



EXECUTIVE SUMMARY:

A REGIONAL BIOSCIENCE STRATEGY FOR CENTRAL ILLINOIS

PREPARED BY:
Technology Partnership Practice
Battelle Memorial Institute
Cleveland, Ohio

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INTRODUCTION

The Central Illinois region, extending from the state's east to its west boundaries, has a substantial economic base anchored by several large medical centers in Peoria, including OSF St. Francis Medical Center, Methodist Medical Center, and Proctor Hospital, in addition to Bradley University, the University of Illinois College of Medicine at Peoria (UICOMP), and the USDA National Center for Agricultural Utilization Research (NCAUR), the largest of four Federal Agricultural Research Services (ARS) laboratories in the United States. In the spring of 2001, these organizations came together to form a Steering Committee to develop a bioscience strategy that would build on their collective assets and position the region to take advantage of the bioscience revolution that has emerged in recent years.

In the last decade, the bioscience sector has significantly grown in its importance to the U.S. economy. In economic activity, the health care component of the bioscience sector alone comprises over 13 percent of the nation's gross domestic product. In absolute size, the biosciences are one of the nation's most significant sectors in research and economic activity. The life science field, encompassing the disciplines of medical science, biology, and agricultural sciences, is reported by the National Science Foundation (NSF) to be the largest and fastest growing areas of university research and development in the nation. More than \$15.6 billion is spent each year on university research in the life sciences, representing 57 percent of all university research activity. The biosciences covers a wide variety of fields, including biology, medical sciences, public health, agricultural engineering, organic chemistry, and increasingly, the information sciences, including computer science and engineering.

The bioscience sector, both in terms of research and economic activity, is generally acknowledged to be entering a new era of innovation with the successful completion of the Human Genome Project, creating new fields of research and applications from bioinformatics to proteomics, and opening up new opportunities to link the biosciences with other fields and disciplines. This bioscience strategy attempts to position the region to take advantage of these national and international trends and developments by building on the region's existing resources and assets.

To assist in the development of this strategy, the Steering Committee, with funding support from other community groups and organizations, retained Battelle Memorial Institute's Technology Partnership Practice (TPP) to assist in this effort. Battelle is one of the world's leading non-profit research and development organizations, managing federal laboratories and conducting contract research with nearly 800 firms annually, and is recognized as a worldwide leader in the development, commercialization, and transfer of technology.

PROJECT DESIGN AND METHODOLOGY

Development of this project involved the undertaking of seven tasks that ultimately led to the development of a set of strategies and actions that, if implemented, will position the region to be a leader in the biosciences. These tasks included:

- *A core focus area identification* of the research and technology strengths of higher education, the nonprofit sector, and industry;
- *An economic analysis* that assessed current strengths, dynamics, and changes in the region's bioscience base;
- *A benchmarking analysis* of other regions' efforts and best practices that would be useful in assessing and developing Peoria's bioscience efforts;
- *An inventory and gap analysis* for the region to assess its current assets;
- *A strengths, weaknesses, opportunities, and threats analysis (SWOT)* to uncover both problems and opportunities, based on the input of many of the region's leaders in one-on-one interviews, small group discussions, and focus group sessions;
- *The development of strategies/actions* to better position Peoria as a player in key bioscience niches; and,
- *An implementation plan* to outline the steps that need to be undertaken to execute the strategy.

The project methodology included the involvement of many individuals and organizations in an effort to seek input, suggestions, and thoughts as to the region's prospects, opportunities, barriers, and resources that will enable it to better position itself in the biosciences. Battelle interviewed over 150 community leaders, not only from the "anchor" organizations mentioned earlier, but also a wide range of business service providers, local and state government officials, economic and business development professionals, academe, and non-profits. In addition, each phase of the project had the direct involvement of the Project's Steering Committee.

RECENT INITIATIVES

It should be noted that Peoria has already undertaken a number of bioscience initiatives:

- The community mobilized behind efforts to attract a star faculty member for UICOMP, who was recently successfully recruited from the MD Anderson Cancer Center in Houston, Texas.
- The region's health centers continue to invest significantly in cutting-edge technologies for treatment and care, and have worked jointly and with UICOMP to begin the process of establishing a Cancer Center in the region.

- Bradley University’s new addition to the Olin Hall of Science is nearing completion, and efforts have been initiated at its business school that are focused on entrepreneurship.
- NCAUR recently completed its pilot plant facility enabling it to continue to be designated as a major research center, while at the same time providing space for firm collaboration and incubation.

These efforts, in addition to the opportunities presented by the anchor organizations’ willingness to collaborate to develop a bioscience strategy, suggests an opportune time for the region to position itself to take advantage of a rapidly changing technology base driven increasingly by the biological and information sciences.

THE REGION’S ECONOMIC BASE IN THE BIOSCIENCES

Introduction

The region possesses a rich agricultural tradition, diverse economic strengths, as well as a variety of industry sectors that present emerging potential for the future. One of the most exciting and dynamic of these sectors is the biosciences.

For the purpose of this analysis, two “regions” have been defined for examination. The first region is the three county Peoria-Pekin Metropolitan Statistical Area (MSA), as determined by the United States Census Bureau. The second region, termed the “Greater Peoria” region, combines the Peoria-Pekin MSA with an extended area that encompasses the regional hospitals, totaling 23 counties. Finally, this analysis focuses on four segments of the bioscience industry sector: agricultural products, medical products, health care, and research and testing.

Profile of the Overall Bioscience Sector in the Region

While the number of bioscience establishments decreased in the 1995 to 2001 period in the MSA and broader region (compared to a slight increase nationally), bioscience employment increased by 9.7 percent within the MSA and 10.6 percent in the overall 23 county region. The biosciences accounted for 10.5 percent of the Peoria-Pekin MSA’s private sector employment and 9.4 percent of the Greater Peoria region’s private sector employment in 2001. These shares decreased by roughly one percent from 1995 to 2001, reflective of the substantial private sector growth in other sectors.

