ADVANCENOW

Madison Region's Strategy for Economic Growth



PHASE 2:
TARGET CLUSTER ANALYSIS

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THRIVE HERE

Thrive is the economic development partnership for the eight-county Madison Region with a vision to create a dynamic environment where people and businesses prosper. We create value with initiatives that focus on long-term, sustained results aimed at building the region's competitive advantage while preserving and enhancing quality of life. Thrive works in the spirit of collaboration to ensure resources are available to the people and organizations that do business here. We serve the Wisconsin counties of Columbia, Dane, Dodge, Green, Iowa, Jefferson, Rock, and Sauk.

LIVE WORK GROW

Market Street brings original insights and clarity to the evaluation and revitalization of the places where people live, work, and grow. Through honest and informed assessments, *Market Street* can equip you with the tools to create meaningful change. Our solutions successfully merge our experience and expertise with the economic and social realities of our clients. *Market Street*'s community partners are successful at creating stronger programs, increasing operational budgets, and creating new quality jobs with competitive wages that improve the quality of life in their communities.

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ADVANCE NOW OVERVIEW

The Great Recession has significantly altered the economic landscape of the United States. While some communities are trying to "get back on track," the **Advance Now** process is a deliberate and proactive effort to strategically position the Madison Region to take advantage of economic opportunities as they reemerge. The Madison Region enjoys tremendous assets, but has, at times, struggled to translate these strengths into economic opportunity.

Regional leaders are thinking anew about the Madison Region's competitive advantages and the need for visionary, aggressive new initiatives to harness these opportunities. *Market Street Services* has partnered with Thrive to coordinate **Advance Now**, a formal Comprehensive Economic Development Strategy planning process that will systematically move the Madison Region's economy forward. **Advance Now** will unite fragmented economic development efforts with a comprehensive action-oriented strategy that will enable the eight-county region to compete on a larger scale in today's global marketplace.

Led by an engaged Strategy Committee of regional leaders from a wide representation of backgrounds, the **Advance Now** process is intended to create an actionable strategy that will not sit on the shelf. The final outcome of this four-phase process will be a detailed program of work for Thrive's leadership, professional staff, and regional partners to leverage new opportunities that concurrently strengthen the region's business climate, create new jobs with competitive wages, and preserve and enhance quality of life across the region.

Phase I. Competitive Assessment & Stakeholder Input: The Competitive Assessment provided a detailed look at the eight-county Madison Region's demographic, socioeconomic, and economic trends in recent years compared to the metro areas of Austin, Texas; Des Moines, Iowa; and Lincoln, Nebraska, as well as the state of Wisconsin and the nation. The realities of the regional economy, well-being of residents, and growth and development of the community were examined. In addition to a community-wide online survey, a series of focus groups and one-on-one interviews were conducted with key stakeholders from throughout the Madison Region to complement the quantitative findings of the Competitive Assessment. This input will directly inform the recommendations of the five-year strategy.

Phase II. Target Cluster Analysis & Marketing Review: The Target Cluster Analysis draws on Phase I research and input to provide a look at the Madison Region's economy that goes beyond traditional measures of current and potential future

economic activity. Leveraging Thrive's current targets and key stakeholder input, the end result is a well-refined list of business clusters that highlights the most important existing and the most promising emerging targets for Madison's regional leaders to pursue.

The Marketing Review component of this phase assesses the Madison Region's image among national site location professionals and identifies best practice economic development marketing programs across the country.

Phase III. Advance Now Strategy: The **Advance Now** Strategy will serve as a tool unifying Thrive and its regional partners across the eight counties behind a consensus blueprint for economic development in the region. Developed in collaboration with the Thrive staff and driven by the volunteer leadership of the Strategy Committee, the final Strategy will be a detailed and visionary game plan of goals, objectives, and actions to achieve over a five-year period. The Strategy will also position Thrive to obtain a federally approved Economic Development District designation for the eight-county Madison Region.

Phase IV. Implementation Plan: If the Madison Region's **Advance Now** Strategy determines the "what" of the eight-county Thrive region's preferred future, then the Implementation Plan answers the "how." The Implementation Plan is a playbook that will guide the launch of **Advance Now** and drives its ongoing momentum through the five years of implementation. It will provide capacity assessments, measurement tools, plans for years one through five, and other information necessary to successfully implement the **Advance Now** Strategy across Thrive's public- and private-sector partners in the eight-county region.

OUR APPROACH

In the professional practice of economic development, many methodologies have been utilized to identify business targets or clusters; however, many use weak or industry-focused approaches. These overlook critical issues of talent and place-based assets which are important to all businesses. *Market Street's* research method includes an analysis of the characteristics of the Madison Region's workforce—the occupations and types of knowledge that support the region's business structure and activities—as opposed to beginning with an examination of the region's industrial composition. This is a "bottom-up" approach, which stands in contrast to the traditional top-down technique historically utilized in target and cluster analysis.

Recommended targets for the Madison Region were selected based on comprehensive quantitative and qualitative research and answers to questions such as:

- ➔ How have the existing targets of Advanced Manufacturing, Health Care, and Agriculture performed?
- ➔ Knowing what we do about the national economy and the Madison Region's competitive position, do these targets continue to make sense?
- ➔ What new opportunities or challenges have arisen in the regional and national economies?
- ➔ Do the existing and proposed targets provide wages at or above the regional average, and therefore have the potential to increase regional wealth?
- ➔ Are there important diversification components for the regional economy?
- ➔ Are there key occupations, compositions, and skill sets that are transferable across multiple clusters and niches?

METHODOLOGY

Federal data sources provide robust business and wage data for geographies beginning at the county level. This Target Cluster Analysis heavily leverages data from the U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW), the Quarterly Workforce Indicators from the U.S. Census (QWI), and the Occupational Employment Statistics (OES) program, provided in eight-county aggregation by the Wisconsin Department of Workforce Development.

- The QCEW provides information on regional employment and wage levels for all **business sectors** as defined by the North American Industrial Classification Systems (NAICS).

ABOUT NAICS CODES

Identifying specific target clusters requires both quantitative and qualitative research. Quantitative examination of indicators like local employment and wages compared to national averages determines the scale and impact of specific business sectors. These data are collected according to North American Industry Classification Systems (NAICS) codes from the U.S. Census Bureau's Quarterly Workforce Indicator surveys and other sources.

NAICS classifies businesses into sectors similar to the now defunct Standard Industrial Codes system, but in categories more closely aligned with today's service-oriented economy. Twenty different divisions represent the broadest NAICS codes at the two-digit level and some data are provided down to the six-digit level of granularity.

Economic development organizations typically track target sector performance overtime through the utilization of NAICS-coded employment data.

- The QWI uses data provided by states and the U.S. Census Bureau to provide a quarterly snapshot of business. Data pertaining to hiring dynamics and age distribution in NAICS business sectors is leveraged in this report.

- The OES provides information on regional employment and wages for specific **occupations** as defined by the Standard Occupational Classification (SOC) system used by the Office of Management and Budget.

The analysis contained within this report examines four-digit-level detail within the NAICS and six-digit-level detail within the SOC system. The Madison Region's identified targets are custom-defined based on the region's existing strengths and potential opportunities revealed by these analyses. The **Appendix** provides a detailed view of the aggregated counties to provide the estimates in the employment and wage tables for each target.

Due to data suppression issues in QWI, data from each Madison Region county for every indicator may not be available. The **Appendix** provides detailed tables that show the suppression issues for data tables showing hiring dynamics and age distribution in each target subsector.

Location Quotients: A location quotient (LQ) is a ratio representing the strength of a particular regional business sector in relation to the national average. Location quotients are used to measure the relative concentration of regional employment in a given business sector or occupation. The calculation for an LQ is as follows:

$$LQ = \frac{\text{(Regional Employment in Sector/Total Regional Employment)}}{\text{(National Employment in Sector/Total National Employment)}}$$

When applied to business sector employment, LQs measure the ratio of a business sector's share of total regional employment to that business sector's share of total national employment. Thus, a business sector with an LQ equal to 1.0 possesses exactly the same share of total regional employment as that business sector's share of total national employment.

If a location quotient is *greater* than 1.0, the area has a larger share of employment in that sector than the nation. The higher the LQ, the more concentrated the level of regional employment compared to its national equivalent. If a location quotient is *less* than 1.0, this indicates a smaller regional share of employment than the nation. For example, if the location quotient of software publishers is 5.01 in the Madison Region, it would indicate that regional employment is just over five times more concentrated than it is in the nation as a while. Conversely, if the LQ of sawmills is 0.33, that would indicate sawmill employment is one-third as concentrated in the Madison Region than it is nationally.

Shift-Share Analysis: Shift-share analysis is a technique that is used to describe the employment growth in a given industry sector over a specified period of time in terms of three components: the **national growth** share, the **industrial mix** share, and the **competitive shift** share.

- The **national growth** share (jobs from national shift) represents the portion of employment growth in a given industry that is attributable to total national employment growth. Precisely, it is the number of jobs lost or gained in a given sector if that sector had grown at the same rate as total national employment.
- The **industrial mix** share (jobs from industry mix) represents that portion of employment growth in a given industry that is attributable to changes in the overall industrial mix of the national economy. It measures the degree to which national growth or decline in a specific industry translates into jobs gained or lost in that same industry within the region. Specifically, it is the number of jobs lost or gained as a result of the deviation between that specific industry's national employment growth rate and the growth rate for all industries nationwide.

- The **competitive shift** share (jobs from regional factors) represents the remaining portion of employment growth or decline; the portion that is attributable to specific competitive advantages or disadvantages within a region that have influenced the growth or decline of a given industry in the region. It is this component that receives the most attention, as it estimates what portion of employment growth or decline is attributable to the unique characteristics of the region's economy and industry. Specifically, it is the number of jobs lost or gained as a result of the deviation between an industry's regional employment growth rate and that same industry's national employment growth rate.

These three components sum to equal the **total change in employment** (net employment change) in a given industry in a given region in the five years examined.

TARGET CLUSTER ANALYSIS

After an analysis of the performance of Thrive's existing targets—**Advanced Manufacturing**, **Health Care**, and **Agriculture**—a close review of the region's occupational clusters and concentrations, and a look at regional industry-level wage and employment growth over two- and five-year spans, *Market Street* proposes the following target business sectors be pursued by Thrive and its partner economic development organizations.

Legacy targets are transitioning sectors in the regional economy with important historical influence and "next generation" potential.

- ➔ **Advanced Manufacturing**
- ➔ **Agriculture and Food Systems**

Leading targets are mature sectors with immense opportunities for growth.

- ➔ **Health Care**
- ➔ **Life Sciences**

Emerging targets are sectors with the potential to create further economic opportunities within the region.

- ➔ **Design and Technology**

In each target cluster, *Market Street* has defined specific **niche areas** within the target sector to help Thrive staff and their regional partners focus economic development efforts.

In addition, **Tourism and Experience** has been identified as an **opportunity area** (rather than a formal target) for the Madison Region. Enhancing the "product" of the Madison Region strengthens targeting efforts in other clusters by working to make the region attractive to an increasing spectrum of talent and firms.

TARGETS		Advanced Manufacturing	Agriculture and Food Systems	Health Care	Life Sciences	Design and Technology
CLASSIFICATION		Legacy	Legacy	Leading	Leading	Emerging
NICHES		Machinery & Materials	Plant & Animal Cultivation	Medical Care & Wellness	Research, Development, & Testing	Technology & Software
		Pharmaceuticals & Chemical	Food Processing	Health Informatics	Production & Distribution	Design & Communications
		Instruments & Precision Components	Food Systems Development & Distribution	Management & Support Operations		Direct-to-Consumer & Specialty Retail
CORE TARGET STRATEGIES	Business retention and expansion	X	X	X	X	X
	Entrepreneurship and small business	X	X	X	X	X
	Internal and external marketing	X	X	X	X	X
	Talent development and recruitment	X	X	X	X	X
	Research and development	X	X	X	X	X
	Infrastructure and site enhancements	X	X	X	X	X
	Quality of life/amenity development			X		X

Prior to presenting these targets to the **Advance Now** Strategy Committee, the *Market Street* team discussed the recommended targets with Thrive staff and the Strategy Committee co-chairs. The Strategy Committee will review and approve the targets for pursuit in the **Advance Now** Strategy.

The Target Cluster Analysis proceeds with a profile and examination of each recommended target. As in the Competitive Assessment, the information is grouped according to the three core areas of competitiveness:

- **People**: Occupational and talent dynamics
- **Prosperity**: Business sector trends
- **Place:** Location assets and competitiveness

The next phase of **Advance Now,** the Strategy, will provide specific tactics to support the development of each target sector. Necessary synergies with educational

institutions and quality of life amenities, a regional approach, and target-specific competitive issues will be incorporated in the Strategy to ensure that Thrive and its partners, throughout **Advance Now**'s five-year implementation, progress holistically and are fully prepared for successful target development efforts.

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ADVANCED MANUFACTURING

Justifications

- The historic strength and support of production in the Madison Region coupled with emerging processes pioneered by the region's higher education and research institutions makes the target a competitive fit.

- Occupation trends reflect both a concentration of production occupations and highly-skilled employees, indicating a competitive advantage in the full spectrum of manufacturing knowledge and expertise.

- The region boasts a wide range of postsecondary offerings, from short-term technical certificates to advanced theoretical engineering degrees. This education continuum also includes manufacturing outreach to Pre-K–12 students as well as customized training programs for displaced workers.

- Despite the national downturn in manufacturing, regional manufacturing employment is still relatively healthy. Seven subsectors employ over 2,000 workers, and an additional six subsectors employ over 1,000 workers.

- Ten subsectors within the Advanced Manufacturing target created jobs that are credited to regional conditions in the Madison Region. These growth patterns are encouraging as losses propelled by national and industry dynamics continue.

- Place-based assets such as the Foreign Trade Zone, university research centers, strong technical college training programs for employers, and transportation infrastructure could be more effectively developed and marketed.

- Synergies with other strong regional sectors, such as agriculture, bioscience, and information technology, complement manufacturing capacity and provide key opportunities for cross-sector collaboration.

Findings and Strategic Implications

- Within the Madison Region, many skilled engineering and technical support occupations earn wages that are below the national average. This dynamic is

concerning as the region may have trouble further attracting and retaining a world-class manufacturing talent base. With national manufacturing labor shortages attracting scrutiny, the wages in these occupations should be followed and used as barometer for sector value-add and competitiveness.

- However, wages increased in all Advanced Manufacturing subsectors between 2005 and 2010, and more recently, between 2008 and 2010. Target strategies for these subsectors must emphasize the retention of these positions, as wage growth is a positive indicator of economic health and prosperity.

- A vast majority of precision production program graduates focus on precision metal working, a direct reflection of the Madison Region's strength in that production process. Alignment of talent with regional competitive sectors will lead to long-term sustainability.

- Many subsectors have high shares of aging workers. Such a dynamic underscores the need to be aware of an "aging out" of knowledge and expertise in the regional workforce, and poses challenges for attracting prospective companies that require a large existing regional workforce.

- Career academies, Madison College's planned Ingenuity Center, and national certification programs available in the region poise the Madison Region well to train competitive talent. The region must also continue and expand its efforts to educate Pre-K–12 students, parents, educators, and career counselors about the cutting-edge, high-technology careers available in Advance Manufacturing.

- Primary strategic efforts must focus on retention of existing manufacturers and diversifying regional manufacturing firms to be sustainable through national and global economic cycles and breakthroughs of new production processes.

- Identifying and attracting suppliers of existing manufacturers will be critical to filling in the region's Advanced Manufacturing supply chain, from the inception of a product idea to the final distribution of a finished product.

- Business retention, expansion, and attraction challenges include the perception and realities of a unionized workforce when competing with right-

to-work states, and state-level incentives and external marketing efforts that have not historically been aggressive in promoting the state and region's manufacturing assets.

Target Profile

Advanced Manufacturing is comprised of both the production of highly specialized products and processes that are hallmarked by the incorporation of high technology. Manufacturing in Wisconsin has a long history of incorporating state-of-the art technologies into its processes, as evidenced by the continued presence of major manufacturing operations and the addition of production jobs to the state economy at a time when the sector experienced national decline. The sector accounts for almost 16 percent of the total nonfarm jobs in the state of Wisconsin and has helped the state mitigate some of the lingering effects of the Great Recession. The Madison Region reflects this history with a varied and diverse manufacturing base. For purposes of leveraging its competitive advantages, the following specific niches are recommended within Advanced Manufacturing.

- **Materials and Machinery:** This niche encompasses products such as agricultural and industrial machinery, plastics, specialized glass, and metal castings (foundries). Inclusive of firms also involved in the auto supply chain, this niche harnesses the primarily metal-based manufacturing operations in the region.

- **Pharmaceutical and Chemical:** Inclusive of medicine manufacturing, agricultural chemical production, and artificial fiber manufacturing, firms in this niche produce products such as probiotics, antibodies, and protein and plasmid DNA. The strong presence of the Life Sciences, Health Care, and Agriculture and Food Systems sectors in the Madison Region support and give exposure to the competitive position of pharmaceutical, chemical, and medical equipment manufacturers. Also this niche highlights the cross-pollination potential between major sectors in the Madison Region and skilled workforce pipeline needed to ensure long term sustainability.

- **Instruments and Precision Components:** This niche includes those firms that make specialized electronic equipment, electrical components, and semiconductors. Employment in specialized wholesale and engineering are also included as these firms complement regional manufacturing by taking products to market and end-use consumers.

In addition to production, the Madison Region has a presence of logistics firms, such as those in warehousing and trucking. The ability to both produce and distribute goods impacts the viability of manufacturers. While these firms are not contained within a niche, they should be tracked along with manufacturing operations.

At the national level, Advanced Manufacturing has been identified as a key sector that can help the U.S. emerge from its persistent economic malaise. In January 2011, President Obama announced the creation of a $500 million public-private partnership aimed at investing in and supporting domestic specialized manufacturing. Focusing on products such as high-powered batteries, advanced composites, alternative energy, and metal fabrication, the partnership aims to spur advancements in capacity to produce high-value and state-of-the art goods. Commitments between the federal government and private-sector firms—including Caterpillar, Dow Chemical, Ford, Intel, Johnson and Johnson, Stryker, and Proctor and Gamble—send the message that American manufacturing can rebound into a position of global leadership.

In a June 2011 study, "Report to the President on Ensuring American Leadership in Advanced Manufacturing," the President's Council of Advisors on Science and Technology outlined new and important technologies that, given adequate funding, can redefine the American manufacturing landscape. Key technologies include nano-scale carbon materials (building blocks of touch screens, chemical and biological sensors, fuel cells, and lightweight body armor); optoelectronics (converting light into electrons with impacts on telecommunications, e-commerce, and medicine); flexible electronics; and nanotechnology-enabled medical diagnostic devices and therapeutics. Such products also require an infrastructure of knowledge creation and technology transfer, thus extending the value chain towards areas with both manufacturing and research and development capacity.

The sector faces significant challenges, including pressure to relocate research and development to be closer to overseas manufacturing, and a domestic shortage of manufacturing talent. Nationally addressing worker training in high-end production occupations; incentivizing the study of science, technology, engineering, and mathematics (STEM); and dispelling myths of modern manufacturing as "dirty" or a dying career path will be vital to increasing global competitiveness.

The Madison Region's existing manufacturing strengths align closely with nationally-recognized technologies of the future. Based on findings from a 2009 report on national metropolitan economic cluster competitiveness compiled by researchers at Harvard University, among 363 American metro areas, manufacturing employment

in the Madison MSA (Dane, Columbia, and Iowa counties) ranked 16th in batteries, fifth in specialized pumps, and 11th in medical equipment.

Ongoing efforts developing products like medical adhesives that inhibit bacterial infection, nanocrystalline diamond coatings for manufacturing tools, and human skin substitutes underscore the high-value products being developed in the Madison Region. Medical device manufacturing will be an especially important field as experts are expecting fast revenue growth and a global market value to exceed $312 billion; existing expertise in this realm positions the regional sector well to compete globally[I].

According to the 2009 Harvard report, other notable Madison MSA manufacturing advantages exist in production of food products machinery (#4), trucks and trailers (#3), household refrigerators and freezers (ranked seventh), and appliances (#13). Such diversity indicates that the larger Madison Region indeed holds a competitive edge in high-end production and strategic focus should be given to retaining existing employers, expanding employment capacity, and supporting the supply chain.

The Madison Region is well positioned to take its Advanced Manufacturing capacity to the next level. To fully leverage the cluster and existing workforce assets, public and private entities must collaborate on retaining existing manufacturers, ensuring a sound workforce pipeline (especially of technically-trained workers), and finding new ways to leverage entrepreneurial opportunities into manufacturing. Further, refining synergies between Advanced Manufacturing and other target sectors, such as Agriculture and Food Systems, Life Sciences, and Design and Technology, will be integral to further developing a diversified, agile, and well-trained sector.

People

This section explores the dynamics of the Advanced Manufacturing target in the Madison Region in terms of its core occupational trends, existing workforce, and talent pipeline.

Occupational Dynamics

The following tables show wage and employment data for selected occupations that correspond to Advanced Manufacturing in the eight-county Madison Region.

[I] "Market Report: Medical Devices Step Up to Regulatory Challenges," *Area Development Online,* March 2011.

ADVANCED MANUFACTURING OCCUPATIONS, 2010

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
Administrative						
11-2022	Sales Managers	1,500	1.20	$98,648	0.86	$114,110
11-3051	Industrial Production Managers	790	1.41	$87,511	0.91	$95,660
11-3061	Purchasing Managers	430	1.69	$95,287	0.95	$100,600
11-3071	Transportation, Storage, & Distribution Managers	320	0.91	$81,572	0.94	$86,630
11-1021	General & Operations Managers	5,430	0.81	$101,579	0.90	$113,100
13-1023	Purchasing Agents, Except Wholesale, Retail, & Farm Products	1,080	1.01	$53,758	0.89	$60,160
13-1041	Compliance Officers	880	1.10	$58,516	0.94	$62,140
13-1081	Logisticians	300	0.73	$63,735	0.87	$73,510
13-2011	Accountants & Auditors	3,490	0.83	$62,523	0.91	$68,960
41-4011	Sales Representatives, Whls & Mfg, Technical & Scientific Products	1,170	0.79	$75,677	0.90	$84,360
41-4012	Sales Representatives, Whls & Mfg, Except Technical & Scientific Products	5,590	1.05	$64,002	1.02	$62,720
43-3061	Procurement Clerks	270	0.94	$38,595	1.04	$37,150
43-4151	Order Clerks	2,460	2.98	$27,700	0.91	$30,320
43-5061	Production, Planning, & Expediting Clerks	1,000	0.96	$41,883	0.95	$44,070
43-5071	Shipping, Receiving, & Traffic Clerks	3,220	1.20	$30,015	1.00	$30,070
Engineering/Technical Support						
15-1131	Computer Programmers	1,400	1.07	$75,797	1.01	$74,900
17-2041	Chemical Engineers	160	1.43	$132,095	1.40	$94,590
17-2071	Electrical Engineers	790	1.36	$76,852	0.88	$87,770
17-2111	Health & Safety Engineers, Except Mining Safety Engineers & Inspectors	60	0.66	$75,098	0.96	$78,210
17-2112	Industrial Engineers	910	1.15	$65,966	0.84	$78,450
17-2131	Materials Engineers	60	0.70	$75,930	0.88	$85,860
17-2141	Mechanical Engineers	980	1.07	$66,492	0.81	$82,480
17-2199	Engineers, All Other	410	0.75	$73,553	0.80	$91,770
17-3012	Electrical & Electronics Drafters	60	0.55	$46,929	0.84	$55,960
17-3013	Mechanical Drafters	490	1.95	$49,836	0.97	$51,200
17-3019	Drafters, All Other	140	2.36	$49,934	1.04	$48,190
17-3023	Electrical & Electronics Engineering Technicians	390	0.68	$50,560	0.89	$56,690
17-3024	Electro-Mechanical Technicians	60	0.96	$41,619	0.81	$51,160
17-3026	Industrial Engineering Technicians	270	1.12	$47,419	0.94	$50,540
17-3027	Mechanical Engineering Technicians	250	1.45	$46,399	0.90	$51,450
19-2032	Materials Scientists	30	0.92	$71,415	0.83	$86,300
19-4031	Chemical Technicians	200	0.86	$37,960	0.86	$44,200

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

ADVANCED MANUFACTURING OCCUPATIONS, 2010 (CONTINUED)

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
Production						
49-9069	Precision Instrument & Equipment Repairers, All Other	60	1.22	$49,317	0.96	$51,290
51-9198	Helpers--Production Workers	1,560	1.01	$27,083	1.12	$24,240
51-2092	Team Assemblers	5,290	1.46	$29,421	1.01	$29,220
51-9111	Packaging & Filling Machine Operators & Tenders	2,950	2.21	$29,891	1.08	$27,580
51-2022	Electrical & Electronic Equipment Assemblers	510	0.72	$30,426	0.98	$31,110
51-4071	Foundry Mold & Coremakers	120	3.06	$30,487	0.95	$31,940
51-9041	Extruding, Forming, Pressing, & Compacting Machine Setters, Operators, & Tenders	440	1.73	$30,961	0.95	$32,740
51-9121	Coating, Painting, & Spraying Machine Setters, Operators, & Tenders	490	1.61	$31,770	1.02	$31,050
51-4072	Molding, Coremaking, & Casting Machine Setters, Operators, & Tenders, Metal & Plastic	1,320	2.94	$31,899	1.06	$30,030
51-4021	Extruding & Drawing Machine Setters, Operators, & Tenders, Metal & Plastic	350	1.17	$31,962	0.94	$33,900
51-9032	Cutting & Slicing Machine Setters, Operators, & Tenders	390	1.63	$32,702	1.05	$31,090
51-4031	Cutting, Punching, & Press Machine Setters, Operators, & Tenders, Metal & Plastic	1,250	1.76	$33,420	1.09	$30,690
51-4035	Milling & Planing Machine Setters, Operators, & Tenders, Metal & Plastic	220	2.74	$33,445	0.89	$37,540
51-9023	Mixing & Blending Machine Setters, Operators, & Tenders	550	1.14	$33,534	0.98	$34,120
51-9012	Separating, Filtering, Clarifying, Precipitating, & Still Machine Setters, Operators, & Tenders	240	1.61	$33,628	0.87	$38,800
51-4081	Multiple Machine Tool Setters, Operators, & Tenders, Metal & Plastic	660	2.44	$33,927	1.02	$33,250
51-9061	Inspectors, Testers, Sorters, Samplers, & Weighers	1,830	1.14	$34,069	0.96	$35,550
51-4033	Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators, & Tenders, Metal & Plastic	400	1.46	$34,539	1.07	$32,310
51-9021	Crushing, Grinding, & Polishing Machine Setters, Operators, & Tenders	260	2.01	$34,600	1.03	$33,720
51-4034	Lathe & Turning Machine Tool Setters, Operators, & Tenders, Metal & Plastic	160	1.00	$34,993	0.98	$35,830
51-4122	Welding, Soldering, & Brazing Machine Setters, Operators, & Tenders	210	1.40	$35,113	1.00	$35,220
51-4011	Computer-Controlled Machine Tool Operators, Metal & Plastic	720	1.49	$35,358	0.99	$35,890
51-4032	Drilling & Boring Machine Tool Setters, Operators, & Tenders, Metal & Plastic	90	1.03	$35,550	1.06	$33,620
51-4121	Welders, Cutters, Solderers, & Brazers	1,640	1.34	$37,578	1.01	$37,370
51-9011	Chemical Equipment Operators & Tenders	120	0.66	$37,942	0.83	$45,790
51-2041	Structural Metal Fabricators & Fitters	210	0.68	$37,958	1.06	$35,900
51-5111	Prepress Technicians & Workers	300	1.60	$39,535	1.04	$37,970
51-4041	Machinists	1,570	1.14	$44,008	1.11	$39,780
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal & Plastic	150	2.35	$44,828	0.93	$48,400
51-4111	Tool & Die Makers	540	2.08	$47,037	0.97	$48,710
51-1011	First-Line Supervisors of Production & Operating Workers	2,800	1.29	$54,447	0.97	$56,170
51-8091	Chemical Plant & System Operators	200	1.19	$54,897	1.00	$54,700

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

ADVANCED MANUFACTURING OCCUPATIONS, 2010 (CONTINUED)

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
Production Support						
43-9011	Computer Operators	320	0.99	$37,640	0.98	$38,340
47-2211	Sheet Metal Workers	540	1.05	$50,177	1.10	$45,710
53-1021	First-Line Supervisors of Helpers, Laborers, & Material Movers, Hand	680	1.05	$44,474	0.97	$45,930
53-1031	First-Line Supervisors of Transportation & Material-Moving Machine & Vehicle Operators	730	0.95	$58,394	1.06	$54,950
53-3031	Driver/Sales Workers	1,380	0.95	$23,337	0.86	$27,070
53-3032	Heavy & Tractor-Trailer Truck Drivers	6,530	1.14	$38,668	0.98	$39,450
53-3033	Light Truck or Delivery Services Drivers	3,110	1.02	$31,895	0.99	$32,140
53-7051	Industrial Truck & Tractor Operators	2,350	1.16	$32,430	1.03	$31,500
53-7062	Laborers & Freight, Stock, & Material Movers, Hand	7,060	0.89	$26,126	1.02	$25,710
53-7063	Machine Feeders & Offbearers	1,580	3.38	$27,137	0.96	$28,170
53-7064	Packers & Packagers, Hand	5,130	1.94	$27,871	1.26	$22,100
49-9041	Industrial Machinery Mechanics	1,090	1.01	$44,291	0.94	$47,100
49-9043	Maintenance Workers, Machinery	180	0.66	$37,330	0.93	$40,310
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	330	0.78	$46,013	1.00	$46,140

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

Data from the previous tables indicate the following:

- **Production workers are especially concentrated in the Madison Region**, compared to the national average. Occupations with more than twice the national concentration include machine feeders and offbearers (LQ=3.38), foundry mold and coremakers (3.06), molding, coremaking, and casting machine setters (2.98), milling and planing machine setters (2.74), and multiple machine tool setters (2.44).

- **The Madison Region has robust concentrations of skilled engineering and technical support occupations**, which are crucial to customizable and adaptable manufacturing operations. Key occupations include computer programmers (1.07), chemical engineers (1.43), electrical engineers (1.36), industrial engineers (1.15), industrial engineering technicians (1.12), and mechanical engineering technicians (1.45).

- **Many skilled engineering and technical support occupations within the region pay below the national average.** The only occupations in this subset with wages above the national occupational average are computer programmers (wage ratio of 1.01; in other words, .01 percentage points higher

than the occupation's U.S. average annual wage), chemical engineers (1.40), and all other drafters (1.04).

- **Production occupations tend to have wages on par with national occupational averages, but few occupations garner more than $40,000 in annual average wages.**
    - Production worker wage ratios range from .83 (chemical equipment operators and tenders) to 1.12 (production worker helpers).
    - The only occupations that have average annual wages greater than $40,000 are machinists ($44,008), computer numerically controlled machine tool programmers ($44,828), tool and die makers ($47,037), first line supervisors of production and operating workers ($54,447), and chemical plant and systems operators ($54,897).
    - **Team assemblers account for the largest occupational group in the region's Advanced Manufacturing cluster**; in 2010, 5,290 team assemblers were employed in the Madison Region and had an average annual wage of $29,421.
- Shortages of skilled labor around the country indicate that **wage differentials for many Advanced Manufacturing occupations may adversely affect the desirability of working in the Madison Region.** Such a trend is concerning as the higher paid production, engineering, and technical support roles will be in highest demand by new and expanding manufacturing operations.

Talent Development

Maintaining a competitive, sustainable pipeline of Advanced Manufacturing workers at every level of the production chain is critical for the cluster's continued development.

Pre-K–12: Presenting manufacturing options to students at an early age is an important link in ensuring America continues to employ the most skilled manufacturing workforce in the world. Investing in career pathways education and apprenticeship programs is an important step in introducing modern manufacturing to students, and dispelling common-held myths.

While there are some promising Pre-K–12 efforts in the region, of particular note is the **Dane County Consortium,** an organization headed by 16 district superintendents

which focuses on connecting schools and students with businesses. With opportunities for Youth Apprenticeships in manufacturing and other fields, the program aims to help high school students gain real world experience while ensuring that they graduate on time and pursue both career and college options.

Higher Education: In 2010, Madison Region institutions of higher education conferred 2,641 degrees and certificates that are applicable to Advanced Manufacturing positions. Representing 11.4 percent of total regional conferrals, these degree programs provide a viable pipeline of high-end manufacturing talent. However, when compared to other targets, degrees related to Advanced Manufacturing are the least numerous.

ADVANCED MANUFACTURING POSTSECONDARY COMPLETIONS, 2010

Degree category	Certificate below baccalaureate	Associate's degree	Bachelor's degree	Master's degree	Doctorate / Professional degree	Total
Total, all regional completions	4,478	3,690	11,092	2,470	1,378	23,108
Computer and information sciences and support svcs.	**76**	**112**	**138**	**58**	**14**	**398**
Computer Programming	38	3				41
Computer Systems Analysis			30			30
Construction trades	**229**					**229**
Engineering	**10**	**222**	**640**	**312**	**101**	**1,285**
Industrial Engineering			73	48	7	128
Materials Engineering			19	24	15	58
Mathematics and statistics			**151**	**41**	**32**	**224**
Mechanic and repair technologies/technicians	**221**	**8**				**229**
Heavy/Industrial Equipment Maintenance Technologies	57	6				63
Electrical/Electronics Maintenance and Repair Technology	19					19
Electromechanical Instrumentation and Maintenance Technologies/Technicians	0	35				35
Precision production	**276**	**0**				**276**
Precision Metal Working	231	0				231
Quality Control and Safety Technologies/Technicians	2	0	25			27
Total, all target-related completions	812	342	929	411	147	2,641

Source: National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)

From the previous table, the following trends are clear:

- **Degrees in engineering are the largest subset of degrees and certificate conferrals** related to Advanced Manufacturing (48.7 percent). Retaining engineering talent and matching opportunities with skill sets will be a priority for further developing this target.

