

# Life Sciences Industry on the North Shore

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NORTH SHORE WORKFORCE INVESTMENT BOARD

NORTH SHORE CAREER CENTER

May 2013



## **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.

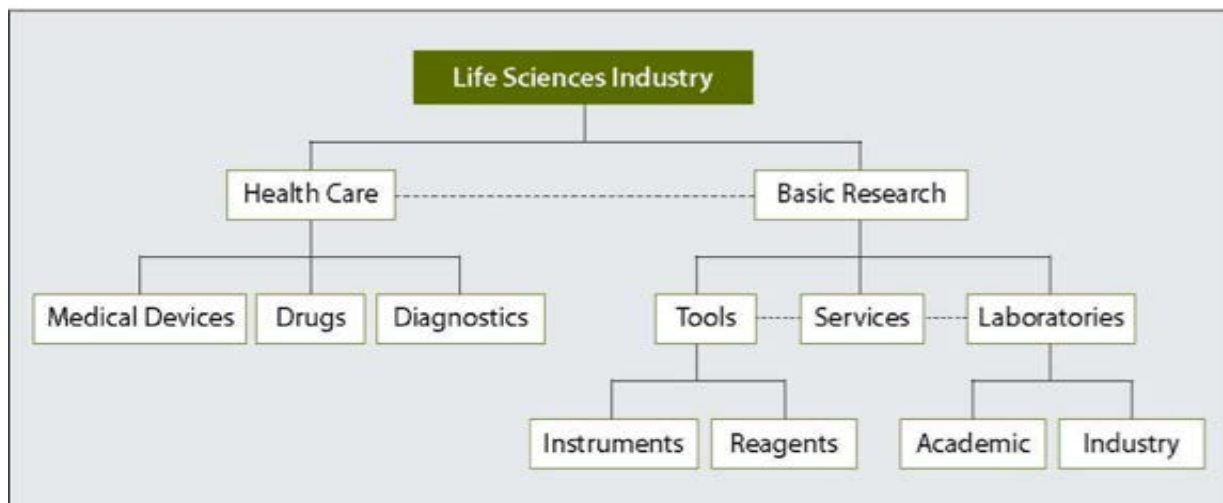
Consultants, Bruce Turner, Ph.D., Jack Leonard, Ph.D. and Susan Long, Ph.D. were hired to carry out the evaluation. These individuals have extensive industry knowledge and experience and connections to facilitate access to individual companies. The project also benefited tremendously from the support 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)

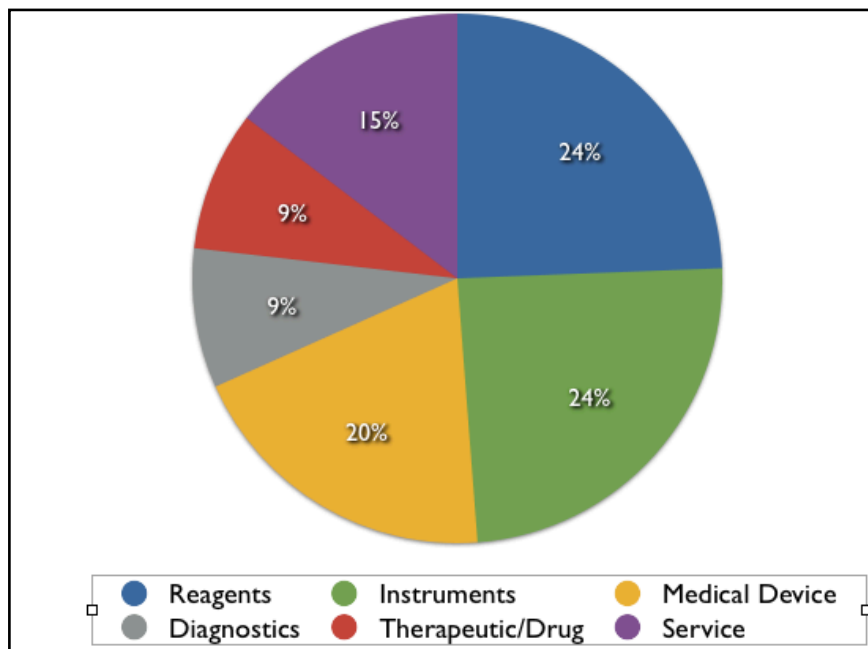
In the current research, we documented 84 life sciences companies in the North Shore region (**Appendix 1**). We recorded company turnover and other changes, as are typical in this industry. There was consolidation as a result of companies mergers and acquisitions and a few companies exited the region. 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.