The region’s bioscience sectors are significantly more concentrated than the U.S. overall, indicating a good base on which to build the region’s bioscience base. The Peoria-Pekin MSA bioscience location quotient grew by .22 from 1.18 in 1995 to 1.40 in 2001 while the Greater Peoria region’s concentration increased by a slightly lesser

Region’s Bioscience Sector Profile

Peoria-Pekin MSA

- 674 establishments
- 20,038 employees
- 9.7% employment growth, '95–'01
- Location quotient of 1.40
- 10.5% of private sector employment

Greater Region

- 2,240 establishments
- 54,413 employees
- 10.6% employment growth, '95–'01
- Location quotient of 1.25
- 9.4% of private sector employment

amount (.17) from 1.08 to 1.25. As a point of reference, a concentration equal to the nations' would be 1.00, and a concentration above 1.20 or 1.25 is viewed as significant. Therefore, both the narrowly and broadly defined Peoria regions have a significant concentration in the biosciences.

Composition and Specializations within the Biosciences

In the U.S., the medical products sector constitutes the largest non-health care segment; however, in both Peoria regions, agricultural products (consisting of the bioprocessing and agricultural chemicals subsectors) is the largest non-health care segment. Therefore, **the agricultural products segment represents a significant industrial specialization in both of Peoria's regions.**

Agricultural Products Segment

Peoria-Pekin MSA

- 14 establishments
- 1,026 employees
- 16.5% employment growth, '95-'01
- 5.1% of bioscience employment
- Location quotient of 2.94

Greater Peoria Region

- 60 establishments
- 1,653 employees
- 16.0% employment decline, '95-'01
- 3.0% of bioscience employment
- Location quotient of 1.56

agricultural chemicals subsectors are growing faster in the Peoria-Pekin MSA than in either the State of Illinois or the U.S. This employment growth also led to an increase in an already significant concentration measure from 2.47 to 2.94 over the 1995 to 2001 period. Even within the Greater Peoria region, which experienced an overall employment decline, the agricultural products location quotient remained significant at 1.56.

Medical Products Segment

Peoria-Pekin MSA

- 21 establishments
- 504 employees
- 20.3% employment decline, '95-'01
- 2.5% of bioscience employment
- Location quotient of 0.31

Greater Peoria Region

- 73 establishments
- 1,014 employees
- 1.9% employment decline, '95-'01
- 3.0% of bioscience employment
- Location quotient of 0.21

within this overall segment employment loss is the growth of the drugs and pharmaceuticals subsector within the Peoria-Pekin MSA. Though small, this subsector posted a 41 percent growth rate over the period, outpacing the subsector's 39 percent U.S. growth rate.

and agricultural chemicals subsectors) is the largest non-health care segment. Therefore, **the agricultural products segment represents a significant industrial specialization in both of Peoria's regions.**

However, employment within the two Peoria regions is dramatically different, declining by 16.0 percent in the Greater Peoria region (due primarily to a 53 percent decline in the agricultural chemicals subsector) while growing by 16.5 percent in the Peoria-Pekin MSA. This employment growth in the MSA is more than twice the segment's national growth rate. Both the bioprocessing and

The medical products segment accounts for slightly more than 500 workers in the MSA, a little over 1,000 workers in the overall Greater Peoria region, and has experienced significant employment declines in both over the 1995 to 2001 period. The biggest driver behind this decline is dramatic employment losses in the medical and pharmaceutical wholesale subsector, where the MSA lost over 110 jobs (and 12 firms) while the remainder of Greater Peoria region lost an additional 450 jobs in the six-year period. This compares to an 84 percent employment growth rate in Illinois. **It is important to note that masked**

Similar to the State of Illinois and the nation, **the health care segment is the largest bioscience segment in both the Peoria-Pekin MSA and the Greater Peoria region.**

Health Care Segment

Peoria-Pekin MSA

- 620 establishments
- 18,086 employees
- 11.2% employment growth, '95-'01
- 90.3% of bioscience employment
- Location quotient of 1.28

Greater Peoria Region

- 2,048 establishments
- 50,842 employees
- 13.6% employment growth, '95-'01
- 93.4% of bioscience employment
- Location quotient of 1.19

The health care segment accounts for over 90 percent of the total bioscience sector in both the Peoria-Pekin MSA and Greater Peoria regions, compared to just under 85 percent in the U.S. overall. Even with declines in overall establishment numbers, both regions' health care segments had double-digit employment growth rates (over double the Illinois rate though lower than U.S.). Yet, only within the Peoria-Pekin MSA is the health care segment considered to be a significant regional specialization.

The decreasing establishment numbers with increasing employment in both the Peoria-Pekin MSA and Greater Peoria region is indicative of a trend toward consolidation. Additionally, outpacing the State's employment growth may be reflective of an increasing market share for the region's health care systems.

Research and Testing Segment

Peoria-Pekin MSA

- 19 establishments
- 422 employees
- 14.4% employment decline, '95-'01
- 2.1% of bioscience employment
- Location quotient of 0.76

Greater Peoria Region

- 59 establishments
- 904 employees
- 0.2% employment decline, '95-'01
- 1.7% of bioscience employment
- Location quotient of 0.54

With the explosion in the development of new bioscience-related technologies and the increasing use of these technologies to assess and diagnose health care issues, the U.S. has seen a massive growth in the bioscience research and testing segment in the 1995 to 2001 period. However, as in the State of Illinois, **research and testing is still the smallest segment, in terms of employment, in both the Peoria-Pekin MSA and the Greater Peoria region.** Unlike the state (which had employment growth of over 93 percent in the 1995 to 2001 period), employment in the segment is declining in both Peoria regional geographies.

Much of this decline can be attributed to the reported reduction of about 110 employees at NCAUR during the 1995 to 2001 period. Given the segment's small size, this employment loss also had the effect of reducing the Peoria-Pekin MSA's concentration in the segment from a significant level of 1.24 in 1995 to below a below national average 0.76 in 2001. **However, at the bioscience R&D subsector level, the existing employment of NCAUR still provides a significant regional subsector concentration of 1.47 in the MSA region in 2001.**

The most robust base for bioscience development and expansion is likely to consist of those subsectors that constitute regional specializations, contribute substantial employment and activity to the region, and are growing faster than national trends or overall regional economic activity.

In the Peoria-Pekin MSA, two subsectors, bioprocessing and general and specialty medical hospitals, meet all three strength criteria. **General and specialty medical hospitals are a fundamental strength of the Peoria region’s bioscience sector. The bioprocessing sector, though not as large, is none-the-less an important regional strength within the Peoria-Pekin MSA demanding continued attention in bioscience industry development efforts.** The same classification criteria applied to the overall Greater Peoria region yields a somewhat similar result, with only the general and specialty medical hospitals subsector meeting all three criteria. The bioprocessing subsector’s growth at the larger regional level is dampened, failing to meet the employment growth criteria.

