DRAFT

Life Sciences Industry Assessment
March 11, 2016

Prepared For

The Business Development Board of Palm Beach County (BDB)

Prepared By

facilityLOGIX
BUILDING PERFORMANCE

This report is CONFIDENTIAL and intended only for the sponsors of the study and their designated counterparts.

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Executive Summary

In August 2015, the Business Development Board of Palm Beach County (BDB) selected Facility Logix to conduct an analysis of the county's life science industry. This draft Final Report presents findings of the market assessment information gathered during our asset inventory; defines the region related to the evaluation of the opportunity in biotechnology and life sciences; analyzes the strengths, weaknesses, opportunities and threats (SWOT) associated with the target industry sector; presents applicable best practices from neighboring markets; and concludes with a set of seven (7) recommendations for a bold sector-focused strategy.

Facility Logix gathered and evaluated baseline information regarding the existing market in Palm Beach County, FL as well as that in competing markets including Tampa, Orlando and Miami. We considered a number of key elements required for a sustainable life sciences industry cluster including:

- The presence of a leading research institution(s);
- The presence of leading hospitals and healthcare providers;
- The presence of local companies in the industry;
- The presence of a sector-trained workforce;
- The presence of a third party industry-specific supplier network;
- Availability of real estate matched to market needs;
- Available capital investment and financing sources; and
- A supportive political environment with industry-appropriate incentive tools.

In discussions and presentations to various stakeholders within the county, it was apparent that the terms life science and bioscience are used broadly. Clarifying the definition and use of terms without including industries and employees within the broader healthcare sector provides a basis from which to compare the Palm Beach county cluster with a competitive set within and outside the state.

Data pulled by the North American Industry Classification (NAICS) code reveals there are “life science” employees and firms within Palm Beach County. However, a concentrated mass of research scientists and entrepreneurial activity outside of a university is not as strong as it needs to be if this industry sector is slated to be a growth engine for Palm Beach County. The BDB must be conscientious in narrowly and consistently defining the industry to its stakeholders and constituents to provide a realistic and accurate depiction of industry presence in the county. Employment figures reveal strong employment within medical services, which is an asset and may bolster the claims of a workforce capable within the medical and medical technology fields that could be leveraged to address the workforce needs of life science and bioscience firms.

Entrepreneurial activity in the Palm Beach-Broward-Miami Metropolitan Service Area (MSA) occurs; however, Palm Beach County alone does not have a high level of entrepreneurial activity specifically in the life sciences. Dynamic discovery engines or large biomedical companies that spin out other companies are still evolving within the county. The region's technology council activities ebb and flow, with biotech meet-ups more likely to occur in Miami, Orlando or Tampa. Regional entrepreneurial activity is ongoing but not especially strong in the life sciences. In our experience, the lack of strong discovery engines at local universities, or at hospitals (engaged in clinical activities), or larger biomedical companies spinning out discoveries and companies, limits the region's life science and bioscience sector-related entrepreneurial activity.

Facility Logix identified and analyzed the activities of three peer group communities to inform the development of the life science strategy recommendations. We selected these markets based on the following criteria:

- Context within Florida – What's Working Already
- Immediate neighbors with stronger clusters
- Proximate neighbor with a bio-manufacturing emphasis – North Carolina
- Proximate neighbor with a research and translational emphasis - Maryland
- Individual regions within the respective neighboring states

We evaluated the legislative and political environment for sector-specific initiatives and found that the 2015-2016 legislative agenda and budget does not contain strategies or amendment(s) directly impacting the life sciences in Florida. Based on the interview feedback, Florida's life science community is open and hopeful that meaningful incentives or legislation will come about; unfortunately, other state priorities have taken precedence this year.

The challenges confronting economic developers seeking to establish, nurture and to grow a life science and biomedical cluster in Palm Beach County will require focus, creativity, consistency and perseverance. A regular comment heard is that there is no "glue" that provides a centralized effort for the industry to speak with one voice. Good intentions abound, but the lack of sector-focused leadership within the county leads to a lack of connectivity. The BDB may wish to consider acting regionally because any company locating to Palm Beach will need to recruit its workforce from the surrounding area (and vice versa). Quantifying workforce and site selection opportunities for companies on a regional level will elevate the competitiveness of Palm Beach County.

The opportunities that emerged from our interviews and the research we have conducted are summarized as follows:

- Develop and provide community education programs to increase awareness and generate political support for industry needs;
- Identify local investors; educate local investors on life science investment needs and timelines; and link investors to local investment opportunities;
- Deploy resident "bench" of retired life science executives with c-suite experience;
- Expand relationships between institutions and regions to build critical mass, develop awareness and diversify areas of excellence;
- Augment underdeveloped clinical trials infrastructure;
- Catalyze a stronger collaboration between hospitals, non-profits, and bioscience companies to create a "clinical research county" using existing resources.
- Capitalize on homegrown companies – create your own successes;
- Develop long-term investments that serve to augment translational research strengths; and
- Function in a truly collaborative manner with aligned interests to advance this initiative

To address this need, Facility Logix developed seven recommendations designed to:

- Capitalize on strengths and promote future benefits
- Diminish weaknesses and prevent potential problems
- Spur economic development and create high-paying, sustainable jobs

The Business Development Board of Palm Beach County, in cooperation with Palm Beach County leadership, should lead this visionary initiative.

Recommendation ONE: Develop a Life Sciences Leadership Group

To assist the BDB in guiding and implementing the strategy, this new private sector led group will provide ongoing insight into industry trends, company needs, and unique opportunities relevant to the Palm Beach County market. This group shall have a high profile in the BDB's effort to promote and implement a successful strategy.

Actions:

- Identify a BDB staff member to lead the County's life sciences business development efforts. Communicate selection of life sciences business development specialist to County life science companies and stake holders or partner organizations

- Develop a list of proposed senior leaders drawn from industry, academia, the non-profit sector, industry organizations, County government, and state government. Do not limit range of participants to individuals from Florida or from any particular academic or non-profit institution. Send out invitations to join the Life Sciences Leadership Group (LSLG)

- Develop criteria for continued participation in LSLG

- Develop work plan benchmarks for review and input from LSLG

- Hold quarterly meetings of the LSLG to review progress in achieving benchmarks and to review long-term objectives and changing industry trends and requirements

- Leverage LSLG to aid in achieving collaborative goals necessary to successfully implement long range strategic goals, and to address the capital and c-level experience challenges detailed in Recommendation 3 (below)

- Leverage LSLG as needed to assist BDB in promotional efforts for life sciences economic development

Suggested Timeline: Short-term and ongoing. Minimal financial requirement

Desired Outcome: Engaged and committed visionary leadership team

Measuring Success: Actively engaged leadership that continually demonstrates thought leadership and facilitates the implementation of strategic initiatives

LSLG attendance of greater than eighty percent (80%) at all quarterly meetings

Demonstration of active involvement from all LSLG members

Recommendation TWO: Foster the Development of a Life Sciences "Aware Community"

As evidenced in many of our interviews with a variety of participants, it seems clear that the majority of Palm Beach County residents and business community members are not conversant at any level about the life science industry and the opportunities it presents by way of potential employment for county residents and their families; nor about the potential of commercializing technologies that may one day impact human health and longevity, the use of environmental resources and climate issues, or the County's food supply and security. Without such basic awareness it will be difficult for the County to support directing limited public funds to advance the development of the industry in the County. In many cases the only awareness individuals have with the industry is press coverage of the perceived short-comings of the non-profit research institutes relative to economic growth objectives.

Actions:

- Engage a marketing firm to assist the County in life science marketing efforts.
- Develop a "Know Your Bio" campaign designed to introduce County residents to the industry.
- Work with County companies and academic labs to arrange for "tour days" for County residents.
- Identify County residents who have benefitted from products or services developed by the life science industry and encourage them to voice their experience as part of the "Know Your Bio" campaign.
- Engage an industry knowledge and training firm such as Biotech Primer to offer basic biology background training to local political representatives.
- Continue to provide support for K-12 efforts to provide industry- specific instruction by seeking opportunities to offer hands-on experiences in the sciences for County youth.

Suggested Timeline: Mid-term and ongoing, some financial commitment

Desired Outcome: A "Life Sciences Literate Community"

Measuring Success: Increased public support for the industry

Recommendation THREE: Expand the "Behind the Gates" Program to Identify Industry-Specific Investment Capital and to Bolster the C-Suite Expertise Available for Palm Beach County and Regional Life Science Firms

A critical component of any life science cluster building effort is to identify sources of early stage and ongoing investment capital to support the product development needs over development timelines that can extend from ten to fifteen years and longer. There is an active investment community in Palm Beach County and throughout Florida; however, the community has limited knowledge and experience in investing in life science transactions. Palm Beach County is home to many high net worth individuals who invest in life science companies; however, they do not invest in the County, nor the state for that matter.

Similarly, c-suite executives experienced in life science product and business development are crucial to effectively leading companies, raising money, and bringing products to market. Many individuals who have retired from successful careers leading life science companies reside either part-time or full-time in Palm Beach County: several of them have expressed a desire to get involved in something "outside the golf course".

Previously the BDB launched a "Behind the Gates" initiative to identify high net worth individuals; however, this effort was not *specifically focused on identifying these individuals for life science investment or to engage in leadership roles with local start-up companies.*

Actions:

- Expand the "Behind the Gates" initiative and revise to include life science sector specific intent.
- Have the LSLG identify "ambassadors" who can tell the story of life science and personalize it to match outreach candidates.

- Create opportunities for County companies to present "Science Fair Days" where attendance is limited to "Behind the Gates" attendees.

- Develop a roster of experienced c-suite individuals and their qualifications, and utilize this list when recruiting companies, seeking investment commitments, and other related activities. Obtain permission from c-suite roster individuals to utilize their experience and credentials for recruiting and marketing efforts as appropriate.

Suggested Timeline: Immediate and ongoing, some financial commitment

Desired Outcome: New sources of investment capital for County-based life science start-ups

Roster of c-suite executives for leadership roles in County-based life science start-ups

Measuring Success: Increased ecosystem activity from early-stage companies

Better ability to respond to site selection consultants and others regarding c-suite leadership with industry experience

Recommendation FOUR: Enhance Sector-Focused Networking Efforts

In a vibrant sector-focused cluster, networking occurs both intentionally and spontaneously. The best networking results in continually growing collaborations and expanded business and personal partnerships and serves to break down silos of expertise.

Actions:

- Create a regular LSLG-sponsored event hosted in different regional settings

- Over time, build number of events to a minimum of four (4) cluster meetings and one (1) event per year

- Consider using these events to solicit sector-specific community feedback via focus groups

- Consider piggybacking on other events that showcase regional assets such as events held at The Max Planck Florida Institute for Neuroscience (Max

Planck) and The Scripps Research Institute - Scripps Florida (Scripps), the World Stem Cell Summit 2015, and others.

- BDB joins BIOFlorida and leverages membership for County-based companies

Desired Outcome: Enhanced networking opportunities, exposure to, and awareness of Palm Beach County sector-specific assets.

Suggested Timeline: Short-term and ongoing, minimal financial commitment

Measuring Success: At least six events held in the County region during 2016

Upward trending attendance at meetings and events over the year

Announcement of one new collaboration initiated at one of these events

Recommendation FIVE: Develop a Regional Definition & Identity

Align the interests of the region and its partners under a single identity that positions the region as a unified entity for life science and biomedical development.

Actions:

- Develop a Memorandum of Understanding or Partnership Agreement that includes all of the region's municipalities and counties, as well as institutions of higher education, and aligns their interests and strategic plans.

- Develop and issue a Request for Proposal to engage a sector-focused branding and marketing group, such as Chempetitive or Right Source Marketing.

- Develop and host a plan for a series of events at key locations throughout the region to announce the partnership. At each event location ensure that the LSLG is represented and require the physical participation of the elected leadership of the event host, as well as the physical participation of elected leadership from two of the other partnership municipalities.

Suggested Timeline: Short-term to six-months. Modest financial requirement.

Desired Outcome: Sector-focused brand identity used consistently in both internal and external communications by all BDB partners.

Measuring Success: One region and a consistent message integrated into all marketing channels for sector-focused efforts of all participants

Recommendation SIX: Enhance the Vertical Entrepreneurial Support Ecosystem

The County should focus on enhancing efforts to grow indigenous companies, which could result in long-term, sustainable benefits including diversifying and growing the overall economy and creating high-paying jobs. The horizon for implementation and subsequent realization of success based on this recommendation will be long-term. This is particularly important due to the fact that the region has had limited success in recruiting large life science and biomedical companies to the region.

Actions:

- Lead the effort to create a Florida or even a Palm Beach County Impact Grant that offers small awards to start-up companies for a variety of uses such as business plan analysis, market analysis, product development, etc.

- Determine sources of funding that could be used to address the high cost of laboratory fit-out for poorly capitalized life science firms. This could take the form of lease guarantees; fit-out laboratory suites; or capital improvement funding via grants or loans.

- Lead the effort to create a sector-specific seed fund to invest in early stage ventures. Leverage individuals identified in the "Behind the Gates" recommendation to accomplish this.

- Provide life science and biomedical specific resources such as mentors and coaches at existing co-work, incubation, and accelerator facilities. Build a roster of advisors and mentors from outside the academic community. These individuals should be accessible on a regular basis to the regional entrepreneurial community, and among them they should offer product or services expertise; legal expertise; financing expertise; accounting expertise; product or service market positioning expertise; product or services delivery expertise; clinical trial and regulatory expertise; etc.

- Offer programs such as Small Business Innovation Research Grant (SBIR) workshops twice annually to educate researchers from Florida Atlantic University (FAU), Palm Beach State College (PBSC), and other institutions on how to obtain SBIR grants and/or other funding opportunities. If programs are offered currently through any of these institutions, open the enrollment to include faculty from other schools.

Suggested Timeline: Six months to ongoing. Needs to be provided and funded for a minimum of five (5) – ten (10) years. Significant effort and financial requirement. Funding will likely be needed on an annual basis and be split among private participants, as well as federal, state, and local governments.

Measuring Success: Increased number of sector-focused new company formations

Desired Outcome: Enhanced entrepreneurial activity leading to economic diversification and job creation.

Increased angel investment in County-based companies

Recommendation SEVEN: Partner with FAU, other Regional Universities and the Non- Profit Institutes to Catalyze Life Sciences Entrepreneurial Efforts

The change in presidential leadership at FAU, coupled with the launch of FAU's medical school and the expanded emphasis on life sciences and STEM education, particularly at the Jupiter Campus, offers an unprecedented opportunity for the County and its academic partners to take a critical look at collective commercialization outcomes under the present framework.

Actions:

- Develop and execute a Memorandum of Understanding with FAU, PBSC, Nova Southeastern University (NSU), Scripps, Max Planck, and other regional research institutions to create a Regional Research Alliance focused on life sciences

- Work collaboratively with the Regional Research Alliance to evaluate alternative means of creating and/or enhancing an entrepreneurial culture among faculty

- Provide financial and personnel support where possible to academic partners to assist them in re-vamping commercialization and technology licensing efforts to align with best practices

- Provide guidance and support within the Regional Research Alliance to determine the applicability of selecting areas of excellence such as Personalized Medicine, Neuroscience, and others

- Provide funding support to offer faculty workshops in commercialization through the Regional Research Alliance

- *Advocate as a regional group at the state level* to secure additional support for life science commercialization efforts

Suggested Timeline: Mid-term and ongoing, ***will require long time horizon for full benefit.***

Some financial requirement

Desired Outcome: Enhanced collaboration between regional research institutions and demonstrable increase in entrepreneurial focus among research faculty

Measuring Success: Higher rates of technology licensing

Greater number of new businesses formed

Higher success rate for new businesses formed

Increased life sciences employment in the County

Increased investment in life sciences in the County

Increased tax base in the County

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Introduction, Background, & Objectives

In the spring of 2015, the Business Development Board of Palm Beach County (BDB) announced plans to analyze its life science industry. The intent of the study would be to assist Palm Beach County in determining whether the county has reasonable potential for the next 15+ years to grow the existing industry, thereby building an ecosystem that will attract, support and sustain a growing life science industry that includes: well-paying jobs, strong capital investment and successful collaborations between educational institutions and businesses. If successful, such a strategy would contribute to a broader source of employment for Palm Beach citizens and a source of economic growth for the county.

Study tasks include:

- Update the 2012 Life Science Steering Group SWOT analysis.
- Examine the research emerging from The Scripps Research Institute - Scripps Florida (Scripps), The Max Planck Florida Institute for Neuroscience (Max Planck), and Florida Atlantic University (FAU).
- Recommend types of companies to be targeted in the life science industry, capitalizing on existing life science work already being conducted in the county.
- Compare Palm Beach County to other similar counties with established life science industries.
- Identify gaps that exist in the county with regards to life science to look at ways to improve the county's ability to attract business relocations and expansions.
- Develop a comprehensive list of life science companies in Palm Beach County.

The BDB issued a Request for Proposal (RFP) for a consultant in June 2015 to assist both the BDB and its Steering Group in evaluating feasibility. The BDB selected Facility Logix to conduct the study in August of 2015. This Final Report presents findings of the market assessment information gathered during our asset inventory; defines the region related to the evaluation of the opportunity in the life sciences; analyzes the strengths, weaknesses, opportunities and threats (SWOT) associated with the target industry sector; presents applicable best practices from neighboring markets; and concludes with a set of recommendations for a sector-focused economic development strategy.

Methodology

In August, a kick-off meeting was held with the BDB team that gathered life science stakeholders from companies, governments, chambers of commerce and academe. The BDB hosted a "community town hall" event at the Max Planck Florida Institute for Neuroscience. Kelly Smallridge, BDB President & CEO, presented information on the study's goals, and Pat Larrabee, President of Facility Logix, introduced the firm, its prior work in the industry and the methodology to be used for the engagement. A substantial and enthusiastic focus group of for-profit companies participated in an engaging discussion on their understanding of the life science industry following the broader meeting. For many participants, the kick-off event was the first time they had met their peers and learned that there is more life science activity occurring in the county than originallyunderstood. Several common comments were voiced by focus group participants:

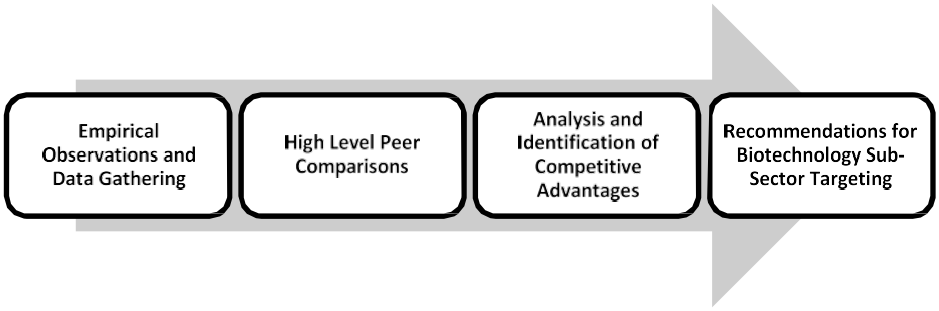
1. There is a need to "build a bridge" with institutes in the county.
2. The county needs to "retain local talent" in order to grow the industry.
3. A forum is needed to bring together companies and resources such as financing for start-ups.
4. The non-profits (Scripps and Max Planck) are part of the ecosystem, but are not the ecosystem.

The kick off-meeting with the BDB and community stakeholders facilitated a positive discussion on the project background and objectives. A list of target businesses, support businesses, localities, educational institutions, and others was developed in collaboration with the BDB and its stakeholders. Among the interview candidates were members of the BDB board, government representatives, existing life science businesses, angel investors and venture capitalists, support businesses, hospital representatives, K-12 school system representatives, and higher education institutions. Focus groups and interviews were conducted in person and over the phone from September through December 2015. Facility Logix also conducted site visits coupled with face-to-face interviews and attended two regional networking events.

Facility Logix held several update calls over this period with Lynne Stein Benzion of the BDB, and delivered two updates that were subsequently provided to BDB leadership and Board members in September and November.

In addition to interviews, Facility Logix utilized indirect research methods using Florida Power & Light's database and online searches to obtain relevant competitor market information and to evaluate prospective markets nationwide for consideration as peer group comparative markets.

The graphic below depicts this methodology.



For a complete list of individuals interviewed please refer to Appendix A.

