University of Minnesota, Humphrey School

The Rochester, Minnesota Health Services Cluster

An Analysis of Competitiveness

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Table of Contents

Executive Summary .................................................................................................................................................. 1
Regional Overview .................................................................................................................................................. 5
Primary Industry Clusters ................................................................................................................................... 9
The Health Services Cluster ................................................................................................................................ 13
  Historical Development ...................................................................................................................................... 13
  Inter-Organizational Support ............................................................................................................................. 16
Challenges Confronting Cluster-led Growth ........................................................................................................... 21
  The Risk-Averse Business Culture at the Mayo Clinic ......................................................................................... 21
  Developing an Entrepreneurial Culture of the Rochester Region ..................................................................... 22
  The Three M’s: Money, Management and Marketing ......................................................................................... 25
Promising Developments .......................................................................................................................................... 29
Regional Strategies for Future Growth .................................................................................................................... 35
  The Mayo Mission: Patient Care, Research and Education for the 21st Century ............................................. 35
  Capturing IP Potential through Local Entrepreneurship ................................................................................. 36
  Leading in an Era of Healthcare Reform ........................................................................................................... 39
Conclusion .............................................................................................................................................................. 43
Appendices ............................................................................................................................................................. 45
  Appendix A: Literature Review .......................................................................................................................... 45
  Appendix B: Specialization in Rochester Metro Area’s Health Services Subclusters, 1998-2007 ............... 49
  Appendix C: Stakeholder Interviews Conducted ............................................................................................... 50
Executive Summary

Rochester, Minnesota is a small metropolitan region with an extraordinary health services industry dominated by the world-renowned Mayo Medical Center. The draw of Mayo and the recession-resistant health care industry have led to strong economic growth and an increasingly educated workforce in the region, both factors that support higher wages and improved quality of life for Rochester residents compared to residents of surrounding communities and similar cities across the nation.

The health services cluster has not only enhanced the lives of local residents, but has resulted in proven patient outcomes and an enviable reputation for efficiency. Since its inception, Mayo has built its competitive advantage by crafting a new model of health services based on value, not just by increasing the volume of its patients, procedures, or high-margin reimbursements. This single-minded and unique focus on seamless delivery of patient-centered care delivered by the best health professionals has led to a global customer base for Mayo.

However, this focus on patient care in the context of the region’s cultural aversion to risk, has led to only scattered entrepreneurial activity in the cluster. Few patents are secured in the region and capital for start-ups remains difficult to obtain. Most innovations therefore are not commercialized, but instead are rolled back into Mayo’s overall health care delivery framework. Efforts to confront this deficiency have emerged in the public, private, and non-profit sectors, requiring some coordination through entities like the Minnesota BioBusness Center.

Despite the surprising lack of successful healthcare related entrepreneurial activity, growth and innovation continues to occur in the cluster. The focus on improving patient outcomes has also led to strong collaborations with higher education, information technology, and hospitality sectors, which has spurred innovation in those arenas. For example, the University of Minnesota opened a new campus in Rochester with an agile health curriculum and the Blue Gene Project with IBM uses supercomputing to comb through years of Mayo’s patient data to form the backbone of a new personalized medicine. These Mayo-led projects have also encouraged outsiders to begin filling the investment gap, as evidenced by the Elk Run development.
To strengthen and expand these promising growth areas, three primary strategies for Rochester and its health services cluster are detailed in this report:

- **Continuing the Mayo Mission of patient care, research and education.** Leveraging the Mayo brand to draw top talent in health professions can only help to support the cluster’s ongoing strength.
- Capturing IP potential through local entrepreneurship. Expanding the resources and support for innovators both inside Mayo and in the wider health services cluster is critical to full vitality in the coming years. Gaps in the “Three M’s” – money, marketing, and management – have been identified in the region and strategies have begun to take shape. Efforts to reduce skepticism of new developments and increase multi-sector support for entrepreneurs should continue.
- Leading in an era of national and global healthcare reform. **The cluster’s connections with the local information technology sector can continue to spur advances in patient outcomes through bioinformatics, telemedicine, and electronic medical records.** Global competition also holds the potential of new developments in health services, and Mayo’s patient base helps to position it for early adaptation of new technologies, thus maintaining its leadership position in U.S. health care.
Regional Overview

Rochester, Minnesota is a prosperous community in southeastern Minnesota, located on the Zumbro River, approximately 90 miles from the Twin Cities metropolitan area. It has experienced significant population growth in the last 50 years, with Olmsted County recording growth of over 20 percent every decade since 1980. The U.S. Census Bureau estimates that the Rochester region had 185,619 residents as of 2009. While the city is primarily known as the home of the Mayo Clinic, Rochester itself is the largest city in Minnesota outside the Minneapolis-St. Paul metropolitan area. The Rochester Metropolitan Statistical Area (Figure 1) now includes Olmsted, Wabasha, and Dodge Counties.

The population growth of Rochester has been a direct result of the region’s continued strengths in quality of life measures. The region is routinely featured in Money Magazine’s Best Places to Live rankings, enjoys the ninth-highest median household income compared to other metropolitan statistical areas, and its poverty rate of 8.8 percent is far below the national rate of 14.3 percent.

Figure 2: Weekly Wage Trends in Rochester Region

<table>
<thead>
<tr>
<th>Year</th>
<th>Average weekly wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>$500</td>
</tr>
<tr>
<td>2000</td>
<td>$550</td>
</tr>
<tr>
<td>2001</td>
<td>$600</td>
</tr>
<tr>
<td>2002</td>
<td>$650</td>
</tr>
<tr>
<td>2003</td>
<td>$700</td>
</tr>
<tr>
<td>2004</td>
<td>$750</td>
</tr>
<tr>
<td>2005</td>
<td>$800</td>
</tr>
<tr>
<td>2006</td>
<td>$850</td>
</tr>
<tr>
<td>2007</td>
<td>$900</td>
</tr>
<tr>
<td>2008</td>
<td>$950</td>
</tr>
<tr>
<td>2009</td>
<td>$1,000</td>
</tr>
</tbody>
</table>

Source: DEED Labor Market Information Office, Quarterly Census of Employment and Wages (QCEW).

5 U.S. Census data.
Median incomes in Minnesota generally exceed the national median, and this is especially true in the Rochester area. As shown in Figure 2, the average weekly wage in Olmsted County exceeds the statewide average by 8 percent and far outpaces its neighbors in Southeast Minnesota (a 22 percent gap). Additionally, average wage growth per year between 1998 and 2007 in Rochester, MN was 3.87 percent, above the US rate of 3.49 percent, leading to an increasing concentration of wealth within Rochester compared to the surrounding region.\(^7\)

Despite this level of affluence, significant variations in income persist within the Rochester Metropolitan Statistical Area (MSA). Overall, the region’s median household income is $63,278, a figure approximately 10 percent and 20 percent higher than the state and national median income figures, respectively. At the same time, Black households report a median income one-third that of Whites, while Latinos and Hispanics have a median at two-thirds that of non-Hispanic Whites. Table 1 reports this data. Note that the data shows no sizable populations of American Indian/Alaska Native or Native Hawaiian/Pacific Islander in the Rochester MSA. While the population remains heavily white (89 percent), proximity to the Twin Cities and its national-high number of Somali immigrants has resulted in a similar, albeit smaller, influx of immigrants from Somalia to the Rochester area.

\(^7\) Prof. Michael E. Porter, Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School; Richard Bryden, Project Director.

<table>
<thead>
<tr>
<th>Table 1: Estimated median household income in Rochester MSA (2008 inflation-adjusted dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>All households</td>
</tr>
<tr>
<td>White alone, not Hispanic or Latino</td>
</tr>
<tr>
<td>Black alone</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
</tr>
<tr>
<td>Other race</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
</tr>
</tbody>
</table>

*Margin of error greater than $30,000 due to small sample size.

Source: U.S. Census Bureau, 2006-2008 American Community Survey
Many of the primary industry clusters in Rochester—information technology, health services, and others—generally require high-skilled employees, a portion of whom are recruited to the city for employment. Overall migration levels have been flat, with the region experiencing only a loss of 13 working-age adults in 2008. The influence of these industry clusters within the Rochester MSA, contributes to a positive net migration of persons with advanced degrees and a loss of workers with less than a high school diploma. This phenomenon is captured in Table 2. This demonstrates either a growth scenario in which higher-wage employment is created, or a severe concentration situation, in which other industries and occupations are not well-supported.

University and technical college programs within the region also support local industry by offering degrees and programs directly related to local employment needs. Nursing, medical assistance, and information systems are among the largest programs at Rochester Community and Technical College (RCTC) and Winona State University. In addition, the newly established Rochester campus of the University of Minnesota has a distinct emphasis on health fields in terms of degree programs and research.

