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**COMPLETING THE PUZZLE:  
CREATING A HIGH-TECH AND LIFE SCIENCES ECONOMY IN KANSAS CITY**

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A Discussion Paper Prepared for the  
The Brookings Institution Metropolitan Policy Program

November 2006

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## **ACKNOWLEDGMENTS**

The Brookings Institution Metropolitan Policy Program would like to thank the Ewing Marion Kauffman Foundation for their generous support of this work.

The author wishes to thank the Brookings Institution and Lesa Mitchell of the Ewing Marion Kauffman Foundation for their support and guidance in this project. Lesa Mitchell was invaluable in connecting me with key survey respondents in Kansas City. Jennifer Vey at the Brookings Institution provided great assistance in writing and editing this report. I would also like to thank all the key respondents who took time out of their busy schedules to meet with me and to share their expertise about the Kansas City economy.

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# COMPLETING THE PUZZLE: CREATING A HIGH-TECH AND LIFE SCIENCES ECONOMY IN KANSAS CITY

## EXECUTIVE SUMMARY

Many cities and regions aspire to the role Silicon Valley plays for high-technology manufacturing or to what San Diego is for biotechnology and life sciences industries. While the goal of becoming the “next Silicon Valley” is for many out of reach, many second-tier regions like Kansas City have sufficient industrial capacity to emerge as viable locations for knowledge-based industries. Kansas City in particular shows underdeveloped capacity on a variety of indicators such as top-tier research universities, patent registrations, or venture capital investments that could support an innovative economy.

Lacking a major research university and not being able to financially support commercialization would lead a pessimist to assume that the region is facing a daunting challenge in trying to establish a vibrant life sciences or high-technology industry cluster. The reality is quite the contrary. Rather, Kansas City has strong potential and the economy shows many promising signs.

For example, Kansas City has been home to locally-grown firms that have functioned as anchors and entrepreneurial seedbeds for a variety of emerging technology sectors. Over the last five years, major investments have been made in life sciences research with the Stowers Institute serving as linchpin. The biggest challenge, however, the Kansas City region faces is to take the next step and commercially exploit new ideas and innovation. Policymakers, business and academic leaders have to establish mechanisms to grow new companies and keep innovation from leaking to the established high-tech and life sciences centers of the East and the West coasts. In essence while industry and research capacity are up to date in Kansas City, regional leaders must focus on entrepreneurship and commercialization to reach the next level.

Key findings of this report are:

- **Kansas City firms have left a strong legacy and influenced the growth of the life sciences, information technology, and telecommunications sectors.** The Kansas City economy boasts a diverse array of strong economic sectors for which innovation and knowledge creation is important. There is a substantive presence of contract research organizations (CROs) working on biological research, therapeutic testing, clinical trials, and other related pharmaceutical developments. Many of these firms have their origins in Marion Laboratories, a home-grown pharmaceutical company that started in Kansas City in 1950. Mergers and acquisitions changed the company’s presence in the region but also led to the growth of small firms founded by former Marion employees. Marion Laboratories’ growth and subsequent decline facilitated the creation of a critical mass of talented people familiar with marketing, regulation, and drug development in the pharmaceutical industry. In effect, Marion Labs functioned like a “surrogate university” for the region. Other firms have been important players as well: Sprint Telecommunications has influenced the growth of a

modest-sized telecommunications and information technology industry. Another firm, though younger but equally important in terms of its innovation capacity, is Cerner Corporation, a health care information technology firm with ties to the area's research institutions. Led by Marion Laboratories, home-grown firms in the Kansas City region have played an important role. Additionally, another area of industrial activity can be found in St. Joseph, a small town about 50 miles north in Missouri, where a significant cluster of internationally-known animal health and nutrition companies is located.

- **Kansas City is gaining funding and reputation in life sciences research.** Since 2000, Kansas City-based research institutions have steadily increased their annual research expenditures from \$128 million to \$243 million in 2004. The region has also gained a reputation for basic research in cellular and molecular biology with the opening of the Stowers Institute in 2000. The significant investments of the Stowers Institute sparked a regional discussion about how to support life sciences industries. As a result, the region created the Kansas City Area Life Sciences Institute (KCLSI) to support and facilitate collaboration among ten research institutions and hospitals. Local leaders credit KCLSI for bringing the organizations together and increasing the levels of funding. The Stowers Institute has elevated Kansas City's reputation among research scientists and has positively influenced other institutions such as the University of Kansas Medical Center and the University of Missouri-Kansas City. The next step Kansas City needs to take is to expand life sciences research and connect it with local hospitals, its industrial base, and entrepreneurs.
- **Regional leaders are involved with many small, but fragmented efforts to improve the environment for innovation and entrepreneurship.** Most interview partners for this research project agreed that the region was lacking readily accessible angel investors and venture capital. There are a number of efforts underway to address the lack of financing by establishing locally-based angel networks and investment funds. Other efforts address aspects of commercialization. For example, the Stowers Institute's BioMed Valley Discoveries focuses on intellectual property rights and licensing of research. In addition, the Kansas City Area Life Sciences Institute is currently considering the development of a broader strategy for commercialization. While most of these efforts are well-intended and needed in the region, a connecting overall vision and strategy is missing. Furthermore, the region needs to have a clear strategy about how it will connect budding research capacity with the already existing industrial base. Failure to make that connection will likely mean that research originating in Kansas City will be commercialized in other regions.
- **In Kansas City the puzzle pieces for creating a vibrant life sciences and information technology community are in place: The region possesses a strong industrial base and is well underway in strengthening the foundations for research. The most pressing challenge is to connect university to industry assets through an entrepreneurial pipeline.** Many older regions like Pittsburgh or Cleveland have experienced the loss of their knowledge and innovation infrastructure. In the case of

Cleveland, research from laboratories and institutions was commercialized in Silicon Valley.<sup>1</sup> In another example Pittsburgh lost the Carnegie Mellon spin-off company Lycos to Boston.<sup>2</sup> Kansas City is at the point where regional leaders have to pay attention to the challenge of how to retain ideas and knowledge developed in their research institutions and firms. Rather than a multitude of unrelated and uncoordinated efforts, Kansas City needs to devise a systematic way to leverage its economic strengths by improving the entrepreneurial environment and better connecting industry with academia. The proposed Comprehensive Cancer Center and the Center for Translational Research are good steps into this direction. However, Kansas City leaders need to do a better job at involving existing life sciences and high-technology firms in the planning and implementation of these centers, offering opportunities for academics to interact with industry experts, and promoting and supporting nascent entrepreneurs.

In short, Kansas City has the potential to increase its high-technology and life sciences capacity, but organized civic leadership and sound public policy are necessary to realize the region's promise.

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<sup>1</sup> Michael S. Fogarty and Amit K. Sinha, "Why Older Regions Can't Generalize from Route 128 and Silicon Valley: University-industry Relationships and Regional Innovation Systems." In L. M. Branscomb, F. Kodama, and R. Florida, eds., *Industrializing Knowledge: University-industry Linkages in Japan and the United States* (Cambridge: MIT Press, 1999).

<sup>2</sup> Richard Florida, *The Rise of the Creative Class and How It's Transforming Work, Leisure, Community and Everyday Life* (New York: Basic Books, 2002).



## I. INTRODUCTION

While Kansas City boasts a relatively diverse and stable economy, the region is not performing well on a variety of measures related to innovative research and entrepreneurialism. Kansas City-based inventors are registering patents well below the national average; the region ranks very low in terms of the amount of research and development funding it receives; its colleges and universities award a relatively small number of advanced academic degrees each year; and regional entrepreneurs have not been able to obtain many federal small business grants or venture capital deals.<sup>3</sup> Contributing to these problems is the fact that the region does not have a top tier research university such as a Stanford or an MIT, which may have curtailed the region's ability to generate cutting-edge research and innovation.

Despite these challenges, the region's economy shows some promising signs. A variety of private firms in sectors as diverse as pharmaceuticals, telecommunications, and information technology are playing an important role in attracting and retaining talent and functioning as entrepreneurial seedbeds. In addition, significant investments have been made in area research institutions such as the Stowers Institute. While the goal of becoming the "next Silicon Valley" or hottest new biotechnology center is likely out of reach, Kansas City has significant industrial prowess and could emerge as a viable location for knowledge-based firms.<sup>4</sup>

This report examines these challenges and assets, in the process shedding light how the region can overcome its liabilities, build on its strengths, and bolster its future competitiveness. The paper first provides an overview of the Kansas City economy, examining its general industrial structure as well as its overall capacity for research, innovation, and commercialization. It then provides background information on the role of firms as "surrogate universities," briefly reviewing the literature on the growth of high-tech regions in the absence of great universities. The third section examines whether Kansas City's private firms and laboratories have themselves acted as "surrogate universities," analyzing the extent to which the region's most prominent home-grown businesses have contributed to the creation of startup companies, the formation of a skilled and talented labor pool, and the production of knowledge in the area.<sup>5</sup> The fourth section of the report assesses Kansas City's "innovation milieu," the organizational, cultural, and political environment that helps foster and support a successful innovative region. The study then concludes with recommendations

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<sup>3</sup> Jennifer S. Vey, "Organizing for Success: A Call to Action for the Kansas City Region," (Washington: Brookings Institution, 2006).

<sup>4</sup> Roger Miller and Marcel Cote, "Growing the Next Silicon Valley," *Harvard Business Review*, July-August (1985): 114–123. In a 2002 study for the Brookings Institution, Joe Cortright and Heike Mayer found that only nine regions have a significant concentration in biotechnology research and commercialization. While most other metropolitan regions gained research funding, the nine leaders disproportionately gained in commercialization. For more information see Joseph Cortright and Heike Mayer, "Signs of Life: The Growth of Biotechnology Centers in the U.S.," (Washington: Brookings Institution, 2002).

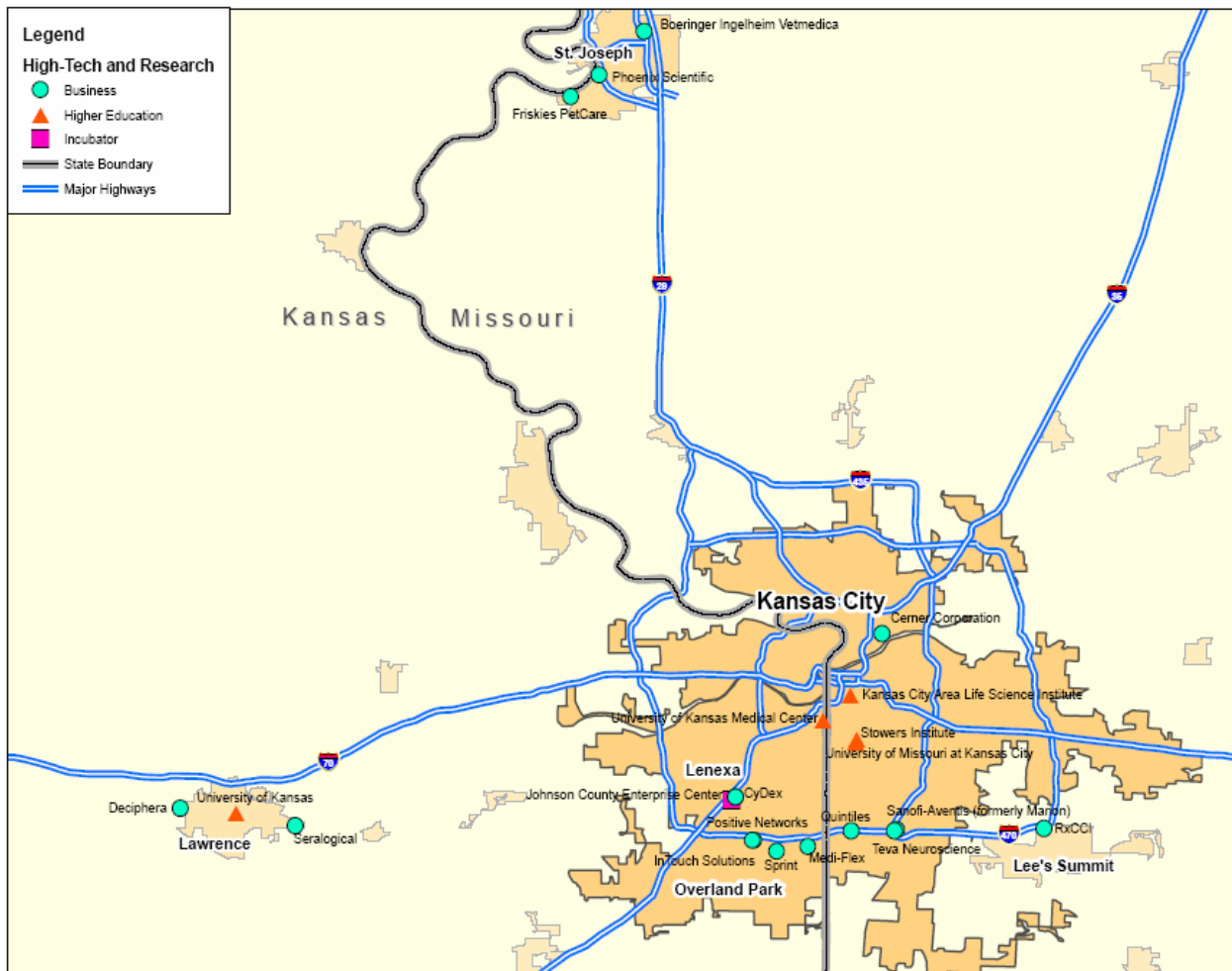
<sup>5</sup> Heike Mayer, "Taking Root in the Silicon Forest: The Role of High-Technology Firms as Surrogate Universities in Portland, Oregon," *Journal of the American Planning Association*, 71(3) (2005): 318-333.

for regional leaders for how this milieu can be improved to exploit new ideas, grow new companies, and keep innovation from leaking to the established high-tech and life sciences centers of the East and West coasts.