Market Assessment

Facility Logix gathered and evaluated baseline information regarding the existing market in Palm Beach County. We considered a number of key elements required for a sustainable life sciences industry cluster including:

- The presence of a leading research institution(s);
- The presence of local companies in the industry;
- The presence of a sector-trained workforce;
- The presence of a third party industry-specific supplier network;
- Availability of real estate matched to market needs;
- Available capital investment and financing sources;
- A supportive political environment with industry appropriate incentive tools; and
- The presence of leading hospitals and healthcare providers

RESEARCH INSTITUTIONS – DISCOVERY & TRANSLATIONAL ENGINES?

The educational institutions within Palm Beach County are significant resources and are already economic engines in the region in the broadest sense. Florida Atlantic University (FAU), FAU's medical school, and Palm Beach State College (PBSC) are the larger institutions holding the most immediate promise for discovery and translational research activities that underpin the development of a robust life science cluster strategy. The smaller private schools are also important contributors in bolstering the educational levels and skills of the workforce, and engaging in collaborations with the hospital systems, businesses and the non-profit institutions in the region.

Several faculty and administrators from the institutions interviewed all agreed that (they), their institutions and the community, "need a handle on science, research, and inter-connections with the non-profits, area hospitals and other firms." Institutions of higher education, primarily universities, are typical technology generators; however, the legal, political and financial climate within Florida makes realizing their full potential challenging, especially when compared to other states with vibrant life science clusters such as Massachusetts, California, North Carolina and Maryland. These states have done a more consistent job of investing in and telling the story with regards to life sciences, and of implementing private industry training requirements.

In other states with vibrant clusters, state institutions sensitive to the needs of industry have specific tabs on their websites' landing pages for industry. The University of Maryland has a tab for businesses on its landing page, making it easy for a business to access meaningful resources that range from professional and customized training to research connections and technology licensing opportunities. The Massachusetts Institute of Technology's (MIT) website provides direct assistance to help technology and science firms connect to their research institutes and researchers.

The institutions in Palm Beach County offer similar information; however, it is "buried", making it difficult to find concise information and connections. The community colleges do a slightly better job of identifying areas of interest to a business, but efforts in this regard illustrate a limited appreciation for what businesses desire: direct, accurate and quick information that is easy to navigate, applicable to their needs, and of value.

Understandably, universities are complex organizations - difficult to navigate and slow to respond. A concerted and organized outreach and collaboration effort must be made by the BDB to keep educational institutional stakeholders engaged and focused on sector-specific industry recruitment efforts. State institutions everywhere are facing difficult budgetary times and are crafting outside collaborations with other institutions, private industry and stakeholder organizations. These collaborations are critical and must become part of the education community's culture. Palm Beach County needs to leverage interests and focus on the life sciences to slowly and deliberately build a network of contacts and opportunities that are mutually beneficial.

Florida Atlantic University – Unbridled Ambition

Florida Atlantic University (FAU) is undergoing a major transformation that includes changes in leadership, administration, and the implementation of a bold new strategic plan. Compared to other Florida state institutions, FAU is focusing on improving efforts and infrastructure to "create technology" by engaging in deeper dialog with industry and the non-profit research groups in Palm Beach. Developing a culture of entrepreneurship

among faculty is slowly occurring, with exciting opportunities to partner and to collaborate with non-profits in the state.

FAU has six campuses – three campuses are south of Palm Beach County in Broward County (Davie, Ft. Lauderdale, Dania Beach); the Harbor Branch Campus north of Palm Beach County (Ft. Pierce, St. Lucie County); and two FAU campuses which anchor the northern and southern points of Palm Beach County (Jupiter and Boca Raton).

The Boca Raton campus was the "original" site of FAU and was founded in 1964. The Boca Raton campus has the potential to foster a life science industry cluster given the adjacency of the Florida Atlantic University Research Park - home to successful life science firms, a technology business incubator and other resources that provide business support for smaller firms and start-ups.

For example, Dan Flynn, Vice President for Research, a recent FAU recruit and Head of the Office of Sponsored Programs, described goals of reaching $75M in sponsored research annually, with 25-30 invention disclosures and 4-5 new start-up companies launched each year. Dan noted that the Boca campus would be the center for patient-based, clinical trial activity while the Jupiter Campus would be science and technology driven and the home of FAU's Honors College. Areas of research emphasis will be personalized medicine and computational techniques for monitoring health and evaluating clinical trial data. The order of priorities envisioned for targeted recruitment of companies starts with genomics and sequencing companies followed by computational companies. Recruiting the research scientists leading these companies, as well as their research teams, will require specialized efforts and funding. Such endeavors will likely require legislative requests to support new hires and the development of specialized facilities appropriate to house these efforts.

FAU's Jupiter campus holds greatest promise in developing and supporting a life science technology park. There is available vacant land that is anchored by two major research institutions, Max Planck and Scripps, which are attractive neighbors that contribute to an environment supporting critical mass. High technology firms are located nearby and the Town of Jupiter is keen on welcoming the industry as the town is poised with available sites, infrastructure and political support, and access to talent.

FAU's new president, Dr. John Kelly, stated emphatically that FAU will substantially increase its research activity and Carnegie ranking to compete alongside universities at $100M and more in research grant activity. Presently FAU is ranked as a high research university with $33M in external grant funding activity. Dr. Kelly is working with his team to recruit high profile research faculty and their teams. He is also emphatic that, "FAU (will) work in partnership with employers," just as he did when he was with Clemson University. FAU has been "niched by politics and not economic development." He intends to change that and show the community "what can be done."

The Carnegie Classification is a widely used matrix for higher education institutions and is a way to represent institutional differences and diversity, especially in the areas of research and policy analysis. Many industries look at local university Carnegie rankings to assess activity level and quality of research and students. The Research II (High Research) category means that the institutions offer a full range of baccalaureate programs; are committed to graduate education; and give a high priority to research.

These institutes award 50 or more doctoral degrees annually and receive $15.5 -$40M in federal research grant support. Research I (or Very High Research), institutions do the same activities as high research ones, but receive $40M or more in federal support. (www.sestat.nsf.gov/docs/carnegie.html). Working with FAU to help with recruitment efforts of faculty as well as partnering on various business and industry specific opportunities should be a priority for the BDB.

Public Institution	Carnegie Ranking	Status
Florida Atlantic University – Boca Raton	High Research	Public
Florida International University – Miami	High Research	Public
Nova Southeastern University – Ft. Lauderdale	High Research	Private
University of Florida – Gainesville	Very High Research	Public
University of Central Florida – Orlando	Very High Research	Public
University of Miami – Coral Gables	Very High Research	Private
University of S. Florida – Tampa Campus – Tampa	Very High Research	Public

FAU graduates are productive members of the workforce and augment the technical capabilities within Palm Beach County. Attention to new faculty recruitments, collaboration with other universities and companies, and increasing research grant activity is critical to sustaining and increasing this contribution. A potential enhancement to FAU's workforce and industry contribution is the College of Engineering & Computer Science, also based in Boca Raton. The college may enhance the capabilities of the life science efforts – potentially in the growing field of bio-engineering. Graduation figures for this particular area are small compared to the other engineering majors, but it is a starting point.

Degrees conferred data was pulled from the Office of Institutional Effectiveness & Analysis (http://iea.fau.edu/reports/degrees), and offers a snapshot of the graduates "produced" with the skill set(s) that many bioscience firms wish to attract. Reports were pulled on December 1, 2015 and analyzed to determine the proportional focus on sector relevant graduates within the context of the overall FAU student body of approximately 30,000.

The numbers show that within the Charles E. Schmidt College of Science roughly fifty-five percent (55%) of the graduates earn degrees relevant to obtaining life science sector focused employment. A total of 994 degrees (BA, BS, MA, MS and PhD's) were conferred during the 2014-2015 Academic year. Majors include Biology, Chemistry, Complex Systems, Geoscience, Mathematics, Psychology and General Science. A breakdown of degrees awarded in 2014-2015 by pertinent life science major is outlined below.

Life Science Related Degrees Awarded 2014-2015 Academic Year

		Degree Awarded						All
		BA	BS	MA	MS	MST	PSM	
Degree Awarded	Major							
BA	Biological Science	93.0						93.0
	Chemistry	21.0						21.0
	Physics	2.0						2.0
	All	116.0						116.0
BS	Major							
	Biological Science		277.0					277.0
	Chemistry		14.5					14.5
	Chemistry: Biochemistry		14.0					14.0
	Neuroscience and Behavior		67.0					67.0
	Physics		4.0					4.0
	Psychobiology		3.0					3.0
	All		379.5					379.5
MS	Major							
	Biological Science				17.0			17.0
	Chemistry				5.0			5.0
	Physics				4.0			4.0
	All				26.0			26.0

** .5 denotes double major.*

Of the 901 degrees conferred by The College of Engineering & Computer Science, four (4) were awarded in a field specifically geared towards bioengineering.

FAU's Charles E. Schmidt College of Medicine was founded in 2011, welcoming its first 64 students into the Class of 2015. The medical school is housed in a 95,000 square feet (sf) state of the art facility that will help the program and students address the access and healthcare needs of the community and build upon basic, applied and translational medical research. Twenty- four (24) MS degrees were awarded last year with 100% residency placement within top hospitals and programs throughout Florida and the country. As of December 2015, no PhD candidates have graduated from the very young M.D. program (PhD programs typically take over 6 years for completion).

FAU – A Critical Palm Beach County Citizen

FAU is an outstanding community citizen with important research centers, specialized facilities, and ongoing community projects and collaborations. A fresh approach to establish relationships with the centers, their missions, and faculty members as well as facilitating introductions and collaboration opportunities will provide a win-win scenario. Such activity is a prime example of *economic gardening,* which is needed to increase the growth and success of FAU. Some of these centers may be physically located outside of Palm Beach County proper – yet, they still merit relationship-building efforts as they will provide opportunities and connections to those in the Palm Beach business community.

Of note is FAU's A Strategic Plan for the Race to Excellence 2015-2025, outlining ***pillars of excellence.*** These pillars are to guide FAU in achieving its institutional goals and actions:

1. Healthy Aging
2. Neuroscience
3. Ocean Science and Engineering/Environmental Sciences
4. Sensing & Smart Systems

Supporting these pillars are "platforms" that "represent scholarly activities that apply to and support all *Pillars.*" (Page 5-6).

1. Big Data Analytics
2. ***Community Engagement & Economic Development***: "Work with communities to develop tools to address challenges and uncover solutions that promote community development and economic prosperity." (page 6)
3. Diversity
4. Global Perspectives and Participation
5. Healthy & Environmentally Sustainable Campus
6. Leadership, Innovation & Entrepreneurship
7. Peace, Justice, and Human Rights

8. South Florida Culture
9. Undergraduate Research & Inquiry – "Distinction through discovery and research experiences that promote scholarship and graduation."

Palm Beach County and the BDB should consider capitalizing on this invitation to partner and to assist FAU on collaboration efforts. Dr. Kelly is open to working with the community and businesses throughout the region. More importantly, he expects his deans, their colleges and their research centers to do the same. A starting point may be to meet with FAU's research centers, particularly those centers specific to life science efforts. The centers are listed below and were copied directly from the FAU College of Science website:

> Center for Biomedical and Materials Physics - The Center for Biomedical and Materials Physics was established in 1989, originally as the Alloy Research Center, and provides a focus for collaborations to facilitate studies in biological physics and material physics. Biological physics deals with the study of biological phenomena using physical techniques. Materials physics applies fundamental Condensed Matter physics concepts to complex and multiphase media, including materials of technological and biological interest. www.physics.fau.edu
>
> Center for Complex Systems and Brain Sciences - The Center for Complex Systems and Brain Sciences was established in 1985 and brings together scientists from different backgrounds including laboratory biologists, psychologists, applied mathematicians and theoretical physicists. The center features state-of-the-art research facilities with access to extensive imaging facilities (EEG & fMRI). Various research and training programs at the center blend emerging concepts from complex dynamical systems with experimental techniques at the molecular, cellular, behavioral and cognitive levels in brain science. www.ccs.fau.edu
>
> Center for Molecular Biology and Biotechnology - The Center for Molecular Biology and Biotechnology was established in 1997 and is committed to developing research and training programs in molecular biology and biotechnology, and serves as a link between FAU, other institutions and industries in this field. The center's primary goals have been to create a strong base in molecular biology, functional genomics and related fields; maintain cutting-edge research; and to train students in this discipline to prepare them for careers in the pharmaceutical and biotechnology industries. www.science.fau.edu/cmbb

FAU's Harbor Branch Oceanographic Institute - Founded in 1971, Florida Atlantic University's Harbor Branch Oceanographic Institute is a research community of approximately 150 marine scientists, engineers, educators and other professionals focused on Ocean Science for a Better World. The institute drives innovation in ocean engineering and exploration, coral research and conservation, marine drug discovery, estuarine and coastal ecology and observation, marine mammal research and conservation, ocean dynamics and modeling, aquaculture and marine science education. To support these efforts and fulfill its potential as a public institution, Harbor Branch seeks to develop collaborations with life science and technology organizations and other entities, placing particular emphasis on intersections of environmental, societal and economic benefits. The site comprises 32 buildings set on 144 acres along the Indian River Lagoon estuary. www.fau.edu/hboi

Jupiter Life Science Initiative - The Jupiter Life Science Initiative is aimed at building educational and research capabilities in the life sciences on FAU's John D. MacArthur Campus in Jupiter, and is a collaborative effort between the Charles E. Schmidt College of Science and the Harriet L. Wilkes Honors College. www.fau.edu/jlsi

The Jupiter Life Science Initiative may be the best low hanging fruit for the BDB to focus on. The presence of the Honors College, the College of Science programs, wet labs for research and instructional activity, two internationally renowned research institutions, available land and a locality supportive of growing the industry and this area lay the groundwork for addressing the critical needs of the industry.

FAU is engaging in efforts to foster an entrepreneurial culture among its faculty and students. Efforts include teaching faculty how to recognize commercializable discoveries; streamlining and simplifying licensing policies; imbedding the discovery and licensing/disclosure activity in the tenure and performance process; and helping students to develop companies through Tech Runway. According to Flynn, FAU is working to build a "Culture of Applied Science".

Palm Beach State College

Palm Beach State College (PBSC) was founded in 1933 and was Florida's first public community college. Today, PBSC serves 48,000 students annually and offers bachelor's degrees, associate degrees, and professional certificates as well as career training and professional development. A strength appears to be in the healthcare field, with emphasis on professional training and career development. PBSC is the "go-to" institution when it comes to developing training programs specific to health sciences. For example, in 2012, the Banner Center for Life Sciences offered a four-series workshop at Scripps Florida. The purpose was to help scientists explore career paths and the fundamentals of starting a business from the research work they do in the Scripps labs. Dr. Tod Fairbanks, a PBSC

faculty member taught the workshop entitled, "Business Basics for the Life Sciences Industry. Participation was positive and well received. These events were open to the community with a majority of participants being Scripps postdocs and graduate students.

Employ Florida Banner Centers, through a Workforce Florida, Inc. (WFI) grant, offered training modules for pharmaceutical manufacturing and medical device manufacturing; unfortunately, the grant and the business model required was not sustainable. However, the program is a good model of partnering with government agencies, industry and educational institutions as a means to provide a one stop resource. A possible way to move towards this is to reach out to Scripps and Max Planck to and coordinate with their counterparts who are responsible for ongoing training, learning, and program coordination.

Keiser University

Keiser University (KU) was founded in 1977 and serves over 20,000 students on 17 campuses. KU is a private "career" university offering associates, bachelors and doctoral degrees. The emphasis at Keiser is career versus research activity (undergraduate or graduate level). The university was founded to help adult learners further their careers. Degrees include a BS (BMT, Pre-Med) in Biomedical Sciences which will be available in the near future at the former Northwood University West Palm Beach location. Other majors offered in Palm Beach County include: Health Science BS, Health Services Administration, Sports Medicine, and Nursing. Additional medical and health science related fields of study are located outside of Palm Beach County (i.e. Port St. Lucie, Melbourne). Keiser offers an Associates in Biotechnology at the Port St. Lucie campus; and the Bachelor's degree in Biotechnology is offered at the Jacksonville, Orlando, Port St. Lucie and Tampa campuses. Keiser faculty and leadership have expressed an interest in working with the county and industry to develop meaningful programs that are mutually beneficial. Optimism was also expressed with the possibilities that may be presented with the new campus location.

NOVA Southeastern

NOVA Southeastern (NSU) is a private, non-profit research university based in Ft. Lauderdale, FL. The school touts $82M in external funding, and has 250 research projects that include: anti-cancer therapies, breast cancer, stem cells, disorders causing blindness and wildlife DNA forensics. NSU features Colleges of Medical Sciences, Pharmacy, Nursing, and Osteopathic Medicine. NSU competes with other Florida state institutions to attract students living in the state, including schools in Palm Beach County, and in collaborating and partnering with local businesses via internships and other outreach activities. The school recently broke ground in neighboring Broward County on a 215,000 sf Center for Collaborative Research (CCR) that will house a supercomputer, wet labs and an NSU Technology Incubator. The CCR will also house a General Clinical Research Center with an

outpatient facility. In contrast to FAU, NSU has a straightforward website that addresses industry needs and establishes a direct inquiry feature for companies interested in leasing space in the new Center. Information includes floorplans, listing of features and amenities with contact information for the leasing firm, Colliers.

Palm Beach Atlantic University

Palm Beach Atlantic University (PBA) is an interdenominational Christian university founded in 1968, with a total enrollment (residential and day/evening students) of just under 4,000. The School for Arts and Sciences offers programs in Biology, Marine Biology, Molecular Biology and Biotechnology. Basic education and career preparedness are the objectives, rather than research activity and training. PBA has campuses in West Palm Beach, Wellington, and Orlando. The School of Arts and Sciences offers a program of study in Biology with concentrations in: Botany and Environmental Science; Graduate School preparation; Marine Biology; Molecular Biology and Biotechnology; Pre-health professional preparation; and Zoology. The university also offers a Master of Science in Nursing, and Doctorates in Nursing Practice and Pharmacy. The school's faculty expressed support for the industry and a willingness to work together. Naturally, all schools are subject to accreditation standards, but the openness to work together build a workforce and to provide opportunities to their students is an absolute priority.

Higher Education in the County

Universities should be major economic development and workforce drivers; however, the efforts of higher education institutions in the county to be such have not been as pro-active as similar institutions in more established life science industry clusters. The public and private institutions of higher education in Palm Beach County have productive departments and centers, populated by faculty who are dynamic and visionary in their fields. They are resources that should skillfully combine academic excellence and research vision. Collaboration – open and transparent – is an ever evolving cultural value at institutions, and therefore, Palm Beach County must be prepared to embrace, promote and assist in this activity. If such culture is promulgated inside and outside these institutions, then collaboration becomes fuel for a powerful and effective engine for economic growth. A facilitator to foster and to encourage business acumen and entrepreneurship will help encourage these institutions to the next level.

Creating name recognition, awareness and regional affiliation for these economic gardening efforts may translate to more funding from alumni, corporations, foundations, and non-profits – both locally and nationally. Published and peer-reviewed articles from students and faculty need to be celebrated not just on the institutions' websites but through other outlets as well. Immense potential resides within FAU and the other area schools. The

relationship must be valued and continued in an organized and deliberate manner. Finding opportunities that will be value propositions for both sides will involve many discussions to ensure that partner interests are aligned.

NON-PROFIT RESEARCH ORGANIZATIONS

Max Planck and Scripps are internationally renowned research and educational institutions that harbor some of the greatest research minds in the world. The general public must be educated to understand that these entities are engaged in basic research and development. They are similar to universities in that they are tasked with designing research, seeking funds for their research, and publishing their discoveries. Like a university, they too have financial and leadership challenges in transitioning from R&D to commercialization.

The efforts of these nonprofits should not be confused or transposed with the job generation potential of pharmaceutical manufacturing entities. In discussions with some local political entities and businesses, the lack of understanding of what Scripps and Max Planck actually do, as well the lack of understanding of the difference between basic research and translational research, became evident. The time horizons and investment necessary to take a discovery from the bench to market are lengthy and substantial. While the state and the county made significant investments to secure the location of these two preeminent research institutes nearly a decade ago in Palm Beach County, the county did not launch or continue to invest in a life science development strategy that would create a life science-focused entrepreneurial ecosystem. Rather, the institutes were left to operate in a vacuum without the development of the supportive community and infrastructure seen in competing successful market clusters. This lack of understanding of the research to market continuum has contributed to some disappointment and unrealistic expectations of the spin-out potential for the institutes. Several firms have been spun out of Scripps; however, few, if any, have evolved from Max Planck, because their mission is to conduct basic research. The community and politicians will need to hit the "reset button" in their understanding of research categories and timing for the evolution of spin-offs.