In addition to its ability to increase human capital, Rochester’s location and infrastructure support its economic growth. In terms of infrastructure, Rochester benefits from close proximity to two major interstate highways (I-90 along its southern border, and I-35 approximately 45 miles to the west). In addition to a direct route to the Twin Cities of Minneapolis and St. Paul via U.S. Highway 52, a four-lane freeway offering close access to a major metropolitan market, a world-renowned research university, and an international airport. For its part, Rochester also boasts a regional airport with a runway capable of accommodating large international flights for passengers and cargo.

Table 2: Workforce migration by education level in Rochester MSA, 2008.

<table>
<thead>
<tr>
<th>Education level of Workers</th>
<th>Workforce Out-migration</th>
<th>Workforce In-migration</th>
<th>Net workforce migration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Workers 18-64</td>
<td>percent of out-migration</td>
<td>Workers 18-64</td>
</tr>
<tr>
<td>Total</td>
<td>10,410</td>
<td>100</td>
<td>10,397</td>
</tr>
<tr>
<td>Less than HS</td>
<td>596</td>
<td>5.7</td>
<td>496</td>
</tr>
<tr>
<td>HS graduate</td>
<td>2,322</td>
<td>22.3</td>
<td>2,683</td>
</tr>
<tr>
<td>Some college</td>
<td>2,632</td>
<td>25.3</td>
<td>2,307</td>
</tr>
<tr>
<td>Associate’s degree</td>
<td>1,109</td>
<td>10.7</td>
<td>1,175</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>2,376</td>
<td>22.8</td>
<td>2,023</td>
</tr>
<tr>
<td>Graduate degree or higher</td>
<td>1,375</td>
<td>13.2</td>
<td>1,713</td>
</tr>
</tbody>
</table>

Primary Industry Clusters

Dominant industry clusters by employment are health services and information technology, with health services comprising nearly a third of total employment in the region. Rochester also demonstrates a competitive advantage in these clusters as noted by the high location quotients in Table 3. In 2007, County Business Patterns data from the U.S. Census revealed that the Rochester MSA was five times more specialized in information technology and four times more specialized in local health services than the United States as a whole. Other clusters prominent in the region include agricultural products, processed food, and local education and training.

These clusters display varying growth and decline trends in terms of their competitive advantage, as highlighted in Table 3. While still dominant, information technology lost significant ground to other regions between 1998 and 2007. Other clusters related to manufacturing have also lost ground, with location quotients of lighting and electrical equipment and heavy machinery declining by a significant margin during the period. Health services and agricultural products, however, have more than doubled their competitive advantage during the same period.

Determinants of these changing levels of employment and specialization also vary between primary clusters in the region. As noted above, the information technology cluster, led by IBM, remains specialized. However, the level of employment and specialization has decreased. Shift-share analysis, as shown in Table 4, presents a

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Table 3: Specialization of Rochester MSA employment compared to national employment by industry cluster, 1998 and 2007

<table>
<thead>
<tr>
<th>Industry</th>
<th>1998 Employment</th>
<th>2007 Employment</th>
<th>1998 Location Quotient*</th>
<th>2007 Location Quotient*</th>
<th>Change in Location Quotient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Technology</td>
<td>8,519</td>
<td>4,149</td>
<td>10.59</td>
<td>5.17</td>
<td>-5.42</td>
</tr>
<tr>
<td>Local Health Services</td>
<td>21,360</td>
<td>30,917</td>
<td>2.75</td>
<td>3.96</td>
<td>+1.21</td>
</tr>
<tr>
<td>Agricultural Products</td>
<td>470</td>
<td>870</td>
<td>1.92</td>
<td>3.54</td>
<td>+1.62</td>
</tr>
<tr>
<td>Automotive</td>
<td>970</td>
<td>1,895</td>
<td>0.78</td>
<td>1.96</td>
<td>+1.18</td>
</tr>
<tr>
<td>Medical Devices</td>
<td>620</td>
<td>580</td>
<td>1.98</td>
<td>1.76</td>
<td>-0.22</td>
</tr>
<tr>
<td>Processed Food</td>
<td>1,162</td>
<td>1,887</td>
<td>0.96</td>
<td>1.68</td>
<td>+0.72</td>
</tr>
<tr>
<td>Local Education and Training</td>
<td>1,243</td>
<td>1,424</td>
<td>1.32</td>
<td>1.22</td>
<td>-0.10</td>
</tr>
<tr>
<td>Nonmetal Mining</td>
<td>140</td>
<td>60</td>
<td>2.32</td>
<td>1.00</td>
<td>-1.32</td>
</tr>
<tr>
<td>Lighting &amp; Electrical Equip.</td>
<td>1,750</td>
<td>175</td>
<td>6.22</td>
<td>0.91</td>
<td>-5.31</td>
</tr>
<tr>
<td>Heavy Machinery</td>
<td>870</td>
<td>185</td>
<td>2.68</td>
<td>0.65</td>
<td>-2.04</td>
</tr>
</tbody>
</table>

*A location quotient greater than 1.00 signifies greater local specialization in the industry than the nation as a whole.

U.S. Census Bureau. County Business Patterns (2007), Rochester MSA.
more nuanced picture of the major growth and decline factors affecting employment levels in each cluster, namely trends in the overall national economy, national industry, and local industry. Examining the information technology data below, it is evident that cluster employment loss in the Rochester region exceeded the almost insignificant loss that would have occurred based on national economic and national industry trends. These data points to a local cause for the loss in information technology jobs. The same is true for Hospitality and Tourism, Business Services, and Local Commercial Services clusters.

The clusters that have increased their advantage despite employment losses or sluggish growth at the national industry level are Processed Food, Automotive, Health Services, and Distribution Services. These clusters exhibit growth trends that may point to local advantages that withstand the pressures of the national economy and industry. Examining the details of these industry clusters would be a key strategy in determining local economic development investment.

Rochester’s major industry clusters are also somewhat unique in that the most dominant clusters are highly concentrated by employer – Mayo Clinic in health services and IBM in information technology.

<table>
<thead>
<tr>
<th>Industry Cluster</th>
<th>Changes in total employment due to</th>
<th>Total Employment</th>
<th>Percent Change in Total Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National economic trends</td>
<td>National Industry trends</td>
<td>Local Industry trends</td>
</tr>
<tr>
<td>Total employment</td>
<td>11,614</td>
<td>0</td>
<td>9,153</td>
</tr>
<tr>
<td><strong>Primary Traded Clusters</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Technology</td>
<td>1,072</td>
<td>-1,076</td>
<td>-4,366</td>
</tr>
<tr>
<td>Hospitality &amp; Tourism</td>
<td>323</td>
<td>-86</td>
<td>-750</td>
</tr>
<tr>
<td>Automotive</td>
<td>122</td>
<td>-338</td>
<td>1,141</td>
</tr>
<tr>
<td>Processed Food</td>
<td>146</td>
<td>-227</td>
<td>806</td>
</tr>
<tr>
<td>Business Services</td>
<td>218</td>
<td>436</td>
<td>-1,138</td>
</tr>
<tr>
<td>Distribution Services</td>
<td>63</td>
<td>23</td>
<td>579</td>
</tr>
<tr>
<td><strong>Primary Local Clusters</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Services</td>
<td>3,891</td>
<td>1,748</td>
<td>16,042</td>
</tr>
<tr>
<td>Hospitality Establishments</td>
<td>744</td>
<td>685</td>
<td>-27</td>
</tr>
<tr>
<td>Real Estate, Construction, and Development</td>
<td>693</td>
<td>869</td>
<td>-1,213</td>
</tr>
<tr>
<td>Commercial Services</td>
<td>523</td>
<td>231</td>
<td>-154</td>
</tr>
<tr>
<td>Retail Clothing and Accessories</td>
<td>436</td>
<td>288</td>
<td>447</td>
</tr>
</tbody>
</table>

These major organizations dwarf other employers such as Olmsted Medical, Zumbro Valley Mental Health and Benchmark Electronics. Clusters like agricultural equipment manufacturing demonstrate less concentration by employer, with around 300 employees at the largest of these companies. A list of the largest employers in the Rochester area is included in Table 5.