## II. METHODOLOGY

To assess whether firms and laboratories in Kansas City have been functioning as surrogate universities, this study relies on a combination of qualitative and quantitative data, including a series of interviews with public and private leaders, as well as additional secondary data to describe the Kansas City economy and to augment the interviews. The report focuses primarily on the Kansas City Metropolitan Statistical Area (MSA), but also examines Lawrence, KS, and St. Joseph, MO, which lie outside the Kansas City MSA. Lawrence hosts the University of Kansas and St. Joseph is the location for a significant industry cluster of life sciences companies. Both are important for the overall health of the Kansas City metro area.

**Figure 1. The Kansas City Metropolitan Area: High-Technology and Life Sciences Assets**





### III. OVERVIEW OF THE KANSAS CITY ECONOMY

The Kansas City economy is performing well in terms of employment and wage growth, and interviewees commented positively on the region's industrial diversity and its ability to weather recessions. Several nationally known firms have their headquarters in the region, including Hallmark Cards, H&R Block, American Century Investments, Cerner, DST Systems, and Applebee's, and while the region is not a hub for innovative industries, recent research reports have identified several technology-based sectors—particularly life sciences, information technology, and telecommunications—that could bolster the area's future economic growth and development.<sup>6</sup> The Kansas City region also has a substantial capacity in business, financial, and architectural and engineering services due to its central location in the Midwestern heartland. Printing and publishing, as well as transportation, logistics and automotive assembly are other sectors of note.<sup>7</sup>

While Kansas City's economy is stable, indicators for research and commercialization show that the Heartland metro is not a hot spot for cutting-edge innovation. Venture capital funding has declined significantly since 2000, and even though research expenditures have increased overall in the last five years, Kansas City's higher education infrastructure is not on par with world-class universities located in places such as Silicon Valley or Boston's Route 128. The following section provides an overview of Kansas City's major economic sectors and how it fares on measures of research, innovation, and commercialization.

#### A. Major Economic Sectors

##### 1. *The emerging life sciences industry cluster in Kansas City, St. Joseph, and Lawrence*

Kansas City's life sciences industry is very small, especially when compared to those metropolitan areas that lead the field.<sup>8</sup> However, a closer look at the specialization and industrial

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<sup>6</sup> Until its merger with Virginia-based Nextel in August 2005, Sprint's headquarters was also in the Kansas City region; post-merger, the operational side of the company remains in Overland Park while the headquarter of the new company will be based in Reston, Virginia. See: "Sprint, Nextel Close Merger," *Kansas City Business Journal*, retrieved August 31, 2005, from [www.bizjournals.com/kansascity/stories/2005/08/08/daily50.html?t=printable](http://www.bizjournals.com/kansascity/stories/2005/08/08/daily50.html?t=printable). For examples of research reports, see New Economy Strategies, *The Greater Kansas City Health Care Innovation Scenario: A Road Map for Life Sciences & Convergent Technologies* (Washington: New Economy Strategies, 2004), David Burress, Joshua Rosenbloom, and Sonia Manzoor, "The Kansas City Economy: Performance, Innovation, and Resources for Future Economic Progress" (Lawrence: Policy Research Institute, 2004), David Burress, Joshua Rosenbloom and Susan Mercer, "Greater Kansas City Opportunities and Capacities for Technology-Based Development" (Lawrence: Policy Research Institute, 2004).

<sup>7</sup> Robert Weissbourd and Alen Amirkhanian, "The Kansas City Region: Economic Opportunity in the Heartland," Brookings Institution, 2005.

<sup>8</sup> Cortright and Mayer, "Signs of Life: The Growth of Biotechnology Centers in the U.S."

pro prowess of certain sub-sectors reveals that Kansas City has some unique competitive strengths and advantages.

A 2003 study by Thomas P. Miller and Associates identified 155 life sciences companies based in Kansas City, St. Joseph, and Lawrence, with total employment estimated at 15,253.<sup>9</sup> The region's particular strengths are in biological research and testing. Firms such as LabOne, Clinical Reference Laboratory, Laboratory Corporation of America, Regular Clinical Consultants (now PRA), Phylogenetix Laboratories, and Quintiles, among others, specialize in testing, contract research, and other services associated with drug development. Several interviewees mentioned that Kansas City ranks second in the nation behind the Research Triangle Park area in hosting firms that perform contract research for pharmaceutical purposes.<sup>10</sup> According to the 2003 study, almost half of Kansas City's total life sciences employment (75 firms) is in this category. Firms in the region also specialize in the development and commercialization of pharmaceuticals and drugs. Employment in this area is estimated at 4,000 and the number of firms is about 43. Companies such as Teva Neuroscience, CyDex, Proteon Therapeutics, Pharmion, and Aventis Pharmaceuticals are part of this sub-sector. Many firms doing contract research or drug development can trace their roots to Marion Laboratories, a company that was started in Kansas City by Ewing Marion Kauffman in 1950.

While the cities of St. Joseph and Lawrence are not included in the official Census definition of the Kansas City metropolitan area, the majority of the interviewees acknowledged the economic importance of these two areas to the region's life sciences sector.<sup>11</sup> The St. Joseph area, for example, is home to a vibrant cluster of companies working in the fields of animal health and nutrition, and agricultural chemicals. The local chamber of commerce estimates the employment in this sector at 4,600 and lists 16 companies. The broader region is known as the "Animal Health Corridor" and hosts firms such as Boehringer Ingelheim, Vetmedica, Friskies PetCare, and Phoenix Scientific. This sector is very important to the region as it captures about 40 percent of the North American animal health and nutrition market.<sup>12</sup>

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<sup>9</sup> The estimate is based on the responses of 112 companies. Thomas P. Miller and Associates, Greater Kansas City Life Sciences Industry Survey, 2003.

<sup>10</sup> The North Carolina Biotechnology Center defines Contract Research Organizations as "those assisting biotechnology companies in the research, testing and approval processes of products or technologies" and on its website lists 79 companies in this category. See: North Carolina Biotechnology Center, "Contract Research Organizations. North Carolina Biotechnology Center" (2005) at [www.ncbiotech.org/ncindustry/directories/companies/cro.cfm](http://www.ncbiotech.org/ncindustry/directories/companies/cro.cfm).

<sup>11</sup> Other studies have also included St. Joseph and/or Lawrence. See David Burress, Joshua Rosenbloom, and Sarah Manzoor, "The Kansas City Economy: Performance, Innovation, and Resources for Future Economic Progress," (Lawrence: Policy Research Institute, 2004). Also: Thomas P. Miller and Associates, "Greater Kansas City Life Sciences Industry Survey."

<sup>12</sup> New Economy Strategies, "The Greater Kansas City Health Care Innovation Scenario: A Road Map for Life Sciences & Convergent Technologies." (Washington D.C.: New Economy Strategies, 2004).



**Table 1. Important Industry Sectors, Kansas City, KS-MO MSA, 2004**

	<b>Total Employment</b>	<b>Number of Firms</b>	<b>Average Annual Wages</b>
<b>Life Sciences</b>	10,473	330	\$ 52,735
<b>Telecommunications</b>	25,471	375	\$ 72,014
<b>Information</b>	12,498	1,321	\$ 71,995
<b>Technology</b>			

*Source: Bureau of Labor Statistics<sup>16</sup>*

*Note: BLS's data for 2004 are estimates. The life sciences industry was defined using the NAICS codes listed in the Kansas Economic Growth Act.<sup>17</sup> We excluded NAICS 54194 since this category primarily includes licensed veterinary practitioners who are typically not associated with life sciences research and innovation. For a detailed list of NAICS codes defining these sectors see Appendix B.*

## **B. Measures of research, innovation, and commercialization**

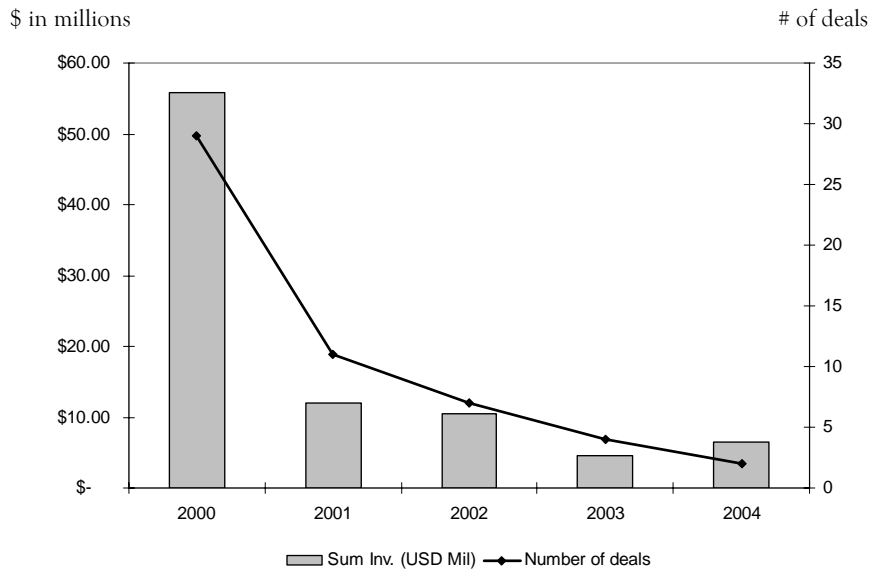
### **1. Innovation and Commercialization**

A variety of measures shows that Kansas City is not an innovation and commercialization hub. Venture capital investments in Kansas City have significantly declined over the last five years, as Figure 1 shows. In 2000, more than \$55 million were invested in 29 deals. In contrast, only two investment deals were made in 2004 totaling just \$6.5 million, indicating a sharp decline and a shortage of risk capital. One major reason for this decline is the bust of the Internet bubble: Second-tier cities like Kansas City that have experienced higher levels of venture funding in the past are receiving almost no investments as venture capitalists have become more cautious.

<sup>16</sup> Bureau of Labor Statistics, Quarterly Census of Employment and Wages. Bureau of Labor Statistics.

<sup>17</sup> Kansas Department of Revenue, "Kansas Economic Growth Act Bioscience Initiative" 2005. See [www.ksrevenue.org/pdf/BioscienceInitiative.pdf](http://www.ksrevenue.org/pdf/BioscienceInitiative.pdf).

