

# Life Sciences Industry on the North Shore

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NORTH SHORE WORKFORCE INVESTMENT BOARD

NORTH SHORE CAREER CENTER

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## **Executive summary**

In December 2012, we initiated an effort to update the scope and needs of the life sciences industry on the North Shore region of Massachusetts. This work documented 84 companies with concentration in 3 important life sciences sub sectors, namely, Reagents, Laboratory Instruments and Medical Devices.

While the region has gained visibility through its successful industry pioneers and leaders, it has also become the home to a thriving environment for young start ups. This unique life sciences ecosystem of mature and entrepreneurial contributors provides a promising catalyst for future innovation and economic development on the North Shore.

We surveyed 35 companies and gathered valuable feedback about the workforce and critical skills needed for the industry to remain competitive and thriving. Educational demands for the workforce are high with 70% of surveyed companies requiring Bachelors degree as a minimum threshold. Skills gaps, training opportunities and other novel ideas for enhancing collaboration in the region were collected for future discussion with educators, industry participants and the community.

## **Introduction**

The North Shore Workforce Investment Board (NSWIB) is a public funded entity that supports the workforce needs of companies and individuals in the nineteen cities and towns that form the North Shore region. The NSWIB, amongst other activities, conducts labor market research to identify skills gaps and develops training programs to address these needs. In this effort, accurate and up to date information is crucial for directing the limited resources toward the areas of highest need and impact.

Prior labor force analysis identified the life sciences industry as the emerging sector for the North Shore. Pressures from regional, national and international competition to attract business and the skills demands of an industry driven by innovation, requires close attention to the business opportunity and the pool of local talent available to support it.

We conducted an in-depth analysis of the industry to assess progress since prior reporting in 2010. The following goals were established at the outset of the project:

1. Catalogue the life sciences companies on the North Shore to reflect basic information about the business. Categorize each company by industry sub sector according to previously identified framework to determine cluster strengths in this region.
2. Document the academic qualifications, general skills and practical experience needs of the work force.
3. Identify gaps in these needs and explore training concepts to help address these deficiencies.

4. Gather preliminary feedback around the concept of Bio-instrumentation Core Facilities at the local academic institutions, to support state of the art analytical needs of the industry.
5. Solicit interest and ideas to promote collaborations that enhance the visibility and contribution by participants in the industry.

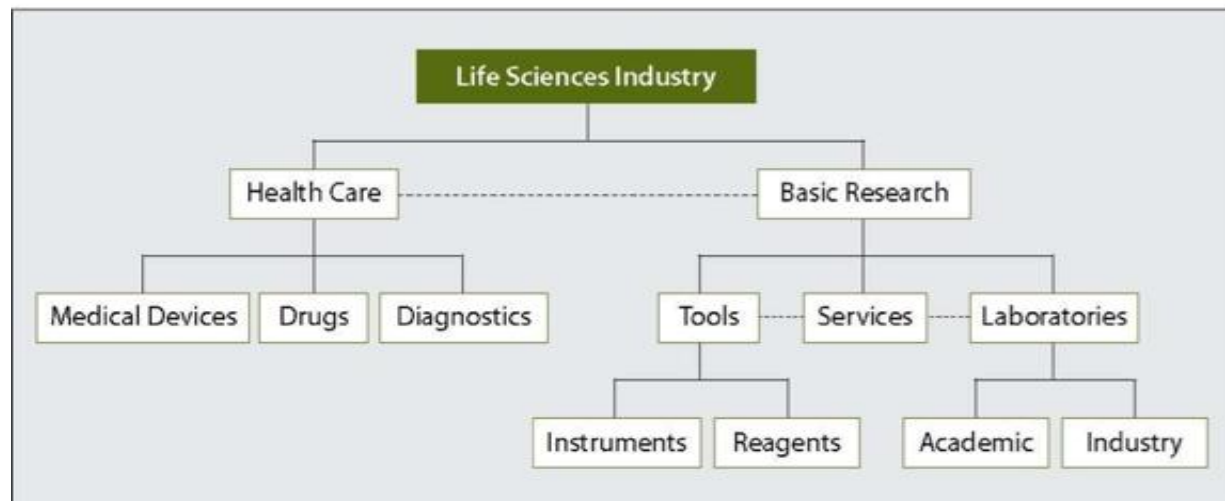
Consultants, Bruce Turner, Ph.D., Jack Leonard, Ph.D. and Susan Long, Ph.D. were hired to carry out the evaluation. These individuals have extensive industry knowledge and experience and connections to facilitate access to individual companies. The project also benefited tremendously from the support and encouragement of industry advocates, Martha Farmer, Ph.D. CEO and President NSIV and Jack Swig, NSIV In House Counsel, and from NSWIB staff, Mary Sarris and Ed O’Sullivan.

At the launch of the project in October 2012, the NSWIB provided a preliminary database of companies, developed with the assistance of local industry organizations, NSTC and NSIV. The approach for the team was to i) refine the list of companies to more accurately reflect the life sciences industry in the region and ii) schedule and conduct in person interviews with representative companies based on the finalized list. A survey tool was developed to facilitate the interview process and ensure the collection of information consistent with the goals of the project.