    - Of the engineering degrees granted in the Madison Region, 10 percent are in industrial engineering and 4.5 percent are awarded in materials engineering. These two programs of study complement manufacturing operations ongoing in the region, especially as industrial machinery and inputs for bioscience and health care are strong manufacturing activities.

- Degrees and certificates in computer and information sciences (15.1 percent) and precision production (10.4 percent) fit well with the target niches.

    - **Of the target-related conferrals, 43.7 percent were below the baccalaureate level,** which is encouraging as those institutions may attract students less likely to migrate out of the region after completion.

    - Finer-grain detail reveals that the majority of precision production program graduates focus on precision metal working (83.7 percent), a direct reflection of the Madison Region's strength in that production process. Further, 11.7 percent of precision production graduates study quality control and safety technologies, an area that will have much applicability across manufacturing subsectors.

The Madison Region's higher education institutions have many programs that prepare students for or train current workers in Advanced Manufacturing careers, including:

- **Blackhawk Technical College:** Associate's degree programs, certificates, and specialty programs in automated systems (electro-mechanical technology), industrial engineering technician, and mechanical design technology.

    - One-year technical diploma programs include diesel and heavy equipment technician, CNC technician, electrical power distribution, industrial mechanic, and welding.

- Certificates include civil engineering, industrial engineering.

- **Madison College (MATC):** Associate's degree programs and certificates in electrical engineering technology, industrial maintenance technician, machine tooling technics, welding, mechanical design technology, electronics, diesel equipment technology, diesel and heavy equipment technician.

    - Apprenticeship opportunities include industrial electrician, injection molding, machinist, maintenance mechanic/millwright, sheet metal, steamfitter, and tool and die.

    - Certificates are offered in industrial automation (post-baccalaureate), computer numerical control (CNC) specialist, HVAC (heating, ventilation, and air conditioning), machine tool operations, and electronic assembler.

    - In 2009, Madison College secured a $3.3 million grant to expand the robotics instructional platform at the Madison College satellite campuses.

    - In November 2010, voters in the 12-county service region of Madison College approved a $133 million building referendum for the institution. Construction on a new $16.8 million building wing on the Truax campus, being dubbed the "Ingenuity Center," is underway. Set to house advanced manufacturing and transportation programs, the new infrastructure will increase training capacity in the region.

- **Moraine Park Technical College:** Associate's degree programs and certificates in HVAC; fabrication technologies; mechatronics; engine research and development; mechanical design technology; process engineering technology in environmental, industrial/manufacturing, or quality assurance; and tool design engineering technology.

    - Apprenticeships in electrician, electrical lineman, plumbing, steamfitting service, and tool and die technologies.

  - Technical diplomas in electrical power distribution, electricity, CNC/tool and die technologies, industrial maintenance technician, metal fabrication, and welding.

  - Certificates in basic industrial maintenance, CNC set-up/operator, CNC, and quality assurance.

- **Southwest Technical College:** Programs and courses in electrical power distribution, electromechanical technology, engineering technologist, and welding.

- **University of Wisconsin (UW)–Rock County:** Collaborative degree programs with UW bachelor's degree-granting institutions offered at the Rock County campus include electrical engineering and mechanical engineering, both with UW–Platteville.

- **UW–Whitewater:** Bachelor's degree programs in occupational safety and operations and supply chain management.

- **Edgewood College:** Bachelor's degree programs in natural science and mathematics with a concentration in pre-engineering.

- **UW–Madison:** According to *U.S. News and World Report,* UW–Madison's industrial/manufacturing engineering program ranks 10th in the nation, tied with Purdue University–West Lafayette. The engineering school was ranked 16th overall. UW–Madison offers a wide variety of programs, from undergraduate to post-professional certificates:

  - Undergraduate degrees in biomedical engineering, chemical engineering, computer engineering, electrical engineering, engineering mechanics, industrial engineering, materials science and engineering, mechanical engineering, and mathematics.

  - Undergraduate certificate programs offered in engineering for energy sustainability, and supply chain management.

  - Graduate programs (master's and doctorate degrees) offered in chemical engineering, electrical engineering, engineering mechanics, industrial engineering, manufacturing systems engineering,

materials engineering, materials science, mathematics, and mechanical engineering.

- Engineering management specialization (graduate certificate).

Workforce Development: The State of Wisconsin has made a commitment to providing training for the manufacturing jobs of the future through the Advanced Manufacturing Training program. Since 2009 the Wisconsin Technical College System Board has been required by the state to make grants of $1 million to technical schools for Advanced Manufacturing training. State legislation increasing training grants to $2.4 million annually passed the Senate in October 2011 with broad bipartisan support (passed 32 to one). After passage in the Senate, the legislation was most recently transmitted to the Assembly, awaiting action. Enacting such legislation in Wisconsin would signal a renewal of that initial commitment to Advanced Manufacturing and enable more manufacturers to access excellent employees.

- The **Southwest Workforce Development Board (SWWDB)** serves six counties, three of which are in the Madison Region – Green, Iowa, and Rock.

  - On-the-Job Training (OJT) is offered in conjunction with the Wisconsin Department of Workforce Development by both WDBSCW and SWWDB. Working with employers, the workforce development boards will reimburse companies cash to help offset training costs of new employees.

  - With a service area that encompasses Rock County, the SWWDB has worked closely with dislocated General Motors workers and been the disbursement point for the National Emergency Grant that was awarded in the wake of the Janesville plant closure (funds totaled over $6 million).

    Working in collaboration with other regional partners including the WDBSCW, the SWWDB has been integral in utilizing $4.68 million from the U.S. Department of Labor-funded Workforce Innovation in Regional Economic Development (WIRED). Over 300 workers were trained and received manufacturing credentials.

  - The SWWDB has been proactive in promoting STEM education in the region. In June 2011, the SWWDB co-sponsored a STEM-Posium to showcase student achievement through a nationally-recognized

educational program, Project Lead the Way (PLTW). Student innovations included a shoe that stores electricity generated through walking and a mounted cell phone induction charger. PLTW courses were offered in six districts during the 2010–2011 school year.

- One of SWWDB's several sectors of focus for 2011–2012 is industrial machinery manufacturing, including advanced manufacturing processes.

- The **Workforce Development Board of South Central Wisconsin (WDBSCW)** serves an area that includes Columbia, Dane, Dodge, Jefferson, and Sauk counties. The WDBSCW has identified manufacturing as a targeted/high-demand industry sector. The South Central Board's work is structured within a career pathway framework, engaging industry and educational partners to build modular and stackable credentials that offer the skills needed in real time. The WDBSCW dedicates resources to trains an average of 300 adults in the Advance Manufacturing technical skill area annually.

  - In concert with both Moraine Park Technical College and Madison College, the WDBSCW supports the Manufacturing Skills Standards Certification (MSSC). The MSSC is a nationally-recognized skill certification that signals proficiency and competence in four key manufacturing modules: safety, production, quality, and maintenance.

  - Working with regional technical colleges, the WDBSCW recently secured a $3.3 million grant to expand the robotics instructional platform at the Madison College satellite campuses.

  - In partnership with Madison College, the WDBSCW supports **Career Academies.** With tracks related to welding, computerized numeric control programming, industrial maintenance, and information technology for business, the short term courses sharpen desirable workplace skills of unemployed workers. The Career Academies also allow students to "ladder" into established academic programs, such as occupational certificates.

  - WDBSCW has implemented the **Middle College Project**, a program targeted to high school juniors and seniors. Students are enrolled as technical college students while remaining connected to their high

schools. Students participate in technical instruction at the college. One area of study is the Manufacturing Academy which builds core knowledge and skills of modern manufacturing.

- In 2008, the workforce development boards of South Central Wisconsin and Southwest Wisconsin and educational partners captured a competitive $5 million **WIRED grant**. The WIRED grant concentrated on the development of Career Pathway training targeted to "demand" sectors within the region. From the grant, $770,000 was dedicated to developing new advanced manufacturing curricula, establishing a portable robotics platform, and training and certifying technical college faculty in both Manufacturing Skills Standard training and LED certifications.

- Select faculty from Madison Region technical colleges, including Blackhawk Technical College, Madison College, and Moraine Park Technical College were the first people in the nation to be granted **Green Manufacturing Specialist Certification** from the Society of Manufacturing Engineers. The certified faculty members are qualified to work with manufacturers in "greening" operations, as well as teaching modules such as energy management, water conservation, pollution solutions, and sustainability in practice to technical students.

Workforce Sustainability

The impending retirement of Baby Boomers represents a significant exodus of organizational experience, knowledge, and skill from the American workforce. While each business sector will fare differently, identifying those sectors with large shares of workers nearing retirement age and those with strong proportions of young adults provides a snapshot into future skill demands and health of the workforce pipeline.

The following table shows target sector percentages of young adults (aged 25–34), Baby Boomers (aged 55–64), and the ratio of young adults to Baby Boomers (a ratio above 1.0 indicates more young adults than Baby Boomers in that sector). The regional average ratio is 1.39, indicating that there are many young adults in the workforce.

ADVANCED MANUFACTURING AGE PIPELINE RATIOS, Q3 2010

NAICS	Subsector	% Young Adults (25-34)	% Baby Boomers (55-64)	Young Adults/ Baby Boomers
	All Employment	21.5%	15.5%	1.39
Niche: Machinery and Materials				
3261	Plastics product manufacturing	19.3%	16.1%	1.20
3272	Glass and glass product manufacturing	23.9%	14.6%	1.64
3315	Foundries	15.6%	23.7%	0.66
3324	Boiler, tank, and shipping container mfg.	21.6%	16.4%	1.32
3325	Hardware manufacturing	ND	ND	ND
3327	Machine shops and threaded product mfg.	16.9%	18.8%	0.90
3331	Ag., construction, and mining machinery mfg.	15.6%	21.4%	0.73
3332	Industrial machinery manufacturing	12.6%	21.4%	0.59
3333	Commercial and service industry machinery	18.3%	19.5%	0.94
3339	Other general purpose machinery manufacturing	20.0%	18.1%	1.11
4231	Motor vehicle and parts merchants wholesalers	17.3%	17.9%	0.96
4238	Machinery and supply merchant wholesalers	17.5%	18.0%	0.97
Niche: Pharmaceutical and Chemical				
3251	Basic chemical manufacturing	22.5%	17.7%	1.27
3252	Resin, rubber, and artificial fibers mfg.	ND	ND	ND
3253	Agricultural chemical manufacturing	23.2%	12.9%	1.80
3254	Pharmaceutical and medicine manufacturing	26.1%	12.1%	2.16
3259	Other chemical product and preparation mfg.	27.4%	12.3%	2.22
3391	Medical equipment and supplies manufacturing	15.6%	22.9%	0.68
4246	Chemical merchant wholesalers	20.6%	12.4%	1.67
Niche: Instruments and Precision Components				
3334	HVAC and commercial refrigeration equipment	14.9%	24.8%	0.60
3353	Electrical equipment manufacturing	14.9%	19.4%	0.77
3359	Other electrical equipment and component mfg.	19.9%	18.9%	1.05
3343	Audio and video equipment manufacturing	17.6%	29.4%	0.60
3344	Semiconductor and electronic component mfg.	19.8%	17.7%	1.11
3345	Electronic instrument manufacturing	20.9%	18.0%	1.16
4236	Electric goods wholesalers	19.8%	16.7%	1.18
4251	Electronic markets and agents and brokers	18.3%	16.5%	1.11
5413	Architectural and engineering services	29.9%	13.6%	2.19
Target Support Operations				
4841	General freight trucking	14.3%	21.1%	0.68
4931	Warehousing and storage	21.1%	13.9%	1.51

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Age pipeline trends from the previous table indicate:

- Employment dynamics in Advanced Manufacturing subsectors reflect **higher percentages of Baby Boomers and lower percentages of young adults**.
    - Of the 27 Advanced Manufacturing subsectors for which data is available, 19 have higher percentages of Baby Boomers than the region.
- Among the target's three niches, **Machinery and Materials has the lowest ratio of Baby Boomers to young adults.** Eight of its 13 subsectors have an age ratio below 1.0. Further, only five subsectors have a ratio that is above the regional average of 1.39.
    - The **industrial machinery manufacturing subsector shows the most susceptibility to workforce shortages** as only 12.6 percent of the workers are between 25 and 34, and 21.4 percent of workers are between 55 and 64.
    - Other significant age gaps occur in agricultural, construction, and mining manufacturing (age ratio of .73) and general freight trucking (.68).
- **Employment in the Pharmaceutical and Chemical niche shows more age balance in the workforce.** The only subsector with an age ratio below 1.0 is medical equipment and supplies manufacturing (.68), but the ratios align well with regional figures.
    - Young workers have a solid presence in pharmaceutical and medicine manufacturing (2.16) and other chemical product and preparation manufacturing (2.22), indicating a strong future talent pipeline and subsector sustainability.
- **Young adults also comprise a strong segment of the workforce in the Instruments and Precision Components niche.** Subsectors with high percentages of young workers include other electrical equipment and component manufacturing (19.9 percent), semiconductor and electronic component manufacturing (19.8 percent), electronic instrument manufacturing (20.9 percent), electric good wholesale (19.8 percent), and architectural and engineering services (29.9 percent).

  - Baby Boomers have significant presence in HVAC and commercial refrigeration manufacturing (age ratio of .60) and audio and video equipment manufacturing (.60).

- **The presence of young adults in high-end manufacturing is encouraging as it contradicts the oft-held perception that manufacturing no longer appeals to younger generations.** Further, it is a testament to the ability of the Madison Region to develop and retain skilled workers and attract quality talent.

Prosperity

Employment in all manufacturing sub-sectors—including those not contained in this report's definition of Advanced Manufacturing—accounts for 12.4 percent of total regional nonfarm employment. Second only to health care and social assistance, the manufacturing sector is a cornerstone of regional employment.

Business Sector Analysis

Employment and Wages: Despite sustained losses between 2005 and 2010, Advanced Manufacturing is still heavily concentrated in the Madison Region and represents an important economic cluster.

ADVANCED MANUFACTURING EMPLOYMENT AND WAGES, 2005-2010

NAICS Code	Subsector	Q4 2010 LQ	Q4 2010 Employment	Q4 2010 AAW	Q4 2010 Wage Ratio	Emp, Q4 '05 - Q4 '10 Madison Region # Change	Emp, Q4 '05 - Q4 '10 Madison Region % Change	Emp, Q4 '05 - Q4 '10 US % Change	AAW, Q4 '05 - Q4 '10 Madison Region $ Change	AAW, Q4 '05 - Q4 '10 Madison Region % Change	AAW, Q4 '05 - Q4 '10 US % Change	Q4 '08 - Q4 '10 Region Employment % Change	Q4 '08 - Q4 '10 Madison Region AAW % Change
	All Employment	1.00	500,237	$43,871	0.87	-10,197	-2.0	-3.0	$7,297	20.0%	17.6%	-4.2%	7.1%
Niche: Machinery & Materials													
3261	Plastics product manufacturing	ND	ND	$42,897	0.87	ND	ND	-19.9%	$6,681	18.4%	21.8%	ND	10.0%
3272	Glass & glass product manufacturing	3.71	1,135	$19,671	0.37	-448	-28.3%	-26.7%	ND	ND	16.9%	-8.8%	0.9%
3315	Foundries	3.73	1,656	ND	ND	-702	-29.8%	-30.2%	ND	ND	14.3%	-21.3%	ND
3324	Boiler, tank, & shipping container mfg.	2.93	969	$53,433	0.86	104	12.0%	-6.6%	$5,167	10.7%	22.9%	-3.4%	7.9%
3325	Hardware manufacturing	2.30	209	ND	ND	24	13.0%	-32.5%	ND	ND	24.0%	-11.4%	ND
3327	Machine shops & threaded product mfg.	0.96	1,194	$46,981	0.87	-478	-28.6%	-6.1%	$6,841	17%	19.1%	ND	7.1%
3331	Ag., construction, & mining machinery mfg.	2.71	2,187	ND	ND	-296	-11.9%	-0.1%	ND	ND	35.1%	-4.2%	ND
3332	Industrial machinery manufacturing	2.44	936	$67,461	0.83	ND	ND	-19.0%	$11,436	20.4%	26.5%	ND	1.3%
3333	Commercial & svc. industry machinery	1.98	706	$64,391	0.94	ND	ND	-15.9%	$19,686	44.0%	13.8%	-12.9%	26.0%
3339	Other general purpose machinery mfg.	2.16	1,918	$64,348	0.97	-133	-6.5%	-14.6%	$17,390	37.0%	22.5%	-27.0%	24.2%
4231	Motor vehicle & parts merchants whlsl.	1.45	1,745	$53,907	0.76	-482	-21.6%	-9.4%	$9,449	28.5%	10.4%	ND	13.7%
4238	Machinery & supply merchant whlsl.	0.85	2,003	$58,433	0.87	-179	-8.2%	-8.1%	$10,344	21.5%	17.8%	-8.2%	2.0%
Niche: Pharmaceutical & Chemical													
3251	Basic chemical manufacturing	1.16	635	$74,435	0.84	157	32.8%	-6.0%	$12,488	20.2%	17.3%	-10.6%	18.4%
3252	Resin, rubber, & artificial fibers mfg.	ND	ND	ND	ND	ND	ND	-14.4%	ND	ND	23.3%	ND	ND
3253	Agricultural chemical manufacturing	3.08	420	$78,669	0.96	-49	-10.4%	-10.7%	$39,755	102.2%	28.7%	-9.7%	62.5%
3254	Pharmaceutical & medicine mfg.	2.05	2,182	$69,426	0.69	578	36.0%	-4.8%	$17,092	32.7%	15.2%	6.0%	-11.4%
3259	Other chemical product & prep. mfg.	0.59	191	$53,571	0.80	44	29.9%	-19.7%	$17,563	48.8%	16.2%	15.1%	16.9%
3391	Medical equipment & supplies mfg.	0.78	917	$60,969	0.94	-133	-12.7%	-0.2%	$4,927	8.8%	20.5%	ND	7.7%
4246	Chemical merchant wholesalers	1.03	482	$63,657	0.81	53	5.8%	1.9%	$5,915	14.0%	17.8%	-3.0%	-17.0%
Niche: Instruments & Precision Components													
3334	HVAC & commercial refrigeration equip.	1.55	757	$49,980	0.94	-65	-7.9%	-16.9%	$7,030	16.4%	11.2%	-27.2%	4.8%
3353	Electrical equipment manufacturing	3.24	1,696	$54,197	0.81	-397	-19.0%	-10.9%	ND	ND	24.9%	-25.4%	17.0%
3359	Other electrical equip. & component mfg.	1.07	494	$38,680	0.59	-296	-37.5%	-11.4%	-$10,849	-21.9%	28.7%	15.2%	22.6%
3343	Audio & video equipment manufacturing	1.14	88	ND	ND	-25	-22.1%	-39.0%	ND	ND	38.9%	-5.4%	ND
3344	Semiconductor & elec. component mfg.	0.31	452	$69,511	0.77	-123	-21.4%	-15.9%	$9,667	16.2%	23.6%	-15.5%	7.1%
3345	Electronic instrument manufacturing	1.40	2,220	$77,316	0.81	24	1.1%	-5.8%	$14,860	23.8%	24.7%	-14.7%	19.5%
4236	Electric goods wholesalers	0.71	853	$61,756	0.73	-145	-14.5%	-8.7%	$5,863	10.5%	20.5%	-8.8%	1.6%
4251	Electronic markets & agents & brokers	0.24	759	$71,498	0.80	57	8.1%	9.0%	$8,626	13.7%	22.5%	-9.5%	5.9%
5413	Architectural & engineering services	0.89	4,645	$74,796	0.84	-954	-17.0%	-3.3%	$11,072	17.4%	20.5%	-9.9%	5.3%
Target Support Operations													
4841	General freight trucking	1.06	3,664	$44,497	0.98	-514	-12.3%	-9.9%	$5,826	15.1%	7.0%	-15.5%	6.6%
4931	Warehousing & storage	1.11	2,803	$39,449	0.91	ND	ND	7.4%	$6,027	18.0%	14.6%	-2.6%	2.4%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Employment and wage data in the previous table point to the following trends:

- **Heavily-concentrated subsectors** include glass and glass product manufacturing (LQ = 3.71); foundries (3.73); boiler, tank and shipping container manufacturing (2.93); hardware manufacturing (2.30); industrial machinery manufacturing (2.44); agricultural, construction, and mining machinery (2.71); agricultural chemical manufacturing (3.08); and electrical equipment manufacturing (3.24).

- In terms of absolute employment, seven subsectors employ over 2,000 workers, and an additional six subsectors employ over 1,000 workers.

- Wages in manufacturing reflect the findings of the **Advance Now** Competitive Assessment, as **all Advanced Manufacturing subsector wage ratios for which data is available are below national subsector wages.**

    - General freight trucking, other general purpose machinery manufacturing, and agricultural and chemical manufacturing have wages within five percent of the national average.

    - Glass and glass product manufacturing has the lowest wage ratio of .37, and average annual wages of $19,671.

    - However, wages in all subsectors increased both between 2005 and 2010, and more recently, between 2008 and 2010. Target strategies for these subsectors must emphasize the retention of these positions, as wage growth is a positive indicator of economic health and prosperity.

As mentioned previously, strategic targeting of Advanced Manufacturing will rely heavily on working with regional manufacturers to retain existing positions and expand operations. Whether through identifying new markets or mapping supply chains, the focus must support existing operations.

Recent announcements of expansions of existing firms include Promega's expansion in Fitchburg and John Deere's expansion in Janesville. Both firms are enlarging their presence in the region, which indicates that these companies are able to operate effectively in the Madison Region and find the workforce needed to sustain profitable operations.

Regional manufacturing is also buoyed by the proximity of other complementary sectors. The production of medical devices, medical instruments, and pharmaceuticals are closely tied to the biotechnology and life sciences research that are ongoing in the area, especially in departments across the UW–Madison and the public-private Wisconsin Institutes for Discovery. In an optimal supply-chain scenario, life sciences breakthroughs at the region's research institutes would be able to leverage regional resources—both funding and expertise— to transition from early research and development phases all the way to production and distribution, without the need to relocate any operations.

Shift-Share Analysis: The following table shows the results from a shift-share analysis of the subsectors in Advanced Manufacturing. National economic contraction is evident as all subsectors experienced job loss of three percent attributable to the national shift share.

Subsector dynamics attributable to national subsector trends ("jobs from industry mix"), were largely negative. Only employment in agricultural, construction, and mining machinery manufacturing; medical equipment and supplies manufacturing; and electronic markets and agents and brokers showed positive growth patterns. Economic conditions in the Madison Region show some subsectors that resisted national and industry trends and other subsectors that mirrored them.

ADVANCED MANUFACTURING SHIFT-SHARE ANALYSIS, 2005-2010

NAICS	Subsector	Net Employment Change	Jobs from National Shift	Jobs from Industry Mix	Jobs from Regional Factors
Niche: Machinery and Materials					
3261	Plastics product manufacturing	ND	ND	ND	ND
3272	Glass and glass product manufacturing	-448	-47	-375	-26
3315	Foundries	-702	-71	-641	10
3324	Boiler, tank, and shipping container mfg.	104	-26	-31	161
3325	Hardware manufacturing	24	-6	-55	84
3327	Machine shops and threaded product mfg.	-478	-50	-52	-376
3331	Ag., construction, and mining machinery mfg.	-296	-74	71	-293
3332	Industrial machinery manufacturing	ND	ND	ND	ND
3333	Commercial and service industry machinery	ND	ND	ND	ND
3339	Other general purpose machinery mfg.	-133	-62	-239	167
4231	Motor vehicle and parts merchants whls.	-482	-67	-143	-273
4238	Machinery and supply merchant whls.	-179	-65	-111	-2
Niche: Pharmaceutical and Chemical					
3251	Basic chemical manufacturing	157	-14	-14	186
3252	Resin, rubber, and artificial fibers mfg.	ND	ND	ND	ND
3253	Agricultural chemical mfg.	-49	-14	-36	1
3254	Pharmaceutical and medicine mfg.	578	-48	-29	655
3259	Other chemical product and preparation mfg.	44	-4	-25	73
3391	Medical equipment and supplies mfg.	-133	-32	30	-131
4246	Chemical merchant wholesalers	53	-13	21	45
Niche: Instruments and Precision Components					
3334	HVAC and commercial refrigeration equipment	-65	-25	-114	74
3353	Electrical equipment manufacturing	-397	-63	-165	-170
3359	Other electrical equipment and component mfg.	-296	-24	-67	-206
3343	Audio and video equipment manufacturing	-25	-3	-41	19
3344	Semiconductor and electronic component mfg.	-123	-17	-74	-32
3345	Electronic instrument mfg.	24	-66	-62	152
4236	Electric goods wholesalers	-145	-30	-57	-58
4251	Electronic markets and agents and brokers	57	-21	84	-6
5413	Architectural and engineering services	-954	-168	-16	-770
Target Support Operations					
4841	General freight trucking	-514	-125	-288	-100
4931	Warehousing and storage	ND	ND	ND	ND

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Job creation and loss data in the previous table indicates:

- Most notably, **regional economic conditions stimulated the creation of 655 jobs in pharmaceutical and medicine manufacturing**, despite contractions at both the national and industry level.

- Regional economic conditions also created over 100 jobs in boiler, tank, and shipping container manufacturing; other general purpose machinery manufacturing; basic chemical manufacturing; and electronic instrument manufacturing.

- Major job losses attributable to negative economic conditions of the Madison Region include employment in machine shops and threaded products (-376 jobs); agricultural, construction, and mining machinery manufacturing (-293); motor vehicle and parts merchant wholesalers (-273 jobs); other electrical equipment and component manufacturing (-206 jobs); and architectural and engineering services (-770 jobs).

Separations and Hires

The following table shows hiring and separations by target subsector for the third quarter of 2010. The data provides a snapshot into recent Advanced Manufacturing dynamics and indicates the extent to which firms are expanding their workforce. A ratio greater than 1.0 indicates the subsector added more employees than it lost during the quarter.

ADVANCED MANUFACTURING HIRING DYNAMICS, Q3 2010

NAICS	Subsector	Hires	Separations	Ratio	Net Jobs
Niche: Machinery & Materials					
3261	Plastics product manufacturing	896	504	1.78	392
3272	Glass and glass product manufacturing	25	39	0.64	-14
3315	Foundries	106	56	1.89	50
3324	Boiler, tank, and shipping container mfg.	23	25	0.92	-2
3325	Hardware manufacturing	0	0	N/A	0
3327	Machine shops and threaded product mfg.	256	220	1.16	36
3331	Ag., construction, and mining machinery mfg.	79	144	0.55	-65
3332	Industrial machinery manufacturing	87	106	0.82	-19
3333	Commercial and service industry machinery	56	38	1.47	18
3339	Other general purpose machinery mfg.	82	96	0.85	-14
4231	Motor vehicle and parts merchants wholesalers	252	136	1.85	116
4238	Machinery and supply merchant wholesalers	130	215	0.60	-85
Niche: Pharmaceutical and Chemical					
3251	Basic chemical mfg.	39	24	1.63	15
3252	Resin, rubber, and artificial fibers mfg.	0	0	N/A	0
3253	Agricultural chemical mfg.	44	26	1.69	18
3254	Pharmaceutical and medicine mfg.	169	144	1.17	25
3259	Other chemical product and preparation mfg.	0	0	N/A	0
3391	Medical equipment and supplies manufacturing	67	66	1.02	1
4246	Chemical merchant wholesalers	77	71	1.08	6
Niche: Instruments and Precision Components					
3334	HVAC and commercial refrigeration equipment	56	50	1.12	6
3353	Electrical equipment manufacturing	24	60	0.40	-36
3359	Other electrical equipment and component mfg	23	4	5.75	19
3343	Audio and video equipment manufacturing	0	0	N/A	0
3344	Semiconductor and electronic component mfg.	51	27	1.89	24
3345	Electronic instrument manufacturing	123	140	0.88	-17
4251	Electronic markets and agents and brokers	160	186	0.86	-26
5413	Architectural and engineering services	1,290	1,344	0.96	-54
Target Support Operations					
4841	General freight trucking	815	695	1.17	120
4931	Warehousing and storage	528	807	0.65	-279

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Hiring dynamics presented in the previous table demonstrate the following:

- **Roughly half of the subsectors (for which data is available), in the Machinery and Materials niche (six of 13) and the Instruments and Precision**

Components niche (three of seven) had positive hiring patterns during the third quarter of 2010.

- Strong hiring occurred in plastics products manufacturing (ratio of 1.78), foundries (1.89), motor vehicle and parts merchants wholesalers (1.85), basic chemical manufacturing (1.63), agricultural chemical manufacturing (1.69), and other electrical equipment manufacturing (5.75).

- Of the sectors in which hiring outpaced separations, increases in plastics products, motor vehicle and parts merchants wholesalers, and general freight trucking netted a combined 628 new hires (or rehires).

- Subsectors in which separations were much greater than hires include glass and glass product manufacturing (ratio of .64), agricultural, construction, and mining machinery manufacturing (.55), and electrical equipment manufacturing (.40). Such dynamics are unsurprising as manufacturers look to stimulate productivity as demand faces sluggish growth and volatility.

Place

Many Advanced Manufacturing facilities are space- and resource-intensive operations, and capacity for different Advanced Manufacturing processes varies across the eight-county region. The components of the Madison Region's place are critical to existing business exploring expansions and site selectors analyzing relocation potential.

Business Climate

Advanced Manufacturing in the Madison Region enjoys many advantages including competitive wages for employers, utility prices, and strong technical and four-year education institutions. Combined with targeted state-level manufacturing incentives and a history of cutting-edge production, the region is well-situated to be a long-term manufacturing haven.

Manufacturing in the Madison Region is also home to companies producing specialized products such as farm equipment, chemical and biological assays, and tempered glass.

- **Cardinal Glass**: With manufacturing locations in Mazomanie (Dane County), Portage (Columbia County), and Spring Green (Sauk County), the company is an important regional employer. Tempered and insulating glass is produced in Dane County, float glass is produced in Columbia County, and coated glass is produced in Sauk County. Research and development as well as headquarters operations are located in Dane County. Cardinal Glass products can be found in solar panels, insulating windows, and windows designed for high-wind areas.

- **John Deere**: This well-known producer of tractors, engines, and other equipment for turf care, construction, and forestry operations operates a production plant in Horicon (Dodge County) which manufactures lawn and garden equipment, utility vehicles, and golf and turf mowers, and a newly-leased distribution and warehouse operation in Janesville. The company employs over 1,500 workers in the region.

- **Promega**: Located in Fitchburg (Dane County), Promega provides technical support to the Life Sciences industry. Manufacturing over 2,000 different products, Promega is especially known for producing specialized chemicals, enzymes, peptides, antibodies and nucleic acids for use in biological testing and manipulation of cell components). The company employs about 670 workers in its Fitchburg location, but recently announced construction of a new manufacturing plant, which will create an additional 100 jobs.

- **Trek Bicycle**: With locations and manufacturing all over the world, Trek Bicycle's headquarters and manufacturing operations for its domestic high-end frames are in Waterloo (Jefferson County); assembly operations of the bikes are in Whitewater (just outside of Jefferson County). The Waterloo headquarters employs over 800 people. In addition to the Trek name, the company also carries the brand names of Gary Fisher, Bontrager, Klein, and LeMond Racing Cycles.

- **Virent, Inc.**: A producer of renewable fuel, the Madison firm was recently identified as one of the nation's fastest-growing companies by *Inc.* magazine, with a reported 104 percent revenue growth over the past three years.

However, as reflected in variable business climate rankings and input from manufacturers, the Madison Region faces tangible obstacles to further development of the manufacturing sector. A prominent casualty of the manufacturing sector in the Madison Region was the closing of the General Motors' assembly plant in Janesville

(Rock County). The plant stopped producing SUVs in 2008 and was idled in 2009. In operation for over 80 years, the plant and the jobs that it provided were the backbone of Rock County and surrounding communities. The closure of the plant resulted in over 1,000 direct job losses. Estimates of indirect losses have been as high as 10,000 due to the impacts on co-located suppliers throughout the region. Ensuring that dislocated workers have access to training and new opportunities will be important to retain manufacturing talent in the region. In addition, regional manufacturers that historically supplied GM parts require continued assistance adapting and diversifying processes and products to emerging and more sustainable niches of Advanced Manufacturing.

In addition to retaining talent, strategies for further developing advanced manufacturing opportunities must also focus on lowering barriers to entry and supporting small operations. Strategies to effectively assist firms of all sizes and ages are vital to a healthy sector. Thrive and its regional partners must look to opportunities such as facilitating access to capital for start-ups and expanding operations, working to streamline permitting processes, and identifying gaps in regional supply chains to provide value to regional manufacturers and suppliers.

Infrastructure: Among those stakeholders who felt qualified to comment on the business climate on the community survey, they gave average or middle-of-the-road rankings for critical regional distribution infrastructure included road and highway capacity serving developed areas, road and highway capacity serving undeveloped areas, the Dane County Regional airport cargo capacity, and Class I freight rail capacity. Input from cluster stakeholders and focus group participants indicated that distribution channels and logistics capacity could be improved, especially to international markets and to customers beyond the region. Connecting manufacturers with proximate distribution hubs and facilitating understanding of supply chain dynamics will be integral to supporting Advanced Manufacturing.

Supporting Institutions

Given the region's rich history in automobile manufacturing, specifically the past presence GM's Janesville assembly plant, the recent restructuring of American automobile manufacturers' operations has had particularly acute effects on manufacturing employment. Targeting efforts must work to identify niches into which automotive suppliers can transition. Thrive will be unable to effectively pursue comprehensive targeting without partnering or collaborating with key stakeholders and programs, some of which are included below.