Primary Bioscience Subsector Strengths

Peoria-Pekin MSA

- General & Specialty Medical Hospitals
- Bioprocessing

Greater Peoria Region

- General & Specialty Medical Hospitals

The Peoria Region’s Bioscience Economy: Summary and Conclusions

Currently, the Peoria region’s bioscience sector is an integral component of the economy. However, this sector has a different structure than the United States in terms of its size and concentration in both the health care and agricultural products segments. **The size and share of the health care segment indicates that the Peoria region has a substantial and established health care base upon which to build. Additionally, the agricultural products segment is more than three times as large a share of the bioscience sector in the region than the U.S. level, and includes significant industrial concentrations in both the bioprocessing and agricultural chemicals subsectors.**

This economic analysis of the Peoria region’s bioscience sector suggests that the bioscience strategy should: build on the substantial growth and regional concentration in general and specialty medical hospitals; exploit significant concentrations in agricultural products segment; and, encourage and support start-up activity in both the research and testing segment and in other select subsectors to both rebuild segment presence in the region and support other subsector growth.

CORE FOCUS AREAS ON WHICH TO BUILD THE REGION’S BIOSCIENCES BASE

Introduction

In order to position any region in the biosciences, a thorough review and analysis must be undertaken of the “core competencies,” or R&D strengths, from which both a region’s research reputation and economic growth can occur. Bioscience research is linked to, and, therefore, must build its foundation on medical, biological, agricultural, and related research and applications. Battelle conducted more than 40 interviews with 85 people, both individually and in small group discussions, to identify core focus areas on which the region can build its bioscience sector. This effort helped to: determine the region’s “niches”; explore existing and emerging strengths that offer potential for expansion; identify research interests or skills across organizations and institutions; and, place in perspective priorities on which to build the future base. Examined, as part of this review,

was NCAUR, Bradley University, UICOMP, and the region's major hospitals and medical centers, including its associated group practices. The Battelle team also interviewed selective private sector firms and industries, including those with major fermentation facilities in the region.

Areas of Existing Core Competency

Existing areas of core competency include agricultural biotechnology, with a specific area of expertise in applied microbiology, and health care education and treatment.

Today, the region's bioscience research base is primarily centered on NCAUR. The USDA's NCAUR laboratory is a significant, research focused institution with nearly \$24 million in annual sponsored research support. Addressing both basic and applied science, its focus is primarily intramural research and associated extramural research through its affiliated Biomedical Research Development Corporation (BRDC), the technology transfer arm of the laboratory. Statistically, NCAUR would place among the top forty universities in the nation in agricultural sciences R&D. Other identified bioscience research in the region includes approximately \$2.2 million in federal funding at UICOMP, and \$131,000 in 1999 from NSF to Bradley University. In terms of scientific publications, the most prolific sources of papers are NCAUR, followed by UICOMP, Bradley University, and Caterpillar, Inc.

NCAUR is a major driver of food technology and **applied microbiology** with world-class scientists and facilities. The region is also the site for three major bioprocessing plants, which represents a mature, yet still growing field, taking advantage of the region's strengths in agricultural production. This focus area involves using microbes to make products for sale, to fix environmental pollution, and to invent new products more efficiently. Another related growing field is nutraceutical production, a logical outgrowth of existing research. A pilot plant was just completed at NCAUR, and it also has a culture collection that is unique in the world.

Region's Existing and Emerging Core Focus Areas

- Applied microbiology
- Healthcare education/treatment
- Clinical trials
- Cancer research
- Neurobiology
- Risk and health assessment

The remaining "anchors" of the region are primarily **education and healthcare treatment** organizations where research is undertaken that is supportive of the primary missions. All have strong education and training programs, and as a result, the health care delivery and treatment in the region is strong. The region has a very productive teaching base for undergraduate, graduate, and residency training in a wide variety of health care fields. A large portion of the Federal grants awarded organizations in the

region has been focused on improving education. UICOMP relies heavily on volunteer faculty for coursework and resident training, limiting its past ability to strengthen and build a research base. Several group practices have established in-house clinical research efforts. This strength in health care provides a sizeable patient base for clinical trials and a foundation for moving discovery to translational research and clinical treatment as well as health outcomes research and analysis.

The region also has strong clinical care through a number of world-class practitioners affiliated with these hospitals and private practice groups in such areas as pediatrics, oncology (95 active clinical trials), neurology, radiology (clinical research in interventional radiology, heart or femoral stents/grafts, and drugs), nephrology, gastroenterology, and cardiovascular medicine (Midwest Heart Institute). OSF Saint Francis Medical Center, the largest and most comprehensive in the region, has clinical strengths in such fields as transplantation, neurology, pediatrics, oncology, radiology, lithotripsy, and cardiology. Methodist Medical Center's clinical strengths include family practice, behavioral health services, sleep disorders, autologous bone marrow transplants, and cardiovascular. Children's Hospital, housed within OSF Saint Francis, has a neonatal intensive care unit handling 20-30 clinical trial protocols at any one time. UICOMP has 11 departments primarily involved in clinical care and research, many with active clinical trials underway. Proctor Hospital houses the Illinois Institute for Addiction Recovery, a national leader in the treatment of addictions related to alcohol, drugs, gambling and other areas. The region's medical centers are increasingly focusing on new areas of opportunity related to clinical research including OSF Saint Francis, which recently established a Center for Clinical Investigation and Therapeutics, and is expanding its radiology focus with major opportunities in imaging.

Emerging Core Focus Areas

The region's primary emerging focus areas include cancer research and treatment, diseases of the brain and drug abuse therapies, clinical trials, and agri-informatics and health risk assessment. These areas are discussed below:

Cancer Research and Treatment. UICOMP recently recruited a research team from Texas to further build its specialization around cancer cell biology with applications to brain and other tumors. This effort was financially supported by many of the other key anchors in the region. This builds on current clinical trial research in the region by physicians and medical centers as well as current cancer treatment, and helps to enable the region to emerge as a future center in cancer biology and tumors. This research team already has received Federal NIH funds, has acquired equipment and lab space, and is working with a network of collaborators at other research institutions. Plans are underway for a major cancer center, and state funding support is being secured. The proposed Cancer Center would draw many scientists together to foster cross-disciplinary projects, and leverage the region's oncology strengths in its hospitals and medical centers as well as UICOMP, NCAUR, and other organizations.

