Growing the Detroit Region’s Technology Economy: A Regional Comparison Study as We Emerge from the Recession
MESSAGE FROM THE EXECUTIVE DIRECTOR

It's a terrific story.

The decades of automotive industry success built on hard work and the pursuit of innovation. The times of thriving businesses and aggressive economic growth.

It's the story of the Greater Detroit region and how we became known for what we could create.

But the story isn’t over. In fact, we’re on our way to a future even more exciting than what we’ve known this region to be in the past. And at Automation Alley, we’ve set our sights on that future.

Automation Alley was created in response to the business community's concerns of a shortage of technical workers. Industry was changing. Skills were evolving. And Oakland County Executive L. Brooks Patterson recognized the need for a renewed dedication to technology innovation. Twelve years later, as a regional organization, Automation Alley continues to build momentum toward a bright technology future. This report makes it clear that our focus has paid off.

While national media have been busy proclaiming the woes of the auto industry, Michigan has been quietly building an army of technology workers and businesses. There isn’t just potential for growth in the technology sector, there is impressive evidence of existing achievement.

The Automation Alley 2011 Technology Industry Report provides indisputable evidence that Southeast Michigan is on track to become the leading technology innovation region in the nation. The data show that this region is incredibly rich in technology resources—both people and businesses—which are providing the ideas and know-how to drive Michigan's new innovation-based economy.

Technology innovation is the foundation of the new American economy, and Southeast Michigan is already a key building block. From where we stand, the future looks bright for our region and our state.

This report is good news and tangible proof of something we at Automation Alley have suspected for a long time—that Michigan is among the leaders in technology innovation in the nation.

Kenneth Rogers
Executive Director
Automation Alley
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Southeast Michigan has battled its way out of the Great Recession that began in 2008, and like the rest of the country, is finally looking ahead to economic growth. Although that recession hit the region hard with high unemployment and challenges to industry, I am very pleased to report that technology and industry are alive, sustainable, and growing again in Michigan.

This report, the culmination of months of sifting through data on actual jobs with actual employees, illustrates how technology is deeply integrated in Southeast Michigan’s economy. We measured employment by industry, occupation category, and by establishment counts within the City of Detroit and its surrounding seven counties. We then benchmarked these measures, both in absolute and relative terms, to other leading economic centers across the United States, including large metropolitan areas like Chicago and Dallas and well-known technology hubs like Silicon Valley and Route 128.

The findings from our analysis point to a strong future for technology-related industries in Southeast Michigan, highlighting the region as a serious competitor on both a regional and national scale.

Ranking higher than almost all other regions in the Midwest, the Greater Detroit region also outpaces metropolitan areas with significantly higher populations, including Dallas-Fort Worth and Atlanta. Despite negative media coverage that has pinned Metropolitan Detroit as a declining region, the results of our research indicate that Southeast Michigan is positioned ahead of Boston, Seattle and Austin in almost every measure analyzed.

**Top Rankings within the Midwest**

Within the Midwest, the Greater Detroit region ranks 1st in the following areas:

- Share of total employment working in a technology industry sector (13.7 percent).
- Number of advanced automotive industry jobs.
- Share of total employment that works in advanced automotive.
- Share of total employment that works in the related technologies industry sector, including the architectural and engineering services sector.
Impressive Rankings among National Leaders

Among the 15 regions in the United States that we analyzed, the Greater Detroit region ranks:

- First in the number of advanced automotive industry jobs.
- First in the number of architectural and engineering services industry jobs and third in the overall related technologies industry sector.
- Second in number of people working in architectural and engineering occupations, trailing only San Jose’s Silicon Valley region.
- Fourth in the percentage of total employment (13.7 percent) that is concentrated within technology industry sectors.
- Fifth in the absolute number of jobs (253,240) within technology industry sectors.

Also notable is that Southeast Michigan, which is home to 1.5 percent of the country’s total population, holds 9.3 percent of the country’s advanced automotive workforce and 3 percent of the country’s engineering and architectural occupation workers.

Looking Ahead

Tomorrow’s technology is being invented today, right here in Southeast Michigan. Now that the Great Recession is over, the opportunity for us to expand into the future is exciting. We not only have a critical mass; we have a leadership position.

Maintaining that leadership position, however, will not be easy. Our state, like many others, is wrestling with fiscal challenges. The competition for workforce talent and investors is strong. The automotive industry has gone through a wrenching restructuring. Yet, in many respects, we are better prepared now than we were five years ago for the challenges that lie ahead.

We have a solid foundation—one that has been tested and that has survived. The future ahead is bright, and the Greater Detroit region is primed to meet it.

Patrick L. Anderson is the founder of Anderson Economic Group, LLC, a business consulting firm headquartered in East Lansing, Michigan. He is the author of more than 100 published works, and has been recognized twice by the National Association of Business Economics for best published article or paper within the field. Mr. Anderson is a graduate of the University of Michigan, and grew up in Oakland County.
INTRODUCTION

PURPOSE

With the Great Recession officially in the rear-view mirror, growth and economic advancement are at the top of the agenda for policy and business leaders. Planning for and pursuing such growth and advancement requires taking stock of current conditions, which is what this report does for the technology sector in Southeast Michigan.