Max Planck Florida Institute for Neuroscience

At this esteemed institute, "(the) scientists conduct basic research in the service of the general public." The institute's mission is to understand the human nervous system– "its capacity to produce perception, thought, language, memory, emotion and action." Scientists are recruited to conduct their research in state of the art facilities, with the ability to recruit their own staff. In turn, these teams are tasked with securing research grants (federal, private, foundation, etc.) to help build the knowledge and understanding of the human neuro-system.

Opportunities for collaboration potentially exist at Max Planck within the context of their service areas and core (centralized shared research resources) facilities. Max Planck is open to discussions on mutually beneficial collaboration efforts, especially within its research teams and through training and offering educational programs. Dialog should be initiated between Max Planck and companies and universities to potentially utilize some of Max Planck's core facilities, including the mechanical workshop (3D CAD and highly specialized milling machines). The machine shop assists in designing, development and construction of scientific equipment, as well as modifications. In discussions with Max Planck employees, there is an openness to sharing this resource if it makes sense. For example, a company developing a medical device could collaborate with Max Planck and utilize the machine shop to create prototypes of the device. Other areas poised for collaboration include electron microscopy and light microscopy, from training and consultation to project development. Some microscopy workshops are already offered to high school and undergraduate interns. Finally, the Molecular Core is available to researchers as well, and includes molecular biological cloning, genotyping, and related capabilities.

Max Planck conducts numerous symposia that have a social/educational slant, providing ample opportunity for introductions and match-making in a collegial environment. Opportunities may also exist to provide sponsorship or quality of place tours to visiting researchers and corporate executives when Max Planck hosts two-plus day conferences. The Institute attracts world renowned researchers to its symposia, which could represent an opportunity for the BDB to leverage the "draw" potential of the Institute to raise awareness of county-wide assets; raise awareness within the community and elected representatives for the potential of the industry; and forge connections and awareness between the financially wealthy residents of the county with interest in making investments in sector-focused start-upcompanies.

The Scripps Research Institute Florida

Scripps' philosophy is to conduct research in the creation of "basic knowledge in the biosciences for its application in medicine, the pursuit of fundamental scientific advances though interdisciplinary programs and collaborations, and the education and training of researchers preparing to meet the scientific challenges of the future." (www.scripps.edu/about)

As a non-profit, the institute is set up similarly to Max Planck and other non-profit research entities in that the best and the brightest scientists in their fields are brought in to conduct research in state of the art facilities. At Scripps, according to one research faculty member, "You get to eat what you kill", meaning that a faculty member is solely responsible for bringing in grant funding to support his/her work. In today's hyper

competitive grant-funding environment, this can prove especially challenging to young researchers seeking to build their laboratories. Scripps researchers verbalized some frustration about the lack of funding and the difficulty in trying to set up a business from the discoveries made.

Scripps Florida hosts 54 faculty members and only 20 staff scientists (with 174 research associates). Areas of research are broader than the very tightly focused mission of Max Planck, and include cancer research, respiratory distress syndrome, and drug development breakthroughs such as adalimumab (trade name Humira), and Belimumab (trade name Benlysta, a lupus treatment).

The Florida campus focuses on cancer, chemistry, immunology, metabolism and aging, molecular therapies and neuroscience. These areas complement FAU's pillars and some of the focuses of some existing life science firms in Palm Beach. Opportunities for spin- offs and commercialization exist; however, as a non-profit, this institute has the same pressures as universities and lacks a strong infrastructure that promotes entrepreneurship and commercialization among its faculty and scientists. Scripps leadership stated that they wish "to foster interactions with their faculty with other institutions." Scientific core facilities are available at Scripps (cell based screening, high throughput screening, histology, metabolic, NMR, and proteomics and mass spectrometry), and may be an avenue for further collaborative exploration. However, several Scripps scientists and faculty members did state, "Scripps needs to do a better job educating their scientists on commercializing."

Graduate programs and postdoc training are available at Scripps, as are specialized seminars on various research topics. Community events are held – the "What If" Discovery Lecture Series, Food for Thought talks, and other events are held throughout Palm Beach County and cover a wide range of topics from aging to medical treatments to equines. Many events are also fundraisers and may bring together key decision makers and collaborators. The non-profits have sophisticated access to databases, charitable organizations and foundation contacts for their fund raising efforts.

Other Non-Profit Institutes

In 2006 and 2008 respectively, the Torrey Pines Institute for Molecular Studies in California and the Vaccine and Gene Therapy Institute in Oregon (VGTI) were successfully recruited to expand to Port St. Lucie, Florida; the facilities opened in 2008 and 2012, respectively. However, in 2015 VGTI-FL failed operationally, causing concern and anxiety amongst the public and politicians due to the substantial investment made.

While still active, Torrey Pines has struggled to maintain the level of funding support necessary to effectively compete. Unrealistic expectations and a lack of understanding regarding the research institute business model and the timelines and investment necessary for such entities to spin-out companies have contributed to the level of

disappointment. Non-profit research entities are research and development driven; this is what they do best. They are primarily tasked with securing funds for their research activity. There is a long time-line and transition period from research & development to commercialization. These nonprofits must seek out collaboration in- and out-of-state, as well as from the government and other foundations. Funding is tight, cyclical and extremely competitive. The communities in which they are located must be pro-active in helping to build an eco-system that supports their efforts, which in turn will encourage more activity, collaboration and commercialization.

The now vacant, former VGTI-FL facility may represent an opportunity for the region to offer fit-out laboratory space to start-up and emerging life science firms that could enable the region to harness the commercializable technologies already under development and provide the "plug-in ready" workspace necessary to advance those technologies to the clinic and beyond. From our conversations with representatives in Port St. Lucie, it is our understanding that the building remains in receivership and that the future fate of the building is underdetermined at this time. The BDB could consider partnering with St. Lucie County and the City of Port St. Lucie to develop a strategy that fully utilizes this resource as a key asset for the region's life science economic gardening strategy.

ENTREPRENEURIAL ENVIRONMENT – A DEFINITIVE CONVERGENCE BETWEEN DISCOVERY AND COMMERCIALIZATION IS ABSENT

Entrepreneurial activity in Palm Beach County exists for various industries; however, activity in life science startups is lackluster. County start-ups are lacking in meaningful financial investments. These firms are disadvantaged because they do not receive the benefit of local large companies and/or institutions actively spinning out real companies. Strong discovery engines or large biomedical companies that spin out other companies are still in the development stages. Typical technology generators are universities, but the challenges they face are similar to those at ALL state institutions: state funding, federal research funds, and budget challenges impacting recruiting efforts. Angel investors, venture capitalists, and high net worth individuals are present in the region, but competition is tight due to many interests inside and outside of the County seeking funds. Other regions throughout the country have a significant head start on the county and understand that advancing a life science economic gardening strategy requires a long horizon with continued, sustained high level investment at all levels of the entrepreneurial ecosystem.

Research Park at Florida Atlantic University

Entrepreneurial activity in Palm Beach County occurs, but in our experience, it is currently not occurring to the extent necessary in *the life sciences* to support and sustain a cluster. The strong discovery engines or large biomedical companies that spin out a variety of companies are years out. According to discussions with some of the local law firms and Florida-based venture capital firms, entrepreneurial activity is more prevalent in the Miami area, as well as north of Palm Beach County in Orlando and Gainesville. Without strong discovery engines or large biomedical companies to spin out companies, activity is almost non-existent.

The Research Park at Florida Atlantic University is successful in that it is at capacity, however wet lab research related firms are absent among current occupants. The park is at a critical point where it must expand to accommodate existing tenants and new applicants, as well as consider catering more to the needs of the bio-chem researcher (wet lab space). The Park is anchored by FAU and Palm Beach State College. Tenants include firms developing products and services pertaining to Alzheimer's treatment, medical devices, software, and is home to a business incubator.

Florida Institute for Commercialization & Public Research (FICPR) – This institute was formed in 2007 and is designed to work with the technology licensing officers at Florida's state universities and private research institutions. The Institute provides support by helping to create companies AND providing assistance in securing funding. Satellite offices are located throughout the state and are staffed by scientists, business mentors, and other service providers. Companies supported have products ranging from technology tools and sensors to medical tools, devices and pharmaceutical products.

Annually, the Institute evaluates products and services from approximately 100 firms from all over Florida. To date, the Institute has funded 30 companies ranging from bio, life science, and medical device firms to software and specialized coatings. A majority of the firms are in the central or "innovation corridor" region of Florida. Two firms (a medical device and a pharmaceutical firm) from Palm Beach County were funded.

The Institute also manages a matching fund - the Florida Technology Seed Capital Fund LLC. The fund stipulates that it funds the growth of early stage firms "primarily (but not exclusively) in the 23 county Florida High Technology Corridor." The firm identifies the primary technology centers as: Orlando, Tampa, Gainesville, Titutsville and Melbourne/Palm Bay.

The Florida Angel Nexus, a statewide angel investor network, is also promoted by the Institute. The Florida Angel Network also manages the NEXUS portal, which helps connect individual firms with investors. The Institute also hosted a seminar series in Miami called, "Doing Well While Doing Good."

In 2014-2015, FICPR funded FAU's EyeLife, which is developing an ultrasound device. In 2013-2014, FICPR funded FAU's flexReceipts, which developed point of sale software.

A majority of the companies funded between 2011 and 2015 by the Institute reside with the University of Florida, the University of Miami and other institutions outside of Palm Beach County. With the overall goal of the Florida Institute to keep technology in the state and foster the growth of new companies, Florida Atlantic University may wish to consider increased funding and organizational support from this Institute as a benchmark for measuring FAU's efforts to focus on the life science industry. See Appendix B - Companies Funded.

FAU Tech Runway – Empower. Engage. Experience.
FAU Tech Runway is designed to foster and to promote entrepreneurship. The program is based on MIT's Venture Mentoring System (VMS). The focus is to encourage undergraduate research, mentor FAU students in new business/ entrepreneurial activity and help create an ecosystem that benefits both the students of FAU and the local business community. Key partners include Gold Coast Venture Capital Association (GCVCA), New World Angels, Enterprise Development Corporation and the FAU Research and Development Authority. Coupled with other emerging strategic foci at FAU (pillar alignment), Tech Runway will play a key role in enhancing the entrepreneurial culture at the university; and in assisting entrepreneurs in advancing their businesses. Currently, the Tech Runway space does not include wet labs, which are needed by start-up and emerging life science firms to develop proofs- of-principle; conduct pre-clinical studies; and to ultimately advance products tithe clinic.

VENTURE CAPITAL – PRESENT BUT WHERE ARE THE DEALS?

As David Bates, Gold Coast Venture Capital Association, stated, "a lot of good is in the community; but a champion is needed…as each market is its own market." A majority of the venture capital (VC) and financial stakeholders we interviewed felt that some of the decisions and messaging of the past have created the situation the county is in now - a lack of marketing or the selling of a vision to the community on what needs to be done to build and to sustain this industry.

Kathy Chiu of Florida Angel Nexus observed that there is a "glut of early stage deals… and they need to be aggregated together. Deals are just too spread out." Several VC firm representatives expressed that they are not clear on how Palm Beach County wishes to engage, and they are not sure who the investors are in the area.

Funding from high net worth individuals was addressed in discussions, and Kathy Chiu summarized the situation best: "People/investors exist, but they do not want to be found." There is sensitivity that people guard their wealth information and that they do get overwhelmed with requests. Finding and matching the right opportunities with the right private investor takes careful strategy.

A statewide industry leader stated that Florida organizations have to overcome the big challenge of getting companies to understand that Florida is for business, not just tourism. This leader observed that access to and information on Angel and Seed funds is not as well organized or as robust as it could be. The individual also echoed comments shared by biotechnology groups and other firms that Florida companies are "terrible pitchers" of their stories.

VC firms are located throughout the state of Florida, and there are firm representatives who travel through southern Florida and Palm Beach County. As past studies for the BDB have reported, there is both a lack of density of firms and a lack of "quality" deals to merit the physical establishments of these VC firms. In our interviews, VC firms and some life science related firms acknowledge the presence of firms (or at least access), but as a matter of priorities, quality deals are lacking. VC firms also state that they are not aware of nor do they understand "what is out there" in Palm Beach County. Another observation is that access to angel or seed funds is not robust or organized. PriceWaterhouse and MoneyTree, in cooperation with the National Venture Capital Association, issue a quarterly report that illustrates that there are deals throughout the United States, including Florida. While 2014 was a "banner year" for deal flow in the biotech/medical device area especially in Boston, new reports show a drop of 2-3% from last year (RX Marketplace Quarterly Newsletter, September 2015) throughout the country.

According to the PricewaterhouseCoopers and the National Venture Capital Association website's "Investment by Industry" page for the third quarter of 2015, there was one life science deal that was transacted in Florida, with a value of $6.02M (nationally there were 121 deals representing $2B) and in the second quarter of 2015 there were three life science deals that equaled $31M transacted in the state of Florida (nationally there were 124 deals representing $2.1B). It should be noted that the state of Florida had more life science deals than Michigan, Tennessee, New Hampshire, District of Columbia, Oklahoma, and Virginia. The top states seeing life science VC investments are: California,

Massachusetts, New York, Texas, Pennsylvania, North Carolina, New Jersey, Ohio, Missouri, Washington, Maryland and Connecticut.

Overall, there appear to be strong investors engaged with the industry who are willing to travel to where deals are located. The challenge that needs to be addressed is the lack of a pro-active, in the field, commercialization liaison at the anchor non-profits such as Scripps and Max Planck. Later-stage funders are more prevalent than the angel and start-up funders. Palm Beach County needs to identify and educate a broader base of early stage and angel investors interested in "investing in the life sciences at home" rather than investing in entities located in perceived "better research areas" such as Cambridge, Cleveland and so on. Acknowledging the current competitive positioning of the county and regional research market in comparison to long-established life science industry cluster markets and creating a strategy that does not seek to duplicate or compete directly with those markets would be time well spent from a potential investor and community educational standpoint. This education should include improving messaging about regional discoveries, regional industry assets, and identifying eco-system assets, networking opportunities, and the best way to engage.

Resources are available and can be better utilized and promoted. For example, Gold Coast Venture Capital Association is a networking association that covers the "gold coast" - Palm Beach to Miami. The goal of this organization is to share information, and to build relationships among entrepreneurs and investors, as well as service providers. Some have commented that the primary focus appears to be IT firms; however, there are investment groups that participate which are focused on life sciences, medical devices and related technologies and services. Meetings are held primarily in Boca Raton, as well as other parts of Palm Beach County, Broward County and Miami. The BDB may want to look at a greater level of participation or at least promotion of these meetings, perhaps steering some of their companies to the more pertinent seminars with exposure to venture funds and investors, as well as "pitch events."

Shawn Titcomb of Noble Life Science Partners, an investor, stated, "(there is) a lot to do, a lot going on." He has an interesting proposal that merits further exploration: a tri- county initiative (Palm Beach, Broward and Miami-Dade) that addresses the needs of building a solid business and management team for life science firms. Shawn observed that there is c-suite talent in Palm Beach; however, there is a need for Chief Manufacturing Officers (CMO's) and Chief Scientific Officers (CSO's). Skilled workers and skilled scientists are in the county; however professionals at the executive level and in regulatory areas are lacking. These are important components to building a management team, and therefore in presenting a story to potential financial investors. With tri-county representation, building a talent pool and an "operational bridge fund," become more possible. Similarly,

there is untapped potential in the community of retired part-time and full-time residents with direct life science industry experience at the c-suite level who could immediately bolster the management level talent profile of the county and provide leadership to current and new life science firms in the county and region.

THE COMMERCIAL REAL ESTATE COMMUNITY – READY-TO-GO SITES?

To be competitive with neighboring counties and states, Palm Beach County must have one or two affordable ready-to-go sites for larger scale manufacturing facilities. The county must be prepared to answer questions specific to a bio- manufacturing firm prospect: the availability of power, water, sewer, and other key utility access. A clear and accurate outline of the permitting process and available assistance must be available. Unfortunately, there is an over-riding impression that getting through the permitting and zoning process at the county level can be challenging, inconsistent and time consuming. Some have even gone so far as to say that timing seems to depend on with whom one speaks. For a manufacturing or other firm, time costs money.

The cost of land in Palm Beach County is high (in the more populated areas, as much as $1 million per acre including locations within the biotech overlay zone). This price point gives pause to a life science firm and even an established pharmaceutical company. A value - proposition needs to be well thought out and verbalized to companies should a ready- to-go site be priced in this range. Available and alternative locations specific to pharmaceutical manufacturing that can compete with other U.S. locations (including some offshore areas) need to be considered and identified. Areas within the region that have lower land costs and economic incentives to be explored include the Glades region and urban redevelopment sites.

A tool that evolved from the recruitment efforts for the non-profit research institutions to Florida was the creation of a Bioscience Research Protection Overlay Zone. Designed with good intentions, it merits being revisited and updated as to the appropriateness and significance for the community and potential life science firms. Soliciting the input of the land owners and developers may be a way to facilitate expressing business goals, while mitigating some concerns regarding financial and planning risks. Additionally, the 21st Century has seen a blurring of lines in the business and work force involved in technology, data, and life science. These industries are better described as innovation businesses, and tend to work in symbiotic relationships when they are nearby, sharing both ideas and employment opportunities, as well as similar educational requirements. A recommendation to consider is to change the name of the overlay from Bioscience to “Innovation Overlay Zone” to indicate to those types of businesses the availability of sites in Palm Beach County.

An additional challenge is the restrictions placed on certain properties within the Bioscience Overlay Zone. In particular, the deed restrictions on prime property nearest to the concentration of Scripps, Max Plank, and FAU have blocked the development of speculative, "ready to occupy" office and industrial space. Developers and lenders are reluctant to invest in properties that are narrowly limited in occupant types. Many life science companies are unable to plan far enough in advance of new demands to wait for facilities to be built for them. Further, the limitation of uses within the Bioscience Overlay limits the pool of skilled workers in other fields that can be employed by life science related employers such as engineers, experienced manufacturing workers, computer and data specialists, and executive officers. The recent addition of United Technology Company's Building Products headquarters is solidifying the corridor as a hub of innovation, and room should be made to accommodate more businesses, and their employees, in close proximity to the four groups that are presently resident in that area (UTC, Scripps, Max Plank, and FAU). Towards this end, it is recommended that the deed restrictions on the Scripps property be revisited and opened to a more diverse group of innovative companies, and that the deed restrictions on the Alton properties nearby be removed to stimulate speculative development. Both properties, as others, should retain the Bioscience Overlay Zone designations, at least until that name is changed as suggested above.

Several Palm Beach County companies expressed frustration: on one hand, they are told that their company needs to remain and to grow in the county, yet on the other hand, developers and landlords are slow to respond or unwilling to make necessary improvements (from building expansion to parking spaces) to allow this activity due to the restrictions on other uses within the Bioscience Overlay. Frustration was expressed by some of the tenants at the Research Park at FAU, as well as firms throughout the county including KRS, Opko, DePuys Synthes, Sancilio and Modernizing Medicine.

Research space with basic wet lab configuration is expensive to build; developers and/ or landlords have greater exposure to financial risk. Speculative wet lab space development has not been financeable by even the most experienced developers due to the perceived lack of demand over the last ten years, which was exacerbated by the economic downturn. Even a lab-experienced landlord such as Alexandria Real Estate (ARE), which developed a speculative lab building in Jupiter, had to take on occupants not necessarily in the field of life science research and development to lease up the space.

The price point for lab space in the ARE building is viewed as a non-starter by many of the firms and individuals we interviewed. Today the ARE space is occupied, and additional speculative basic wet lab space is not available in Palm Beach County. Exploration of the development of wet lab space for life science research on and around local educational

institutions using public/private partnerships should be conducted, removing the reliance on the private sector that has been unwilling or unable to create such facilities. Additionally, identifying a site within the vacant 70 acres on the Scripps campus that is suitable for a 15,000 to 20,000 square foot wet lab building should be explored. The County could enable the issuance of Industrial Revenue Bonds in an amount sufficient to develop a wet lab building on the Scripps property, while a public/private entity is established to build and run such facility. Members of the partnership should include Scripps and FAU and other local bioscience-related entities, such as major healthcare providers and hospitals.