Table 5: Major employers in Rochester area

<table>
<thead>
<tr>
<th>Employer</th>
<th>NAICS Code</th>
<th>Products/Services</th>
<th>Employee Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mayo Medical Center</td>
<td>6221</td>
<td>General Medical &amp; Surgical Hospitals</td>
<td>31,539</td>
</tr>
<tr>
<td>IBM Corp</td>
<td>3344</td>
<td>Semiconductor &amp; Other Electronic Component Mfg.</td>
<td>4,200</td>
</tr>
<tr>
<td>Rochester Public Schools</td>
<td>6111</td>
<td>Elementary &amp; Secondary Schools</td>
<td>2,293</td>
</tr>
<tr>
<td>Olmsted, County of</td>
<td>9211</td>
<td>Executive, Legislative, &amp; Other Gen. Govt. Support</td>
<td>1,270</td>
</tr>
<tr>
<td>Olmsted Medical Center</td>
<td>6221</td>
<td>General Medical &amp; Surgical Hospitals</td>
<td>1,070</td>
</tr>
<tr>
<td>HyVee Store</td>
<td>4451</td>
<td>Grocery Stores</td>
<td>860</td>
</tr>
<tr>
<td>Rochester, City of</td>
<td>9211</td>
<td>Executive, Legislative, &amp; Other Gen. Govt. Support</td>
<td>843</td>
</tr>
<tr>
<td>Charter Communications</td>
<td>515210</td>
<td>Cable &amp; Other Subscription Programming</td>
<td>686</td>
</tr>
<tr>
<td>Sunstone Hotel Properties</td>
<td>7211</td>
<td>Traveler Accommodation</td>
<td>650</td>
</tr>
<tr>
<td>RCTC</td>
<td>6113</td>
<td>Colleges, Universities, &amp; Professional Schools</td>
<td>550</td>
</tr>
<tr>
<td>Target</td>
<td>452112</td>
<td>Discount Department Stores</td>
<td>500</td>
</tr>
<tr>
<td>Crenlo Inc</td>
<td>3362</td>
<td>Motor Vehicle Body &amp; Trailer Manufacturing</td>
<td>475</td>
</tr>
<tr>
<td>Federal Medical Center</td>
<td>311119</td>
<td>Other Animal Food Mfg.</td>
<td>453</td>
</tr>
<tr>
<td>Seneca Foods Corp</td>
<td>3114</td>
<td>Fruit &amp; Vegetable Preserving &amp; Spec. Food Mfg.</td>
<td>450</td>
</tr>
<tr>
<td>Benchmark Electronics</td>
<td>3353</td>
<td>Electrical Equipment Manufacturing</td>
<td>394</td>
</tr>
<tr>
<td>Marigold Foods Inc</td>
<td>3115</td>
<td>Dairy Product Manufacturing</td>
<td>344</td>
</tr>
<tr>
<td>Samaritan Bethany</td>
<td>623210</td>
<td>Residential Mental Retardation Facilities</td>
<td>325</td>
</tr>
<tr>
<td>Hiawatha Homes</td>
<td>6232</td>
<td>Resid. Mental Retard., Mental Health &amp; Subst. Abuse</td>
<td>324</td>
</tr>
<tr>
<td>Pace Dairy Food Co</td>
<td>3115</td>
<td>Dairy Product Manufacturing</td>
<td>320</td>
</tr>
<tr>
<td>Schmidt Printing</td>
<td>323117</td>
<td>Books Printing</td>
<td>300</td>
</tr>
</tbody>
</table>

Source: Minnesota Department of Employment and Economic Development, MNPro Community Profile
The Health Services Cluster

The development of the health services cluster in Rochester has been steady and pronounced, eventually becoming nearly synonymous with the Mayo Medical Center and growing to account for nearly half of all employment in the city. This section explores the foundations of the cluster as well as its current structure, players, and focus.

Historical Development

The origins of the health services cluster in the region coincide with the founding of Rochester. Rochester was founded in 1854 and was named after the town’s first European settler’s hometown in New York. By 1857, it became the seat of Olmsted County and a stagecoach stop between St. Paul, Minnesota, and Dubuque, Iowa. When the railroad was constructed in the 1860s, it brought many new residents, including William W. Mayo, who was an examining surgeon for draftees in the Civil War.8 A devastating tornado in 1883, which demolished much of the city and injured scores of residents, provided the impetus for Mayo and his sons to start a medical facility in Rochester with the help of the Sisters of St. Francis.9

Since its start in the wake of disaster, Mayo has grown to become the largest employer in Rochester, as well as the largest private employer in Minnesota – with nearly 32,000 employees. The Clinic itself is also geographically large, taking up 15 million square feet, or about 2.9 times the size of the Mall of America.10 The Mayo Clinic has grown exponentially since its beginnings, and now includes operations in Florida and Arizona.

While the Mayo Clinic has been extremely successful, this success has not precipitated similar growth in related industries such as pharmaceuticals, biomedicine, or medical devices within the Rochester MSA (as shown by primary industry clusters identified in the previous section). In fact, Minnesota’s preeminent medical device manufacturers, such as Medtronic and Boston Scientific, are located in the northern reaches of the Twin Cities metropolitan area.

Figure 3: Health Services Cluster Map

- **Medical Research Affiliations:** National Institutes of Health, National Cancer Institute
- **Educational Institutions:** University of Minnesota, Rochester CTC, Riverland Community College, Rochester Public Schools
- **Government Agencies:** Department of Health, MN Board of Medical Practice, Medicare/Medicaid Services
- **Industry/Professional Accreditation Groups:** American Medical Association, Minnesota Nursing Association

**Supporting Networks & Affiliations**

**Core Activities**
- Research: Genomics/Bioinformatics, Cancer, Chronic Disease
- Clinical trials
- Physician and health professional education
- Publications: Scholarly reports, public health information
- Medical procedures
- Local Mayo Health System administration
- International/destination health services
- Pharmacy services
- Health Policy: Medical education, health care reform

**Suppliers**
- Medical devices and equipment
- Health professionals: Doctors, nurses, technicians, researchers, etc.
- Information technology & advanced computing
- Food & housekeeping suppliers
- Construction and building materials
- Pharmaceuticals
- Health Insurance

**Service Providers**
- Local Retail, Restaurants and Hotels
- Specialized business services: Insurance, legal, translation
- Local and International Transportation
- Banks/financial institutions
- PR and market research services
- Specialized medical services: Billing, sterilization, waste disposal, etc.

**Industry Cluster Outgrowths**
- Elk Run Bioscience Park
- IBM-Blue Gene Project
- Minnesota BioBusiness Center
- Southern MN Initiative Fund—Bioscience Entrepreneur Prog
- Destination Medical Community initiative

**IFCs**
- BioBusiness Alliance of Minnesota, Bio Business Center, RAEDI, Rochester
- Entrepreneur Network, SEMBiD, Southern Minnesota Competitiveness Partnership
In Rochester, the Mayo Clinic system is responsible for $22 billion in economic impact nationally, including $9.6 billion in Minnesota. Hospitals contribute nearly $26.6 million to the state’s economy in hospital-related expenditures alone. The Mayo Clinic has served as a focal point connecting other regional industries, but specific figures regarding how much the regional cluster contributes to the Minnesota economy has not been firmly calculated, as the definitional boundaries dictating what entails “health services” often varies.

However, the definition of “health services” is expansive, making it difficult to fully account for all the various firms and organizations that make up the Southeastern Minnesota health services industry cluster. Figure 3 indicates this broad spectrum of suppliers, service providers, supporting networks, and outgrowths from the Mayo Clinic’s core activities.

To better understand these connections between Mayo Clinic and the other components of the cluster one must examine its value-creating services within the overall industry cluster value chain. However, it is important to consider an element not visible in this model: the primary, overarching attention to patients. “The needs of the patient come first” resonates with all players in the value chain, both inside and outside the organization. Given the new emphasis on “lean management” in health care, this characteristic may take on new importance. The delivery of health care, and the value it creates for patients, is important to understanding how the Mayo Clinic’s healthcare-based strengths has created an economic advantage for the region based on the strengths of its health services alone.

However, the health care industry cluster of the region includes activities that “develop, market, and/or distribute health-related products or provide health care services, such as hospitals, nursing homes, HMOs, medical laboratories, and community services.” The regional health services value chain, shown in Figure 4, shows that there is value added in both delivery and research and development. The Mayo Clinic participates in both activities, but lags in developing value for the region through its research and development. It strengthens the market in health care delivery, but is somewhat unable to

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15 Industry Cluster Summary, Center for Workforce Development, Maricopa, Arizona.
capitalize on its strengths to create further economic development through the creation of new markets and industries.

The inability of Mayo Clinic and the Rochester region to create and support entrepreneurial activity based upon Mayo-generated medical intellectual property is well known. For instance, the City of Rochester itself has been classified as an “understanding region” in cluster-analysis literature – which suggests the region has strengths in arts, sciences and humanities but relative weakness in manufacturing sectors. Similar to other “understanding regions,” Rochester has lower levels of economic development than regions focused on engineering or building sectors. Therefore, according to the literature, while the region has an educated population and strong economy, it has not been able to translate its knowledge specifically into production.

Inter-Organizational Support

Regional clusters lagging in economic competition are often dominated by one entity, which captures the local innovation infrastructure and “leverages power asymmetries to capture a larger share of the inventions growing out of the local information space.” In the Rochester region, however, the Mayo

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16 Gabe, et. al, Knowledge in Cities, Federal Reserve Bank of New York, September 2010, Page 10
Clinic has no vested interest in capturing inventions because its strengths are in health services, not in profit-driven sectors such as health technology. It seems that the Mayo Clinic’s size, however, does not by itself explain a lack of innovation.