**Figure 2. Venture Capital Investments in Kansas City, 2000–2004**



Source: PricewaterhouseCoopers/Thomson Venture Economics/National Venture Capital Association MoneyTree Survey

Kansas City also ranks low in the amount of federal grants awarded to small businesses for technology development and innovation. The region ranks 39<sup>th</sup> nationally in terms of the value of Small Business Innovation Research (SBIR) and Small Business Technology Transfer awards.<sup>18</sup> The region ranks even lower (42<sup>nd</sup>) among all 52 metropolitan statistical areas in per capita patenting.<sup>19</sup>

## 2. Research

In contrast to the decline in venture capital investments, research expenditures at universities, private laboratories, and hospitals in the Kansas City region increased since 2000 (Figure 2). While still low compared to other regions, Kansas City has managed to improve this dimension of its innovation economy.<sup>20</sup> Several interviewees ascribed this success to the efforts of the Kansas City Area Life Sciences Institute in creating research collaborations among its ten partner institutions and their subsequent success in obtaining funding.<sup>21</sup>

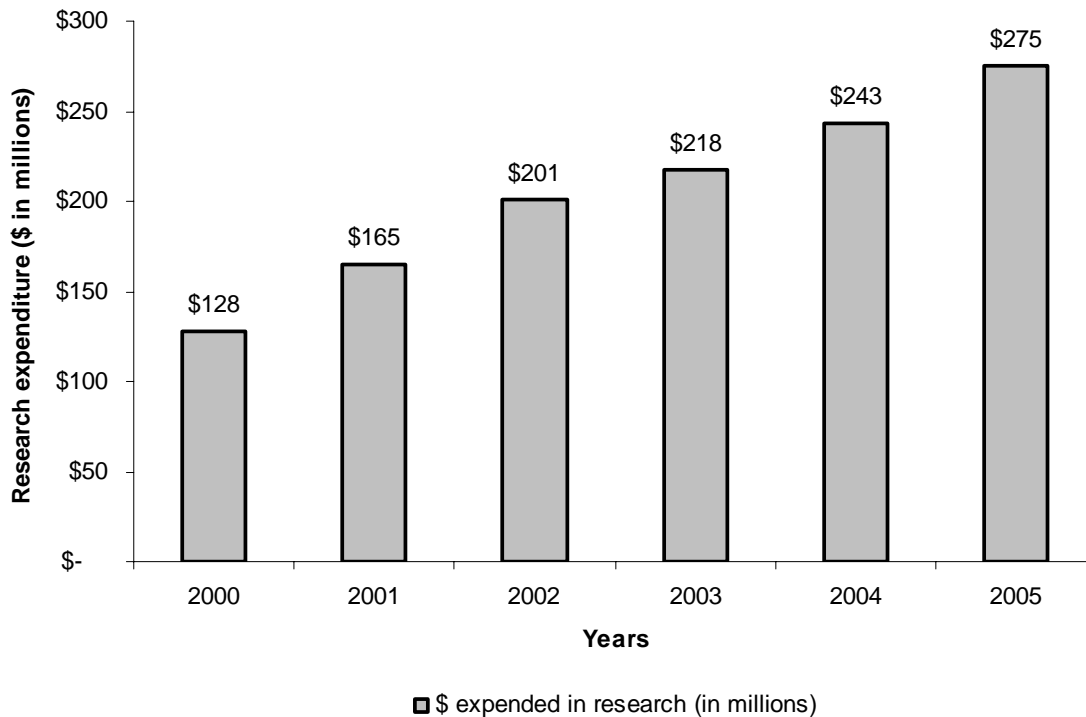
<sup>18</sup> Burress, Rosenbloom, and Manzoor, “The Kansas City Economy: Performance, Innovation, and Resources for Future Economic Progress.”

<sup>19</sup> Ibid. p. 13

<sup>20</sup> Ibid. Kansas City ranks 33<sup>rd</sup> in the nation in terms of R&D expenditures per 1,000 persons.

<sup>21</sup> Initially KCLSI consisted of eight partner institutions: Children’s Mercy Hospitals and Clinics, Midwest Research Institute, KS City University of Medicine and Biosciences, The University of Kansas Medical Center, The University of Kansas—Lawrence, The University of Missouri—Kansas City, Saint Luke’s Hospital, and the

**Figure 3. Research Expenditures at KCLSI Institutions, 2000 to 2005**



Source: *Kansas City Area Life Sciences Institute*

Still, while Kansas City has begun to build a strong private research infrastructure, most notably through Stowers and the Life Sciences Institute, it does not have a significant research university. While the metropolitan area has over 60 colleges, universities, and professional training institutes, according to the Carnegie Classification of Institutions of Higher Education only one institution—the University of Missouri, Kansas City (UMKC)—is categorized as a doctoral/research university. UMKC is a second-tier institution, however, based on the number of doctoral degrees awarded annually. UMKC awarded just 62 doctoral degrees in 2002/2003, only 3 of which were awarded in Biological, Physical, Computational, Engineering, and Sciences.<sup>22</sup> Another major criticism of UMKC is that it does not have a strong leadership base, adequate funding, or a comprehensive strategy for improvement.<sup>23</sup>

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Stowers Institute for Medical Research. In 2005, it added University of Missouri—Columbia and Kansas State University.

<sup>22</sup> Robert Weissbourd and Alen Amirkhanian, “The Kansas City Region: Economic Opportunity in the Heartland.”

<sup>23</sup> Greater Kansas City Community Foundation, “Time to Get it Right: A Strategy for Higher Education in Kansas City,” 2005.

While generally regarded as a “weak link” in Kansas City’s “competitive chain,” several interviewees did highlight some of the qualitative strengths the area’s academic institutions offer.<sup>24</sup> Some of these are well established, while others are in the process of being built and developed. Some interviewees noted improvements in business education and research. For example, UMKC is currently developing research and educational strengths related to entrepreneurship and has established an Institute for Entrepreneurship and Innovation. More often, interviewees noted several areas of expertise in the regional academic community in fields closely related to life sciences. In particular, the University of Kansas’ School of Pharmacy in Lawrence and the university’s Kansas City-based Medical Center (KUMC) provide high quality education and research in areas closely aligned with the region’s strengths in contract research and pharmaceutical development.<sup>25</sup> Furthermore, interviewees mentioned the quality of the area’s teaching hospitals.<sup>26</sup>

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<sup>24</sup>The Citistates Report notes the weakness of Kansas City’s universities. See Curtis Johnson and Neal Peirce, “Citistates Report/Kansas City,” reprinted from the *Kansas City Star*, 2003.

<sup>25</sup> Personal communication from Peter Higuchi, Vice President Corporate Development, airPharma, August 17, 2005.

<sup>26</sup> Personal communication from Mike Herman, retired executive from Marion Laboratories, August 18, 2005.



## IV. SURROGATE UNIVERSITIES IN KANSAS CITY

The main ingredient in the recipe for building a high-technology or life sciences region is believed to be the world-class research university. Stanford and MIT, for example, have played major roles in fostering the growth of Silicon Valley and Route 128. An increasing number of regions, however, have bootstrapped their knowledge economies by leveraging the presence of highly innovative firms, government agencies, or private laboratories. These actors serve as “surrogate universities” and compensate for the lack of a significant higher education infrastructure. Several firms and a private laboratory in Kansas City appear to have played—or are playing—this role of surrogate universities. The firms (Marion Laboratories, Cerner, and Sprint) have done so primarily through the attraction and retention of talent, while the private research laboratory (the Stowers Institute) is adding the much needed research. Kansas City, along with other regions such as Portland and Washington D.C., provide us with good case studies through which to understand alternative high-tech and life sciences development paths.

### A. The Surrogate University Concept

The concept of the surrogate university was derived from the literature on the role of the university as an engine of regional economic growth. The concept applies to private firms, government agencies, and laboratories in regions that are not well endowed with world-class research universities. Universities typically contribute three important factors to regional economic growth: The attraction and retention of a qualified and skilled labor pool, the creation of knowledge and innovation, and the development of spin-off companies. If a top-tier university is not present, firms or laboratories may act as surrogate universities by themselves creating spillover effects in the realms of talent, innovation, and entrepreneurship.

Countless studies have been written about the economic successes of California’s Silicon Valley and Boston’s Route 128 corridor. Common to most of these studies has been the central treatment of the research university as an engine of economic growth.<sup>27</sup> Policymakers and economic development practitioners across the world have adopted the theory of the university as an engine and have tried to imitate these successes. In many cases, such efforts have failed. For instance, the undertakings of Frederick Terman, former dean at Stanford University, to spur economic development around research institutions in places as far flung as New Jersey and South Korea have shown few promising outcomes.<sup>28</sup> Common to these failures is the lack of a supportive

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<sup>27</sup> Everett M. Rogers and Judith K. Larsen, *Silicon Valley Fever: Growth of High Technology Culture* (New York: Basic Books, 1984). See also: AnnaLee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge: Harvard University Press, 1994), Martin Kenney, *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region* (Stanford University Press, 2000), and Chong-Moon Lee, William F. Miller, Marguerite Gong Hancock, and Henry Rowen, *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship* (Stanford University Press, 2000).

<sup>28</sup>S. W. Leslie, “Regional Disadvantage: Replicating Silicon Valley in New York’s Capital Region,” *Technology and Culture* 42 (2) (2001): 236-264. See also: Stuart W. Leslie, and Robert H. Kargon, “Selling Silicon Valley: Frederick Terman’s Model for Regional Advantage,” *Business History Review* 70, (1996): 435-472.

environment in which the benefits an academic institution produces are absorbed and turned into tangible economic returns that can spur high-technology success. These benefits include, but are not limited to, the students who, after graduating from the university, would replenish a skilled labor pool locally, and research that is commercialized into products by scientists who become entrepreneurs and start their own company.

Lesser known are cases in which a region has achieved technology-based economic success in the absence of a major research university. In most of these cases, industry has played an important role as a catalyst of economic growth, and individual firms or laboratories have functioned as “surrogate universities” by attracting and retaining labor, functioning as incubators for startup companies, and conducting research and development that was of use not only to the company but also to other actors in the region. In order for firms or laboratories to function as surrogate universities, however, regions need to develop an innovative and entrepreneurial environment that can support spillover effects created by these private actors.

### **1. *Portland, OR***

One such region that has had successful surrogate universities is Portland, OR.<sup>29</sup> This region, also known as the “Silicon Forest,” hosts a significant cluster of electronics manufacturing firms that specialize in semiconductor manufacturing, output devices like printers and displays, measurement instruments, computer manufacturing, and software. Portland’s academic infrastructure has not influenced the high-tech industry to a great extent, and the two major land grant universities do not play a significant role since they are located about 50 and 100 miles south of the city. Instead, the growth of the Silicon Forest evolved largely from two private firms, Tektronix and Intel.

Home-grown Tektronix started in 1946 and quickly became a world leader in manufacturing oscilloscopes. By the mid 1980s, the company employed more than 24,000 workers worldwide and about 15,000 locally. During the 1980s and 1990s, market pressures and the entrance of new competitors forced Tektronix to restructure. As a result, the firm conducted employee layoffs, divested business units, and refocused on its core functions. Tektronix’s corporate crisis, however, influenced the regional economy greatly as the company ultimately served as an incubator for over 90 direct and indirect startup companies.

In 1976, Intel decided to establish its first branch plant outside of California in Portland. Initially the plant produced memory chips, but over time evolved into a complex research and development location where Oregon-based inventors at times generated more patents than their

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<sup>29</sup> Heike Mayer, “Taking root in the Silicon Forest: The Role of High-Technology Firms as Surrogate Universities in Portland, Oregon.” For a detailed history of Tektronix and the company’s role in the creation of the Silicon Forest see Heike Mayer, “Planting High-Technology Seeds: Tektronix Role in the Creation of Portland’s Silicon Forest,” *Oregon Historical Quarterly*, 106 (4): 568-593.

California counterparts. Intel not only influenced the creation of 57 startup companies, but also attracted outside supplier and competitor companies.

While Tektronix and Intel functioned as surrogate universities for the Silicon Forest, their mere presence and influence on firm activity in the region was not sufficient. Parallel to business formation, the region was also able to create an environment that was highly conducive for entrepreneurship and innovation. This “innovation milieu” consisted of the presence of related and competing firms, support services, policies and programs encouraging continued investments in research intensive corporate activities, the creation of locally-based industry groups and trade associations, and a high quality of life that ensured that workers stayed in the region even if they were laid off. Moreover, universities were enlisted to contribute basic research in nanoscience and microtechnologies. They formed a consortium, the so-called Oregon Nanoscience and Microtechnologies Institute (ONAMI), which represents an innovative way to overcome institutional and financial challenges in the higher education system. In addition, ONAMI provides the region’s high-tech industry with valuable basic research.

## **2. Washington, D.C.**

The Washington D.C. region represents another interesting case of economic growth in knowledge-based industry sectors without the influence of a research university. In her studies of the region, Maryann Feldman asserts that the Johns Hopkins University played a minor role in the development of the biotechnology and information technology industries in and around the Washington-Baltimore region.<sup>30</sup> Instead, a series of exogenous policy shifts induced local entrepreneurship and innovative activity.<sup>31</sup> First and foremost, in the 1970s government downsizing started to encourage federal employees to turn to entrepreneurship. At the same time, private business activities were encouraged by increased federal procurement spending and contracting, and the introduction of policies supporting new firm formation and technology commercialization.<sup>32</sup> Over time, entrepreneurs self-organized and formed membership organizations to promote networking; they formed angel and venture capital funds, and created private incubators. Universities responded “by offering new programs and building branch operations closer to commercial activity.”<sup>33</sup> Today the economy in the Washington D.C. region has become “self-

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<sup>30</sup> Maryann P. Feldman, “The University and Economic Development: The Case of Johns Hopkins University and Baltimore,” *Economic Development Quarterly* 8 (1) (1994): 67-76.