- **Wisconsin Manufacturing Extension Partnership:** With a statewide presence, the Wisconsin Manufacturing Extension Partnership (WMEP) supports small

and medium-sized manufacturers. Madison Region manufacturers, located in WMEP's Southwest Region, have access to next-generation manufacturing services which encompass customer focused innovation, systemic continuous improvement, advanced talent management, global engagement, extended enterprise management, and sustainable products and process development. In addition to customized services, WMEP also sponsors special events, workshops to help take Wisconsin manufacturing to the next level.

- **Dane County Airport Foreign Trade Zone:** As discussed in the Competitive Assessment, the Dane County Airport (MSN) is located in the South Central Wisconsin Foreign Trade Zone (FTZ). The designation allows certain categories of imports to circumvent formal customs procedures and potentially be eligible for inverted tariffs and duty exemptions. As markets continue to flatten and international ties become further diffused, leveraging the FTZ to its fullest potential will be an integral step in connecting Madison Region businesses to new suppliers and customers.

- **UW–Madison Research Centers:** UW is home to a number of research programs focusing on advancing production technologies, including the Center for Quick Response Manufacturing, the Center for Quality and Productivity Improvement, UW E-Business Consortium, Biomedical Engineering Center for Translational Research, and Polymer Engineering Center.

AGRICULTURE AND FOOD SYSTEMS

Justifications

- The historic strength of agriculture, especially dairy, in the Madison Region and Wisconsin makes this target a highly-supported priority among regional stakeholders. Many of the counties in the region have among the largest agriculture employment bases in the state.

- The increasing global demand on food systems poses great opportunities for places like the Madison Region with well-developed food systems and distribution channels. The need for fuel alternatives possible through agricultural waste and biomass are also projected increase.

- The Madison Region's employment in bioscience, plant and animal genomics, and agricultural sciences is reflected in high concentrations of animal scientists, soil and plant scientists, and agricultural sciences postsecondary teachers.

- Many facets of the regional economy connect to agriculture, as evidenced by 11 subsectors that each employ over 1,000 workers. Such numbers reveal the deep integration of agriculture with regional prosperity.

- The sector offers multiple points of entry for workers across a range of skill, experience, and education levels.

- The continued dominance of regional dairy and grain production is the backbone of the sector. The presence of the World Dairy Expo in Dane County continues to hallmark the importance of agriculture in the region, making the region "ground zero" for the global dairy industry.

- The sector is well supported by the advanced capacity at UW–Madison in both research and practice fields of agriculture coupled with the strong institutional and programmatic collaboration of organizations and trade groups at the local, state, and national levels.
- Food incubator capacity is especially strong, indicating positive investment in building regional food capacity.

- The Madison Region and Wisconsin are already nationally and internationally known for key food products such as cheese and beer, positioning the region well for marketing its diverse and innovative cluster.

- The target poses strong cross-cluster opportunities with Advanced Manufacturing and Life Sciences targets.

Findings and Strategic Implications

- With employment concentrations in niche subsectors such as support activities for animal production, agricultural chemical manufacturing, animal food manufacturing, and alcoholic beverage merchant wholesalers, it is clear that the Madison Region already encompasses the critical mass necessary for a fully-developed cluster.

- Overall, occupations within the Agriculture and Food Systems target show wages that are lower than the regional average. This could potentially threaten the viability of agriculture as an appealing career choice within the region. However, wages in highly-skilled occupational niches exceed national occupational averages and the regional average annual wage. Still, it will be critical for the region to work to attract and maintain high-quality agriculture and specialty food processing operations that offer competitive wages.

- Age distribution in Agriculture and Food Systems indicates much penetration by younger generations, indicating a sustainable workforce. In addition, in 2010, Madison Region colleges and universities conferred 354 degrees in agriculture-related fields.

- Food security concerns, federal regulations, and shifts in global markets generate instability in the sector that must be constantly monitored.

- Opportunities exist for increased coordination and cooperation between the region's higher education and research institutions and the private sector.

- There is strong potential to broaden the Madison Region's "local food" scope to the entire Midwest and better market the region as a producer of high-quality foods and as an innovator of cutting-edge processes.

Target Profile

Wisconsin is widely known as the dairy epicenter of the nation. However, the agricultural capacity of the Madison Region extends well beyond dairy and encompasses food processing, distribution, and agribusiness. Further, the sector is driven by important synergies with the Life Sciences through plant and animal genomics, animal systems, and environmental service systems. The Agriculture and Food Systems target expands upon traditional notions of food and animal cultivation, and includes the processing, packaging, and delivery of foodstuffs to end-use consumers.

The niches in the target reflect a comprehensive understanding of agriculture economic activity and attempt to capture those businesses and occupations that impact the value chain.

- **Plant and Animal Cultivation:** This niche includes those businesses involved in cultivation and production of agricultural products. Subsectors reflect both dairy and non-dairy farming, support activities for animal and agricultural chemical production, and agricultural machinery. Additional firms involved in this niche include those firms that help implement precision agriculture practices and aid in optimizing farm product output.

- **Food Processing:** Turning raw products and agricultural inputs into consumable products are the key processes included in this niche. With subsectors such as animal slaughtering and processing, animal food manufacturing, and other food and nutrition manufacturing this niche attempts to be inclusive of large operations, as well as small-scale and regional production.

- **Food Systems Development and Distribution:** This niche links food production to consumption and end-use customers. In addition to groceries and restaurants, economic activity such as specialty food stores, farm product wholesale, and warehousing and storage is integral to this niche. New technologies for tracking food shipments and combating food-borne pathogens complement the warehousing and distribution channels of this niche, as well as the Life Sciences target.

These niches also parallel the smaller state-level clusters identified by the UW–Extension report "The Economic Impacts of Agriculture in Wisconsin Counties" (March 2011), including dairy farming and food processing such as breweries.

The Agriculture and Food Systems target represents the entire value chain of food, plant, and animal products. Integral to the development of this target is support for small businesses, including small farms and co-ops. New capacities in food incubators, agricultural career pathway tools, and "buy local" campaigns indicate the feasibility of further developing the cluster. Synergies with all the other targets can lead to much cross-pollination among sectors and work to integrate agriculture into other sectors.

The U.S. Bureau of Labor Statistics forecasts that despite its very small size, employment in agriculture will experience little growth and slow contraction. This dynamic is important as the sector has experienced years of decline. According to the BLS, "Rising costs, greater productivity, increasing urbanization, and greater imports of lumber and fish will cause many workers to leave this industry, although at a slower pace than in the past." Further, consolidation of smaller farms will continue as markets pressure farmers to be more productive. However, the U.S. Department of Agriculture is forecasting that 2011 net farm sector income will be up $24.5 billion over 2010, bringing total net income to $103.6 billion.

However, while downward pressure is exerted on the sector, consumers are demanding new products, especially organics, which is helping moderate workforce shrinkages. Farmers markets, community-supported agriculture (CSA), and locally-grown products along with new marketing techniques through cooperatives are allowing small and medium agriculture operations to remain viable.

Much like other manufacturing sectors, food processing is experiencing increased automation, decreasing the need for labor. According to the Bureau of Labor Statistics, the outcome of such trends will be losses in positions such as packaging and filling machine operators and tenders, while industrial engineers and industrial machinery mechanics will experience occupational demand. Further, some labor-intensive processes, such as slaughtering, meat packing, and other meat, poultry, and fish cutting will resist automation as they have proven difficult to computerize. The demand for prepackaged food is also expected to continue to rise benefitting the occupational outlook for other production workers, such as food batchmakers.

In addition to automation, agriculture is taking advantage of other cutting-edge technology, such as tracking systems, new testing mechanisms, and remote sensing, allowing for safer food systems and precise food cultivation.

In recognition of security threats to food systems, the National Institute of Food and Agriculture is actively soliciting grant proposals for issues such as prevention and control of food-borne pathogens, sustainable food systems, and translational genomics for disease resistance in animals. Development and commercialization of

animal electronic identification, biosensors, and product tracing technologies will be integral aspects of agriculture safety.

Prior to entering the food system, farmers and cultivators are enhancing their ability to optimize information gathering about their produce. Using remote sensing, specialized machinery, and active management systems, farmers can maximize output and account for variability in environmental conditions. Increasing the ease of access to these technologies provides an important opportunity for value-added cross-pollination between agriculture and technology sectors.

Finally, two national legislative issues are germane to this target: the U.S. Farm Bill and the Food Safety Modernization Act (FSMA). Though the U.S. Farm Bill expires in September 2012, the activity of the deficit reduction supercommittee drove the U.S. House and Senate agriculture committees to examine changes to subsidies and direct payments to farmers.

However, the recent failure of the supercommittee to come to an agreement thwarted any decision regarding subsidies. Negotiations will occur in the coming year of 2012, and pressures to cut federal spending will certainly propel lawmakers to scrutinize subsidy payments.

The FSMA, which President Obama signed into law in early 2011, is also of note as the FDA is establishing rules for preventing food-borne illness and expanded science-based regulations for ensuring safe and secure food systems.

Agriculture and agriculture-related products and services are a vital part of the Madison Region's economy. Regional input reflects this role as participants in the **Advance Now** online survey rated agriculture as the fourth most important sector for job creation in the eight-county region. According to a 2009 study by UW–Extension (using data from 2007), agriculture generates almost $60 billion in economic activity and employs more than 350,000 Wisconsinites. The following table provides a brief snapshot of the economic impact of agriculture in the counties of the Madison Region.

REGIONAL ECONOMIC IMPACT OF AGRICULTURE, 2008

County	Business Sales, $ billion	Local and State Taxes Generated, $ millions	Top Commodity	
			Commodity	Sales, $ millions (2007)
Columbia	$1.00	$24.1	Grains	69.2
Dane	$3.45	$117.2	Milk	206.2
Dodge	$2.30	$47.4	Milk	148.8
Green	$1.39	$39.6	Milk	104.7
Iowa	$0.33	$9.6	Milk	81
Jefferson	$7.90	$62.7	Milk	55.5
Rock	$1.45	$36.5	Grains	105.9
Sauk	$0.68	$20.3	Milk	94.9

Source: "The Economic Impacts of Agriculture in Wisconsin Counties," University of Wisconsin-Extension

According to the UW–Extension study, the Madison Region alone has over 59,000 jobs directly related to agriculture, comprising 20 percent of Wisconsin's agriculture employment. Dane County is the second largest county for agriculture in the state.

Further development of businesses within the Agriculture and Food Systems target will require attention to retaining and expanding existing businesses, stimulating entrepreneurship, and forging ties with research and development capacity. Enhanced and more effective marketing efforts that communicate the Madison Region is a destination for artisanal and local food as well as an exporter of quality food products must be cohesive and unified. Collaboration among public and private stakeholders must take place if this target is to leverage all potential opportunities and avoid operating in a silo.

People

This section analyzes the most recent employment and wage data for key Agriculture and Food Systems occupations in the eight-county Madison Region.

Occupational Analysis

The following table shows wage and employment data for selected occupations in the Madison Region in the target.

AGRICULTURE AND FOOD SYSTEMS OCCUPATIONS, 2010

SOC Code	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	**496,550**	**1.00**	**$42,187**	**0.95**	**$44,410**
	Administrative					
11-2022	Sales Managers	1,500	1.20	$98,648	0.86	$114,110
11-3031	Financial Managers	1,600	0.86	$100,312	0.86	$116,970
11-3051	Industrial Production Managers	790	1.41	$87,511	0.91	$95,660
11-3071	Transportation, Storage, & Distribution Managers	320	0.91	$81,572	0.94	$86,630
11-9051	Food Service Managers	750	1.03	$43,785	0.84	$52,220
11-9121	Natural Sciences Managers	220	1.23	$108,720	0.84	$129,320
11-1021	General & Operations Managers	5,430	0.81	$101,579	0.90	$113,100
13-1021	Buyers & Purchasing Agents, Farm Products	40	1.00	$60,347	0.95	$63,540
13-1023	Purchasing Agents, Except Wholesale, Retail, & Farm Products	1,080	1.01	$53,758	0.89	$60,160
13-1199	Business Operations Specialists, All Other*	4,620	1.19	$61,261	0.90	$67,710
13-2011	Accountants & Auditors	3,490	0.83	$62,523	0.91	$68,960
41-3031	Securities, Commodities, & Financial Services Sales Agents	520	0.48	$57,087	0.60	$95,130
41-4012	Sales Representatives, Whls. & Mfg, Except Technical & Scientific Products	5,590	1.05	$64,002	1.02	$62,720
43-3031	Bookkeeping, Accounting, & Auditing Clerks	6,170	0.94	$34,286	0.97	$35,340
43-3051	Payroll & Timekeeping Clerks	610	0.87	$35,059	0.95	$37,070
43-4151	Order Clerks	2,460	2.98	$27,700	0.91	$30,320
43-5071	Shipping, Receiving, & Traffic Clerks	3,220	1.20	$30,015	1.00	$30,070
43-5081	Stock Clerks & Order Fillers	6,740	0.96	$22,856	0.96	$23,790
43-5111	Weighers, Measurers, Checkers, & Samplers, Recordkeeping	370	1.42	$31,814	1.10	$28,990
	Research & Development					
17-1021	Cartographers & Photogrammetrists	150	3.29	$44,349	0.73	$60,970
17-2021	Agricultural Engineers	30	3.05	$88,556	1.18	$74,790
17-2051	Civil Engineers	1,100	1.13	$67,994	0.83	$82,280
17-3025	Environmental Engineering Technicians	20	0.28	$57,001	1.22	$46,820
19-1011	Animal Scientists	110	11.54	$74,438	1.09	$68,170
19-1012	Food Scientists & Technologists	160	3.91	$66,850	1.02	$65,380
19-1013	Soil & Plant Scientists	250	5.28	$59,095	0.94	$62,600
19-2043	Hydrologists	100	3.70	$68,869	0.87	$79,280
19-4011	Agricultural & Food Science Technicians	180	2.73	$38,070	1.08	$35,140
19-4091	Environmental Science & Protection Technicians, Including Health	50	0.45	$41,775	0.94	$44,440
25-1041	Agricultural Sciences Teachers, Postsecondary	210	5.07	$85,084	1.04	$81,760
29-1131	Veterinarians	450	2.11	$77,102	0.83	$92,570
29-2056	Veterinary Technologists & Technicians	480	1.54	$40,984	1.32	$31,030

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

AGRICULTURE AND FOOD SYSTEMS OCCUPATIONS, 2010 (CONTINUED)

SOC Code	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	**496,550**	**1.00**	**$42,187**	**0.95**	**$44,410**
Cultivation						
37-3012	Pesticide Handlers, Sprayers, & Applicators, Vegetation	40	0.44	$30,704	0.98	$31,470
45-1011	First-Line Supervisors of Farming, Fishing, & Forestry Workers	70	0.92	$49,787	1.11	$45,040
45-2011	Agricultural Inspectors	70	1.32	$34,899	0.82	$42,340
45-2041	Graders & Sorters, Agricultural Products	70	0.46	$19,971	0.94	$21,180
45-2091	Agricultural Equipment Operators	290	3.08	$30,079	1.16	$25,970
45-2092	Farmworkers & Laborers, Crop, Nursery, & Greenhouse	160	0.18	$20,788	1.04	$20,040
45-2093	Farmworkers, Farm, Ranch, & Aquacultural Animals	400	3.21	$24,745	1.03	$24,040
Processing/Production						
47-2073	Operating Engineers & Other Construction Equipment Operators	1,310	1.00	$50,984	1.14	$44,830
49-1011	First-Line Supervisors of Mechanics, Installers, & Repairers	1,440	0.89	$64,075	1.04	$61,350
49-3041	Farm Equipment Mechanics & Service Technicians	230	1.94	$37,027	1.07	$34,680
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	330	0.78	$46,013	1.00	$46,140
49-9041	Industrial Machinery Mechanics	1,090	1.01	$44,291	0.94	$47,100
49-9043	Maintenance Workers, Machinery	180	0.66	$37,330	0.93	$40,310
49-9071	Maintenance & Repair Workers, General	4,540	0.95	$38,047	1.04	$36,630
51-1011	First-Line Supervisors of Production & Operating Workers	2,800	1.29	$54,447	0.97	$56,170
51-3091	Food & Tobacco Roasting, Baking, & Drying Machine Operators & Tenders	210	2.87	$29,379	1.02	$28,940
51-3092	Food Batchmakers	820	2.16	$32,972	1.23	$26,820
51-3093	Food Cooking Machine Operators & Tenders	320	2.54	$24,244	0.96	$25,360
51-9032	Cutting & Slicing Machine Setters, Operators, & Tenders	390	1.63	$32,702	1.05	$31,090
51-9061	Inspectors, Testers, Sorters, Samplers, & Weighers	1,830	1.14	$34,069	0.96	$35,550
51-9111	Packaging & Filling Machine Operators & Tenders	2,950	2.21	$29,891	1.08	$27,580
51-9192	Cleaning, Washing, & Metal Pickling Equipment Operators & Tenders	110	1.54	$26,703	0.95	$28,090
51-9198	Helpers--Production Workers	1,560	1.01	$27,083	1.12	$24,240
53-1021	First-Line Supervisors of Helpers, Laborers, & Material Movers, Hand	680	1.05	$44,474	0.97	$45,930
53-1031	First-Line Supervisors of Transp. & Material-Moving Machine & Vehicle Operators	730	0.95	$58,394	1.06	$54,950
53-7011	Conveyor Operators & Tenders	210	1.46	$31,616	1.03	$30,550
53-7062	Laborers & Freight, Stock, & Material Movers, Hand	7,060	0.89	$26,126	1.02	$25,710
53-7063	Machine Feeders & Offbearers	1,580	3.38	$27,137	0.96	$28,170
53-7064	Packers & Packagers, Hand	5,130	1.94	$27,871	1.26	$22,100
53-7199	Material Moving Workers, All Other	90	0.82	$23,225	0.62	$37,480

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

Several trends are easily identified through a review of the target's occupations:

- The **high concentration of expertise in bioscience, plant and animal genomics, and agricultural science** is reflected in high concentrations of animal scientists (LQ = 11.54), soil and plant scientists (5.28), and agricultural sciences postsecondary teachers (5.07).

    - Wages in this occupational niche exceed national occupational averages, with the exception of veterinarians and soil and plant scientists. This niche is highly skilled and average annual wages reflect this premium, the wages range from $40,984 to $77,102.

- Workers that are primarily focused on **cultivation and crop production have lower wages** than the other occupational niches, which range between $19,971 and $49,787.

    - Supervisory positions of farmworkers command the highest wages.

- **Food processing occupations are highly concentrated**, including food and tobacco roasting, baking, and drying machine operators (2.87); food batchmakers (2.16); and food cooking machine operators and tenders (2.54).

    - The U.S. Bureau of Labor Statistics forecast that demand for packaging and filling machine operators and tenders would decrease by 2018, a dynamic that could potentially impact 2,950 Madison Region workers.

- **Processing and production occupation wages tend to compare well with national occupational averages.** Of the 23 occupations analyzed, 22 show wages that are above, equal to, or within six percent of the national occupational average. The only occupation that shows wages significantly below the national occupational average is all other material moving workers (.62).

- Overall, **occupations within the Agriculture and Food Systems target show wages that are lower than the regional average**. Of the 55 occupations assessed, less than half (25) have wages that exceed $42,187. Further, only 23 of the selected occupations (42 percent) have average annual wages that exceed the nation's average of $44,410.

Talent Development

Pre-K–12: Connecting students with agriculture and teaching them about where food originates is an important aspect of getting young people excited about a future in agriculture and food-related careers.

- **The Center for Integrated Agricultural Systems (CIAS)** at UW–Madison is helping in this regard by providing high school teachers with a curriculum, entitled "Toward a Sustainable Agriculture." The curriculum teaches students about the "social, environmental and economic impacts of agriculture" and covers topics such as sustainable horticulture, the growing organics market, field crops, and animals.

- **The National FFA Organization** (formerly known as the Future Farmers of America) is very active in Wisconsin. While the Wisconsin organization does not provide regional statistics on membership, their information indicates that 40,000 students are enrolled in agricultural education and 17,000 of those students are organization members.

- **4-H** is another youth organization with a strong presence in Wisconsin. Founded as the youth development arm of the USDA's National Institute of Food and Agriculture, 4-H has over 35,000 members in Wisconsin.

Higher Education: In 2010, Madison Region colleges and universities granted 2,260 certificates and degrees—representing approximately 20 percent of all regional higher education awards—that are germane to the Agriculture and Food Systems target, including biology and physical sciences. Of those target-related awards, 354 certificates and degrees directly within the agriculture field were conferred.

AGRICULTURE AND FOOD SYSTEMS POSTSECONDARY COMPLETIONS, 2010

Degree category	Certificate below baccalaureate	Associate's degree	Bachelor's degree	Master's degree	Doctorate / Professional degree	Total
Total, all regional completions	4,478	3,690	11,092	2,470	1,378	23,108
Agriculture- Agriculture Operations and Related Sciences	**77**	**22**	**194**	**43**	**18**	**354**
Agricultural Engineering			17	4	1	22
Agricultural Mechanization	14	16				30
Agricultural Production Operations	17			8		25
Agricultural Public Services			48	13		61
Animal Sciences			49	8	3	60
Applied Horticulture and Horticultural Business Services	40					40
Food Science and Technology			23	6	4	33
Soil Sciences			9	4	3	16
Plant Sciences			22	1	2	25
Biological and Biomedical Sciences			**1,150**	**86**	**142**	**1,378**
Biochemistry- Biophysics and Molecular Biology			184	7	51	242
Biological and Biomedical Sciences- Other			5			5
Botany/Plant Biology			13	8	6	27
Biotechnology				24		24
Genetics			72	15	15	102
Natural Resources and Conservation			**29**	**39**	**18**	**86**
Physical Sciences			**166**	**67**	**74**	**307**
Personal and Culinary Services	**75**	**60**				**135**
Total, all target-related completions	*152*	*82*	*1,539*	*235*	*252*	*2,260*

Source: National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)

Higher education data, seen in the previous table, support the following trends:

- Conferral of target-related degrees was dominated by **degrees in biological and biomedical sciences (61.0 percent) and agriculture (15.7 percent).**
    - Within the biological field, 17.6 percent of degrees were conferred in biochemistry, biophysics, and molecular biology. Combined with a talent pipeline in related fields such as genetics and plant biology, it is clear that the Madison Region has a competitive advantage for training future target workers.

- **The majority of awards conferred are at least at the bachelor's degree level. This finding reflects the integration of high-technology and complicated processes into agriculture.** With the proliferation of precision agriculture, including the use of remote sensing and geospatial technologies, the premium on higher education will be evident in target niches.

Specific target-related degrees at regional postsecondary institutions include:

- **Blackhawk Technical College:** Technical diplomas in agribusiness, farm business and production management, and horticulture/landscape technician.

- **Madison College:** Programs and certificates in agricultural equipment technology, basic horticulture, farm business and production management, veterinary technician, and wind energy and renewable energy.

- **Moraine Park Technical College:** Associate's degree in water quality technology and certificates in food production and food service production.

- **Southwest Technical College:** Programs and courses in ag power and equipment technician, agribusiness/science technology, dairy herd management, and farm business and production management.

- **UW–Madison:** The Microbiology Doctoral Training Program is ranked 15th in the nation by *U.S. News,* among top biological sciences programs.

    - UW's chemistry program is ranked seventh in the nation among graduate chemistry programs.

    - Undergraduate degrees in agricultural and applied economics, agricultural business management, agronomy, animal sciences, biochemistry, biological systems engineering, biology, dairy Science, food science, genetics, horticulture, landscape architecture, plant pathology, poultry science, soil science, wildlife ecology, biological aspects of conservation, botany, chemistry, environmental sciences, environmental studies, and zoology.

    - Graduate degrees in agricultural engineering, agricultural journalism, agricultural and applied economics (MA, MS, PhD), agroecology (MS), agronomy (MS, PhD), animal sciences (MS, PhD), conservation

biology and sustainable development (MS), dairy science (MS, PhD), food science (MS, PhD), horticulture (MS, PhD), land resources, landscape architecture (MA, MS), plant breeding and plant genetics (MS, PhD), plant pathology (MS, PhD), soil science (MS, PhD), water chemistry, water resources management (MS), wildlife ecology (MS, PhD), zoology (MA, MS, PhD).

Workforce Development: The Madison Region's strength in Agriculture and Food Systems is reflected in the concerted effort by numerous organizations to make sure that the sector has a regionally-trained and available talent pool.

- One of the **Southwest Workforce Development Board**'s several sectors of focus for 2011–2012 is food processing/food manufacturing.

- The **Workforce Development Board of South Central Wisconsin** has identified agriculture as a driver sector on which to designate priority spending.

    - In 2010 the WDBSCW raised funds to partner with the Wisconsin Agriculture Education Foundation and the Wisconsin Agricultural Education and Workforce Development Council to establish statewide training in Agriculture targeted to both new workers and incumbent workers. 230 participants participated in training which included the Wisconsin Agribusiness Academy; Meat Processing Boot Camp; Future Fields; Introduction to Dairy Processing; Orientation to Agriculture Careers; Dairy Processing Hazard Analysis and Critical Control Points (HACCP); Food Processing HACCP; and Landscape Technician Training.

    - The WDBSCW also raised funds to support the launch of the WhyAg website, hosted by the Wisconsin Department of Agriculture, Trade, and Protection. The WhyAg website (whyag.com) serves as a portal for information on Agriculture careers.

- The **Wisconsin Agricultural Education and Workforce Development Council** was established in 2008 and chartered to "Attract, develop and retain the premium workforce required to Grow Wisconsin's agricultural industry, food, and natural resource systems." Providing information on agricultural career pathways, agribusiness, and other specialized training, the

organization is an important state-level resource for developing a skilled agricultural workforce.

  - Training and programs coordinated through the Council include the Wisconsin Agribusiness Academy; Meat Processing Boot Camp; Future Fields; Introduction to Dairy Processing; Orientation to Agriculture Careers; Dairy Processing Hazard Analysis and Critical Control Points (HACCP); Food Processing HACCP; and Landscape Technician Training. Approximately 230 people participated in the sessions.

- **Madison Area Community Supported Agriculture Coalition (MACSAC)** is a consortium of CSAs that work to address issues such as training, diversified revenue sources, expanding customer bases, and educating both growers and consumers. With programs such as technical workshops and mentorship opportunities, MACSAC is dedicated to the development and sustainability of the regional agricultural economy.

- The **UW–Extension, Cooperative Extension** has offices in every Wisconsin county and runs many agriculture-based workforce training and educational programs. Coordinating programs including 4-H Youth Development, Agriculture and Natural Resources, and Community, Natural Resources and Economic Development, extension agents are an on-the-ground resource for community agriculture and food production operations.

- In addition to bachelor's degrees and higher, **UW–Madison College of Agricultural and Life Sciences** enrolls approximately 135 students each year in an abbreviated Short Course. Intended for high school graduates who want to go into agriculture, the courses run November to April for one or two years, and offer over 50 different courses.

  - As part of the Farm and Industry Short Course students may opt to continue participation in the School for Beginning Dairy and Livestock Farmers. The school offers internships, distance learning, and classroom learning options. Since 1995, 34 percent of graduates have started their own businesses.

Workforce Sustainability

The following table highlights target niche areas by age, including young adults (aged 25–34) and Baby Boomers (55–64).

Across all sectors in the Madison Region, approximately 21.5 percent of those working are young adults and 15.5 percent are Baby Boomers. Therefore, within a given subsector, higher concentrations of Baby Boomers or lower concentrations of young adults than the regional share could indicate structural workforce deficiencies and a potential labor shortage.

AGRICULTURE AND FOOD SYSTEMS AGE PIPELINE RATIOS, Q3 2010

NAICS	Subsector	% Young Adults (25-34)	% Baby Boomers (55-64)	Young Adults/ Baby Boomers
	All Employment	21.5%	15.5%	1.39
Niche: Plant & Animal Cultivation				
1111	Oilseed and grain farming	13.6%	15.1%	0.90
1112	Vegetable and melon farming	15.0%	12.5%	1.20
1114	Greenhouse and nursery production	15.3%	17.8%	0.86
1121	Cattle ranching and farming	20.0%	9.5%	2.12
1122	Hog and pig farming	17.5%	23.8%	0.73
1123	Poultry and egg production	19.7%	16.1%	1.23
1129	Other animal production	21.1%	16.8%	1.25
1151	Support activities for crop production	18.8%	13.4%	1.40
1152	Support activities for animal production	21.2%	21.2%	1.00
3253	Agricultural chemical manufacturing	23.2%	12.9%	1.80
3331	Ag., construction, and mining machinery mfg.	15.6%	21.4%	0.73
Niche: Food Processing				
3111	Animal food manufacturing	15.8%	23.0%	0.69
3113	Sugar and confectionery product mfg	35.0%	9.3%	3.77
3116	Animal slaughtering and processing	18.5%	16.6%	1.12
3118	Bakeries and tortilla manufacturing	23.9%	8.8%	2.73
3119	Other food manufacturing	21.0%	12.9%	1.63
3121	Beverage manufacturing	18.9%	18.6%	1.01
Niche: Food Systems Development & Distribution				
4244	Grocery and related product wholesalers	21.6%	15.0%	1.44
4249	Misc. nondurable goods merch. whls.	17.2%	18.8%	0.92
4245	Farm product raw material merch. whls.	13.2%	21.5%	0.62
4248	Alcoholic beverage merchant wholesalers	34.5%	8.5%	4.07
4452	Specialty food stores	14.1%	11.2%	1.26
4451	Grocery stores	15.8%	11.5%	1.38
4453	Beer, wine, and liquor stores	32.7%	6.9%	4.74
4931	Warehousing and storage	21.1%	13.9%	1.51
7221	Full-service restaurants	25.6%	4.8%	5.33
7222	Limited-service eating places	20.4%	4.0%	5.16
7223	Special food services	18.5%	12.5%	1.48
7224	Drinking places, alcoholic beverages	31.2%	6.5%	4.83

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Age pipeline data from the previous table demonstrate the following:

- Age distribution in Agriculture and Food Systems indicates much inclusion of younger generations, but **in the majority of subsectors the share of Baby**

Boomers exceeds the regional average (15.5 percent). Subsectors that have fewer young adults than Baby Boomers, indicated by a ration less than 1.0, are particularly vulnerable to an aging out of workforce knowledge and expertise.

  - These subsectors include oilseed and grain farming (.90); greenhouse and nursery production (.86); agricultural, construction, and mining machinery manufacturing (.73); animal food manufacturing (.69); miscellaneous nondurable wholesale (.92); and farm product raw material merchant wholesale (.62).

- Subsectors that exceed the regional ratio of young adults to Baby Boomers (1.38) include cattle ranching and farming (2.12) support activities for crop production (1.40), agricultural chemical manufacturing (1.80), sugar and confectionery product manufacturing (3.77), and bakeries and tortilla manufacturing (1.63).

  - **Many of the subsectors within the Food Systems Development and Distribution niche have high ratios of young adults to Baby Boomers** as those economic activities provide many young people an entrance to the labor market.

Prosperity

This section presents employment dynamics and wage data for the Agriculture and Food Systems target. According to the 2008 U.S. Farm Bill (officially the Food, Energy and Conservation Act), food that travels less than 400 miles is considered local. With such proximity to Minneapolis, Chicago, and Milwaukee, the Madison Region can grow jobs by leveraging its agriculture and food systems as the center of an upper Midwest "food shed."[2]

Business Sector Analysis

Employment and Wages: The Agriculture and Food Systems target is optimized to encompass the entire value chain of the agricultural spectrum. The following table identifies the subsectors that make up this diverse cluster.

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[2] "Farming for jobs: Can local food movement prove a broader economic engine?" *The Capital Times,* November 30, 2011.