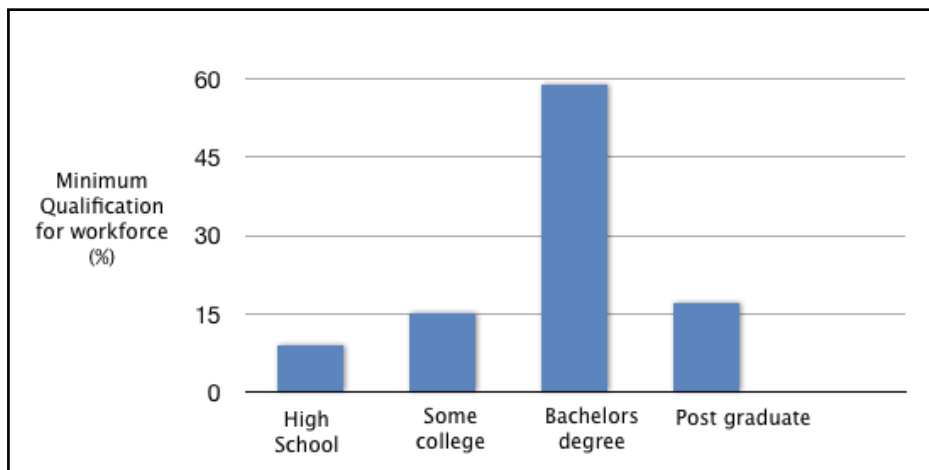
Founder or CEO residency was the predominant reason for company location on the North Shore. In this regard, the region has benefitted from noteworthy industry pioneers and leaders,

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.

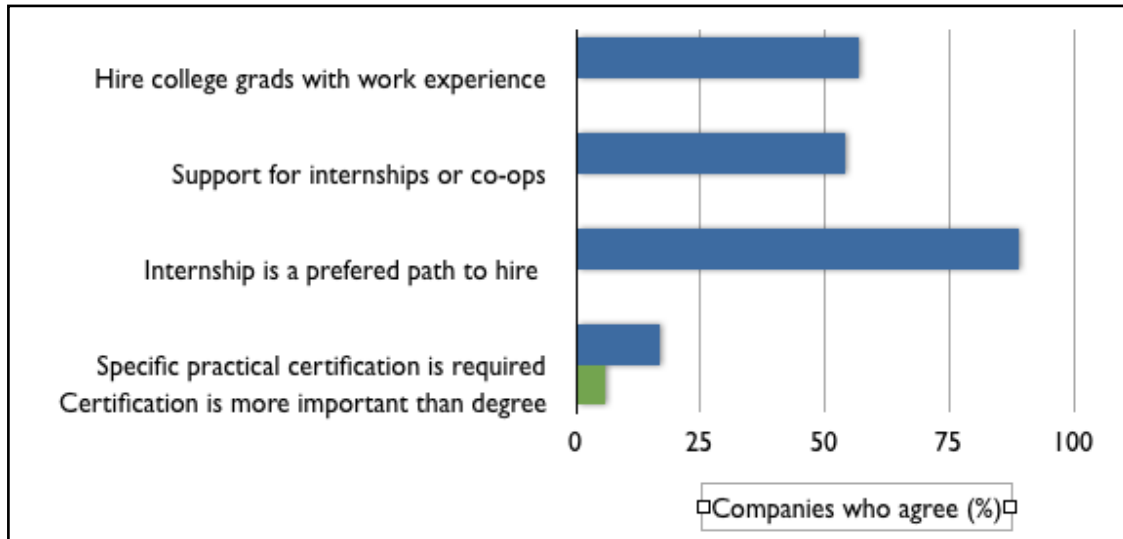
**Academic qualifications, general skills and needs:** The life sciences workforce include a range of talents and educational backgrounds. While demand is mostly for bachelors or higher degree, there is also a need for associate's level and high school graduates (**Figure 2**). The industry accommodates 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