Furthermore, it seems regional agencies and organizations understand that working together toward shared goals strengthens the area’s industry clusters. Figure 5 represents the Porter Diamond of Advantage\(^{19}\), which demonstrates the inter-organizational support of the Health Services industry in Rochester. Partners and allies include educational institutions, medical services providers, researchers, computational and information specialists like IBM; each with its unique contributions to the strength and cohesiveness of the health services cluster.

Rochester Community and Technical College President Don Supalla states that supporting the area’s employment needs is a “major part of the RCTC academic program.” In fact, the needs of employers often drive the course offerings at RCTC. For example, RCTC has designed several customized training programs for the Mayo Clinic and IBM.

Moreover, the involvement of such training programs starts early on in the Rochester community. For instance, Rochester public schools receive support, career information and programming opportunities from RCTC as well as Mayo Clinic researchers; furthermore, RCTC even created a healthcare career center for high school students in order to provide an opportunity for students to explore careers in the health sciences. President Supalla notes that the Mayo Clinic and RCTC “talk all the time – having discussions almost monthly.” The RCTC and the Mayo Clinic enjoy a “wonderful partnership,” Supalla adds. Officials at University of Minnesota- Rochester shared similar comments.

\(^{19}\) See Michael Porter, *On Competition*
The close relationship between institutions produces local benefits to the Rochester community.

**Figure 4: Diamond of Advantage, Health Services**

**Factor (Input) Conditions**
- Mayo Clinic & Health Services
- St. Mary’s Hospital
- Access to highly-skilled workforce
- Proximity to University of MN, a major research university and Academic Health Center
- Proximity to MSP International Airport
- Local international airport suitable for all aircraft
- Thriving state K-12 system, local districts & schools
- State history of healthcare innovation/investment
- Concentrated health services campuses in downtown Rochester
- Quality area medical, nursing, and med tech education programs
- University of MN – Rochester
- Proximity to other high-quality institutions of higher education

**Context for Firm Strategy & Rivalry**
- Mayo’s strong local, national & global reputation & brand (”best and brightest”)
- Employer, Provider, & Educator of Choice
- Quality state, national & global competitors
- Role of healthcare in local economy
- Role of healthcare in local social standing (prestige of working at Mayo)

**Demand Conditions**
- Proximity to sophisticated Twin Cities market
- Global demand for best healthcare money can buy, VIP treatment
- Loyal patient/customer base
- Long-term relationships with patients, recruiters, labs, others hospitals and resources
- Patients seeking primary, secondary & tertiary (specialized) care
- Certain degree of price insensitivity
- Aging population
- Growing role of government in healthcare regulation, reimbursement

**Related & Supporting Industries**
- Clinics, Hospitals & Physician Groups
- Education (K-12, CC, Higher, Medical)
- Mayo Medical School
- Higher Ed (Nursing / Med Tech)
- Biomedical / Pharmaceutical
- Medical Technology: Medical Devices, Medical Instruments, Information Technology
- Suppliers / Distributors: Utilities, Technology (IBM), Medical Supplies
- Specialized Health Services, e.g.: Dentists
- Long-Term Care: Home Healthcare, Nursing Homes
- Emergency Care
- Lab Services
- Waste Management
- Recruitment
- Hospitality
- Health Insurers
President Supalla acknowledged that the Mayo Clinic’s national reach means that it can work with anyone it wants to, and yet the clinic still chooses local partners for many of its activities. For instance, in Scottsdale, Arizona, the Mayo Clinic could have utilized the nearby Gateway Community College for many training programs. Instead, Mayo chose RCTC to set up an online program for Arizona students seeking to gain future employment in the health services field. Supalla explained that the Mayo Clinic “just knew the local players in the Rochester community and wanted to do business with us.” Institutions and agencies seem to enjoy a high level of trust in the region.

Under the proposed Destination Medical Community initiative – spurred on in partnership between the Mayo Clinic, City of Rochester, and other stakeholders to address, in part, the rise of medical tourism abroad – local businesses may benefit even more. Susan Ahlquist, Mayo Clinic Community Relations Administrator, notes that although the Mayo has done extremely well at serving patients while they are in the hospital, the clinic would like to do more to support the patient and the patient’s friends and family while they are staying in the Rochester community. The Mayo Clinic has estimated that on average, each patient brings two people with him or her to Rochester. These two people spend about 70 percent of their time outside of the Clinic, within the Rochester community. Therefore, Mayo is now leading a multi-faceted approach in addressing patient needs beyond the hospital walls: from ensuring that local restaurants understand patient dietary needs to supporting arts and other activities for those visiting the community with the patient. This initiative involves the Mayo Clinic partnering with the community to serve patients and their friends and family from the moment they seek out the Mayo Clinic. However, there may be negative results to the Destination Medical Community as well. There is the possibility that Mayo will solely promote hotels, restaurants, and other businesses if they meet the Clinic’s standards. Consequently, businesses that do not meet these standards may be exposed to additional risk.

Educational institutions also work with one another to serve the Rochester community, rather than emphasizing destructive types of competition. For instance, the University of Minnesota-Rochester (UMR) is viewed as a collaborator and valuable addition to the community, as opposed to merely new competition, according to Chancellor Stephen Lehmkuhle. With the addition of UMR to the community, the Mayo Clinic and UMR must collaborate to find their niche. Instead of the Mayo Clinic forcing everyone into specific roles, Supalla notes, each partner has been shaped by their relationships to one
another. The UMR Master Plan states, for instance, that “The University presence in Rochester will act as a catalyst for collaboration between the University and businesses relating to bioscience research and to enhance commercialization activity within the State of Minnesota. It represents an opportunity for the state to better capture the economic development potential of enhanced coordination of efforts of U of M, Mayo Clinic, Rochester, and IBM.”

These relationships emphasize shared visions but not at a cost to adaptability. For example, UMR is designing its curriculum from the ground up, seeking to address student and employer needs each year by tailoring course offerings to what both demand. Such adaptability and flexibility is at the core of Chancellor Lehmkuhle’s leadership at the University. Lehmkuhle notes that local officials have often sought a “shared vision and a higher set of principals” that can guide collaborative action. “You can’t do it all on your own anymore,” Lehmkuhle noted.

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Challenges Confronting Cluster-led Growth

While the health services cluster in Rochester clearly possesses many historical and developing strengths that have increased the cluster’s competitiveness in recent years, challenges to continued vitality exist. As described here, some of these challenges are, in fact, based in the same characteristics that have been the cluster’s strengths.

The Risk-Averse Business Culture at the Mayo Clinic

For all its renown and achievement in the practice of medicine, Mayo Clinic is not widely regarded as an engine for creating spin-offs seeking to capitalize on in-house innovation. Throughout its history, Mayo Clinic has produced medical intellectual property, which in turn has led to the development of a number of procedures, instruments, and products bearing some connection to research and development – trial and error, serendipity even – all taking place in Rochester.

At its core, the Mayo Clinic’s success has traditionally depended on its strengths as a health care provider. This focus has led to an incomparable reputation and engendered the trust of patients expecting the best care possible. World-class care is Mayo Clinic’s identity, and one can understand the importance not only of honoring such a storied mission, but also the business implications of protecting such a coveted brand.21

Continuing to protect the Mayo brand has been considered essential to the clinic’s future. As such, the same ethic – a deliberate approach and attention to detail – that has served the clinic’s patient care in the past is just as influential in its business dealings today. Mayo Clinic has risen to prominence and enjoyed success by promoting change to accomplish defined ends and strictly adhering to its mission. As Susan Alhquist has pointed out, however, the clinic has recently been seeking ways to open up its intellectual property, to work with the community more cooperatively, and to seek more productive partnerships.

Developing an Entrepreneurial Culture of the Rochester Region

Steve Smith, Southeast Minnesota BioBusiness Development (SEMBiD), has noted that sophisticated, long-term, or financially substantial support for entrepreneurs has often been lacking in the Rochester area. Several factors appear to have contributed to this limitation for entrepreneurship and innovation in the region.

First, despite the seemingly collective agreement regarding shared goals and the benefits of collaboration among Rochester institutions and organizations, the structure and culture of these organizations has often impaired entrepreneurialism. As Mayo’s Community Relations Administrator notes, “We’ve often been so altruistic [in patient care] that we haven’t always taken the next step towards supporting commercialization.”

Mayo Clinic has risen to prominence and enjoyed success by consistently following its mission. As such, the clinic is conservative, brand-conscious, and adverse to risk – qualities well suited for guiding an established entity, but rather ill-suited for an entrepreneurial world where creativity is important and risk, even failure, is an accepted part of the process. This is not only seen at Mayo, but also in the entire Rochester community because the chance of failing is not acceptable. However, Steve Smith of Southeastern Minnesota BioBusiness Development (SEMBiD) noted that failure and risk are essential for successful entrepreneurs and attract venture capital. This tension is clearly a limitation for Mayo and the region.