AGRICULTURE AND FOOD SYSTEMS EMPLOYMENT AND WAGES, 2005-2010

NAICS Code	Subsector	Q4 2010 LQ	Q4 2010 Employment	Q4 2010 AAW	Q4 2010 Wage Ratio	Emp, Q4 '05 - Q4 '10 Madison Region # Change	Emp, Q4 '05 - Q4 '10 Madison Region % Change	Emp, Q4 '05 - Q4 '10 US % Change	AAW, Q4 '05 - Q4 '10 Madison Region $ Change	AAW, Q4 '05 - Q4 '10 Madison Region % Change	AAW, Q4 '05 - Q4 '10 US % Change	Q4 '08 - Q4 '10 Madison Region Employment % Change	Q4 '08 - Q4 '10 Madison Region AAW % Change
	All Employment	1.00	500,237	$43,871	0.87	-10,197	-2.0	-3.0	$7,297	20.0%	17.6%	-4.2%	7.1%
Niche: Plant & Animal Cultivation													
1111	Oilseed & grain farming	1.92	323	$45,199	1.23	11	3.5%	39.7%	$9,876	28.0%	27.0%	-14.3%	9.6%
1112	Vegetable & melon farming	0.33	126	$45,199	ND	-22	-14.9%	-0.7%	ND	ND	26.3%	5.0%	ND
1114	Greenhouse & nursery production	1.30	685	$31,964	1.09	ND	ND	-16.6%	$2,483	8.4%	9.3%	56.8%	-8.7%
1121	Cattle ranching & farming	3.11	1,612	$27,940	0.90	494	44.2%	9.8%	$1,202	4.5%	15.5%	2.5%	1.0%
1122	Hog & pig farming	0.75	83	ND	ND	-18	-17.8%	14.0%	ND	ND	11.4%	-15.3%	ND
1123	Poultry & egg production	1.71	261	$38,732	1.02	-25	-8.7%	-2.3%	$4,979	14.8%	25.0%	-10.0%	-54.3%
1129	Other animal production	3.58	243	$40,982	1.20	-206	-45.9%	-6.4%	ND	ND	17.2%	-25.7%	ND
1151	Support activities for crop production	0.21	234	ND	ND	95	68.3%	0.3%	ND	ND	22.3%	12.5%	ND
1152	Support activities for animal production	7.35	762	$50,491	1.46	295	63.2%	0.9%	$22,705	81.7%	19.8%	31.8%	1.4%
3253	Agricultural chemical manufacturing	3.08	420	$78,669	0.96	-49	-10.4%	-10.7%	$39,755	102.2%	28.7%	-9.7%	62.5%
3331	Ag., construction, & mining machinery mfg.	2.71	2,187	ND	ND	-296	-11.9%	-0.1%	ND	ND	35.1%	-4.2%	ND
Niche: Food Processing													
3111	Animal food manufacturing	2.96	592	$69,357	1.25	85	16.8%	5.9%	$5,332	8.3%	17.2%	6.5%	1.0%
3113	Sugar & confectionery product mfg.	1.00	278	$46,093	0.95	-1	-0.4%	-12.1%	$8,034	21.1%	25.9%	-12.9%	32.3%
3116	Animal slaughtering & processing	1.70	3,210	$44,728	1.24	-337	-9.5%	-3.2%	$6,950	18.4%	19.2%	-2.4%	-21.4%
3118	Bakeries & tortilla manufacturing	0.81	884	$27,197	0.74	14	1.6%	-0.5%	$5,597	25.1%	17.3%	-5.9%	12.7%
3119	Other food manufacturing	1.83	1,174	$38,658	0.67	-311	-20.9%	3.9%	-$18,704	-32.6%	24.5%	7.8%	-4.3%
3121	Beverage manufacturing	0.73	471	$50,198	0.95	41	9.5%	-0.1%	-$1,751	-3.4%	11.8%	8.5%	0.3%
Niche: Food Systems Development & Distribution													
4244	Grocery & related product wholesalers	1.12	3,084	$48,141	0.89	169	5.8%	1.9%	$5,915	14.0%	17.8%	0.7%	8.4%
4249	Misc. nondurable goods merchant whls.	1.47	1,839	$50,642	0.99	-60	-3.2%	-9.1%	$7,648	17.8%	21.0%	7.0%	0.1%
4245	Farm product raw material merch. whls.	1.34	394	$34,208	0.66	ND	ND	1.4%	$10,811	46.2%	43.5%	-7.3%	12.5%
4248	Alcoholic beverage merchant whls.	1.48	924	$47,689	0.75	187	25.4%	11.2%	$4,067	9.3%	15.1%	-0.4%	2.2%
4452	Specialty food stores	1.40	1,191	$18,210	0.73	152	14.6%	-11.5%	$1,014	5.9%	8.8%	-5.5%	4.1%
4451	Grocery stores	0.80	7,700	$19,776	0.84	-601	-7.2%	1.1%	$2,429	14.0%	14.3%	-5.3%	2.0%
4453	Beer, wine, & liquor stores	0.86	501	$18,982	0.78	ND	ND	6.1%	$2,034	12.0%	5.4%	ND	-12.7%
4931	Warehousing & storage	1.11	2,803	$39,449	0.91	ND	ND	7.4%	$6,027	18.0%	14.6%	-2.6%	2.4%
7221	Full-service restaurants	1.00	17,340	$13,089	0.75	-964	-5.3%	4.2%	$1,775	15.7%	15.6%	2.3%	11.4%
7222	Limited-service eating places	0.93	14,487	$12,403	0.87	1,100	8.2%	4.1%	$2,092	20.3%	17.1%	5.5%	13.1%
7223	Special food services	0.41	917	$16,988	0.74	ND	ND	3.9%	$1,594	10.4%	20.3%	-9.6%	4.9%
7224	Drinking places, alcoholic beverages	2.85	3,775	$10,950	0.75	-54	-1.4%	-5.0%	$1,661	17.9%	16.3%	2.1%	5.5%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Wage and employment data from the previous table indicate the following:

- In absolute terms, **the target represents a wide swath of the Madison Region's workforce.** With 11 subsectors employing over 1,000 workers, the sustainability and viability of this target is integral to the economic health and vitality of the region.

    - With employment concentrations in niche subsectors such as support activities for animal production (LQ = 7.35), agricultural chemical manufacturing (3.08), animal food manufacturing (2.96), and alcoholic beverage merchant wholesalers (1.48), **it is clear that the Madison Region already encompasses the critical mass necessary for a fully-developed cluster.**

- Employment gains in large subsectors are encouraging. **Between 2005 and 2010 employment in 10 of 24 subsectors (for which data is available), expanded by a greater percentage than the national subsector.**

    - Important expansions include cattle ranching and farming (44.2 percent growth), support activities for animal production (63.2 percent growth), animal food manufacturing (16.8 percent growth), and alcoholic beverage merchant wholesalers (25.4 percent growth).

- **Many sectors experienced double-digit contraction between 2005 and 2010.** Employment losses in other animal production (-45.9 percent), agricultural, construction, and mining machinery manufacturing (-11.9 percent), and other food manufacturing (-20.9 percent) accounted for 813 job losses.

    - Employment in other food manufacturing rebounded between 2008 and 2010, with growth of 7.8 percent. While losses persisted for the other two subsectors, they were less drastic during the past two years.

- **Wages in the target show positive growth between 2005 and 2010.** All subsectors, with the exception of other food manufacturing and beverage manufacturing, experienced five-year growth in average annual wages. Notable growth occurred in support for animal production (81.7 percent growth), agricultural chemical manufacturing (102.2 percent growth), and farm product raw material merchant wholesalers (46.2 percent growth).

- However, despite five-year wage growth, the lingering effects of the Great Recession are apparent as **five subsectors experienced two-year declines in average annual wages** between the fourth quarters of 2008 and 2010.

    - The largest percentage declines occurred in poultry and egg production (-54.3 percent), animal slaughtering and processing (-21.4 percent), and beer, wine, and liquor stores (-12.7 percent). Declining wages are troubling in these sectors as 2010 average annual wages were below $40,000. Further, declining wages dampen consumer power and disposable income in the region.

Farm Employment: As referenced in the **Advance Now** Competitive Assessment, because the U.S. Bureau of Labor Statistics gathers only nonfarm employment, workers engaged in the direct production of agricultural commodities—either livestock or crops—as sole proprietors, partners, or hired laborers are not included in BLS employment figures.

However, the U.S. Bureau of Economic Analysis (BEA) does gather, estimate, and report both farm and non-farm employment. BEA employment data indicates that in 2009, farm employment made up a 2.64 percent share, or 17,625 workers, of the Madison Region's total job base.

Shift-Share Analysis: The following table presents regional subsector job creation, with losses and gains attributed to national, industry, and regional conditions.

AGRICULTURE AND FOOD SYSTEMS SHIFT-SHARE ANALYSIS, 2005-2010

NAICS	Subsector	Net Employment Change	Jobs from National Shift	Jobs from Industry Mix	Jobs from Regional Factors
Niche: Plant & Animal Cultivation					
1111	Oilseed and grain farming	11	-9	133	-113
1112	Vegetable and melon farming	-22	-4	3	-21
1114	Greenhouse and nursery production	ND	ND	ND	ND
1121	Cattle ranching and farming	494	-34	143	384
1122	Hog and pig farming	-18	-3	17	-32
1123	Poultry and egg production	-25	-9	2	-18
1129	Other animal production	-206	-13	-15	-177
1151	Support activities for crop production	95	-4	5	95
1152	Support activities for animal production	295	-14	18	291
3253	Agricultural chemical manufacturing	-49	-14	-36	1
3331	Ag., construction, and mining machinery mfg.	-296	-74	71	-293
Niche: Food Processing					
3111	Animal food manufacturing	85	-15	45	55
3113	Sugar and confectionery product mfg.	-1	-8	-25	33
3116	Animal slaughtering and processing	-337	-106	-7	-223
3118	Bakeries and tortilla manufacturing	14	-26	22	18
3119	Other food manufacturing	-311	-45	102	-369
3121	Beverage manufacturing	41	-13	12	41
Niche: Food Systems Development & Distribution					
4244	Grocery and related product wholesalers	169	-87	143	114
4249	Misc. nondurable goods merch. whls.	-60	-57	-116	113
4245	Farm product raw material merch. whls.	ND	ND	ND	ND
4248	Alcoholic beverage merchant wholesalers	187	-22	105	104
4452	Specialty food stores	152	-31	-88	271
4451	Grocery stores	-601	-249	340	-692
4453	Beer, wine, and liquor stores	ND	ND	ND	ND
4931	Warehousing and storage	ND	ND	ND	ND
7221	Full-service restaurants	-964	-549	1318	-1733
7222	Limited-service eating places	1,100	-402	950	551
7223	Special food services	ND	ND	ND	ND
7224	Drinking places, alcoholic beverages	-54	-115	-77	137

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Job creation and loss dynamics, presented in the previous shift-share table, indicate the following:

- The Madison Region, between 2005 and 2010, **created jobs that are attributable to regional conditions in 14 niche subsectors of the target.**

Further, regional conditions grew employment in five subsector in which employment losses were sustained at the national and industry level.

  - Robust employment growth attributable to regional conditions occurred in cattle ranching and farming (384 jobs), support activities for animal production (291 jobs), specialty food stores (271 jobs), and limited-service eating places (551 jobs).

- **Of the 24 subsectors for which data is available, 10 sustained losses credited to regional conditions.** Out of the 10, only two—other animal production and animal slaughtering and processing—lost jobs attributable to the industry contraction.

  - This finding shows that eight of the 10 subsectors contradicted industry expansion trends. Such a dynamic is troubling as those positions may have moved to other locations.

Small Business Programs: Integral to targeting efforts must be a commitment to supporting small and medium-sized operations. One of the important programs that Thrive has already championed has been the Grocers Buy Local Initiative. A partnership with the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP), the Wisconsin Grocers Association, and UW–Extension's Agricultural Innovation Center (AIC), the program tracked sales of locally-grown Wisconsin products in four Madison Region stores. The pilot resulted in a $1.2 million increase in sales of locally-produced food products (labeled "Something Special from Wisconsin") and accounted for an estimated 26 new jobs by the end of 2010. Expanding programs like the Grocers Buy Local into additional counties and neighboring states will be an important step in leveraging the agricultural sector beyond local consumption.

Participants in the agriculture and food manufacturing focus group said that the sector could really benefit from additional relationships, not only within the sector, but also with other economic clusters in the Madison Region. Innovations with the manufacturing, tourism, and alternative energy sectors will be critical to finding new ways to support the sector. Although best practices will be discussed in further detail in the Strategy, innovations in the agriculture sector that could be replicated include:

- Recent investment by Fromm Family Foods, a Wisconsin pet food manufacturer, to revive a previously shuttered cow and other animal feed mill in Columbus (Dodge and Columbia counties) presents a model to reuse and

redevelop manufacturing facilities. Tapping into the $50 billion pet spending market, the manufacturer is producing large volumes of high-end pet food.

- In Massachusetts, a company is working with local dairy farmers to install anaerobic digesters to transform manure and animal waste into an energy source. With creative financing partnerships a single dairy farm can produce 2.4 million kilowatt hours of electricity annually, the majority of which is sold to the local utility.

- Using a similar process, the research arm of Hewlett Packard outlined in 2010 the feasibility of powering a data center using cow manure. The report argues that a 10,000 head dairy farm has the ability to power a 1-megawatt data center, while also providing for its own utility needs.

Cross-pollination of energy and agriculture is already happening in the Madison Region. With anaerobic digesters operating at some farms in the region, the projects have attracted national attention, including a segment on *NBC Nightly News* featuring Crave Brothers Farmstead Cheese in Dodge County. Dane County has constructed a digester facility to generate methane gas for electricity from three Waunakee dairy farms, with plans for another digester served by Middleton dairy farms. The electricity is then purchased by Alliant Energy.

The concentration of dairy farms in the Madison Region lends to high kilowatt generation potential through anaerobic digestion. Further diffusion of such technology will be an important aspect of creating new opportunities. However, cost and scale are often limiting factors in the widespread adoption of new technologies, especially among smaller operations and independent businesses. Advancing connections within the agriculture sector is a key first step to long-term vitality.

Separations and Hires

The following chart presents the target niches as detailed by hiring and separation dynamics. The subsectors with ratios greater than 1.0 are those sectors that brought on more workers than were let go, in the third quarter of 2010. Intended as a snapshot of niche and subsector health, the dynamics can help inform the strategic agenda, especially as it includes retraining displaced workers and skills matching.

AGRICULTURE AND FOOD SYSTEMS HIRING DYNAMICS, Q3 2010

NAICS	Subsector	Hires	Separations	Ratio	Net Jobs
Niche: Plant & Animal Cultivation					
1111	Oilseed and grain farming	490	406	1.21	84
1112	Vegetable and melon farming	47	62	0.76	-15
1114	Greenhouse and nursery production	7	71	0.10	-64
1121	Cattle ranching and farming	389	247	1.57	142
1122	Hog and pig farming	11	0	N/A	11
1123	Poultry and egg production	25	17	1.47	8
1129	Other animal production	4	14	0.29	-10
1151	Support activities for crop production	94	89	1.06	5
1152	Support activities for animal production	43	49	0.88	-6
3253	Agricultural chemical manufacturing	44	26	1.69	18
3331	Ag., construction, and mining machinery mfg.	79	144	0.55	-65
Niche: Food Processing					
3111	Animal food manufacturing	7	11	0.64	-4
3113	Sugar and confectionery product mfg	58	46	1.26	12
3116	Animal slaughtering and processing	414	304	1.36	110
3118	Bakeries and tortilla manufacturing	139	94	1.48	45
3119	Other food manufacturing	104	94	1.11	10
3121	Beverage manufacturing	22	31	0.71	-9
Niche: Food Systems Development & Distribution					
4244	Grocery and related product wholesalers	599	337	1.78	262
4249	Misc. nondurable goods merch. whls.	129	283	0.46	-154
4245	Farm product raw material merch. whls.	28	34	0.82	-6
4248	Alcoholic beverage merchant wholesalers	44	50	0.88	-6
4452	Specialty food stores	179	199	0.90	-20
4451	Grocery stores	745	748	1.00	-3
4453	Beer, wine, and liquor stores	76	80	0.95	-4
4931	Warehousing and storage	528	807	0.65	-279
7221	Full-service restaurants	4607	4900	0.94	-293
7222	Limited-service eating places	2367	2777	0.85	-410
7223	Special food services	413	318	1.30	95
7224	Drinking places, alcoholic beverages	897	1105	0.81	-208

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Hiring dynamics, as presented in the previous table, evidence the following:

- Of all the subsectors, 41 percent (12 of 29) exhibited expansionary hiring patterns during the third quarter of 2010. **The majority of hiring subsectors are contained within the Food Processing niche and Plant and Animal Cultivation niche.**

- Robust hiring occurred in cattle ranching and farming (ratio of 1.57), agricultural chemical manufacturing (1.69), animal slaughtering and processing (1.36), and grocery and related product wholesale (1.78).

- The same subsectors netted 532 jobs during the quarter.

- Subsectors in which hiring did not outpace separations include greenhouse and nursery production (.10); agricultural, construction, and mining machinery (.55); miscellaneous nondurable goods wholesalers (.46); and warehousing and storage (.65).

- Hiring and separation dynamics in restaurants, limited-service eating places, and drinking places (bars), were dominated by employee losses, but **these trends may point to high turnover among employees rather than downsizing of jobs,** as the corresponding ratios do not imply direct removal of positions.

Place

Business Climate

Industry Presence: The ability of companies to be profitable and find skilled employees is a direct result of the business climate. The Madison Region clearly has a competitive advantage as it is home to companies such as Landmark Cooperative, Monsanto, Associated Milk Producers, Del Monte, and Seneca Foods. Further, New Glarus Brewing Company was recently listed as one of the nation's fastest-growing companies, by *Inc*. Magazine, with reported revenues of $22 million and 56 percent growth over past three years.

Important employers in the region that help drive the Agriculture and Food Systems cluster include:

- **Landmark Services Cooperative**: Representing over 15,000 members and employing over 350 employees, the company is dedicated to creating a sustainable and quality food system. In 2010, the company purchased two energy companies, complementing already existing logistics and financing subsidiaries. Sales in 2010 topped $280 million and returned over $3 million to its members. Landmark is also a recognized leader in implementing precision agriculture techniques.

- **Monsanto**: Though employment is relatively low, about 75 in Middleton at the main facility in the region, the Agracetus Campus focuses on transgenic plant

research and development, with soybean and cotton being the main commodities under study. The facility sits on 4.5 acres and contains approximately 100,000 square feet of lab space and 35,000 square feet of greenhouse space.

- **Kraft/Oscar Mayer:** With approximately 5,000 employees in the region, Kraft/Oscar Mayer is a large employer in the food processing space. The company recently split its operations into two separate businesses, with the Madison-based Kraft/Oscar Mayer as the focal point of the domestic grocery market. Revenues for the Kraft/Oscar Mayer business are estimated at $16 billion.

Smaller and innovative specialty food producers, distributors, and retailers include Fromm Family Foods, Yumtum, New Glarus Brewery, Metcalfe's Market, and Hoesly's Meats.

Public Policy: As mentioned in the Competitive Assessment, the business climate in Wisconsin—while little consensus abides—seems to be gaining positive recognition. Specific agricultural business climate analyses are difficult to find. Participants in the agriculture and food processing focus group indicated that many agriculture-related regulatory schemes were variably enforced and burdensome on small to medium-sized operations. Participants spoke to the presence of a pervasive distrust of government that has colored the relationship.

The recent special session of the Wisconsin legislature included some agriculture-related bills, such as easing restrictions on transportation of farm and manufacturing goods, increasing the cap on small business loans from the Wisconsin Housing and Economic Development Authority, and allowing liquor stores to open two hours earlier.

Prior to the special session, a bill regulating beer wholesale licensing received much debate and frustration from small breweries. Changes to the law preclude breweries from holding wholesale licenses, thus further restricting their ability to jointly distribute. The legislation further reinforces a three tiered system of brewers, distributors, and wholesalers. Further regulations may negatively impact regional brewers to be competitive with larger brewers and may dampen the market for locally-sourced beer and other products.

Infrastructure

Effective infrastructure in the Agriculture and Food Systems target must aid connectivity of products to customers, improve information systems, and facilitate incubation of new start-ups.

Connectivity of Products and Consumers: Logistical considerations, and ease of access, impact the ability of producers to get product to market in a manner that is cost-effective. Stakeholders repeatedly attested to the quality of transportation routes and the ability of the region to maintain quality roads. Further, while cargo handling at the Dane County Airport may trail other competitors, the presence of FedEx is encouraging, especially with their expertise in shipping fragile and nondurable goods.

One of the more acute concerns that arose in the agriculture and food manufacturing focus groups was the lack of distribution hubs and cold storage in the Madison Region. Increasing the distribution and warehousing capacity in the region must be a strategic agenda item.

The Dane County Planning and Development Department recently released a feasibility study of a southern Wisconsin food hub. The hub would be an aggregator of local produce in order to facilitate wholesale and direct sale to consumers. With long-term ambitions to add on-site processing and an integrated business center, the report found that there was unmet buyer demand and that the hub could produce $20 million in sales and generate enough revenue to be profitable, with enough margin to survive price fluctuations.

Food-Related Incubators: The Food Business Innovation Network (FoodBIN) is a public-private partnership supported by Thrive and UW–Extension's Agricultural Innovation Center that provides incubator and shared kitchen space as well as business assistance for start-up food processors. The Madison Region is home to several incubators in the FoodBIN network that provide food-based entrepreneurs space, business development assistance, commercial-grade equipment, and distribution and marketing assistance to get them off the ground. The program is aimed at lowering entry costs, reducing risk, and increasing entrepreneur success. Food incubators in the Madison Region include:

- **Bushel & Peck's Local Market**, Beloit (Rock)
- **FONDUE/Barb's Kitchen**, Monroe (Green)
- **FRIDGE (Food Resource Incubator Developing Green Entrepreneurs)**, Monroe (Green)
- **Mazomanie Heritage Kitchen and Market**, Mazomanie (Dane)

- **Watertown Farm Market Kitchen,** Watertown (Dodge and Jefferson)
- **Wisconsin Innovation Kitchen**, Mineral Point (Iowa)

In addition, the City of Madison is planning a new $1 million food business incubator in its North Side, to be called the Food Enterprise and Economic Development Kitchens, or **FEED Madison**. Funded in part by a Community Development Block Grant and other regional and state donors, the incubator will be the first of its kind in the city. The planned **BioAg Gateway** in Madison will also include kitchen incubator space for food entrepreneurs.

Supporting Institutions

- **World Dairy Expo**: The largest dairy-focused trade show in the world, this annual five-day event has been held in Dane County for the past 45 years. The event generated a direct economic impact of nearly $16 million in the area in 2010, and in 2011 attracted over 68,000 attendees with 2,699 coming from 90 foreign countries.

    - There are serious concerns about future space accommodations at the Alliant Energy Center as the World Dairy Expo grows each year. In December 2011, Dane County assembled a task force of public and private sector leadership to address expansion and funding of the Alliant Energy Center to meet the long-term needs of the World Dairy Expo.

- **Wisconsin Economic Development Corporation (WEDC):** Established in 2011 as a public-private corporation to replace the wholly-public Wisconsin Department of Commerce, the WEDC administers Qualified New Business Venture Capital Gains certification. Agriculture businesses are eligible to be certified and may receive investment from qualified investors.

- **Wisconsin Entrepreneurs' Network (WEN):** This state-level group administers Dairy 2020 Early Planning Grants, which are developed for dairy producers residing in towns with populations less than 6,000. The grant helps cover a portion of hiring a for-profit, in-state contractor to develop a comprehensive business plan. Grants are capped at $3,000 and recipients must provide a 25% match.

- **Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP):** The Division of Agri-Business of DATCP publishes a

clearinghouse of business resources for helping small businesses develop and grow, aptly titled Got Moola? With links to trade groups, government funding opportunities, venture capital funds, and angel investor networks, Got Moola? is one of the premium resources for agriculture-based businesses in Wisconsin.

- **University of Wisconsin-Extension:** The Cooperative Extension–Agriculture and Natural Resources provides data and research on agriculture and its value to Wisconsin. Other services include emergency preparedness, information on pests, flood and drought, and the design, development, and evaluation of agriculture and natural resource educational programs.

- **University of Wisconsin-Madison and affiliated research centers:** College of Agricultural and Life Sciences; Babcock Institute for International Dairy Research and Development; Center for Dairy Research; Food Research Institute; J.F. Crow Institute for the Study of Evolution; Land Information and Computer Graphics Facility; Molecular and Environmental Toxicology Center. Highlighted programs include:

    - **Center for Integrated Agricultural Systems:** Works to build sustainable agriculture research programs that respond to farmer and citizen needs. The Center's Eco-Fruit program, an ecological approach to pest control, recently won an award for Exemplary Partnerships at the Wisconsin Idea Symposium in November. Sponsored by grants from the USDA and EPA, the program engaged trade associations, federal agencies, UW–Extension, and other community partners.

    - **Great Lakes Bioenergy Research Center (GLBRC):** Conducts research in pursuit of technology that converts cellulosic biomass to ethanol and other biofuels. A recent study by a GLBRC team and the Department of Energy Joint Genome Institute identified new genes in yeast that can improve the use of a sugar that makes up almost half of all plant sugars. Improved efficiency of the yeast has large impacts for improving the viability of biomass crops, such as switchgrass.

    - **The Wisconsin Bioenergy Initiative:** Performs bioenergy research that pertains to biological and thermochemical conversions, biomass production, improved plants, and environmental and economic impacts.

  - **Center for Dairy Profitability:** Located in Madison, the center works to provide education and applied research to dairy farms and dairy service providers in support of creating sustainable and profitable operations.

- **Statewide trade organizations:** Including the Wisconsin Grocers Association, Wisconsin Milk Marketing Board, Wisconsin Cheese Makers Association, Wisconsin Egg Producers Association, Wisconsin Agribusiness Council, Wisconsin Farm Bureau Federation, and Wisconsin Agri-Service Association.

- **Wisconsin Energy Research Consortium (WERC)**: A relatively new trade group dedicated to providing energy-related consulting, research, and workforce development solutions. With a new office opening in Madison, WERC will be a key partner, especially in developing bioenergy capacity and research.

HEALTH CARE

Justifications

- The Madison Region boasts a historically-strong Health Care sector due to the output and influence of UW–Madison's School of Medicine and Public Health. In addition, the IT and business roots in the region provide strong technology, management, and support services to the Health Care sector.

- UW–Madison is not the only postsecondary institution with highly-competitive medical education and training programs; all of the region's higher education institutions offer programs to prepare students and workers in some way for careers in the Health Care field. In addition, middle school and high school programs throughout the region expose the future workforce to Health Care occupations.

- As reported in the Competitive Assessment, the region has a high per-capita number of physicians and hospital beds, compared to the national average and benchmark metros. Many health care providers in the region are nationally recognized for their specializations.

- Several teaching hospitals throughout the region provide residency opportunities for medical students and offer a critical tool to attract and retain physicians to the region.

- The presence and continued expansion of Epic Systems poses an advantage in attracting IT skill that could be more effectively and strategically retained.

- A diverse range of occupations and skill levels in the Health Care sector meet the needs of a broader workforce, from low-skill or entry-level occupations to highly-educated and skilled specialized medical professionals.

- National growth and projections indicate continued expansion as the population ages and as new treatment methods, such as outpatient care, gain popularity.

- Within the Madison Region, the Health Care sector is already closely aligned with Life Sciences activities. The sector also poses the potential for cross-cluster collaborations with the Design and Technology target.

Findings and Strategic Implications

- Over 30 of the occupations in the Health Care cluster are more highly concentrated than the national level. In addition, high employment concentrations in key Health Care information technology and development occupations pose a competitive advantage for the Madison Region in expanding its Health Informatics niche.

- In the health professions and related clinical sciences category, nearly as many doctorates and professional degrees were granted in 2010 as bachelor's degrees.

- Only offices of physicians, under the Medical Care and Wellness niche, have a larger proportion of workers 55–64 than workers 25–34. All other subsectors in the region's core Health Care niches boasted larger proportions of young adult workers than the overall regional share of this age cohort.

- Consistent with national trends, almost all of the region's Health Care subsectors displayed positive short- and medium-term employment growth.

- Many subsectors in Health Care offer wages below the national average, although some wages are growing faster at the regional level than in the U.S. Only offices of dentists pay average annual wages above the national average. These less-competitive wages pose a significant challenge to recruiting and retaining a talented Health Care workforce.

- Most areas of the Madison Region do not have the download speeds, via broadband infrastructure, necessary to engage in two-way telemedicine.

- Ambiguity over federal health care reform implications and a changing regulatory environment will continue to cause uncertainty among health care providers, patients, and support businesses. However, these changes also pose great opportunities for innovative businesses and providers.

- Continued efforts to transition medical technology pioneered by UW–Madison and other postsecondary education and research institutions will be critical to further establishing the Madison Region's target competitiveness. Innovations must be more effectively leveraged to launch start-up firms in the region.

- Retaining the Epic workforce within the Madison Region as young workers turnover will be an important effort in capturing strong health informatics talent.

- As explored in the **Advance Now** Competitive Assessment, the sluggish population growth in most of the Madison Region's counties and net out-migration and low percentages of young adults in some counties pose a major challenge for key niches of the Health Care target that require a growing local population for a consumer base.

Target Profile

This year, 2011, the oldest of the Baby Boom generation turned 65 years old. Baby Boomers are numerically the largest generation in America (75 million), more than twice the size of the generation which preceded them (31 million) and about 15 percent larger than the generations which follow (Generation X, 66 million; Millennials, 65 million). Because of this, the nation will experience remarkably rapid growth within its oldest age cohorts over the next twenty years, heightening demand for health care services, pharmaceuticals, and medical products. According to 20-year population projections from the U.S. Census Bureau, the number of adults in the United States ages 65 to 84 are anticipated to increase by 82 percent while the 85 and up age group will grow by 48 percent. Younger age groups are projected to grow by only two to ten percent.

This sustained surge in demand for services in the Health Care sector corresponds with rapidly-increasing service and administration costs (growing on average at 2.5 times the rate of inflation); mounting accessibility problems (the percentage of U.S. adults on private or employer-provided health insurance has declined for the last eight years); and the implementation of the federal 2010 Patient Protection and Affordable Care Act (PPACA), which aims to balance the health care marketplace for consumers and providers alike. Major changes initiated by PPACA and parallel federal reform efforts include the following:

- Launches online insurance marketplaces, called American Health Benefit Exchanges and Small Business Health Options Program Exchange, which provide one-stop shopping for public and private sector insurance options to expand choice and competition in the marketplace.

- Applies medical loss ratios mandating that insurers must spend between 80 and 85 percent of revenues on medical services or issue rebates to customers.

- Modifies reimbursement policies and rates for Medicare and Medicaid patients.

- Establishes financial incentives and, starting in 2015, Medicare-related penalties to encourage doctors and hospitals to adopt and use electronic health records.

- Creates an excise tax on pharmaceutical and medical device manufacturers and importers based on market share of the company.

- Introduces new rules related to pre-existing conditions, lifetime limits, and continued young adult insurance coverage through age 26 on parental plans.

As the volume of health care is increasing, new models are being adopted to stem ever-escalating costs. A shift from traditional inpatient care to outpatient procedures is a driving trend, decreasing the demand in hospital beds. Hospitals are consolidating and cutting inpatient programs and strengthening ambulatory care and outpatient clinics. Emphasis on prevention and wellness as a cost-saving measure is being driven by insurance companies, in order to reduce costly hospitalizations.

While the impacts and implications of the federal health care reform changes have yet to be seen or fully understood, the outlook for health informatics throughout the transition is strong. According to PricewaterhouseCoopers' Health Research Institute, 86 percent of consumers do not yet access their medical records electronically. It is estimated that in 2010, $88.6 billion was spent by providers on health information technology initiatives, including electronic health records and health information exchanges, which allow for the transfer of clinical information between disparate health care information systems. Industry analysts expect to see 10 to 20 percent growth in health IT in the coming years.

Health Care has long been a leading economic engine for the Madison Region. At the national level, Health Care was the sole net job creator in the private sector during the Great Recession. The Madison Region grew jobs in the health care and social assistance sector at a faster rate than the nation during the recession. The strength of its care providers across the eight counties is highly competitive and a critical component of the region's quality of life. Hospitals and clinics offer a broad range of specialties and access to patients in both urban and rural communities.

This Health Care target encompasses the delivery and administration of medical care and wellness services, the technological innovations that advance the ease and

efficiency of delivering services to patients, and the management and support of comprehensive and specialized health care operations. Broadly, this target provides high wage jobs, ensures entry and advancement opportunities for workers of all skill levels and educational attainment, and contributes to the enhancement of the Madison Region's overall quality of life.

In addition, this sector has attracted and continues to generate a strong support infrastructure. In addition to major hospitals and care providers, the Madison Region is home to firms that specialize in health management software, medical informatics, health insurance, and medical data processing.

Recommended niches for special focus within this Health Care target include:

- **Medical Care and Wellness:** Encompassing existing specialty research areas, including cancer research, pediatrics, rural medicine, public health, heart and vascular care, and outpatient clinics. Major employers in this niche are UW Health, Meriter Health Systems, American Family Children's Hospital, Monroe Clinic, and St. Mary's Hospital.

- **Health Informatics:** Using health care to promote the Madison Region's competitiveness in fields such as telemedicine and rural care, records management and administration, clinical informatics, immunization and response management, biosurveillance, management engineering process improvement, medication management, nursing informatics, organizational patient safety tools, health IT development, public health case reporting, and leveraging the region's major telecommunications assets. Major firms in this niche include GE Healthcare, CPM Marketing, Symphony Corporation, ScheduleSoft Corporation, Nordic Consulting, and Epic Systems Corporation.

- **Management and Support Operations:** Incorporating the subsectors that strengthen and streamline the region's Health Care sector in order to increase efficiency and productivity. These management and support operations include pharmacy benefit management, medical insurance and support, health care consulting, human resources management, government regulations and quality assurance management, financial operations and planning, strategy development and implementation, marketing, equipment and infrastructure planning, and legal counsel. Major employers in this niche include Navitus Health Solutions, CUNA Mutual, SVA Healthcare Services, Clifton Gunderson, WPS Health Insurance, Flad Architects, and DeLair Consulting.

Madison Region residents have access to world-class health care and health specialties. The University of Wisconsin Hospitals and Clinics received national acclaim in the 2011–2012 best hospital rankings from *U.S. News and World Report*. Specialties at St. Mary's and Meriter have received recognition, in addition to those at the university system hospitals. Outside of the City of Madison, Stoughton Hospital and Waupun Memorial Hospital have been recognized as outstanding critical access hospitals by the National Rural Health Association.

A key issue to be explored in the **Advance Now** Strategy is how Thrive can rally leading employers, workforce development providers, educational institutions, and elected leadership to support a true regional approach to branding and sustaining the Madison Region as a competitive region for best practice and innovative health care delivery, management, and information technology, as well as a region with favorable health factors and outcomes for its residents and workforce.

People

This section analyzes the most recent employment and wage data for key Heath Care occupations in the eight-county Madison Region.

Occupational Analysis

In the following tables, the Health Care sector's occupations are divided into core skill areas that cross the target's niches: management and administrative, information technology and development, support, education, practitioner, and technical professions.

