



ANGLE Technology

Hampton Roads Bioscience Cluster Survey

Prepared by
ANGLE Technology Group

For The
Hampton Roads Research Partnership

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We wish to thank all of the private companies and public sector organizations that participated in the survey.

Hampton Roads Bioscience Cluster Survey

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Executive Summary

Forty-one organizations were identified as potential members of the Bioscience Cluster. Thirty-two organizations responded to the survey, although four provided no data. Five organizations believed to be in the Bioscience industry did not respond to requests to participate.

Organization Profiles

Based on these responses, the industry is characterized by three large organizations in different markets averaging 350 employees each.

- ◆ Eastern Virginia Medical School – medical education and research
- ◆ Virginia Institute of Marine Science – marine science
- ◆ LifeNet – organ procurement and distribution

Twenty-three additional organizations range from one to 16 employees with an average of six. No organizations in the 16-250 employee range responded to the survey. These organizations have a total of 1,249 direct employees with an average salary of \$65,429 per year. It is 65 percent higher than the average in Hampton Roads of \$39,728. The number of direct employees is about half the size of the modeling and simulation industry in Hampton Roads with 2,130 direct employees. Using the same multiplier (2.39) used in the September 2007 update of the modeling and simulation economic impact study, total regional employment supported by these Bioscience organizations would be 2,985.

The average annual growth in employment expected over the next five years is in excess of 20 percent.

Two-thirds of the respondents are located on the South Side

Over 60 percent have annual sales less than \$1 million, and 80 percent have annual sales less than \$10 million.

Both young and established organizations are represented, and over 40 percent have been operating for more than ten years.

They are in multiple markets, and over half are focused on medical devices and biomedical research - followed closely by marine biology, pharmaceuticals and bioinformatics.

Two-thirds conduct research. This role is followed closely by product developers and service providers.

Survey Results

Key suppliers for survey respondents are Fisher Scientific, VWR and Sigma as well as other equipment and chemical suppliers, information technology companies, electronics companies, industrial gas suppliers and service providers (patent lawyers and printing companies).

Over 40 percent of the respondents have pharmaceutical companies as end users, 33 percent have hospitals and 29 percent have medical device companies as end users.

Emerging Bioscience opportunities are wide-ranging and include medical devices, biosensors and environmental protection.

Gaps, weaknesses and needs include research funding, cited by almost 80 percent of the respondents, and 40 percent listed difficulties with obtaining a trained workforce, the lack of networking opportunities and difficulties with business financing.

Over 40 percent of the respondents listed increased teaming and partnerships as a strategy to make funding proposals more competitive. The federal Small Business Innovation Research (SBIR) program was also mentioned by several respondents as providing research and commercialization funding opportunities.

Workforce solutions included increasing college level degree programs in biotechnology and matching training programs with the needs of local employers.

Networking opportunities included hosting national scientific meetings, the development of cluster groups and participation in VA Bio and the Hampton Roads Technology Council.

Business financing solutions included attracting venture and angel investors, expanding the state high tech investment tax credit and subsidizing wet lab space for start-ups.

Other comments said the industry is too diversified and too geographically separated, and one responder would like to see light rail connecting all seven cities.

Additional comments suggested recruiting faculty members capable of attracting research funding and coordinating programs to make Hampton Roads more competitive with other research centers in attracting and retaining researchers.

Observations and Options

The combination of large and small members in the cluster permits building on their respective strengths. Venues and events organized by the cluster could be designed to create new communications links that would move large organizations into new markets more quickly and accelerate the growth of the smaller ones.

The widespread interest in partnering and networking presents an opportunity for the cluster to distribute information on the qualifications of its members, distribute announcements of requests for federal research proposals and conduct SBIR workshops focused on NIH.

Another type of partnering would join researchers sponsored by federal agencies with companies in commercial markets developing new products and services. New opportunities for company sponsored research could be created and real economic development could be achieved through research commercialization. Start with the fields

listed most often in the survey: medical devices, biomedical research, marine biology, pharmaceuticals and the emerging biosensor opportunity.

The HRRP Bioscience cluster could also partner with the Hampton Roads Technology Council and VA Bio. Projects might include attracting scientific conferences to Hampton Roads and linking with the Sensors Cluster for bio sensor development.