## Findings

**Life sciences industry on the North Shore:** The North Shore Investment Board Labor Market Blueprint (Quimby 2010) described the life sciences industry according to a framework of Healthcare related and Basic Research related sectors:

**Figure 4.1 The Life Sciences Industry on the North Shore**



North Shore WIB Labor Market Blueprint (Quimby, 2010)

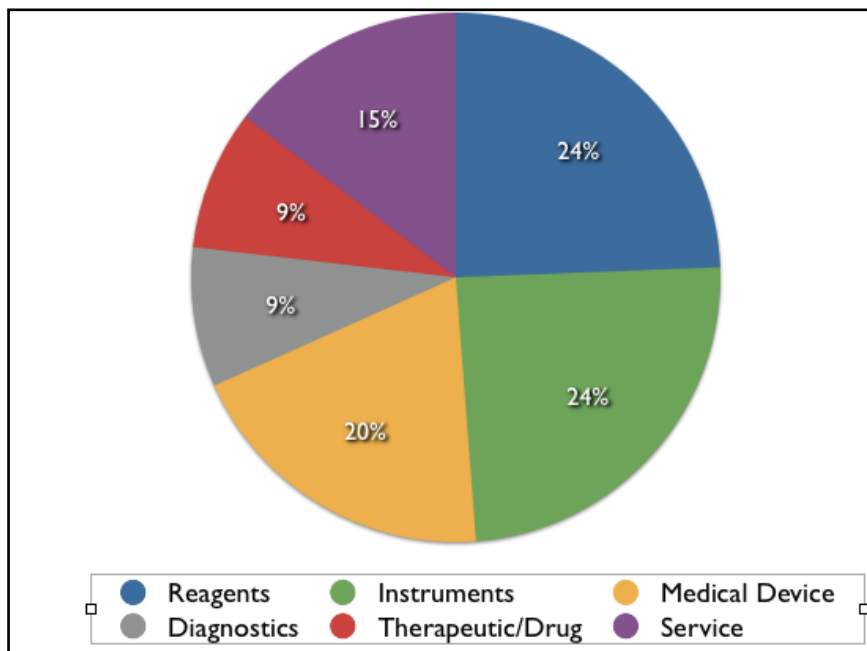
In the current research, we documented 84 life sciences companies in the North Shore region (**Appendix 1**). We recorded company turnover and other changes, as are typical in this industry. There was consolidation as a result of companies mergers and acquisitions and a few companies exited the region. However, this reduction was off set by an influx of new entrants, particularly young start up companies, who have set up operations on the North Shore. Thus,

the overall picture is encouraging as the region remains an attractive environment for the life sciences, and possibly offers advantages for “boot strapped” entrepreneurs looking for cheap space to demonstrate their technology and deliver on critical business milestones.

While 11 of 19 North Shore communities host at least one life sciences company, business parks such as in Beverly (Cummings Center), Danvers (Cherry Hill Drive), Peabody (Centennial Drive) and Salem (Shetland Park) are spawning regional life sciences clusters. Industry pioneers have helped to stimulate the emergence of these eco-systems. Such companies are Waters and Thermo Fisher (Cummings Center), Abiomed (Cherry Hill Drive), Analogic (Centennial Drive) and US Biologics (Shetland Park). It should also be noted that NSIV, the biotech incubator at the Cummings Center, has successfully recruited a pipeline of life sciences start ups, while successful NSIV graduates have largely remained in the area.

In the process of our research, we attempted to classify each of the 85 companies into industry sub-sector categories using the previously defined life sciences framework above. In doing so, we found strength in 3 sectors that together comprised over 70% participant companies (**Figure 1**). These strong sectors are 1) *Reagents* (24%), 2) *Instruments* (24%) and 3) *Medical Devices* (20%). Other represented sectors in our region are Services (15%), Diagnostics (9%) and Drugs (9%).

**Figure 1** Sector categorization of the 84 life sciences companies on the North Shore



**Results from company interviews:** We conducted 37 in person interviews with company leadership and/or Human Resource personnel at 35 companies from across the region. A standardized survey tool was used to guide the interview process and facilitate the data collection. Facts and figures in the following sections are based on the feedback from these 35 companies.

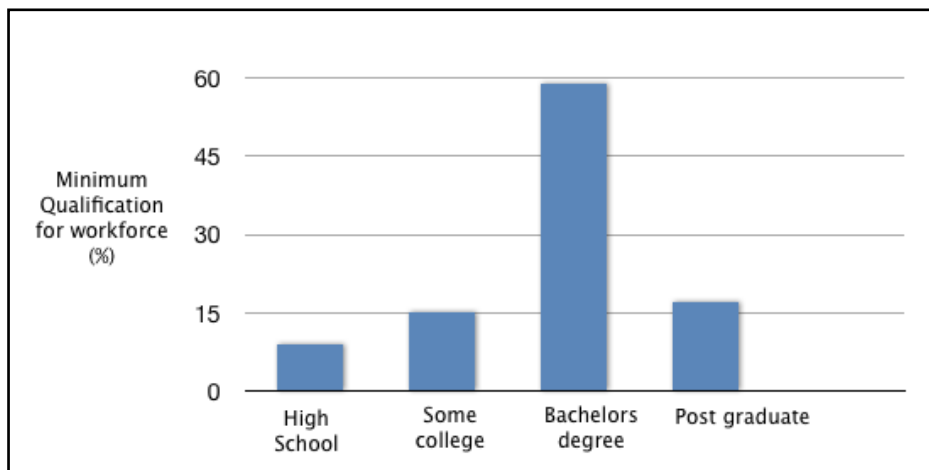
Founder or CEO residency was the predominant reason for company location on the North Shore. In this regard, the region has benefitted from noteworthy industry pioneers and leaders,

for example, AbioMed, Analogic, Cell Signaling Technologies, New England Biolabs, to name a few.