HEALTH CARE OCCUPATIONS, 2010

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
	Management & Administrative					
11-3011	Administrative Services Managers	770	0.82	$78,589	0.93	$84,390
11-9111	Medical & Health Services Managers	950	0.86	$92,494	0.99	$93,670
11-9161	Emergency Management Directors	30	0.65	$55,800	0.92	$60,330
43-3021	Billing & Posting Clerks	1,430	0.76	$34,938	1.05	$33,270
43-3061	Procurement Clerks	270	0.94	$38,595	1.04	$37,150
43-4171	Receptionists & Information Clerks	3,830	0.98	$27,050	1.03	$26,260
43-5031	Police, Fire, & Ambulance Dispatchers	330	0.86	$41,169	1.12	$36,900
43-6013	Medical Secretaries	1,320	0.68	$30,515	0.96	$31,820
	Information Technology & Development					
11-3021	Computer & Information Systems Managers	1,360	1.21	$102,750	0.83	$123,280
15-1121	Computer Systems Analysts	2,590	1.34	$70,236	0.86	$81,250
15-1131	Computer Programmers	1,400	1.07	$75,797	1.01	$74,900
15-1132	Software Developers, Applications	2,130	1.09	$78,995	0.87	$90,410
15-1133	Software Developers, Systems Software	660	0.45	$81,234	0.83	$97,960
15-1141	Database Administrators	470	1.16	$68,990	0.91	$75,730
15-1142	Network & Computer Systems Administrators*	1,440	1.11	$61,753	0.86	$72,200
15-1150	Computer Support Specialists	3,800	1.68	$50,574	1.01	$49,930
15-1179	Info. Security Analysts, Web Developers, & Computer Network Architects	1,750	1.84	$69,798	0.88	$79,370
15-2011	Actuaries	160	2.24	$90,101	0.91	$98,620
29-2071	Medical Records & Health Information Technicians	670	0.97	$36,532	1.04	$35,010
	Support					
21-1093	Social & Human Service Assistants	1,210	0.87	$32,210	1.07	$30,100
31-1012	Nursing Aides, Orderlies, & Attendants	7,020	1.24	$26,727	1.06	$25,140
31-1013	Psychiatric Aides	780	3.08	$21,969	0.82	$26,710
31-2011	Occupational Therapy Assistants	120	1.11	$47,381	0.92	$51,300
31-1011	Home Health Aides	4,280	1.11	$22,392	1.03	$21,760
31-2021	Physical Therapist Assistants	180	0.70	$46,630	0.94	$49,810
31-2022	Physical Therapist Aides	80	0.45	$28,561	1.14	$25,000
31-9091	Dental Assistants	800	0.70	$34,807	1.02	$34,140
31-9092	Medical Assistants	1,490	0.73	$31,481	1.06	$29,760
31-9093	Medical Equipment Preparers	180	0.97	$29,207	0.96	$30,350
31-9094	Medical Transcriptionists	640	2.08	$34,588	1.03	$33,530
31-9799	Healthcare Support Workers, All Other	910	1.20	$30,250	0.96	$31,670
39-9021	Personal Care Aides	2,790	1.04	$21,669	1.06	$20,420
53-3011	Ambulance Drivers & Attendants, Except Emerg. Medical Technicians	100	1.32	$28,627	1.19	$24,130

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

HEALTH CARE OCCUPATIONS, 2010 (CONTINUED)

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
	Practicioner					
21-1011	Substance Abuse & Behavioral Disorder Counselors	150	0.49	$46,433	1.14	$40,810
21-1014	Mental Health Counselors	410	0.95	$44,393	1.07	$41,360
21-1015	Rehabilitation Counselors	350	0.80	$37,328	1.04	$35,850
21-1022	Medical & Public Health Social Workers	480	0.86	$48,376	0.98	$49,200
21-1023	Mental Health & Substance Abuse Social Workers	580	1.24	$45,098	1.08	$41,880
29-1021	Dentists, General	320	0.93	$173,234	1.09	$158,770
29-1031	Dietitians & Nutritionists	260	1.24	$58,796	1.08	$54,340
29-1041	Optometrists	150	1.45	$90,517	0.85	$106,750
29-1051	Pharmacists	1,060	1.01	$113,372	1.04	$109,380
29-1061	Anesthesiologists	230	1.69	$171,668	0.78	$220,100
29-1062	Family & General Practitioners	630	1.65	$194,587	1.12	$173,860
29-1063	Internists, General	40	0.20	$189,369	1.00	$189,480
29-1064	Obstetricians & Gynecologists	50	0.64	$189,400	0.90	$210,340
29-1065	Pediatricians, General	140	1.19	$149,446	0.90	$165,720
29-1067	Surgeons	130	0.77	$250,459	1.11	$225,390
29-1069	Physicians & Surgeons, All Other	680	0.59	$222,130	1.23	$180,870
29-1071	Physician Assistants	380	1.19	$82,265	0.94	$87,140
29-1081	Podiatrists	10	0.27	$155,490	1.17	$133,410
29-1111	Registered Nurses	9,990	0.96	$71,307	1.05	$67,720
29-1123	Physical Therapists	700	0.99	$75,538	0.97	$77,990
29-1124	Radiation Therapists	50	0.77	$72,324	0.92	$78,290
29-1126	Respiratory Therapists	380	0.89	$55,276	1.00	$55,200
29-1127	Speech-Language Pathologists	460	1.05	$54,805	0.78	$69,880
29-1128	Therapists, All Other	360	5.70	$33,853	0.65	$51,980
29-1181	Audiologists	50	1.00	$67,269	0.96	$69,840
29-1199	Health Diagnosing & Treating Practitioners, All Other	100	0.82	$86,552	1.06	$81,830
29-2061	Licensed Practical & Licensed Vocational Nurses	1,890	0.66	$41,909	1.01	$41,360
29-2091	Orthotists & Prosthetists	30	1.29	$70,571	1.02	$68,930
	Education					
21-1091	Health Educators	170	0.75	$56,297	1.12	$50,270
25-1071	Health Specialties Teachers, Postsecondary	1,850	3.27	$81,153	0.78	$103,960
25-1072	Nursing Instructors & Teachers, Postsecondary	280	1.33	$62,519	0.95	$66,010

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

HEALTH CARE OCCUPATIONS, 2010 (CONTINUED)

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
	Technical					
29-2011	Medical & Clinical Laboratory Technologists	730	1.14	$55,766	0.98	$56,870
29-2012	Medical & Clinical Laboratory Technicians	610	1.00	$42,082	1.10	$38,190
29-2021	Dental Hygienists	990	1.43	$61,864	0.90	$68,680
29-2031	Cardiovascular Technologists & Technicians	120	0.63	$50,819	1.00	$50,720
29-2032	Diagnostic Medical Sonographers	140	0.68	$78,241	1.21	$64,900
29-2033	Nuclear Medicine Technologists	60	0.71	$71,497	1.04	$69,050
29-2037	Radiologic Technologists & Technicians	940	1.11	$54,565	0.98	$55,730
29-2041	Emergency Medical Technicians & Paramedics	940	1.08	$32,693	0.98	$33,300
29-2051	Dietetic Technicians	50	0.54	$33,558	1.16	$28,820
29-2052	Pharmacy Technicians	1,220	0.94	$28,574	0.97	$29,330
29-2055	Surgical Technologists	350	0.97	$47,042	1.14	$41,310
29-2799	Health Technologists & Technicians, All Other	600	1.75	$50,224	1.19	$42,240
29-9799	Healthcare Practitioners & Technical Workers, All Other	130	0.60	$55,862	1.06	$52,580
51-9081	Dental Laboratory Technicians	220	1.47	$36,475	0.96	$37,980
51-9082	Medical Appliance Technicians	10	0.19	$47,266	1.22	$38,610
51-9083	Ophthalmic Laboratory Technicians	50	0.46	$33,333	1.13	$29,610

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

Several trends are easily identified through a review of the target's occupations:

- **Over 30 of the occupations in Health Care cluster are more highly concentrated than the national level.** The region's highest concentrations of Health Care workers are all other therapists (LQ = 5.7), postsecondary health specialties teachers (3.27), psychiatric aides (3.08), actuaries (2.24), and medical transcriptionists (2.08).

- **Across the cluster's occupations, about half have wages below the national average and half above.** Occupations with average annual wages well over the national occupational averages include physicians and surgeons (wage ratio of 1.23, $222,130 average annual wages), medical appliance technicians (1.22, $47,266), diagnostic medical sonographers (1.21, $78,241), health technologists and technicians (1.19, $50,224), and ambulance drivers and attendants (1.19, $28,627).

- The largest net occupational groups directly employed in the Health Care cluster are registered nurses (9,990 workers); nursing aides, orderlies, and attendants (7,020); home health aides (4,280); and personal care aides (2,790).

- As the digitization of medical records spreads and medical research becomes increasingly complex, a competitive regional Health Care system will require extensive IT infrastructure to support patient care and disease research. Currently, **high employment concentrations (most with LQs over 1.0) in key Health Care information technology and development occupations** pose a competitive advantage for the Madison Region in expanding its health informatics niche.

- Occupations with low concentrations in the region include general internists (.20), podiatrists (.27), software developers of systems software (.45), physical therapist aides (.45), ophthalmic laboratory technicians (.46), substance abuse and behavioral disorder counselors (.49), and dietetic technicians (.54). **The low LQs may indicate shortages in these specialized fields.**

    - However, all of these underrepresented occupations except for systems software developers offer regional wages equal to or higher than the national occupational average.

Talent Development

The Madison Region has extensive resources to build and retain Health Care talent. With an understanding of the value of providing multiple points of entry into the Health Care field, many workforce development programs assist job seekers and employers in recruiting and exposing the future Health Care workforce to the field as well as train the existing workforce to compete and advance in increasingly complex and technical workplaces. Some of the key Health Care talent development programs in the Madison Region follow.

Pre-K–12: The region offers a wide range of programs hosted by schools and health care providers to promote Health Care careers to Pre-K–12 students through hands-on experiences. Highlights of some of these opportunities are listed below.

- **Youth Apprenticeship Programs**: Available to students of Verona Area High School, Waunakee High School, Monona Grove School District, Oregon High School, Edgerton High School, and schools in CESA 5.

- **Certified Nursing Assistant training**: For high school juniors and seniors through Blackhawk Technical College, Beloit Memorial Hospital and McFarland High School.

- **Madison Health Careers Summer Camp**: A five-day program for rising high school sophomores, juniors, and seniors through the South Central Area Health Education Center (AHEC), which serves 13 counties including the eight-county Madison Region. Because of strong sponsorships in the program, the cost to participating students is between $40 and $75.

- **Youth Health Services Corps**: A program of AHEC, this opportunity is offered at Madison East High School, McFarland High School, and Beloit High School.

- **Club Scrub and Advanced Club Scrub**: A program of the Rural Wisconsin Health Cooperative (RWHC) Sauk City that offers an experiential curriculum for junior high or high school students.

- **Health Occupation Student Clinical Experiences**: Available for high school students through Upland Hills Health in Dodgeville.

Higher Education: As evidenced in the following table, a significant portion of the degrees conferred in the Madison Region are in Health Care-related fields. Biological and biomedical sciences comprise the largest share of bachelor's and higher degrees in this group, while health professions and related clinical sciences account for almost all of the sector's certificate and associate's degrees.

HEALTH CARE POSTSECONDARY COMPLETIONS, 2010

Degree category	Certificate below baccalaureate	Associate's degree	Bachelor's degree	Master's degree	Doctorate / Professional degree	Total
Total, all regional completions	4,478	3,690	11,092	2,470	1,378	23,133
Biological and biomedical sciences			**1,150**	**86**	**142**	**1,378**
Computer and information sciences and support svcs.	**76**	**112**	**138**	**58**	**14**	**398**
Family and consumer sciences/human sciences	**143**	**32**	**182**	**10**	**5**	**372**
Health professions and related clinical sciences	**3,063**	**611**	**453**	**238**	**430**	**4,795**
Allied Health and Medical Assisting Services	128	97				97
Allied Health Diagnostic- Intervention- and Treatment Professions	422	100	33			555
Clinical- Counseling and Applied Psychology				27	8	35
Clinical/Medical Laboratory Science/Research and Allied Professions	30	25	21	3		79
Health Aides/Attendants/Orderlies	0					
Health and Medical Administrative Services	120	37				157
Health and Physical Education/Fitness			79	4	1	84
Health/Medical Preparatory Programs			2			2
Hospitality Administration/Management		18				18
Pharmacology and Toxicology			5	3	13	21
Pharmacy- Pharmaceutical Sciences- and Administration				5	133	138
Physiology- Pathology and Related Sciences					22	22
Practical Nursing- Vocational Nursing and Nursing Assistants	2249					2249
Psychology- General			438	14	12	464
Public Health				73	22	95
Registered Nursing- Nursing Administration- Nursing Research and Clinical Nursing		307	270	58	4	639
Total, all target-related completions	*3,282*	*755*	*1,923*	*392*	*591*	*6,943*

Source: National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)

Higher education data in the previous table support the following trends:

- The broad degree and certificate category of **health professions and related clinical sciences comprises the largest degree type grouping in this target.** Within that, certificates in practical nursing make up nearly one third of all postsecondary completions.

- **Registered nursing, nursing administration, and nursing research and clinical nursing was the largest sub-category of associate's degrees** conferred in 2010.

- **Biological and biomedical sciences are by far the strongest bachelor's degree program outputs in the region.** Often these degree programs prepare students for further graduate programs, either in applied or clinical health programs or research fields related to Health Care.

- In the health professions and related clinical sciences category, **nearly as many doctorates and professional degrees were granted in 2010 as bachelor's degrees.**

Every major postsecondary institution in the Madison Region has programs to prepare students for jobs in Health Care.

- **Blackhawk Technical College (BTC)** has a career cluster centered on Health Science, with three distinct pathways offering multiple degree and certificate options: Therapeutic Services, Diagnostic Services, and Health Informatics.

    - In partnership with the Southwest Wisconsin Workforce Development Board and UW–Rock County, BTC participated in the Wisconsin Technical College System's Regional Industry Skills Education (RISE) health care pathways initiative to create a direct Licensed Practicing Nurse (LPN) degree. However, through research efforts the team determined the need for additional health care pathways that are still being developed for implementation: Medical Interpreter, Diagnostic Aide, and Restorative Aide.

    - The RISE grant has also enabled a transfer agreement from BTC's nursing program to UW–Oshkosh's BS in nursing program at the UW–Rock County campus.

- **Madison College** has career clusters in health science and information technology. In the health science cluster, MATC offers extensive specialized health and clinical associate's degrees in applied sciences (A.A.S.) as well as one-year technical diplomas, post-baccalaureate certificate in biotechnology, and advanced technical certificates. Degrees offered include biotechnology laboratory technician, nursing (practical or R.N.), surgical technologist (one-year technical diploma), and bioinformatics.

  - Recently, Madison College received a grant of $759,822 from the U.S. Department of Health and Human Services (HHS) over a two-year period to enable training of 300 health care information technology (HIT) workers.

- **Moraine Park Technical College** offers over 20 programs of study in Health Care-related specialties, including emergency medical technician, health information technology, medical coding specialist, medical transcription, nursing, and phlebotomy technician.

- **Southwest Tech** offers degrees relevant to the Health Care sector and its specific niches, organized under health occupations and information technology. Medical transcription and medical coding programs are available online.

- **Beloit College** offers majors in psychology and health and society.

- **Edgewood College**'s School of Nursing educates and trains nursing students in classrooms and in hands-on clinical placements around Dane County. Edgewood also offers bachelor's degree in psychology, with concentrations in clinical counseling or substance abuse.

  - The Edgewood College Center for Nursing Excellence is a nursing training partnership with Meriter and St. Mary's. The facility has computer-controlled mannequins, a simulation nurses' station, and courses led by clinical experts.

- **UW–Madison** has extensive Health Care degree offerings, from bachelor to post-doctorate. Highlights include the following programs:

  - UW's Center for Pre-Health Advising assists undergraduate students who plan to pursue graduate programs in the health fields. Programs include pre-medicine, pre-dental, pre-pharmacy, pre-occupational therapy, pre-physician assistant, pre-nursing, pre-public health, and pre-physical therapy.

  - Through its School of Medicine and Public Health, one of the nation's top ten medical schools for primary care, UW grants graduate degrees (master's, doctorate, and post-doctorate), Doctor of

Medicine (MD), Master of Public Health, and Master of Physician Assistant Studies (MPAS).

- The School of Medicine and Public Health provides a Medical Scientist Training Program which grants an MD/PhD, and a five-year MD/MPH dual degree.

- Training in Urban Medicine and Public Health (TRIUMPH), a track within the MD program, addresses the health needs and disparities of urban communities. Third-year rotations and the fourth-year preceptorship are based in Milwaukee.

- The Wisconsin Academy for Rural Medicine (WARM) prepares M.D. students to practice rural medicine, with a goal to increase the number of practicing physicians in rural Wisconsin and to improve the public health of rural communities in the state.

- The UW Health Clinical Simulation Program features a 6,500-square-foot advanced clinical simulation facility for UW students, faculty, and staff. The program supports skill development and mastery in procedures, nursing, surgery, anesthesia, pharmaceutical procedures, and pediatrics.

- The Department of Biostatistics and Medical Informatics is housed in the School of Medicine. Faculty and staff programs in this department include biostatistics, clinical trials, medical informatics, and biomedical computing. The program provides training to MS and PhD students as well as a graduate certificate in bioinformatics.

- The UW School of Pharmacy offers many degree and certificate programs—undergraduate, professional, and graduate—from a BS in pharmacology and toxicology to Doctor of Pharmacy (PharmD), PhD and pharmaceutical sciences, and continuing education.

- The Computation and Informatics in Biology and Medicine (CIBM) program is a cross-disciplinary training institute for PhD students in chemistry, computer sciences, statistics, genetics, biochemistry, engineering, mathematics, and other computational and biological fields at UW. The mission of CIBM is to train the next generation of

computer researchers to address biomedical problems. Three sub-areas—biomedical informatics, clinical informatics, and translational informatics—focus on distinct components of the application of medical informatics, from molecular and cells to individuals to transitioning discoveries to a clinical setting.

- UW's top-ranked graduate program in computer science provides Research Assistantships at Epic for first-year students.

- The Wisconsin School of Business, UW's business school, offers a specialization in Health Care management for undergraduate students.

Workforce Development: Providing technical training is a vital way to endow the regional workforce with skills that are in demand by regional employers. With partnerships with existing health care organizations, the following programs prepare students to immediately add value to ongoing operations.

- **Southwest Wisconsin Workforce Development Board**: The SWWDB has identified health care, involving the subsectors of ambulatory health care services, hospitals, and nursing and residential care facilities, as an industry focus for efforts. SWWDB partners with UW–Rock County and Blackhawk Technical College in the RISE health care pathways initiative.

- **Workforce Development Board of South Central Wisconsin:** The WDBSCW leads and partners on some key Health Care workforce training programs.

  - The WDBSCW sponsors and staffs the Health Care Workforce Alliance. Alliance members represent the 12 counties of the WDBs of South Central and Southwest Wisconsin. The Health Care Workforce Alliance seeks to recruit, train, retain, and advance Health Care careers in the WDBs' service areas through a close collaboration of medical employers and workforce development entities.

  - Additionally, in 2009 and 2010 the WIRED grant supported both regional WDBs to collaborate with the Madison Region's four technical colleges, Meriter and St Mary's hospitals, and Edgewood College to establish portable and place-based human patient simulation training platforms. Over 2,440 health care workers and students have received training.

- **Urban League of Greater Madison:** Offers a health care administrative training academy geared toward preparing job seekers for administrative and clerical careers in the health sector. Participants earn credit at Madison College in Medical Terminology, Health Care Customer Service, and Health Care Privacy. Participants are also trained in Epic Software.

- **University of Wisconsin Continuing Studies, Professional Development and Applied Studies:** Offers programs and courses related to health care such as aging and long term care and health education.

- **UW Hospital and Clinics:** The health system provides training for its employees via access to education and training for their employees in career and personal development, computer skills, fundamentals, and leadership development.

    - A 32-week program assists employees at or below the ninth grade reading level, in which employees are paid to attend each week and which is geared toward improving skills in reading, writing, mathematics, medical terminology, anatomy and physiology.

- **Campus Community Partnerships' Health Care Workforce Excellence Center:** The Health Care Workforce Excellence Center is a product of a 2006 study by the UW–Madison Center on Wisconsin Strategy (COWS) that identified the need to help lower-skilled, lower-wage workers in the Southwest and South Central WDBs' service areas to advance professionally through training and education. The program is led by COWS and MATC in collaboration with Meriter, St. Mary's, UW Hospital, other South Madison hospitals, and community-based organization leadership.

Workforce Sustainability

The following table lists the ratios of workers in the Health Care target between the ages of 25 and 34 to workers between the ages of 55 and 64 to compare the region's proportion of "young professionals" to seasoned professionals nearing retirement. The table shows ratios favorable to long-term sustainability in the sector's talent pool, with most subsectors in the target's niches having a larger share of young adults than workers near retirement age.

HEALTH CARE AGE PIPELINE RATIOS, Q3 2010

NAICS	Subsector	% Young Adults (25-34)	% Baby Boomers (55-64)	Young Adults/ Baby Boomers
	All Employment	21.5%	15.5%	1.39
Niche: Medical Care & Wellness				
6211	Offices of physicians	18.2%	20.5%	0.89
6212	Offices of dentists	22.6%	16.1%	1.40
6213	Offices of other health practitioners	22.0%	15.2%	1.45
6214	Outpatient care centers	23.4%	17.9%	1.31
6215	Medical and diagnostic laboratories	24.4%	16.2%	1.51
6216	Home health care services	21.6%	17.3%	1.25
6221	General medical and surgical hospitals	23.8%	18.0%	1.33
6231	Nursing care facilities	20.1%	16.4%	1.22
6233	Community care facilities for the elderly	22.9%	13.9%	1.65
6239	Other residential care facilities	38.0%	12.9%	2.95
6242	Emergency and other relief services	24.8%	21.6%	1.15
Niche: Health Informatics				
5112	Software publishers	59.7%	2.0%	30.29
5182	Data processing, hosting and related services	27.9%	11.8%	2.36
Niche: Management & Support Operations				
4242	Druggists' goods merchant wholesalers	25.1%	11.6%	2.16
4234	Commercial equipment merchant wholesalers	22.8%	14.9%	1.52
4461	Health and personal care stores	24.3%	13.3%	1.83
5242	Insurance agencies and brokerages	23.3%	17.0%	1.37
5251	Insurance and employee benefit funds	30.0%	9.6%	3.12

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Findings from the previous table include the following:

- Only offices of physicians, under the Medical Care and Wellness niche, have a larger proportion of workers 55–64 than workers 25–34.

- **The youngest subsectors are software publishers** (young adults/Baby Boomer ratio of 30.29), insurance and employee benefit funds (3.12) and other residential care facilities (2.95).

All subsectors in the region's core Health Care niches boasted larger proportions of young adult workers (ranging from 18.2 to 59.7 percent) than the overall regional share (14.2 percent).

Prosperity

Employment in health care and social assistance is the largest in the Madison Region, accounting for 13.4 percent of total employment. This section explores the business sector composition and structure of the Health Care cluster in the Madison Region.

Business Sector Analysis

The Madison Region's Health Care cluster is comprised of hospitals, health practitioners' offices, outpatient care centers, medical and diagnostic laboratories, home health services, nursing homes, and mental health facilities. The target also includes IT providers and software and data developers specific to Health Care as well as the management and other operations that support the practice and development of medical care.

Employment and Wages: The following table provides employment trends for the Madison Region's Health Care target.

HEALTH CARE EMPLOYMENT AND WAGES, 2005-2010

NAICS Code	Subsector	Q4 2010 LQ	Q4 2010 Employment	Q4 2010 AAW	Q4 2010 Wage Ratio	Emp, Q4 '05 - Q4 '10 Madison Region # Change	Emp, Q4 '05 - Q4 '10 Madison Region % Change	Emp, Q4 '05 - Q4 '10 US % Change	AAW, Q4 '05 - Q4 '10 Madison Region $ Change	AAW, Q4 '05 - Q4 '10 Madison Region % Change	AAW, Q4 '05 - Q4 '10 US % Change	Q4 '08 - Q4 '10 Region Employment % Change	Q4 '08 - Q4 '10 Madison Region AAW % Change
	All Employment	1.00	500,237	$43,871	0.87	-10,197	-2.0	-3.0	$7,297	20.0%	17.6%	-4.2%	7.1%
Niche: Medical Care & Wellness													
6211	Offices of physicians	0.89	8,182	$91,381	0.98	232	2.9%	11.2%	$12,890	16.4%	16.7%	-1.6%	2.9%
6212	Offices of dentists	0.94	3,038	$74,974	1.41	241	8.6%	6.6%	$16,332	27.9%	11.0%	3.4%	6.9%
6213	Offices of other health practitioners	0.78	2,064	$35,492	0.84	74	3.7%	21.5%	$3,834	12.1%	16.5%	6.2%	1.2%
6214	Outpatient care centers	0.97	2,495	$38,635	0.67	ND	ND	23.9%	$6,087	18.7%	31.2%	26.5%	3.2%
6215	Medical & diagnostic laboratories	0.58	516	$58,271	0.94	ND	ND	15.9%	$15,005	34.7%	17.3%	10.5%	8.1%
6216	Home health care services	0.47	2,033	$31,914	1.08	522	34.5%	32.2%	$7,087	28.5%	21.1%	8.8%	12.7%
6221	General medical & surgical hospitals	1.10	23,221	$53,321	0.93	2,328	11.1%	6.7%	$7,348	16.0%	24.9%	-0.4%	3.3%
6231	Nursing care facilities	0.88	5,922	$28,330	0.93	291	5.2%	6.0%	$4,139	17.1%	16.4%	2.8%	4.8%
6233	Community care facilities for the elderly	1.29	3,800	$21,643	0.87	609	19.1%	21.0%	$1,644	8.2%	15.9%	10.6%	3.5%
6239	Other residential care facilities	0.54	363	$20,935	0.69	-3	-8.0%	-4.4%	$2,460	13.3%	12.6%	4.9%	16.5%
6242	Emergency & other relief services	0.75	430	$27,996	0.84	63	17.2%	9.9%	$3,478	14.2%	21.9%	5.9%	7.1%
Niche: Health Informatics													
5112	Software publishers	4.08	4,120	$118,477	0.96	1,889	84.7%	9.3%	$36,128	43.9%	18.1%	5.6%	16.3%
5182	Data processing, hosting & related svcs.	2.23	2,143	$42,704	0.51	458	27.2%	-7.5%	$8,009	23.1%	27.2%	0.6%	12.9%
Niche: Management & Support Operations													
4242	Druggists' goods merchant wholesalers	ND	ND	ND	ND	ND	ND	-5.5%	ND	ND	14.8%	ND	ND
4234	Commercial equipment merchant whls.	1.21	2,861	$58,433	0.87	-147	-4.9%	-4.8%	$7,393	13.6%	19.0%	-6.3%	13.3%
4461	Health & personal care stores	0.80	3,079	$32,921	0.89	343	12.5%	2.9%	$7,318	28.6%	19.9%	-7.0%	4.0%
5242	Insurance agencies & brokerages	0.78	2,654	$60,546	0.90	386	17.0%	-1.6%	$6,702	12.4%	8.9%	6.7%	6.6%
5251	Insurance & employee benefit funds	1.60	333	$44,183	0.60	ND	ND	10.7%	$14,582	49.3%	15.3%	ND	33.5%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Wage and employment dynamics in the previous table indicate the following:

- Consistent with national trends, **almost all of the region's Health Care subsectors displayed positive short- and medium-term employment growth.**
    - Software publishers, health and personal care stores, insurance agencies and brokerages; data processing, hosting, and related services; and emergency and other relief services saw five-year employment growth at a positive rate faster than the national change.
    - Outpatient care centers (26.5 percent), community care facilities for the elderly (10.6 percent), and medical and diagnostic laboratories

(10.5 percent) experienced the greatest two-year growth in the cluster (between Q4 2008 and Q4 2010).

- **Many subsectors in Health Care offer wages below the national average, although some wages are growing faster at the regional level than in the U.S.** Only offices of dentists pay average annual wages above the national average (1.41 times higher). These less-competitive wages pose a significant challenge to recruiting and retaining a talented Health Care workforce.

    - Although lower than the national subsector averages, the highest average annual wages in the Madison Region's Health Care cluster are in software publishers ($118,477), offices of physicians ($91,381), offices of dentists ($74,974).

    - The lowest wages are found in other residential care facilities ($20,935), community care facilities for the elderly ($21,643), emergency and other relief services ($27,996), and nursing care facilities ($28,330). Five other Health Care subsectors also have average annual wages below the regional average across all sectors of $43,871.

- Despite the strength and presence of the Health Care sector in the Madison Region, **location quotients show employment in key subsectors is less concentrated than the national level.** General medical and surgical hospitals (LQ=1.10), insurance and employee benefit funds (1.60), and subsectors in the health informatics niche show particularly strong concentrations in the region, with LQs over 1.0.

- **General hospitals provide the largest share of employment in the Health Care cluster, employing over 23,000 workers. However, the subsector has seen some decline** since Q4 2008, with a -0.4 percent drop in employment, bucking the national trend of 3.3 percent growth. Still, employment gains prior to Q4 2008 put five-year hospital job growth trends (11.1 percent) ahead of the national average (6.7 percent).

    - Offices of physicians (8,182), nursing care facilities (5,922), and software publishers (4,120) also provide strong employment bases in the Madison Region. All experienced five-year growth.

- Epic Systems announced in November 2011 that it would be launching a major facilities expansion of its Verona headquarters and hiring up to 800 new positions by late 2012.

- Although it employs over 2,000 people in the region, home health care services (.47) has the lowest concentration of workers compared to the national level. Other residential care facilities (.54), medical and diagnostic laboratories (.58), and emergency and other relief services (.75) also have low LQs.

Shift-Share Analysis: The following table shows the results from a shift-share analysis of the subsectors in Health Care. Shift-share analysis for the Health Care sector demonstrates that the sector grew nationally, independent of regional competitiveness. These national trends accounted for much of the growth experienced in the Madison Region.

HEALTH CARE SHIFT-SHARE ANALYSIS, 2005-2010

NAICS	Subsector	Net Employment Change	Jobs from National Shift	Jobs from Industry Mix	Jobs from Regional Factors
Niche: Medical Care & Wellness					
6211	Offices of physicians	232	-239	1,129	-658
6212	Offices of dentists	241	-84	269	56
6213	Offices of other health practitioners	74	-60	488	-354
6214	Outpatient care centers	ND	ND	ND	ND
6215	Medical and diagnostic laboratories	ND	ND	ND	ND
6216	Home health care services	522	-45	532	35
6221	General medical and surgical hospitals	2,328	-627	2,027	928
6231	Nursing care facilities	291	-169	507	-47
6233	Community care facilities for the elderly	609	-96	766	-61
6239	Other residential care facilities	-3	-11	-5	13
6242	Emergency and other relief services	63	-11	47	27
Niche: Health Informatics					
5112	Software publishers	1,889	-67	274	1,682
5182	Data processing, hosting and related services	458	-51	-76	584
Niche: Management & Support Operations					
4242	Druggists' goods merchant wholesalers	ND	ND	ND	ND
4234	Commercial equipment merchant wholesalers	-147	-90	-54	-3
4461	Health and personal care stores	343	-82	161	264
5242	Insurance agencies and brokerages	386	-68	32	422
5251	Insurance and employee benefit funds	ND	ND	ND	ND

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Job change dynamics, as presented in the previous table, indicate that job growth in the Health Informatics niche is notable as gains were driven by regional competitiveness, with over 2,000 jobs attributable to regional conditions. While some of the growth in the following subsectors can be credited to regional competitiveness, most of it was due to the strength of the national health care sector (jobs from industry mix):

- Offices of physicians
- Offices of dentists
- Offices of other health practitioners
- Home health care services
- General and medical surgical hospitals
- Nursing care facilities
- Community care facilities for the elderly

Separations and Hires

The following table shows hiring and separations within the niches of the Health Care sector for the third quarter of 2010. The data provides a snapshot into recent cluster dynamics and indicates the extent to which Health Care firms and employers are expanding their workforce. A ratio greater than 1.0 indicates the subsector added more employees than it lost during the quarter.

HEALTH CARE HIRING DYNAMICS, Q3 2010

NAICS	Subsector	Hires	Separations	Ratio	Net Jobs
Niche: Medical Care & Wellness					
6211	Offices of physicians	645	470	1.37	175
6212	Offices of dentists	255	275	0.93	-20
6213	Offices of other health practitioners	359	350	1.03	9
6214	Outpatient care centers	296	283	1.05	13
6215	Medical and diagnostic laboratories	72	38	1.89	34
6216	Home health care services	348	377	0.92	-29
6221	General medical and surgical hospitals	1,216	1,366	0.89	-150
6231	Nursing care facilities	901	983	0.92	-82
6233	Community care facilities for the elderly	894	1,080	0.83	-186
6239	Other residential care facilities	28	22	1.27	6
6242	Emergency and other relief services	75	80	0.94	-5
Niche: Health Informatics					
5112	Software publishers	494	406	1.22	88
5182	Data processing, hosting and related services	549	160	3.43	389
Niche: Management & Support Operations					
4242	Druggists' goods merchant wholesalers	41	30	1.37	11
4234	Commercial equipment merchant wholesalers	333	281	1.19	52
4461	Health and personal care stores	215	379	0.57	-164
5242	Insurance agencies and brokerages	314	276	1.14	38
5251	Insurance and employee benefit funds	146	125	1.17	21

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Findings from the previous table include the following:

- **More than half of the subsectors in Health Care were expanding their workforces** through hires or rehires in the third quarter of 2010.

- Strong hiring activity occurred in data processing, hosting, and related services (ratio of 3.43); medical and diagnostic laboratories (1.89); offices of physicians (1.37); druggists' goods merchant wholesalers (1.37); and other residential care facilities (1.27).

    - Of these hiring subsectors, **data processing and offices of physicians added the most net jobs.**

- Community care facilities for the elderly, health and personal care stores, and general medical and surgical hospitals shed the most net jobs through separations.

Place

A key element in sustaining and advancing the Madison Region's Health Care sector will be the growth of the regional and state population base. Growth in senior populations is important to sustaining some of the fastest-growing subsectors of Health Care, such as medical and diagnostic laboratories. Nearly 70 percent of online survey respondents indicated they would retire or remain retired in the Madison Region.