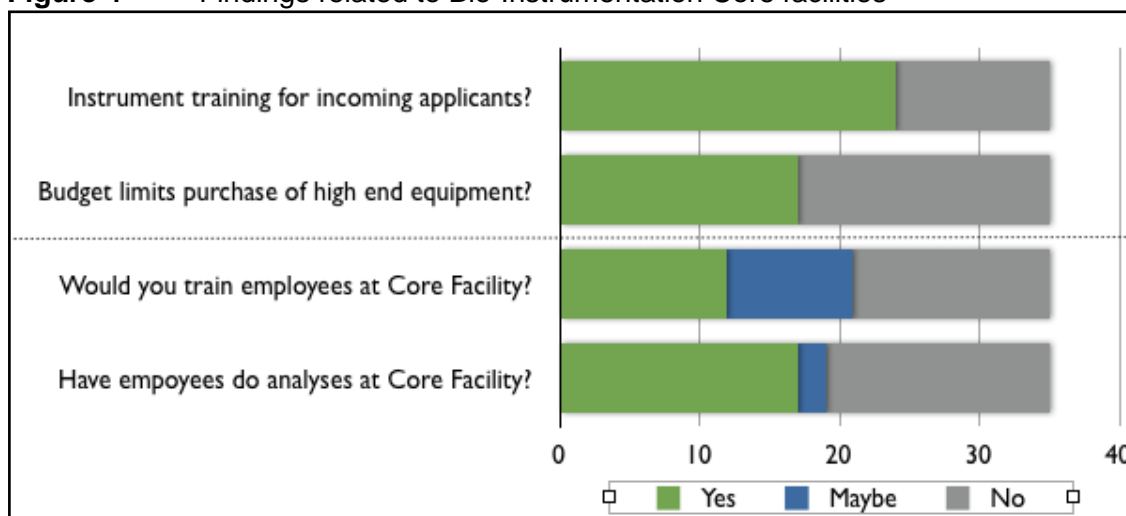
electromechanical and software engineers. Talent gaps identified for the scientist/researcher category ranged from “specialist” (e.g. areas such as Bioinformatics) to “broad generalist expert” (e.g. combination of chemistry or physics with biology). Across all industry sub sectors, there was a need for 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.

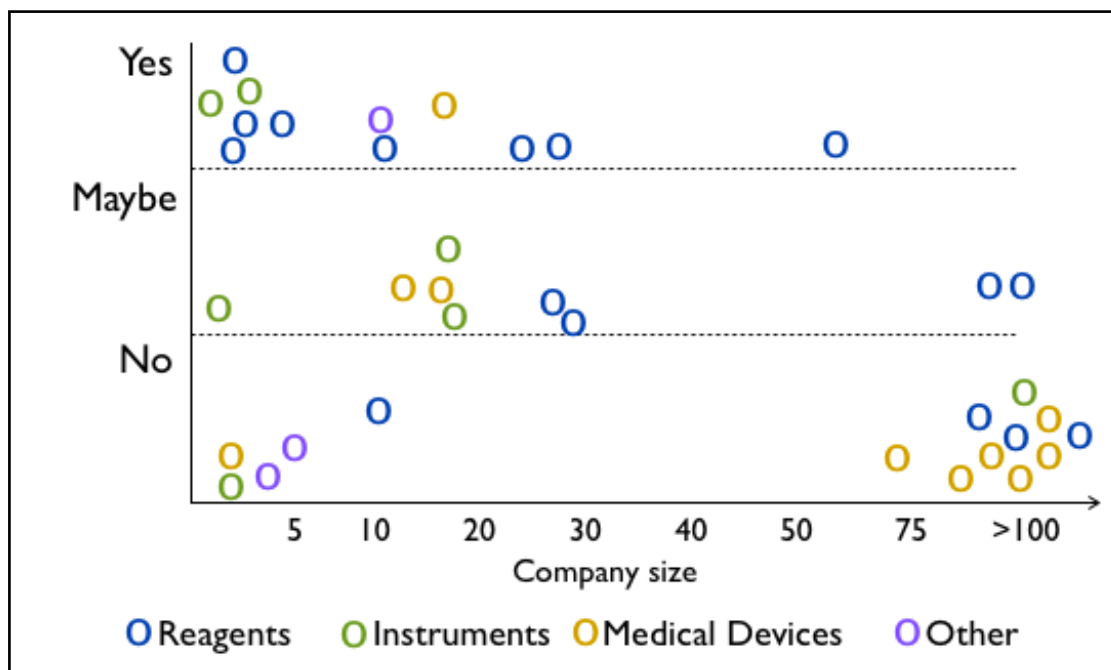
**Figure 4** Findings related to Bio-Instrumentation Core facilities



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   |