<sup>31</sup> Maryann P. Feldman, Johanna Francis and Janet Bercovitz, “Creating a Cluster While Building a Firm: Entrepreneurs and the Formation of Industrial Clusters,” *Regional Studies*, 39 (1) (2005): 129-141.

<sup>32</sup> In 1980, the Stevenson-Wydler Technology Innovation Act and the Bayh-Dole University and Small Business Patent Act were passed and helped encourage the transfer of research from federal and university laboratories to the marketplace. In addition, Feldman notes that opportunities for licensing and joint product development in the life sciences increased through the so-called Cooperative Research and Development Agreements (CRADAs). The 1980s also saw the establishment of the Small Business Innovation Research (SBIR) Program.

<sup>33</sup> Maryann P. Feldman, Johanna Francis and Janet Bercovitz, “Creating a Cluster While Building a Firm: Entrepreneurs and the Formation of Industrial Clusters,” p. 136.

sustaining” because “the factors that typically describe industry clusters, such as strong industry networks and a supportive local culture, are in place.”<sup>34</sup>

Both Portland and Washington D.C. illustrate that the growth of a technology region is possible even if some critical ingredients such as a world-class research university or a pre-existing entrepreneurial innovation environment are missing. Moreover, it is clear that not just one factor—such as the presence of a firm, a laboratory, or a university—is generally responsible for regional success; rather a multitude of reinforcing mechanisms and actions are typically necessary to create and sustain industry clusters.

## **B. Firms and Private Research Institutions as Surrogate Universities in Kansas City**

Traditional measures of innovation and commercialization such as patent registrations, venture capital investments, federal small business awards, or research expenditures are biased towards activities that are either going on in large research establishments such as universities, or within regional clusters of dynamic and highly innovative companies. But while Kansas City does not perform well based on these indicators, some observers of the region’s economy point to the presence of innovation occurring “below the radar.”<sup>35</sup>

One recent study, for example, notes that “in 2004 approximately \$1.2 billion was invested by industry in R&D activities in the region. That compares to \$135 million associated with federally funded research at the region’s universities and hospitals in that same year.”<sup>36</sup> This same report states that 80 percent of private sector research is financed by Sprint (\$950 million), while Cerner’s R&D budget was \$127.6 million. In addition, several interviewees stated that the Kansas City economy has a healthy share of small and medium-sized businesses and a fairly good standing in terms of companies choosing to do initial public offerings (IPOs). For example, despite the bust of the Internet, between 1996 and 2003 Kansas City had 11 IPOs. Taken together, these characteristics—a strong private sector R&D investment culture, a healthy small business environment, and positive entrepreneurial dynamics—indicate that the Kansas City economy has some significant corporate assets.

Using quantitative secondary statistics that are inherently retrospective in nature generally veils many of Kansas City’s strengths, however. This section uses qualitative data to examine the influence the private sector has had on the evolution of the Kansas City economy from a historical perspective. It looks particularly at four major private actors (Marion Laboratories, Sprint, Cerner,

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<sup>34</sup> Ibid, p. 137

<sup>35</sup> David Burress, Joshua Rosenbloom, and Sarah Manzoor, “The Kansas City Economy: Performance, Innovation, and Resources for Future Economic Progress.”

<sup>36</sup> New Economy Strategies, “The Greater Kansas City Health Care Innovation Scenario: A Road Map for Life Sciences & Convergent Technologies,” p. 49.

and the Stowers Institute) to understand their impact on the local labor market, their research and innovation capacities, and to what extent they have functioned as entrepreneurial incubators for local startup companies. In doing so, it reveals that they have in fact acted as “surrogate universities” in the region.

## **1. The legacy of Marion Laboratories**

In 1950, Ewing Marion Kauffman started Marion Laboratories in the basement of his Kansas City home. As an entrepreneurial sales person, Kauffman developed a business model for Marion Laboratories that was based on the development and marketing of pharmaceutical products for which basic research was done by other companies, often firms outside the United States. The company specialized in getting drugs approved and through the regulatory process and introducing them to the North American market. This business model was based on an excellent sales force, a research and development organization that specialized in clinical testing and regulatory matters of drug development, and a strong marketing division.<sup>37</sup> Kauffman built his company on three unique principles that reflected his personal experiences: The first principle stated “to treat others as you want to be treated” and the second noted that “those that produce should share the rewards.”<sup>38</sup> A third principle—to give back to the community—resulted in the establishment of the Ewing Marion Kauffman Foundation in the mid 1960s.

From the start, Marion Laboratories was a successful and growing company in terms of both rising sales and employment. The company had an initial public offering on the New York Stock Exchange in 1965 and in the late 1960s and early 1970s began a series of acquisitions of related companies in an effort to diversify.<sup>39</sup> During the late 1970s, the firm’s performance sagged because of difficulties with federal drug approval, spurring it to divest non-core business units and begin to market new drugs.<sup>40</sup> This led to improved performance during the 1980s so that by 1985 the company employed 2,148 people of whom about 500 were associated with research and development.<sup>41</sup> To keep Marion Laboratories growing and profitable by adding strength in basic research, the company’s executives decided to merge with Dow Chemical to form Marion Merrell

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<sup>37</sup> Debra Skodack, “Ciba-Geigy Executive to Lead Marion Merrell Research,” *The Kansas City Star*, January 15, 1992, pp. B1:2.

<sup>38</sup> Anne Morgan, *Prescription for Success: The life and values of Ewing Marion Kauffman* (Kansas City: Andrews and McMeel), p. ix.

<sup>39</sup> Anne Morgan, *Prescription for Success: The life and values of Ewing Marion Kauffman* (Kansas City: Andrews and McMeel).

<sup>40</sup> Walt Potter, “KC’s Marion Laboratories Finds Formula for Success,” *The Kansas City Star*, October 4, 1983, pp. D1:1.

<sup>41</sup> Joseph Keenan, “Marion Labs attributes soaring success to its staff,” *The Kansas City Star*, August 13, 1985, pp. D1:1.

Dow in 1989.<sup>42</sup> Kansas City became the headquarters location of the newly created company, which continued to expand over the next several year.

By the early 1990s, Marion Merrell Dow began to experience a series of changes. In 1993 a broad restructuring process led to the first massive layoffs, and in 1995, German-based Hoechst acquired Marion Merrell Dow and formed Hoechst Marion Roussel. In this merger, Kansas City again remained as the North American headquarters of the merged company. In 1998, the North Carolina company Quintiles Transnational bought the drug development and approval operation of Hoechst Marion Roussel. This division is still operating in Kansas City today. In 1999, Hoechst merged with Rhone-Poulenc to form Aventis, and this time the Kansas City-based operation lost its headquarters status. As a result, 900 administrative jobs were moved to New Jersey, of which about 130 were filled by Kansas City employees; the remaining 770 employees preferred to stay and look for alternative employment opportunities in the heartland.<sup>43</sup> Aventis retained about 1,300 industrial and distribution-related jobs until it was taken over by the French company Sanofi Synthelabo in 2004. Today, Sanofi-Aventis employs about 850 people in Kansas City and manufactures drugs such as Allegra, Cardizem, and Ketek.<sup>44</sup>

In sum, Marion Laboratories emerged as a leader in the field of drug development and profoundly influenced the Kansas City economy. One interviewee noted that the “rise and subsequent decline of Marion Labs” represented one of the most important milestones in the evolution of Kansas City life sciences economy.<sup>45</sup> The subsections below discuss the legacy of Marion Laboratories, paying special attention to the role of Marion as a “surrogate university” in attracting talent and functioning as a seedbed for entrepreneurs.

#### Talent: Expertise in drug development, regulatory approval, and market research

Marion Laboratories never developed drugs from scratch. Instead of specializing in laboratory research, the firm formed partnerships with pharmaceutical research companies in countries such as Germany and Japan and licensed their technology. This process was often referred to as the “search and development method.”<sup>46</sup> The company then added testing and clinical

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<sup>42</sup> Randolph Heaster, “Marion Labs Will Remain in KC,” *The Kansas City Star*, July 18, 1989, pp. A1:4.

<sup>43</sup> Julius Karash, “Drug Firm’s pullout Costs KC 900 jobs. Hoechst Marion Headquarters Going to N.J.,” *The Kansas City Star*, October 15, 1999, pp. A1. See also: D. Stafford, “Smooth Moves—Aventis Assists Workers in Transition,” *The Kansas City Star*, April 3, 2001, pp. D1.

<sup>44</sup> Sanofi-Aventis, “U.S. Manufacturing Fact Sheet. Sanofi-Aventis,” 2005. See [www.sanofi-aventis.us/live/us/en/layout.jsp?scat=E6A55491-82EB-407E-8AF7-7921F223BF61](http://www.sanofi-aventis.us/live/us/en/layout.jsp?scat=E6A55491-82EB-407E-8AF7-7921F223BF61).

<sup>45</sup> Personal communication from Peter Higuchi, Vice President Corporate Development at Sanofi-Aventis, August 16, 2005.

<sup>46</sup> Jack Etkin, “Marion Asks to Market Ulcer Drug,” *The Kansas City Star*, July 3, 1979, pp. 5c:1.

trials to obtain regulatory approval in the United States. It also conducted market research and devised strategies to sell the drugs to doctors and other consumers in North America.

To sustain this model and perfect it for economic success, Kauffman realized that he had to build a workforce knowledgeable about commercializing and marketing pharmaceutical products. Over time, Marion Laboratories attracted talent characterized by its expertise in all the phases of its business model. A former Marion employee who is now responsible for business development in a pharmaceutical startup company noted that Marion's labor pool created the necessary support services for new companies. He said that Marion Labs had "a very broad, strong core base of capable people" able to do regulatory work, clinical development, and sales, and noted that many of them are still in Kansas City.<sup>47</sup>

#### Culture: Marion's influence on Kansas City firms

Marion Laboratories also attracted a very entrepreneurial workforce. Initially, most of its employees were sales people who obtained the title of an "associate" once they joined the firm. Typically, a Marion associate was rewarded for their sales performance and many devised entrepreneurial sales strategies. The entrepreneurial environment at Marion was supported by the company's profit-sharing program and a culture of meritocracy that rewarded performance rather than seniority. These characteristics in turn seemed to have attracted a unique collection of employees.

The Marion legacy went beyond merely the creation of an entrepreneurial labor pool, however, to significantly influence the corporate practices and organizational principles of many Kansas City-based firms. Several Marion spin-offs, for example—including RxCCI, CyDex, and Medi-Flex—adopted the culture of meritocracy and profit sharing programs.<sup>48</sup> Other home-grown firms, such as Cerner, consciously copied the Marion model and call their employees "associates." In addition, corporate practices such as the training of the sales and marketing force developed at Marion Laboratories have been adopted by entrepreneurs who experienced them first-hand during their time at Marion.<sup>49</sup> It was often ex-Marion employees who were instrumental in shaping the cultures of their new firms.

#### Entrepreneurship: Corporate changes and spin-off activity

As noted above, Marion Laboratories underwent a series of corporate mergers and acquisitions in the late 1980s, which began to spur an exodus of Marion employees. One

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<sup>47</sup> Personal communication from Peter Higuchi, Vice President Corporate Development airPharma, August 22, 2005.

<sup>48</sup> S. M. Brown, "Doing it the Marion way: Associates Apply Principles, Profits to New Ventures," *Kansas City Business Journal*, March 9, 2001.

<sup>49</sup> Personal communication from James Byrnes, Executive Vice President, airPharma, August 17, 2005.

interviewee, a former management executive for Marion, noted that the first merger affected upper management more than other levels and recalled that 12 out of 14 executive officers left the firm.<sup>50</sup> Another interviewee who worked in middle management remarked that the second merger seemed to influence the exodus of middle and lower level employees. These mergers were then followed by the first layoffs in 1995.

The upside of these changes was that they created the impetus for entrepreneurial activities, including the formation of many new companies. Former Marion Laboratories employees often did not leave the region because they were rooted there. They either became entrepreneurs themselves or found alternative employment in local companies. This phenomenon is often referred to as the “location inertia” of entrepreneurs and can be an important facilitator of regional economic development (Table 2).

One example of a Marion spin-off illustrates this development and the role of location inertia. Pharmion, a pharmaceutical company focused on hematology and oncology, was started by former Marion employee Judith Hemberger and Colorado-based Patrick Mahaffy in 1999. From the start the company operated in two locations: Boulder, Colorado, and Overland Park in the Kansas City metro area. The division of labor between the two locations reflects Kansas City’s expertise in regulatory affairs, drug development, and clinical testing because about 40 employees—many of whom are former Marion employees—work in these fields at the Kansas City facility. As one interviewee noted, the founders were able to tap their Marion networks in Kansas City both in terms of labor and support services.<sup>51</sup> Pharmion also adopted Marion’s business model of licensing from biotechnology companies. Drawing on a readily available labor pool and specialized support services is important for young startup companies like Pharmion.