This report provides a careful assessment of employment and industry data for the technology sector in Southeast Michigan. The data offer benchmarks of the size and nature of the region’s technology sector relative to other metropolitan areas across the United States. These data provide measures that can be reviewed over time to assess the evolution of the technology sector in the region. They also illustrate opportunities for economic growth and advancement in Metro Detroit today.

APPROACH

The technology sector of the economy can be viewed as consisting of businesses that have a technical orientation and workers who have technical occupations. The businesses together form an industry, while the workers together form a workforce. Data from the U.S. Census Bureau and the Bureau of Labor Statistics are used in this study to assess both the industry and workforce components of the technology sector. Measures of the sector across metropolitan areas are also included to provide context to the data for Greater Detroit.

Metropolitan Areas

In an effort to provide a benchmarking of the Automation Alley technology sector relative to other regional economies, we have included industry and occupational data for the Metro Detroit region and 14 other metropolitan areas in the United States. Map 1 on page 5 shows the regions, which are defined as Metropolitan Statistical Areas (MSAs) by the U.S. Census Bureau. These 14 areas were selected because they represent national and midwestern centers of population and industry that are similar to Metropolitan Detroit based on location or population.

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1. The National Bureau of Economic Research (NBER), which tracks business cycles under contract for the U.S. Department of Commerce and is often cited as the primary source for determining recession periods, shows the most recent recession of the United States Economy began in December 2007 and concluded in June 2009.

2. Grand Rapids was included despite having a comparatively low population level to the other benchmarking regions as it provides an in-state benchmark.
Note: Automation Alley is comprised of the City of Detroit and eight counties in Southeast Michigan: Genesee, Livingston, Macomb, Monroe, Oakland, St. Clair, Washtenaw, and Wayne. This report includes data representative of the region included in the Detroit-Warren-Livonia MSA and the Ann Arbor MSA.
Industry Data

Prior to assessing any industry it is essential to properly define the industry. To do this for the technology industry, we have derived a definition based on North American Industry Classification System (NAICS) codes. The definition includes sectors of business that rely on a significant use of technical knowledge and applications in their work. These sectors include:

1) Advanced Automotive
2) Advanced Manufacturing
3) Chemical and Material
4) Information Technology
5) Life Sciences
6) Related and Other Technology

Industry data for this study is from the U.S. Census Bureau’s 2010 County Business Patterns data set and is representative of conditions in 2008. Employment levels and establishment count data, by region and industry sector, are the primary industry data measures used in this report.

Occupation Data

Industries become technologically-oriented as a result of workers developing new tools and techniques to improve processes and products. Such advancements are commonly tied to the result of those working in science, engineering, and mathematics. These fields fall into four occupational categories:

1) Computer and Math Sciences
2) Architecture and Engineering
3) Life, Physical, and Social Science
4) Computer, Information Systems, Engineering, and Natural Science Management

The United States Bureau of Labor Statistics, through its Occupational Employment Statistics Survey, provides employment data for each of these occupation fields, as well as many others. This report assesses such data from the most recently published data set, which is representative of conditions in 2009.

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3. The definition used in this report is consistent with that used in our prior technology industry assessments. It was first developed by Anderson Economic Group in 2005 for an analysis of the industry in Automation Alley, and was published in “Automation Alley’s First Annual Technology Industry Report: Driving Southeast Michigan Forward,” 2005.

4. These fields are often cited as STEM (science, technology, engineering, and mathematics) fields, which both the U.S. National Research Council and the National Science Foundation consider to be core technological underpinnings of an advanced society.
Analysis

The industry and occupation data in this report are presented in pure terms, such as total number of jobs and total number of establishments, and in relative terms, such as the share of total jobs found in one sector. One particularly useful relative measure is the Location Quotient (LQ). LQs are the ratio between an area’s share of employment in a particular industry and a larger area’s share of employment in that industry. In this analysis, our larger comparison area is always the United States as a whole. So, by example, if an area has an LQ of 2, this indicates that its percentage of employment in a specific field is twice the national percentage in that same field.
DETROIT REGIONAL OVERVIEW

This report focuses on the City of Detroit and the surrounding counties in Southeast Michigan. The area includes the seven counties of Lapeer, Livingston, Macomb, Oakland, St. Clair, Washtenaw, and Wayne.