Approximately, 40% of the companies interviewed are established entities, employing 75 or more people at one or more sites across Massachusetts. The remaining 60% are business start ups, young emerging companies or regional offices, with 1 to 24 people employed at a single site on the North Shore.

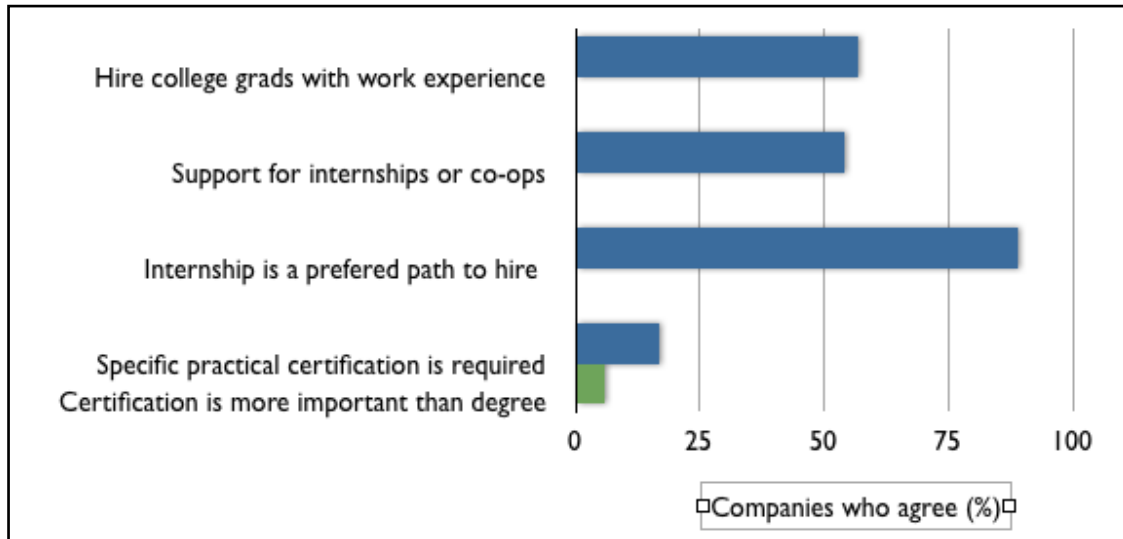
**Academic qualifications, general skills and needs:** The life sciences workforce include a range of talents and educational backgrounds. While demand is mostly for bachelors or higher degree, there is also a need for associate's level and high school graduates (**Figure 2**). The industry accommodates a broad spectrum of occupations (**Table 1**). For the technical roles, we noted skill demand differences between the scientist/researcher roles in the Reagents industries verses the engineer training (all types) required by the Instruments and Medical Devices companies.

**Figure 2** Education requirements for life sciences workers



Hands on job experience was highly valued when compared against academic training. While a handful of respondents hire graduates directly out of college, the majority expect new hires to have some prior hands on experience (**Figure 3**). There was heightened interest in supporting internships and co-ops as one way to provide this crucial industry experience to future company hires. It is important to note that over 90% of companies with internships see their interns as a preferred path to hire. Six companies stated that practical certification influenced their hiring decision. In these cases, the certification needs were in CAD/CAM, Safety and Medical Technology.

**Figure 3** Job related practical experience needs



**Table 1** Occupations at Reagent, Instrument and Medical Devices companies

	Reagents	Instruments	Medical Devices
Research Scientists	✓		
Skilled scientist/manager (applications/product/team)	✓	✓	
Laboratory Technicians	✓		✓
Manufacturing/Quality	✓	✓	✓
Technical/Customer Support	✓	✓	✓
Sales/Field Support	✓	✓	✓
Engineers (Mechanical, Electrical, Software, Quality)		✓	✓
Specialist (automation, molding)			✓
Assembler/machine operators engineering technicians			✓
Procurement/Logistics/Warehousing		✓	
Admin, Marketing, Website, etc.	✓	✓	✓

**Skills gaps and training concepts to address:** Approximately, 80% of the companies in our survey mentioned one or more industry position that was challenging to fill due to skills gaps in the talent pool. The most pressing need is for Engineers, all specialties, but especially