Neurobiology/Diseases of the Brain/Drug Abuse Therapies. A substantial amount of cutting edge research is taking place in the Department of Biomedical and Therapeutics Sciences at UICOMP. The research is focused on understanding the biology of brain tumors at the molecular level, as well as working on other major brain diseases such as Parkinson's disease, epilepsy, stroke, and the central mechanisms of addiction. Research and clinical expertise is also found in these areas in the medical centers and other clinical departments at UICOMP, Bradley University, and private group practices.

Clinical Trials. The region is a site for many clinical trails, especially in the areas of oncology and cardiovascular medicine. Indeed, the vast majority of the region's current

clinical research is clinical trials. This competency extends throughout the community, with a significant amount of clinical trial work involving private group practices such as Heart Care Midwest, Illinois Cardiac Surgery Associates, and Oncology/Hematology Associates of Central Illinois, as well as UICOMP. OSF SFMC has created a Center for Clinical Investigation and Therapeutics that helps coordinate clinical research within its system. This emerging area builds on the region's stable population, which mirrors the nation, and its extensive health care delivery system, a base for an extensive database for outcomes-focused research related to such fields as proteomics and bioinformatics.

Agri-Informatics and Health Risk Management Assessment. Bradley University has started a nascent program to conduct research for managing insurance claims against the USDA's crop insurance program. In this project provides a base for developing capabilities in handling massive data collections and using such tools for data mining and management. In this project funded by the Risk Management Agency of the USDA, the Bradley Center for Agribusiness and Agrotechnologies brings together the tools of information technology including data mining, data visualization, and related areas in application to agriculture. Building on this base over the long-term, the region may be able to further build strength in select "niche" areas around bioinformatics, linking agriculture, information sciences, and biological sciences.

Market Trends and Potential in Core Focus Areas

Each of the focus areas offers significant opportunities in terms of private sector markets and economic growth opportunities:

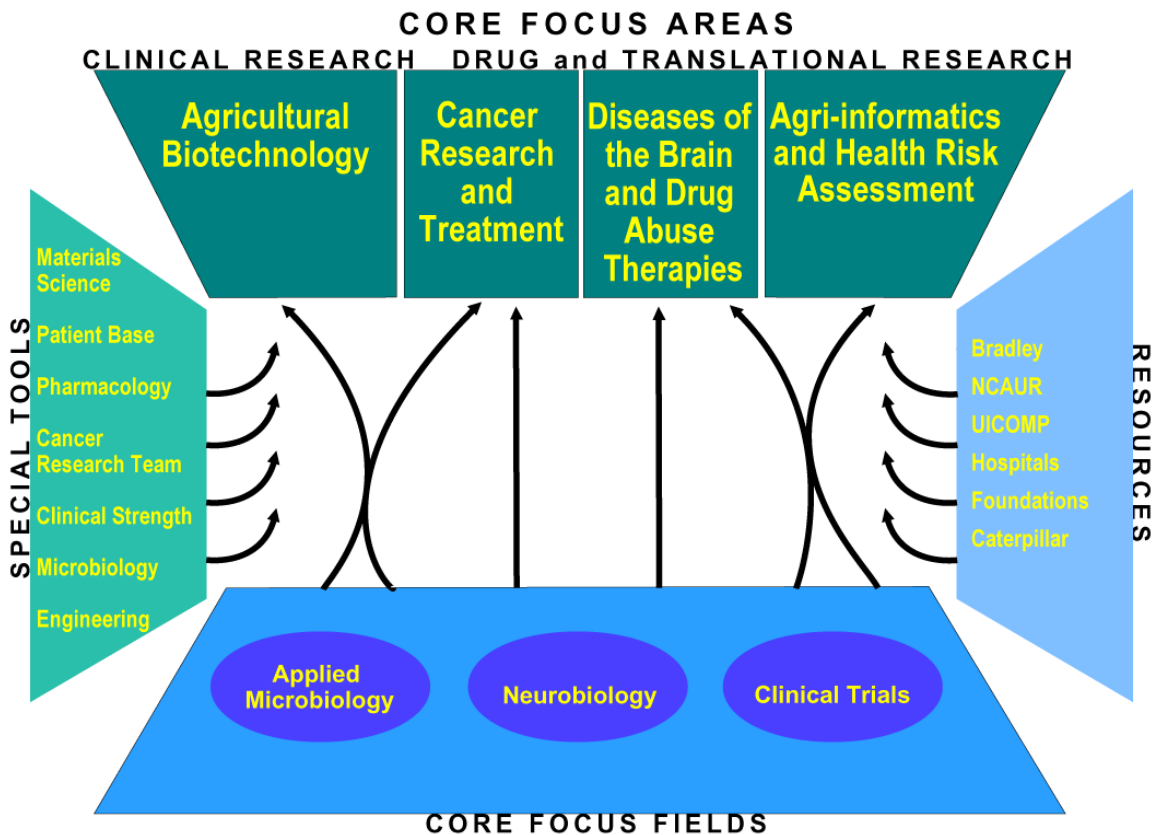
Market Trends and Potential in Core Focus Areas

- Agricultural biotechnology products totaled less than \$1 billion in 1995, and are expected to reach \$10 billion by 2005. BIO reports ten agricultural biotechnology food products are currently in the market, and this is expected to increase by 20 new products in the next 6 years. The retail market for functional foods is estimated to be growing at 16 percent per year, and reached \$17 billion in 2000.
- Clinical research, involving all phases of clinical evaluation of new drugs, comprises 32 percent of the \$26 billion spent on pharmaceutical research and development. Pharmaceutical outsourcing of clinical research is growing at 13.6 percent per year and is expected to reach \$5.3 billion in 2002.
- Cancer research and treatment had a worldwide market for cancer therapies of \$15.4 billion in 1998, and it expected to grow by 14 percent annually, reaching \$29 billion in 2003; cancer therapies are the leading research area of pharmaceutical firms and single largest area of biotechnology medicine development
- Diseases of the brain and neurological and other central nervous system diseases account for 21 percent of all drug sales; anti-epileptic therapies stood at \$2.8 billion in 1998, growing 15 percent a year and estimated to be \$7 billion in 2000.
- Health outcomes research and "care" space estimated to be in excess of a \$700 million market.