Another area for consideration is the development of scale-up and/or manufacturing sites for new and existing firms. Early engagement of the landlord and owners of potential facilities and sites is necessary. At the kick-off meeting, John Couris of Jupiter Medical Center mentioned potentially available existing space for life science companies needing research laboratories. The BDB and Jupiter Medical Center could begin this dialog with a developer. References from other landowners and commercial real estate members have been made that there may be less expensive sites available to build or buildings to retro-fit to accommodate life science start-ups. These properties may be less costly opportunities and possibly represent a starting point to begin meaningful discussions between communities and developers. The Cities of Jupiter and Boca Raton were the most vocal in supporting the industry and expressed a strong willingness to explore opportunities. Additional localities would like to learn more, but need to be invited and to be engaged; these interactions are typically beneficial and bring about understanding of the risk-benefits, as well as eliciting potential leads and partners.

As suggested, a revisit of the Bioscience Overlay should be conducted. Thought should be given to encouraging alternate related uses so as to provide a ready inventory of facilities and workforce for use by life science companies. The possibility of limiting the Scripps property to strictly life science uses, while opening up other sites nearby to standard office and industrial development and still prohibiting conversion to other uses such as housing or retail, can accomplish this goal, while still providing for over 1,500,000 square feet of space dedicated solely to life science undertakings.

The Bristol-Meyers Squibb (BMS) story is a case study for the BDB and county to consider. The BMS project was piloted out of New Jersey, arising out of the business improvement and cost control areas. The company wanted a lower operating cost, and a rich workforce that had experience in back-office and shared services (programming, data management) as well as the “dry sciences”, which includes skills in scientific writing, business support in managing vendor contracts, and proof readers. This also included capacity to help manage clinical trials.

Locations considered included Ann Arbor, Michigan; Toledo, OH; Miami, FL; Raleigh Durham, NC; Tampa, FL, Nashville, TN; and Louisville, KY. Consideration was given to these locations due to the presence of clinical trial activity at universities, medical centers and hospitals, as well as the presence of contract research organizations (CRO's) and statisticians. BMS also looked at the opportunity for the company to be an "early mover" and build a brand for itself with limited competition for workforce. Tampa provided this opportunity. Tampa's use of an "industry ambassador" was impressive and helped the company feel comfortable with the business environment. 600 full time jobs are anticipated upon full buildout.

BMS was very clear in communicating its business goals with this new center, and did not make promises to help Tampa re-shape its industry base to include research and development. Bristol-Meyers wanted to demonstrate that it was aware of the business model challenges Florida communities and non-profits faced.

Tampa's economic development team provided immediate responses to BMS regarding land, infrastructure, site work and timing for the development of a facility. Tampa, with neighboring communities, quantified and demonstrated an available workforce that is capable in the dry sciences and back office operations. The use of industry ambassadors to have candid peer to peer (business to business) discussions was effective as well. Especially critical was the fact that Tampa provided a sound business environment and team that understood the business needs of BMS and their requirement to be ready to go to market.

A potential opportunity to address near-term space needs may reside with the VGTI facility located in Port St. Lucie, just north of Palm Beach County. The BDB has proactively reached out to the community to begin a dialog to see if there may be shared opportunities with the facility, equipment and brain trust left behind. As mentioned previously, legal issues between VGTI and the state may delay concrete near-term opportunities, but discussions and interest in collaborating in a regional effort may bode well for the life science community.

MEDICAL AND HEALTHCARE PROVIDERS – BENCH TO BEDSIDE

Hospitals can provide opportunities for patients to participate in clinical research that may uncover ways to treat, prevent, diagnose and to understand diseases. Hospitals participate in clinical trials because of an existing patient base and the ability to provide care as necessary. Medical doctors are typically the lead principal investigators, with a team of additional health care professionals. Studies or clinical trials are sponsored or funded by government agencies,

foundations, the National Institutes of Health, Veterans Affairs, pharmaceutical companies and academic medical centers. The location of clinical trials is typically based on the location of whomever is conducting the study, particular patient cohort criteria, study size, and other factors. Trials can be held at doctor's offices, hospitals, community clinics and universities.

In Palm Beach County, there are fourteen community hospital systems, all important partners with area schools, service providers, and the community. Having research in a community hospital enhances patient care and often offers patients treatment they could not otherwise receive. One of the challenges of providing research in a community based facility is educating the public, alleviating their fears of something "experimental," and teaching them where they can obtain information on clinical research studies. The local population is not always aware that they can participate in the same research protocols that take place at major institutions and universities.

Clinical research activity occurs in Palm Beach County hospitals; and the hospitals have expressed a strong desire to further collaborate to increase the importance and amount of patient research. The research occurring in county hospitals could be enhanced, as suggested by the statement of an out-of-state attorney involved in the recruitment of a non-profit research entity to northern Florida, who said, "The hospitals in Palm Beach must do a better job of getting engaged in the mission of the non-profits (Max Planck and Scripps)." Clearly, there needs to be a sustained effort by all parties - the hospitals, Max Planck, Scripps, and private companies - if discussions on clinical research studies and collaborations are to move forward. The West Palm Beach Veterans Administration Hospital should be included in these discussions.

One example of the research that exists in county hospitals is Jupiter Medical Center's new partnership with Mount Sinai Health System, based in New York City. Patients from Jupiter Medical Center are able to take advantage of the clinical research expertise available at Mount Sinai through this partnership; Jupiter Medical Center physicians then incorporate that expertise in patient treatment plans. Such collaboration is very important: although it will likely not be a major source of discovery that leads to commercialization efforts within Palm Beach County in the immediate future, ultimately, it could evolve into a research and commercialization opportunity within Palm Beach County. It is important to note that Jupiter Medical Center has conducted clinical research trials for over a decade with its own research division and Institutional Review Board. For example, in 2015 Jupiter Medical Center conducted over 30 trials involving over 300 people.

Another hospital where research takes place is JFK Medical Center, which is engaged in approximately 40-50 clinical research studies annually, in almost all disciplines of medicine. Medical oncology research is mandated at JFK, and this makes up a large number of these studies. In addition, JFK Medical Center belongs to the Center for Information and Study on Clinical Research Participation ("CISRP"), a non-profit organization that educates the public and provides awareness of available clinical research studies.

There are over 3,000 physicians in Palm Beach County, and a vast majority of them participate in a variety of clinical research studies both on an inpatient and outpatient basis. They and the hospital systems may wish to work together in identifying areas of strengths and challenges and ways to address them. Outstanding medical professionals practice in the area and therefore, patients will travel to see them. Beginning the dialog internally will start to address the potential for additional partnering and hosting clinical trials.

The study's hospital focus group participants raised several consistent questions and points:

1. What are we trying to accomplish?
2. What problems are we trying to resolve?
3. Let's synchronize our "ask and solution."
4. We need to sit down with the research institutes and ask them what they need; and then, they can also ask us what we (the hospitals) need.
5. Work to build bridges with the non-profit institutes needs to occur.

The county's hospitals will need to work closely with Scripps, Max Planck and other research organizations to create a research collaborative. This can be accomplished with ongoing collaboration and a clear strategy. Additionally, the Palm Beach County Medical Society should be engaged, as its members would bring added expertise in the areas of patient engagement and physician leadership.

The bioscience sector within the healthcare industry should leverage and work with the existing hospitals within Palm Beach County. The medical centers within the county have the infrastructure and the ability to provide clinical research opportunities for physicians and scientists. A collaborative should be formed between the medical centers and the bioscience organizations that have the desire to conduct clinical research trials. While no single hospital that can provide all clinical research opportunities, a true collaboration among existing organizations can do so, and innovate in a sustainable way where the entire community can benefit.

PERSPECTIVES OF ELECTED OFFICIALS & OTHER STAKEHOLDERS

A majority of the localities, chambers, political leaders and networking entities support growing the life science industry in Palm Beach County. Some provided feedback of wishing to continue supporting the industry but also to focus time and efforts on high technology firms. Opposition to the industry was not obvious; however, it was evident that some organizations were not clear on how to define life science or what exactly a life science company meant. Some even understood life science to also include the presence of pharmacies.

Another observation is that not many people verbalized that the industry potentially offers "future employment for their sons or daughters." Another comment was that the industry and their own localities or organizations could do a better job celebrating the successes of life science firms, thereby raising the awareness of constituents and educating them as to the potential of the industry.

Important to note is that it appears that Florida (and Palm Beach County) have not been consistent in telling the life science story to incoming politicos and changing leadership.

Telling the story of the recruitment, placement and mission of these on- profit research institutes to changing leadership provides context and a deeper appreciation for past efforts, in order to develop a statewide ecosystem that is more competitive and supportive of the industry than in the present-day.

States such as Maryland, Massachusetts and North Carolina have been consistent and methodical over decades. This consistent investment and support has facilitated the creation of meaningful tax credits, training programs, organized collaboration efforts, and local and statewide political engagement. A great deal of time has elapsed since Florida's initial investment with the high profile non-profit research institutes; yet there does not appear to have been a concerted effort to tell the story or to educate new cycles of incoming political leaders – both on the local and statewide level. Unrealistic expectations are expressed, while the mantra of "they didn't come as they said they would" becomes an over generalized statement that feeds disappointment.

Now is an opportunity to address, clarify and correct statements so that expectations are managed and there is a realistic understanding that the industry is still 10-15 years out from early maturity.

Palm Beach County's Chambers ofCommerce

Important proponents of the life science industry in Palm Beach County are the local and county wide chambers of commerce. All chambers interviewed expressed deep desire to work more closely with the BDB and expressed concerns that "collaborations are being missed." Many also reiterated their desire to assist in marketing as well as to serve as a lead for legislative advocacy, as appropriate. Some chambers recognize that historically, there may have been a lack of trust between them and the BDB; but improvements have been made and communication remains essential.

BIOFlorida

BioFlorida is the statewide association supporting the life sciences in Florida. The organization promotes the life sciences industry in Florida as a strong and major economic driver for the state. Within the biotechnology, pharmaceuticals, medical devices, nutraceuticals, diagnostics and bio agriculture sectors, Florida proudly boasts 5,500 establishments and employs nearly 80,000 Floridians. (Source: Battelle/BIO State Bioscience Jobs, Investments and Innovation 2014).

BioFlorida's mission is to support and advance the life sciences in the state. Membership is diverse with members ranging from emerging and established life sciences companies, universities, research institutions, hospitals, medical centers, economic development agencies, investors and service providers. The association has a strong relationship with Enterprise Florida, and many of the regional EDCs and Chambers.

As the statewide voice of the industry, BioFlorida provides state and federal advocacy, hosts state and regional conferences and events designed to showcase scientific advancements, business innovations and policy debates, facilitates networking, educational and professional development opportunities, communicates the news and events, and provides information and resources on the industry.

The organization consists of 3 staff members and 7 regional chapters led by volunteers across the state, including a Palm Beach/Treasure Coast Chapter. Each regional chapter conducts programming that reflects the local strengths and needs of their area.

Fostering a relationship between BioFlorida and the BDB is important from both a regional and statewide perspective. Through sharing resources and connections and leveraging existing capabilities, the life sciences sector locally can be strengthend, and the resources supporting and growing the life sciences ecosystem and entrepreneurial efforts across the state can be augmented. Increased collaboration would expand the participation and effectiveness of both organizations and elevate the industry's advocacy in Tallahassee.

Legislative Environment

A favorable business climate, the creation of new jobs and improving the quality of education in Florida are high on the priority list for Governor Scott and members of the Florida legislature. Tax cuts in the manufacturing arena are under discussion, and bode well in the tool kit for attracting pharmaceutical manufacturers. Increased funding for Enterprise Florida has also been proposed and is supported by the Florida Chamber of Commerce.

Florida provides targeted industry incentives to the life sciences (biotechnology, pharmaceutical and medical device firms), pro-business tax structures, and various tax advantages for businesses. Involvement and dialog with associations and the local and state chambers are critical. An organized and unified lobbying and education effort by the various stakeholders is necessary to tell a consistent and accurate story that will help build critical and universal support for the life science industry and the research and education institutions (including the K-12 education system, community and four-year colleges, and the non-profits such as Max Planck and Scripps).

EXISTING PRIVATE INDUSTRY

Palm Beach County has a modest base of diverse life science related firms. Many firms are experiencing growth and expansions. However, the BDB must be specific and clear on how they wish to identify "life science" companies. Several lists are available, but after careful review and research, many companies on the list are service providers, sales offices, product distributors or even retail or re-sellers. More meaningful information is acquired when looking at the actual product or material being made.

Palm Beach County has many homegrown companies that are doing very well. These firms seem to fall into several areas or categories that may be worth closer scrutiny:

- Nutraceuticals/Supplements that are pharmaceutical grade
- Proteins, molecules, and raw materials for pharmaceutical manufacturing
- Compounding pharmacies, contracted research, and small batch manufacturing
- Stem cell, plasma, blood banks
- Medical devices and tools

TherapeuticsMD and **Sancillo & Company** are experiencing business success and stable growth. They are solid corporate citizens of Palm Beach County and will make great ambassadors when recruiting prospects. The products they manufacture tie in with the area's population as well as one of FAU's pillars – Aging.

TherapeuticsMD has over 100 employees. Its niche is women's health related products available by prescription only. Pre-natal and post-natal vitamins and hormone replacement therapies are important to a woman's health and aging process. Similarly, Sancilio produces pharmaceutical grade supplements and will be expanding into more sophisticated products that improve the quality of life and the aging process.

As these companies grow and expand into more specialized manufacturing, the requirement to hire individuals with more extensive operations and regulatory experience will increase.

KRS Global Biotechnologies, Akron Biotech, and **Dyadic** are biotech firms that focus on the production of molecules and proteins, and materials used by pharmaceutical manufacturers. Clean room manufacturing skills and production are critical to the success of their products. KRS Global provides compounding services as well as contract manufacturing. Having recently undergone an expansion, it will soon enter into pharmaceutical manufacturing. The skills sets critical for KRS' operations will be operational manufacturing in a clean room setting, and regulatory compliance.

Akron Biotech is a contract manufacturer and provider of biologics (reagents, regenerative medicine products, cell therapy kits). Products are produced under strict regulatory guidelines and in a clean room environment. Dr. Claudia Zylberberg, Founder and CEO, expressed very positive feedback on doing business in Palm Beach. She has been very pro-active in recruitment, targeting an experienced pharmaceutical manufacturing and regulatory-experienced workforce in Miami and Puerto Rico. She is very engaged in the community and is a board member of BIOFlorida.

Dyadic is based out of the Netherlands, with US headquarters in Jupiter. The company's mission is to discover, develop and manufacture proteins and enzymes for bio-fuels/bio-energy, pharmaceuticals and industrial use. The chairman of Dyadic's Scientific Advisory Board is the former president of the Scripps Institute. He remains engaged with Scripps as a faculty member. The fermentation process is a primary means of production.

Several companies that are collecting, analyzing, and processing (quality testing), storing and securing human stem cells, cord blood, and plasma are located in Palm Beach

County. Stem cell blood can be used for basic research for cell therapies, transplant and regenerative medicine. As personalized medicine grows in practice and popularity, the storing of stem cells and blood may increase in popularity and practice. Assureimmune (stem cell bank), Biotest Pharmaceuticals (plasma), BocaBiolistics (blood and tissue), and US StemCell Inc. (regenerative and cellular therapies from stem cells) provide a solid base for a growing field nationwide.

Numerous device specialty products are created in Palm Beach County, and range from lumbar spinal support products, surgical medical tools, and implants to diagnostic equipment with proprietary software for specific patient use. The skills necessary for these types of products require design, engineering, precision manufacturing and milling. All of these are invaluable skills that are widely sought and that crossover into many industries. Training must be encouraged in these areas as they are also found to be very attractive to larger scale manufacturers, including the biologics and pharmaceutical companies. These firms may benefit from access to Max Planck's 3D fabrication core.

POSSIBLE TARGETS

The BDB needs to review the list of actual life science companies in Palm Beach County, and review the possible synergies that may appear to facilitate collaborations with the universities, the non-profit research entities and other companies in the region.

- A ready-to-go site will be attractive to larger pharmaceutical and certain specialty medical device manufacturers.

- Companies engaged in screening, analyzing and creating molecules and proteins will be comfortable knowing that there are firms in the area with the service and equipment support needed, as well as labor force.

- As personalized medicine grows in popularity, there are a variety of opportunities to target these specialty firms, especially if there are opportunities to partner with the universities, a hospital and/or Scripps or Max Planck.

- As in the Bristol-Meyers Squibb Tampa case study, targeting a "dry science" operation (that which requires scientific writing, business support, vendor contract management, medical contact, proofreaders, clinical trial management, and back- office support), may provide interesting opportunities for the community across many industry sectors.

Finally, given the beautiful climate and the ease of living a healthy and active lifestyle in the county, firms that focus on well-being, production of anti-aging products such as skin care, hormone replacement, nutraceuticals, and so forth will find a natural fit and a good customer base waiting.

Longer term focus should align with FAU's pillars, particularly in the area of personalized medicine, neuroscience, and aging.

NETWORKING – COERCED COLLEGIALITY

As mentioned in almost all interviews and discussions, there are too many networking events spread throughout the county. The networking events are well intentioned, but tend to attract the same players or service providers hoping to solicit business. There is an opportunity to spread efforts, yet maintain a theme in bringing life science companies together. Many would like to see events that target only the founders and leaders of companies so they have an opportunity to network, hear stories, share best practices and begin discussions on collaborating or partnering. Additional events can be held that limit the number of service providers who attend. People need to be brought together, but they need to be brought together for a meaningful event. The Life Science Study kick-off is a prime example of the ability to fill a room for a program that holds every single participant's interest. The county is big and spread-out, but hosting a timely event with quality speakers on meaningful topics will encourage people to travel and to participate. Webinars or recording these events may also be an option.

The World Stem Summit, Max Planck and Scripps symposiums, FAU's events, BIOFlorida networking, and DePuys Synthes' training events are all opportunities to include visitors to the area, facilitate meaningful networking and learning, and to showcase Palm Beach County as a quality location for a company, its employees and its customers.

UNIVERSAL THEMES

The Business Development Board is well respected throughout the community and the state. There is admiration for the hard work, marketing efforts, and outreach put forth while navigating sometimes delicate political idiosyncrasies. Recurring comments and constructive feedback were provided and are listed below to offer a starting point for dialog. Some of the observations or comments may help frame future discussions with community members and stakeholders.

- There is no focal point or central leader for leading efforts in the life sciences. One is sorely needed.
  - Too many well-intentioned groups are operating in a vacuum with no end-goal stated.
  - Need a champion that will provide sustained effort.

- Need better managed and timely public relations and communications to the business community, the chambers of commerce and the press.

- Need more inclusion of business stakeholders, developers, land owners, and chambers in marketing and business recruitment.
  - Sooner rather than later is preferred.

- Need a better articulated strategy on what the BDB will do to attract the industry (and clarify who, what).
  - Tell us (the community as defined above) how we can help or participate.

- BDB and County tensions are sometimes observed.
  - Online permitting process is helping, but can be tough.
  - County employees need better training.

- There is confusion as to why hospital systems and healthcare providers are included in "life sciences."
  - Including them over-inflates actual numbers.
  - Needs to be a separate effort.

- Need a developer who understands biotech and who WANTS to participate.

- Every political leader has different priorities so don't rely on politicians, but keep them informed from transition to transition so that stories are "accurate and straight."

- Hospitals need to be more engaged in activities of non-profits such as Max Planck and Scripps; hospitals want to do research & clinical trials – if they can.
  - The Veterans Administration Hospital may be a more likely and logical partner with Scripps.

- Recommend that the BDB collect meaningful data and better communicate the "multiplier effect" when making announcements that include incentives.

- Opportunities for collaboration are being missed.
- Accountability is not with BDB – accountability is with the companies that sign performance agreements.
- Businesses, the press, and elected politicians cannot blame an entity for an industry not coming.
- Better dialog and understanding of the needs in order to support the needs of small businesses and existing businesses as they grow.
- Don't know who is here – once you figure it out, let companies know.