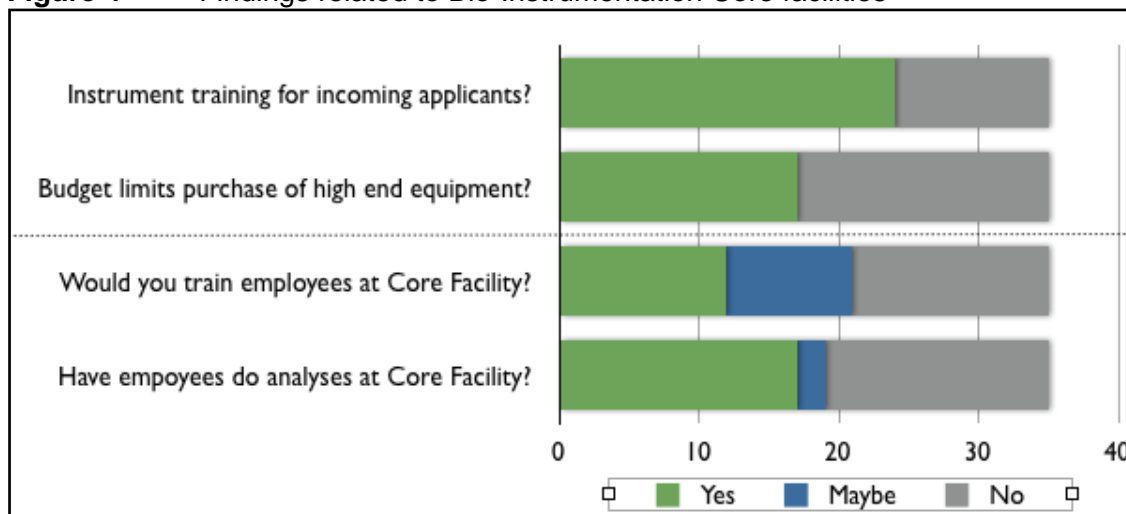
electromechanical and software engineers. Talent gaps identified for the scientist/researcher category ranged from “specialist” (e.g. areas such as Bioinformatics) to “broad generalist expert” (e.g. combination of chemistry or physics with biology). Across all industry sub sectors, there was a need for tailored technical training for sales force and other field personnel, because of the technical nature of the products and the fact that customers, in many cases, are technically inclined. Technical managers and regulatory affairs experts were also mentioned as challenging roles to fill. These skills needs are currently being explored by NSWIB in consultation with industry and local schools as the basis for future training programs.

The survey also generated suggestions about foundational competencies that are critical in this industry, namely:

- Communications skills, all forms - writing, verbal, presentation
- Complex problem solving
- Critical thinking
- Professionalism
- Basic quality procedures (documentation, document control, data management, etc.)

**Bio-instrumentation Core Facilities:** The North Shore Biotech Consortium is a newly formed collaboration that includes the four regional academic centers, Endicott College, Gordon College, Salem State University and North Shore Community College, and biotechnology incubator North Shore InnoVentures. The consortium is pursuing funding to create a distribute core facilities model that allow each institution to share ‘state of the art’ analytical instrumentation for research and training. We took advantage of our survey audience to measure enthusiasm for this model and gather feedback on specific areas of need from the local industry. While further investigation and refinement of the market research is required, preliminary results are shared here.

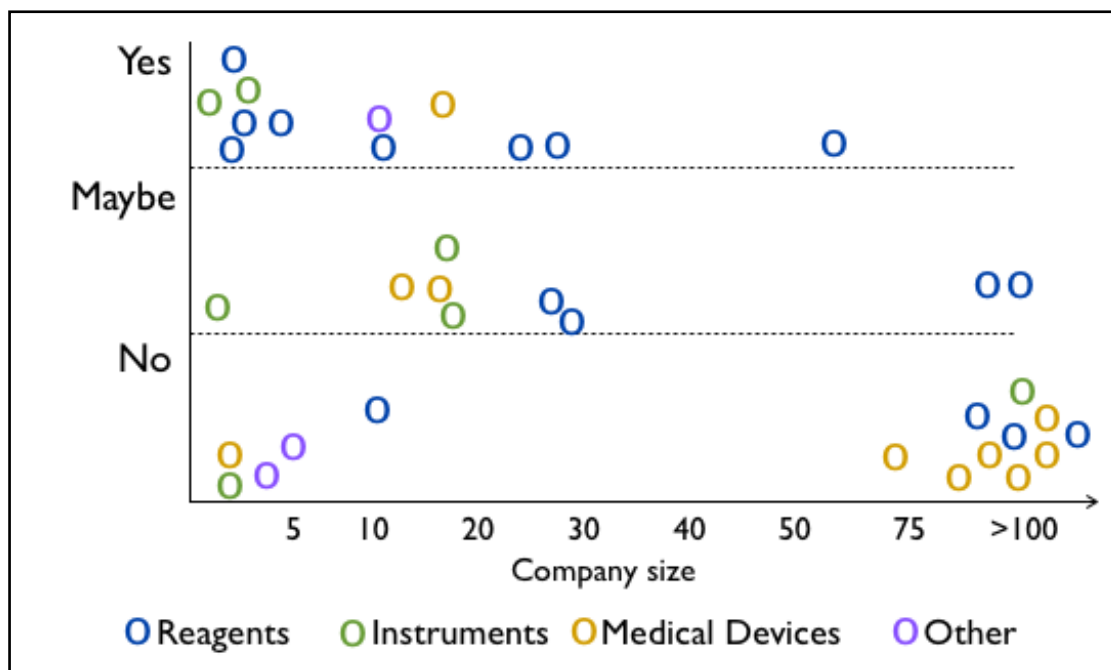
**Figure 4** Findings related to Bio-Instrumentation Core facilities



When companies were queried about their needs for trained equipment users as part of their employee teams, 24 out of the 35 companies (70%) identified such a role at their company. In addition, 18 companies (50%) in our survey, mentioned a desire to own a particular high end instrument that was currently beyond the scope of their budget. The feedback from these 2 questions about equipment needs is documented in **Appendix 2**.