Metropolitan Statistical Areas

The industry and occupational data available for this analysis is not fully available for each individual county, making an assessment of the full geographic area encompassed by Automation Alley difficult. However, by combining the Detroit-Warren-Livonia MSA and the Ann Arbor MSA we are able to account for all but Genesee and Monroe counties. This provides a sound representation of the Automation Alley area overall.\(^5\)

Global Connectivity

The region is very close in proximity to several other major markets. Major interstates including I-94, I-75, and I-96, as well as extensive road networks, connect the region to the rest of the United States. The area is only a few hours’ drive from Toledo and Cleveland, Ohio; Chicago, Illinois; and Toronto, Ontario. The Ambassador Bridge, Detroit-Windsor Tunnel, and Blue Water Bridge also make the region a connector for the United States and Canada. In 2009, 1.2 million trucks crossed the U.S. border in Detroit, making it the busiest U.S.-Canadian border crossing for trucks, and the second busiest U.S. border overall. In Port Huron, there were 625,642 truck crossings, making it the third busiest U.S.-Canadian crossing.\(^5\)

Rail and water networks also facilitate trade between the region and the rest of North America. The Port of Detroit spans 35 acres along the Detroit River, providing an international shipping port for businesses in Greater Detroit. In 2010, more than $950 million in goods were imported through the Detroit/Wayne County Port and more than $1.8 billion in goods were exported. At the Port of Port Huron in St. Clair County, an additional $88 million in goods were imported in 2010 and $1.2 billion in goods were exported. Port Huron was the second busiest port for train crossings with 3,064 in 2009. Detroit was sixth busiest in 2009 with 2,074 train crossings.\(^7\)

\(^5\) Lapeer County is included in the Detroit MSA, and is not part of Automation Alley. Data for the Monroe and Flint MSAs, while available, often proves incomplete due to low sampling sizes, and as such was not included in the analysis.

\(^6\) United States Bureau of Transportation Statistics, Intermodal Transportation Database.

There are several airports that service the region, making travel for leisure or business convenient. In 2009, Detroit Metro Airport serviced more than 14 million passengers on 205,215 passenger flights, making it the 13th busiest airport in the country. Other regional airports include Willow Run in Wayne County, Bishop International in Genesee County, and Oakland County International in Oakland County.\(^8\)

**Population**

Of the 14 metropolitan regions analyzed in this report, the Greater Detroit region ranks as the fourth largest in terms of total population. The 2009 population for the region was 4.75 million, which accounts for 1.5 percent of the entire U.S. population. This was second in the Midwest, trailing only Chicago, which had a 2009 population of 9.58 million people.

<table>
<thead>
<tr>
<th>Metropolitan Area</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chicago</td>
<td>9,580,567</td>
</tr>
<tr>
<td>Dallas-Fort Worth</td>
<td>6,447,615</td>
</tr>
<tr>
<td>Atlanta</td>
<td>5,475,213</td>
</tr>
<tr>
<td><strong>Detroit (including Ann Arbor)</strong></td>
<td><strong>4,751,000</strong></td>
</tr>
<tr>
<td>Boston</td>
<td>4,588,680</td>
</tr>
<tr>
<td>Seattle</td>
<td>3,407,848</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>3,269,814</td>
</tr>
<tr>
<td>St. Louis</td>
<td>2,828,990</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>2,354,957</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>2,173,896</td>
</tr>
<tr>
<td>Cleveland</td>
<td>2,091,286</td>
</tr>
<tr>
<td>San Jose</td>
<td>1,839,700</td>
</tr>
<tr>
<td>Indianapolis</td>
<td>1,743,658</td>
</tr>
<tr>
<td>Austin</td>
<td>1,705,075</td>
</tr>
<tr>
<td>Grand Rapids</td>
<td>778,009</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau, Population Estimates Program
Note: Total U.S. Population in 2009 was 307,006,550.

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8. United States Bureau of Transportation Statistics, Intermodal Transportation Database.
Technology is a broad term, and businesses across almost every industry employ some level of technology in everyday operations. Some industries, however, are set apart by the technical nature of their processes and their products. It is these businesses, which fall into the six sub-sectors shown below, that comprise the overall technology industry:

**Technology Industry Sub-Sectors**

1) Advanced Automotive  
2) Advanced Manufacturing  
3) Chemical and Material  
4) Information Technology  
5) Life Sciences  
6) Related and Other Technology

It is worth noting that not all employees of businesses in technology industries have technology jobs. Businesses in a technology industry may employ accountants, laborers, sales people, and custodians, which are not technical jobs by nature, but are supported by, and supportive of, the technological processes and products that are core to the business.

**INDUSTRY EMPLOYMENT AND ESTABLISHMENTS**

**Jobs**

As of 2008, Metro Detroit was home to 253,240 employees who worked for technology businesses, making it a leader in overall technology employment. Of the 14 other regional economies that are analyzed in this report, only Chicago, Boston, San Jose, and Dallas have more technology industry jobs than Metro Detroit. See Figure 1, “Technology Industry Employment by Region (2008),” on page 11.