DEFINING THE LIFE SCIENCE INDUSTRY - FLORIDA AND PALM BEACH COUNTY

The State of Florida has a healthy life science industry base that, according to Enterprise Florida, includes 260 biotechnology firms, 220 pharmaceuticals, 620 medical device companies and 46,000 health businesses that include 720 hospitals (www.enterpiseflorida.com). The industry is anchored by several leading non-profit research centers and universities (some with medical schools and/or affiliations with hospital systems). The industry is spread primarily north to south on the Atlantic Coast and Gulf Coast, bisected by life science and health care related firms along the corridor anchored by St. Petersburg and Orlando.

Life science is a broadly used term, and for the purposes of this engagement, the term has been defined to include those firms that are involved in biotechnology research and development, pharmaceutical and medicine manufacturing, and medical device manufacturing.

NAICS - North American Industry Codes

The following are definitions of typical NAICS codes used to identify those firms in the life sciences, as well as examples. The categorizations are not always accurate, but they provide a benchmark. Definitions are from www.census.gov.

5417 – Scientific Research & Development Services – research and experimental development in physical engineering and life sciences.

> **541711**: Involves the study of the use of microorganisms and cellular and biomolecular processes to develop or alter living or non-living materials. The activity may result in development of new biotechnology processes or in prototypes of new or genetically-altered products that may be reproduced, utilized, or implemented by various industries.
>
> **541712:** Research and experimental development in the physical, engineering, and life sciences, such as agriculture, electronics, environmental, biology, botany, computers, chemistry, food, fisheries, forests, geology, health, math, medicine, oceanography, pharmacy, physics, veterinary and other allied subjects.

3254 – Pharmaceutical & Medicinal Manufacturing – medicinal and botanical manufacturing of uncompounded medicinal chemicals and their derivatives

> **325411:** medicinal and botanical manufacturing for use by pharmaceutical preparation manufacturers, and/or grading, grinding, and milling uncompounded botanicals. Examples include antibiotics, anesthetics, fish liver oils (medicinal), cortisone, herbal supplements, insulin, nicotine, salicylic acid, vitamins.
>
> **325412**: in-vivo diagnostic substances and pharmaceutical preparations (except biological) intended for internal and external consumption in dose forms, such as ampoules, tablets, capsules, vials, ointments, powders, solutions, and suspensions. Examples include birth control pills, antacid preparations, analgesic preparations, botanical extract preparations, eye and ear preparations, hormone preparations, thyroid preparations, sedatives.
>
> **325413**: in-vitro (i.e., not taken internally) diagnostic substances, such as chemical, biological, or radioactive substances. The substances are used for diagnostic tests that are performed in test tubes, petri dishes, machines, and other diagnostic test-type devices. Examples include: blood glucose test kits, HIV test kits, hormone diagnostic substances, pregnancy tests.
>
> **325414:** These manufacturers make vaccines, toxoids, blood fractions, and culture media of plant or animal origin (except diagnostic). Examples include antigens, antiserums, vaccines (bacterial, virus), blood derivatives, plasma.

3345 – Navigational, Measuring, Electromedical, and Control Instruments Mfg.

334510: manufacture apparatus such as magnetic resonance imaging equipment, medical ultrasound equipment, pacemakers, hearing aids, electrocardiographs, and electro medical endoscopic equipment. Additional examples include defibrillators, MRI's, dialysis equipment, pacemakers, hearing aids, laser equipment.

334517: irradiation apparatus and tubes for applications, such as medical diagnostic, medical therapeutic, industrial, research and scientific evaluation.

3391 – Medical Equipment & Supplies Manufacturing

339112: surgical and medical instruments for surgical, ophthalmic, and veterinary use (except electrotherapeutic, electro medical and irradiation apparatus). Examples of products made are syringes, hypodermic needles, anesthesia apparatus, blood transfusion equipment, catheters, surgical clamps, and medical thermometers.

339113: surgical appliances and supplies such as orthopedic devices, artificial limbs, biohazard clothing, surgical dressing, sutures, cotton and cotton balls, depressors, operating room tables, wheelchairs.

COMMUNITY PROFILE

Life Science Employment

Facility Logix gathered life sciences and biotechnology-specific employment statistics for Palm Beach Beach County as part of the Miami-Fort Lauderdale-West Palm Beach, FL MSA. Palm Beach County consists of 38 cities and towns over a massive 1,977 square miles (does not include Lake Okeechobee). The economy is diversified and industries span the agriculture, business/financial, equestrian, IT/telecommunications, aerospace, manufacturing and life science sectors. The County has approximately 1.4 million residents. The current unemployment rate is approximately 5.8%. The average age of the population is 44, with 32.5% attaining a bachelor's degree or higher. The top goods-producing employers are in agriculture, aerospace, and distribution. In the services sector, the top employers are: the K-12 school system and higher education, Palm Beach County government, and the health care systems (the 14 hospitals mentioned previously).

Despite reportedly high numbers of "life science" workers in the region, a deeper and more detailed investigation of the North American Industry Classification (NAICS) code revealed that most "life science" employees were actually within the healthcare or care giver arena. A notable and critical mass of research scientists outside of a university is lacking. The BDB may wish to more narrowly define their use of terms such as biotechnology and life science to provide a more accurate picture of what actually exists in the region and to develop a focused strategy to grow this employment sector.

The definition of life science by BIO (Biotechnology Industry Organization) is, "biotechnology… harnesses cellular and bio molecular processes to develop technologies and products that help improve our lives and the health of our planet… Modern biotechnology provides breakthrough products and technologies to combat debilitating and rare diseases, reduce our environment footprint, feed the hungry, use less and cleaner energy, and have safer, cleaner and more efficient manufacturing processes" (www.bio.org, January 2015). Within Palm Beach County, traditional life science and pharmaceutical industry positions are present, but not in high or even moderate numbers. The numbers improve substantially when figures from other surrounding counties are included.

Important to note reviewing the attached tables: data was pulled from numerous sources: the Florida Power and Light database, the Federal Government's Bureau of Labor Statistics, and the Department of Commerce. Data is also referenced from Enterprise Florida. Numbers vary slightly due to rounding or the dates that data sets were pulled and/or adjusted by the Federal Government and support agencies.

The occupation titles listed below and used in our research to sort data for the following tables, are typical to the field of life science manufacturing, research and development. Positions in health care, hospitals, physicians' offices, et cetera are NOT included.

Code	Description
19-1011	Animal Scientists
19-1021	Biochemists and Biophysicists
19-1022	Microbiologists
19-1029	Biological Scientists, All Other
19-1041	Epidemiologists
19-1042	Medical Scientists, Except Epidemiologists
19-1099	Life Scientists, All Other
19-2031	Chemists
19-4021	Biological Technicians
19-4031	Chemical Technicians
19-4099	Life, Physical, and Social Science Technicians, All Other

The chart below compares 2014 occupational breakdown of jobs (aggregate of all positions listed above) typically found within the life science industry. Data was pulled from the FPL Resource Center database, which pulls data from the Bureau of Labor Statistics (third quarter of 2015), and other federal government resources.

The Miami-Fort Lauderdale-West Palm Beach, FL MSA has a 2014 population of 5,929,819 people. The Tampa-St. Petersburg-Clearwater, FL MSA has a 2014 population of 2,915,582. (www.bea.gov/regional).

Occupations by MSA Location (11 Occupations)

Region	2014 Jobs	2015 Jobs	Change	% Change	Median Hourly Earnings
Miami-Fort Lauderdale-West Palm Beach, FL	4,412	4,625	213	5%	$28.98
Tampa-St. Petersburg-Clearwater, FL	2,939	3,099	160	5%	$25.28

The same occupation data search was conducted on three neighboring counties to further illustrate the number of life science related occupations in: Palm Beach, Broward and Miami-Dade Counties.

Occupations by Three Counties

County Name	2014 Jobs	2015 Jobs	2014 - 2015 Change	2014 - 2015 % Change
Palm Beach County, FL	877	941	64	7%
Broward County, FL	972	1,026	54	6%
Miami-Dade County, FL	1,465	1,528	63	4%
	3,314	3,494	180	5%

In the healthcare industry for Palm Beach County the number of healthcare practitioners and support occupations are as follows:

Healthcare Practitioners & Technical Occupations (SOC 299099) and Healthcare Support Occupations (319099): 502 employed

**Data from FPL Resource Center and FL Department of Economic Opportunity*

In the healthcare industry for the counties of Broward, Miami-Dade and Palm Beach the number of healthcare practitioners and technical occupants are as follows:

Healthcare Practitioners & Technical Occupations (SOC 299099) and Healthcare Support Occupations (319099): 1,127 employed

**Data from FPL Resource Center and FL Department of Economic Opportunity*

An area to consider is the inventory of life science/biotechnology businesses that provide the necessary critical mass, community, and employment/recruitment opportunities for a firm establishing a presence in Palm Beach County. Facility Logix gathered data from surrounding sub-markets to provide a comparison to Palm Beach County. Several NAICS codes were selected for this comparative snapshot and provide interesting insight, especially when compared to state-wide figures.

Miami-Ft. Lauderdale-West Palm Beach MSA

Description	NAICS	Establishments	Employees March 2015	Average Weekly Wage
Biotech R&D	541711	85	1053	
Medicinal/Botanical	325411	9	194	819
Pharma prep	325412	78	2282	1924
Totals:		343	5353	1189

The above establishment, employment and wage data indicates that research and development and pharma prep firms are present, but are not an overwhelming strength within Palm Beach County, or the MSA. The average weekly wage is a positive and competitive consideration for firms conducting a site search, especially when they are looking at markets in Boston, San Francisco, and Maryland. A review of federal data and other sources support that there is not an abundance of biotechnology/life science firms in the region.

Employment figures do indicate an employment population within medical services, proving to be an asset and supporting claims of a workforce within the medical and medical technology fields. The chart below presents data for NAICS code 621511, described as “Medical Laboratories.” Note the significant differential in numbers with the term “medical.”

Quarterly Census of Employment & Wages
NAIC 621511

MSA 2015 Data	Quarterly Estab.	January Employment	February Employment	March Employment	Avg Weekly Wage
Miami-Ft. Lauderdale-West Palm Beach	**343**	**5292**	**5299**	**5353**	**$1189**

Bureau of Labor Statistics, December 2015

Enterprise Florida provides informative tables on private sector life science establishments and employees in Florida, and provides state-wide context and comparisons. A summarized snapshot is below:

Description	NAIC	Est.	Employees	Ave Annual Wage	Total Payroll $Millions
Biotech R&D	541711	262	2,372	$77,708	$184.3
Pharma & Medicine Mfg	541221	221	4,472	$65,139	$291.3
Medical Device	325622	622	18,926	$66,088	$1250.8

It is critical that references to life science and biotechnology are accurate in marketing efforts for Palm Beach County. The underlying message for the BDB is that employment data indicates that significant long-term focus and investment on growing a dynamic life science and biomedical sector is needed before this type of data will truly represent a vibrant cluster***. A consistent terminology use and communication of the industry definitions are recommended to make marketing efforts and discussions consequential and impactful.*** Palm Beach County can claim that the presence of a workforce, with the capacity to provide healthcare services and support within medical care industry, is present. Such workforce capabilities may lead to other opportunities in related fields. Careful consideration should be taken of how the region develops its life sciences and biomedical value proposition, market position and message moving forward.

Economic gardening of the current medical and life science related companies in the area must be nurtured and cultivated for future opportunity referrals and introductions. There are opportunities especially for the smaller "homegrown" businesses focused on integrative health and wellness. Communicating, collaborating and matchmaking with various local business contacts is critical. Many companies host training events, client

visits, et cetera to aid in this effort.

The World Stem Cell Summit, produced by the Palm Beach based Genetics Policy Institute, features thought leaders and practitioners from around the world in the fields of stem cell science and regenerative medicine. Partners and sponsors include nonprofits, academic research institutions and research foundations from around the country. The 2016 World Stem Cell Summit is scheduled to be held in West Palm Beach. The 2014 host, San Antonio, Texas, when pitching to their area the effort to host the conference, stated: "It's impossible to calculate the impact that the 2014 World Stem Cell Summit had on San Antonio, but the exposure to national and international bioscience industry leaders and investors was significant enough that Alamo City has boots on the ground in Atlanta this week in an effort to recapture the global event." (San Antonio Business Journal, December 11, 2015).

These Summit visitors are from various industries including information technology, pharmaceutical firms, medical device and financial firms from all over the world. Such events present occasions to showcase the area and quality of place, but more importantly represent opportunities for exposure to this international business community and its intellectual and clinical expertise. Co-attendance at conferences and tradeshows with current corporate "ambassadors" may give rise to introductions and business relationships that will lead to economic development opportunities. The BDB needs to give serious consideration to partnering and fully utilizing opportunities such as these.

Quality of Place – Quality of Life

Palm Beach County offers a myriad of restaurants, cultural activities, a dynamic "arts" scene, and active social and philanthropic activities. The County's climate – conducive to outdoor activities ranging from sailing/boating, horseback riding, and polo to golf and fishing, is a strong selling point to support marketing efforts to promote health and wellness or integrative health and related businesses in the county and in the region. These attributes need to be embraced and carried through in Palm Beach's mission to attract firms that embrace these qualities.

Our involvement in a variety of site selection efforts for the life science and biomedical sector indicates that quality of life (or place) issues, including the strength of K-12 education, access to the arts, and easily accessible wellness and recreational activities are very important in site selection decisions. This factor is clearly a strength for Palm Beach County; however, that alone will not support efforts to enhance the development of sector- focused economic development efforts.

The K-12 school system, despite its financial and teaching compensation challenges in the face of a growing population, coupled with dated instructional wet labs, has taken pro-active steps through teacher training programs, teacher internships and other measures to provide STEM education opportunities to students and to their families. Palm Beach County offers various academies throughout the area and has done well in providing science, technology, engineering and math to its population – with much success in underrepresented communities, especially in GIS, logistics and cyber security.

A substantial waiting list to enter into these academies illustrates how popular and how "hungry" families and their students are to participate in these quality programs. Dr. Peter Licata, Director of Choice & Career Options, is optimistic about getting more company engagement with the education system, thereby increasing opportunities "to teach beyond the textbook." School system leaders acknowledge that they need to be more intentional in keeping graduates in the county and therefore, need a better understandingof the landscape and of the companies in the area. No one will dispute the good intentions and efforts of the school system to improve; however, the situation is frustrating because competitive salaries for teachers and industry experienced professionals, as well as updated facilities to support ambitious curricula, remain a struggle that may severely impair the ability for the community to develop and to sustain a viable workforce for a technologically inclined industry.

Market Assessment Results (SWOT)

Based on the input gathered from interviews completed during the study, as well as our analysis of employment data and publicly available information, Facility Logix developed the following summary of Palm Beach County's strengths, weaknesses, opportunities, and threats.

STRENGTHS	WEAKNESSES
▪ Supportive local stakeholders ▪ Strong quality of life and amenity base ▪ Strong healthcare and medical workforce ▪ FAU and PBSC ▪ Cost of living in comparison with other life science cluster markets ▪ Proximity to Central and South America ▪ Presence of wealthy investors ▪ Favorable demographics for patient profiles for aging/neuroscience clinical trials ▪ 15 strong hospitals	▪ Lack of regional identity ▪ Limited scientific expertise in broad life sciences sub-markets ▪ Limited life science entrepreneurial culture ▪ Limited discovery and translational research at academic institutions ▪ Lack of bio-ready workforce/training ▪ Lack of sector-focused funding/investment sources ▪ Lack of plug-and-play lab space ▪ Awareness of and acceptance of time horizons and investment necessary in industry for economic development initiatives to bear fruit ▪ Lack of affordable real estate
OPPORTUNITIES	**THREATS**
▪ Capitalize on homegrown companies – create your own successes ▪ Expand relationships between institutions and regions to build critical mass, develop awareness and diversify areas of excellence ▪ Augment underdeveloped clinical trials infrastructure ▪ Identify and educate local investors and link to local investment opportunities ▪ Develop and offer community education that results in broader awareness and political support for industry needs ▪ Deploy retired executive bench of life science c-suite individuals	▪ Sector volatility & risk ▪ Federal funding shortfalls resulting in a decrease in research activity/discovery at Scripps, etc. ▪ Long horizon and focus necessary to achieve objectives – multiple changes in political leadership

As is often the case with SWOT analyses, strengths and opportunities often carry corresponding weaknesses and threats. For example, while the health care workforce is strong and continues to grow and has some lateral applicability to the hiring needs of life science companies, it does not offer direct bench research experience or offer the regulatory and compliance background and experience necessary for life science and biopharmaceutical manufacturing recruiters. If employees with the qualifications needed to fulfill these requirements are recruited from out-of-state, they may face challenging follow-on employment options for trailing spouses/significant others or for themselves if the recruiting employer's circumstances change due to cutbacks or acquisitions. Similarly, while the County, the region and its stakeholders are very supportive of industry growth and expansion efforts, the lack of understanding of what is involved to build a sustainable life science ecosystem from a public investment, private investment, and development standpoint and timeline creates unrealistic expectations and short-circuits the positive benefits and contributions of institutions like Scripps and Max Planck.

Best Practices from Other Markets

Facility Logix identified three peer group communities for analysis to inform the development of the life sciences strategy. We selected these markets based on the following criteria:

- Suburban counties without large, public research intensive universities;
- Regions with a bio-manufacturing focus requiring less research-intensive workforce; and
- Other Florida markets that have developed and are implementing a life science strategy

Montgomery County and the State of Maryland

In Maryland, both the state and Montgomery County, the state's largest life sciences sub-market, continue to develop and invest in the life science industry. According to Lindsey Robbins of *The Gazette* (2011), the state employed 71,618 in life sciences including the public sector at an average wage of $91,000 annually. The Maryland Biotechnology Center (MBC), modeled after the North Carolina Biotechnology Center and others, was formed as part of Governor O'Malley's 2020 Initiative. The vision of the center was illustrated in the Governor's 2008 2020 Initiative. The center was formally announced in the spring of 2009, later opening in the summer of 2009 at the Shady Grove Innovation Center in Rockville, with another office co-located at the World Trade Center in Baltimore. The MBC has an online presence as well. An executive director was named in 2010. The 2020 Initiative is a 10-year, $1 billion plan to build Maryland's reputation as a global leader in bioscience.

The center serves as a one-stop portal of Maryland's programs, resources and information to grow and to support the bioscience industry's innovation and entrepreneurship in Maryland. The Center purposefully promotes cooperation among Maryland Technology Development Corporation (TEDCO), the Department of Labor, Licensing and Regulation (DLLR), and the University of Maryland. The Maryland Biotechnology Center is part of the Maryland Department of Business and Economic Development. MBC's website boasts the following statistics:

- Maryland is home to more than 500 core bioscience companies, representing approximately 8% of the U.S. industry. This is the second largest cluster (per capita) in the U.S., and fourth overall in "core biotechnology companies (Ernst and Young, 2006-2008).

- Approximately **one-half** of Maryland's bioscience industry is engaged in **therapeutic development**, primarily bio therapeutics as opposed to small chemical molecules. Another 25 % provide supporting research services ("CROs"). The rest are creating gene-based diagnostics, integrating biologics and nanotechnology into medical devices, and developing innovative R&D technology platforms.

- There are approximately **45** Maryland companies conducting more than **150** clinical trials with preclinical pipeline development programs for novel bio therapeutics. Clinical focus strengths include oncology, CNS, cardiovascular, and infectious disease with a strong vaccine development expertise.

- The State of Maryland has invested more than **$700 million** in infrastructure (research parks, institutes, etc.), programs (Maryland Venture Fund, Biotechnology Investor Tax Credit, Nano biotechnology) and directly to bioscience companies over the past 20 years.

- Maryland has the third largest state **Stem Cell Research Fund,** which has committed funding of more than ***$*50 million** for peer reviewed research grants to date. Total fund commitment is **$71.4 million (FY 2007 – 2010)**.

In 2011 Maryland Governor Martin O'Malley announced Invest Maryland, an initiative designed to raise at least $70 million by selling tax credits to insurance companies with the proceeds being invested at a rate of fifty percent (50%) in biotech companies. The Maryland Biotechnology Investor Tax Credit, now in its sixth year of funding, has stimulated 5 years of investments of just over $64 million in 53 entrepreneurial bioscience enterprises.

For additional relevant statistics associated with Maryland's Life Science industry please visit: www.marylandbiocenter.org.