Company access to a bio-instrumentation facility was influenced by company size and industry sector (**Figure 5**). There was a bias for this service from the smaller, budget constrained companies. Proportionally fewer Medical Device companies had a need because of the specialized nature and needs of their business and the products they produce.

**Figure 5** Support for Bio-Instrument Core Facilities by respondent size and sector



**Ideas for strengthening the Life Sciences industry on the North Shore:** In concluding our survey, we solicited interest and ideas to promote and enhance the visibility and strengthen the life sciences industry on the North Shore.

Ideas for enhancing the work force:

1. Strengthen the connection between industry and the educators. Knowledge about the industry should begin in grammar school. Students should be made aware of the breadth and diversity of career path choices for STEM graduates. Future prospects should be given a “job in the life..” view.
2. There was a compelling support for industry based Post-doc. programs in which all parties share the risk/BENEFIT of the program.
3. The need for internships extends across the board: internships, co-ops, apprenticeships.
4. Solutions to fill the Engineering talent hole. Companies asked why is there a low participation from North Shore schools?
5. Cross training is an advantage for this industry with innovative and complex product/services. Science students should be encouraged to minor in business courses and vice versa.
6. Education and training around interviewing and hiring skills. Job applicants lack interview skills and knowledge about how to “sell” their capabilities, while hiring managers maybe missing talent because of rigid checklist approach to candidate selection.

Ideas for enhancing industry collaboration:

1. Share and exchange new technologies for beta-testing applications.



2. Share business best practices e.g. customer relationship management (CRM) systems, process workflows, etc.
3. Host distributor training sessions.
4. Networking: access to talent pool for recruiters and candidates, or development opportunity for employees.

## **Outlook**

The life sciences industry on the North Shore is thriving. The region is fortunate to have a long legacy of successful industry pioneers located here, while nurturing an entrepreneurial environment of new company entrants, with expectation to grow and add to the future work force. The mature companies in this region are full integrated business with broad skills needs from new product development to manufacturing and logistics on an international scale. On the other hand, the early stage companies are looking for specialized and combination type skills. Overall, we noted a need for a skilled work force with high demand for bachelors or higher degree. Our survey revealed specific insights into workforce gaps and industry needs to help focus training needs toward the most impactful outcomes and continued success of the North Shore.

**Appendix 1** North Shore life sciences company listing. The shaded companies participated in the survey.

	<b>Company</b>	<b>Category</b>	<b>City</b>	<b>Mission</b>
1	Aberjona Laboratories, Inc.	<b>Reagents</b>	Beverly	Collaborative research organization specializing in high speed, high quality drug discovery service in medicinal chemistry, chemical process research
2	Abiomed Inc	<b>Medical Device</b>	Danvers	Abiomed® (NASDAQ: ABMD) is a pioneer and global leader in healthcare technology and innovation, focused on breaking new ground in RECOVERING HEARTS AND SAVING LIVES.
3	AdvaStim, LLC	<b>Medical Device</b>	Beverly	Advanced platforms for neuromodulation with new technology focused on improving the patient outcomes
4	Akrivis	<b>Reagents</b>	Salem	Z-TECT™ Technology Platform which provides ultrasensitive detection and accurate quantification of biomolecules
5	Alamak Biosciences, Inc.	<b>Service</b>	Beverly	Histology Tissue based assays such as IHC, ISH, DNA/RNA extraction for our clients in pharmaceutical industries and academic institutes.
6	Alpaqua Engineering, LLC	<b>Instrumentation</b>	Beverly	Alpaqua designs products and solutions to expand and improve the functionality of your automated liquid handling equipment.
7	American Federation For Medical Research	<b>Service</b>	Beverly	International multi-disciplinary association of scientists engaged in all areas of biomedical investigation-patient-oriented, translational, & basic research
8	American Surgical Company	<b>Medical Device</b>	Lynn	Innovative array of products of varying materials, sizes and uses for neurosurgical applications
9	Analogic (acquired BK Medical)	<b>Medical Device</b>	Peabody	Analogic creates innovative technology that improves the practice of medicine and saves lives.
10	Anova Corp. (DE)	<b>Service</b>	Beverly	medical device service?
11	Anterion Therapeutics	<b>Reagents</b>	Salem	Drug delivery company currently in bankruptcy
12	Applied Materials Orion Group	<b>Service</b>	Beverly	Global leader in providing innovative equipment, services and software to manufacture semiconductor and solar photovoltaic products
13	Atlantic Lab Equipment Llc	<b>Instrumentation</b>	Salem	Reconditions surplus lab equipment
14	Bactes Imaging Solutions	<b>Other</b>	Beverly	Health Information handling - informatics
15	Beckman Coulter Genomics, Inc. (subsidi of Beckman Coulter, Inc.)	<b>Reagents</b>	Danvers	Beckman Coulter Genomics sets the standard for delivering expert genomics solutions to life science and healthcare businesses as well as academic and government institutions worldwide
16	Biobase Corp	<b>Reagents</b>	Beverly	BIOBASE is a leading provider of expert-curated biological databases, software and services for the life sciences
17	BioChemics (formerly Vasco Active)	<b>Drugs</b>	Danvers	A pharmaceuticals company with portfolio of novel topical and transdermal drug delivery systems which allow drugs previously undeliverable transdermally to be delivered through the skin
18	Biohelix Corporation (MA)	<b>Diagnostics</b>	Beverly	To improve the quality of healthcare through the development of simple molecular diagnostic tests
19	Biometrix Corp	<b>Instrumentation</b>	Beverly	Biometrix was founded in 1994, with the goal of providing high quality instrumentation services at a reasonable price to the biotechnology, pharmaceutical and medical devices industries of New England.
20	C F Medical, Inc. (MA)	<b>Medical Device</b>	Danvers	Experienced customer sales and services organization servicing the cardiovascular field
21	Cell Assay Innovations, Inc. (MA)	<b>Reagents</b>	Beverly	Cell Assay Innovations (CAI) is an innovative biotechnology service company dedicated to cell-based assay technology development for drug discovery.
22	Cell Signaling Technology Inc. (MA)	<b>Reagents</b>	Danvers	To deliver the world's highest quality research tools that accelerate progress in biological research and personalized medicine.