Mayo Clinic’s development of cortisone is a telling example. The financial benefits of this significant medical discovery were lost to Mayo not because the clinic misread its potential. Rather, Mayo Clinic intentionally gave away the compound’s license rights to avoid any appearance of impropriety and to prevent conflict of interest accusations from assailing its physicians. In essence, the clinic did not want to be burdened by the fact that its research led to the development of a drug that might be prescribed commonly – both by its physicians and others the world over.

22 Susan Ahlquist, Community Relations Administrator, Mayo Medical Center
A second factor limiting entrepreneurial culture in the region is that the large institutions in the area are often not focused on supporting entrepreneurs because of the risk involved. Smith notes that if the Mayo Clinic decided to develop a new technology, it would work with established companies in the Twin Cities area such as Boston Scientific, Medtronic, and St. Jude Medical, rather than pursue the sale of intellectual property (IP) licenses locally. These decisions may, as Smith notes, “minimize risk and maximize return” for Mayo, but they do not help grow the regional economy. Making this factor even more damaging, says Dick Booth of Rochester Entrepreneur Network, is the fact that “to have some endorsement by the Mayo Clinic is absolutely vital.” Without support from the Mayo Clinic, local businesses seeking to grow may be at a disadvantage. SEMBID is working on ways to leverage entrepreneurs’ position to purchase the less expensive IP from Mayo Clinic that larger corporations might not otherwise purchase.

Third, some leaders believe there is a cultural barrier preventing the Rochester region as a whole from reaching its potential. It is essential for a potential business to obtain capital in order to establish itself and grow. While entrepreneurs in Silicon Valley may thrive on risk-taking, those in the Rochester area likely view failure with relative aversion. This may be further supported by the large, generally risk-averse employers in the area. These businesses depend on good brand image and business predictability, from finances to management and vision. Sarah Walbert, BioBusiness and Medical Devices Specialist at the Minnesota Department of Employment and Economic Development, echoed this reality, tracing this cultural avoidance of risk to the area’s agricultural history. The steady processes of agriculture, compared to the fast-paced, all-or-nothing approach to oil drilling, for instance, develops a much more conservative and cooperative culture that may be stifling to the big ideas required for entrepreneurial growth and commercialization.

Smith also noted that the conservative culture is present in Rochester and the Midwest region as a whole, which may create a barrier. Venture capitalists and angel investors are attracted to high-return propositions, often from entrepreneurs that have demonstrated success in some other business proposition. The belief of some local business leaders is that there is a lack of CEO-talent to draw in investors. The Director of Technology Commercialization at Mayo Clinic24 stated that Mayo within the

24 Steve Van Nurden, Director of Technology Commercialization at Mayo Clinic
past year sold IP licenses to 40 companies; only three were based in Minnesota, and none in the Rochester MSA. He hopes that the UMR will change the culture by promoting entrepreneurism.

Additionally, the Southern Minnesota Regional Competitiveness Partnership (SMRCP), a coalition of businesses, foundations, investors, and non-profits, has initiated a new effort to develop local entrepreneurial investment. Through SMRCP’s members—primarily AgStar Financial and the Southern Minnesota Initiative Foundation, the coalition has developed several local financing tools to fulfill both the debt and equity needs of small business owners. These funds are available both in early start-up phases and at critical expansion points in a business’s life cycle. While still in its early stages, the SMRCP proposition represents a cluster-based approach to development that is seeking to address barriers that impede the region’s future success in health services and related activities.

Fourth, the Rochester MSA does not have large biomedical businesses that would create a sustainable business culture in the region. Smith’s Southeast Minnesota BioBusiness Development (SEMBiD) has just begun serving local business leaders, and may offer a solution to this issue. SEMBiD focuses on medical technology and biotechnology, and the organization has sought to keep its mission narrow; for instance, the group refuses to focus on pharmaceuticals and associated technology. The organization is now helping several small entrepreneurial companies address their challenges, hoping that “success breeds success.” In other words, the BioBusiness group would like to create a few strong Rochester-based businesses in hopes that the success will attract and encourage future entrepreneurs. Currently, there are no such large “biobusinesses” located in the Rochester region, and the presence of even one sizable company would strengthen the health services cluster. Complicating the problem is that within the Mayo Clinic, the specialists focus on “narrow and deep technologies” that serve only very specific business ends, if any.

The University of Minnesota-Rochester is seeking to change some of the structural problems in Rochester. According to Chancellor Lehmkuhle, research at large public institutions such as the University of Minnesota has historically been “department-based research,” which impaired inter-departmental knowledge, expertise, and real-world applicability for discoveries. UMR, however, is seeking to implement more “problem-based” research, utilizing cross-department collaboration. This is especially important in the interdisciplinary fields such as bioinformatics and “person-based medicine.”
Typically, numerous start-up companies tend to form near research universities due to the research and development they produce; UMR hopes to contribute to such a trend in Rochester.

**The Three M’s: Money, Management and Marketing**

Although Mayo Clinic’s generally conservative culture does not foster an environment for local entrepreneurialism and product innovation, there is much more to the question of why more start-ups and spin-offs do not locate in the Rochester MSA.

In the Rochester region, there is a lack of seed money from venture capitalists or angel investors. These investors tend to be located far from Rochester – frequently along the east or west coast – where they can closely-monitor the fruits of their investments. Although this fact has not stopped such capital from flowing into the Twin Cities medical device industry, the limited supply of capital investment presents a serious challenge for promoting entrepreneurial growth in Rochester.

The absence of entrepreneurial-minded business management talent is another apparent shortcoming of the Rochester MSA. Although both Mayo Clinic and IBM have enjoyed their share of local innovative success stories, such development has been in-house and driven by corporate managers. As such, for its wealth of researchers and practitioners, engineers and technicians, Rochester lacks locally-based business managers with a healthcare acumen who are accustomed to taking personal risk and building a business from the ground-up.

Despite receiving recent distinction by Fortune magazine as a top location for entrepreneurs to build business and other publications as a premier “livable city”, Rochester may have an image problem as well. For many Minnesotans, Rochester is perceived as being located near Minnesota’s southern border – far beyond a “short” car ride from the Twin Cities area. For other non-residents, Rochester might remain the home to Mayo Clinic, but it is located outside the metropolitan region of a state one might otherwise simply fly over en route between Chicago and one coastal destination or the other.

Regardless of its many successes, Rochester historically has not marketed itself as an incubator for innovation. Of course, Mayo Clinic has built a reputation for cutting-edge medical care – but the clinic has so dominated the area’s identity that it may appear that there’s no room in the story of Rochester’s
success for mention of anything else. For instance, until recently Rochester’s IBM facility was responsible for creating the world’s fastest computer – a tremendous feat, but one that appears to have been drowned out by the accomplished Mayo Clinic. To market Rochester as ripe for entrepreneurialism, there must be more to the story than simply the many successes of Mayo Clinic.

It is necessary that the Mayo Clinic analyzes its strengths and weaknesses and also the opportunities and threats that the Rochester MSA provides. Figure 6 uses a SWOT analysis to illustrate the important factors that affect growth in the region and inform the strategies described in the final section of this report.
Figure 5: SWOT Analysis, Health Services Cluster

**Strengths**
- Over 30,000 employees in Minnesota.
- Partnership with clinics throughout Minnesota, Iowa, and Wisconsin to provide specialized health services.
- Educational support:
  - Mayo Clinic Graduate School and College of Medicine.
  - University of Minnesota Rochester and Mayo Clinic signed Memorandum of Understanding to promote academic collaboration.
  - Rochester Community and Technical College and Mayo Clinic partnership
- R&D provides high levels of innovation within the company.
- Destination Medical Community program: increase competition and improve patient and guest experiences

**Weaknesses**
- Due to the clinic’s size, the barriers for entrance into the market increase.
- Outside of the Mayo Clinic, there is a lack of innovation in the cluster.
- Destination Medical Community program: potential negative effect on entrepreneurs.
- Control/influence on the community.
- Rochester MSA is specialized, although it is limited to healthcare. IBM, UMR, RCTC, and other organizations in Rochester depend on Mayo Clinic. Institutions for Collaboration rely on Mayo as well.

**Opportunities**
- Well educated people in the Rochester cluster
- 2010 federal healthcare reform
- MN Rail Alliance – plan to connect the Twin Cities and Rochester by railway which will transport people for both labor and patients.
- IBM is located in Rochester and collaborations have occurred between the companies.
- Growing renewable energy industry and joint animal/human health initiative in Rochester.
- Elk Run bio-business could help solve innovation issues and provide an influx of people, resources, knowledge, etc.
- Rochester Area Economic Development, Inc, RAEDI, works to attract new businesses, retain existing businesses, and facilitate thoughtful growth and expansion in the Rochester area.

**Threats**
- Recession: studies have shown that people are less likely to visit a doctor in a recession.
- 2011 healthcare policy changes
- Rochester is dependent on three main industries: agriculture, healthcare, and manufacturing
- Lack of venture capitalists in Midwest
- Midwestern culture restricts risk-taking and entrepreneurism.
Promising Developments

Despite the many challenges facing Rochester and its health services industry, stakeholder interviews reveal several recent developments and future opportunities: First, a local sales tax policy may be directed towards higher education. This would potentially amount to $120 million over 10 years, with $24 million dedicated to higher education. Many local leaders expressed their hopes that this sales tax would pass and be directed toward local institutions.