Summary

Figure ES-1 illustrates the areas and fields on which the region should build its bioscience future: agricultural biotechnology (applied microbiology); health care education and treatment; cancer research and treatment; neurobiology diseases and drug abuse therapies; clinical trials; and, agri-informatics and health risk assessment. It also illustrates the tools or enablers in which investments need to be made to achieve both research stature for the region and economic benefits, including such areas as neurobiology. Finally, the source of resources is also identified, including hospitals, academic, and other assets of the region.

Figure ES-1: Core Competencies



BENCHMARKING OTHER REGIONS AND IDENTIFICATION OF BEST PRACTICES

To better understand the dynamics of regional bioscience development and learn from both the successes and failures of regions that have succeeded or are in the process of becoming major bioscience centers, the Battelle Project Team conducted an analysis that simultaneously looked at activities in four regions with existing or growing bioscience industries (“Best Practices”), and activities in six regions comparable to the Peoria region (“Benchmarking”).

Benchmarked Regions:

- Iowa City, Iowa,
- Kansas City, Missouri & Kansas
- Rochester, Minnesota
- Greensboro-Winston Salem, North Carolina
- Omaha, Nebraska and
- Norfolk, Virginia

Best Practice Regions:

- Baltimore/Washington;
- Birmingham, Alabama;
- Roanoke, Virginia and
- Worcester, Massachusetts

The regions selected for the best practices and benchmarking studies were chosen by the project’s Steering Committee from a list assembled by Battelle.

The Battelle Project Team identified the following key success factors:

- **Engaged universities**, seeking not only to build enhanced R&D, but also to build stronger industry collaborations and technology commercialization connections within their regions and with industry throughout the country and the world.
- **Intensive networking**, helping to raise the profile and create a sense of identity for the region’s emerging bioscience sector, as well as engaging broad community leadership in support of the sector.
- **Available capital**, needed at all stages of the bioscience firm life cycle, some portion of which must be indigenous to the region.
- **Discretionary R&D funding**, enabling the region to continually build upon specific areas of research excellence and to advance the region’s reputation and position in world-class bioscience research.
- **Workforce Development/Talent**, training and attracting the professional and technical staff needed to grow the research enterprise, to undertake product development research, as well as to attract and develop executive management with entrepreneurial business management skills. As bioscience companies mature, their personnel needs change, and it is critical that a region have the workforce pool ready to address those changing but predictable needs.

Success Factors

- Engaged universities
- Intensive networking
- Available capital
- Discretionary R&D funding
- Workforce development
- Patience and a long-term perspective and commitment

- ***Patience and a long-term perspective and commitment***, recognizing that it takes time to develop innovative, start-up companies, and to build the industry linkages around research drivers. Moreover, the bioscience sector is an emerging one with tremendous growth prospects; but, to seize this future development, regions must prepare for a marathon, not a sprint.

Table ES-1 demonstrates the variety of success factors fueling each of the benchmark regions examined as part of this benchmarking exercise:

Table ES-1: Summary of Lessons Learned from Benchmark Regions

REGION	KEY ACTIVITIES TAKING PLACE
Iowa City, IA	<ul style="list-style-type: none"> • Engaged universities creating a technology park and incubator • Available capital from philanthropic families • Discretionary R&D funding— > \$200 million in R&D
Kansas City, MO & KS	<ul style="list-style-type: none"> • Building a stronger research base with \$1.6 billion from Stowers Family. • Capital needs have yet to be addressed. • Intensive networking—KC Catalyst, a bioscience umbrella organization
Rochester, MN	<ul style="list-style-type: none"> • Available capital – Mayo Medical Ventures • Disengaged university/research institution—exclusive focus on improving health care delivery and practice • Workforce development—trains scientists, technicians, and MDs who then move away.
Greensboro-Winston Salem, NC	<ul style="list-style-type: none"> • Engaged universities—Wake Forest and Winston Salem State University sharing downtown technology park • Intensive networking—local technology council—Idealliances • Explicit long term plans—Blueprint for Technology Development
Omaha, NE	<ul style="list-style-type: none"> • Engaged universities—UNMC created UneMed to commercialize intellectual property, • Discretionary funding—Tobacco Settlement Fund distribution
Norfolk, VA	<ul style="list-style-type: none"> • Federal laboratory presence—Jefferson Center for Research and Technology • Networking – creation of the Hampton Roads Technology Council • Patience and long term commitment

The lessons from this benchmark analysis suggest, it is important to note, that while you first need a strong academic medical center/higher education intellectual base, that alone is not sufficient. Requirements are “connectivity” and an attitude of collaboration so as to connect the research drivers with the emerging industry drivers. Concurrently, there must be key investments in the research base and focused efforts to support new enterprise development through availability of seed capital and incubator programs in order to secure success through the creation of new bioscience enterprises. Once a critical mass of bioscience firms is present, then an active outreach marketing effort can capitalize on this growing bioscience cluster to attract expansion opportunities, as well as companies with

relationships with both local research drivers and cutting edge bioscience firms that have been “home grown.”

STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS (SWOT) ANALYSIS

This section presents an analysis of the strengths, weaknesses, opportunities, and threats facing the region in building a bioscience sector for the future. This SWOT analysis is much like a business planning process. In preparing its business plan, a company undertakes a similar exercise, identifying its internal strengths and weaknesses, and taking into account and addressing external factors, including markets and opportunities and adverse events and threats. In the following review, the Peoria region is examined much as a business would examine itself.

Strengths:

- There is a strong health care sector upon which to build the region’s bioscience base, with significant specialization in general/specialty medical hospitals.
- Agricultural products represent a strong second base for the region’s bioscience future.
- The region’s business climate is cost competitive.
- The region has been successful in the past twenty years in diversifying its economic base and becoming less dependent on the success of one major manufacturer.
- New leadership is emerging to fill a local vacuum caused by the region’s economic transition.
- The region’s quality of life is strong and offers a world-class city with a small town feel, heritage, and culture.
- The community’s physical infrastructure includes good airport facilities and an extensive fiber optic network.
- The region has experienced an increased level of entrepreneurial activity.
- It is a wealthy community generous to community causes and philanthropic support.