Altogether, former Marion Laboratories are involved with at least 17 firms (Table 2). These firms are either direct spin-offs from Marion or, like Pharmion, they are firms that set up part of their operations in the Kansas City region. Most of them specialize in a similar business model as Marion, namely the development and marketing of drugs and pharmaceutical products. Some, like ImmunoGenetix Therapeutic, partner with local university researchers. By examining the history of Marion Laboratories and the events associated with the mergers and acquisitions, we can see a clear parallel with the creation of new companies in the Kansas City region.

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<sup>50</sup> Personal communication from Mike Herman, retired executive, Marion Laboratories, August 18, 2005.

<sup>51</sup> Personal communication from Karl Strohmeier, Director Business Development for Pharmion, August 22, 2005.

**Table 2. History of Marion Laboratories and its Spin-off Companies, 1950 to 2005**

Events associated with Marion Laboratories	Year	Companies founded by ex-Marion Lab employees
<i>Marion Laboratories</i> founded by Ewing Marion Kauffman	1950	
Marion Laboratories goes public	1965	
Marion Labs receive license for Carafate	1975	
	1976	Beckloff & Associates founded
Marion Laboratories had bad economic performance	Late 70s	
Marion Labs divests several business units to refocus	Early 80s	American Stair-Glide Kalo Laboratories Marion Scientific Rockwill Safety & Health
Marion Labs begins to sell Cardizem	1982	
	1983	CyDex is founded by ex-Marion employee Peter Higuchi
Marion Laboratory employment: 2,148 with about 500 in R&D	1985	Medi-Flex is formed through a leveraged buyout by Joe Brandemeyer
Marion Labs expand R&D staff and grows by about 100	1987	
	1988	EPIQ Systems (fka Electronic Processing, Inc. - EPI)
Marion Laboratories merge with Dow Chemical to form <i>Marion Merrell Dow</i> , headquarter is in Kansas City	1989	
Marion Merrell Dow is expanding	1990	
Marion Merrell Dow employment: 2,500	1992	Rip Grossman & Associates are founded
Marion Merrell Dow announces job cuts (1,300 jobs) R&D will be spared, first time in history of company to have layoffs	1993	
German-based Hoechst acquires Marion Merrell Dow & forms <i>Hoechst Marion Roussel</i> , Kansas City is headquarter for U.S.	1995	
	1997	IMTCI is sold to PRA, operation stays in Lenexa, KS
Quintiles Transnational Corp. buys drug development and approval operation from Hoechst Marion Roussel; will work with them as a CRO, will keep 500 employees	1998	Regulatory/Clinical Consultants (RxCCI) are founded by Diane Saif
Hoechst merges with Rhone-Poulenc to form <i>Aventis</i> ; decision is made to move headquarter out of Kansas City to New Jersey; loss of 900 white-collar jobs; 130 people move to New Jersey	1999	InTouch Solution is founded by Faruk Capan
Aventis has about 1,300 employees in Kansas City; mainly industrial and distribution-related jobs	2000	Cultural Horizons are formed Ex-Marion employees open Pharmion in Kansas City
	2001	Teva Neuroscience is formed from Teva Marion Partner
	2002	ImmunoGenetix Therapeutic founded by Jim Lauffenberg
Hostile takeover by Sanofi Synthelabo of Aventis to form <i>Sanofi-Aventis</i> ; Employment: 850; manufacturing of Allegra and Ketek	2004	
	2005	Regulatory/Clinical Consultants (RxCCI) is sold to PRA

Source: *Kansas City Star*, personal interviews, various other sources

### Research: The weak link in Marion's legacy

There is little doubt that Marion Laboratories contributed significantly to the creation of a specialized labor pool in Kansas City, as well as to the founding of new firms that often specialized in the same industry and in some cases even adopted the Marion business model. While only a fraction of the original Marion Laboratories exists (Sanofi-Aventis and Quintiles combined account for about 2,150 jobs), what remains are strong networks among former Marion employees and new startup companies working in closely related life sciences and pharmaceutical topic areas.<sup>52</sup>

Still, while Marion's legacy is important, the company did not profoundly influence the region's capacity to innovate and create new knowledge. Marion Laboratories' research efforts focused primarily on developing pharmaceutical compounds and testing their uses—its employees knew how to test, package, and market pharmaceutical products, but basic research was done elsewhere, mostly at laboratories outside the region. As a result, this model of “small R and big D” did not produce spillover effects in the form of research and new ideas that could be commercialized outside by other companies. Coupled with the lack of a university, Kansas City has thus not been able to match the success of other life sciences and biotechnology regions where the commercialization of research and ideas benefited from the presence of universities and companies.

### ***2. The role of other companies: Cerner, Sprint, and others***

Besides Marion Laboratories, other companies function as anchors in the Kansas City economy. The two firms with the greatest potential to influence the region's innovation and entrepreneurial activity are Cerner Corporation and Sprint. Each represents an industry sector—information technology and telecommunications—that is critical to the overall economic health of the region. Some interviewees mentioned that the region's business and economic development community does not appreciate the importance of these firms and often overlooks their potential for creating synergistic interactions between sectors such as life sciences, information technology, and telecommunications.<sup>53</sup> Cerner and Sprint, however, have not influenced the region in the same way Marion has. Both companies are younger and have a different technology focus. Consequently, their spillover effects for the region's economy as yet are limited.

### Sprint: Telecommunications in the heartland

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<sup>52</sup> In the early 1980s and again in the late 1990s, Marion divested a range of business units that it acquired earlier for the purpose of diversification. Many of the divested business units—such as American Stair-Glide (now ThyssenKrupp Access, based in Grandview, Missouri) and Marion's drug development and testing unit (sold to Quintiles Transnational in 1998)—still operate in the Kansas City region and add to the region's industrial specialization in life sciences.

<sup>53</sup> Personal communication from Robert Marcusse, President and CEO, Kansas City Area Development Council, August 16, 2005, and Richard Brown, Co-Chairman, The Stowers Institute, August 18, 2005.

Sprint was founded as Brown Telephone Company in 1899 in Kansas and evolved into the second largest non-Bell telephone company in America by the 1950s. The company changed its name to United Telecommunications in 1972 and began offering domestic long distance services in 1986 under the name of Sprint. During the 1990s, Sprint broadened its business base to provide international, local and long distance, and wireless services.<sup>54</sup> In 2004, Sprint was the largest employer in Kansas City with over 20,000 jobs.<sup>55</sup> In August 2005, Sprint announced the merger with the Virginia-based wireless company Nextel and the decision was made to headquarter the merged firm in Reston, VA, with operations in Kansas City.<sup>56</sup>

Similar to Marion Laboratories, Sprint's influence in the Kansas City economy has been primarily in the area of labor and entrepreneurship. Several interviewees mentioned spin-off companies that were started by entrepreneurs who at one point worked for Sprint, including Birch Telecom, Positive Networks, Tech Guys, FiberNet, IT Decision Management, Net Cadence, and Nexgenesis.<sup>57</sup> Most of these firms are in the field of telecommunications, and some operate at the intersection of information technology and telecommunications. This entrepreneurial activity facilitated the creation of a moderately sized telecommunications industry in the Kansas City region. (For more information on these firms' founders, industry sectors, and founding year, see Appendix C.)

Even though Sprint is Kansas City's largest private sector investor in research and development, interviewees were generally skeptical about the firm's influence on the region's innovation and research capacity. Several mentioned that Sprint was more of a "deployer" of technology rather than a creator.<sup>58</sup> Further support for this observation comes from the fact that significant portions of Sprint's Advanced Technology Laboratories are based in Burlingame, CA.<sup>59</sup> Moreover, Sprint's capital expenditures have been more focused on building up communication network capacity and broadband alignment than on innovating technology.<sup>60</sup>

Sprint is the largest employer in the region and serves as an anchor in the regional labor market. Its influence as a "surrogate university" for the region seems to have been limited to a modest amount of spin-off activity and labor movement, with some former Sprint executive

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<sup>54</sup> See [www.sprint.com/sprint/ir/sd/sh.html](http://www.sprint.com/sprint/ir/sd/sh.html).

<sup>55</sup> Kansas City Business Journal, "22nd Annual Book of Lists, 2003-2004."

<sup>56</sup> "Sprint, Nextel Close Merger," *Kansas City Business Journal*, August 12, 2005. See [kansascity.bizjournals.com/kansascity/stories/2005/08/08/daily50.html?t=printable](http://kansascity.bizjournals.com/kansascity/stories/2005/08/08/daily50.html?t=printable).

<sup>57</sup> Data on spin-off companies was selected through the interviews and verified using various sources, including company websites, management bios, Business Journal articles, etc.

<sup>58</sup> Personal communication from Stephen Dispensa, Chief Technology Officer, Positive Networks, August 15, 2005, and Robert Marcusse, President and CEO, Kansas City Area Development Council, August 16, 2005.

<sup>59</sup> "Sprint Advanced Technology Laboratories." See [www.sprintlabs.com/](http://www.sprintlabs.com/).

<sup>60</sup> Personal communication, Irvine Hockaday, Lead Independent Director, Sprint/Nextel, October 25, 2005.

managers now working for smaller locally based firms. The recent merger with Nextel and changes in location priorities might change Sprint's role in the Kansas City economy. Similar to Marion Laboratories, Sprint's presence in the region might become smaller and spillover effects—in terms of labor movements and new entrepreneurial ventures—might become more obvious as the effects of the merger manifest themselves.

Cerner: The growing influence of health information technology.

Cerner Corporation—originally Patterson, Gorup, Illig & Associates—was founded in Kansas City in 1979 by three former employees of Arthur Andersen. Today it is a nationally known information technology company with headquarters in Kansas City. Its focus on information technology products for the health care industry offers synergies with Kansas City's budding life sciences sector.

Cerner did not start as a healthcare information technology company, but rather as a software consulting firm. The idea for the business was to offer consulting services in the emerging field of software support for mission critical business systems.<sup>61</sup> The three founders took advantage of the change from mainframe computers to minicomputer and the possibilities this transition presented to small- and medium-sized businesses. The first customers were primarily locally-based firms such as a manufacturing firm, a trucking business, a local tax preparation company (H&R Block), and a clinical laboratory. In working with the clinical laboratory, the founders discovered the potential in applying information technology to the healthcare system and began focusing on this sector.

Since its inception, Cerner has grown into a successful company. The firm occupies a sprawling campus along Rockcreek Parkway and local employment in 2004 stood at 3,207 (up from 600 in 1994).<sup>62</sup> It was also one of a few companies that added employees during the recession.<sup>63</sup> Like Marion Laboratories, Cerner calls its employees "associates." Besides being a major employer, Cerner invests heavily in research and development (\$127.6 mio in 2004) and ranked second behind Sprint in 2004 expenditures for R&D.<sup>64</sup>

When asked about Cerner's influence on the Kansas City economy, interviewees expressed enthusiasm. Several interviewees thought that it was too early for the company to have played a

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<sup>61</sup> Neal Patterson, "Neal Note - Q3 2005," *The Cerner Quarterly*. See [www.cerner.com/public/CernerQuarterly.asp?id=23699](http://www.cerner.com/public/CernerQuarterly.asp?id=23699).

<sup>62</sup> Chris Lester and J.D. Moore, "Cerner Chooses Rockcreek," *The Kansas City Star*, January 21, 1994, pp. B8:1. 2004 employment is reported in: *Kansas City Business Journal*, "22nd Annual Book of Lists, 2003-2004."

<sup>63</sup> S. Roth, "Go Figure: KC-Area Work Force Grows as Economy Shrinks," *Kansas City Business Journal*, March 8, 2002.