	<b>Company</b>	<b>Category</b>	<b>City</b>	<b>Mission</b>
23	Cellanyx	<b>Diagnostics</b>	Beverly	Developing a functional, cell based assay quantitative and objective diagnostic for prostate cancer. Will initial offer lab test.
24	Cellceutix Corporation (MA)	<b>Drugs</b>	Beverly	is an emerging bio-pharmaceutical company in the business of developing small molecule therapies in areas of unmet medical need.
25	Cloeren	<b>Instrumentation</b>	Gloucester	
26	CMT, Inc.	<b>Instrumentation</b>	Essex	Cutting tools
27	Commonwealth Laboratories Inc. (MA)	<b>Diagnostics</b>	Lynn	Commonwealth Laboratories, Inc. is a state and federally licensed clinical laboratory that specializes in testing for levels of methane and hydrogen in the breath.
28	Converge Diagnostics Services, LLC (MA) (Lab For Clinical Medicine merged)	<b>Diagnostics</b>	Peabody	Lab diagnostic services dedicated to women's health, includes specialty trained pathologists, to our specialized testing.
29	Creganna Medical Devices Inc. (CA)	<b>Medical Device</b>	Beverly	Specializing in Minimally Invasive delivery & access devices, provide a complete range of solutions to assist medical device and life science companies specializing in Minimally Invasive delivery & access devices
30	CytoCure LLC (DE)	<b>Drugs</b>	Beverly	Cancer drug development company
31	Development Insights LLC (MA)	<b>Service</b>	Beverly	A company focused on delivering highly effective consulting services targeted to the specific regulatory and quality needs of the pharmaceutical, medical device, and biotechnology industries
32	Eliza Corporation (MA)	<b>Medical Device</b>	Beverly	Our goal is simple - engage people in conversation, improve their health, & enhance quality of life. Speech recognition engine - automated calls, healthcare communications, compliance, data analysis
33	Elucida Research, LLC (MA)	<b>Reagents</b>	Beverly	Elucida Research LLC is a privately held biotechnology research company that provides contract and proprietary research to a wide range of pharmaceutical and biotechnology clients
34	EMD Millipore Corporation (MA)	<b>Reagents</b>	Danvers	Life science leader providing cutting edge technologies, tools, and services for bioscience research and biopharmaceutical manufacturing
35	Endodynamix Inc	<b>Medical Device</b>	Salem	EndoDynamix develops, manufactures and markets a new generation of instruments for use in minimally invasive surgery
36	Enzymatics, Inc. (MA)	<b>Reagents</b>	Beverly	leading provider of molecular biology reagents and manufacturing services
37	Evans Analytic Group	<b>Service</b>	Peabody	fully integrated, independent laboratory network, providing high value expert analytical and testing services to a wide range of industries and end users
38	Front Run OrganX, Inc. (MA)	<b>Service</b>	Ipswich	Provide Biotech, Pharmaceutical & Fine Chemical industries with a source for high quality Custom organic synthesis, & Process resource for creative, high purity, scalable & robust solutions to difficult & problematic organic syntheses
39	Glycozym	<b>Reagents</b>	Beverly	Design, synthesis and microarray display of post translational modification of peptides
40	Hamilton Thorne Inc (HTL:TSX) (DE)	<b>Instrumentation</b>	Beverly	Leading provider of advanced laser systems for the regenerative medicine, fertility and stem cell research markets
41	Helix Medical	<b>Medical Device</b>	Gloucester	medical contract manufacturing leader specializing in the design, manufacture, assembly, and lifecycle management of silicone and thermoplastic components and finished devices