**Establishments**

There were 7,519 technology-industry business establishments in the region in 2008, which was second most in the Midwest. Establishment counts provide a measure of an industry’s potential for short-term growth, especially in a period of recovery, as existing businesses will likely be the first to resume hiring. Of the Midwest markets analyzed, only Chicago has more technology-industry establishments. Nationally, the Greater Detroit region ranks fourth in the number of technology establishments, surpassing Seattle, San Jose, and Austin. See Figure 2, “Technology Industry Establishments by Region (2008),” on page 11.
Relative Share of Economy

Jobs

Metro Detroit’s 253,240 technology jobs represented 13.7 percent of the total 1.85 million jobs in the region in 2008.\(^\text{10}\) Nationally, only 9.3 percent of all jobs at the time were in technology industries, which implies a technology jobs location quotient of 1.48 for the region.\(^\text{11}\)

Based on this data, Greater Detroit has the strongest concentration of technology sector employment among Midwest regions analyzed in this report, with the second highest score being a 1.21 for Grand Rapids. Chicago, the regional leader in total technology jobs, has an LQ of less than 1.0, implying that the area has fewer technology jobs relative to total industry employment that is observed throughout the nation as a whole. See Figure 3, “Technology Employment Location Quotients by Region (2008),” on page 13.

Establishments

Metro Detroit’s technology business establishments accounted for 6.8 percent of all establishments in 2008. The national average in 2008 was 5.9 percent, giving the Detroit region an LQ of 1.15 on the establishments side. This lower LQ score, relative to the jobs LQ, evidences that many of the establishments in the region employ larger numbers of people, whereas nationally, technology establishments, on average, tend to be smaller in terms of employment. See Figure 4, “Technology Establishment Location Quotients by Region (2008),” on page 13.

Of the Midwest regions we analyze, only Minneapolis has a higher technology establishment location quotient than Metro Detroit. San Jose (2.47) leads the nation, while Atlanta, Austin, Boston, Dallas, and Seattle also post establishment LQs above Metro Detroit. Again, this data suggests that technology businesses in the Greater Detroit region are larger, in terms of employment levels, than are technology establishments in markets that have an establishment location quotient exceeding the employment location quotient. A strong advanced automotive sector is central to the larger technology establishment sizes in Metro Detroit.

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\(^\text{10}\) Excludes jobs in crop and animal production, rail transportation, postal service, private households, public administration (most government), and military sectors, as well as those who are self-employed. See http://www.census.gov/econ/cbp for more information on the County Business Patterns data set.

\(^\text{11}\) Location Quotient = 13.7% Automation Alley Share / 9.3% National Share. Rounding of shares may account for slight differences in calculated values.
FIGURE 3  Technology Employment Location Quotients by Region (2008)
Source: Anderson Economic Group, LLC

FIGURE 4  Technology Establishment Location Quotients by Region (2008)
Source: Anderson Economic Group, LLC
Leading Sub-Sectors

Advanced Automotive

Metro Detroit is, not surprisingly, the leader when it comes to the Advanced Automotive sector, which includes the manufacturing of cars, trucks, vehicle bodies, and vehicle parts. The data shows that 9.3 percent of all advanced automotive jobs in the United States (81,656) are in Greater Detroit, as are 5.7 percent of the advanced automotive establishments (468). The advanced automotive location quotient for Metro Detroit is 6.08. The second highest LQ for this is Grand Rapids (4.43). Indianapolis, Cleveland, and Cincinnati are the only other regions with advanced automotive employment LQs exceeding 1.0. These measures show that Metro Detroit is still the center of America’s automotive industry.

Life Sciences

Life Sciences technology, which includes pharmaceutical and medical equipment manufacturing, as well as scientific research and development businesses, had 23,119 jobs in Metro Detroit for 2008. Of the markets we analyzed, Chicago and Minneapolis are the only Midwest regions with more life science jobs, and only Boston and San Jose have more nationally. The Metro Detroit region is also third among the Midwest markets in terms of share of total employment in life sciences, with an LQ of 1.27. Chicago, the leader in job count for the sector, is fourth with an LQ of 1.05.

Related Technologies

This sector includes three NAICs codes that represent businesses with a significant technology orientation, but that do not directly fit another category. Included are petroleum and natural gas extraction; professional and commercial equipment wholesalers; and architectural, engineering, and related services. Metro Detroit had 53,522 such jobs in 2008. On the whole, the region is first in the Midwest and third nationally with an LQ of 1.53 for this sector (Austin was at 2.49 and San Jose was at 2.20). Within the sub-sector, we found that Metro Detroit has 44,898 jobs in architectural, engineering, and related services. This was the most among the markets we analyzed, and no other region has more total employment concentrated in the architectural and engineering services sector than Greater Detroit. Further, the majority of these jobs are engineering-based, reflecting the region’s position as a global hub for automotive and mechanical design, engineering, and innovation.

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12. NAICS 5413 in the architectural, engineering, and related services sector. Representative businesses from the sector include RCO Engineering (Macomb County), NSF International (Washtenaw County), Raytheon Professional Services (Oakland County), General Physics Corporation (Oakland County), Magnum Consulting (Oakland County) and Roush Enterprises (Wayne County).
Technology Occupation Data

Not everyone who works in technology is part of the technology industry. Many hospitals, for example, employ biochemists, epidemiologists, and computer system administrators. A hospital is not part of the technology industry, however, so these employees with technical occupations are not measured by our industry analysis in “Technology Industry Data” on page 10. Fortunately, occupational employment data is available that allows us to analyze the size of a region’s technology-oriented workforce. This workforce consists of those working in the four occupational categories shown below.