The cluster could match workforce needs with workforce development programs in the universities and community colleges to identify gaps. It could also establish new programs to make information and curricula on Bioscience careers widely available in the public schools.

The cluster could quantify the need for incubator wet lab space and explore the feasibility of providing it as part of the incubator system of the Hampton Roads Technology Council.

The cluster could be expanded to bring suppliers and end users into cluster activities. Options include special events for the suppliers identified in the survey – Fisher Scientific, VWR and Sigma – and end users – pharmaceutical companies, hospitals, doctors and medical device companies.

A special challenge for Hampton Roads Bioscience is bringing together organizations in diverse markets that are geographically dispersed. A first step might be bringing the Big Three (EVMS, VIMS and LifeNet) together to search for commonalities and opportunities for multidisciplinary innovation. The agenda could also include their relationships with the smaller companies in the region to identify potential mentoring relationships.

HRRP could also support the expansion of the Virginia high tech investment tax credit program to provide additional incentives for angel investors. Joining the legislative initiatives of the Hampton Roads Technology Council would add strength in numbers.

Summary

Further development of the Bioscience Cluster is an important initiative in the development of a more diversified regional economy. We need to build on the momentum it has created.

1. Introduction

The Hampton Roads Partnership contracted with ANGLE Technology LLC on February 12, 2008, for consulting and economic development support to continue the development of technology clusters in Hampton Roads. On February 20, the Partnership initiated a task order to design, conduct and report the results of an e-mail survey of Bioscience economic activity in Hampton Roads.

A list of potential survey respondents was developed, and a draft survey instrument was designed and tested based on inputs from the Bioscience Cluster leadership. The survey was launched April 10, 2008, asking the respondents to access the questionnaire via a Survey Monkey web site. The initial emails were followed up with numerous emails and telephone calls in an effort to increase the response rate. The survey was concluded on July 3, 2008. The list of respondents and non-respondents is provided in the following section.

2. Response

The following 32 organizations responded to the survey, although four provided no data.

Table 2.1 Survey Respondents

Able Devices LLC	Institute Of Anti-Aging Research
Arkios BioDevelopment International	Jefferson Lab
BAPIC, Inc. (no data)	Keraderm LLC
Beaufort Advisors, LLC	LifeNet Health, Inc.
Cell MicroControls	Light Bioscience, LLC
Center for Biotechnology & Biomedical Sciences	Old Dominion University Biological Sciences
Cerulean Associates LLC	Old Dominion University Dr. Nancy Xu (no data)
College of William and Mary (no data)	Old Dominion University Center for Bioelectronics
CW Optics, Inc.	Schuelke Biomedical/Laser Services, Inc.
CymaSonics LLC.	Soluble Systems, LLC
Dalos BioPharma	The Bionetics Corporation
Dilon Technologies (no data)	Virginia Institute of Marine Science
Eastern Virginia Medical School	Virginia Tech Tidewater Agricultural Research and Extension Center (no data)
GordonSquared Inc	Virginia Tech Seafood Agricultural Research and Extension Center
INCOGEN, Inc.	VMASC/ODU
Insight Therapeutics	WilBio

The following organizations are believed to be engaged in the Bioscience industry, but they did not respond to the survey or they provided no data.

Table 2.2 Survey Non-Responders

BAPIC, Inc.	Laser, Skin and Vein Center
Computerized Imaging Reference Systems Inc	Morphix Technologies
Dilon Technologies	Old Dominion University, Dr. Nancy Xu
EyeRx Research, Inc	Virginia Tech Tidewater Agricultural Research and Extension Center
Hampton University	

2.1 Respondent Profiles

Table 2.3 indicates how the Bioscience organizations are distributed throughout Hampton Roads. Two-thirds are located on the South Side.

Table 2.3 Bioscience Organization Locations

City	Number of Bioscience Organizations
Norfolk	9
Virginia Beach	9
Williamsburg	4
Newport News	3
Suffolk	3
Hampton	2
Gloucester Point	1
Seaford	1

Table 2.4 indicates that over 60 percent of Bioscience organizations have annual sales less than \$1 million, and 80 percent have annual sales less than \$10 million.

Table 2.4 Company Size by Annual Sales

Current Annual Sales	Percent of Organizations	Response Count
Less than \$1 million	62.5	15
\$1-\$10 million	20.8	5
\$11-\$50 million	8.3	2
\$51-\$100 million	4.2	1
More than \$100 million	4.2	1
Answered Question		24

Table 2.5 indicates the number of years these organizations have been operating in Hampton Roads. Both young and established organizations are represented, and over 40 percent have been operating for more than ten years.