	<b>Company</b>	<b>Category</b>	<b>City</b>	<b>Mission</b>
42	HepatoChem, Inc. (DE)	<b>Reagents</b>	Beverly	Offers pharmaceutical & biotech companies reliable & efficient access to small molecule metabolites. Services and kits to accelerate drug R&D & reduce costs due to a high rate of drugs attrition.
43	Hettich Instruments Management, Inc. (GA)	<b>Instrumentation</b>	Beverly	Centrifugation products
44	Jeol USA Inc (DE)	<b>Instrumentation</b>	Peabody	Leading global supplier of scientific instruments used for research and development in the fields of nanotechnology, life sciences, optical communication, and biotechnology
45	KARD Scientific, Inc.	<b>Service</b>	Beverly	in vivo efficacy studies to support drug discovery and development. Models include cancer, neurological, inflammation, arthritis and other diseases
46	Kernco	<b>Instrumentation</b>	Danvers	<a href="http://www.kernco.com">http://www.kernco.com</a>
47	Krohne America, Inc.	<b>Instrumentation</b>	Peabody	<a href="http://us.krohne.com">http://us.krohne.com</a>
48	Lariat	<b>Diagnostics</b>	Beverly	Developing technology for early detection of genetic mutations
49	Leica Biosystems	<b>Diagnostics</b>	Danvers	cancer diagnostics
50	LGC GmbH (formerly Kbioscience )	<b>Reagents</b>	Beverly	KBioscience offers SNP genotyping, DNA extraction/purification, whole genome amplification, transgenic animal genotyping, and assay design services.
51	Marine Polymer Technologies, Inc. (DE)	<b>Medical Device</b>	Danvers	Medical device company that researches, develops, and markets Syvek hemostasis devices. An innovative med. device co. focused on the development & delivery of biomaterials for the medical field.
52	Medtronic Interventional Vascular, Inc. (MDT-NYSE) (MA)	<b>Medical Device</b>	Danvers	Products to alleviate pain, restore health, and extend lives
53	Microdial	<b>Instrumentation</b>	Danvers	Microscope and optical needs equipment
54	Microline Surgical Inc	<b>Medical Device</b>	Beverly	Improve the quality of patient care and the productivity of health care delivery
55	Mimetogen Pharmaceuticals Usa Inc. (DE)	<b>Drugs</b>	Gloucester	Biotechnology company actively pursuing development of novel small molecule compounds to treat neurodegenerative diseases of the eye, including dry eye, glaucoma and retinitis pigmentosa
56	MTS Systems Corp.	<b>Instrumentation</b>	Marblehead	Sensor technology and applications. Engineers have helped customers expand the use of our technology into new markets and applications such as Medical Devices.
57	Nanosurf Inc	<b>Instrumentation</b>	Saugus	Manufacture unique scanning probe microscopes to help professionals capture, analyze , and present material surface information with subnanometer resolution
58	NeuroLogica Corporation (acquired by Samsung)	<b>Medical Device</b>	Danvers	design, development and manufacturing of imaging systems including ultrasound, CT, PET, radiation therapy and MRI
59	New England Biolabs Inc	<b>Reagents</b>	Ipswich	World leader in the production and supply of reagents for the life science industry
60	New England PharmAssociates, LLC (MA)	<b>Service</b>	Beverly	To help life science entrepreneurs, management teams, and investors optimize asset value with the most efficient expenditures of capital and time
61	Next Generation (RCI Next Generation, Inc. dba) (FL)	<b>Service</b>	Beverly	Microbiology service
62	Orbital Biosciences, LLC (MA)	<b>Reagents</b>	Beverly	Develop and manufacture innovative new processes and products for laboratory separations that offer significant improvements in performance
63	PCI Synthesis, Inc.	<b>Service</b>	Newburyport	Custom contract chemical manufacturer of new chemical entities (NCEs), generic APIs, and other specialty chemical products
64	Radikal Therapeutics Inc. (DE)	<b>Drugs</b>	Beverly	Radikal Therapeutics is a life science discovery and development firm focused on the discovery and development of innovative pharmaceuticals.
65	Ran Biotechnologies	<b>Reagents</b>	Beverly	Novel technology for capturing and concentrating biological materials