<sup>64</sup> New Economy Strategies, "The Greater Kansas City Health Care Innovation Scenario: A Road Map for Life Sciences and Convergent Technologies."

substantive role as a surrogate university, though some local startup activity can be traced to it. For example, firms like Akcia and Tradebot Systems were founded by former Cerner employees. Akcia was started by a Cerner development team manager (Douglas Akbari) who retains a business relationship with Cerner and provides software that complements Cerner products.<sup>65</sup> Tradebot Systems was founded by Dave Cummings, who developed software for Cerner during the early 1990s. He then spent some time working for the Kansas City Board of Trade to learn about stock trading and started Tradebot Systems in early 1999.<sup>66</sup> As in Sprint's case, former Cerner employees are also moving into management positions at local startup companies. SoftVu is one example of such movement of talent, as two of its executive officers have long track records in working for Cerner as senior managers.<sup>67</sup>

As an information technology company that is focusing on health care, Cerner Corporation also serves as an important link to the region's life sciences sector. Cerner co-founder Cliff Illig is a member of the board of the Stowers Institute. Local life sciences leaders interviewed for this research see great potential in tapping Cerner's business expertise in health information technology for advanced research in life sciences, as, for example in the development of a national cancer registry that would allow researchers to identify patients for experimental drugs.<sup>68</sup>

#### Building critical mass: Other success stories in the Kansas City economy

Besides Marion Laboratories (and its successors), Cerner, and Sprint, several other small and innovative technology firms have evolved in Kansas City, a sign that the regional economy may be maturing and diversifying. The three surrogate universities may have indirectly encouraged the development of these firms in the Kansas City area. Garmin International, for example, started in 1989 to design and manufacture navigation and communication instruments for the aviation and consumer markets. The firm is a leader in the application of Global Positioning Systems (GPS) and can trace its roots to Kansas City's aviation industry. More specifically, Garmin is a spinoff company of Allied Signal which in turn purchased King Radio and Bendix in the mid 1980s.<sup>69</sup> Other companies that were mentioned include kozoru, a startup company that develops an Internet search engine. Kozoru's founder John Flowers is a serial entrepreneur from California who relocated to Kansas City because of the region's quality of life. Another firm mentioned is Euronet, a company that provides services for secure financial transactions. Euronet's founder Michael Brown invested

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<sup>65</sup> Steele M. Brown, "Programming success: Akcia Inc. Works Toward More Growth in its Software Business by Sticking to its Plan," *Kansas City Business Journal*, October 6, 2000.

<sup>66</sup> Charlie Anderson, "I, Tradebot: Melding of Experience as Trader, Unique Software—'Day-trading on Steroids'—Pumps up Firm's Profit," *Kansas City Business Journal*, January 14, 2005.

<sup>67</sup> See [www.softvu.com/company/leadership.aspx](http://www.softvu.com/company/leadership.aspx).

<sup>68</sup> Personal communication from Richard Brown, Co-Chairman, The Stowers Institute, August 18, 2005.

<sup>69</sup> In 1999 Allied Signal merged with Honeywell. See also [www3.bendixking.com/static/main/aboutus.jsp](http://www3.bendixking.com/static/main/aboutus.jsp).

in kozoru, and prior to starting Euronet worked for one of Kansas City's first software companies, Innovative Software.<sup>70</sup>

### **3. The Stowers Institute**

The Stowers Institute for Medical Research opened its 600,000 square foot facility in Kansas City in November 2000. In contrast to the region's private firms, the Stowers Institute is conducting high level basic research in biological and molecular sciences, employing approximately 270 researchers and staff. Its facilities and laboratories are designed to provide a high quality research environment for a maximum of 30 to 40 laboratories. The institute's endowment stands at about \$2 billion and plans are in place to add another similarly sized facility every decade. In terms of its organization and financial support, the Stowers Institute is comparable to the Howard Hughes Medical Institute and the San Diego-based Salk Institute.<sup>71</sup> In fact, its endowment is larger than all the research endowments in San Diego and a recent report on higher education strategy in Kansas City states that the Stowers endowment "is already the largest endowment in the world devoted to basic life sciences research."<sup>72</sup>

Planning for the Stowers Institute goes back to the early 1990s when its founders, Jim and Virginia Stowers, began thinking about their estate and were interested in making a philanthropic contribution. Jim Stowers is a Kansas City-based entrepreneur who founded American Century Investments, a mutual fund management company, in 1958. Co-chairman of the board, Richard Brown, recalls that they were confronted with a lot of skepticism regarding the location of the facilities in Kansas City: "Some advisors told Jim Stowers that he could not build a world-class research facility in Kansas City."<sup>73</sup> Jim Stowers heard such criticism before when he founded his mutual fund management company in Kansas City and had proven a lot of skeptics wrong. He was determined to prove his critics wrong one more time.

Until the research facilities opened in Kansas City, the Stowers Institute funded individual researchers at universities across the nation. During the planning phase, the institute's founders also traveled across the country to gather information about how to best set up a research institute. Their conversations with researchers led the Stowers to adopt a philosophy that is based on excellence in basic research. To achieve excellence, the institute built a high quality research facility, created a supportive and collaborative research environment, and attracted researchers who

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<sup>70</sup> Charlie Anderson, "Tech Startup kozoru Lands \$3M," *Kansas City Business Journal*, August 10, 2005.

<sup>71</sup> The Howard Hughes Medical Institute (HHMI) has an endowment of about \$10.3 billion. In the past, HHMI primarily funded researchers at academic institutions all across the nation. A few years ago, the institute decided to build a permanent campus in the Northern Virginia portion of the D.C. region. The Salk Institute in San Diego consists of 24 laboratories and employs more than 900 researchers and scientific staff.

<sup>72</sup> Greater Kansas City Community Foundation, "Time to Get it Right: A Strategy for Higher Education in Kansas City," p. 37.

<sup>73</sup> Personal communication from Richard Brown, Co-Chairman, The Stowers Institute, August 18, 2005.

are among the best in their respective fields. The incentives the institute can offer to researchers, as well as its budding national and international reputation, have contributed to successfully attracting leading scientists. Interviewees indicated that Stowers is able to hire 80 percent of those it has interviewed for positions. Similar to other institutions, the Stowers Institute offers the principal investigators to relocate their entire laboratory staff to Kansas City. Anecdotal accounts provide testimony that the researchers enjoy living and working in Kansas City and retention has not been a problem. So far, the institute has attracted more than 21 investigators, who for the most part have joint appointments with other universities in the region.

Plans for the institute include substantial expansions every decade. However, the completion of the second phase of expansion is currently on hold due to the political debate about stem cell research. Institute management emphasizes that the expansion would only take place in Kansas City if the states of Missouri and Kansas retain a favorable legal environment for stem cell research. That seems to be the case as a November 2006 Missouri ballot initiative amending the state constitution to prevent the banning of federally authorized stem cell research was approved. Jim Stowers and his wife Virginia contributed \$27 million to the effort to pass the measure.

Interviewees agree that the Stowers Institute can play an important role in the regional economy, though direct economic effects have yet to materialize. For example, no spin-off companies have formed and linkages to locally based firms are not yet in place. Small impacts, however, can already be observed. Some local life sciences firms have been able to recruit trailing spouses of researchers who moved to Kansas City for a job at the institute.<sup>74</sup> Also, the Stowers Institute has positively influenced the recruitment of scientists and researchers at the region's universities. In turn, the institute benefits from the universities in the region because its researchers are able to hold joint appointments. Collaboration between the research institutions is just beginning but there are already signs that the academic institutions—primarily the University of Kansas' Medical Center and Johnson County Community College—are working together.

The entrepreneurial and philanthropic effort to establish the Stowers Institute has put Kansas City on the map for basic research in life sciences.<sup>75</sup> Several interviewees, however, questioned the local economic impact the Stowers Institute will have, remaining fearful that the ideas and innovation created locally will be commercialized in other regions. To address these concerns, the Stowers Institute formed the BioMed Valley Partnership, a systematic effort to address commercialization of research created at the Stowers Institute and its partner research organizations, the University of Missouri in Kansas City, and the University of Kansas.<sup>76</sup> The partnership founded BioMed Valley Discoveries as a for-profit venture dedicated to the development of discoveries through intellectual

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<sup>74</sup> Personal communication from Nicholas Franano, President and CEO, Proteon Therapeutics, August 23, 2005.

<sup>75</sup> Russel Gold, "A Concentration of Firms In One Industry Seen Spurring Jobs, Growth," *The Wall Street Journal*, June 6, 2001, pp. B11.

<sup>76</sup> Personal communication from Richard Brown, Co-Chairman, The Stowers Institute, August 18, 2005.

property licensing. Income generated through these activities will be channeled back to the research partners and will fund further research in life sciences. BioMed Valley Discoveries is currently in the process of recruiting a director to lead its efforts. Richard Brown, co-chairman of the board of the Stowers Institute, highlighted that “such a person will be recognized as a luminary in cellular biology and will have experience with commercial successes.”<sup>77</sup>

Table 3 compares Marion, Spring, Cerner, and the Stowers Institute regarding their influence on the region’s labor pool, entrepreneurial dynamics, and research capacity.

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<sup>77</sup> Personal communication from Richard Brown, Co-Chairman, The Stowers Institute, August 18, 2005.

**Table 3. Comparison of Marion Laboratories, Sprint, Cerner, and Stowers**

Surrogate University Role	Marion Laboratories	Sprint	Cerner	Stowers Institute
<b>Labor</b>	Expertise in drug development, regulatory approval, market research	Skilled telecommunication s labor force	Skilled IT labor force with expertise in healthcare	Scientific talent (biological, molecular)
<b>Entrepreneurship</b>	Corporate changes facilitated spin-off activity, especially in contract research	Some entrepreneurship in telecommunication s and information technology	Some very innovative spin-offs, but too early to have significant impact on economy	No effect (yet)
<b>Research</b>	No significant impact on regional research capacity	Significant R&D investments, but more a “deployer” of technology	Significant R&D investments with synergies in life sciences	High level basic scientific research



## V. KANSAS CITY'S INNOVATION MILIEU

The mere presence of a research university, innovative firm, or laboratory is not a guarantee for technology-based economic growth. All successful high-technology regions have also developed a supportive environment in which innovation and knowledge created at the anchor institution is translated into real economic benefits through entrepreneurial actions. The academic literature refers to such an environment as the “innovation milieu.”<sup>78</sup> The milieu consists of the following factors:

- Specialized business support services
- Strong and specialized labor market
- Quality of life
- Strong research infrastructure
- Capital formation
- Entrepreneurial environment and support system
- Active and supportive networking

An innovation milieu can create the conditions for the growth of companies, which in turn create a self-sustaining mechanism that ultimately produces an industry cluster in which firms specialize in certain segments and complement each other. A successful innovation milieu has several components, including firms that do work and network with each other, specialized support services and supplier companies, and a strong and specialized labor market. It also supports and encourages active networking among businesses and higher education institutions. Finally, an innovation milieu necessarily supports risk taking and entrepreneurship.<sup>79</sup> For example, as a source of risk financing and of management and business advice, venture capitalists and angel investors play a fundamental role in building high-technology and life sciences regions.<sup>80</sup>

The following section reviews the strengths and weaknesses of Kansas City's innovation milieu, illustrating that while the region has strong business support services, a highly specialized labor market, and a good quality of life, it does not yet have a strong research infrastructure and it substantially lacks the entrepreneurship, commercialization, and networking functions that can translate innovation created at local firms and laboratories into real economic benefits.

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<sup>78</sup> Olivier Crevoisier and Denis Maillat, “Milieu, Industrial Organization and Territorial Production System: Towards a New Theory of Spatial Development.” In Roberto Camagni, ed., *Innovation Networks: Spatial Perspectives* (London: Belhaven Press, 1991).

<sup>79</sup> Maryann Feldman and Johanna Francis, J. “Entrepreneurs and the Formation of industrial Clusters,” 2001. See also: Susan M. Walcott, “Analyzing an Innovative Environment: San Diego as a Bioscience Beachhead,” *Economic Development Quarterly* 16 (2), (2002): 99–114.

<sup>80</sup> Richard Florida and Mark Samber, “Capital and Creative Destruction. Venture Capital and Regional Growth in U.S. Industrialization.” In Trevor Barnes and Meric Gertler, eds., *The New Industrial Geography* (London: Routledge, 1999).

**Table 4. Assessing Kansas City’s Innovation Milieu**

Innovation Milieu Component	Strengths	Weaknesses
Specialized business support services	✓	
Strong and specialized labor market	✓	
Quality of life	✓	
Strong research infrastructure		✓
Capital formation		✓
Entrepreneurial environment and support system		✓
Active and supportive networking		✓

**A. Kansas City innovation milieu strengths**

The innovation milieu in Kansas City has several significant strengths. Among them are good business support services and a strong labor market—both of which are linked to the Marion legacy—and a high quality of life and low cost of doing business, important factors in retaining skilled employees and starting new businesses. While still weak compared to innovation hotspots around the country, the region’s research infrastructure is improving, and there are some signs of entrepreneurial activity.

**1. Good support services, strong labor market, and some entrepreneurship**

The region’s industrial legacy has helped to create locally available support services, a strong labor pool, and some entrepreneurial activity. Support services—such as market research firms, drug testing and clinical trial firms, regulatory affairs consultants, etc.—are critical, especially for young companies in the life sciences that are just starting out. As discussed above, the region also has a specialized labor pool from which firms can draw. For example, the labor force of some Marion-related startups consists predominately of ex-Marion employees. Finally, Kansas City’s surrogate universities have spurred the growth of several new firms, while a handful of serial entrepreneurs have also created companies within existing industry sectors. Together these factors indicate the increased maturity of the Kansas City economy, and the ability for local entrepreneurs to conceptualize new opportunities while staying in the same region or city.