Technology Occupation Categories
1) Computer and Math Sciences
2) Architecture and Engineering
3) Life, Physical, and Social Science
4) Computer, Information Systems, Engineering, and Natural Science Management

The above represent four of the 23 occupational categories defined by the United States Bureau of Labor Statistics, Occupational Employment Statistics Survey. This report assesses such data from the most recently published data set, which is representative of conditions in 2009.13

OCCUPATIONAL EMPLOYMENT

Number of Jobs

Metro Detroit had a total of 156,400 technology occupation jobs in 2009, ranking in the top half of the 15 regional economies that are analyzed in this report. Chicago is the only Midwest region with more technology occupation jobs than Metro Detroit. See Figure 5, “Occupational Employment Levels (2008),” on page 17.

Relative Share of Economy

The Greater Detroit region’s 156,400 technology occupation jobs represented 8.0 percent of the total 1.95 million jobs in the region in 2009. Nationally, only 5.8 percent of all jobs were technology occupations, which implies a technology occupation location quotient of 1.39 for the region.14


14. Location Quotient = 8.0% Automation Alley Share / 5.8% National Share.
Greater Detroit is tied with Minneapolis for having the strongest concentration of technology occupation jobs among the Midwest regions analyzed in this report. Of the national markets we assessed, San Jose (LQ of 3.23), Seattle (1.94), Austin (1.81), and Boston (1.78) have stronger technology occupation concentrations than Metro Detroit. Chicago, the regional leader in total technology occupation jobs, has an LQ of less than 1.0, implying that the area has fewer technology occupation jobs relative to total occupation employment that is observed throughout the nation as a whole. See Figure 6, "Occupational Employment Location Quotient by Region," on page 17.

**Leading Sub-Sectors**

**Architecture and Engineering**

Metro Detroit is the leader among the Midwest regions in the Architecture and Engineering occupation category, with 73,610 such jobs. Three percent of all architecture and engineering occupation jobs in the United States are in Metro Detroit, which is significant as 1.5 percent of the total United States population was in the region in 2009. The architecture and engineering occupation location quotient for Metro Detroit is 2.04, the highest in the Midwest and second highest nationally. San Jose has the highest LQ (3.09) of the regions analyzed in this report. Seattle, Austin, Boston, Grand Rapids, Pittsburgh, Dallas, and Minneapolis have architecture and engineering occupation LQs exceeding 1.0, ranging from 1.15-1.79.

**Technology Management**

In 2009, Metro Detroit had 9,950 technology management occupation jobs. Of the Midwest regions analyzed, only Chicago (17,988) and Minneapolis (12,580) have more jobs in the Technology Management sector. Metro Detroit has the second highest location quotient in the Midwest and sixth highest of the national regions analyzed, with an LQ of 1.30. The regions with the highest LQs are San Jose (4.37), Boston (2.03), Minneapolis (1.86), Seattle (1.70), and Atlanta (1.40).

**Computer and Mathematical Sciences**

Greater Detroit has the third largest number of occupation jobs (55,740) of the Midwest regions analyzed for computer and mathematical sciences, behind Chicago (116,820) and Minneapolis (68,380). The computer and mathematical sciences LQ for the region was 1.13 in 2009. Within the Midwest, only Minneapolis and St. Louis have higher LQs, with 1.56 and 1.26 respectively.
FIGURE 5  Occupational Employment Levels (2008)
Source: Anderson Economic Group, LLC

FIGURE 6  Occupational Employment Location Quotient by Region
Source: Anderson Economic Group, LLC
Foundation for the Future

With the Great Recession, automotive bailouts and bankruptcies, record-high unemployment, scores of negative press from the national media, and mayoral scandal now in the rear-view mirror, the Greater Detroit region finds itself in the lead pack of technology hubs across the United States. This leadership position is clearly evidenced in the data presented in the prior sections, which record conditions in the depth of the 2007 to 2009 recession.

Today, with all eyes forward, the region is positioned to lead both Michigan and the United States through the “New Economy” and into the “Next Economy.”

FROM NEW TO NEXT

As computer technologies and the Internet became ubiquitous worldwide throughout the late 1990s, a New Economy came to be, signaling a shift from an industrial base to a knowledge base. Two trends are commonly cited as advancing this new economy. First, the globalization of business and the spread of capitalism opened markets for new trade and investment. Second, information technology launched new industries, improved communications, and facilitated innovation and productivity increases. These trends accelerated through the late 1990s and into the early 2000s, with low-skill and labor-intensive work being off-shored; Wall Street and Silicon Valley creating wealth and exporting ideas; Americans growing wealthier and increasing consumption; and financial engineering surpassing mechanical, electrical, and civil engineering in its ability to create new wealth in the U.S. and abroad.