Table 2.5 Years in Operation in Hampton Roads

Years in Operation In Hampton Roads	Percent of Organizations	Response Count
Less than 3 Years	21.7	5
3-5 Years	8.7	2
6-10 Years	26.1	6
More than 10 Years	43.5	10
Answered Question		29

Table 2.6 lists the market focus of the organizations. They are in multiple markets, and over half are focused on medical devices and biomedical research - followed closely by marine biology, pharmaceuticals and bioinformatics.

Table 2.6 Market Focus

Market Focus	Percent of Organizations	Response Count
Medical Devices	56.7	17
Biomedical Research	53.3	16
Marine Biology	43.3	13
Other (listed below)	40.0	12
Pharmaceuticals	36.7	11
Bioinformatics	30.0	9
Bio Modeling and Simulation	20.0	6
Bio Sensors	16.7	5
Therapeutic Products	13.3	4
Alternative Medical Therapies	13.3	4
Food Science	13.3	4
Agriculture	10.0	3
Genetics	6.7	2
Clinical Trials	3.3	1
Bioenvironmental Science	3.3	1
Answered Question		30

These additional markets were listed by the respondents:

- ◆ Medical education
- ◆ Modeling and simulation beyond Bioscience
- ◆ Population modeling
- ◆ Regulatory and quality consulting
- ◆ Aquaculture
- ◆ Biomedical communications and consulting

- ◆ Medical research equipment
- ◆ Vaccines, viral gene vectors, tissue regeneration
- ◆ Medical and science writing, biomedical publishing

Table 2.7 indicates the roles that the organizations play in the business environment. Two-thirds of the organizations responding to this question conduct research. This role is followed closely by product developers and service providers.

Table 2.7 Business Role

Role	Percent of Organizations	Response Count
Research	66.7	20
Product developer	43.3	13
Service provider	43.3	13
Other (listed below)	30.0	9
Marketing and sales	23.3	7
End user	6.7	2
Product distribution	6.7	2
Supplier	3.3	1
Answered Question		30

The following roles were added:

- ◆ Education
- ◆ Extension
- ◆ Clinical introduction
- ◆ Manufacturer
- ◆ Conferences and publications
- ◆ University-industry partnering

Table 2.8 indicates how the Bioscience organizations vary by number of employees. Note the large gap between 16 and 250 employees. There were no medium-size organizations among the respondents.

Table 2.8 Number of Employees

Number of Employees	Number of Organizations
1-5	13
6-10	5
11-16	5
17-249	0
250-500	3

Three large organizations in different markets average 350 employees each.

- ♦ Eastern Virginia Medical School – medical education and research
- ♦ Virginia Institute of Marine Science – marine science
- ♦ LifeNet – organ procurement and distribution

Twenty-three additional organizations that provided employment information range from one to 16 employees with an average of six. A total of 1,249 direct employees was reported by all 26 organizations.

The number of direct employees is about half the size of the modeling and simulation industry in Hampton Roads with 2,130 direct employees. Using the same multiplier (2.39) calculated in the September 2007 update of the modeling and simulation economic impact study, total regional employment created by these Bioscience organizations would be 2,985¹.

Tale 2.8 shows the distribution of average annual salaries among the organizations. The average for all organizations is \$65,429. It is 65 percent higher than the average salary in Hampton Roads of \$39,728².

¹ ANGLE Technology, The Economic Impact of Modeling, Simulation and Visualization in Hampton Roads (Virginia) Update, September 2007

² Virginia Workforce Connection, 4th Quarter 2007, Virginia Beach-Norfolk-Newport News MSA, www.vawc.virginia.gov

Table 2.8 Average Annual Salary

Average Annual Salary \$	Number of Organizations
30,000-50,000	9
51,000-70,000	5
71,000-90,000	4
91,000-110,000	0
111,000-130,000	2
131,000-150,000	1

3. Survey Results

The following tables provide survey results on

- ♦ Growth rates
- ♦ Suppliers
- ♦ End users
- ♦ Emerging opportunities
- ♦ Gaps, weaknesses and needs
- ♦ Solutions
- ♦ Additional Comments

Table 3.1 shows the estimated annual percentage change in Bioscience jobs anticipated over the next five years. Over half of the organizations project growth rates of 10 percent or less. However, when the more optimistic respondents are added in, the expected average annual growth rate increases to 23.5 percent.

