013	\$308,000.00
Dartmouth	Capital	2013	\$6,000,000.00

City/Town	Program	Year	Award Amount
Marlborough	Equipment	2013	\$90,284.00
Upton	Equipment	2013	\$99,984.00
Canton	Equipment	2013	\$100,000.00
Taunton	Equipment	2013	\$99,940.20
Harwich	Equipment	2013	\$77,738.02
Fall River	Equipment	2013	\$92,555.23
Tyngsboro	Equipment	2013	\$89,936.15
Haverhill	Equipment	2013	\$99,289.40
Holyoke	Equipment	2013	\$195,019.93
Lynn	Equipment	2013	\$77,419.35
Cambridge	Equipment	2013	\$249,777.00
Lexington	Equipment	2013	\$134,137.91
Fitchburg	Equipment	2013	\$248,274.76
Westford	Equipment	2013	\$96,665.20
Walpole	Equipment	2013	\$97,612.00
Middleton	Equipment	2013	\$99,999.52
Wakefield	Equipment	2013	\$71,610.00
Warren	Equipment	2013	\$7,438.65
Quincy	Equipment	2013	\$94,469.05
Revere	Equipment	2013	\$98,176.02
Cambridge	Equipment	2013	\$100,000.00
Springfield	Equipment	2013	\$100,000.00
Billerica	Equipment	2013	\$95,928.00

Northampton	Equipment	2013	\$100,000.00
Hanover	Equipment	2013	\$119,925.00
Pittsfield	Equipment	2013	\$88,028.74
Taunton	Equipment	2013	\$99,384.00
Cambridge	Equipment	2013	\$95,300.00
Westfield	Equipment	2013	\$44,333.00
Worcester	Equipment	2013	\$64,995.00
Worcester	Equipment	2013	\$99,982.82

Boston	STEM	2013	\$50,000.00
Dorchester	STEM	2013	\$10,000.00
Eastern MA Region	STEM	2013	\$30,000.00
Statewide	STEM	2013	\$50,000.00
Cambridge	STEM	2013	\$50,000.00
Statewide	STEM	2013	\$18,950.00
Statewide	STEM	2013	\$50,000.00

<b>Town</b>	<b>Program</b>	<b>Year</b>	<b>Award Amount</b>
Watertown	Accelerator	2013	\$984,500.00
Wayland	Accelerator	2013	\$1,000,000.00
Boston	Accelerator	2013	\$1,000,000.00
Wellesley	Accelerator	2013	\$1,000,000.00
Natick	Accelerator	2013	\$1,000,000.00
Woburn	Accelerator	2013	\$1,000,000.00

<b>City</b>	<b>Program</b>	<b>Year</b>	<b>Amount Awarded</b>
Boston	Cooperative Research	2013	\$500,000.00
Boston	Cooperative Research	2013	\$500,000.00
Boston	Cooperative Research	2013	\$500,000.00
Boston	Cooperative Research	2013	\$500,000.00

<b>Town</b>	<b>Program</b>	<b>Year</b>	<b>Award Amount</b>
Cambridge	Tax Incentive	2013	\$260,000.00
Cambridge	Tax Incentive	2013	\$1,225,000.00
Weston	Tax Incentive	2013	\$5,512,500.00
Cambridge	Tax Incentive	2013	\$294,000.00
Cambridge	Tax Incentive	2013	\$245,000.00
Framingham	Tax Incentive	2013	\$450,000.00
Billerica	Tax Incentive	2013	\$1,347,500.00
Raynham	Tax Incentive	2013	\$1,715,000.00
Beverly	Tax Incentive	2013	\$152,000.00
Cambridge	Tax Incentive	2013	\$416,500.00
Cambridge	Tax Incentive	2013	\$450,309.00

Bedford	Tax Incentive	2013	\$980,000.00
Boston	Tax Incentive	2013	\$60,000.00
Cambridge	Tax Incentive	2013	\$490,000.00
Cambridge	Tax Incentive	2013	\$318,500.00
Cambridge	Tax Incentive	2013	\$343,774.00
Waltham	Tax Incentive	2013	\$1,730,000.00
Westborough	Tax Incentive	2013	\$127,500.00
Billerica	Tax Incentive	2013	\$1,421,000.00
Waltham	Tax Incentive	2013	\$1,470,000.00
Cambridge	Tax Incentive	2013	\$1,225,000.00
Cambridge	Tax Incentive	2013	\$1,225,000.00
Lexington	Tax Incentive	2013	\$750,000.00
Lexington	Tax Incentive	2013	\$784,000.00

<b>Town</b>	<b>Program</b>	<b>Year</b>	<b>Amount Awarded</b>
Framingham	MIIP	2013	\$250,000
Boston	MIIP	2013	\$200,170

<b>Project Liason</b>	<b>Award Amount**</b>
Biogen Idec	\$250,000
Janssen Research & Development, LLC	\$250,000
EMD Serono	\$250,000
Sunovion Pharmaceuticals, Inc.	\$250,000
Merck	\$250,000
AbbVie	\$250,000
Pfizer	\$250,000

ite industry Consortium members.

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