Additionally, growth across all age cohorts will be necessary to sustain the region's Health Care workforce and consumers. Strong Health Care providers will continue to contribute to population growth, as health care access and value is a leading quality of life issue for residents. In the **Advance Now** online survey, 75.4 percent of respondents agreed health care in the region is excellent or above average, and ranked health care availability as the strongest component of the region's quality of life.

Major Employers

The Madison Region is home to many large employers in Health Care and its targeted niches, from major hospitals to health IT software development firms. **Epic Systems**, the largest private sector employer in the Madison Region and developer of electronic medical software, is an integral player in the Health Care target. With over 5,000 employees, the privately-held company has big expansion plans for its campus in Verona (Dane County) and could employ near 6,000 people by the end of 2012.

Additional major Health Care employers by county include:

- **Columbia:** Divine Savior Healthcare, Columbus Community Hospital
- **Dane:** UW Hospital and Clinics (including American Family Children's Hospital), SSM Healthcare of Wisconsin (St. Mary's Hospital), Meriter Hospital, UW Medical Foundation, William S. Middleton Memorial Veterans Hospital, Dean Medical Center, Epic Systems, GE Healthcare, American Family Insurance
- **Dodge:** Beaver Dam Community Hospitals, Watertown Regional Medical Center, Agnesian Healthcare
- **Green:** Monroe Clinic
- **Iowa:** Upland Hills Health
- **Jefferson:** Fort Healthcare

- **Rock:** Mercy Health System, Edgerton Hospital, Beloit Health System, Dean Medical Center
- **Sauk:** St. Mary's, Reedsburg Area Medical Center, Sauk Prairie Memorial Hospital, St. Clare Hospital

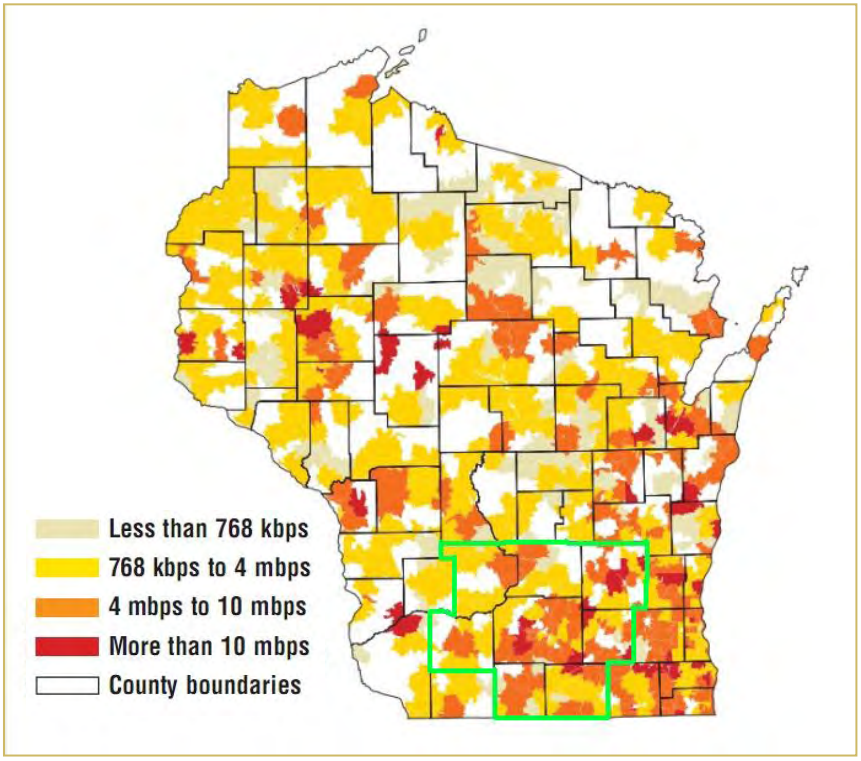
Business Climate and Infrastructure

As medical providers continue the trend away from inpatient hospital care to outpatient procedures, the site and facilities needs of health systems is changing. Rather than locate new clinics within or adjacent to a hospital complex, new facilities are located close to population centers. Demonstrating the strength and sustainability of the communities within the Madison Region will ensure that access to new facilities is equitable across the eight counties.

The Madison Region's health care market is dominated by health maintenance organizations (HMOs). Providing integrated health services, these organizations have kept health care plans local and are maintaining market share, a trend not common in other health care markets in the U.S. According to a national provider of managed care market research, sustained enrollment in provider-owned HMOs has put pressure on employers with locations in multiple states and could have negative implications for attracting national companies with national insurance contracts. Despite the integrated structure of the market, demands for health systems to have their own physicians and clinics have put upward pressure on competition, which has played out in news-making contentious relationships. The high cost of health care as a component of cost of living, as noted in the Competitive Assessment, further complicates the competitive position of the region's Health Care target and may prove a disincentive to businesses to locate in the region.

Technology: New medical care facilities also require a level of technology infrastructure that aging buildings may not have. While most health care technology requirements can be built with new construction or retrofitted to older facilities, communication technology in the form of broadband infrastructure will be a critical component of Health Care's growth and development in the Madison Region. Fiber optic broadband, necessary for two-way telemedicine, requires upload and download speeds between 10 and 25 megabit per second (mbps).

AVERAGE DOWNLOAD SPEED BY ZIP CODE, 2011



Source: Speed Matters

As seen in the previous map, most areas of the Madison Region do not have the download speeds necessary to engage in two-way telemedicine, with only a few areas averaging speeds above 10 mbps.

Supporting Institutions

The Madison Region is home to extensive research facilities and capacity related to Health Care, most housed in the University of Wisconsin–Madison. Many have cross-cluster implications with the region's Life Sciences cluster, and are discussed further in the section of this Target Cluster Analysis focused on Life Sciences. The following centers and institutes drive Health Care and medical services research and development.

- The UW School of Pharmacy's **Sonderegger Research Center** drives research on a number of pharmacy and health services fields, including organization and financing of health care and best practice pharmacy practice. The Center also administers the Pharmacy Practice Enhancement and Action Research Link (PEARL Rx), a statewide network of pharmacists to build capacity for best-practice research and practice.

- The **Games and Simulation for Healthcare Library and Database** is a website that serves as a portal and network to help health care clinicians, academicians, and educators seeking to integrate games and simulation into their research and patient care strategy. This resource is also open to health care consumers, advocates, and other interested in simulation-based learning.

- The **Wisconsin Center for Natural Products Research** (WISC-NPR) promotes interdisciplinary natural product-based translational research to drive drug discovery and development through chemical libraries. Research projects include infectious disease drug discovery.

- The first part of the two-phase **Wisconsin Institutes for Medical Research** focuses on cancer treatment and cure research at its Carbone Cancer Center headquarters, as well as medical physics, imaging science, and radiology research; regenerative medicine and surgery research; and outpatient treatment in radiotherapy.

    - Research sub-divisions of the Carbone Cancer Center include the McArdle Laboratory for Cancer Research (the first basic science cancer center in an academic institution in the United States), the Cancer Health Disparities Initiative, and the Cancer Control Program.

    - The second phase of WIMR, still under construction, will house the Eye Research Institute and expanded facilities for research programs in neuroscience, cardiovascular science, regenerative medicine, and molecular medicine. The base of this facility will house a vivarium for live animal research.

LIFE SCIENCES

Justifications

- Many groundbreaking biotech innovations have been pioneered in the Madison Region, including the first human embryonic stem cells grown in a laboratory.

- The region has as critical mass of talent as evidenced by a sustainable continuum of biology-based degrees and high concentrations of employment in research and development.

- Serious research and development that is ongoing at UW–Madison is a key asset in creating and retaining major bioscience and biotech firms in the region. Increased incubator and accelerator space for biotech companies aids further target development.

- According to BioForward, 75 percent of bioscience jobs created in the state of Wisconsin in 2009 occurred in and around Madison.

- There is strong regional and state support for Life Sciences as a targeted sector for attraction and cluster development.

Findings and Strategic Implications

- Within the region, employment in scientific research and development services grew by 149.5 percent between 2005 and 2010, far outpacing national subsector growth of six percent.

- Employees in scientific research and development services are relatively young, indicating a healthy workforce pipeline that will resist leakage of knowledge due to retirement of Baby Boomers.

- Low concentrations of distribution and business-development occupations drive the need to evaluate talent development through the whole spectrum of target components.

- Low wages, when compared against national subsector averages, indicate structural disadvantages for employees. Such dynamics may induce skilled talent to seek out other opportunities in higher-paying markets.

- The federal regulatory environment for Life Sciences testing, development, commercialization, and distribution is a major challenge for entrepreneurs and firms across the U.S.

- Many companies in this target have fewer than 10 employees, underscoring the need to pursue strategic small business support, where resources to grow are easily accessible.

- Competitive disadvantages stem from a lack of venture capital funding. However, while venture capital is debated at the state level, strategic options for formalizing regional and early-stage funding should be pursued.

- According to stakeholder input, the lack of seasoned entrepreneurial managers is acute in the Madison Region, posing a concern for start-ups that need strong leadership to successfully guide a firm through its challenging early stages and for researchers looking to bring their innovations to market.

- There are opportunities for increased coordination and cooperation between higher education and research institutions and the private sector to bring more innovations to market and generate start-ups and jobs within the Madison Region.

- While there is much public sector growth in the cluster through UW–Madison's activities, there is a need to continue to grow and develop Life Sciences more fully on the private sector side.

- A coordinated and recognizable marketing program is seriously needed to bring the Madison Region's Life Sciences sector additional visibility and outside investment. In the past the region has not asserted itself as a hotbed of biotech activity as aggressively and as well-coordinated as other U.S. regions.

Target Profile

The Life Sciences target is comprised of world-class research, manufacturing, and distribution operations. The Madison Region has a long history of excellence and

innovation in the Life Sciences going back more than 20 years. One of the most important and significant breakthroughs in the sector occurred in 1998 when biologist James Thomson cultured and isolated the first human embryonic stem cells at UW–Madison. Since then, UW has attracted huge amounts of capital and resources dedicated to further bioscience initiatives, including the donation of $50 million to develop the Wisconsin Institutes of Discovery.

The Life Sciences target has been developed with an eye toward existing definitions and tracking efforts. In a September 2010 publication, BioForward, the state-level bioscience membership organization, defined 27 subsectors that make up the bioscience space. Based on the "Battelle/Bio State Bioscience Initiatives 2010" publication, the subsectors are broken into four primary categories: Agricultural Feedstock and Chemical Manufacturing; Drugs and Pharmaceuticals; Medical Devices and Equipment, and Research, Testing, and Medical laboratories. Each category is comprised of detailed six-digit NAICS codes. These categories are used as the basis for the Life Sciences target, and supplemented by additional codes reflecting distribution and logistics operations.

The level of detail afforded in the BioForward publication was not replicable given the data we were able to secure from the Wisconsin Department of Workforce Development. Thus, the numbers presented below will be higher than those published by BioForward.

The Life Sciences target is subdivided into two niche areas:

- **Research, Development, and Testing**: This niche captures the discovery and development, as well as the service delivery, of new bioscience and biotechnology innovations. Subsectors in this niche correspond to those in the Research, Testing and Medical Laboratories category. Activities such as research and development in physical sciences, engineering, and biotechnology, as well as diagnostic imaging are included in this niche.

- **Production and Wholesale**: This niche encompasses the production of inputs, devices, and medicines that are integral to bioscience. Such products include organic chemicals, pesticides, fertilizers, irradiation apparatuses, surgical instruments, and organic fibers. Further, wholesale and specialized logistics aspects are also included as the sector has specific distribution needs.

The Madison Region is at the epicenter of bioscience and biotechnology in Wisconsin. According to BioForward, in 2009, the Madison Region bioscience payroll exceeded $470 million and directly supported over 7,000 jobs. The largest concentrations of employment occur in Drugs and Pharmaceuticals along with

Medical Devices and Equipment. Further, the presence of UW–Madison in the Thrive Region drives sector job gains. Using university research dollars as a basis for job creation, BioForward estimates that in 2009, 75 percent of bioscience jobs occurred in the Madison Region, approximately equivalent to 23,635 jobs.

In a recent report for the Bioscience Industry Organization (BIO), the Madison MSA was one of only two geographies to have employment concentrations that ranked nationally in the top 15 in all four recognized bioscience subsectors. Madison was the only MSA to receive the same distinction in the previous iteration of the same report.

Employment in Life Sciences is balanced between large and small companies, as well as new and old companies. According to BioTech Profiles, a regional bioscience networking membership organization, as of 2009, approximately two-thirds of Madison area bioscience companies (those in their database) have fewer than 25 employees and almost 13 percent have over 100 employees. The critical mass of bioscience and biotech firms is evident as companies have steadily been formed over the past 20 years. Also reported by BioTech Profiles, between 1990 and 2000 the Madison area (geography parameters unspecified) formed, on average, three companies per year; over the past decade, the rate has increased to eight companies per year.

Madison Region companies in the bioscience space are truly diverse and extremely innovative. Some, like Promega, overlap with other identified target clusters. Other major employers include:

- **Covance**: A global developer of drugs provides services in the Madison area primarily devoted to early development of drugs, through Phase IIa of the clinical trial process. Other services in Madison include toxicology, drug metabolism, and program management services.

- **GE Healthcare–Life Support Solutions**: A product of UW–Madison research, the company manufactures anesthesia and critical care ventilation machines. The company's market share is estimated at 75 percent.

- **Pharmaceutical Product Development (PPD)**: With two labs in Middleton, WI, the company employs around 600 workers. The Madison Region labs provide analytical services for drug development and perform bioanalytics to measure all types of compounds.

- **Thermo Fisher Scientific**: With more than 400 employees in the Madison Region, the company manufactures molecular spectroscopy and microanalysis products.

Nationally, the outlook for companies and employees in the Life Sciences target is strong. According to the U.S. Bureau of Labor Statistics, the aging of the population will be an important dynamic that increases the demand for new drugs and pharmaceuticals. Other breakthroughs and innovations in disease-resistant crops, enzymatic manufacturing, and bioinformatics will continue to attract research dollars and spur new products and services.

Researchers at the Wharton School at the University of Pennsylvania have teamed up with industry experts to identify key trends and factors that will influence the future of life sciences and biotechnology arena. The Bioscience Crossroads Initiative forecasts that important factors will include the customization of therapeutics and personalized medicine, nano-scale treatments, proliferation of bioterrorism, increasing needs for better agricultural production, and cost reduction. Some of the technological breakthroughs will likely surround medical robotics, biodefense, nutraceuticals, genomics, biometrics, and cloning.

The same research also articulates the uncertainties that will likely play a role in how the sector develops. Questions surrounding legislative priorities and constraints will certainly accompany new cell and biological therapies, especially those originating from human stem cells. Other ambiguities revolve around funding cycles, public acceptance of new research, artificial life forms, intellectual property, and the supply of qualified workers.

As can be seen in the Advanced Manufacturing target, many of the technologies that will fuel new manufacturing opportunities will be very much related to new opportunities in bioscience. Along with other sectors, such as agriculture and information technology, the Life Sciences sector should be pursued not in a silo, but in close synergy with other economic activities.

People

Occupational Analysis

The following table presents employment and wage data for selected occupations in the Life Sciences target. The occupational data indicates that the Madison Region houses many of the critical skills and expertise needed for a robust bioscience cluster. With occupations ranging from research and development to distribution and

manufacturing, the cluster has proven that it can attract top talent and take product to market.

LIFE SCIENCES OCCUPATIONS, 2010

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
Research, Development, & Testing						
11-9041	Engineering Managers	650	0.95	$113,492	0.90	$125,900
11-9121	Natural Sciences Managers	220	1.23	$108,720	0.84	$129,320
15-2041	Statisticians	50	0.56	$67,374	0.89	$76,070
17-2021	Agricultural Engineers	30	3.05	$88,556	1.18	$74,790
17-2041	Chemical Engineers	160	1.43	$132,095	1.40	$94,590
17-2071	Electrical Engineers	790	1.36	$76,852	0.88	$87,770
17-2072	Electronics Engineers, Except Computer	190	0.36	$78,624	0.85	$92,730
17-2081	Environmental Engineers	210	1.08	$69,996	0.84	$83,160
17-2112	Industrial Engineers	910	1.15	$65,966	0.84	$78,450
17-2141	Mechanical Engineers	980	1.07	$66,492	0.81	$82,480
19-1011	Animal Scientists	110	11.54	$74,438	1.09	$68,170
19-1012	Food Scientists & Technologists	160	3.91	$66,850	1.02	$65,380
19-1013	Soil & Plant Scientists	250	5.28	$59,095	0.94	$62,600
19-1021	Biochemists & Biophysicists	130	1.46	$58,262	0.67	$86,580
19-1022	Microbiologists	300	4.19	$55,694	0.77	$72,030
19-1023	Zoologists & Wildlife Biologists	40	0.59	$53,833	0.87	$61,660
19-1031	Conservation Scientists	280	3.80	$64,865	1.06	$61,200
19-1041	Epidemiologists	60	3.26	$76,452	1.12	$68,280
19-1042	Medical Scientists, Except Epidemiologists	1,400	3.83	$52,881	0.61	$86,710
19-1029	Biological Scientists, All Other	250	2.10	$57,091	0.80	$71,310
19-2012	Physicists	130	1.97	$82,143	0.73	$112,020
19-2021	Atmospheric & Space Scientists	140	4.15	$79,298	0.90	$88,010
19-2031	Chemists	470	1.50	$56,083	0.77	$73,240
19-2041	Environmental Scientists & Specialists, Including Health	420	1.32	$71,248	1.05	$67,810
19-2042	Geoscientists, Except Hydrologists & Geographers	40	0.33	$85,944	0.92	$93,380
19-2099	Physical Scientists, All Other	960	9.95	$82,508	0.86	$95,780

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

LIFE SCIENCES OCCUPATIONS, 2010 (CONTINUED)

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
Research, Development, & Testing (Continued)						
19-4011	Agricultural & Food Science Technicians	180	2.73	$38,070	1.08	$35,140
19-4021	Biological Technicians	450	1.58	$33,713	0.81	$41,740
19-4031	Chemical Technicians	200	0.86	$37,960	0.86	$44,200
19-4099	Life, Physical, & Social Science Technicians, All Other	320	1.48	$44,569	0.97	$45,980
25-1041	Agricultural Sciences Teachers, Postsecondary	210	5.07	$85,084	1.04	$81,760
49-9062	Medical Equipment Repairers	80	0.62	54,153	1.17	46,380
Production						
Cross-cluster occupations with Advanced Manufacturing						
Distribution						
11-3071	Transportation, Storage, & Distribution Managers	320	0.91	$81,572	0.94	$86,630
41-4011	Sales Rep, Whls. & Mfg., Technical & Scientific Products	1,170	0.79	$75,677	0.90	$84,360
43-5011	Cargo & Freight Agents	20	0.06	$42,349	1.09	$39,020
53-2012	Commercial Pilots	70	0.60	$74,259	1.01	$73,490
53-3032	Truck Drivers, Heavy & Tractor-Trailer	6,530	1.14	$38,668	0.98	$39,450
53-3033	Truck Drivers, Light or Delivery Services	3,110	1.02	$31,895	0.99	$32,140
53-7064	Packers & Packagers, Hand	5,130	1.94	$27,871	1.26	$22,100
53-7199	Material Moving Workers, All Other	90	0.82	$23,225	0.62	$37,480
Education						
25-1022	Mathematical Science Teachers, Postsecondary	180	0.89	$83,606	1.14	$73,480
25-1042	Biological Science Teachers, Postsecondary	210	0.99	$98,963	1.14	$86,570
25-1052	Chemistry Teachers, Postsecondary	90	1.09	$80,536	1.01	$80,070
25-1054	Physics Teachers, Postsecondary	120	2.28	$93,439	1.08	$86,560

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

Several trends are easily identified through a review of the target's occupations:

- Scientific knowledge clustering is evident as research, development, and testing occupations are very highly concentrated.
    - High occupational concentrations include agricultural engineers (3.05), animal scientists (11.54), food scientists and technologists (3.91), soil and plant scientists (5.28), microbiologists (4.19), and all other physical scientists (9.95).

- **Occupational wages show some parity with national averages, but many occupations pay less than the national occupational average.** The lowest wage ratio occurs in medical scientists (except epidemiologists, .61) and the highest ratio occurs in chemical engineers (1.40).

- With the exception of three technician occupations, **all of the scientific and highly-skilled positions afford wages above the regional average.** Such dynamics indicate that these positions are critical to keeping wealth in the region.

- Some dynamics within the distribution aspect of the Life Sciences target are concerning. **While truck drivers and packagers are abundant, those occupations that develop business, such as wholesalers and sales representatives, are less concentrated.**

  - Wholesale and manufacturing sales representatives for technical and scientific products have a location quotient of .79 and have wages below the national average.

  - Regional air and cargo occupational capacity is troubling as freight and cargo agents are few and commercial pilots have a location quotient of .60. Increasing occupational capacity in this segment of the Life Sciences space should be a strategic priority.

Talent Development

Pre-K–12: Investing in science, technology, engineering, and mathematics (STEM) education from an early age is integral to producing students who will be able to compete in an increasingly global labor market. Further, homegrown talent will be crucial to addressing such issues as aging infrastructure, energy independence, and sustainable practices. The Madison Region has a number of resources that cater to encouraging young students to be excited about science and math.

- **State of Wisconsin Youth Apprenticeship Program (YAP):** In concert with the Department of Workforce Development, the BioPharmaceutical Technical Center (BTC) Institute assists in coordinating the YAP experience. The program enrolls a select group of high school juniors and seniors for two years of study and real world experience in a lab setting. For the 2011-2012 school year worksites include Primorigen Biosciences, BTC Institute, and

UW–Madison Departments of Bacteriology, Biochemistry, Food Sciences, and Genetics, among others.

- **UW–Madison** plays an integral role in bringing STEM educational opportunities to young people. While the university has many more such programs, the following programs are selected to provide a snapshot of the breadth of the programming available:

    - **Institute for Chemical Education (ICE):** Based out of the chemistry department at UW–Madison, ICE works to communicate science to multiple audiences, including students, as young as four years old. ICE partners with the Boys and Girls Club of Dane County as well as sponsors its own programming, including outreach via interactive websites, science shows, and summer chemistry camps.

    - **Engineering Summer Program:** Situated within the College of Engineering, this program is a six-week residential program targeted at historically under-represented groups, including racial and ethnic groups, as well as women. With classes in calculus, physics, chemistry, engineering and technical communications, the program is designed to immerse students in STEM. Weekend activities and site visits complement the rigorous schedule.

    - **Wisconsin Junior Science, Engineering and Humanities Symposium (JSEHS):** Held on campus, this two-day event seeks to teach high school students about careers in science, engineering, and mathematics. Sponsored by a grant from the U.S. Department of Defense, the program provides students various presenting and listening opportunities, as well as lab visits and panel discussions.

- **WISTEM.org:** Acting as a portal "for all things STEM" in Wisconsin, WISTEM.org is an online clearinghouse that provides links to resources, programming, and funding opportunities that further STEM education. With Pre-K–12 educators identified as one of three key stakeholders, WISTEM.org aims to connect students and teachers with a diverse suite of STEM resources.

Higher Education: The following table highlights regional higher education program completions. The Life Sciences target is dependent on highly skilled employees, thus it is encouraging to see high numbers of biology-based degree conferrals.

LIFE SCIENCES POSTSECONDARY COMPLETIONS, 2010

Degree category	Certificate below baccalaureate	Associate's degree	Bachelor's degree	Master's degree	Doctorate / Professional degree	Total
Total, all regional completions	4,478	3,690	11,092	2,470	1,378	23,108
Biological and Biomedical Sciences			**1,150**	**86**	**142**	**1,378**
Biochemistry- Biophysics and Molecular Biology			184	7	51	242
Biological and Biomedical Sciences- Other			5			5
Biology- General			534			534
Biology Technician/Biotechnology Laboratory Technician		8				8
Biomathematics- Bioinformatics- and Computational Biology				1		1
Biotechnology				24		24
Botany/Plant Biology			13	8	6	27
Genetics			72	15	15	102
Microbiological Sciences and Immunology			94	18	15	127
Pharmacology and Toxicology			5	3	13	21
Natural Resources and Conservation			**29**	**39**	**18**	**86**
Physical Sciences			**166**	**67**	**74**	**307**
Engineering	**10**	**222**	**640**	**312**	**101**	**1,285**
Biomedical/Medical Engineering			53	24	8	85
Chemical Engineering			49	2	15	66
Mathematics and statistics			**151**	**41**	**32**	**224**
Computer and Information Sciences and Support Services	**76**	**112**	**138**	**58**	**14**	**398**
Computer and Information Sciences and Support Services- O	8	10				10
Computer and Information Sciences- General	0		102	58	14	174
Computer Engineering	0	0	27			27
Computer Programming	38	3				3
Computer Science			6			6
Computer Software and Media Applications	6	20				20
Computer Systems Analysis			30			30
Health Professions and Related Programs	**3,063**	**611**	**453**	**238**	**430**	**4,795**
Pharmacy- Pharmaceutical Sciences- and Administration				5	133	138
Total, all target-related completions	*3,149*	*945*	*2,727*	*841*	*811*	*8,473*

Source: National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)

Higher education data from the previous table evidence the following trends:

- While health professions account for 56.6 percent of regional target-related degree completions, a very small percentage of those degrees are directly related to the target.
    - Pharmacy and pharmaceutical sciences degree conferrals are concentrated in doctoral degrees.
- More than 1,300 degrees were granted in biology-related fields of study and over 1,200 in engineering. **However, biomedical engineering accounted for only 6.6 percent of all engineering degrees conferred in the region.**
- Total target degree conferrals represent 36 percent of all regional conferrals, confirming the presence of a strong and stable pipeline of talent.
    - **However, there is some concern in the region that graduates lack enough practical experience to be a high-value asset to a biotech company soon after graduation.** Ensuring graduates have the skills to be successful in the marketplace will be an important aspect of talent retention for the region.

Specific target-related programs are as follows:

- **Madison College** offers certificates and training in various disciplines that are directly related to the Life Sciences target. Programs including the bioinformatics certificate and biotechnology post-baccalaureate certificate are especially important to the cluster. Further, training as biotechnology lab technicians and electron microscopy technicians provide skills that are immediately applicable to Life Sciences companies.
    - In 2005, the Madison College received a grant from the National Science Foundation and subsequently started the post-baccalaureate intensive certificate program. The one-semester program provides advanced laboratory techniques and an introduction to the business of biotechnology.
- **Beloit College** has a robust offering of biology-related degrees including mathematical biology, environmental biology, and molecular, cellular, and integrative biology.

  - Beloit College also offers the **Summer Biomedical Research Scholars Program** which funds eight weeks of mentored biomedical lab research and living expenses in Chicago.

- **Edgewood College** offers five majors and four minors through its Natural Science Department. Additional natural science teaching majors and minors are also offered. Specific concentrations in biology include chemistry, geoscience, and physics.

- **UW–Madison** is the largest producer of graduates in the bioscience and biotechnology space in the region. The excellence of UW–Madison is evident through *U.S. News and World Report* rankings, including a top 20 ranking for its doctoral program in biological sciences (ranked third in microbiology). Further, the undergraduate chemical engineering was ranked sixth in the nation. UW–Madison offers over twenty programs of study related to the Life Sciences target, ranging from certificates to doctoral programs, including animal sciences, biological systems engineering, bacteriology, biophysics, laboratory quality management, and cellular and molecular pathology.

- **UW–Whitewater** offers degrees in biology, chemistry, integrated science and business, and physics. Emphases in biology include cell biology, physiology, ecology and field biology, marine and freshwater ecology.

Workforce Development: Biotechnology is a sector identified by the **Workforce Development Board of South Central Wisconsin** as a strategic regional investment area. The WDBSCW has partnered with BioForward to capture $195,000 grants to provide infrastructure support and training to the biotechnology industry through three overarching objectives: The launch of a seminar series for human resource development in biotechnology firms; the creation and launch of a pilot peer learning program to transition scientists from an academic to a business setting; and completion of a synopsis of the biotechnology sector in the state.

In addition, the **Southwest Wisconsin Workforce Development Board** has recently added professional, scientific, and technical services to its industry sectors of focus.

Workforce Sustainability

The following table shows the age distribution of workers in the Life Sciences target. With a majority of subsectors exhibiting high shares of young adults, the target workforce is well-situated to weather effects of retiring Baby Boomers.

LIFE SCIENCES AGE PIPELINE RATIOS, Q3 2010

NAICS	Subsector	% Young Adults (25-34)	% Baby Boomers (55-64)	Young Adults/ Baby Boomers
	All Employment	21.5%	15.5%	1.39
Niche: Research, Development, & Testing				
6215	Medical and diagnostic laboratories	24.4%	16.2%	1.51
5413	Architectural and engineering services	29.9%	13.6%	2.19
5417	Scientific research and development services	37.6%	9.1%	4.11
Niche: Production & Distribution				
3112	Grain and oilseed milling	ND	ND	ND
3251	Basic chemical mfg.	22.5%	17.7%	1.27
3252	Resin, rubber, and artificial fibers mfg.	ND	ND	ND
3253	Agricultural chemical mfg.	23.2%	12.9%	1.80
3254	Pharmaceutical and medicine mfg.	26.1%	12.1%	2.16
3345	Electronic instrument mfg.	20.9%	18.0%	1.16
3391	Medical equipment and supplies mfg.	15.6%	22.9%	0.68
4242	Druggists' goods merchant wholesalers	25.1%	11.6%	2.16
4234	Commercial equipment merchant wholesalers	22.8%	14.9%	1.52
4246	Chemical merchant wholesalers	20.6%	12.4%	1.67
4842	Specialized freight trucking	15.7%	18.1%	0.87
4921	Couriers and express delivery services	21.1%	12.3%	1.72

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Age pipeline data from the previous table demonstrate the following:

- The subsector with **the largest share of workers between the ages of 25 and 34 is scientific research and development services** (37.6 percent).
    - Other relatively young subsectors—those with age ratios above the regional average—include medical and diagnostic laboratories (1.51), architectural and engineering services (2.19), agricultural chemical manufacturing (1.80), pharmaceutical and medicine manufacturing (2.16), druggists' good merchants wholesalers (2.16), commercial merchant wholesalers (1.52), chemical merchant wholesalers (1.67), and couriers and express delivery services (1.72).
    - **Subsectors with larger shares of Baby Boomers include primarily manufacturing and distribution operations.**

The integral role that UW–Madison plays in the research and development process propagates a sustained infusion of new young talent into the target subsectors.

Prosperity

Business Sector Analysis

Employment and Wages: As mentioned in the Target Profile, the basis for this target sector is the set of bioscience subsectors identified by BioForward and Battelle. Supplemented with additional subsectors representing distribution and logistics, this target represents some of the most dynamic and cutting-edge economic activity in the region.

LIFE SCIENCES EMPLOYMENT AND WAGES, 2005-2010

		Q4 2010				Emp, Q4 '05 - Q4 '10			AAW, Q4 '05 - Q4 '10			Q4 '08 - Q4 '10	
NAICS Code	Subsector	LQ	Employment	AAW	Wage Ratio	Madison Region # Change	Madison Region % Change	US % Change	Madison Region $ Change	Madison Region % Change	US % Change	Madison Region Employment % Change	Madison Region AAW % Change
	All Employment	1.00	500,237	$43,871	0.87	-10,197	-2.0%	-3.0%	$7,297	20.0%	17.6%	-4.2%	7.1%
Niche: Research, Development, & Testing													
6215	Medical & diagnostic laboratories	0.58	516	$58,271	0.94	ND	ND	15.9%	$15,005	34.7%	17.3%	10.5%	8.1%
5413	Architectural & engineering services	0.89	4,645	$74,796	0.84	-954	-17.0%	-3.3%	$11,072	17.4%	20.5%	-9.9%	5.3%
5417	Scientific research & dev. svcs.	1.48	3,688	$70,139	0.69	2,210	149.5%	6.0%	$5,554	8.6%	21.7%	-3.7%	8.0%
Niche: Production & Wholesale													
3112	Grain & oilseed milling	ND	ND	ND	ND	ND	ND	-3.6%	ND	ND	11.4%	ND	ND
3251	Basic chemical mfg.	1.16	635	$74,435	0.84	157	32.8%	-6.0%	$12,488	20.2%	17.3%	-10.6%	18.4%
3252	Resin, rubber, & artificial fibers mfg.	ND	ND	ND	ND	ND	ND	-14.4%	ND	ND	23.3%	ND	ND
3253	Agricultural chemical mfg.	3.08	420	$78,669	0.96	-49	-10.4%	-10.7%	$39,755	102.2%	28.7%	-9.7%	62.5%
3254	Pharmaceutical & medicine mfg.	2.05	2,182	$69,426	0.69	578	36.0%	-4.8%	$17,092	32.7%	15.2%	6.0%	-11.4%
3345	Electronic instrument mfg.	1.40	2,220	$77,316	0.81	24	1.1%	-5.8%	$14,860	23.8%	24.7%	-14.7%	19.5%
3391	Medical equipment & supplies mfg.	0.78	917	$60,969	0.94	-133	-12.7%	-0.2%	$4,927	8.8%	20.5%	ND	7.7%
4242	Druggists' goods merchant wholesalers	ND	ND	ND	ND	ND	ND	-5.5%	ND	ND	14.8%	ND	ND
4234	Commercial equip. merchant wholesalers	1.21	2,861	$58,433	0.87	-147	-4.9%	-4.8%	$7,393	13.6%	19.0%	-6.3%	13.3%
4246	Chemical merchant wholesalers	1.03	482	$63,657	0.81	53	5.8%	1.9%	$5,915	14.0%	17.8%	-3.0%	-17.0%
4842	Specialized freight trucking	0.97	1,458	$43,227	0.97	-355	-19.6%	-7.3%	$3,641	9.2%	15.1%	-11.7%	3.8%
4921	Couriers & express delivery services	0.71	1,385	$37,346	0.79	-249	-15.2%	-7.8%	$5,274	16.4%	16.8%	-20.0%	8.8%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Employment and wage data presented in the previous table support the following:

- Employment in the Life Sciences target reflects both an existing foundation of expertise and a continually-developing cluster.
    - **High concentrations of employment in scientific research and development (1.48), agricultural chemical manufacturing (3.08), pharmaceutical and medicine manufacturing (2.05), and commercial**

equipment merchant wholesalers (1.21) indicate existing specialization.