Weaknesses:

- The region’s bioscience R&D base, once a regional strength (although narrow in focus), is declining despite dramatic growth nationally and in other parts of the state.
- There is no critical mass of bioscience-related firms in the region.
- The region has had static population growth, affecting both the demand for health services and the revenue base on which the community and region can grow.

- Lack of comprehensive entrepreneurial support infrastructure, including risk capital.
- Major institutions in the community have historically not been involved in the community's efforts to address its economy.
- A major obstacle to building a bioscience vision for the region is that there is a limited history of sustained collaboration among major health anchors in the region.
- Attitudes regarding Peoria's future role and vision need to be given more focus and attention.
- There has been a fractured leadership base.
- It is difficult for UICOMP to build stature, enhance its research base, and secure its share of state funds as an appendage of UI-Chicago.
- Citizens lack knowledge of region's medical excellence.
- The region lacks a fully developed higher education base and the corresponding talent pool on which to build its future economy.
- Quality of air service, both as to availability and costs, may adversely affect developing the bioscience base in addition to potentially hindering the growth of existing employers.
- The practice of economic development in the region has focused on retention, with limited attention to areas such as technology and entrepreneurship.
- Peoria's physical infrastructure shows signs of deterioration around its urban core, creating general uneasiness about crime and spread of city blight.

Opportunities:

- Peoria has a history of biotechnology, and was a pioneer in the techniques of fermentation.
- Build the region's reputation statewide and multi-state as a center of excellence in selective areas of health treatment and care (boundaries are Iowa City, Rochester, Minnesota, Urbana/Champaign and Chicago) as well as on its agricultural bioprocessing around NCAUR.
- Build collaboration around the region's core competency areas and talent, sustained by R&D and industry/university/federal lab connectivity including ag biotechnology, cancer research and treatment, diseases of the brain and drug abuse therapies, and agri-informatics and health risk assessment including data mining.
- Startup bioscience industry activity in areas with high national growth can serve as bridges to further building the region's strengths.
- Use the "gold standard of excellence" of "will it play in Peoria" as part of the branding and image for Peoria's bioscience future, building on the region's national name recognition.

- CIBR represents an already initiated nonprofit vehicle through which the region can invest in building the research base and excellence of the region.
- The region's elected officials, including state and federal leaders, work together well across party lines and could provide state and federal investments in Peoria's bioscience efforts.
- Biosciences can contribute to the City of Peoria's three-prong economic development strategy: redevelop the core; stabilize neighborhoods; and capture growth.
- Peoria, as a community, has a number of wealthy individuals, several foundations, and other potential investors for bioscience spin-off companies.
- There may be further opportunities to link research conducted at the region's traditional manufacturing and agricultural firms.
- Build the region's talent base by both retaining and attracting talent.
- Use Peoria's emergence as a center for K-12 sports tournaments as an opportunity to sell the health care image of the region throughout the state and beyond.

Threats:

- Other nearby regions in Illinois and adjoining states may have similar aspirations to Peoria, potentially adversely affecting efforts to increase the health industry's market penetration to a broader region.
- Other regions have stronger research infrastructure upon which to build their bioscience base and attract star talent.
- Other regions have addressed and developed mechanisms and approaches to help form bioscience firms, secure their capitalization, and build the management and other talent necessary for these firms to survive and grow.
- Major bioscience private sector players are absentee-owned outside the region.
- Lack of availability of public higher education could adversely affect the ability of the region to develop and maintain an adequate labor force.
- Mergers and acquisitions could potentially adversely affect the region's specialization in health care.
- The region's stable population base could adversely affect downstate representation, both at the state and national levels.
- Adverse impacts on the traditional economic base in the region could adversely affect the community's willingness to invest in and take the long view that the biosciences require.
- Inability to organize, convene, and mobilize the community's leaders to implement this strategy.
- International efforts to regulate the biosciences, particularly in agriculture, could adversely affect firm growth and product introduction.

- Centralization of health care could adversely affect the direction and growth of the medical/hospital industry in the region.

These strengths and opportunities are translated later in this strategy into strategies and actions. But first we need to determine the vision and mission for the region.

VISION AND MISSION

The future vision suggested for Peoria, as seen a decade from now, is described as follows:

Vision: *The region's strong bioscience base is anchored by its twin pillars of medical care and agriculture. The region is a recognized major Midwest Health Care Center for the practice and application of the tools of modern medical treatment and disease prevention. It is also a major center in agricultural bioprocessing research, development and adoption.*

The region's mission is that a decade from now it will be acknowledged by the nation and world that:

Mission: *The region offers quality health care delivery and its medical discoveries have led to research and teaching excellence in selective fields such as cancer, agricultural bioprocessing, diseases of the brain and informatics. Key contributing factors to the region's bioscience success include the region's biosciences anchors (hospitals, medical center, university, federal laboratory) which collaborate with each other and partner with industry, government and others to build and sustain the region's biosciences base.*

STRATEGIES FOR POSITIONING THE REGION

Five strategies are proposed to accomplish this vision and achieve this mission:

- **Strategy One:** Strengthen the region's research and development base in identified core areas through collaboration among key anchors;
- **Strategy Two:** Build the region's technology infrastructure so as to enable research and technology commercialization to flourish;
- **Strategy Three:** Create an entrepreneurial-driven culture by establishing and forming home-grown businesses in the biosciences;
- **Strategy Four:** Establish a regional business climate supportive of biosciences around its health care base; and,
- **Strategy Five:** Mobilize community and regional support for the biosciences.

To implement these five strategies, a series of specific actions are proposed. For each action item this summary identifies the resources needed for its implementation and the priority the action should receive. Priorities indicated are immediate (within the next year); short-term (within the next 18-24 months); and long-term (within the next five

years). Table ES-2 defines the strategies, the actions for each, the time/frame priority, and the resources required for implementation.