Table 3.1 Estimated annual percent change in Bioscience jobs over the next five years

Annual Percentage Change In Bioscience Jobs Over The Next Five Years	Number of Organizations
0-10	13
11-20	3
21-30	1
31-40	2
41-50	3
100	2

Table 3.2 lists the key suppliers for survey respondents. Fisher Scientific, VWR and Sigma were listed by several respondents as well as other equipment and chemical suppliers, information technology companies, electronics companies, industrial gas suppliers and service providers (patent lawyers and printing companies).

Table 3.2 Key Suppliers

Tidewater Community College, Southbay Metal, Bon Secour Hospital (education)
Fisher Scientific, Canfield Scientific, Superarray Bioscience, Coriel, Invitrogen
Fisher, Sigma, VWR, ATCC, Dell, Olympus, CDW-G, Allied Electronics,
Fisher, VWR
Clinical Trial Sites, Patent Lawyers, Device Prototypers
Arc of the Peninsula, Hampton Roads (manufacturer) House of Printing (labels, brochures)
Fisher Scientific, Forma Lab Products, Harlan Sprague Dawley, Air Products, Norfolk Welding and Gases, Charles Rivers, Dupont
Sun Microsystems, Dell, Microsoft
Bio-Rad, Invitrogen, Sigma, Aldrich, VWR, Dell, Mac, Fisher Scientific
Materials Suppliers, Product Design Companies Manufacturing Contractors
Lab, electronics, & computer-related suppliers
Fisher Scientific
American Medical Systems, Inc.
Chemical reagents, software vendors, IT support, materials suppliers, lab equipment
Mouser electronics, Digikey electronics
Knowledge Information Solutions (IT), Teagle & Little (printing)

Table 3.3 lists the end users reported by respondents. Over 40 percent of the respondents have pharmaceutical companies as end users, 33 percent have hospitals, and 29 percent have medical device companies as end users.

Table 3.3 End Users

Neuromuscular patients, Nursing students
Pharmaceutical and medical device companies
Students, federal agencies
Pharmacies
Medical device customers
Pharma and Medical Device companies
Physicians, consumers
Sentara Hospital, VOA, Norfolk Surgical, Pfizer, Merck, Lilly, Aventis
Pharmaceutical companies, biotech companies, university research labs
We distribute globally to thousands of hospitals, surgical facilities, etc
Primarily federal and state agencies, aquaculture growers to some extent, private foundations
Medical device companies, clinics, hospitals
Pharmaceutical, IVD & medical device companies
Consumers and food processing industries
Sentara, physician practices, ASC's
Wound clinics, doctors and hospitals
About 100 U.S. universities, 20 drug companies, 75 international universities, 25 international drug companies plus others.
Biotech, pharmaceutical and vaccine companies. Product and service suppliers to the biotech industry
Hospitals, nursing homes, doctors, institutional pharmacies, pharmaceutical companies, non-profits
Clinics, physicians, medical spas, hospitals, consumers
Medical device companies, biotech companies, pharmaceutical firms

Table 3.4 lists emerging Bioscience opportunities listed by respondents. They were wide-ranging with opportunities in medical devices, biosensors and environmental protection mentioned most often.

Table 3.4 Emerging Bioscience Opportunities

Ocular therapeutics
Bioelectrics - for both medical and environmental applications
Proteomics and genomics, computer-assisted drug design
Commercialization of EVMS patents
Applications in medical devices, biosensors, women and infant health, diabetes and obesity, cardiovascular, cancer, infectious diseases
Bioinformatics, biosensors, environmental monitoring and remediation, aquaculture
Device manufacturing, device R&D
Biophotonics
Emerging food safety Issues
Collaboration with state Institutions such as Virginia Tech, translational medicine programs and the Institute for Biomedical and Public Health Sciences
Medical device companies and laboratory services
Biosensors, environmental science, marine science

Table 3.5 lists gaps, weaknesses and needs of the Bioscience industry identified by the respondents. Research funding was cited by almost 80 percent, and 40 percent listed difficulties with obtaining a trained workforce, the lack of networking opportunities, and difficulties with business financing.