Second, the Minnesota Legislature recently passed a tax credit for angel investors. Local leaders view this as an important first step. The tax credit is intended to stimulate private investment in emerging businesses and encourage job creation. It provides tax incentives to investors or funds that put money into start-up businesses that are focused on high technology or new proprietary technology. The legislation allocates $17 million for angel investor credits in FY 2011, $12 million in FY 2012 and $11.9 million in FY 2013.

Local leaders have stated that, historically, state support for entrepreneurs, has been lacking. For example, the level of support for the BioBusiness Alliance, as compared to similar groups in other states, has been liked by some to “chicken feed.” Minnesota has, however, supported multiple small programs:

- Minnesota’s BioScience Zone Program, created in 2003, provides tax incentives for bioscience companies to move into areas near university and research centers. Currently, there are BioScience zones in Minneapolis, St. Paul, and in Rochester. To qualify for the tax exemptions, businesses must start-up, relocate to, or expand to the zone. Multiple states have established similar zones to encourage the development of research nodes near universities by providing financial incentives for start-ups. 25
- In 2007, the Minnesota Legislature approved $10 million to support infrastructure development for research facilities. The majority of the funds, $8 million, supported construction of the Minnesota BioBusiness Center in Rochester. The anchor tenant is intended to be Mayo Health Solutions (formerly Mayo Medical Ventures), the technology commercialization arm of Mayo Clinic. Nationally, billions of dollars are spent to support the development of research facilities.

25 UMR Master Plan at page 9
and equipment. California provides the most research funding of any state, including $3 billion in bond funding to create the California Institute of Regenerative Medicine.²⁶

- Twenty-seven states, including Minnesota, report that they provide designated support for bioscience research and development through grants or funding to provide research centers or centers of excellence. Minnesota is one of many states with a program such as the Partnership for Biotechnology and Medical Genomics. Its $15 million of state funding can be used to support improvement of high tech facilities that are used to recruit new scientists to Minnesota and aid commercialization of promising discoveries. According to Rochester Area Economic Development, Inc. (RAEDI), 14 research teams have been funded by the Partnership, which has tremendous potential for positively impacting the Minnesota economy. For example, the Partnership reports that “a state investment of $70 million over five years, with mid-range assumptions, will yield an expected overall economic impact returned to the state of $320 million and 4,300 direct and indirect jobs in 2010.” ²⁷

- A $21.7 million Minnesota bond issue created a three-story research facility on the top floors of the Stabile Building in Rochester. Dedicated to the Minnesota Partnership for Biotechnology and Medical Genomics, this high tech facility provides general research space, as well as dedicated laboratories for genomics and bioinformatics. Investigators from both Mayo Clinic Rochester and UMR collaborate on research at the facility.²⁸

- Another partnership in Minnesota is the Hormel Institute, a medical research unit of U of M focused on cancer research. Hormel Institute Expansion Project in Mower County is an 89,954 square foot facility that opened in October 2008. The expansion project includes a renovation of the existing 24,000 square foot facility.¹⁴ The expansion includes space for IBM’s Blue Gene supercomputer and 100 new researchers.¹⁵ State support for bioscience research facilities is significant, but Battelle reports that 28 states made comparable investments in bioscience research facilities between 2006 and 2008.²⁹

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²⁶ UMR Master Plan at page 10
²⁷ UMR Master Plan at page 11-12
²⁸ UMR Master Plan at page 13
²⁹ UMR Master Plan at page 16
• State activity to support and encourage commercialization has been focused on the creation of university-associated commercialization centers. The centers support venture formation, recruitment of management teams, strategic planning, and help with accessing capital. For example, the Minnesota Research Fund, an initiative of the Blandin Foundation and U of M, supports the development and commercialization of technology generated by Minnesota’s educational institutions. Another state-funded initiative is U of M Innovation Grants Program, which supports translational research not otherwise funded by the federal government or industry. According to Battelle, many states have established funds that provide up to about $50,000; but, for those focused on the biosciences, some funds provide as much as $200,000 to $500,000.  

• Today, every state offers some form of enhanced curricula at the post-secondary level designed to encourage pursuit of bioscience careers. Minnesota offers programs in biotechnology research through the Biotechnology Education and Training Initiative at U of M biomedical device workforce development at Anoka-Ramsey Community College; agricultural biosciences through Minnesota West Community and Technical College (a 2-year laboratory technician degree); and biotechnology is also offered at Minneapolis Community and Technical College (a 2-year associate of science degree).  

Third, despite the historic lack of related industry development amidst the booming Health Services growth in Rochester MSA, a proposed biobusiness park 15 miles northwest of Rochester could change this story significantly. The park would be part of an ambitious 2,300-acre mixed-use development situated along the Highway 52 corridor between Rochester and the Twin Cities that promises to “foster a high quality of life for residents alongside corporate and scientific innovation in a stunning natural setting.”

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30 UMR Master Plan at page 17
31 UMR Master Plan at page 18
Specifically, the Biobusiness Park at Elk Run is a 200-acre business park offering the “flexible space, state-of-the-art infrastructure, and aggressive incentives today’s biotechnology companies demand.” Its design promises to accommodate the needs of a broad spectrum of companies—from start-ups to industry leaders looking to expand or relocate, and to support early-stage development, clinical development, and commercial manufacturing in one location, with technical showcase, warehouse, and distribution space also available. In terms of implications for related industry growth, the park claims to offer opportunities for such industries as medical devices, diagnostics, pharmaceuticals and specialty pharmaceuticals, animal health, renewable materials, and bioinformatics.

The park has been promoted as being ideally situated with access to world-class biotech industry and logistical resources including: Mayo Clinic, IBM, University of Minnesota, Hormel Institute, FedEx, and two international airports (in Minneapolis-Saint Paul and Rochester). Developers herald the site’s proximity to Minnesota’s educated, experienced, and proven reliable workforce, adding that the proposal is positioned to complement the efforts of the State to accelerate biobusiness industry growth in Minnesota. Further, the proposal is committed to incorporating sustainable design and green technology.

Fourth, the BioBusiness Alliance and other groups may be having more traction in garnering support for small business start-ups. As Chancellor Lehmkuhle noted, what the area “doesn’t need is another MBA program. It needs support.” The BioBusiness Alliance is investigating the possibility of taking a stake in

Figure 6: Elk Run location and development plan
the businesses it develops. The Alliance would then invest the revenues from the successful businesses back into the group. Such approaches have been implemented elsewhere with success.\textsuperscript{33}

Fifth, the Mayo Clinic is opening up its IP “shelf” to those willing to use its innovations for start-ups. Previously, if a piece of IP did not promise large enough revenues, the Mayo Clinic would not pursue it. Other companies outside the Mayo Clinic structure could take advantage of these innovations and pursue the IP. This process of sifting through the Mayo Clinic’s IP portfolio has only been occurring for a year, and may offer huge benefits to the region in terms of business development and entrepreneurism.

Sixth, between leadership changes and the new outreach at Mayo Clinic, the dynamic and flexible approach of the UMR, and the new efforts at the Minnesota BioBusiness Center, there seems to be a shift in thinking, away from the view of the Rochester health industry cluster as a national competitor toward that of an international competitor.\textsuperscript{34} This, perhaps above all else, may be the most important in pushing local leaders toward further action, according to several local officials.

\textsuperscript{34} The UMR Master Plan at page 11
Regional Strategies for Future Growth

Despite the mounting competition and the uncertain future facing Mayo Clinic and the Rochester health services cluster, there are clear strategies the organization and region can pursue to foster an environment for continued growth. Some promising developments, such as the creation of the University of Minnesota-Rochester campus, Minnesota BioBusiness Center and Minnesota Partnership for Biotechnology and Medical Genomics, are well underway. Others, such as the Elk Run BioBusiness Park development and Destination Medical Community concept, hold great potential but require significant nurturing and remain unproven. Additional possibilities, although raw and unrefined, are clearly identifiable and worthy of future investment of time and resources.

For the Rochester MSA and Mayo Clinic to build upon past successes and realize its potential in the years ahead, this report identifies three overarching strategies:

- Continuing the Mayo Mission of patient care, research and education
- Capturing IP potential through local entrepreneurship
- Leading in an era of healthcare reform

The Mayo Mission: Patient Care, Research and Education for the 21st Century

Mayo and the Rochester health services cluster have many things working for them and shouldn’t waste precious time and resources fixing something that isn’t broken. Given the history of growth and success, accomplishment and accolades, perhaps the best strategy moving forward for both the region and the clinic is to focus on what has worked in the past. For the Rochester MSA, this means continued investment in strategies that seek to strengthen the Mayo Clinic and related healthcare activity in the spirit of “what’s good for Mayo Clinic is good for Rochester.” This approach is tested and trusted; it has helped the area outperform numerous similarly sized peers elsewhere, and has led to a local economy that has been remarkably resilient in the face of economic recession.