Table ES-2: Bioscience Strategies and Actions

Strategy	Action	Priority	Resource Requirements
Strategy One: Strengthen the Region's R&D Base in identified core areas through collaboration among key anchors	Form Inter-institutional Programs of Excellence in cancer and other core areas that include shared facilities, provide health care treatment and patient care and a research component.	Initiate in the short term but recognize that areas can be added over time, including emerging areas such as diagnostic radiology.	Inter-institutional Program costs will amount to \$20–25 m. per center and \$2 m. in funding support for operations. Five centers may be the ultimate target or one a year for five years. Each center should have, at minimum, three endowed chairs (at a cost of \$3 m. each).
	Offer Incentive Grants for Center planning and to encourage multi-institutional endeavors.	Short Term	CIBR or another organization could provide seed funding.
	Expand graduate degree offerings and programs in the basic sciences in the region to further build the research core strengths.	Short to Mid Term	Graduate fellowships, additional faculty lines, and supplemental pay for health professionals will be needed of \$2–3 million in annual additional funding.
	Secure federal clinical research center designation in each of the core areas.	Mid to Long Term	Funding sought will vary by area.
	Hospitals and UICOMP should expand medical and clinical fellowships and residencies related to core areas such as vascular medicine, cardiology, surgery, other areas.	Mid Term	\$100–150,000 per residency annually in additional operational revenues would be needed.
	Build a viable and active Research Networks across health anchors to encourage cross-institutional, multidisciplinary research.	Short Term	Staff support provided by BioCollaborative. No additional costs.
	Change status and designation of the University of Illinois College of Medicine at Peoria to achieve improved local visibility, greater flexibility, independence of action, and access to appropriate funding.	Immediate to Short Term	Legislation and additional financial support of \$20 million in funding to expand its research efforts and an ongoing additional \$3–5 million in basic research support to build strengths in core areas is needed.
	Strengthen NCAUR's capabilities and expertise in metabolic engineering and other bioprocessing areas around metabolic pathways/renewable resources to further increase NCAUR's research strengths.	Immediate to Short Term	Renovation work on NCAUR's biosciences wing will require \$25–30 m. over six years and will need an additional \$5 m. a year in research support.
	Provide incentives for group practices to undertake clinical research collaboration so as to increase the number of clinical trials and build an interest in clinician research among group practice members.	Mid to Long Term	Matching grants to clinicians of \$75,000 to \$150,000 each to partner with biosciences anchors in region in clinical research totaling around \$500,000 yr.

Strategy	Action	Priority	Resource Requirements
Strategy Two: Build the region's technology infrastructure so as to nurture a critical mass of bioscience industries	Establish research/tech park to link anchors with existing and new industries in a geographical cluster within the region.	Immediate	Feasibility study to select site and develop concept plan \$150,000 to \$300,000 including preliminary engineering and market analysis. Land assembly costs and infrastructure depend on site and could range from \$10–15 m. for first ten years.
	Establish biosciences/information technology incubator/accelerator.	Short Term	\$5–7 million for 25,000 square foot minimum new facility; less for renovated facility. Operating costs of \$200,000 for the first 18 months may need to be addressed.
	Establish high speed Internet 2 and GRID access within the region and between Peoria, Champaign/Urbana, state and world.	Short to Mid Term	Financial costs depend on access and location and can range from a few hundred thousand to several million.

Strategy	Action	Priority	Resource Requirements
Strategy Three: Create an entrepreneurial-driven culture by forming home-grown businesses in the biosciences	Establish a Bioscience Commercialization Center with several functions including managing a Commercialization/Pre-Seed/Seed fund, providing entrepreneurial development assistance, and linking universities, federal labs, hospitals, and UICOMP technology efforts with market opportunities.	Immediate	Commercial and Pre-Seed/Seed Fund will need \$10–15 m. in one-time investments to get started and ongoing operational support of \$500–750,000 per year to provide entrepreneurial assistance.
	Establish strong linkages between BRDC/NCAUR and Commercialization Center to form firms around bundled technologies and serve as administering arm for BRDC. Link Center to NCUAR/BRDC effort to capture IP regionally in new firms.	Immediate	Will need Congressional Committee language to change administrative arm. Establish Commercialization Center as the legal entity and equity partner for BRDC.
	Form a Biosciences Angel Network of informal investors.	Short to Mid Term	No additional costs as Commercialization Center could facilitate.
	Form a Biosciences Network for interested parties to meet monthly, build relationships, and address common problems.	Immediate	No additional costs as Commercialization Center could facilitate.
	Establish international sister city relationships in biosciences.	Mid to Long Term	In-kind costs.

Strategy	Action	Priority	Resource Requirements
Strategy Four: Establish a regional business climate supportive of this biosciences effort	Build a national brand and image around the region's biosciences base of medical care and ag bioprocessing. Redirect Peoria's name becomes a "gold standard" for biosciences.	Immediate	\$175,000 to develop campaign, supported by volunteers/in-kind. \$1-3 m/yr in ongoing marketing materials, exhibits, collaterals, advertising and promotion.
	Establish one or more technology zones within region around which technology infrastructure investments are focused and provide fast track permitting and other incentives for firms and others to locate within the zone.	Short Term	City government would establish zone likely where tech park is located.
	Revamp economic development efforts to focus on entrepreneurship and selective recruitment and priority to biosciences and related information technologies.	Short Term	Redirect use of existing funds.
	Attract Biosciences talent to the region through such efforts as a Magnet Academy in the Biosciences, establishment of bioscience technician program at the community college, attract back bioscientists to Peoria recruitment effort, and form a Biosciences Fellows Program (for recent graduates to remain in Peoria).	Short to Mid Term	The bioscience technician program will have one time costs under \$250,000 with in kind support and ongoing costs of \$100,000. Attracting natives back to work in biosciences will cost \$250,000 annually for coordinator and collateral and marketing materials. The Biosciences Fellows total costs would be \$250,000 annually for ten fellows per year.
	Address need for transportation access including passenger air service, availability and dependability, as well as road transportation to Chicago and other parts of the state and region.	Short to Mid Term	Resolution of the airport issue needs to occur and efforts need to continue to find ways to increase air service to other locations than St. Louis and Chicago to assure dependability.
	Review and study formation of an International school and a multicultural support organization.	Long Term	Volunteer effort and out of pocket costs of \$25,000.
	Continue efforts to form a Young Professionals Association to help develop an amenities strategy for young professionals in the region.	Short Term	One time philanthropic support of \$50-125,000 self-supporting thereafter.