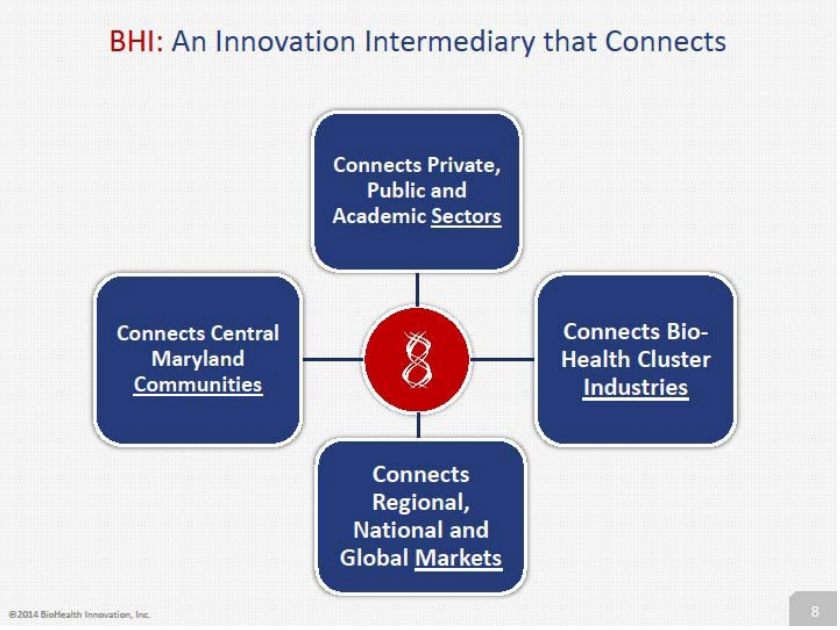
Montgomery County has supported economic development initiatives in life science and biomedical sectors for over thirty (30) years. These efforts originally were focused on the development of a traditional research park, the Shady Grove Life Sciences Center, located just northwest of the National Institutes of Health (NIH) and the Food and Drug Administration (FDA). This park is home to The Johns Hopkins University Montgomery County Campus. County initiatives include the following:

- Well-funded and managed incubation and accelerator programs
- Exemption of biotech projects from impact tax fees
- Industry-specific training programs offered through Montgomery College (MC)
- The grand opening of MC's Bioscience Education Center in 2014
- Degree programs offered by multiple institutions through the Universities at Shady Grove

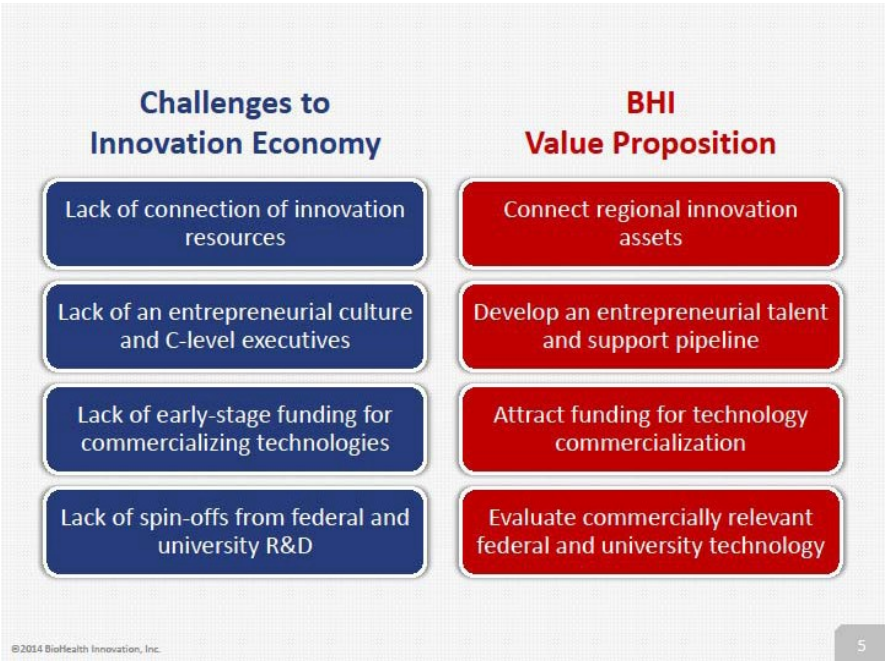
During fiscal 2012, Montgomery County launched the first local program nationwide to piggyback on a state level tax credit program. According to Kevin Shay of *The Gazette* (2012), ten local companies benefitted from the program.

In 2014, the county launched its inaugural Impact Grant program, which will provide five to seven grants ranging from $5,000 to $25,000 dollars for business and product development. The application window for this program closed the first week of January.

Montgomery County has long held the primary sub-market position in Maryland, trailed by Baltimore and Frederick. This lead position is underscored by the formation in 2012 of Bio Health Innovation (BHI), an "***Innovation Intermediary"*** as shown below (BHI, 2014). BHI is a public-private partnership, with a board of directors appointed from various pharmaceutical firms, universities, regional businesses and political appointments. Funding is through public and private entities, with some grants supporting various programs, such as NIH's Entrepreneur in Residence Program (EIR). Specific funding levels by entity are not available presently.



The concept for BHI arose out of the Montgomery County Life Science Task Force and a group of county-based life science companies. Initially conceived for just Montgomery County, the program rapidly gained partners and sponsors from throughout the state and now acts on behalf of Central Maryland. BHI's value proposition is illustrated by the graphic below (2014):



It is clear that Maryland in general, and Montgomery County in particular, represent several Best Practices for consideration by Palm Beach County, including but not limited to the following: target sector focus with some emphasis on genomics and proteomics; long investment horizon spanning multiple changes in elected officials; emphasis on economic gardening over large relocation projects; a range of programs matched to the specific stage of a life science company's development (e.g., start-up through product launch); sector focused tax policies; understanding that providing space for start-ups and beyond is an *infrastructure issue* in the absence of private sector offerings meeting that need; and workforce development initiatives tailored to the requirements of regional employers. Printed materials on the county are not available for inclusion as attachments in this report, however, information on Montgomery County's approach to biotechnology and the life sciences ecosystem (business support, hospital systems, and resources) can be found at:
http://www.choosemontgomerymd.com/business-community/industry-sectors/biotechnology-life-sciences/#.VuMWe6Ym7IU
http://choosemongomerymd.com/business

Eastern Carolina and the State of North Carolina

According to the North Carolina History Project (www.northcarolinahistory.org), during the mid-1950s, business and government leaders worried about North Carolina's economic future. The per capita income ($1,049) was one of the lowest in the Southeast and in the nation, and the state seemed dependent on manufacturing jobs in the agriculture, forestry, furniture, and textile industries. Leaders, including Robert Hanes, the president of Wachovia Bank and Trust Company, and Romeo Guest, a Greensboro contractor, planned how to attract modern industries to the Tar Heel State. Research Triangle Park (RTP) was their brainchild, and it later became one of the top five research centers in the United States.

Since that time North Carolina's life science and bio-manufacturing cluster has grown dramatically as shown in the graphic below. (See: http://www.ncbiotech.org/biotech-in-nc).

- 600+ Biotech Companies Including
  - 350 research and development
  - 125 contract research and testing
  - 110 production and manufacturing
- 60,000 employees with an average annual salary of $78,000
- 7% employment growth through the recession

North Carolina is known worldwide for its bio-manufacturing cluster. Key initiatives that support this segment of the industry have included the pre-eminent workforce training programs in the world for manufacturing technicians. In a phone conversation, Norris Tolson, former President and CEO of the North Carolina Biotech Center, described the three critical inputs needed for successful economic development initiatives centered on life sciences and biomedical:

1. Critical mass of research and development activity that will attract companies and that will produce commercializable discoveries. This cannot be created overnight.

2. An educated and sector-specific trained workforce.

3. Significant investment, both public and from the angel and venture capital communities.

According to Tolson, 28 of 58 community colleges throughout North Carolina offer biotech training programs. Investments of over $100M are made through a variety of channels to support sector growth. One of North Carolina's strategies has been to divide the state into regions, each of which focus on a specific sub-sector of the broader life science and biomedical sector. In addition to Research Triangle Park (RTP), there are five regional offices as follows (NC Biotech, 2015):

- Eastern Office – Greenville: The Eastern Office taps into research at East Carolina University as well as deep agriculture, manufacturing, marine and education resources. The region boasts research and development in agricultural biotechnology, bio-manufacturing and processing, and marine biotechnology, in addition to various networking opportunities.

- Greater Charlotte Office: The Greater Charlotte office brings an international flavor to its intellectual capital in technology and nutrition. These diverse strengths yield leadership in bioinformatics, genomics, medical devices, health and nutrition.

- Piedmont Triad Office – Winston-Salem: The Piedmont Triad contributes advancements in nano biotechnology, regenerative medicine, agricultural biotech, biopharmaceuticals and medical devices.

- Southeastern Office – Wilmington: The Southeastern region is known first and foremost for marine biotechnology research.

- Western Office – Asheville: The West thrives in entrepreneurship, agricultural biotechnology, biopharmaceuticals, medical devices and fermentation technologies.

North Carolina's Eastern Region is centered in Greenville, which is home to East Carolina University (ECU), ECU's Medical School and the Vidant Health Hospital. The eastern region includes Wilson County and the Town of Wilson, home to the Wilson Corporate Park. The Wilson Corporate Park is a mini-cluster of bio-manufacturing, anchored by Becton Dicksinson, DSM/Patheon, and Merck. The park is 500 acres and costs $28,000 per acre. Currently, 350 acres are available for development. The property is owned by Wilson County Properties, Inc., a private non-profit development corporation. All utilities, including fiber optics, are provided by the City of Wilson. Wilson County Properties is charged with maintaining shovel-ready properties for consideration. Since conception (the mid 1990's), the entity has constructed and sold six shell or spec buildings, and developed three industrial parks on the 500 acre park.

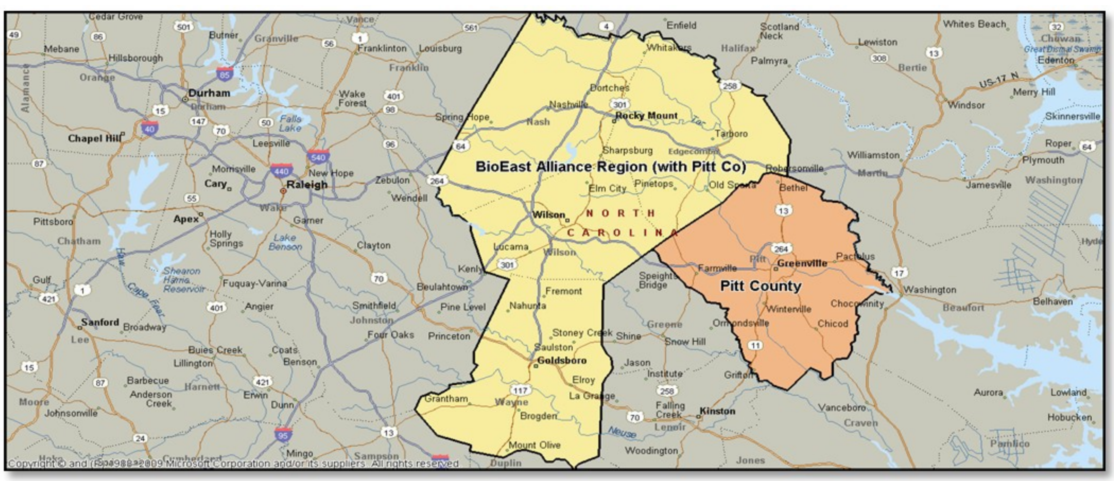
Wilson's bio-manufacturing industry includes 1,200 employees in over 1 million square feet of high-cost, highly regulated bio- manufacturing space which has resulted in over $500M invested in the town of Wilson. It should be noted that the pharmaceutical manufacturing industry first took hold in Wilson in the late 1960's with the location of a pharmaceutical manufacturing facility Glaxo/Burroughs. Hospira came to the region in the 1970's followed by Becton Dickenson in the early 1980's. Novo Nordisk followed in the 1990's.

The area has seen continuous growth despite the contractions and expansions of the industry. Wilson and its neighboring counties are responsive and prepared to work closely with their existing pharmaceutical manufacturers and interested prospects from around the world. Ready-to-go sites, infrastructure capacity and quick follow-up have

enhanced recruitment efforts. The unemployment rate within Wilson County is 8%; however, the surrounding workforce (approximately 16,000 commuters) easily supports the manufacturing facilities with needed skills running the gamut from manufacturing and machining to regulatory and research.

Especially critical is the partnership that has developed with the state universities and local community colleges, as well as the K-12 educational system. Pro-active steps are being taken to prepare high school students for work requirements and environment in a manufacturing setting. A specialized program has been created where students attend high school for five years with a curriculum geared towards technical skills – reading and writing technical reports, working as a team, and problem solving – especially on a manufacturing line. This program will streamline students into available positions with contract pharma and pharmaceutical manufacturing firms, as well as their support industries.

The local community colleges have worked with industry to develop training programs ranging from aseptic work skills, packaging, automation engineering and fermentation. Recruiting from former military for process maintenance tech positions has been especially successful. Manufacturing has a strong tradition in this region and therefore, the communities have taken this to the level that helps their citizens and their industry.



The City of Greenville shares similar characteristics with the Palm Beach and the South Florida Region. ECU produces large number of graduates through its undergraduate programs in the sciences; however, most of these graduates leave the area to work in nearby RTP where the jobs are. ECU's Medical School trains quality physicians, many of whom work in the nearby Vidant Hospital.

The region is located within the "Diabetes Belt" and there is significant state-wide clinical emphasis and priority placed on managing this crucial health issue. The emphasis on the treatment of diabetes is primarily centered with the research universities. Novo Nordisk, a major diabetes pharmaceutical manufacturer in the region, does NOT work with the schools in North Carolina, but rather with their research centers in Seattle, WA and Denmark. The mere presence of specialized pharma manufacturers does not necessarily drive research work with hospitals; however, the educational institutions particularly, facilitate research and development connections and activities in various diseases such as diabetes and cardio-related diseases.

Recently, Eastern Region counties (Pitt, Nash, and Wilson) partnered to create the Life Science Alliance, which will seek to grow the life science and biomedical presence in the region with a specific emphasis on bio-manufacturing recruitment. See Appendix C for the Eastern Region's brochure.

Other Florida Sub-Markets

Several life science sub-markets are in Florida: Orlando, Lake Nona, Tampa, and Miami. Each of these markets has implemented different yet deliberate strategies to fuel life science growth in their communities.

Orlando is ranked as one of the top modeling and simulation locations in the world, with a deep and technology-inclined labor force. Anchored by the University of Central Florida and several research hospitals including the Veterans Health Administration Simulation Learning, Education and Research Network, the community has made concerted efforts to capitalize on its labor force and the opportunities presented by dynamic research universities. Additionally, a prospect firm has a variety of options when it comes to locating its (build to suite or turnkey) new facility.

Unique to the area is a 172 acre mixed use development that co-locates a life science research center, hospital and medical care facilities. The Florida Hospital Health Village will soon feature three bio research centers featuring both wet and dry lab spaces.

Orlando has a stated goal to be an "innovative economy." The local businesses and marketing community determined that capitalizing on their strengths (modeling, simulation, healthcare, and life science research) and forming cross-disciplinary partnerships to attract businesses to the area was a worthwhile investment. IQ Florida (Innovation Quotient) was recently organized to focus on targeting life science start-up companies. The end goal is that start-ups will locate to Orlando, and areas like the Health Village, to gain access to organizations "that can help them get their products out faster, get it tested faster, reduce any bureaucracy, and

Possibly even raise money" (Rashes Thakkar, Snr. Mng Director of Tavistock Group).

Lake Nona has also gained recent attention as the community has focused efforts from the ground up, participating in an exciting program – Lake Nona Medical City. In fact, David Day, Asst. VP of Technology Transfer of University of Florida, proudly refers to their efforts as "truly grassroots," because of the proactive efforts by the local community, developers, state and local economic development groups, hospitals, and educational institutions to bring this park to fruition. The concept for this 650 acre health and life science park began in 2005. It is anchored by University of Central Florida (College of Medicine), the University of Florida Research and Academic Center, the Burnham Medical Discovery Institute and several hospitals.

Like the Health Village, the creation of this life sciences park demonstrates a deliberate strategy to bring education, research, medical care and life sciences together.

Tampa-Hillsborough claims over 600 life science firms that employ over 13,000 people in the community. Tampa is anchored by the University of South Florida – a Carnegie *very high* research institute ($428M) – the University of Tampa, Hillsborough Community College's Health Sciences and Nursing division and the Moffitt Cancer Center, among others. Hillsborough has embraced companies such as Moffitt, Laser Spine Institute, Lions Eye Institute and other leading medical facilities, successfully marketing the area for medical tourism. The largest employers in the region are: Moffitt Cancer Center, Florida Hospital, Tampa General Hospital and BayCare Health Systems. These employers plus the presence of research universities such as University of South Florida and University of Tampa have helped with recruitment efforts of a wide variety of life science and medical device companies.

The region is considering a study to determine if "medical tourism" is a possible targeted focus. The area is rich with tourist sites and state of the art medical care facilities for a myriad of treatments. Marrying their existing assets of climate, tourist attractions ranging from outdoor activities and sports, to museums and amusement parks, with medical care and treatment centers, the region hopes to turn their strengths and existing assets into opportunities for job and business growth.

Miami-South Dade is geographically a close neighbor to Palm Beach County. Miami also has the advantage of serving as regional and US headquarters for Latin American life science companies. As with the other successful submarkets in Florida, Miami is anchored by the University of Miami and its Life Science Park (built by Wexford Science & Technology). These campuses are located in Miami's "Health District" which includes specialty medical care facilities, six hospitals, and Florida International

University's College of Medicine and Biomedical Engineering program. The district is second in size and research and medical facility concentration to Houston, TX.

Interesting to note is the "health district," initially started around Jackson Memorial Hospital in 1912. The 1950's saw additional health care and medical school programs. The Miami Dade College Medical Center opened in 1977 and FIU Wertheim College of Medicine opened in 2006. The University of Miami Life Science & Technology Park is certainly central to the marketing efforts of the community – as the park allows occupants and visitors to have a "sense of place" in an otherwise dense urban environment.

In all of these instances, the communities assessed what they have and deliberately andstrategically planned how to brand and to market their communities. They utilized their existing resources by way of universities, research capacity and workforce to boldly create a community. Palm Beach County is not too far behind, with two non-profit research institutes, a growing and improving research university, a solid base of smaller, diverse and successful life science firms, and potentially several areas from which to choose in placing an innovative life science hub. Finding the right partners, dedication, and increasing the momentum for success will be necessary.

Statement of Need

Palm Beach County and its regional partners and stakeholders wish to build upon earlier investments in the life science industry which centered on landing Scripps and Max Planck nearly a decade ago. The life science and biomedical sectors represent an attractive opportunity to achieve economic growth for the County as these sectors are:

A. projected for growth given the aging population;

B. aligned with regional strengths represented in research institutions, hospitals and healthcare facilities; and,

C. Dependent on capital. The presence of high net worth individuals represents a potential source of the early stage and ongoing investment capital necessary to advance the development of life science products, medical devices, and life science service offerings.

Acknowledging that the current baseline from which to build the desired cluster needs augmenting, and recognizing that the region is in a catch-up position relative to neighboring Florida communities and other east coast states, the BDB and its stakeholders understand that realistic and bold recommendations are in order.

A parallel need is to define the region for this targeted industry sector initiative in comparison to state-wide sub-markets and for the potential customer community.

The challenges confronting economic developers seeking to establish and grow a life science and biomedical cluster in Palm Beach County can be daunting and will require creativity and perseverance if they are to be overcome.

Recommendations

To address this need, Facility Logix developed seven (7) recommendations designed to:

a. Capitalize on strengths and promote future benefits
b. Diminish weaknesses and prevent potential problems
c. Spur economic development and create high-paying, sustainable jobs

The opportunities that emerged from our interviews and the research we have conducted are summarized as follows:

i. Develop and provide community education programs to increase awareness and generate political support for industry needs;
ii. Identify local investors; educate local investors on life science investment needs and timelines; and link investors to local investment opportunities;
iii. Deploy resident "bench" of retired life science executives with c-suite experience;
iv. Expand relationships between institutions and regions to build critical mass, develop awareness and diversify areas of excellence;
v. Augment underdeveloped clinical trials infrastructure;
vi. Catalyze a stronger collaboration between hospitals, non-profits, and bioscience companies to create a "clinical research county" using existing resources.
vii. Capitalize on homegrown companies – create your own successes;
viii. Develop long-term investments that serve to augment translational research strengths; and
ix. Function in a truly collaborative manner with aligned interests to advance this initiative

The graphic below depicts how we applied the interpretation of the SWOT analysis to develop recommendations.