For Mayo Clinic, such an approach means continued emphasis on matching comprehensive patient data with cutting-edge medical treatment, a track record of identifying and treating rare and difficult medical cases, and an ability to offer world-class medical care to a diverse range of patients visiting from all over
the world – as well from just down the street. Given rapid advances in the study of genomics, understanding of stem cell development, and the practice of transplant medicine, the next frontier of such “cutting edge medical treatment” will no doubt include new approaches in regenerative medicine. Mayo Clinic is well positioned to lead in this area – and many others as it has for so many years.

Capturing IP Potential through Local Entrepreneurship

In order for the Rochester MSA to realize its full economic potential – particularly given its abundance of health-related knowledge and intellectual property, the region would benefit from capturing more of the medical IP emanating from Mayo Clinic and translating it into local growth. After all, recall that Mayo Clinic recently granted licenses to approximately 40 firms interested in capitalizing on its medical IP. Of these licensees, only three were based in Minnesota, and none in Rochester. In terms of cluster-based economic growth, this inability to translate locally-grown medical IP into locally-developed value-added product – and jobs – is a glaring blemish on an otherwise sterling record.

To address this shortcoming, the region must build its business bona fides and think seriously about how to retain such medical IP for local gain. Recalling the “three M’s” of building business—money, management and marketing—Rochester would be well-served to pursue strategies that encourage entrepreneurial investment and innovation.

With respect to money, efforts must be redoubled to attract private capital necessary to finance local biomedical and medical IT start-ups and spin-offs. The Minnesota BioBusiness Center and proposed Elk Run BioBusiness Park highlight the fact that Rochester is ripe for such growth, and the history of private equity streams funneling into the Twin Cities medical device industry demonstrate that such capital is not solely reserved for investment in California, Massachusetts or other coastal states. Minnesota has a track record of providing a return on the venture capital dollar, and Rochester needs to focus like a laser on securing such funding.

Specifically, well-positioned stakeholders should consider the following actions to spur private capital investment:
• Advocate for expansion of state tax incentives, such as the Angel Investor Tax Credit, that make it easier for private capital investors to take a chance on promising entrepreneurs that lack the necessary capital to grow business.

• Advocate for a more competitive state corporate income tax code, thus making Minnesota a more attractive home for licensees of medical IP.

• Offer full-throated support for the proposed Elk Run BioBusiness Park. Local leaders express skepticism that the project has what it takes to succeed. However, Elk Run represents an unprecedented opportunity for the greater Rochester region to translate some of its medical IP into locally-based and privately financed business growth.

Given the general difficulty of attracting private capital, investment of public dollars to provide necessary infrastructure and financing – such as low-interest loans with favorable terms – for promising projects may help fill the void. As noted previously, state dollars already have been allocated to constructing the Minnesota BioBusiness Center and the Minnesota Partnership for Biotechnology and Medical Genomics facilities, as well as for providing basic initial infrastructure for the Elk Run BioBusiness Park and funding research capacity at UMR and the Hormel Institute. Similarly, City of Rochester is planning to direct sales tax revenue toward facilities and curriculum at RCTC and initial development of the Destination Medical Community concept. Nonetheless, other regions nationally have made or are considering making large, concerted investments designed both to create a transformational difference and to generate significant publicity. Rochester would be well-served to consider additional public investments at the local level, and spearhead efforts to leverage state dollars providing for a stable, long-term financing mechanism for entrepreneurialism based on medical IP.

In terms of attracting necessary management talent, local economic development officials might consider working with Mayo Clinic and related partners to directly pursue accomplished business leaders and tap their experience and insight to spur growth based on medical IP. For instance, a CEO-in-residence program designed to attract proven entrepreneurs to the area might make the difference in contributing dynamic leadership and strategic thinking, securing essential private investment, or invigorating the area’s unrealized entrepreneurial potential.
Similarly, the region might consider building partnerships with University of Minnesota’s Carlson School of Business and St. Thomas University both to tap each institution’s highly-regarded business management and entrepreneurship programs and to introduce the Rochester area and its entrepreneurial potential to Minnesota’s next generation of business innovators.

As for marketing itself as a destination ripe for entrepreneurial growth, Rochester may consider short- and long-term approaches designed to diversify its economy and rebrand the city through a “Mayo – and so Much More” campaign. After all, the Rochester IBM facility played an important role in creating the world’s fastest computer. Although this feat was recently outdone, the achievement placed Rochester at the epicenter of cutting-edge innovation critical in a technology-hungry world. Nonetheless, the accomplishment is not widely known, and it did little to change the perception of Rochester as the home of Mayo Clinic – and nothing more. Until Rochester defines itself as a place of economic dynamism cutting across industries, young entrepreneurs and other members of the creative class will not likely stray far from the Twin Cities – for to them, Rochester is a far-off place dominated by one large, sector-specific employer. As perceptions hold, such is not exactly a place for entrepreneurial opportunity.

Local leaders must continue to think creatively and act decidedly in order to balance what’s immediately best for Mayo Clinic with that which will foster an environment for entrepreneurialism. While it may be true that “what’s best for Mayo Clinic is best for Rochester,” the area would be wise to give considerable thought to further diversifying its economy. Despite health care’s historic ability to thwart the ills of economic recession and the fact that Mayo’s dominance might render Rochester one of the most recession-proof local economies in the country, a diversified economy may introduce a renewed sense of entrepreneurial spirit. This spirit can promote health-related spin-offs and start-ups and, over the long term, result in a more robust and dynamic industry cluster.

Considering the many successes of the Rochester health services industry and the defining role healthcare plays in the local economy, it is unrealistic to envision a Rochester MSA not dominated by healthcare. After all, the sector’s appealing reputation and competitive standing in the face of an aging baby boomer population makes it a safe bet for future growth. However, for Rochester to realize its full
economic potential, it must capture more value by way of locally-based licenses for locally-grown medical IP.

**Leading in an Era of Healthcare Reform**

Another potential strategy relies upon Mayo Clinic’s historic strengths in research and patient care to provide the institution with a competitive edge in a changing domestic healthcare landscape following the federal healthcare reform legislation of 2010. Although many details related to healthcare reform remain uncertain, it’s becoming increasingly clear that future medical reimbursement models will shift emphasis away from fee-for-service toward value-based approaches to healthcare. Rather than measured in number of procedures performed or in-person doctor visits, value-based reimbursement schemes focus on the treatments that make a difference and provide value to the patient, provider and broader healthcare system.

While there is no single example of what such “value” looks like, Mayo Clinic’s proven ability of linking comprehensive patient data and cutting-edge medical treatment has been providing the clinic and its patients with tremendous value for generations. This value is not simply measured in patients seen, diseases identified, or lives saved – but in misdiagnoses averted, unnecessary treatments avoided, and waste in time and resources minimized.

In an era of value-based healthcare, Mayo Clinic is poised to benefit in three major areas detailed below. These are telemedicine and electronic consultation, bioinformatics and medical information technology, and comprehensive electronic medical records.

**Telemedicine and electronic consultation.** The clinic’s Center for Innovation is currently leading a pilot project examining the use of telemedicine techniques to conduct web-based follow-up visits with participating cardiovascular patients at Mayo Health System’s Cannon Falls location. The telemedicine pilot uses state-of-the-art equipment to link patients and practitioners in real time and has tremendous application potential across any number of medical specialties. A second pilot is scheduled to commence in Spring 2011 focusing on initial dermatological appointments between remote or isolated patients and Rochester-based specialists.
Where implemented, telemedicine and electronic consultation offer to provide increased efficiency and effectiveness for patients and practitioners alike. For patients, the approach allows for access to expert care and savings of time and money due to reduced travel. Similarly, practitioners who might otherwise split time between their Rochester office and far-flung Mayo Health System locations can increase productivity by providing the same expert opinion without the need for travel. In addition, the approach allows the Mayo Clinic to further screen its patients by turning away misguided cases or quickly diagnosing more straight-forward cases that simply require brief specialist consultation.

One potential application of the pilot findings may include adoption of a “telestroke” protocol and participation in a national telestroke network whereby patients suffering symptoms of a stroke can present at local hospitals, however remote, and receive specialist care once their vital statistics and medical data are shared between the satellite facility and Mayo Clinic electronically.

**Bioinformatics and medical IT.** Defined as an “interdisciplinary research area that applies computer and information science to solve biological problems,” bioinformatics is among the chief areas of focus at UMR and relates directly to the shared interests and competencies of the Mayo Clinic – IBM partnership. For Mayo Clinic or IBM, development of medical IT could include efforts to package, market and sell the know-how, software, computing components, or back-office capability essential to the type of data-driven yet personalized healthcare delivery anticipated for the years ahead.