**2. Improved research infrastructure**

As previously discussed, Kansas City’s academic sector has lagged behind many other regions, and its research and development investments are primarily made in the private sector without many spillover effects to the region. However, the investments at the Stowers Institute are addressing this shortcoming and are improving the innovation milieu by enhancing research activities. In addition, universities such as the University of Kansas Medical Center have made a significant commitment to become more significant players in research.

Besides increased investments in research, several interviewees mentioned that the collaboration among the research institutions in the area has significantly improved with the

inception of the Kansas City Area Life Sciences Institute (KCLSI) in 2000. As a nonprofit umbrella organization, KCLSI consists of ten stakeholder institutions and “serves as the coordinating body for the Kansas City region’s life sciences research initiatives.”<sup>81</sup> The stakeholders are comprised of the region’s medical hospitals and the research institutions.<sup>82</sup> KCLSI represents the life sciences research community and functions as its voice. Its main task, however, is to facilitate the collaboration among its stakeholders especially as it relates to joint research proposals and obtaining external funding. From the outset, KCLSI was charged with the goal to increase the amount of research expenditures at its stakeholder institutions to \$500 million annually over a period of ten to twelve years. 2005 was the fifth year of KCLSI and research expenditures amounted to \$275 million, almost twice the amount expended five years earlier in 2000. Local economic development leaders and entrepreneurs interviewed for this project credit the institute for achieving significant success in raising the level of research funding and also bringing the various research institutions together and facilitating their collaboration.

KCLSI’s main focus has been on the facilitation of research collaboration among research institutions. So far, the institute has not played a role in facilitating collaboration between the research institutes and the life sciences industry. Bill Duncan, KCLSI Director, pointed out that KCLSI is currently in the early planning stages for a more concerted effort to promote commercialization and entrepreneurship.<sup>83</sup>

### **3. *Quality of life and low cost of doing business***

Several interviewees credited Kansas City’s quality of life in helping retain entrepreneurs and employees. Low cost of living—especially as it relates to housing prices—has facilitated the retention of a highly qualified labor pool, while some interviewees thought that low costs of doing business may have helped young startup companies with limited budgets. For pharmaceutical development companies, costs for materials used in clinical trials and for using research facilities at the region’s research institutions are significantly lower than in the traditional biotechnology or life sciences centers.<sup>84</sup> Several interviewees also mentioned that the small size of the Kansas City region provides advantages regarding the facilitation of collaboration among the research institutions.

## **B. Kansas City innovation milieu weaknesses**

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<sup>81</sup> See [www.kclifesciences.org/content/Fact\\_Sheet.pdf](http://www.kclifesciences.org/content/Fact_Sheet.pdf).

<sup>82</sup> For list of KCLSI partner institutions, see endnote 21. For more information about KCLSI see [www.kclifesciences.org](http://www.kclifesciences.org).

<sup>83</sup> Personal communication from Bill Duncan, President, Kansas City Life Sciences Institute, August 17, 2005.

<sup>84</sup> Personal communication from Nicholas Franano, President and CEO, Proteon Therapeutics, August 23, 2005.

While the Kansas City region has several elements that form a good basis for knowledge-based economic development, it also has significant shortcomings, particularly in its entrepreneurial support system. Kansas City entrepreneurs experience difficulty in attracting venture capital or obtaining angel investments. Its organizational support for entrepreneurship is highly fragmented. And the level of networking among entrepreneurs, and between industry and academia, appears to be low. Addressing these issues is essential if the region wants to move forward as a life sciences and information technology hub: While most cities and regions in the United States are improving their research infrastructure, only the regions that are best equipped leveraging new ideas and turning them into commercial ventures will realize the economic benefits.<sup>85</sup> In other words, regions have to build entrepreneurial pipelines—mechanisms to commercialize ideas and knowledge into tangible economic outcomes.

### **1. *Weak Capital formation***

The majority of entrepreneurs interviewed for this project mentioned that it was difficult to raise venture capital or find angel investments in Kansas City, a finding supported by a 2004 study conducted by the Policy Research Institute at the University of Kansas.<sup>86</sup> Several interviewees indicated that there was a short supply of locally-based venture capital or angel investments, and many felt that there was a lack of understanding locally about financial investments in high risk industry sectors such as life sciences. Entrepreneurs also mentioned that they had a very difficult time convincing venture capitalists and other outside investors—those primarily based on the East and West coasts—to pay attention to their business plans. In fact, several noted that they've been asked whether they would be willing to move and relocate their firms closer to the venture capitalists. Interviewees cited two reasons for these trends. Some felt that Kansas City's geographic location in the heartland, combined with the fact that the region is not known as a high-technology or life sciences center, creates obstacles in attracting venture financing. Others thought that the region is lacking the deal flow which in turn would attract risk financing.

There are several efforts underway in the region to address the lack of locally-based venture capital. There is, for example, some activity in terms of the establishment of locally-based funds.

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<sup>85</sup> For biotechnology, this divergence has been very pronounced. While every major metropolitan area has gained research funding, only a few made substantial gains in developing new companies, attracting venture capital, and filing IPOs. For more information see Joseph Cortright and Heike Mayer, "Signs of life: The Growth of Biotechnology Centers in the U.S." Also, in a recent study for the Small Business Administration, Michael Camp describes the nexus between innovation and entrepreneurship and highlights the regions that are most successful in linking the two concepts. See: Michael Camp, "The Innovation-Entrepreneurship NEXUS: A National Assessment of Entrepreneurship and Regional Economic Growth and Development," (Washington: Small Business Administration, 2005).

<sup>86</sup> David Burress, Joshua Rosenbloom, and Susan Mercer, S. "Greater Kansas City Opportunities and Capacities for Technology-Based Development," (Lawrence: Policy Research Institute, 2004).

Cerner co-founder Cliff Illig created a new angel investment fund called Prairie Wind Angels.<sup>87</sup> And in August 2005, Illinois-based venture capital firm Open Prairie Equity Partners announced the opening of a Kansas City office and hired Michael Peck from the Kansas Technology Enterprise Corporation (KTEC). Overall, however, efforts to increase the amount of capital flowing to the region seem to be fragmented, focused on just one industry sector or one state, and some initiatives have ceased because of a lack of funds or management problems. Of the nine venture capital firms listed in the Kansas City Book of Lists, all of them have made the majority of their investments in companies located outside the region.<sup>88</sup> In addition, some of the investment funds have run out of funding and are not making new investments. These trends may be a result of the overall downturn in the economy and may not be a specific Kansas City problem.

Kansas has been more active than Missouri in terms of state support for economic development. In 2004, the Kansas legislature endorsed the Kansas Economic Growth Act (KEGA), a state-wide effort to support the development of the bioscience and life sciences economy. To this end, the state dedicated \$500 million in tax revenues generated from bioscience and life sciences firms for investments in research matching funds, R&D vouchers, tax investment incentives, and scholar recruitment programs. The investments are overseen by a board of local and national experts that constitute the Kansas Bioscience Authority.<sup>89</sup> Interviewees agreed that the state of Missouri has been less active in supporting knowledge-based industries in the Kansas City region. Even though the economy is regional in scope, the state line that divides Kansas City impacts the ways in which economic development efforts are supported.

## **2. *Fragmented organizational support for entrepreneurs***

Organizational or institutionalized support for entrepreneurs can make a significant difference in growing a high-technology economy. Trade associations, industry support groups, and professional associations can facilitate networking that in turns leads to sharing of new ideas and cross-fertilization within the industry.

The Kansas City region has a good endowment of entrepreneurial support services, but the efforts are not well-connected and for the most part they do not strategically target the growth of technology-based firms. As noted above, KCLSI, for example, is currently considering ideas about how to best approach entrepreneurial support and commercialization. These ideas have yet to materialize but they are primarily focused on the life sciences sector. Stowers' efforts to establish a corporation that deals with intellectual property and licensing includes partners such as the two main universities, but is focused primarily on licensing and not on entrepreneurial development.

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<sup>87</sup> Charlie Anderson, "New Angel Fund Will Watch over KC's Life Sciences," *Kansas City Business Journal*, April 15, 2005.

<sup>88</sup> Kansas City Business Journal, "22nd Annual Book of Lists, 2003-2004."

<sup>89</sup> Kansas Technology Enterprise Corporation, "Statewide Bioscience Initiative: Kansas Economic Growth Act. Kansas Technology Enterprise Corporation," 2005. See [www.ktec.com/sec\\_bioscience/section/kega.htm](http://www.ktec.com/sec_bioscience/section/kega.htm).

KCSourceLink, a small business resource center that serves the whole region, provides support for small businesses, but it does not have a clear specialization on high growth entrepreneurs in sectors like life sciences or information technology. In early 2006, KTEC initiated a new program to mentor entrepreneurs and link them to the technology and innovation creation. The program, called KTEC Pipeline, is a good start at nurturing entrepreneurial talent but is still, of course, in its nascent stage of development.<sup>90</sup> And though nationally and internationally known for its philanthropic support of entrepreneurship, the Ewing Marion Kauffman Foundation does not solely focus on supporting high-technology and life sciences activity in Kansas City.

One failed effort in Kansas City did try to focus on a region-wide support system for entrepreneurs. KCCatalyst, formed from a membership-based organization called Silicon Prairie Technology Association, was established in 2001 to promote the growth of the information technology and life sciences sectors by facilitating collaboration, contributing to capital formation, and supporting the commercialization of new ideas. The organization was funded through grants from state government (both Missouri and Kansas), the Kauffman Foundation, the Greater Kansas City Chamber of Commerce, and other organizations. The effort was modeled after the San Diego CONNECT Program and the North Carolina Council for Entrepreneurial Development, and regional leaders hoped it would play an important role in regional economic development.<sup>91</sup> Unfortunately, KCCatalyst never achieved substantial success and was closed in early 2005. Interviewees and newspaper articles cited several reasons for its failure, such as the timing of the organization's formation during the downturn of the economy and the associated difficulty in raising risk capital, as well as mismanagement and failure to devise a clear strategy and niche. Still, KCCatalyst had had broad support from government leaders on both sides of the state line, as well as industry and academic representation, and its focus on providing support to high-growth entrepreneurs distinguished it from other organizations. Some interviewees—primarily the entrepreneurs—felt that there is still a need for such an organization in the region.

### **3. *Lack of Networking***

Networking among entrepreneurs and academic leaders facilitates information exchange and learning. In turn, such activity may contribute to a more resilient and sustainable industry cluster. Strong networks exist among former Marion Laboratory employees. An alumni organization and a newsletter (the Marion Phoenix) facilitate their interactions, and entrepreneurs who worked for Marion Laboratories can draw on the Marion alumni network for support in finding jobs or management talent for their firm. But while the level of interaction among Marion alumni is rather strong, several interviewees indicated that, overall, networking among entrepreneurs in the region,

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<sup>90</sup> Personal communication from Maria Meyers, Network Building and Managing Director, KCSourceLink and UMKC, August 15, 2005.

<sup>91</sup>Michelle Buckley, "Conditions Right for KCCatalyst to Make Play for Tech Businesses," *Kansas City Business Journal*, June 1, 2001.

and between local industry and universities, is generally underdeveloped. Networking events are sparse and have only recently been reinstated.

While institutionalized efforts to create networking such as the Kansas City Area Life Sciences Institute have been successful in connecting their own, they have not yet focused on making connections to industry. Also, the Stowers Institute has not yet developed relationships with the local life sciences industry; for example, local startup firms are not working with researchers at the institute as of yet. It will be critical for the region to find ways to connect the already existing industrial strengths with the research capacities that are forming at the universities and research institutions in the region.



## VI. POLICY RECOMMENDATIONS

The Kansas City economy is characterized by a strong firm legacy, significant industry strengths, and a resolute effort to build the research and innovation infrastructure. Among second tier regions that are trying to position themselves as the challengers of the established high-technology or life sciences centers, Kansas City is in a very good position. However, the region faces one major challenge: Regional leaders need to find ways to connect these advantages and to facilitate the commercialization of ideas and entrepreneurship. To the outside observer, Kansas City looks like a puzzle that needs to be finished: The pieces—a well developed industrial base, a research infrastructure that is beginning to show significant strengths, and nascent efforts to commercialize ideas—are present, but have yet to be put together in a strategic way.