The 2007-2009 Great Recession may mark the beginning of a shift into the Next Economy. The Next Economy—a concept being advanced by Bruce Katz, vice president at the Brookings Institute and founding director of the Brookings Metropolitan Policy Program—reflects a necessary shift away from the consumption-based, offshore-oriented, derivative-funded economy that propelled us to new highs through 2007, before we fell to near record lows later in the decade. Also at work are rising fuel and transportation costs, and increasing geopolitical instability, which have businesses reevaluating their supply chains and shifting production back to be closer to the point of consumption.

17. Nissan, for example, is shifting more production from Japan to Mexico and America to offset transportation costs, reduce exposure to currency fluctuations, and to be closer to customers. “As Nissan shifts production from Japan, no sacred cows,” Automotive News, February 22, 2011.
At the forefront of the Next Economy are innovation, exports, skilled workers, and clean energy. Katz sees it as “a vision where the U.S. exports more and wastes less, innovates in what matters, produces and deploys more of what it invents, and ensures the economy works for working families.” As such a shift occurs, finance and information technology will certainly still advance and create wealth. However, they are likely to do so in support of other sectors, as opposed to fueling the growth directly. Businesses like Caterpillar, General Motors, and Dow Chemical (and many that are not even established yet) will replace the likes of AIG, AOL, and Goldman Sachs as the leaders in creating economic activity and opportunity.

**AUTOMATION ALLEY’S NEXT ECONOMY FOUNDATION**

The shift to the Next Economy is, in many ways, a return to normal for Greater Detroit. An innovative, skilled workforce building best-in-class products for export to the world is the foundation on which Southeast Michigan was built. That foundation remains strong today, as is evidenced by conditions in industry, academia, and in the public sector (government and defense).

*Industry*

**Metro Detroit’s technology businesses have more than 7,500 establishments employing more than a quarter-million people in the region,** as the data from “Industry Employment and Establishments” on page 10 illustrated. This ranks second only to Chicago within the Midwest, and compares favorably with other national leaders even during a period when Michigan, and especially the Detroit area, was bearing the brunt of the recession. The region also has a greater share of its total workforce in technology industry jobs than does any other Midwest region analyzed, with automotive and engineering leading the way. Further, Metro Detroit was recently identified as having one of the strongest export-oriented economies in the United States, with $26.9 billion in annual exports and 239,920 jobs supported by export-oriented work.

The data in this analysis provide a look at the region’s technology industry, automotive in particular, when it was near bottom. Since that bottom, however, the region’s automotive industry has surged forward with a renewed focus on innovation, design, and efficiency. Ford, General Motors, and Chrysler are showing gains in market share, and leading advancements in clean energy, fuel efficiency, vehicle safety, and production capability. Import automakers are also investing in Greater Detroit. Toyota, for example, recently announced that it will establish

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18. Ibid.
a new Collaborative Safety Research Center in Ann Arbor.\textsuperscript{20} Investments like this reflect the strength of the region’s industry, and the continued shift to skilled jobs and innovative work.

Renewed growth in the automotive sector is also spurring investments in other sectors of the technology economy. Automotive suppliers, including FANUC Robotics Distribution and Automation Systems Group, are seeing demands increase as manufacturers require improved and more efficient manufacturing tools. FANUC builds industrial robots at its Rochester Hills facility, and also provides related research and software development services in sectors outside of automotive.\textsuperscript{21}

The IT sector is also benefiting, with businesses like Google, Microsoft, and Compuware growing their presence in the area. Google has located the headquarters for its AdWords division in Ann Arbor, leveraging the talented workforce, relatively low costs, and proximity to the large media buyers of the automotive industry that the area provides. Compuware, a business founded in Detroit, has developed CloudSleuth, a tool for measuring and reporting on service provider performance within the cloud computer network.\textsuperscript{22} Additionally, Microsoft has opened a new Technology Center in Detroit, one of just nine in the country, to introduce businesses in the area to Microsoft solutions.\textsuperscript{23}

**Academia**

The Greater Detroit region’s universities are cultivating a new generation of ideas and the knowledge base that will drive the Next Economy’s innovative and skilled workforce. This is evidenced in emerging academic programs, research centers, and through partnerships between industry and educational institutions. The University of Michigan (U-M) houses the S.M. Wu Manufacturing Research Center that has ties with more than 60 industrial partners including General Motors, Chrysler, Ford, and Boeing; the Ground Robotics Reliability Center that conducts projects primarily sponsored by the US Army’s Tank-Automotive Research Development and Engineering Center; and the Automotive Research Center, a key partner with the National Automotive Center and several universities for the development of a distributed simulation and design environment for ground and off-road vehicles and robots.\textsuperscript{24}