**Comprehensive Electronic Medical Records.** A century ago, Mayo’s Dr. Henry Plummer developed the "unit record" – the original comprehensive medical record that included all of the patient’s medical information in a single file that traveled with the patient and was stored in a central file system. This approach quickly became the standard for medical record keeping around the world. Today, Mayo patient records are stored electronically in one of the largest such systems in the world. “Everything related to a patient’s care — physician notes, laboratory reports, surgical dictations, copies of correspondence, appointment schedules, X-rays, ultrasounds, CT and MRI scans, echocardiograms — is instantly available to Mayo caregivers via more than 16,000 computer terminals on Mayo's three campuses.”
Given its past success of matching comprehensive, long-term patient medical records with healthcare delivery, Mayo Clinic – and, by association, IBM – is well positioned to take advantage of the growing need among other healthcare providers and insurers to do the same. Of course, Mayo Clinic has long considered its competency in this area to be a significant aspect of its comparative advantage, a distinguishing feature of its competitive edge, and, perhaps, a valued trade secret. The extent to which there exists a compelling market for such proven approaches is currently unknown, and it’s difficult to gauge whether Mayo Clinic would be interested in assisting its potential competitors, given the uncertain financial return. However, a drastically-changing healthcare landscape is on the horizon, and the Rochester health services cluster is positioned to seize any number of potential opportunities that may arise.
Conclusion

Despite its many accomplishments and near-unrivalled standing in the world, Mayo Clinic must reconcile completing forces to advance in its role leading the Rochester health services cluster. On the one hand, it should focus on its core competencies, make change only when necessary or decidedly advantageous, and build on its past success by remaining true to itself and to its mission. On the other hand, it needs to be nimble and open to significant systemic change in a rapidly evolving world. While there is widespread confidence that Mayo’s ability to match excellent patient care with pioneering research will keep the clinic relevant – if not dominant – well into the 21st Century, some in the organization worry that the competition is catching up quickly.

For instance, Mayo Clinic added five new DNA sequencers at a cost of $600,000 each within the past year; however, a major Beijing research facility added 187 such sequencers during the same period. As globalization continues to flatten the world economy and other countries invest in order to rival the United States in every facet of production and service, it is clear that what passed as competitive even 10 years ago barely passes muster today. A generation ago, it was clear that the market basket of competition facing Mayo Clinic consisted of a small handful of elite institutions, based almost exclusively in the U.S. In the century ahead, competition may come from all corners of the globe, with large sums of public money and private investment spurring growth elsewhere.

Fortunately for Mayo and for the Rochester MSA, the clinic is well positioned to pursue any number of strategies that either rely upon or contribute to its competitive edge. To its credit, the clinic has a proven track record of innovation and can be expected to continue this trend well into the future. Similarly, the Rochester area has demonstrated a long-standing ability both to accommodate, if not promote, growth at Mayo Clinic and to take advantage of the many benefits – economic, social, cultural – associated with hosting such a dynamic institution. The challenge ahead, shared both by Mayo Clinic and the surrounding region, lies in imagining an optimal 21st Century identity and making the strategic choices necessary to realizing the identity’s full potential.

35 Steve Van Nurden, Mayo Clinic Office of Intellectual Property
Appendices

Appendix A: Literature Review

Industry clusters analysis is increasingly being used to frame economic development and the interactions between often-overlapping firms, institutions, and organizations. Published research has often focused on the Minneapolis-St. Paul medical device industry cluster, with only passing mention toward Southeastern Minnesota’s health services industry cluster. This report analyzes the dual economic impacts on the Rochester region and the Minnesota state economy: (1) world-class health care delivery and (2) associated (although relatively untapped) potential for start-ups, new industries, local supply chain infrastructure, and the many other positive externalities that result from a hospital as large and successful as the Mayo Clinic.

The often-fluid nature of health services makes precise, compartmentalized quantitative analysis difficult. For instance, while the U.S. Census Bureau updated industry classifications in 1997, these classifications are especially ambiguous when applied to health and bioscience firms and organizations because they describe a firm’s primary purpose, which serves as a proxy for a wide array of products and services. 36

Because of the ambiguity in categorizing health sciences and delivery, a literature review necessitated a broad range of in-depth reports. The following studies have been invaluable to enriching our understanding of the Southeastern Minnesota economy and the health sciences cluster:

36 Biobusiness Alliance of Minnesota: Biobusiness: Minnesota’s Present Position and Future Prospects, August, 2006, page xviii ("Organizations in Minnesota engaged in biobusiness – whether for-profit companies, not-for-profit institutes or units of universities, hospitals or for-profit companies – are often active in multiple fields simultaneously, stretching across conventional market and product categories"), page 13 (describing Census changes).
The Mayo Clinic and Economic Development
In this report, Battelle seeks to quantify the impact of the Mayo Clinic on the U.S. and regional economies. This report measures the economic affects – including employment and the purchasing of goods and services – of Mayo’s presence in southeastern Minnesota.

The Mechanics of Health Care Delivery and the Internal Operations of the Mayo Clinic
This book shows how the health care value chain operates.

This book explains how the Mayo Clinic created and sustains their competitive advantage in delivering health care services.

Sagar and Bharathi, Mayo Clinic’s SPARC Igniting Innovation in Healthcare Delivery, 2006
This report explains the internal innovations of the Mayo Clinic seeking to further improve its delivery of health care

Describes how health services in Southeastern Minnesota should reduce waste, similar to the manufacturing sector.

Michael Porter, Value-Based Competition in Health Care, October 20, 2006.
Porter describes how only competition that increases value will strengthen health care in the United States.

Alsup describes how partnerships can strengthen the value chain in health care delivery.

**Health Services and Economic Development**


The Biobusiness Alliance of Minnesota analyzed the present condition and future outlook for health sciences, medical devices, and related health-related industries.


This article gives a framework to studying and analyzing clusters oriented around health services.


This report to the Minnesota Legislature gives a broad picture of what is needed for future Minnesota economic development in the science and technology fields.

**Economic Development and Value Driven-Healthcare, RegionalIntel, June 2009**

This report examines the two sides for health care-drive economic development: health care delivery, and the economic development associated with health care itself (start-ups, industries starting from health-related R&D, etc)

**Southeastern Minnesota Economic Development in General**

These reports delve into how strengths of Southeastern Minnesota can be combined with the untapped economic potential in the area to produce economic dividends for the region.

Gabe, et. al, Knowledge in Cities, Federal Reserve Bank of New York, September 2010
This report details the different strengths and weaknesses of different types of regions. Their classification of Rochester, Minnesota reflects the current development challenges outlined in our report.

In conjunction with the Gabe report, this shows that although the Rochester region may be lacking in producing strong economic development, it still has healthy economy.

This report has the helpful description of the Rochester region as a “Hub and Spoke” District.

This report analyzed the economic condition of manufacturing and industrial economic activity in Southern Minnesota.

New Economy Strategies, “From Clusters of Industry to Clusters of Knowledge and Competency,” July, 2007
This report seeks to move analysis beyond regional clusters to a framework of “hub and nodes,” where regions either drive development (hubs) or participate in supporting growth of other regions (nodes). This analysis starts first with “knowledge and competencies” rather than the study of a region’s industries
Appendix B: Specialization in Rochester Metro Area’s Health Services Subclusters, 1998-2007
Appendix C: Stakeholder Interviews Conducted

Susan Ahlquist, Community Relations Administrator, Mayo Medical Center
Karla Bollesen, Curriculum Director, Rochester Public Schools
Dick Booth, Member, Rochester Entrepreneur Network
Ardelle Brede, Mayor, City of Rochester
Dr. Rajeev Chaudhry and Perry Erdahl, Mayo Office of Innovation (Telemedicine Pilot Project)
Karen Doll, Executive Director, Pine Island Economic Development Authority
John Garry, President, Economic Development Corporation of Austin
David Hewitt, Organizer, Rochester Entrepreneur Network
Kevin Kelleher, SE Small Business Development, MN Department of Employment and Economic Development
Stephen Lehmkuhle, Chancellor, University of Minnesota-Rochester
Jeremy Lenz and Rebekah Kent, BioBusiness Alliance of Minnesota
Michael Olesen, Director of IT/Research, University of Minnesota-Rochester
Brent Pearson, SE Labor Market Analyst, MN Department of Employment and Economic Development
Rick Roy, MN Department of Employment and Economic Development
Yvonne Simon and Marnie Werner, Southern Minnesota Regional Competitiveness Partnership
Steve Smith, Director, Southern Minnesota BioBusiness Development (SEMBiD)
Gary Smith, Director, Rochester Area Economic Development, Inc. (RAEDI)
Don Supalla, President, Rochester Community and Technical College
Steve Van Nurden, Director of Technology and Commercialization, Mayo Office of Intellectual Property
Sarah Walbert, BioBusiness and Medical Devices Specialist, MN Department of Employment and Economic Development
Dr. Eric Wieben, Director, Mayo Genomics Research Center