  - Less concentrated sectors, such as medical and diagnostic laboratories (.58), architectural and engineering services (.89), and medical equipment and supplies manufacturing (.78), are equally as important as they employ over 6,000 workers.

- **Growth in employment in scientific research and development services was the most sound, increasing by 149.5 percent**, or 2,210 jobs. Such growth far outpaced the national subsector growth of six percent.

  - Other notable growth subsectors include basic chemical manufacturing (32.8 percent), pharmaceutical and medicine manufacturing (36.0 percent), and chemical merchant wholesalers (5.8 percent).

  - While growth was not as strong as the aforementioned subsectors, **electronic instrument manufacturing had positive growth despite a national subsector contraction.**

- Despite the high skill requirements in many of the target subsectors, **wages still lag national averages.** All of the subsectors for which data is available (with the exception of two distribution-related subsectors), pay average annual wages above the regional average, but none show parity with national subsector wages.

  - Within the Research, Development, and Testing niche, the closest regional wages to the national subsector averages are in medical and diagnostic laboratories (.94).

  - The wage ratio in scientific research and development services (.69) certainly favors employers, but **as skilled researchers are increasingly competing in a global marketplace, Madison Region employers may have trouble finding the best match for vacant positions.**

Shift-Share Analysis: The following table shows job creation and destruction that is attributable to national, industry, or regional conditions.

LIFE SCIENCES SHIFT-SHARE ANALYSIS, 2005-2010

NAICS	Subsector	Net Employment Change	Jobs from National Shift	Jobs from Industry Mix	Jobs from Regional Factors
Niche: Research, Development, & Testing					
6215	Medical and diagnostic laboratories	ND	ND	ND	ND
5413	Architectural and engineering services	-955	-168	-17	-770
5417	Scientific research and development svcs.	2,210	-44	133	2,121
Niche: Production & Distribution					
3112	Grain and oilseed milling	ND	ND	ND	ND
3251	Basic chemical mfg.	157	-14	-14	186
3252	Resin, rubber, and artificial fibers mfg.	ND	ND	ND	ND
3253	Agricultural chemical mfg.	-49	-14	-36	1
3254	Pharmaceutical and medicine mfg.	578	-48	-29	655
3345	Electronic instrument mfg.	24	-66	-61	151
3391	Medical equipment and supplies mfg.	-133	-32	29	-131
4242	Druggists' goods merchant wholesalers	ND	ND	ND	ND
4234	Commercial equipment merchant whls.	-147	-90	-54	-3
4246	Chemical merchant wholesalers	53	-13	21	45
4842	Specialized freight trucking	-355	-54	-78	-223
4921	Couriers and express delivery services	-249	-49	-78	-122

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Job creation and loss dynamics in the previous table indicate the following:

- Two subsectors with high employment concentration, scientific research and development and pharmaceutical and medicine manufacturing, generated many new jobs between 2005 and 2010 from regional conditions.
    - **Employment gains in pharmaceutical and medicine manufacturing attributable to regional conditions (655 jobs) occurred while both the industry and national economy contracted.**
- **Electronic instrument manufacturing and basic chemical manufacturing also posted notable job gains that are attributable to regional conditions.** The viability of many manufacturing subsectors indicates that Madison Region manufacturing is able to adapt and create jobs, despite a difficult economic climate.

- Employment losses in architectural and engineering services far outpaced losses seen at the national and industry level, and were primarily responsible for subsector contraction.

Separations and Hires

Hiring dynamics during the third quarter of 2010 provide a snapshot of the growth and health of the sector. While many sectors showed some growth, the largest gains were made in the distribution aspect of the target. Employment losses in scientific research and development services are especially concerning as that field is the genesis of many new and translatable technologies.

LIFE SCIENCES HIRING DYNAMICS, Q3 2010

NAICS	Subsector	Hires	Separations	Ratio	Net Jobs
Niche: Research, Development, & Testing					
6215	Medical and diagnostic laboratories	72	38	1.89	34
5413	Architectural and engineering services	1,290	1,344	0.96	-54
5417	Scientific research and development services	508	601	0.85	-93
Niche: Production & Distribution					
3112	Grain and oilseed milling	0	0	N/A	0
3251	Basic chemical mfg.	39	24	1.63	15
3252	Resin, rubber, and artificial fibers mfg.	0	0	N/A	0
3253	Agricultural chemical mfg.	44	26	1.69	18
3254	Pharmaceutical and medicine mfg.	169	144	1.17	25
3345	Electronic instrument mfg.	123	140	0.88	-17
3391	Medical equipment and supplies mfg.	67	66	1.02	1
4242	Druggists' goods merchant wholesalers	41	30	1.37	11
4234	Commercial equipment merchant wholesalers	333	281	1.19	52
4246	Chemical merchant wholesalers	77	71	1.08	6
4842	Specialized freight trucking	374	322	1.16	52
4921	Couriers and express delivery services	134	199	0.67	-65

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Data from the previous table indicate the following:

- In absolute terms, **the largest number of hires occurred in architectural and engineering services and scientific research and development services, but separations negated net job growth.**
    - Separations in the two subsectors accounted for a total loss of 147 jobs.

- **Medical and diagnostic laboratories hired nearly twice as many employees as were let go or quit, indicating increased capacity and resources.**

    - Other notable job gains occurred in pharmaceutical and medicine manufacturing (25 jobs), commercial equipment wholesalers (52 jobs), and specialized freight trucking (52 jobs).

With pressure on the target subsectors coming from both U.S. coasts and increasingly from international markets, issues such as funding and regulatory environments will come to play larger roles as maturing businesses decided to relocate or stay in the Madison Region.

Business Establishment Size Dynamics

The following table shows the occurrence of small businesses within the Life Sciences target. Along with the Design and Technology target, targeting efforts pertaining to the Life Sciences sector must focus on developing smaller operations and building resources easily accessible by small firms.

LIFE SCIENCES FIRM SIZE, 2004-2009

NAICS Code	Subsector	1-4 Employees 2009 Total	1-4 Employees 2009 % of all Est	1-4 Employees 04-'09 % Change	5-9 Employees 2009 Total	5-9 Employees 2009 % of all Est	5-9 Employees 04-'09 % Change	All Establishments 2009 Total	All Establishments 04-'09 % Change
	All Regional Establishments	12,628	50.2%	0.1%	4,905	19.5%	-2.6%	25,135	-0.7%
Niche: Research, Development, & Testing									
6215	Medical and diagnostic laboratories	7	38.9%	16.7%	1	5.6%	-50.0%	18	5.9%
5413	Architectural and engineering services	201	56.3%	1.5%	51	14.3%	4.1%	357	5.0%
5417	Scientific research and development services	45	49.5%	21.6%	15	16.5%	-6.3%	91	8.3%
Niche: Production & Wholesale									
3112	Grain and oilseed milling	1	16.7%	N/A	0	0.0%	N/A	6	50.0%
3251	Basic chemical mfg.	1	10.0%	-50.0%	2	20.0%	100.0%	10	0.0%
3252	Resin, rubber, and artificial fibers mfg.	2	22.2%	-33.3%	0	0.0%	-100.0%	9	12.5%
3253	Agricultural chemical mfg.	2	40.0%	100.0%	0	0.0%	-100.0%	5	-28.6%
3254	Pharmaceutical and medicine mfg.	3	12.5%	0.0%	1	4.2%	-50.0%	24	26.3%
3345	Electronic instrument mfg.	9	26.5%	80.0%	4	11.8%	33.3%	34	25.9%
3391	Medical equipment and supplies mfg.	27	54.0%	50.0%	15	30.0%	-6.3%	50	0.0%
4242	Druggists' goods merchant wholesalers	37	40.7%	0.0%	20	22.0%	0.0%	91	-4.2%
4234	Commercial equipment merchant whlolesalers	14	46.7%	180.0%	4	13.3%	300.0%	30	87.5%
4246	Chemical merchant wholesalers	14	37.8%	-41.7%	11	29.7%	10.0%	37	-14.0%
4842	Specialized freight trucking	173	66.5%	-22.4%	42	16.2%	-8.7%	260	-17.2%
4921	Couriers and express delivery services	8	29.6%	-46.7%	2	7.4%	-33.3%	27	-18.2%

Source: U.S. Census Bureau, County Business Patterns

Firm size trends in the previous table demonstrate the following:

- Many target subsectors exhibit a high occurrence of small firms. **In eleven target subsectors (73.3 percent), at least one quarter of all establishments have fewer than five employees.**

    - In architectural and engineering services, medical equipment and supplies manufacturing, and specialized freight trucking, establishments with fewer than five employees account for over half of all establishments.

    - In the Research, Development, and Testing niche, growth in establishments with fewer than five employees generally outpaced growth in subsector establishments between 2004 and 2009.

- Establishments with between five and nine employees are far less numerous. **The highest share of establishments with between five and nine employees occurs in medical equipment and supplies manufacturing** (30 percent). Increasing the proportion of these companies in the Region will be important, especially as they progress from the smallest category.

Place

Business Climate

Funding: There is much recognition at both the state and regional levels that bioscience and biotechnology are essential drivers of the Wisconsin economy. In support of the cluster, Governor Scott Walker attended the 2011 BIO International Convention in Washington, D.C. and attested to the importance of biotech and the need for a state-backed venture capital funding bill.

The need for additional funding mechanisms in Wisconsin, especially available to bioscience and biotech companies, was also brought up repeatedly during **Advance Now** public input and interviews with industry leaders. One stakeholder estimated that the Madison Region alone could accommodate up to $500 million in venture capital, a fourfold increase over current levels.

However, the most recent special legislative session failed to produce any large-scale venture funding bills despite the Assembly remaining in an active floor period, and recall efforts against Governor Walker are sure to dominate legislators' calendars for the foreseeable future.

The debate surrounding venture capital and the vehicle that will best serve Wisconsin business needs continues. A specific bill to stimulate jobs and investment in bioscience and biotech companies has support from BioForward. Entitled the Wisconsin Next Generation Jobs Act, the bill would allocate 95 percent of payroll taxes from new biotech industry jobs into a reserve fund. The fund, capped at $50 million annually and $500 million over 15 years, would be used to make investments, grants, and loans to new qualified bioscience companies. The returns on investment would be reinvested into the fund.

In addition to funding, other legislative actions surrounding social issues have caused concern among bioscience and biotech companies. Prohibiting or severely curtailing the ability of companies in the Madison Region to perform stem cell research would

not cause a severe loss of jobs in the area, but the sentiment and message could be received as hostility toward other scientific innovations ongoing in the region.

Human Capital: Compounding legislative and venture capital issues is the relative lack of seasoned entrepreneurial manager talent. The ability to bring qualified leadership into the community is equally important as the ability to grow entrepreneurial talent. Stakeholder input reflected frustration with regulations around bringing in and expediting citizenship and visa requirements for experienced foreign entrepreneurial managers.

Further, focus group participants said that many entrepreneurs in the region place little premium on growing their company, content to keep their operations small. Easing restrictions and working to combat what was described as a "culture of comfortable" and risk-aversion in entrepreneurship will be an important aspect of further developing the target.

Infrastructure

Cargo Capacity: Many companies in the Life Sciences target have special distribution and logistics needs, such as special shipping and packaging requirements. The presence of FedEx at the Dane County Regional Airport and its capacity to ship sensitive material is a critical regional asset. Developing additional capacity for shipment of specialized materials and chemicals, including to international destinations, may be a strategic option for further supporting the cluster.

Incubators: Incubation space is especially important to firms in the Life Sciences target as many firms are small and ostensibly need specialized help to take products to market. Important bioscience and biotech incubation and co-working spaces include the following.

- **BioAg Gateway**: With an aim to bring together bioscience and agriculture, the BioAg Gateway is the latest in Madison-based incubators. Despite a significant funding gap, the proposed space has received backing from the City of Madison and $4.5 million from the federal government.

- **University Research Park (URP)**: Located in Madison and established in 1984, URP sits on 260 acres of developed space. With more than 126 tenants and more than 3,500 employees, URP is a center of innovation. A notable component is URP Accelerator, a facility designed for start-ups who have outgrown smaller spaces. With customizable lab build-out options and lab ready space, the facility provides great R&D space options. Current tenants include firms specializing in medical devices, bioscience, pharmaceutical,

and research, among others. With a second phase build-out scheduled to begin in 2012, URP is looking to expand its footprint and capacity.

- **T.E.C. Incubator Center**: Situated near the Madison College campus, the T.E.C Center offers tenant businesses business advisory services as well as access to conference rooms, a computer lab, high-speed internet, and customized training options. Since its beginning in 2002, companies at the T.E.C. Center have created more than 200 jobs. Current firms are broadly involved in activities surrounding bioscience, green technology, and genetically engineered products.

Supporting Institutions

- **BioForward** is the state-level trade association that represents and addresses biotech and bioscience issues in Wisconsin. With research capacity as well as networking and advocacy capabilities, BioForward is an important voice of the biotech sector. Aligning legislative priorities and further leveraging their technical expertise will be integral to reaching out to the bioscience cluster in the Madison Region.

- **Wisconsin Technology Council** is the organization that advises the Governor and Legislature on science and technology. With representation from tech companies, venture capital firms, research institutions, and government, the Tech Council drives networking, tech-based research, entrepreneurship, and angel funding in Wisconsin.

- **UW–Madison** is affiliated with and houses many cutting-edge bioscience and biotech research centers. A sampling of the centers includes the UW Biotechnology Center, Genome Center of Wisconsin, University of Wisconsin Stem Cell and Regenerative Medicine Center, Center for Eukaryotic Structural Genomics, W.M. Keck Laboratory for Biological Imaging, Molecular and Environmental Toxicology Center, Wisconsin National Primate Research Center, Zeeh Pharmaceutical Experiment Station, and the Biomedical Engineering Center for Translational Research.

    - A recent newsmaking breakthrough at UW–Madison revolved around researchers' ability to grow human stem cells into neurons that are capable of sending and receiving messages from other cells. With implications for treating patients with Parkinson's disease and

amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease.

- **WiCell Research Institute** is a nonprofit research institute devoted to the advancement of stem cell research. Established in 1999, the organization works to expand the study of human pluirpotent cells. WiCell is also home to the Wisconsin International Stem Cell (WISC) Bank. In addition to research, WiCell actively engages in outreach and has partnerships with the Madison Metropolitan School District and other middle school science teachers around Madison.

- **Wisconsin Alumni Research Foundation (WARF)** is a nonprofit foundation that supports research and technology transfer from UW–Madison researchers. Since its founding in 1925, WARF has given $1.24 billion to the university to fund research. WARF files patents, licenses technology, and discloses inventions from UW–Madison. In 2010-2011, WARF filed more than 200 patents and signed 56 new license and option agreements.

    - With patents and inventions applicable to cleantech, environmental monitoring, pharmaceuticals, pluripotent cells, and drug discovery, WARF is an important organization for start-up and developed Life Sciences companies.

DESIGN AND TECHNOLOGY

Justifications

- Higher education assets, including the UW–Madison's Wisconsin School of Business, education technology, and information systems degree programs, drive highly-skilled talent to the region for education opportunities.

- The region boasts a vibrant arts community, walkable downtown areas, and high quality of life that are attractive to professional, creative, and young workers.

- The Design and Technology target offers cross-target applications with Life Sciences and support for a diverse range of business sectors that exist regionally, nationally, and globally.

- Growth in co-working and incubator spaces across the region pose major opportunities in attracting, housing, and clustering start-ups and small firms in this sector.

- Design and Technology occupations can utilize the Madison Region's young professional workforce, exhibited by favorable age pipeline ratios in its subsectors.

Findings and Strategic Implications

- The sector offers regionally competitive earning potential for workers across skill levels.

- High-tech GDP growth in both the Madison and Janesville metros are in the top quartile of the largest and smallest metros, respectively, in the U.S.

- The region experienced strong IT employment growth between the fourth quarters of 2005 and 2010.

- The region is struggling with a lack of venture capital and competitive incentives to invest in long-term research and development and high-tech markets. In addition to growth in capital capacity, the Madison Region needs

increased social capacity through support for technology networking organizations and events.

- Low passenger capacity and relatively few affordable flight options at Dane County Regional Airport impede the ease of business travel to other markets.

- Design and Technology wages, while competitive within the region, are lower than national averages in the target's occupations and industry subsectors.

- Talent attraction and retention competition with other nearby major Midwestern metros with vibrant amenities and opportunities to attract young professionals and recent college graduates.

- The sector offers compelling potential to transfer technologies driven by higher education institutions, such as educational technology research, to the marketplace.

- Additional degree programs and more focused specialties in existing degree programs offered in the Madison Region will be necessary to continue to hone cluster talent.

- More effectively marketing the Madison Region to current young residents and startups and potential firms and talent will be important in order to position the region as a hub for innovative and creative firms.

- Continued efforts to expand technology infrastructure and quality of life amenities in downtowns and central city areas throughout the Madison Region will retain and attract Design and Technology firms and talent.

Target Profile

The occupations and businesses captured in the Design and Technology target are critical components of functional, successful business operations across a broad range of enterprise types due to the rise of and reliance on constantly-changing digital technologies and media. The emphases of this target are technology-driven creative services. The services provided by this sector can be organized as in-house supports for business operations or as stand-alone firms and consultancies, driving local, regional, national, and global businesses.

The Madison Region's Design and Technology target contributes to job growth across a wide scope of skill levels and promises competitive earning potential, with opportunities to grow and attract mid- to high-wage jobs that surpass regional average wages. The target's primary subcomponents are broken down by the niche areas of Technology and Software, Design and Communications, and Direct-to-Consumer and Specialty Retail. The niches are positioned to flourish in environments with large-scale professional, information, and technology-related operations as well as small, entrepreneurial firms and sole proprietorships.

- The development of **Technology and Software** continues to have an impact on businesses in virtually every business sector. As companies continue to expand their reliance on innovative software, hardware, Internet applications, data processing services, file digitization, and computer security solutions to drive the growth of their businesses, the sector will grow and diversify. Increasingly, firms in this sector will need to be innovative, designing and marketing their products and services competitively in order to benefit from businesses' technology infrastructure and software upgrades. At the national level, even as the effects of the Great Recession are acutely felt by most businesses, firms are projected to ramp up spending on new software, hardware, and services. Growth opportunities regionally and nationally include the development and marketing of gaming, disruptive technologies, and cyber security solutions.

  The implications for gaming in the region will strengthen as national-sector educational technology advances and expands. The cluster of higher education institutions in the Madison Region position this niche well to develop and commercialize technologies for both business and education applications.

  Subcomponents of the Technology and Software niche include software design and publishing, computer systems design, and electrical engineering. Since many of the occupations and business sectors included in this niche cross into the realms of technology, science, and medicine, they provide ample cross-cluster opportunities with other targets in the Madison Region, including Advanced Manufacturing, Life Sciences, and Agriculture and Food Systems. Employers in the region include Simple Network Consulting, Core BTS, Tushaus, TeamSoft, IBM, CDW (formerly Berbee), Raven Software, and Human Head Studios.

- The **Design and Communications** niche comprises those white-collar business support services that provide corporate entities with communication and design capacity across a variety of platforms and often are strong opportunities for small business development and growth. In an era of continually-changing media formats and communication channels, these firms are increasing in importance. Major subcomponents include specialized design services; marketing, public relations, and advertising; architectural and design services; and video and audio production.

  Employers in the region include Cricket Design Works, Design Concepts, Bjorksten | bit 7, the Creative Company, Fusion Fly Web Design, Makin' Hey! Communications, Tweedee Productions, LK Design Studio, Broadjam, the Gunter Agency, Shine Advertising Company, Hiebing, Econoprint, Next Level Communications, and Lindsay, Stone and Briggs.

- **Direct-to-Consumer and Specialty Retail** encompasses Internet retail and electronic shopping and mail-order houses, as well as "bricks and mortar" destination retail establishments. This niche provides strong opportunities for entrepreneurship, pioneering new customer outreach methods and tools (via the Internet) and business-to-business partnerships, including connections between manufacturer and wholesaler and between wholesaler and retailer. The presence of large e-commerce and consumer web companies in the Madison Region such as Lands' End, Alice.com, Colony Brands, Artful Home, The Century House, American Girl Brands, CDW (and formerly Berbee), and ShopBop—most of which were founded and are headquartered in the region—indicates that design talent, distribution channels, and technical expertise provide a competitive edge.

The IT Industry Business Confidence Index, a survey of IT businesses published by CompTIA, a non-profit IT trade association, aggregates three indicators: confidence in the national economy, confidence in the IT industry, and confidence in one's own business. While the overall index dropped by 1.0 point in the fourth quarter of 2011, the outlook for the first quarter of 2012 is a 1.9 point gain. The survey found that 53 percent of firms plan to invest in R&D or new revenue-generating initiatives and 37 percent of firms expect to expand their staff in the next six months. IT executives participating in the survey of nearly 400 firms indicated particular interest in security products and services and Health Care information technologies.

The Great Recession caused considerable layoffs and shrinkages in the niches encompassed in the Design and Technology target. However, mass layoffs and initial

unemployment claims in the sector have diminished notably in the past year, an indication of national sector stabilization and potential growth. Due to layoffs over the past few years, there is potentially an available, underemployed pool of talent in the Madison Region and nationally from which to draw.

People

Like the other proposed targets for the Madison Region, the Design and Technology cluster requires specialized and diverse skills for its workers. In addition, there is some crossover between other targets' occupations and industry sectors.

Occupational Analysis

The following tables identify the strength of employment, wages, and regional concentration through major and key occupations in the Design and Technology target.

DESIGN AND TECHNOLOGY OCCUPATIONS, 2010

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
Technology & Software Development						
11-3021	Computer & Information Systems Managers	1,360	1.21	$102,750	0.83	$123,280
15-1799	Computer Occupations, All Other	260	0.36	$72,007	0.90	$79,790
15-1121	Computer Systems Analysts	2,590	1.34	$70,236	0.86	$81,250
15-1131	Computer Programmers	1,400	1.07	$75,797	1.01	$74,900
15-1132	Computer Software Engineers, Applications	2,130	1.09	$78,995	0.87	$90,410
15-1133	Computer Software Engineers, Systems Software	660	0.45	$81,234	0.83	$97,960
15-1141	Database Administrators	470	1.16	$68,990	0.91	$75,730
15-1142	Network & Computer Systems Administrators	1,440	1.11	$61,753	0.86	$72,200
15-1150	Computer Support Specialists	3,800	1.68	$50,574	1.01	$49,930
15-1179	Info. Security Analysts, Web Developers, & Computer Network Architects	1,750	1.84	$69,798	0.88	$79,370
17-2071	Electrical Engineers	790	1.36	$76,852	0.88	$87,770
17-2072	Electronics Engineers, Except Computer	190	0.36	$78,624	0.85	$92,730
17-2141	Mechanical Engineers	980	1.07	$66,492	0.81	$82,480
17-3023	Electrical & Electronic Engineering Technicians	390	0.68	$50,560	0.89	$56,690
Direct-to-Consumer & Specialty Retail						
11-2022	Sales Managers	1,500	1.20	$98,648	0.86	$114,110
13-1081	Logisticians	300	0.73	$63,735	0.87	$73,510
13-1022	Wholesale & Retail Buyers, Except Farm Products	620	1.47	$50,700	0.90	$56,300
13-1161	Market Research Analysts	1,020	1.00	$61,456	0.92	$66,850
13-1199	Business Operations Specialists, All Other	4,620	1.19	$61,261	0.90	$67,710
41-1011	First-Line Supervisors/Managers of Retail Sales Workers	3,710	0.81	$38,879	0.97	$39,890
41-3099	Sales Representatives, Services, All Other	1,880	0.91	$61,920	1.02	$60,430
43-3061	Procurement Clerks	270	0.94	$38,595	1.04	$37,150
43-4051	Customer Service Representatives	10,010	1.19	$32,341	0.99	$32,780
Education						
25-1021	Computer Science Teachers, Postsecondary	150	1.16	$89,681	1.15	$78,190
Design and Communications						
11-2011	Advertising & Promotions Managers	140	1.11	$82,781	0.84	$98,720
11-2021	Marketing Managers	540	0.84	$96,507	0.79	$122,720
11-2031	Public Relations Managers	250	1.20	$89,243	0.85	$104,390
13-1011	Agents & Business Managers of Artists, Performers, & Athletes	30	0.65	$41,316	0.46	$89,840
17-1011	Architects, Except Landscape & Naval	310	0.90	$77,300	0.98	$78,530

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

DESIGN AND TECHNOLOGY OCCUPATIONS, 2010 (CONTINUED)

SOC	Occupation	Madison Region Employment	LQ	Average Annual Wage	Wage Ratio	United States Average Annual Wage
	All Occupations	496,550	1.00	$42,187	0.95	$44,410
Design and Communications (Continued)						
17-1012	Landscape Architects	110	1.69	$63,149	0.94	$66,880
17-3011	Architectural & Civil Drafters	270	0.77	$47,668	0.98	$48,740
25-4011	Archivists	40	2.04	$41,534	0.84	$49,190
25-9011	Audio-Visual Collections Specialists	40	1.32	$48,251	1.05	$45,910
27-1011	Art Directors	130	1.12	$84,573	0.90	$94,100
27-1013	Fine Artists, Including Painters, Sculptors, & Illustrators	20	0.50	$43,296	0.82	$53,080
27-1014	Multi-Media Artists & Animators	120	1.16	$50,735	0.80	$63,440
27-1019	Artists & Related Workers, All Other	20	0.68	$42,039	0.68	$61,760
27-1021	Commercial & Industrial Designers	160	1.43	$54,701	0.88	$61,890
27-1022	Fashion Designers	80	1.36	$78,043	1.05	$74,440
27-1024	Graphic Designers	930	1.24	$44,687	0.93	$48,140
27-1025	Interior Designers	330	2.11	$45,057	0.86	$52,100
27-1026	Merchandise Displayers & Window Trimmers	150	0.60	$28,141	0.99	$28,480
27-2011	Actors	80	0.37	ND	ND	ND
27-2012	Producers & Directors	290	0.89	$45,360	0.51	$88,610
27-2041	Music Directors & Composers	60	0.74	$53,182	1.01	$52,750
27-2099	Entertainers & Performers, Sports & Related Workers, All Other	30	0.33	ND	ND	ND
27-3011	Radio & Television Announcers	170	1.34	$40,675	1.02	$39,910
27-3012	Public Address System & Other Announcers	120	4.05	$52,672	1.39	$37,840
27-3021	Broadcast News Analysts	30	1.35	$60,392	0.83	$72,710
27-3022	Reporters & Correspondents	240	1.36	$28,487	0.65	$43,780
27-3031	Public Relations Specialists	1,060	1.20	$53,386	0.90	$59,150
27-3041	Editors	590	1.52	$46,965	0.79	$59,340
27-3042	Technical Writers	130	0.76	$56,682	0.86	$66,240
27-3043	Writers & Authors	160	1.00	$56,323	0.85	$65,960
27-3099	Media & Communication Workers, All Other	80	0.86	$42,815	0.85	$50,490
27-4011	Audio & Video Equipment Technicians	180	0.97	$44,314	1.00	$44,460
27-4012	Broadcast Technicians	90	0.75	$34,448	0.84	$41,170
27-4021	Photographers	260	1.22	$36,555	1.02	$35,980
27-4031	Camera Operators, Television, Video, & Motion Picture	70	1.07	$37,889	0.78	$48,450
27-4032	Film & Video Editors	50	0.64	$38,316	0.62	$61,890
41-3011	Advertising Sales Agents	530	0.93	$44,378	0.81	$55,020

Source: U.S. Bureau of Labor Statistics, Occupational Employment Survey via Wisconsin Department of Workforce Development

Several trends are easily identified through a review of the target's occupations:

- The Madison Region has high location quotients in many of the occupations that populated the Technology and Software niche. **The largest occupational groups in this subsector—information security analysts, computer support specialists, computer systems analysts, computer and information systems managers, and computer software engineers—also have location quotients well over 1.0.**

- **All occupations in the Technology and Software niche pay, on average, higher than the regional average wage of $42,187. However, only two are slightly more competitive than the national average wages** for the occupations—computer programmers (wage ratio of 1.01, average annual wage of $75,767) and computer support specialists (1.01, $50,578).

    - These lower-than-average wages in the niche pose a major concern as the market for skilled and specialized technology talent continues to tighten nationally. Retaining the pool of technology workers in the Madison Region will be an activity to be addressed in the **Advance Now** Strategy.

- The business operations specialists, all other occupation category includes customs brokers and online merchants. This is the second-largest occupational group in the direct-to-consumer and specialty retail niche, with 4,620 employees in May 2010.

- **A few occupations in this niche pay under the Madison Region's average annual wage.** These include first-line supervisors/managers of retail sales workers ($38,879), procurement clerks ($38,595), and customer service representatives ($32,341). These wages also reflect a lower average than the national level. However, many occupations in this niche pose good entry-level opportunities for workers with fewer skills or less experience.

- **The largest occupational group in Design and Communications is public relations specialists, which also has a high concentration relative to the national level** (1,060 employees, LQ = 1.20).

    - Graphic designers (930 employees; LQ = 1.24), marketing managers (540 employees), and advertising sales agents (540 employees) also comprise large segments of the Design and Communications employment base. These highly-represented occupations are

applicable to a wide range of business sectors, from agriculture to construction to scientific services.

Talent Development

Higher Education: The Design and Technology target cluster relies on very technical skills of all levels, depending primarily on two- and four-year post-secondary institutions for education and training capacity. As this cluster continues to grow, the Madison Region may need to address retention of talent.

DESIGN AND TECHNOLOGY POSTSECONDARY COMPLETIONS, 2010

Degree category	Certificate below baccalaureate	Associate's degree	Bachelor's degree	Master's degree	Doctorate / Professional degree	Total
Total, all regional completions	4,478	3,690	11,092	2,470	1,378	23,108
Business- management- marketing- and related support svcs	**124**	**515**	**1,769**	**570**	**7**	**2,985**
Entrepreneurial and Small Business Operations	9		3			12
Marketing		81	280	31		392
Communication- journalism- and related programs	**9**	**18**	**701**	**26**	**14**	**768**
Communication and Media Studies			419	17	14	450
Computer and information sciences and support svcs	**76**	**112**	**138**	**58**	**14**	**398**
Computer and Information Sciences- General			102	58	14	174
Computer Engineering			27			27
Computer Programming	38	3				41
Computer Science			6			6
Computer Software and Media Applications	6	20				26
Computer Systems Analysis			30			30
Visual and Performing Arts	**2**	**103**	**438**	**97**	**20**	**640**
Arts- Entertainment-and Media Management				11		11
Design and Applied Arts	2	103	36			139
Visual and Performing Arts- General			19			19
Music			77	34	12	111
Drama/Theatre Arts and Stagecraft			79	8	3	87
Architecture and Related Services			**31**	**22**		**53**
Architectural Engineering Technologies/Technicians		**31**				**31**
Total, all target-related completions	*211*	*779*	*3,077*	*773*	*55*	4,895

Source: National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS)

The data in the previous table support the following trends:

- **The largest share of all certificates and degrees in the target are granted in business, management, marketing, and related services.** Over 1,700 bachelor's degrees in business were conferred in 2010.

- Within specializations more directly applicable to the target, **marketing (280 degree completions), communication and media studies (280), and computer and information sciences (138) graduated the most bachelor's degrees.**

    - Design and applied arts (103 associate's degree completions) and marketing (81) were large two-year programs.

- **It is important to note that the region lacks specific majors in product or industrial design and architecture.**

The region offers a strong complement of higher education opportunities to fuel necessary talent growth in the Design and Technology sector. Key post-secondary degree and certificate programs are highlighted below.

- **Blackhawk Technical College:** Associate's degree options include information technology with network specialist, web analyst/programmer, or systems security specialist concentrations and marketing. Certificate programs available are IT database management, Java developer, Visual Basic.Net developer, web programming, and computer hardware support.

- **Madison College:** Information technology certificate programs include Cisco certified networking associate, CompTIA A+ computer essentials, android applications development, information security, Java professional developer, iPhone applications development, and LAMP open source development. Arts, audio visual technology, communications, and marketing certificates offered include social media, sales academy, and web page design.

    - Two-year IT degree programs include network specialist, computer systems administration, and programmer/analyst. Associate's degree opportunities related to Design and Communications and Direct-to-Consumer and Specialty Retail niches are animation, graphic design, marketing, visual communications, fashion marketing, and marketing. Madison College also offers a one-year technical diploma in small business entrepreneurship.

- **Moraine Park Technical College:** Several specializations are available with a two-year information technology degree: applications developer in business or interactive media, network specialist, technical support specialist, or web designer/developer. Interactive media design degrees offer concentrations in animation or motion graphics. Specializations for two-year graphic communications degrees are design and prepress. A web site coordinator certificate, electronic publishing certificate, and marketing associate's degree are also available.

- **Southwest Tech:** Several associate's in applied sciences degree programs with information technology specializations including graphics and web design, computer support specialist, and web analyst/programmer.

- The for-profit **Madison Media Institute** houses programs in recording, game design, video production, graphic design, media systems, and entertainment business.

- **UW–Madison:** The Wisconsin School of Business' marketing department was recently rated second in country for research productivity, seventh in the country for its undergraduate program, and twenty-fifth for its MBA program. Specializations include brand and product management and marketing research. Fine arts degrees include bachelor's and graduate degrees in graphic design or digital modeling. Through the College of Education, graduate programs (MA and PhD) are available in educational communications and technology. The computer science department offers a wide range of specializations in the discipline, from bachelor's to doctorate degrees and post-graduate certificates.