\textsuperscript{22} “Compuware on Cloud 9,” The Detroit News, March 8, 2011.
\textsuperscript{23} “Microsoft to add biz consulting center at Southfield Town Center,” Crain’s Detroit Business, July 23, 2010.
\textsuperscript{24} “The University Research Corridor’s Support for Advanced Manufacturing in Michigan,” Anderson Economic Group, 2010.
Perhaps one of the most highly visible and touted successes of Wayne State University (WSU) is TechTown, which began with a partnership between WSU, General Motors, and the Henry Ford Health System. The 12-block research and technology park, located in Detroit, was created to jump-start small businesses that focused on emerging technologies. TechOne, the business incubator facility, houses 70 companies and cultivated several successful businesses, including Asterand, a biomaterials bank that recently became an international, publicly traded company on the London Stock Exchange; and Visca, LLC, a developer of microsensors and microsystems for a range of applications.25

One of just a few graduate programs of its kind in the nation, Lawrence Technological University’s (LTU) Master of Science in Mechatronic Systems Engineering focuses on autonomous and conventional vehicle mechatronics systems engineering and robotics engineering for improved vehicle mobility and energy/fuel efficiency. Industry has supported the university’s centerpiece laboratory, which houses more than $625,000 in sophisticated equipment. LTU has also launched two new programs: a five-year program combining a bachelor’s and master’s degree in architectural engineering, and a master’s program in industrial engineering.26

**Defense**

The United States military is another significant part of the technology sector in Automation Alley. The area is home to several military establishments, including:

1. **The U.S. Army Tank Automotive Research, Development, and Engineering Center (TARDEC) and National Automotive Center (NAC).** TARDEC is responsible for modernizing ground vehicles and related equipment used in today’s Army. The National Automotive Center (NAC) division of TARDEC strives to identify dual needs of the Department of Defense and the automotive industry and accelerate the exchange and implementation of automotive technologies by fostering relationships and forming cost-shared partnerships. TARDEC was started during World War II to allow the military to tap into the automotive design and engineering talent pool in the region. TARDEC remains in the region for the very same reason and continues to partner with private industry to advance technologies for military and civilian use.

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2. The U.S. Army’s Tank-automotive and Armaments Command (TACOM) Life Cycle Management Command. TACOM is one of the Army’s primary weapon systems sustainment organizations, advancing and providing ground combat, automotive, marine, and armaments technologies for U.S. soldiers and Allies.

3. The Robotic Systems Joint Program Office (RS-JPO). This program serves both the Army and Marine Corps and manages the development, improvement, testing, and integration of robotic systems to revolutionize combat systems. This includes robotic systems for surveillance, counter-explosives, anti-tank mine detection, and vehicle portable control systems. RS-JPO is a relatively new addition to the area, having moved from Huntsville, Alabama in 2007 in part to leverage the engineering talent base in Metro Detroit.

4. Selfridge Air National Guard Base (SANG). This joint-services base is strategically located along the Great Lakes, making it an ideal location for joint homeland and border security training, scenario response practice, and testing.

5. The Automation Alley Diminishing Manufacturing Sources and Material Shortages (DMSMS) program. This program links the military with private industry to ensure sustained sources for weapon-system parts that original equipment manufacturers no longer make. The advanced manufacturing capabilities of Automation Alley’s industry base provides the military with ready access to parts-molding, casting, and production for strategically important components often needed on short notice.

These programs employ thousands of military and civilian staff throughout the Greater Detroit region. They also provide a strong customer base for local businesses, helping to spur innovative start-ups, attract large defense contractors to the area, and fund important research programs that deliver new technologies for both military and civilian benefit.

EMERGING OPPORTUNITIES IN THE REGION

Automation Alley finds itself with a solid foundation on which the Next Economy can be built in Metro Detroit. A still strong industry base, talented workforce, world-class research and educational institutions, and leading military technology programs are fundamental inputs for innovative and export-oriented growth. This is not to suggest an easy transition. Many in the workforce require additional skill development, and competition from global economies is strong. However, Metro Detroit has core strengths that offer opportunities to establish the region as the leader in the Next Economy. Among these opportunities are:

1. Advanced Manufacturing
2. Simulation Engineering
3. Alternative Energy
Advanced Manufacturing

Engineering, design, and production are central components to Automation Alley’s strong technology core. These assets, which are unmatched by any other workforce in the country, have built the world’s automotive industry and can be adapted and applied to a range of other manufacturing activities. Electrical equipment, industrial machinery, electromedical, aerospace, communications equipment, and semiconductors are all sectors that can benefit from Metro Detroit’s advanced manufacturing industry base, skilled workforce, military programs, and universities. Additionally, many manufacturing processes are significant users of water, which is abundant throughout Metro Detroit but growing more sparse in other regions of the country.

Simulation Engineering

Demands for faster, less costly, and more precise product and process developments are growing across all industries. Simulations and modeling are increasingly turned to as the key to meeting these demands. Metro Detroit’s engineering and design professionals have long used simulations and modeling to test concepts, evaluate risks, and lower development costs, and can take this skill set to a global scale to offer solutions for all industries.