Positive Attributes	**Strength**	A core locational asset (or having the potential to become such) with slight to distinguishing competitive and market advantages.
	Opportunity	A target for short-term promoting actions, or to capitalize on as part of a longer-term strategy.
Negative Attributes	**Weakness**	A locational liability (or having the potential to become such), with slight to significant disadvantages.
	Threats	A risk that could jeopardize current performance and also may warrant contingent or corrective actions over the long-term.

The Business Development Board of Palm Beach County, in cooperation with Palm Beach County leadership, should lead this visionary initiative.

Recommendation ONE: Develop a Life Sciences Leadership Group

To assist the BDB in guiding and implementing the strategy, this new private sector led group will provide ongoing insight into industry trends, company needs, and unique opportunities relevant to the Palm Beach County market. This group shall have a high profile in the BDB's effort to promote and implement a successful strategy.

Actions:

- Identify a BDB staff member to lead the County's life sciences business development efforts. Communicate selection of the life sciences business development specialist to County life science companies and stakeholders and partner organizations
- Develop a list of proposed senior leaders drawn from industry, academia, the non-profit sector, industry organizations, County government, and state government. Do not limit range of participants to individuals from Florida or from any particular academic or non-profit institution. Send out invitations to join the Life Sciences Leadership Group (LSLG)
- Develop criteria for continued participation in the LSLG
- Develop work plan benchmarks for review and input from the LSLG
- Hold quarterly meetings of the LSLG to review progress in achieving

- benchmarks and to review long-term objectives and changing industry trends and requirements
- Leverage LSLG to aid in achieving collaborative goals necessary to successfully implement long range strategic goals, and to address the capital and c-level experience challenges detailed in Recommendation 3 (below)
- Leverage the LSLG as needed to assist the BDB in promotional efforts for life sciences economic development

Suggested Timeline: Short-term and ongoing. Minimal financial requirement

Desired Outcome: Engaged and committed visionary leadership team

Measuring Success: Actively engaged leadership that continually demonstrates thought leadership and facilitates the implementation of strategic initiatives

LSLG attendance of greater than eighty percent (80%) at all quarterly meetings

Demonstration of active involvement from all LSLG members

Recommendation TWO: Foster the Development of a Life Sciences "Aware Community"

As evidenced in many of our interviews with a variety of participants, it seems clear that the majority of Palm Beach County residents and business community members are not conversant at any level about the life science industry and the opportunities it presents by way of potential employment for county residents and their families; nor about the potential of commercializing technologies that may one day impact human health and longevity, the use of environmental resources and climate issues, or the County's food supply and security. Without such basic awareness it will be difficult for the County to support directing limited public funds to advance the development of the industry in the County. In many cases the only awareness individuals have with the industry is press coverage of the perceived short-comings of the non-profit research institutes relative to economic growth objectives.

Actions:

- Engage a marketing firm to assist the County in life science marketing efforts.
- Develop a "Know Your Bio" campaign designed to introduce County residents to the industry.

- Work with County companies and academic labs to arrange for "tour days" for County residents.
- Identify County residents who have benefitted from products or services developed by the life science industry, and encourage them to voice their experience as part of the "Know Your Bio" campaign.
- Engage an industry knowledge and training firm such as Biotech Primer to offer basic biology background training to local political representatives.
- Continue to provide support for K-12 efforts to provide industry-specific instruction by seeking opportunities to offer hands-on experiences in the sciences for County youth.

Suggested Timeline: Mid-term and ongoing, some financial Commitment

Desired Outcome: A "Life Sciences Literate Community"

Measuring Success: Increased public support for the industry

Recommendation THREE: Expand the "Behind the Gates" Program to Identify Industry-Specific Investment Capital and to Bolster the C-Suite Expertise Available for Palm Beach County and Regional Life Science Firms

A critical component of any life science cluster building effort is to identify sources of early stage and ongoing investment capital to support the product development needs over development timelines that can extend from ten to fifteen years and longer. There is an active investment community in Palm Beach County and throughout Florida; however, the community has limited knowledge and experience in investing in life science transactions. Palm Beach County is home to many high net worth individuals who invest in life science companies; however, they do not invest in the County, nor the state for that matter.

Similarly, c-suite executives experienced in life science product and business development are crucial to effectively leading companies, raising money, and bringing products to market. Many individuals who have retired from successful careers leading life science companies reside either part-time or full-time in Palm Beach County; several of them have expressed a desire to get involved in something "outside the golf course".

Previously the BDB launched a "Behind the Gates" initiative to identify high net worth individuals; however, this effort was not *specifically focused on identifying these individuals for life science investment or to engage in leadership roles with local start-up companies.*

Actions:

- Expand the "Behind the Gates" initiative and revise to include life science sector specific intent.
- Have the LSLG identify "ambassadors" who can tell the story of life science and personalize it to match outreach candidates.
- Create opportunities for County companies to present "Science Fair Days" where attendance is limited to "Behind the Gates" attendees.
- Develop a roster of experienced c-suite individuals and their qualifications and utilize this list when recruiting companies, seeking investment commitments, and other related activities. Obtain permission from c-suite roster individuals to utilize their experience and credentials for recruiting and marketing efforts as appropriate.

Suggested Timeline: Immediate and ongoing, some financial commitment

Desired Outcome: New sources of investment capital for County-based life science start-ups

Roster of c-suite executives for leadership roles in County-based life science start-ups

Measuring Success: Increased ecosystem activity from early-stage companies

Better ability to respond to site selection consultants and others regarding c-suite leadership with industry experience

Recommendation FOUR: Enhance Sector-Focused Networking Efforts

In a vibrant sector-focused cluster, networking occurs both intentionally and spontaneously. The best networking results in continually growing collaborations and expanded business and personal partnerships and serves to break down silos of expertise.

Actions:

- Create a regular LSLG-sponsored event hosted in different regional settings.
- Over time, build number of events to a minimum of four (4) cluster meetings and one (1) event per year.
- Consider using these events to solicit sector-specific community feedback via focus groups.

- Consider piggybacking on other events that showcase regional assets, such as events held at Max Planck and Scripps, the World Stem Cell Summit 2016, and others.
- BDB joins BIOFlorida and leverages membership for County-based companies.

Suggested Timeline:	Short-term and ongoing, minimal financial commitment
Desired Outcome:	Enhanced networking opportunities, exposure to, and awareness of Palm Beach County sector-specific assets.
Measuring Success:	At least six events held in the County region during 2016 Upward trending attendance at meetings and events over the year Announcement of one new collaboration initiated at one of these events

Recommendation FIVE: Develop a Regional Definition & Identity

Align the interests of the region and its partners under a single identity that positions the region as a unified entity for life science and biomedical development.

Actions:

- Develop a Memorandum of Understanding or Partnership Agreement that includes all of the region's municipalities and counties, as well as institutions of higher education, and aligns their interests and strategic plans.
- Develop and issue a Request for Proposal to engage a sector-focused branding and marketing group, such as Chempetitive or Right Source Marketing.
- Develop and host a plan for a series of events at key locations throughout the region to announce the partnership. At each event location ensure that the LSBLG is represented and require the physical participation of the elected leadership of the event host, as well as at the physical participation of the elected leadership from two of the other partnership municipalities.

Suggested Timeline: Short-term to six-months. Modest financial requirement.

Desired Outcome: Sector-focused brand identity used consistently in both internal and external communications by all BDB partners.

Measuring Success: One region and a consistent message integrated into all marketing channels for sector-focused efforts of all participants

Recommendation SIX: Enhance the Vertical Entrepreneurial Support Ecosystem

The County should focus on enhancing efforts to grow indigenous companies, which could result in long-term, sustainable benefits including diversifying and growing the overall economy and creating high-paying jobs. The horizon for implementation and subsequent realization of success based on this recommendation will be long-term. This is particularly important due to the fact that the region has had limited success in recruiting large life science and biomedical companies to the region.

Actions:

- Lead the effort to create a Florida or even a Palm Beach County Impact Grant that offers small awards to start-up companies for a variety of uses such as business plan analysis, market analysis, product development, etc.
- Determine sources of funding that could be used to address the high cost of laboratory fit-out for poorly capitalized life science firms. This could take the form of lease guarantees; fit-out laboratory suites; or capital improvement funding via grants or loans.
- Lead the effort to create a sector-specific seed fund to invest in early stage ventures. Leverage individuals identified in the "Behind the Gates" recommendation to accomplish this.
- Provide life science and biomedical specific resources such as mentors and coaches at existing co-work, incubation, and accelerator facilities. Build a roster of advisors and mentors from outside the academic community. These individuals should be accessible on a regular basis to the regional entrepreneurial community, and among them they should offer product or services expertise; legal expertise; financing expertise; accounting expertise; product or service market positioning expertise; product or services delivery expertise; clinical trial and regulatory expertise; etc.
- Offer programs such as Small Business Innovation Research Grant (SBIR) workshops twice annually to educate researchers from Florida Atlantic University (FAU), Palm Beach State College (PBSC), and other institutions on

how to obtain SBIR grants and/or other funding opportunities. If programs are offered currently through any of these institutions, open the enrollment to include faculty from other schools.

Suggested Timeline: Six months to ongoing. Needs to be provided and funded for a Minimum of five (5) – ten (10) years. Significant effort and financial requirement. Funding will likely be needed on an annual basis and be split among private participants, as well as federal, state, and local governments.

Desired Outcome: Enhanced entrepreneurial activity leading to economic diversification and job creation.

Measuring Success: Increased number of sector-focused new company formations

Increased angel investment in County-based companies

Recommendation SEVEN: Partner with FAU, other Regional Universities and the Non-Profit Institutes to Catalyze Life Sciences Entrepreneurial Efforts

The change in presidential leadership at FAU coupled with the launch of FAU's medical school and the expanded emphasis on life sciences and STEM education, particularly at the Jupiter Campus, offers an unprecedented opportunity for the County and its academic partners to take a critical look at collective commercialization outcomes under the present framework.

Actions:

- Develop and execute a Memorandum of Understanding with FAU, PBSC, Nova Southeastern University (NSU), Scripps, Max Planck, and other regional research institutions to create a Regional Research Alliance focused on life sciences
- Work collaboratively with the Regional Research Alliance to evaluate alternative means of creating and/or enhancing an entrepreneurial culture among faculty
- Provide financial and personnel support where possible to academic partners to assist them in re-vamping commercialization and technology licensing efforts to align with best practices
- Provide guidance and support within the Regional Research Alliance to determine the applicability of selecting areas of excellence such as Personalized Medicine, Neuroscience, and others

- Provide funding support to offer faculty workshops in commercialization through the Regional Research Alliance
- *Advocate as a regional group at the state level* to secure additional support for life science commercialization efforts

Suggested Timeline: Mid-term and ongoing, ***will require long time horizon for full benefit***.

Some financial requirement

Desired Outcome: Enhanced collaboration between regional research institutions and demonstrable increase in entrepreneurial focus among research faculty

Measuring Success: Higher rates of technology licensing

Greater number of new businesses formed and higher success rate for new businesses formed

Increased life sciences employment in the County

Increased investment in life sciences in the County

Increased tax base in the County

APPENDIX A
Individual & Company Interviews

	Last Name	Title	Company / Affiliation
Mireille	Aleman, PhD	Associate Professor of Chemistry	Palm Beach Atlantic University
Julia	Amadio	Chief Productions Officer	TherapeuticsMD
Sherry	Ambrose	Director – Business Development	Enterprise Florida
Peter	Applefield	Founding Principal	Aurum Property Partners
R. Douglas	Armstrong, PhD	Chief Business Officer	Dawson James Securities; Gold Coast Venture Capital Association
Tara	Auclair Ryan	Marketing Communications Manager	Modernizing Medicine
Robert	Avossa, Ed.D.	Superintendent	School District of Palm Beach County
Terrence	Bailey	Public Works	City of Riviera Beach
Robert	Barrett III, J.D.	Senior Advisor	Cross Keys Capital, LLC
David	Bates, J.D.	Chair	Gold Coast Venture Capital Assn.
Mary Lou	Bedford	CEO	Central Palm Beach Chamber of Commerce
Ilan	Berkner	Senior Manager	Centric Consulting
Mike	Bornstein	City Manager	City of Lake Worth
Debbie	Bradley	Asst. Director Facilities Operations	Florida Atlantic University
Stacey	Brandt	VP of Strategic Development & Marketing	Jupiter Medical Center
Tony	Brazzale	Founder & CEO	Gordian Biotechnologies, Inc.
Ryan	Britton, J.D.	Director of State Relations	Florida Atlantic University
Nancy	Bryan	President & CEO	BIOFlorida
Mark	Bryan	CEO	Delray Medical Center
Dan	Cane	CEO & Co-Founder	Modernizing Medicine
Brandon	Carson	Director - Economic Development	Merit Advisors, L.P.
Satish	Chandran, PhD	CEO	Somahlution
Kathy	Chiu	COO	Florida Angel Nexus
Najum	Choudhry	Senior VP, Director Pharmacy	KRS Global Biotechnology
Madelyn	Christopher	VP Physician Services & Business Development	JFK Medical Center & West Palm Hospital
Camille E.	Coley, J.D.	Senior Associate VP of Research	Florida Atlantic University
Michael	Corbit	Director, Business Development	CareerSource Palm Beach County
John	Couris	President & CEO	Jupiter Medical Center
Steve	Craig	President & CEO	CareerSource Palm Beach County
Tony	Cutshall	Worldwide Senior VP Marketing & Development	DePuy Synthes
David	Day	Asst. VP of Technology Transfer	University of Florida

APPENDIX A
Individual & Company Interviews (cont.)

	Last Name	Title	Company / Affiliation
Jessica	Del Vecchio	Economic Dev Manager	City of Boca Raton
Gregory	DelSesto	Special Advisor to the VP of Research	Florida Atlantic University
Michelle	Dryer	Director of Educational/Community	CareerSource Palm Beach County
Andrew	Duffell	President	Research Park at Florida Atlantic University
Stephen	Duffie	VP Business Development	KRS Global Biotechnology
Rina	Dukor	President & Co-Founder	BioTools, Inc.
Judith	Dunn	Manager, Healthcare Partnerships	CareerSource Palm Beach County
Ryan	El-Hosseiny	Co-Founder	Access Medical Labs
Mark	Emalfarb	Founder & COO	Dyadic International (USA), Inc.
Michael	Feldman	Director	Cushman & Wakefield
Mark	Felici	VP, Human Resources	Biotest Pharmaceuticals Corp
Andrew	Fevata	Manager, Development, Construction & Project Mgmt	Prime Development Advisors, LLC
John	Flanigan,, J.D.	Shareholder	Haile Shaw & Pfaffenberger
Daniel	Flynn, PhD	Vice President of Research	Florida Atlantic University
Denise	Garcia	Exec. Director / Co-Founder	Life Science & Technology (LST) Hub
Steven	Garine	Research Vice President	Florida Research Park
Gerard	Genovese	COO	CareerSource Palm Beach County
Sam	Genovese	VP of Strategic Planning & Corporate Development	KRS Global Biotechnology
Colin	Goddard, PhD	CEO	Blink Bio (formerly Coferon)
Eric	Goldman	CEO	Palms West Hospital
Gabriel	Goldstein	CEO, Chief Product Designer	Anidea Engineering, Inc.
Joan	Goodrich	Economic Development Director	Delray Beach
Kimberly	Gramm	Associate Vice President	FAU Tech Runway; Director, Adams Center for Entrepreneurship
J. Michael	Gregson	Founder & CEO	Wavefront Health Tech; Founder, Life Science and Technology (LST) Hub
Avi	Halpert	VP Corporate Real Estate	United Therapeutics
Libby	Handel, PhD	Director of Business Development	Torrey Pines Institute of Molecular
Matthias	Haury, PhD	COO	Max Planck Florida Institute for Neuroscience (MPFI)
Shilah	James	Assistant to the City Manager	City of Lake Worth
Danny	Jones	Deputy City Manager	City of Riviera Beach
Bill	Justice	Executive Director	Breckenridge Pharmaceuticals
Marc	Kantorow, PhD	Professor of Biomedical Sciences; Director of Graduate Programs	Florida Atlantic University
Jeff	Kelly	Executive Vice President	CBRE
John	Kelly, PhD	President	Florida Atlantic University

APPENDIX A
Individual & Company Interviews (cont.)

	Last Name	Title	Company / Affiliation
Dolores	Key	Economic Development Manager	City of Lake Worth
Beth	Kigel	President & CEO	Northern Palm Beach County Chamber of Commerce
Ken	Kirby	President	Transdermal Delivery Solutions (TDSC)
Donald	Kiselewski	Director of External Affairs	Florida Power & Light
Thomas	Kodadek, PhD	Professor/Chair, Dept. of Cancer Biology; Professor, Dept. of Chemistry	Scripps Florida
Andrew	Kroll	Account Manager	Aerotek
Ferris	Lander	Registered Patent Agent	Ferris H. Lander, Inc.
Larry	Lapila	President	Breckenridge Pharmaceuticals
Shannon	LaRocque	Assistant County Administrator	Palm Beach County
Thomas	Laussermair, PhD	President	Visualign Consulting
Robbin	Lee, RN	CEO	Wellington Regional Medical Center
Zhongwei	Li, PhD	Professor of Biomedical Sciences; Int. Asst. Dean of Faculty Affairs	Florida Atlantic University
Anthony	Librizzi	Vice President	CBRE
Peter	Licata, PhD	Director – Career & Career Choice Options	School District of Palm Beach County – Division of Choice Options
Michael	Lovell, PhD	Executive Vice President	GLG Pharma
Andy	Lukasik	Town Manager	Town of Jupiter
Andrew	Mack	Director of Development/City Engineer	City of Boynton Beach
Karen	Marcus	Community & Govt Relations	Scripps-Florida
Gary	Margules, Sc.D.	VP of Research & Technology Transfer	Nova Southeastern University
Jay	Marshburn	Account Mgr – Healthcare	Aerotek
Daniel	Martell, J.D.	President & CEO	Economic Council of Palm Beach County
Gina	Melby	CEO	JFK Medical Center
Kimberly	Mendes, PhD	Staff Scientist	OPKO Health, Inc.
Becky	Mercer, PhD	Director of Biotechnology Programs	Palm Beach State College
Neil	Merin	Chairman	NAI/Merin Hunter Codman
Michael	Miller	Founder	SoundHealth
Robert	Mino, J.D.	Corporate Counsel	Sancilio & Company, Inc.
Robert	Missroon, Jr.	CFO	DSS, Inc.
Mary Katherine	Morales	Director of Development	FAU Tech Runway
Thomas	Muir (Col., Ret)	Director of Support Services	U.S. Department of Veterans Affairs
Maina	Ndungu, PhD	Senior Scientist	OPKO Health, Inc.
Gregory	Nelson, J.D.	Partner	Novak Druce Connolly Bove & Quigg LLP; Gold Coast Venture Capital Association

APPENDIX A
Individual & Company Interviews (cont.)