Table 3.5 Gaps, Weaknesses and Needs

Gaps, Weaknesses and Needs	Percent of Respondents	Response Count
Research Funding	79	22
Trained Workforce	43	12
Networking Opportunities	43	12
Business Financing	39	11
Transportation	11	3
Other: Lack of Coordination	7	2

Table 3.6 lists solutions to the gaps, weaknesses and needs listed in Table 3.5. Over 40 percent of the respondents to the research funding solutions question include increased teaming and partnerships to make funding proposals more competitive. The SBIR program was also mentioned by several respondents. Workforce solutions included increased college level degree programs in biotechnology and matching training programs with the needs of local companies. Networking opportunities included hosting national scientific meetings, the development of cluster groups and participation in VA Bio and the Hampton Roads Technology Council. Business financing solutions included attracting venture and angel investors, expanding the state high tech investment tax credit and subsidizing wet lab space for start-ups. Other comments said the industry is too diversified and too geographically separated, and one responder would like to see light rail connecting all seven cities.

Table 3.6 Solutions

Research Funding
We need grant writers & web support staff
Joint proposals with local industry
SBIR and city funded research projects
State and Federal support
Target funding to emerging cross-discipline technologies where it is difficult to convince the "old guard" to step outside their field.
More matching small hi tech business grants
Education of the economic development people; changes in practices/laws regarding funding
Partnerships between academia and companies to pursue SBIRs, state recognition of funding
Creating a research incubator with available funds
Collaboration with new partners to identify funding opportunities
Identify specific consultants that can assist in writing SBIR Grants
Strong and creative partnering
Trained Workforce
Increased salaries
Increased university degrees in biotechnology
Coordinate college training with local technology needs

Better communication strategy to target appropriate workers
Funding for training workforce
Hard to find people with electronics/CNC machine skills
Networking Opportunities
Increase opportunities to hold national scientific meetings in Hampton Roads
Would like opportunity to meet more medical doctors
Develop cluster groups to facilitate networking
A seamless line of communication with all bioscientists within all academic communities within the HR area. Transferable credits and classes among colleges. Pooled resources and personnel for training of undergraduates for technical positions throughout the Hampton Roads. Regular and heavily promoted local scientific conferences designed to promote collaborations.
Have members join VA Bio
Work with VA Bio to create a BIO afterhours events in Hampton/Newport News
Business Financing
Attract venture capital and mobilize angels
Investor networking
Expand VA high tech investment tax credit
Education of the community regarding the opportunities
Venture capital and wet lab space for start-ups
Wet lab incubator facility subsidized to \$12 / square foot. Loan guarantees for small businesses
Transportation
Light rail system connecting all seven cities
Other
Coverage of effort is too diversified and too geographically separated
Work with Hampton Road Tech Council to set up dinners, speakers, etc. on these issues

Table 3.7 lists additional comments made by the respondents. They suggest recruiting faculty members capable of attracting research funding and coordinating programs to make Hampton Roads more competitive with other research centers in attracting and retaining researchers.

Table 3.7 Additional Comments

We need to bring in faculty who are capable and willing to attract research funding. This will help bring in other companies that want to collaborate with those researchers and take advantage of their expertise. This will create a critical mass and additional networking opportunities that eventually will help attract outside capital to this area. But, of course, that's only theoretical. The burden has always been in the execution.

When I advertise for a technical position, I find barely 2 or 3 locals that fit the bill. I also can receive applications from many more people in other states that may be more capable. If I lose a good one, they are headed for NIH, Research Triangle Park or a large university in a large city. We really need to coordinate efforts to make this an appealing research corridor both for training as well as employment

4. Observations and Options

The combination of large and small members of the cluster permits building on their respective strengths. Small companies are typically more innovative than larger organizations and can move more quickly to exploit emerging market opportunities that can be useful for the larger ones. The larger organizations often have more experienced managers and researchers that can serve as mentors, and their resources and networks are typically more extensive. Venues and events organized by the cluster organization could be designed to create new communications links that would move larger organizations into new markets more quickly and accelerate the growth of the smaller ones.