Automation Alley’s businesses and universities are home to some of the world’s leaders in simulation engineering, and leaders in the field have identified opportunities to strengthen the industry. The World Technology Evaluation Center (WTEC), through a panel chaired by University of Michigan Professor Sharon C. Glotzer, released an assessment of Simulation-based Engineering and Science (SBE&S) in 2008. This report finds “there are immediate opportunities to strengthen the U.S. capability for SBE&S through strategic investments in industry-driven partnerships with universities and national laboratories; new and sustained mechanisms for supporting Research and Development (R&D) in SBE&S; and a new, modern approach to educating and training the next generation of researchers in high performance computing, modeling and simulation for scientific discovery and engineering.”

Industry, academia, and government agencies in Automation Alley have a strong history of partnering to provide innovations in science and engineering and can have the potential to lead in simulation engineering. Competition in the field, however, is global, and the talent demands are steep. A concentrated effort to identify the range of assets available in Automation Alley will help to further reveal the already existing base of simulation engineering talent in the region, and its potential to become a recognized center of excellence for advanced simulation and modeling.

**Alternative Energy**

The need for a long-term solution to our economy’s current reliance on fossil fuel driven energy sources, combined with demands for short-term gains in fuel efficiency and usage of sustainable sources, has launched new industries and research centers focused solely on transforming global energy sources and uses. Rising gasoline prices and increased fuel economy rules have further driven the need for alternative energy development within the automotive industry, and Automation Alley’s scientists, engineers, and research have taken a leading role in this emerging field.

There are several notable assets within Automation Alley that offer opportunity for further expansion of this sector. These include:

1. A strong engineering and science workforce, both in business and research settings, already doing cutting-edge work in the fields of energy storage, biofuels, solar, wind-energy, and more efficient use of fossil fuels.

2. Manufacturing facilities and a skilled workforce with the capacity and scale to undertake advanced production work on wind turbines, solar cells, advanced storage batteries, advanced engines, and other generators of power from new and alternative fuels.

3. Leading research centers working with industry, academia, and the military on next generation power solutions. This includes programs at Automation Alley’s two research universities (Wayne State University and University of Michigan), the fuel cell and alternative energy programs at Kettering University and Lawrence Technological University, and the research projects underway at NextEnergy, a non-profit research center in Detroit.
Appendix A: About Anderson Economic Group

Anderson Economic Group, LLC was founded in 1996 and today has offices in East Lansing, Michigan and Chicago, Illinois. AEG is a research and consulting firm that specializes in economics, public policy, financial valuation, and market research. AEG’s past clients include:

- **Governments** such as the states of Michigan, North Carolina, Ohio, and Wisconsin; the cities of Detroit, Cincinnati, Norfolk, and Fort Wayne; counties such as Oakland County, Michigan, and Collier County, Florida; and agencies such as the Detroit-Wayne County Port Authority.

- **Corporations** such as General Motors, Ford, Delphi, Honda, Taubman Centers, The Detroit Lions, PG&E Generating; SBC, Gambrinus, Labatt USA, and InBev USA; Spartan Stores, Nestle, automobile dealers and dealership groups representing General Motors, Ford, Hyundai, Toyota, Honda, Chrysler, Mercedes-Benz, and other brands.

- **Nonprofit organizations** such as Michigan State University, Wayne State University, University of Michigan, Project Management Institute, the Michigan Manufacturers Association, United Ways of Michigan, Service Employees International Union, Automation Alley, the Michigan Chamber of Commerce, Business Leaders for Michigan, and the Michigan Education Association.

Please visit www.AndersonEconomicGroup.com for more information.
DATA SOURCES

The industry and establishment data, occupation employment data, and location quotient calculations for each region analyzed in this report are available upon request. This will be provided at no cost, and in read-only format, to current Automation Alley members. A read/write Excel workbook containing all of the data is also available at a cost of $500. To order, please contact Automation Alley by e-mailing info@automationalley.com.

Industry Data

The industry data used in this analysis was obtained from the United States Census County Business Pattern program. The vintage is 2008, which represents the most current data available at the time of publication. The full data set that is available contains the data at the 4-digit NAICS code level.

Occupation Data

The occupation data used in this analysis was obtained from the United States Bureau of Labor Statistics, Occupational Employment Statistics program. The vintage is 2009, which represents the most current data available at the time of publication. The full data set that is available contains the detailed components of the technology management occupational category used in the analysis.

Geographical Data

All uses of Metropolitan Detroit, the greater Detroit region and Southeast Michigan refer to the geographic area of analysis indicated in the Detroit Regional Overview section on page 8.

ABOUT AUTOMATION ALLEY

Automation Alley is a regional technology business association that connects government, business and education. Automation Alley’s membership includes nearly 1,000 businesses, educational institutions and government entities from the City of Detroit and the surrounding eight county region.

We provide our members and those in Southeast Michigan’s business community with a variety of opportunities to grow their business, including entrepreneurial and exporting assistance, diversification opportunities, workforce development initiatives and technology acceleration.