First Name	Last Name	Title	Company / Affiliation
Karl	Nembach	Area Vice President	Arthur J. Gallagher & Co.
Jennifer	O'Flannery Anderson	VP for Advancement & Community Relations	Nova Southeastern University
Dana	Oaks	CEO	West Palm Hospital
Keith	Oswald	Chief Academic Officer	School District of Palm Beach County
Ava	Parker, J.D.	President	Palm Beach State College
Peter	Pignataro	Manager, Performance Analysis	CareerSource Palm Beach County
Maneesh	Pingle, PhD	VP Operations & Business Development	Blink Bio (formerly Coferon)
Richard	Reade	Village Manager	Village of Palm Springs
Bill	Reichel	President	Reichel Realty & Investments
Irene	Revelas		Hacklab – North Boynton
Scott	Rocklage, PhD	Managing Partner	5AM Ventures
Raquel	Rodriquez, J.D.	Miami Managing Member	McDonald Hopkins
Nicholas	Romanello, J.D.	Interim CEO	Health Care District – Palm Beach County
Chris	Roog	Director of Economic Development	City of West Palm Beach
Riccardo	Roscetti	CEO	KRS Global Biotechnology
Christer	Rosén	Chairman & Founder	Jupiter Orphan Therapeutics, Inc.
Bruce	Rosetto, J.D.	Shareholder	Greenberg Taurig
Roxana	Ross	Director of Operations, Research & Technology Transfer	Nova Southeastern University
Ed	Sabin	Chair, Life Sciences Committee	Northern Palm Beach County Chamber of Commerce
John	Sajeski	VP Acquisitions & Leasing	Redina Companies
Alex	Sancilio	VP of Corporate Development	Sancilio & Company, Inc.
Elicia	Sanders	Assistant to the City Manager	City of Palm Beach Gardens
Rick	Sartory	Exec. VP, Business Development & Community Relations	Northern Palm Beach County Chamber of Commerce
Constance	Scott	Director of Local Relations	Florida Atlantic University
Andrew	Shapiro	Managing Director	Biggins Lacy Shapiro & Co.
Kevin	Shapiro	Principal	Shapiro-Pertnoy Companies
Steven	Shapiro	Principal	Shapiro-Pertnoy Companies
John	Sickler	Director of Planning & Zoning	Town of Jupiter
Bernard	Siegel, J.D.	Executive Director	Genetics Policy Institute/World Stem Cell Summit
Sheridan	Snyder	Chairman, President & CEO	BioCatalyst International
Crystal	Stiles	Manager, Economic Development	Florida Power & Light
Barbara	Suflas Noble	President	Max Planck Florida Foundation; VP Advancement, MPFI

APPENDIX A
Individual & Company Interviews (cont.)

	Last Name	Title	Company / Affiliation
Adele	Sullivan, PhD	Dean of Academic Affairs	Keiser University
Alison	Tanner	Entrepreneur in Residence	FL Institute for Commercialization of Public Research
Jane	Teague	COO	FL Institute for Commercialization of Public Research
Peter	Tesch	President	Economic Development Council of St. Lucie County, Inc.
James	Tisdale	Client Relations Specialist	Morrison, Brown, Argiz & Farra
Shawn	Titcomb	Managing Director	Noble Financial
Ofelia	Utset, MD	Director, Biomarker Development	OPKO Health, Inc.
Hal	Valeche	Vice Mayor	Palm Beach County Board of County Commissioners
John	Vara, MD	Associate Chief of Staff, Education and Research	U.S. Department of Veterans Affairs
Danielle	Vennett	Managing Director	Next Tier HD
Michael	Villella	Finance Director	Town of Jupiter
Angelica	Vrablic, PhD	Principal	ASV Consulting
Paul M.	Walczak	CEO	NuVista Living / Institute for Healthy Living
Jay	Watson, PharmD	Executive VP, Strategic Operations	United Therapeutics
Karen	Whetsell	Asst. Superintendent, Teaching & Learning	School District of Palm Beach County
David	Willoughby, PhD	Senior Scientist	Ocean Ridge Biosciences
Al	Zucaro	Member Manager	Palm Beach Regional Center
Claudia	Zylberberg	Founder & CEO	Akron Biotech
Site Selector		Operations / Real Estate	Bristol Meyers Squibb

APPENDIX A
Additional Individuals who Participated in the Kickoff Meeting

	Last Name	Title	Company / Affiliation
Aaron	Brown	Real Estate Agent	KW Commercial
Beth	Corson		Atlas Spine, Inc.
Natalie	Crowley	Director of Planning & Zoning	City of Palm Beach Gardens
Kelly	Fanelli	Membership Director	Chamber of Commerce of the Palm
Sylvia	Gografe, DVM, PhD	Director, Veterinary Services; Assoc. Professor, College of Medicine	Florida Atlantic University
Richard	Jundzil	Vice President, Operations	Dyadic International (USA), Inc.
Barbara	LeBrun	Managing Director	KW Commercial
Haarm	Maarsingh, PhD	Associate Professor of Pharmaceutical Sciences	Palm Beach Atlantic University
Cindy	Metzler	Entrepreneur	Cindy Metzler Consultin
Jeff	Ostrowski	Reporter	Palm Beach Post
Lesley	Sheinberg	Senior Commercial Associate	NAI/Merin Hunter Codman
Stacey	Silver	VP, Marketing and Membership	BIOFlorida
Carlos	Torrado, PharmD, J.D.	Director of Experiential Programs; Asst. Prof. of Pharmacy Practice	Palm Beach Atlantic University

Appendix B

Florida Institute
Commercialization of Public Research
Companies Funded to Date

Addresses and links to company profiles are available at www.florida-institute.com/programs

Altavian – Gainesville
Aviana Molecular Technologies – Orlando
Bing Energy International – Tallahassee
BioFront Technologies – Tallahassee
Biscayne Pharmaceuticals – Miami
ClearSpec Medical- Boca Raton
Cool Flow Dynamics – Sarasota
Entrinsic Health Solutions (Enterade) – Newberry
eTect – Gainesville
EyeLife – Boca Raton
flexReceipts – Windemere
Garmor – Orlando
Genetic Networks – Miami
GLG Pharma – Jupiter
Heart Genomics – Miami Beach
Intecrowd – Orlando
Integene – Miami
Intelligent Retinal Imaging Systems – Pensacola
Kairos – Miami
KeriCure – Wesley Chapel
KynderMed – St. Petersburg
Modulation Therapeutics – Tampa
MYOLYN – Gainesville
Nanophotonica – Orlando
NeuroNet Learning – Gainesville
OB Medical – Newberry
Ocoos – Oscala
Paracosm – Gainesville
peerfit – Tampa
Powers Medical Devices – Delray Beach
Prevacus – Tallahassee

Appendix B (continued)

Florida Institute
Commercialization of Public Research
Companies Funded to Date

Addresses and links to company profiles are available at www.florida-institute.com/programs

RAPidGenomics – Gainesville
Robotics Unlimited - Pensacola
RxMP Therapeutics – Miami
Sentinel Diagnostics Imaging – Gainesville
Shadow Health – Gainesville
SharpSpring, LLC – Gainesville
Spyglass Technologies – St. Petersburg
Sun BioPharma – Ponte Vedra Beach
TAO Connect – Gainesville
TransGenX Nanobiotech – Tampa
TruVitals – Aluchua
US Bioplastics – Winter Park
Verigo (FKA Comn-N-Sense) – Gainesville
Vigilant Bioscience - Miami

Appendix C
North Carolina Eastern Regional Brochure

— Advantages —
for Life Sciences Companies

Quality of Life
- Annually ranked among the best places to live
- 65 miles of white sand beaches
- Lower than average per capita tax burden
- Temperate four-season climate
- Cost of living below national average

Workforce
- Recent labor study confirmed availability of qualified workers, familiar with cGMP, to support additional 400-employee bio-manufacturing facility
- Growing workforce supported by an integrated Community College and University system providing customized production, maintenance, and management training
- A regional articulated life sciences ladder, developed with guidelines from the life sciences community, is in place. It includes Associate Degrees; BS programs in Biology, Biochemistry, Bioprocess Engineering and Industrial Technology, an MS in Biotechnology and a PhD in Microbiology.

Educational & Research Resources
- www.BioEastAlliance.org
- East Carolina University and Medical School
- East Carolina Metabolic Institute
- East Carolina Heart Institute
- Duke, UNC Chapel Hill and NC State Marine Science Centers
- NOAA - Center for Coastal Fisheries and Habitat Research
- Agricultural Research Stations
- NC Community College Biomanufacturing & cGMP training

Educational & Research Resources Proximate to the Region:
- Duke University, Durham
- University of North Carolina and Medical School, Chapel Hill
- NC State University, Raleigh
- UNC Wilmington Marine Science Center, *Wilmington*

Dedicated Support Agencies
- NC Biotechnology Center Eastern Region Office
- NC Validation Academy, Raleigh
- NC Community College System BioNetwork Bioprocessing Center, Greenville
- Eastern North Carolina Investor Network
- Inception Micro Angel Fund – East (IMAF-EAST)
- NC Defense Security and Technology Accelerator, Fayetteville
- NC Sea Grant
- NC Small Business and Technology Development Center at ECU
- ECU Entrepreneurial Initiative

NORTH CAROLINA'S EASTERN REGION

3802 Hwy. 58 North, Kinston, NC - USA 28504
Phone: 800-474-8499 • Fax: 252-523-9017
E-mail: info@nceast.org www.nceast.org

Appendix D
List of Life Science Companies in Palm Beach County

COMPANY	CITY	WEBSITE	DESCRIPTION
Accelerated Biologics	Jupiter		Research & Development In Biotechnology
Advanced Chemical Sensors	Boca Raton	www.acsbadge.com	Sensors used in biomedical and bio-industrial field
Akron Biotechnology LLC	Boca Raton	www.akronbiotech.com	Manufactures and distributes components and raw materials for cell therapy discovery, development, and commercialization.
AMG Renewables	West Palm Beach	www.amgenergy.com	Cellulosic materials
Assure Immune	Boca Raton	www.assureimmune.com	Banking adult stem cells; Part of GE Healthcare Life Science
Atlas Spine, Inc.	Jupiter	www.atlasspine.com	Spinal implant and instrument systems
Aurora Diagnostics	Palm Beach Gardens	www.auroradx.com	Diagnostic lab support service for hospitals, physicians and researchers.
Aurora Research Institute	Palm Beach Gardens	www.auroradx.com/research-institute	Research, discovery, development and validation of key biomarkers for cancer diagnosis, therapy selection, and accurate response monitoring
Avanti Pharma	Boca Raton		
Beacon Biologicals Inc	Boca Raton		Small surgical & medical Instrument manufacturing/supplier
BF Industires	Boca Raton	www.bfindustries.com	Precision manufacturing of medical devices
BioTools, Inc	Jupiter	www.Btools.com	Manufacturer of scientific instruments; contract laboratory services focused on proteins, peptides, carbohydrates, DNA, chiral molecules analysis.
Biochem Manufacturing Inc	Jupiter		Manufactures. glycerin used pharmaceuticals
BioMune	Palm Beach	www.biomune.us	Research focused on immunomodulation therapy for various cancers including melanoma, lymphoma, and fibro sarcoma
Biotest Biopharmaceuticals	Boca Raton	www.biotestpharma.com	Researches and mfg bio therapeutic products for immunology and hematology. Collect source plasma proteins.
Blink Bio (formerly Coferon)	Jupiter	www.coferon.com	Bioorthogonal chemistries for cancer treatment. Sharing space at Scripps.
Brain Matters Research	Delray Beach	www.brainmattersresearch.com	Alzheimers clinical trials
Breckenridge Pharmaceutical	Boca Raton	www.bpirx.com	Privately held own label, generic pharmaceutical research and development company
Charleston Laboratories	Jupiter	www.charlestonlabs.com	Research and development of novel pain products that address nausea and vomiting induced by chemotherapy, radiation, migraine, or postoperatively.
ChemPep	Wellington	www.chempep.com	Manufacture peptides and biochemicals.
CHS Pharma	Jupiter	www.chspharma.com	R&D is focused on skin cancers and precancerous skin lesions.
Concepts in Confidence	Boynton Beach	www.conceptsinconfidence.com	Manufacture and sell laxatives/suppositories
Criterium Florida	Boca Raton	www.criteriuminc.com	Contract Research Organization; conducts clinical trials.
CSL Plasma	Boynton Beach	www.cslplasma.com	Plasma collection and banking; division of CSL Behring (King of Prussia, PA). Develops and manufactures protein based therapies.
Cytonics Corporation	West Palm Beach	www.cytonics.com	Diagnostics and therapeutics for musculoskeletal disease.
Daya Medicals, Inc	Boca Raton	www.dayamed.com	Develop, manufacture and distributor of pharmaceuticals,
DePuy Synthes Co	West Palm Beach	www.Depuysynthes.com	Surgical & Medical Instrument Manufacturing
Digicare Biomedical Technology	Boynton Beach	www.digi-vet.com	Animal Health Division - design and manufacturing vital signs monitors.
Dyadic International Inc	Jupiter	www.Dyadic.com	Enzymes and proteins

Appendix D
List of Life Science Companies in Palm Beach County (cont.)

COMPANY	CITY	WEBSITE	DESCRIPTION
E5 Pharma	Boca Raton	www.E5phama.com	Veterinary medication
Ergogenic Labs LLC	Wellington	www.ergogenicalabs.com	Compounding lab for human and animal products.
ESBA Laboratories Inc.	Jupiter	www.esbalabs.com	Mfg. hair removal products and topicaine (anesthic gel)
EyeLife Inc.	Boca Raton	www.eyelife.com	Ultrasound device
FirstAide	Wellington	www.westickbetter.com	Surgical grade bandages
Gaudet Associates	Jupiter	www.gaudetassociates.com	Petrol products and other materials used pharma mg.
GLG Pharma	Jupiter	www.glgpharma.com	Develop cancer treatment and other therapeutic areas.
Global Pharma Analytics	Jupiter	http://www.globalpharmaanalytics.com/	CRO for pharmaceutical industry
Glucose Health Inc	West Palm Beach	www.Glucosehealthinc.com	Medicinal & Botanical Manufacturing - dietary supplement for Type 2 Diabetes.
Gordian Biotechnologies	West Palm Beach	www.gordianbio.com	Manufacture b-lactamase inhibitors that allow existing antibiotics to be effective against otherwise resistant pathogens.
Health Awareness, Inc.	Jupiter	www.healthawarenessinc.com	Clinical trials and contract research; affiliated with medical practice as well.
Helix Biomedics LLC	Boynton Beach	www.Helixbiomedics.com	CGMP contract analytical chemistry laboratory
Hennessy Dental Laboratory	Riviera Beach	www.hennessydental.com	Biofunctional dental aesthetic implants (teeth)
Hormone Replacement Technologies / Transdermal Delivery Solutions (TDSC)	Palm Beach Gardens	www.hrtinc.us ; tdsc.us	Rapid-acting drug specific, liquid spray-on transdermal delivery system
Intrexon Corp	West Palm Beach	www.DNA.com	Synthetic biology - cellular therapeutics; engineered microbes
iSense, Inc.	West Palm Beach		Prostate cancer detection
iTherapeutics	Boca Raton	www.itherapeutics.com	RNAi therapies for AMD
Jupiter Environmental Labs	Jupiter	www.Jupiterlabs.com	Contract research for pharma products, environmental, et cetera.
KRS Global Biotechnology	Boca Raton	www.krsbio.com	Sterile and non-sterile compounding
LAP Laser	Boynton Beach	www.lap-laser.com	Manufactures laser systems for measuring
Lers Surgical	West Palm Beach		Surgical cranial cap; Patent application on file.
LGM Pharma	Boca Raton	www.lgmpharma.com	Supplier of pharma ingredients; customized synthesis, compounding. Headquartered in TN. May broker cGMP facilities.
Max Planck Florida Institute	Jupiter	www.maxplanckflorida.org	Nonprofit research and educational institution; neuroscience
Meridian Life Science	Boca Raton	www.meridianlifescience.com	Manufacturer of antibodies, viral antigens, recombinant proteins, and critical assay reagents. Provides contract R&D, process development, and mfg. services along with cGMP biologics manufacturing for Phase I/II clinical trials.
Microspherix (Entotherapy)	Boca Raton	www.entotheraphy.com	Delivery of drugs for oncology with reduced side effects.
MolecularMD Corp.	West Palm Beach	www.molecularmd.com	Molecular assays for leukemia, lymphomas and tumors
NeuX Technologies Inc	West Palm Beach	scottm@neuxtec.com	Medical Devices

Appendix D
List of Life Science Companies in Palm Beach County (cont.)

COMPANY	CITY	WEBSITE	DESCRIPTION
Nutriss	Wellington	www.nutriss.com	Agbio firm
Ocean Ridge Bio Sciences	Palm Beach Gardens	www.oceanridgebio.com	Contract research lab (RNA, Gene expression, MicroRNA)
Ophtec USA	Boca Raton	www.ophtec.com	Medical device manufacturer providing unique and high quality intraocular lenses, and ophthalmic surgical devices for Cataract, Trauma and Refractive surgery. HQ-Netherlands
OPKO Health	Jupiter	www.opko.com	Medical test, medication company focused on diagnostics and pharmaceuticals. HQ'd in Miami, but presence at FAU Jupiter.
Ovation Diagnostics	Boca Raton	www.ovationdiagnostics.com	Cancer diagnostics for detection of ovarian cancer
Palm Beach Clinical Research	West Palm Beach	www.palmbeachcro.com	Clinical trials management and clinical research organization
PDR-Separations	Palm Beach Gardens	www.pdr-separations.com	Manufacture laser devices for compound purification.
Pelican Therapeutics	Boca Raton	www.pelicantherapeutics.com	Immunotherapy for cancers
Perry Baromedical	Riviera Beach	www.perrybaromedical.com	Medical device manufacturer - hyberbaric therapy systems.
Pivotal Therapeutics	Boca Raton	www.pivotaltherapeutics.us	Prescription medical food - Vascazen
PROTECH Leaded Eyeware	Palm Beach Gardens	www.protecheyeware.com	Protective leaded eyeware for medical professionals
R/S Tech-Prob Solutions	Jupiter	www.chiralanlytics.com	Contract research lab
Regenerative Technologies Corp	Riviera Beach	www.regnerativetech	Tissue regeneration medicine company. Also listed as being in Alachua.
Sancilio & Company, Inc.	Riviera Beach	www.sancilio.com	Integrated pharmaceutical firm with novel therapies for application in the emerging field of lipidomics
Scripps Research Inst-Florida	Jupiter	www.Scripps.Edu	Nonprofit research and educational institution; cancer research
Somahlution	Jupiter	www.somahlution.com	Manufactures DuraGraft, used to preserve, store and flush vascular conduits
Stolle Milk Biologics Inc	West Palm Beach	www.smbimilk.com	R&D on health-enhancing milk products; company based in Ohio
STROX Biopharmaceuticals	Wellington	www.stroxbio.com	antibacterial antibody
Surface Chemists Of Florida	Jupiter	www.Surfacechemists.com	R&D firm for specialty chemicals and polymers used in pharma industry
TherapeuticsMD	Boca Raton	www.therapeuticsmd.com	Hormone therapies for women
Tyrogenex	Palm Beach Gardens	www.tyrogenex.com	Manufactures medication for tumors
Veriteq	Delray Beach	www.veritequcorp.com	Radio frequency medical devices
Vycor Medical Inc	Boca Raton	www.Vycormedical.com	Neuro surgical devices
Winprobe Corporation	North Palm Beach	www.winprobe.com	Designer, manufacturer and supplier of the UltraVision line of ultrasound systems for research and clinical applications
Xcovery	Palm Beach Gardens	www.xcovery.com	Cancer treatment on molecular level.
Zimmer Biomet	Palm Beach Gardens	www.zimmerbiomet.com	Medical device manufacturer

Appendix D
List of Life Science Companies in Palm Beach County (cont.)

Critical to a life science ecosystem are the hospital systems within the county:

Bethesda Health
Boca Raton Regional
Delray Medical Center
Good Samaritan Medical Center
Health Care District of Palm Beach County / Lakeside Medical Center
Institute for Healthy Living
JFK Medical Center
Jupiter Medical Center
Palm Beach Gardens Medical Center
Palms West Hospital
St. Mary's Medical Center / Palm Beach Children's Hospital
Wellington Medical Center
West Boca Medical Center
West Palm Hospital
West Palm Beach Veteran's Administration Medical Center

Appendix E
Definitions and Terms

The following industry definitions are used in the MoneyTree Reports (andby PricewaterCoopers) for their Industry Studies:

Biotechnology - Developers of technology promoting drug development, disease treatment, and a deeper understanding of living organisms. Includes human, animal, and industrial biotechnology products and services. Also included are biosensors, biotechnology equipment, and pharmaceuticals.

Healthcare services - Includes both in-patient and out-patient facilities as well as health insurers. Included are hospitals, clinics, nursing facilities, managed care organizations, Physician Practice Management Companies, child care and emergency care.

Medical devices and equipment -Manufactures and/or sells medical instruments and devices including medical diagnostic equipment (e.g., X-ray, CAT scan and MRI), medical therapeutic devices (drug delivery, surgical instruments, pacemakers, artificial organs), and other health related products such as medical monitoring equipment, handicap aids, reading glasses and contact lenses.

The following industry definitions are used by the Biotechnology Industry Organization

Biotechnology - technology based on biology. Biotechnology harnesses cellular and biomolecular processes to develop technologies and products that help improve our lives and the health of our planet. We have used the biological processes of microorganisms for more than 6,000 years to make useful food products, such as bread and cheese, and to preserve dairy products.

Appendix F
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