Strategy	Action	Priority	Resource Requirements
Strategy Five: Mobilize community and regional support for the biosciences	Establish a permanent vehicle to guide strategy implementation that could become the BioCollaborative in the Biosciences (BCB), chartered by the hospitals, Bradley, NCAUR, and UICOMP.	Immediate	\$400,000–600,000 in annual costs for supporting catalyst role.
	Identify and mobilize champions to support this strategy.	Immediate	Critically important to secure leadership across all sectors—industry, health care, education.
	Educate and inform opinion leaders and broader citizenry on biosciences.	Short Term	Part of imaging and marketing effort.
	Identify and secure Federal and State investments in strategy.	Long Term	Need to do as part of building research and technology commercialization base for region.
	Establish and monitor measures of success including tracking developments and progress of strategy.	Short Term	Part of operating costs of BioCollaborative.

SIGNIFICANT AND CRITICAL ACTIONS FOR LONG TERM SUCCESS

Among the twenty-nine actions suggested, ten stand out as most critical to the long-term success in achievement of these strategies and thereby the vision for the region:

- Form the Regional BioCollaborative;
- Change status and designation of UICOMP;
- Establish brand name/image for region in the biosciences;
- Build equivalent of a research university in selective bioscience-related fields through Interinstitutional Programs of Excellence linking NCAUR, UICOMP, Bradley University, and the regional medical centers and hospitals;
- Establish a technology park in the region;
- Establish a technology incubator/accelerator;
- Create the Biosciences Commercialization Center along with the Commercialization/Pre-Seed Fund, entrepreneurial assistance, and linkages to BRDC;
- Market the brand/image regionally and globally;
- Form angel network; and,
- Expand K-12 base to include a Magnet Academy in the biosciences.

Immediate Actions That Can Be Initiated in The First Year

Eleven actions can be undertaken, although not necessarily completed, in the first year:

- Form the regional BioCollaborative, led by champions in the region;
- Establish a biosciences network that meets monthly and ensures connectivity and collaboration among researchers, business, and others;
- Create Biosciences Commercialization Center;
- Form work group to establish brand name/image;
- Start and complete a feasibility/conceptualization study for a technology park including site location selection;
- Secure federal/state funds for implementation of this strategy;
- Begin to expand graduate degree offerings in the sciences as a joint collaboration among Bradley, NCUAR, UICOMP, and regional hospitals and medical centers;
- Educate and inform the community and media regarding the strategy and its implementation;
- Establish measures of success in the short and long term;
- Secure high speed Internet 2 access among institutions to UIUC NCSA; and,
- Start Young Professionals Association.

RESOURCES

Institutions in the region are already making significant investments in research, clinical treatment, and science education. It is estimated that an additional one time cost of \$240-255 million will be needed, primarily to build the region's research base through the Interinstitutional Program of Excellence over the next five to ten years, including funding from state, federal, private and philanthropic sources. It is estimated that \$100 million will be needed for these programs, and an additional \$45 million for endowed chairs. All programs should not be initiated at once; however, if five centers/programs can be established and initially supported in the first five years, the region will have moved forward in overcoming its most significant weakness, a lack of sufficient depth in bioscience research and development.

Other one time costs include three major items:

- | | |
|-----------------------------------|-----------------|
| • Commercialization/Pre-Seed Fund | \$10-15 million |
| • Technology Park | \$10-12 million |
| • Incubator/Accelerator | \$5-8 million |

Annual ongoing costs for implementation of this strategy are estimated at \$13-15 million per year. It is suggested that the BioCollaborative begin a fund raising effort to secure these funds as the Programs come on line over a five-year period. Not all funds will be needed initially.

ORGANIZATION AND STRUCTURE

It is proposed that the Regional BioCollaborative be established as a mechanism to implement this strategy, and be tasked with several responsibilities:

- Serve as the regional advocate for mobilizing resources around this strategy and its implementation;
- Serve as the one-stop center to address issues and problems as they arise that affect the ability of the region to become a major Midwestern center in the biosciences; and,
- Serve as the broker/facilitator to link sectors (government, industry, academe) that are critical to implementing this strategy and ensuring that the vision becomes a reality.

The BioCollaborative will require \$400,000 – 600,000 a year to hire sufficient staff to be effective. It can be a new organization, a subsidiary of a new organization, or encompassed within an existing organization. The critical issue is that it has an independent board that is capable of initiating action without additional layers of administrative and programmatic approval and potential delay.

Guiding principles in the implementation of this strategy include:

- Roles, responsibilities, and contribution of resources to this common cause need to be made by all key “anchors”;
- Concrete actions are identified above that enable efforts to begin in the near term enabling the region’s leadership to “hit the ground running” in implementation;
- The region’s leadership and citizenry need to be educated and informed regarding this strategy and its contents;
- Other regions that have been successful in building their biotech base took, at minimum, 12-14 years for success. The region must be both realistic in the short term and persevere in the long term; and,
- Continue to focus on priorities as this strategy is implemented and concurrently go about securing the needed resources to make this strategy a reality; however, don’t wait until all the resources have been secured before implementation begins.

ACCOUNTABILITY AND MEASURES OF SUCCESS

This strategy can use the following measures to gauge success and progress over time:

- Amount of funded R&D in the region;
- Bioscience economic base: number of firms, their employment, their concentration in region relative to the nation; and birth and death rates of firms;
- Reputation and stature in health sciences and agricultural bioprocessing as measured by citation analysis, funding, and reputation rankings;
- Funds leveraged to implement this strategy (all sources); and,

- Progress in implementation of the actions (monitor and chart progress).

In addition, this strategy should be reviewed and updated every three to five years as markets change and progress is made.

SUMMARY

The region is positioned to determine its destiny. Does it want to diversify its economy and take advantage of the bio and digital revolutions to capture these developments in a strong research and economic base within the region? Or does it simply want to continue what it has done in the past? The community and its leadership must make this decision. Other regions and communities have recognized that to keep and attract talent they must offer well paying jobs that involve the development and use of technologies, require advanced education and training, and are built on knowledge and innovation. The region has emerged as a regional health center. It has the potential with its major national laboratory, Bradley University, and UICOMP, to be a developer and innovator, not simply a health care provider and deliverer.

This is not to say the journey to the region's bioscience future is simple or easy. The region must create the equivalent of a major research university in the medical and agricultural biosciences, not by creating or building a new university, but through connectivity and increased collaboration, along with new investments as outlined in this strategy. Talent, technology, and capital are the three key ingredients in the New Economy. This strategy addresses how the region, to build itself into a major bioscience performer, can address each of these factors or elements.

The region is mobilizing. The key is to seize the momentum and make the vision a reality. This strategy and its actions lay the groundwork for the pursuit of this dream.