	<b>Company</b>	<b>Category</b>	<b>City</b>	<b>Mission</b>
66	Rock Creek Pharmaceuticals Inc (DE)subsid -Star Scientific, Inc.(NASDAQ: CIGX)	<b>Drugs</b>	Gloucester	Patented Anatabloc, anti-inflammatory supplement, used by body builders. Being studied for potential to fight Alzheimer's & other inflammatory illnesses. CiGRX, lozenge that reduces urge to smoke. Anatabloc® Face Cream to Improve the Appearance of the Skin
67	Rotem Inc. (NY)	<b>Instrumentation</b>	Topsfield	Provide rapid and complete hemostatis analysis information to help the bleeding patient - instrument and FDA cleared assays
68	Rowley Biochemical Institute Incorporated (MA)	<b>Reagents</b>	Danvers	Supplies biomedical research facilities, university and clinical laboratories with quality in-vitro stains and reagents
69	Sage Science, Inc. (DE)	<b>Instrumentation</b>	Beverly	Our mission is to provide new systems to streamline and improve sample preparation workflows
70	Sensitech Inc (DE)	<b>Instrumentation</b>	Beverly	Products and services designed to help monitor and manage the cold chain of the world's most temperative sensitive products
71	Sirius Analytical Inc. (DE) (Sirius Analytical Instruments Ltd - UK)	<b>Instrumentation</b>	Beverly	Manufacture highly automated instruments to measure physicochemical parameters
72	SpineFrontier Inc. (DE)	<b>Medical Device</b>	Beverly	Focus on the needs of the surgeon to enable us to improve patient care through innovative and revolutionary technologies
73	Technical Manufacturing Corp [acq 1/3/12 by AMETEK, Inc. (NYSE: AME)]	<b>Instrumentation</b>	Peabody	Leader in high-performance vibration isolation systems and optical test benches used in high-end analytical instruments, such as scanning electron microscopes and ultra precision machine tools
74	Theratorr Medical Inc.	<b>Medical Device</b>	Beverly	
75	Thermo Fisher Scientific Inc	<b>Reagents</b>	Beverly	Make the world healthier, cleaner and safer
76	Thorne Diagnostics, Inc.	<b>Reagents</b>	Beverly	DNA technology company developing a portfolio of technologies for the detection and quantification of proteins and nucleic acids and analysis of rare cells in clinical samples
78	Triple Ring Technologies, Inc. (CA)	<b>Service</b>	Beverly	Innovative research and development company that, in collaboration with clients & partners develops technical solutions to critical, typically complex, challenges.
79	Tuv Sud America Inc	<b>Medical Device</b>	Peabody	Product testing laboratories and engineering, audit, certification service
80	United States Biological Corporation (MA)	<b>Reagents</b>	Salem	Primary brand for the Life Science Industry
81	Velico Medical, Inc (fka ZymeQuest) (DE)	<b>Drug</b>	Beverly	Private clinical stage company focused on applying its proprietary technologies to Transforming Transfusion Medicine
82	Waters Corp	<b>Instrumentation</b>	Beverly	Laboratory Equipment and Supplies Manufacturers
83	Willow Laboratories & Medical Center (MA)	<b>Diagnostics</b>	Lynn	State and federally licensed laboratory for drugs of abuse testing
84	Zoe Medical Incorporated (MA)	<b>Instrumentation</b>	Topsfield	Provide affordable, high quality patient monitoring systems to under-served healthcare sectors

## Appendix 2 Survey response from companies about bio-instrumentation needs

Company	Question: On what specific analytical instrumentation would	Question: Is there state-of-the-art instrumentation which
Akrivis		Mass Spec, Imaging, MEMS, micro machining
Alamak	Microscopy, confocal microscopy	confocal microscopy
Alpaqua	Confocal microscopy/image analysis programs for digital pathology.	3-D Printer. Laser etching equipment
Atlantic Lab Equip.	Fluorometer. 3-D Printer. Laser etching equipment.	No
Beckman Coulter Genomics (BCG)	Sequencing, qPCR, thermal cycling, automation, liquid handling, capillary electrophoresis (Agilent and ABI)	Raindance, Fluidigm, Agilent Tape Station, and Oxford Nanopore
BioHelix Corp.		automate dispensing liquids
Commonwealth Laboratories, Inc.	GC	no
EMD Millipore	Spectrophotometer, robotics, Mass Spec, HPLC, general imaging instruments	High end mass spec
EndoDynamix	CNC machining centers and knowledge of mold-making, design and manufacturing	Computer controls, Moriseiki machines, Progressive stamping equipment, bidirectional molding machines.
Enzymatics	General lab, protein purification, chromatography.	sequencers
Hamilton Thorne		4 channel microscope & modeling software (iMATlab)
HepatoChem	HPLC, Mass Spec	High end mass spec
Hettich Instruments	general lab equipment	No
JEOL USA, Inc.	EM or NM	yes
LGC Genomics	Liquid handling	No
Life Technologies	Next gen sequencer, PCR, technologies for characterizing samples (UV, IR), preparative & analytical electrophoresis,	Typhoon, or similar fluorescent imager
Microline Surgical	standard mechanical manufacturing equipment. Familiarity with use of a microscope is a asset.	No
Nanosurf	AFM, Standard technologies, microscopy-related technologies	No
NEB	FPLC. bioreactors	No
Orbital	Mass Spec, Sumimoto Injection Molding	Mass spec. Plasma generator for surface activation
Sage Science	Gel Electrophoresis, PCR	yes
Sirius Analytical	UV spectrometers, titration equipment, particle size analyzers	no
Thorne Diagnostics	Thermal cycler (RT-PCR) and spectrophotometer	Yes. Automated liquid handling
US Biochemicals	HPLC, Atomic adsorption, MS	no
Velico Medical		Flow cytometer