The widespread interest in partnering presents another opportunity for the cluster. There is perhaps interest in two types of partnering. One would create teams to make local research proposals to federal agencies more competitive. Creating new teams could be enhanced if all the members of the cluster were aware of their collective qualifications. The cluster organization could provide this information in a directory simply by collecting and distributing qualifications summaries used by its members in recent proposals. The cluster organization and its members could also distribute information about research announcements by federal agencies much like the sensor cluster managed by the College of William and Mary has been doing. A response to the widespread interest in the SBIR program might be an invitation to CIT to organize a special workshop in Hampton Roads focusing on the development of proposals and teams to respond to the annual NIH solicitation.

The other type of partnering would join researchers sponsored by federal agencies with private sector companies developing new products and services for commercial markets. They have historically worked in separate worlds. If researchers currently focusing their talents on helping federal agencies achieve their research missions could focus part of their attention on learning about the research needs of private sector markets, new opportunities for company sponsored research could be created, and if the results of the research can be commercialized, real economic development could be achieved. The cluster organization could organize venues and events that would present private sector research challenges to academic researchers operating in related fields. It might be appropriate to start with the fields listed most often in the survey: medical devices, biomedical research, marine biology and pharmaceuticals as well as the emerging biosensor opportunity.

The Bioscience Cluster organization itself might consider partnering with the Hampton Roads Technology Council and VA Bio. The combined resources of these organizations might be particularly useful in responding to the need expressed by survey respondents to attract scientific conferences to Hampton Roads. Coordination with the Sensor Cluster organized by the College of William and Mary for the Hampton Roads Technology Council could uncover opportunities in the bio sensor market.

To address the workforce concerns expressed by the respondents, it might be useful to review programs available in local universities and community colleges that are relevant for the cluster. This review could be followed up with a special survey of cluster members focused on their current and future workforce needs. A comparison of programs

and needs could identify gaps that could be the topics of follow-up conversations with the educational institutions. These conversations could also include the need to have transferable credits among educational institutions expressed by one respondent. Needs may also be identified that could establish new programs to make information and curricula on Bioscience careers widely available in the public schools.

The workforce survey might also include some questions on the need for incubator wet lab space identified by one respondent. The responses could then be discussed with the Hampton Roads Technology Council to assess the feasibility of adding a wet lab to their incubator system.

It may also be useful to bring suppliers and end users into cluster activities. Suppliers would probably appreciate the opportunity to interact with current and potential customers, and cluster members would probably be interested to learn more about the needs of their customers. Special events might be organized for the suppliers identified in the survey – Fisher Scientific, VWR and Sigma – and end users - pharmaceutical companies, hospitals, doctors and medical device companies. Both suppliers and end users might also be useful for identifying potential new cluster members that were missed by the survey.

A special challenge for Hampton Roads Bioscience is bringing together organizations in diverse markets that are geographically dispersed. The markets of the Big Three – medical research, marine science and organ distribution – are certainly diverse, and they are geographically dispersed in Norfolk, Gloucester Point and Virginia Beach. The first step might be to bring them together, perhaps in Virginia Beach, to search for commonalities and opportunities for multidisciplinary innovation. It would also be useful to dig deeper into their relationships with the smaller companies in the region in an effort to identify potential mentoring relationships.

A response to the need for additional start-up capital might be encouraging cluster members to contact their state legislators to expand the Virginia high tech investment tax credit program mentioned by one respondent. Participating with the legislative initiatives of the Hampton Roads Technology Council would add strength in numbers.

5. Summary

Bioscience organizations are important contributors to the Hampton Roads economy. Forty-one organizations were identified as potential members of the Bioscience Cluster. Among the 28 organizations responding to the survey, there are over 1,200 employees leveraging a total of almost 3,000 in the regional economy and making an average salary 65 percent higher than the average. Most of the members of this emerging sector expect their employment to grow over 20 percent annually during the next five years.

There is widespread interest in partnering, teaming and networking as tools to achieve this growth. The Bioscience Cluster organization is an excellent vehicle for building on this interest by facilitating communications and organizing networking events. The Cluster can also play a role in workforce development, wet lab incubation and investor incentives.

Further development of the Bioscience Cluster is an important initiative in the development of a more diversified regional economy. We need to build on the momentum it has created.

Appendix I: Survey Cover Letter



Bioscience Cluster Survey

Welcome!