The stakes are high: Without a strategic plan for putting innovation-led, entrepreneurial development at the top of the region's economic development agenda, ideas and knowledge created within industry and academic laboratories will not be captured locally and the economic benefits will materialize in other areas of the country, particularly the already established life sciences or high-technology centers. In short, if Kansas City wants to maintain the legacy of its surrogate universities and keep ideas, innovation, and entrepreneurs in the region, then regional leaders need to focus on three areas:

1. Continue to expand academic research capacity
2. Strengthen linkages between universities, research institutions, and industry
3. Support the innovation milieu by building an entrepreneurial pipeline

### ***Continue to expand the academic research capacity.***

Over the past several years, the Stowers Institute has boosted Kansas City's reputation in life sciences research. Still, Stowers alone cannot fully meet the region's research needs. Without better local research capacity, firms and private laboratories that function as surrogate universities can only go so far in creating spillover effects for Kansas City region.

To fill this gap, regional leaders need to match the Stowers investment by continuing to support the research capacity at the region's public universities, particularly UMKC and KUMC.

Such focus on academic research is necessary for two primary reasons. First, former Marion employees, Marion spinoff companies, and other firms in sectors as diverse as information technology and telecommunications need to be connected to academic research because they can be the critical agents in commercializing academic discoveries. A stronger higher education infrastructure will provide the Stowers Institute, local hospitals, and industry with these viable academic partners. Second, a strong university presence is essential to attracting talent—students, professors, post-docs—to the region that in turn can be employed in firms and startups.

To increase its academic research prowess, Kansas City's civic leaders should follow the suggestions the Greater Kansas City Community Foundation's blue ribbon task force report made for strengthening the higher education infrastructure. It suggests boosting the research capacity in life sciences at the University of Kansas Medical Center (KUMC) and selectively at UMKC through better funding to build specialized research centers, attract quality faculty and students, and ultimately lead to increased external funding. The report also recommends building leadership and governance structures at UMKC so that it can transform itself into a world-class urban university that not only serves the knowledge economy, but also provides education opportunities for the city's disadvantaged populations.<sup>92</sup>

***Strengthen linkages between universities, research institutions, and industry.***

Building the academic capacity is not enough. Kansas City needs to pay more attention to connecting its already established and vibrant industrial capacity with the emerging academic institutions. While KCLSI has been successful in forming collaborations among Kansas City's research organization, as yet there are no systematic efforts to connect them to industry. Both industry leaders and academics can benefit from increased interaction: Firms could leverage academic resources for applied research, and researchers could partner with companies for the purpose of commercialization. These local connections need to be made if the region wants to keep innovative ideas and turn them into profitable ventures.

The blue ribbon task force report made several recommendations on how Kansas City can help better connect research with industry and local leaders. Building upon the recommendations, KCLSI is currently prioritizing its efforts around the establishment of a Comprehensive Cancer Center and a Center for Translational Research. These centers could function organizations that combine several institutions (universities, research laboratories, hospitals, and industry) with a variety of disciplinary areas, and could allow these different institutions to coalesce around a field or a sector. Such cooperation can also lead to the convergence of cognate research and industry fields such as telecommunications, information technology, and life sciences. In order for these efforts to be successful, however, it is vital that Kansas City's industry representatives are integrally involved from the onset.

Several other regions are trying out new ways to connect industry with academia by utilizing a collaborative consortium approach. Silicon Valley, for example, formed the Bay Area Science and Industry Consortium (BASIC) in 1999 with a stated mission to strengthen the region's scientific leadership by becoming more aware of what industry and academia can offer and how they can better connect.<sup>93</sup> BASIC's Board of Directors includes the directors and CEOs of the most prominent Silicon Valley institutions, and its teams range from advocacy and communication on behalf of the

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<sup>92</sup> Greater Kansas City Community Foundation, "Time to Get it Right: A Strategy for Higher Education in Kansas City."

<sup>93</sup> For more information on BASIC, see [www.bayeconfor.org/basic/index.html](http://www.bayeconfor.org/basic/index.html).

organization to hands-on approaches to R&D collaboration. Oregon Nanoscience and Microtechnologies Institute (ONAMI) is another example of successful industry-academic collaboration from which Kansas City might learn.<sup>94</sup> ONAMI was formed in 2000 and comprises all the major academic institutions, federal research laboratories and major industry leaders, including Intel, Hewlett-Packard, LSI Logic, Triquint Semiconductors, and Tektronix. The institute focuses on research collaborations, commercialization programs, education, and workforce development, and has launched a strategic effort to bring university innovations to the market place. Since its inception, the organization has attracted \$60 million in grants for nanoscience research.

***Support innovation milieu by building an entrepreneurial pipeline.***

In order to ensure that its growing research capacity is connected to industry and vice versa, it is essential that Kansas City build an entrepreneurial pipeline. This can be accomplished in several ways.

First, Kansas City leaders need to design the Cancer Center and the Center for Translational Research in ways that systematically include a focus on entrepreneurship and commercialization. Venture capital funds and locally based angel investors need to be networked into these efforts, and incubator and wet lab space for nascent entrepreneurs and small ventures should also be incorporated into the centers.

Second, regional leaders should examine the need for a technical assistance and entrepreneurial support institution such as KCCatalyst. If such an organization is formed, it needs to be closely connected and integrated with Stowers, KUMC, UMKC, and industry groups. KCLSI can take a leadership role in establishing such an organization and leaders could examine national models such as UC San Diego's CONNECT. The San Diego region benefited from CONNECT's efforts in providing venues for networking among entrepreneurs, university researchers, venture capitalists and other service providers. For Kansas City, connecting the memberships of the KCLSI stakeholders with the business community needs to be a top priority.

Third, these more tangible efforts need to be paired with the development of an entrepreneurial culture that supports risk taking and forgives failure. The region needs to focus on building a critical mass of home-grown firms and a milieu that is supportive of business ventures. Elements of a supportive entrepreneurial milieu are often created through rather intangible mechanisms. A strong culture of networking may facilitate learning and interaction among business owners. Entrepreneurship could be valued in the community through awards, dedicated newspaper clippings, or annual events. New firm formation is one of the most important ways in which a region can achieve economic success, and entrepreneurship needs to be recognized and celebrated. Once such an environment is established, entrepreneurs and talent from elsewhere are more likely to be attracted to the region.

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<sup>94</sup> For more information, see [www.onami.us/](http://www.onami.us/).



## VII. CONCLUSION

Kansas City is well-positioned to develop a vibrant high-technology and life sciences economy. While virtually every region in the country is aiming to foster knowledge-based industries, only a few will have the capacity to reap serious economic development benefits. In the case of Kansas City, the industrial capacity originated with Marion Laboratories, Sprint, and Cerner, which have in turn helped to attract and retain a highly skilled and specialized talent pool in the region, with seasoned managers and industry executives now running competitive and innovative startups. This industrial capacity is augmented with basic research through the presence of the Stowers Institute. The key to Kansas City's continued and growing success is the ability of civic leaders to connect industry with research and to develop an environment in which the commercialization of ideas will flourish. Building an entrepreneurial pipeline is essential to ensuring that other regions don't reap all the benefits from the ideas created in Kansas City. The research has shown that a region can bootstrap its high-technology and life sciences capacity, but organized civic leadership and sound public policy are necessary to push this burgeoning prowess to the next level.



## APPENDIX A. LIST OF INTERVIEWEES

Name, Position	Organization	Date of Interview
Irvine Hockaday, Lead Independent Director	Sprint	August 4, 2005 October 25, 2005
Jewel Scott, President	Civic Council	August 14, 2005
Maria Meyers, Network Builder & Managing Director	KCSourceLink & UMKC	August 15, 2005
Joe Kessinger, Founder	Innovia Medical	August 15, 2005
Stephen Dispensa, Chief Technology Officer	Positive Networks	August 15, 2005
Tim Cowden, Senior VP, Business Development	KC Area Development Council	August 16, 2005
Robert Marcusse, President and CEO	KC Area Development Council	August 16, 2005
Peter Higuchi, Vice President Corporate Development	airPharma	August 17, 2005
James Byrnes, Executive Vice President	airPharma	August 17, 2005
Bill Duncan, President	Kansas City Life Sciences Institute	August 17, 2005 October 25, 2005
Richard Brown, Co-Chairman of the Board	Stowers Institute	August 18, 2005
Mike Herman, Former CFO, Board member	Marion Laboratories, Cerner	August 18, 2005
David Warm, President	Mid-America Regional Council	August 18, 2005
Frank Lenk, Director of Research	Mid-America Regional Council	August 18, 2005
Tracy Taylor, President	Kansas Technology Enterprise Corp.	August 19, 2005
Lesa Mitchell, Vice President Advancing Innovation	Kauffman Foundation	August 19, 2005
Michael Song, Professor	University of Missouri - Kansas City	August 22, 2005
Karl Strohmeier, Director, Business Development	Pharmion Corporation	August 22, 2005
Nicholas Franano, President & CEO	Proteon Therapeutics	August 23, 2005
Steve Garver, Chief Executive Officer	SoftVu	October 24, 2005
Diarmuid Boran, Entrepreneur in Residence	Kansas Technology Enterprise Corp.	October 24, 2005
Michael McHugh, Business Development	Teva Neuroscience	October 25, 2005
Jim Laufenberg, President and CEO	ImmunoGenetix Therapeutics	October 25, 2005
Michie Slaughter, Retired Vice President of HR	Marion Laboratories	October 25, 2005
David Vranicar, formerly with Marion, Birch Telecom	Marion Laboratories, Birch Telecom	October 26, 2005
Brian Jackson, Business Development	Medi-Flex	October 26, 2005
Jim Mitchum, President	Medi-Flex	October 26, 2005
Cliff Illig, Vice Chairman and Co-Founder	Cerner	October 26, 2005
Larry Jacob, VP Community Investment	Greater Kansas City Community Foundation	October 27, 2005

**APPENDIX B. NAICS DEFINITION OF INDUSTRY SECTORS**

Industry Cluster	NAICS Codes
Life Sciences	NAICS 32541 Pharmaceutical and medicine manufacturing NAICS 541710 Physical, engineering and biological research NAICS 334510 Electromedical apparatus manufacturing NAICS 33911 Medical equipment and supplies manufacturing NAICS 32519 Other basic organic chemical manufacturing NAICS 32532 Pesticide and other ag. chemical mfg NAICS 334516 Analytical laboratory instrument mfg NAICS 334510 Electromedical apparatus manufacturing NAICS 621511 Medical laboratories NAICS 621512 Diagnostic imaging centers NAICS 54138 Testing laboratories
Telecommunications	NAICS 517: Telecommunications
Information Technology	NAICS 5415: Computer systems design and related services NAICS 5112: Software publishers

*Source: Kansas Economic Growth Act*

### APPENDIX C. SPIN-OFF COMPANIES FROM MARION LABORATORIES, CERNER, SPRINT

Company	Year	Founder	Former Employer	Area of expertise
Beckloff Associates	1976	n/a	Marion	Drug development, approval, marketing
CyDex	1983	Peter Higuchi	Marion	Drug development, approval, marketing
Medi-Flex	1985	Joe Brandemeyer	Marion	Drug development, approval, marketing
EPIQ Systems (fka Electronic Processing, Inc. - EPI)	1988	Tom Olofson	Marion	Fiduciary management systems
Rip Grossman & Associates	1992	Rip Grossman	Marion	Market research/consulting
Regulatory/Clinical Consultants (RxCCI)	1998	Diane Saif	Marion	Pharmaceutical contract research
InTouch Solution	1999	Faruk Capan	Marion	Information technology
Cultural Horizons	2000	n/a	Marion	Market research
Pharmion	2000	Judith Hemberger	Marion	Pharmaceutical development
Teva Neuroscience	2001	Larry Downey	Marion	Drug development, approval, marketing
ImmunoGenetix Therapeutic	2002	Jim Lauffenberg	Marion	Drug development, approval, marketing
Network Integration Services	Na	Bob Jewell	Marion	Telecommunications networks services
Birch Telecom	1997	Jeff Shackelford Dave Scott	Sprint	Local exchange carrier
Information Technology Decision Management	n/a	Patrick Zimmer	Sprint	IT decision support
Net Cadence	n/a	Creighton Hill	Sprint	Na
Nexgenesis	n/a	Cary Stronach	Sprint	Mobile commerce
Taccent	n/a	n/a	Sprint	Na
Positive Networks	2001	Tim Sutton Steve Dispensa	Sprint	IT / Wireless security
Tech Guys	n/a	Jeff Shackelford	Sprint	Computer support
FiberNet	1987	Jeff Shackelford	Sprint	Access provider
Akcia	1997	Douglas Akbari	Cerner	Healthcare IT/ Software
Tradebot Systems	1999	Dave Cummings	Cerner	E-Trading
Garmin Systems	1989	Min Kao & Gary Burrell	Allied Signal	Global Positioning Systems (GPS)