The Hampton Roads Research Partnership, a consortium of local research universities and federal laboratories, is supporting the formation and operation of technology clusters in the region. The purpose of these clusters is to stimulate interactions among private companies and members of the Partnership with the goal of expanding research, technology commercialization and economic development. Clusters for sensors and modeling and simulation have been established. The objective of this survey is to define a new Bioscience cluster.

The term "Bioscience" should be interpreted broadly to include biomedical and biotechnology enterprises, medical devices, pharmaceuticals, alternative medical therapies, marine biology, bioenvironmental science, food science and agriculture. It also includes bio applications in the other clusters of sensors and modeling and simulation.

Defining a cluster requires basic information on the organizations involved such as market focus, number of employees and growth. To define the economic impact of the cluster we also need to know the average salary of all employees involved in bio activities. In addition, we need to identify linkages in the value chain of customers and suppliers of cluster members.

Please take a few minutes to complete this important survey. Your participation will:

- Help you identify new customers and suppliers to support the growth of your organizations
- Create a forum for the Bioscience industry to discuss common issues and develop action plans with more clout

- Assist in attracting and creating new companies and government agencies in Hampton Roads that support the industry
- Help attract both state and federal government funds for research and applications
- Support the growth of communications among the participants in the industry and expand your network

Your responses will be treated as confidential information. Only aggregated data will be published. In addition, all participants will be provided with an Executive Summary of the final report.

You may direct questions to Bob Rea at ANGLE Technology at 757-271-8892. His email address is robert.rea@angletec.com. The deadline for completing the survey is May 15, 2008.

Your participation is vital for defining and developing the Bioscience industry in Hampton Roads. Thank you for your help.

Sincerely,

William J. Wasilenko, PhD
Bioscience Cluster Project Director
Hampton Roads Research Partnership

Associate Dean for Research
Eastern Virginia Medical School

Appendix II: Survey Questionnaire



Bioscience Cluster Survey

1. Organization:

2. Business Unit:

3. Name of Person Completing the Survey:

4. Location of principal business unit (city):

5. Are there business units or divisions, other than your own, operating in Hampton Roads?

Yes

No

6. If yes, please identify:

7. Current Annual Sales (Check only one):

- Less than \$1 million
- \$1 – 10 million
- \$11 - \$50 million
- \$51 – 100 million
- More than \$100 million

8. Years your organization has been in operation in Hampton Roads:

- Less than 3 years
- 3 – 5 years
- 6 – 10 years
- More than 10 years

9. Focus of Your Organization (Check all that apply):

- Biotechnology
- Biomedical research
- Medical Devices
- Marine Biology
- Agriculture
- Clinical Trials
- Bioinformatics
- Bio Sensors
- Bio Modeling and Simulation
- Genetics
- Therapeutic Products
- Pharmaceuticals
- Alternative medical therapies
- Food science
- Bioenvironmental science
- Other (please specify)

10. Business Role (Check all that apply):

- End User
- Product Development
- Marketing and Sales
- Product Distribution
- Service Provider

- Supplier
- Research
- Other (please specify)

11. Number of full-time Bioscience employees in Hampton Roads:

12. Number of part-time Bioscience employees in Hampton Roads:

**13. Estimated average annual salary for Bioscience employees working in Hampton Roads:
(Based on full-time equivalent employees including administrative support)**

14. Estimated annual percentage change (+/-) in number of Bioscience jobs expected over the next 5 years?

15. Key Suppliers to your organization, e.g. chemical reagents, software vendors, IT support, materials suppliers, lab equipment

16. Key end users and customers, e.g. hospitals, clinics, doctors, pharmacies, pharmaceutical and medical device companies

17. What are emerging Bioscience opportunities in Hampton Roads?

18. Are there gaps, weaknesses or needs in conducting Bioscience research and business activities in Hampton Roads? Please specify:

- Research funding
- Trained workforce
- Business financing
- Transportation
- Networking opportunities
- Other (please specify)

19. Please suggest solutions to address any of the gaps/weaknesses and/or problems identified above:

Research funding

Trained workforce

Business financing

Transportation

Networking opportunities

Other

20. Please list other Bioscience companies and organizations in Hampton Roads.

21. Please comment on any other pertinent information we should be aware of for this survey.

Thank you for your participation in the Hampton Roads Bioscience Survey. The results of this survey are confidential; answers are compiled and reported in aggregated data to the Hampton Roads Research Partnership. An executive summary, including aggregated results and findings, will be provided to all respondents.