- **UW–Whitewater:** Majors and other areas of specialized study include graphic design (BFA); communication with emphases in electronic media or public relations; journalism with advertising minor; entrepreneurship; management of computer systems (BS and BBA); information technology infrastructure; marketing with three areas of minor or emphasis: direct and internet marketing, integrated marketing communications, and professional sales; media arts and game development with minors or emphases in communications/gaming, technology, and visual media design; and a minor in computer science—web site development and administration.

Workforce Development: The **Southwest Wisconsin Workforce Development Board** has identified non-store retail trade as a high-demand industry sector. This sector is

inclusive of administrative and support services and transportation, distribution, and logistics.

The **Workforce Development Board of South Central Wisconsin** considers information technology as a cross-sector industry. The WDBSCW has worked with Madison College to build IT academies which provide foundational technology instruction for persons wishing to enter a technology-related career pathway. Each year, 400 people access these training opportunities. Additionally, the WDBSCW has established computer-equipped skill centers to provide a place for unemployed workers to practice and advance their technology skills.

Workforce Sustainability

The following table compares the region's proportion of young workers (ages 25–34) to seasoned professionals nearing retirement (ages 55–64). The Design and Technology cluster has a strong pipeline of young workers in the Technology and Software and Design and Communications niches. However, some subsectors within the Direct-to-Consumer and Specialty Retail niche have larger shares of workers age 55–64 or smaller shares of workers ages 25–34, possibly posing workforce challenges as older workers leave the labor force in subsectors that continue to adapt and stay competitive in the global marketplace.

DESIGN AND TECHNOLOGY AGE PIPELINE RATIOS, Q3 2010

NAICS	Subsector	% Young Adults (25-34)	% Baby Boomers (55-64)	Young Adults/ Baby Boomers
	All Employment	21.5%	15.5%	1.39
Niche: Technology & Software				
5112	Software publishers	59.7%	2.0%	30.29
5182	Data processing, hosting and related svcs.	27.9%	11.8%	2.36
5416	Management and technical consulting svcs.	24.4%	15.4%	1.59
5415	Computer systems design and related svcs.	34.1%	8.3%	4.09
5419	Other professional and technical svcs.	29.1%	9.5%	3.08
Niche: Design & Communications				
5121	Motion picture and video industries	16.5%	5.6%	2.94
5414	Specialized design services	22.6%	8.6%	2.62
5418	Advertising, PR, and related svcs.	26.7%	11.9%	2.25
5413	Architectural and engineering svcs.	29.9%	13.6%	2.19
5151	Radio and television broadcasting	33.1%	13.8%	2.40
7111	Performing arts companies	23.4%	15.5%	1.50
7115	Independent artists, writers, and performers	21.2%	11.5%	1.83
Niche: Direct-to-Consumer & Specialty Retail				
4251	Electronic markets and agents and brokers	18.3%	16.5%	1.11
4541	Electronic shopping and mail-order houses	17.4%	19.0%	0.91
4452	Specialty food stores	14.1%	11.2%	1.26
4543	Direct selling establishments	15.6%	15.3%	1.02
4921	Couriers and express delivery services	21.1%	12.3%	1.72
4931	Warehousing and storage	21.1%	13.9%	1.51

Source: U.S. Census Bureau, Quarterly Workforce Indicators

Age pipeline dynamics, as seen in the previous table, support the following:

- **The only subsector ratio that indicates a possible acute future workforce shortage due to retirement of Baby Boomers is electronic shopping and mail-order houses** (age ratio of 0.91 with nine percent more Baby Boomers than young adults).

- Specialty food stores have the lowest proportion of young adults (14.1 percent) of all the subsectors examined; however, this subsector also has a lower-than-average share of Baby Boomers (11.2 percent) when compared to the overall regional workforce (15.5 percent).

    - Neither of these subsectors require the same level of specialized education and training as some found in the Technology and

Software and Design and Communications niches, implying that workforce shortage issues may not be top priority.

Prosperity

In the highly-competitive national climate for technology cluster development and talent recruitment, the Madison Region has built its success in fostering business development via UW–Madison and other hotbeds of entrepreneurial tech and creative talent. While these firms have sustained the Design and Technology cluster regionally by gaining national clients and working on global platforms, the region must assert itself nationally to attract businesses and talent from outside of the region and the state.

Business Sector Analysis

Employment and Wages: The following table shows the region's employment and wages for the Design and Technology target business subsectors in the fourth quarter of 2010 and its two- and five-year employment and wage trends.

DESIGN AND TECHNOLOGY EMPLOYMENT AND WAGES, 2005-2010

NAICS Code	Subsector	Q4 2010 LQ	Q4 2010 Employment	Q4 2010 AAW	Q4 2010 Wage Ratio	Emp, Q4 '05 - Q4 '10 Madison Region # Change	Emp, Q4 '05 - Q4 '10 Madison Region % Change	Emp, Q4 '05 - Q4 '10 US % Change	AAW, Q4 '05 - Q4 '10 Madison Region $ Change	AAW, Q4 '05 - Q4 '10 Madison Region % Change	AAW, Q4 '05 - Q4 '10 US % Change	Q4 '08 - Q4 '10 Madison Region Employment % Change	Q4 '08 - Q4 '10 Madison Region AAW % Change
	All Employment	1.00	500,237	$43,871	0.87	-10,197	-2.0	-3.0	$7,297	20.0%	17.6%	-4.2%	7.1%
Niche: Technology & Software													
5112	Software publishers	4.08	4,120	$118,477	0.96	1,889	84.7%	9.3%	$36,128	43.9%	18.1%	5.6%	16.3%
5182	Data processing, hosting & related svcs.	2.23	2,143	$42,704	0.51	458	27.2%	-7.5%	$8,009	23.1%	27.2%	0.6%	12.9%
5416	Management & technical consulting svcs.	ND	ND	$73,087	0.75	ND	ND	17.7%	$2,415	3.4%	19.2%	ND	-16.2%
5415	Computer systems design & related svcs.	0.51	2,953	$74,903	0.74	279	10.4%	20.8%	$10,365	16.1%	19.9%	-1.9%	3.4%
5121	Motion picture & video industries	0.49	672	$23,990	0.32	145	27.5%	-1.8%	$6,706	38.8%	25.2%	12.8%	-19.2%
5419	Other professional & technical svcs.	0.91	2,118	$34,623	0.75	11	0.5%	9.9%	$1,556	4.7%	28.5%	-11.4%	5.6%
Niche: Design & Communications													
7111	Performing arts companies	1.72	773	$22,537	0.40	-216	-21.8%	-1.7%	-$442	-1.9%	17.2%	-8.5%	-17.7%
7115	Independent artists, writers, & performers	0.71	134	$19,916	0.08	49	57.6%	1.9%	-$8,989	-31.1%	20.4%	42.6%	-19.1%
5414	Specialized design services	0.52	230	$61,347	0.92	3	1.3%	-13.9%	$13,151	27.3%	16.4%	-16.7%	6.3%
5418	Advertising, PR, & related svcs.	0.57	925	$60,619	0.80	-117	-11.2%	-7.7%	$11,141	22.5%	17.7%	-13.7%	11.0%
5413	Architectural & engineering svcs.	0.89	4,645	$74,796	0.84	-954	-17.0%	-3.3%	$11,072	17.4%	20.5%	-9.9%	5.3%
5151	Radio & television broadcasting	0.93	769	$53,121	0.78	-109	-12.4%	-11.3%	$9,009	20.4%	17.4%	-7.5%	14.4%
Niche: Direct-to-Consumer & Specialty Retail													
4251	Electronic mkts. & agents & brokers	0.24	759	$71,498	0.80	57	8.1%	9.0%	$8,626	13.7%	22.5%	-9.5%	5.9%
4541	Electronic shopping & mail-order houses	7.75	7,909	$32,992	0.65	-1,086	-12.1%	4.4%	$9,798	42.2%	26.4%	-29.0%	17.7%
4452	Specialty food stores	1.40	1,191	$18,210	0.73	152	14.6%	-11.5%	$1,014	5.9%	8.8%	-5.5%	4.1%
4543	Direct selling establishments	0.71	369	$35,920	0.74	54	17.1%	-5.1%	6458.00	0.22	0.20	-6.8%	-2.2%
4921	Couriers & express delivery svcs.	0.71	1,385	$37,346	0.79	-249	-15.2%	-7.8%	$5,274	16.4%	16.8%	-20.0%	8.8%
4931	Warehousing & storage	1.11	2,803	$39,449	0.91	ND	ND	7.4%	$6,027	18.0%	14.6%	-2.6%	2.4%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Several trends are supported by the previous table:

- **All of the subsectors in the Technology and Software niche performed better than the overall regional economy in the five years examined.** In addition, software publishers (84.7 percent growth in employment), data processing, hosting, and related services (27.2 percent), and motion picture and video industries (27.5 percent) outperformed the national growth for these subsectors.

- **Several subsectors across the niches saw wage growth that surpassed the regional average and national subsector averages** between Q4 2005 and Q4 2010.

  - These are software publishers (43.9 percent wage growth), motion picture and video industries (38.8 percent), specialized design services (27.3 percent), advertising, PR, and related services (22.5 percent), radio and television broadcasting (20.4 percent), and electronic shopping and mail-order houses (42.2 percent).

  - However, **none of the subsectors examined in the Design and Technology cluster had wages equal to or above the national average annual wages.**

- Wage ratios of .32 for motion picture and video industries, .08 for independent artists, writers, and performers, and .51 for data processing, hosting, and related services **demonstrate the major challenge that the Madison Region faces in offering competitive wages to attract and retain workers in important parts of Design and Technology operations.**

- Despite overall gains over the course of five years, **some subsectors endured small to stiff decline during the recession.** Computer systems design and related services (-1.9 percent employment loss), specialty food stores (-5.5 percent), direct selling establishments (-6.8), electronic markets and agents and brokers (-9.5 percent), other professional and technical services (-11.4 percent), and specialized design services (-16.7 percent), experienced employment losses between the fourth quarters of 2008 and 2010, although five-year trends demonstrate growth.

- **Only a few subsectors in the target show concentrations above the national average.** Electronic shopping and mail order houses (LQ = 7.75), software publishers (4.08), data processing, hosting, and related services (2.23), performing arts companies (1.72), and specialty food stores (1.40) all boast regional employment bases much more concentrated than in the U.S.

Shift-Share Analysis: The following table presents regional subsector job creation, with losses and gains attributed to national, industry, and regional conditions.

DESIGN AND TECHNOLOGY SHIFT-SHARE ANALYSIS, 2005-2010

NAICS	Subsector	Net Employment Change	Jobs from National Shift	Jobs from Industry Mix	Jobs from Regional Factors
Niche: Technology & Software					
5112	Software publishers	1,889	-67	274	1,682
5182	Data processing, hosting and related svcs.	458	-51	-76	584
5416	Management and technical consulting svcs.	ND	ND	ND	ND
5415	Computer systems design and related svcs.	279	-80	637	-278
5419	Other professional and technical svcs.	11	-63	272	-198
Niche: Design & Communciations					
5121	Motion picture and video industries	145	-16	6	154
5414	Specialized design services	3	-7	-25	35
5418	Advertising, PR, and related svcs.	-117	-31	-49	-37
5413	Architectural and engineering svcs.	-954	-168	-17	-769
5151	Radio and television broadcasting	-109	-26	25	-108
7111	Performing arts companies	-216	-30	13	-199
7115	Independent artists, writers, and performers	49	-3	4	47
Niche: Direct-to-Consumer & Specialty Retail					
4251	Electronic markets and agents and brokers	57	-21	84	-6
4541	Electronic shopping and mail-order houses	-1,086	-270	666	-1,482
4452	Specialty food stores	152	-31	-88	271
4543	Direct selling establishments	54	-9	-7	70
4921	Couriers and express delivery services	-249	-49	-78	-122
4931	Warehousing and storage	ND	ND	ND	ND

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW) via Wisconsin Department of Workforce Development

Job shift, creation, and loss dynamics in the previous table support the following trends:

- Between 2005 and 2010, **the Madison Region created jobs that are attributable to regional conditions in seven niche subsectors of the target.** Further, regional economic factors increased employment in four subsectors in which employment losses were sustained at the national and industry level.

    - The strongest employment growth attributed to regional conditions was in software publishers (1,682 jobs), data processing, hosting, and related services (584 jobs), specialty food stores (271 jobs), and motion picture and video industries (154 jobs).

- **Of the 16 subsectors for which data is available, eight sustained losses attributable to regional conditions.** Of the eight, three—advertising, PR, and

related services; architectural and engineering services; and couriers and express delivery services—dropped jobs due to industry narrowing.

- This indicates that five subsectors contradicted industry expansion trends, implying that **those lost positions may have relocated to other regions.**

Separations and Hires

The following table shows hiring and separations by subsectors within the Design and Technology target for the third quarter of 2010. The data highlights recent hiring dynamics and indicates the extent to which firms are expanding their workforce. A ratio greater than 1.0 indicates the subsector added more employees than it lost during the quarter.

DESIGN AND TECHNOLOGY HIRING DYNAMICS, Q3 2010

NAICS	Subsector	Hires	Separations	Ratio	Net Jobs
Niche: Technology & Software					
5112	Software publishers	494	406	1.22	88
5182	Data processing, hosting and related svcs.	549	160	3.43	389
5416	Management and technical consulting svcs.	476	488	0.98	-12
5415	Computer systems design and related svcs.	841	730	1.15	111
5419	Other professional and technical svcs.	559	479	1.17	80
Niche: Design & Communications					
5121	Motion picture and video industries	405	420	0.96	-15
5414	Specialized design services	50	43	1.16	7
5418	Advertising, PR, and related svcs.	104	158	0.66	-54
5413	Architectural and engineering svcs.	1,290	1,344	0.96	-54
5151	Radio and television broadcasting	48	52	0.92	-4
7111	Performing arts companies	684	714	0.96	-30
7115	Independent artists, writers, and performers	30	44	0.68	-14
Niche: Direct-to-Consumer & Specialty Retail					
4251	Electronic markets and agents and brokers	160	186	0.86	-26
4541	Electronic shopping and mail-order houses	2,165	530	4.08	1,635
4452	Specialty food stores	179	199	0.90	-20
4543	Direct selling establishments	65	64	1.02	1
4921	Couriers and express delivery services	134	199	0.67	-65
4931	Warehousing and storage	528	807	0.65	-279

Source: U.S. Census Bureau, Quarterly Workforce Indicators

The following trends are indicated by the data in the previous table:

- **Electronic shopping and mail-order houses made major hiring moves in the third quarter of 2010,** adding a net 1,635 new or re-hired employees to the subsector, possibly in anticipation of demand during the end-of-year holiday season.

- Data processing, hosting, and related services also saw growth in hiring, with 389 net new jobs.

- **The most significant layoffs were with warehousing and storage**, with 807 layoffs that resulted in 279 net jobs lost.

Business Establishment Size Dynamics

Strategic cluster development efforts in this target must recognize the dominance of small businesses in the field of Design and Technology. Along with businesses in the Life Sciences target, small business outreach and specialized solutions will be integral to target development.

DESIGN AND TECHNOLOGY FIRM SIZE, 2004-2009

NAICS Code	Subsector	1-4 Employees 2009 Total	1-4 Employees 2009 % of all Est	1-4 Employees 04-'09 % Change	5-9 Employees 2009 Total	5-9 Employees 2009 % of all Est	5-9 Employees 04-'09 % Change	All Establishments 2009 Total	All Establishments 04-'09 % Change
	All Regional Establishments	12,628	50.2%	0.1%	4,905	19.5%	-2.6%	25,135	-0.7%
Niche: Technology & Software									
5112	Software publishers	16	47.1%	0.0%	2	5.9%	-60.0%	34	0.0%
5182	Data processing, hosting and related svcs.	14	38.9%	-33.3%	2	5.6%	-60.0%	36	-25.0%
5416	Management and technical consulting svcs.	326	82.3%	29.9%	27	6.8%	-30.8%	396	21.5%
5415	Computer systems design and related svcs.	243	73.4%	25.9%	38	11.5%	15.2%	331	24.9%
5121	Motion picture and video industries	26	49.1%	18.2%	3	5.7%	-40.0%	53	10.4%
5419	Other professional and technical svcs.	152	52.4%	-3.2%	64	22.1%	1.6%	290	2.5%
Niche: Design & Communications									
7111	Performing arts companies	28	66.7%	27.3%	4	9.5%	33.3%	42	13.5%
7115	Independent artists, writers, and performers	39	90.7%	-11.4%	2	4.7%	-33.3%	43	-8.5%
5414	Specialized design services	68	79.1%	-8.1%	11	12.8%	120.0%	86	-2.3%
5418	Advertising, PR, and related svcs.	74	60.7%	19.4%	20	16.4%	-28.6%	122	5.2%
5413	Architectural and engineering svcs.	201	56.3%	1.5%	51	14.3%	4.1%	357	5.0%
5151	Radio and television broadcasting	9	25.0%	125.0%	6	16.7%	20.0%	36	16.1%
Niche: Direct-to-Consumer & Specialty Retail									
4251	Electronic markets and agents and brokers	99	83.2%	10.0%	9	7.6%	0.0%	119	6.3%
4541	Electronic shopping and mail-order houses	60	61.9%	122.2%	7	7.2%	-53.3%	97	49.2%
4452	Specialty food stores	41	41.0%	-21.2%	25	25.0%	-3.8%	100	6.4%
4543	Direct selling establishments	60	54.5%	13.2%	34	30.9%	112.5%	110	23.6%
4921	Couriers and express delivery services	8	29.6%	-46.7%	2	7.4%	-33.3%	27	-18.2%
4931	Warehousing and storage	25	41.0%	31.6%	10	16.4%	100.0%	61	38.6%

Source: U.S. Census Bureau, County Business Patterns

Firm size dynamics in the previous table support the following:

- Small businesses have a heavy presence in target subsectors. **Of the 18 target subsectors, 15 subsectors have at least 50 percent of establishments with fewer than 10 employees.**
    - Subsectors in which establishments with fewer than 10 employees comprise more than 80 percent of all establishments include management and technical consulting services (89.1 percent),

computer systems design and related services (84.9 percent), and specialized design services (91.9 percent).

- Growth dynamics of small firms in the region show both positive and negative trends.

    - **Growth in establishments with fewer than five employees was positive in the majority of subsectors.** Strong growth occurred in electronic shipping and mail-order houses (122.2 percent), warehousing and storage (31.6 percent), performing arts companies (27.3 percent), management and technical consulting (29.9 percent), and computer systems design (25.9 percent). Other large increases are attributable to the small number of firms overall.

    - Notable contractions of establishments with between five and nine employees include advertising, PR, and related services (-28.6 percent) and specialty food stores (-3.8 percent).

Technology Growth

The Milken Institute's Best Performing Cities Index annually analyzes and ranks U.S. metropolitan areas by a number of indicators related to job, wage and salary, and gross domestic product growth. In 2010, the overall ranking for the Madison MSA (Dane, Columbia, and Iowa counties) on the index was 31 out of the 200 largest metro areas in the country. The Janesville MSA (Rock County) ranked 166th out of 179 smaller metros. However, some of the components of the index related to high-tech growth fared better than the overall score for each metro. Between 2008 and 2009, both the Madison and Janesville metro's high-tech GDP growth were in the top quartile of metros.

HIGH-TECH GROWTH AND CONCENTRATION, 2010

	Madison MSA Rank (out of 200)	Janesville MSA Rank (out of 179)
5-Year Relative High-Tech GDP Growth (2004-2009)	13	45
1-Year Relative High-Tech GDP Growth (2008-2009)	35	33
High-Tech GDP LQ (2009)	41	116
# of High-Tech GDP LQs Over 1 (2009)	42	56

Source: Milken Institute

According to the Milken Institute, the Madison MSA's high-tech GDP had a location quotient of 1.43, which ranked in the top quarter of large metros examined. The Janesville MSA's high-tech GDP location quotient was 0.56 and ranked in the bottom quarter of small metros. Translating the growth in high-tech productivity to a higher concentration across the entire Madison Region will be an important effort for the **Advance Now** Strategy.

Place

The Design and Technology cluster further positions the Madison Region as a key launching point for entrepreneurs in creative design and technology-driven startups.

Business Climate

In 2006, the Film Wisconsin legislation was passed by then-Governor Jim Doyle to offer tax credits to companies involved in the production of film, electronic games, television, and broadcast advertisements. The incentive allowed a 25 percent tax credit on certain salaries and wages, and a 15 percent production services credit for permanent infrastructure investment.

The Madison Region gained net jobs and investment during the tenure of the incentive program, and UW–Whitewater expanded workforce development and film production programs to meet expected demands. However, less than a year and a half after the incentives were launched, the legislation was significantly scaled back.

Current Governor Scott Walker has noted the need to restore the legislation that would encourage the further development of electronic game, editing and post-production, and other creative technology firms in the region, but as of the end of 2011 no such tax credit has been introduced.

Infrastructure

Technology: As discussed in the Health Care target narrative, the Madison Region has challenges in terms of technology infrastructure. In order to attract and retain national firms and workers that serve national and global markets, the region must be connected at all times to customers and vendors. The Madison Region's lower-than-average broadband speed is a challenge to overcome to ensure the Design and Technology target has strength across the entire region. Online interactive gaming, remote interactive education, technology and business park infrastructure, and remote supercomputing all require speeds well over 10 mbps.

Transportation: In addition, low passenger capacity and relatively few affordable flight options from Dane County Regional Airport to other major metros pose a challenge to firms needing direct travel options to national markets. Business travelers seeking same-day travel to and from New York City, Austin, and San Francisco, and other Design and Technology hubs have experienced difficulty in finding a wide range of departure and arrival time options. However, the Madison Region's close proximity to Mitchell International Airport in Milwaukee is favorable as travelers are within two hours of a major international airport offering flights across the world.

Real Estate: Another significant factor is the availability of Class A office space. While Madison, Middleton, and other communities in Dane County currently have Class A options or plans to develop more offerings, there is less available office space outside of the core county. With little room for growth in the City of Madison, other areas around the urban core and in counties throughout the Madison Region offer the most expansion opportunities for Design and Technology firms seeking more or newer office space. However, these areas may not have access to the technology infrastructure necessary to conduct the operations and services central to the cluster.

Extensive co-working and incubator space in the central city—including Sector 67, the Student Business Incubator, Horizon Co-Working, Urban Tech Catalyst, and the Metro Innovation Center—and throughout the region are already driving the development of this cluster. Additionally, some spaces are being planned such as The Link (co-working site) and possible increased incubator space along the East Washington Corridor of Madison.

Quality of Life

Due to the relatively young workforce in most niches of this cluster, strong place-based amenities that foster the growth of Design and Technology are those assets that young professionals find most appealing.

The region's young population, high quality of life, access to higher education institutions, and strong artistic presence is attractive to professionals in this cluster. The Madison Region's location and access to other creative and high-technology markets is also strong. The region has interstate access to other major cities, including Chicago, Milwaukee, and Minneapolis. However, due to its close proximity to larger metros, stakeholder input participants indicated that the Madison Region does lose new college graduates and young professionals seeking broader advancement and earning opportunities in bigger cities that can offer higher wages.

The creative and entrepreneurial emphasis of this cluster challenges the Madison Region to leverage its already high quality of life in addition to traditional business services, infrastructure, facilities, and incentives. Many creative and technology-driven companies, such as Madison's Human Head Studios, have expressed the desire to be located in walkable urban areas with social amenities and near colleges and other new economy firms in order to attract and retain their workforce. Downtown Madison, its surrounding areas within the urban core, and other downtowns in the region offer these attractive characteristics.

Supporting Institutions

As in other targets, the strength of the higher education and research institutions in the Madison Region provide ample opportunities for firms to tap into cutting-edge research and interact with academic leaders in these fields related to private sector innovation. A long-term strategic action must be to transform the technology research conducted and discussed in the university and academic conference settings into firm creation and job growth.

The region lacks a critical mass of supporting networks and organizations that bring entrepreneurs and firms in this cluster together to networking, mentoring, and marketing when compared to the region's legacy and leading targets. In addition, with the younger cohort of workers in this target there is a higher likelihood of turnover and dissolution of networks and groups as "footloose" young workers move in and out of the region. However, some formal organizations are well-established, and many more are in the early stages of formation.

- The **Wisconsin Innovation Network (WIN) Foundation** chapter in Madison was founded in 1984, later becoming a subsidiary of the Wisconsin Technology Council. The WIN-Madison chapter co-hosts the Wisconsin Early Stage Symposium and provides forum opportunities on issues pertinent to the tech-based economy in the Madison Region and elsewhere.

- **Arts Wisconsin** is an advocacy and support organization focused on promoting and building the arts as a viable component of the Wisconsin economy. Activity areas include advocacy and visibility for the arts; technical assistance, training, and education; information and research; and fiscal receiver services for Wisconsin-based arts projects, providing tax-exempt benefits

UW–Madison's School of Education has several pioneering educational and gaming technology research groups in its Department of Curriculum and Instruction.

- **Games, Learning, and Society (GLS)** is a group of academic researchers, interactive media and game developers, and government and business leaders who study how the gaming medium operates, how it can be used to innovate learning, and the implications for society. Significant study is conducted on the cognitive efforts of playing video games, how these gaming design features might be utilized to design and improve learning systems, and how educational organizations—such as schools—must respond.

    - The Games, Learning, and Society Conference is the nation's top event in the field of video games and education; 2012 will be its eighth year. The GLS Conference is one of the few events where the leaders and innovators who create high-quality digital learning media gather to discuss trends in the field.

- The national **Academic Advanced Distributed Learning Co-Lab (AADLC)** was founded in 2000 to promote synergies in learning technology research and development among academic, government, and industry groups. AADLC has extensive partnerships with academic researchers and accredited institutions involved in learning technology research and development.

    - The **Games and Professional Practice Simulations (GAPPS)** initiative is located at the Academic Advanced Distributed Learning Co-Lab.

One recent program to emerge from UW – Madison's School of Library and Information Studies is the **Library as Incubator Project,** a program launched by graduate students that identifies how artists, performers, designers, and writers use libraries in their research, creation, and marketing of their work. The project aims to promote and make available library resources to further creative works.

Research programs housed at the Wisconsin School of Business of UW–Madison include:

- The **A.C. Nielsen Center for Marketing Research** is a national center for which trains graduate students in marketing research.

- The **Center for Brand and Product Management** gives students experience in and preparation for jobs in product management.

OPPORTUNITY AREA: TOURISM AND EXPERIENCE

A dynamic tourism economy can be a vital mechanism for future Madison Region diversification, and provides the additional benefit of establishing a reputation for individual communities as attractive places to visit or live. A committed regional tourism development effort drives job and revenue growth (measured in payroll and tax receipts) and encourages the workforce and business recruitment and retention initiatives of the region's targeting efforts.

Below are just a few of the activities and sites that attract visitors to the Madison Region every year:

- Fairs, events, expos, and conferences
- Spectator sports events
- Recreation and experience—camping, hunting, fishing, and boating
- Arts, cultural, and heritage tourism
- Gaming
- Retail
- Green tourism
- Food tourism and agritourism
- Business travel

Regional beauty, coupled with proximity to natural resources and a diverse scope of tourist attractions position the Madison Region as a destination for those seeking one-of-a-kind experiences. However, according to stakeholder input, the regional tourism industry currently resides in a silo and is not well-integrated with other business sectors. There is a strong need for a regional tourism plan that incorporates business development activities. Potential synergies with other sectors include eco-tourism and recreation, agritourism and local food tourism, downtown and cultural tourism, and expanded regional experience packages.

Tourism and experience opportunities are present in all eight counties and have the potential to be an important unifying regional theme. In addition to traditional marketing activities, the region must also focus on building relationships with travel writers, travel bloggers, and national food critics. Such outreach can help earn national and international accolades and expand marketing reach significantly. This component of the Target Cluster Analysis does not represent a standalone cluster to be targeted, but an opportunity area that can be further developed and integrated into the region's other clusters.

People

Many occupations in tourism are low-wage and allow unskilled workers a way into to the labor market, providing much-needed opportunities for a component of the population whose job prospects have been severely impacted by the Great Recession. Tourism can also serve to further diversify the regional economy and provide balance when other regional industries suffer downturns.

Important employment dynamics include:

- Employment concentrations greater than those of the nation are found in performing arts companies (LQ=1.72), specialty food stores (1.40), and other amusement and recreation (1.46).
- Despite low average annual wages, employment in traveler accommodations and RV parks and recreational camps accounts for over 7,300 jobs.
- Spectator sports employment grew 20.4 percent between 2005 and 2010, outpacing the national contraction of the subsector.
- Blackhawk Technical College and MATC's Hospitality and Tourism clusters prepare students for careers in this opportunity area.

Prosperity

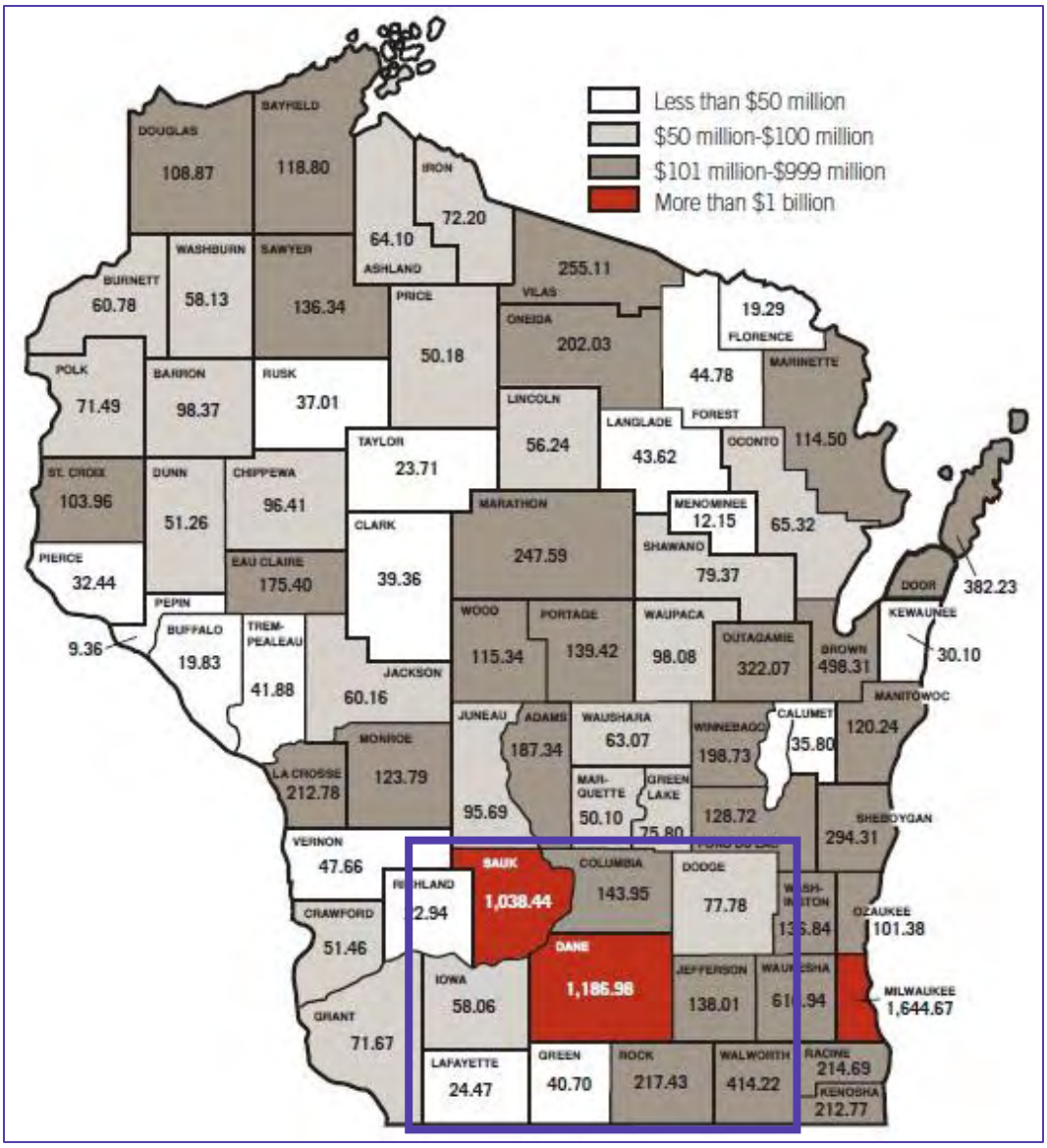
Tourism should be thought of as an export business sector—one that brings in outside money—because it draws people and their dollars to a local or regional economy. The money tourists spend is often retained in the regional economy and can reinforce many of an area's service-oriented businesses. Visitors and the money they spend in the Madison Region can bolster local municipalities' tax receipts; bring business to regional retailers, attractions, and restaurants; and guide further development of amenities that promote residents' quality of life.

As seen in the following map published in the Wisconsin Department of Tourism's annual economic impact report, the Madison Region generated $2.9 billion through tourism in 2010. Some of the individual counties in the region—Dane, Sauk, and Rock—draw among the highest expenditures in the state, and are responsible for a share of nearly 20 percent of the state's total tourism income.

A report of the economic impact of tourism expenditures prepared for the Wisconsin Dells Visitor and Convention Bureau estimated that in 2010, tourism created 24,270 full-time job equivalents, generated $447.18 million in total resident income, and

$42.24 million in local government revenue in the Wisconsin Dells Area (comprised of the City of Wisconsin Dells and the Village of Lake Delton).

TRAVEL EXPENDITURES BY COUNTY (MILLIONS OF DOLLARS), 2010



Source: Wisconsin Tourism's Economic Impact report (May 2011), Wisconsin Department of Tourism

Place

Making a region attractive for visitors and residents elicits the complementary impacts of enhancing the region's appeal for young professionals as well as relocating businesses and talent. Consider that every visitor to the Madison Region is

also a potential investor, resident, business owner, or marketing tool advertising the region's strengths to friends, relatives, and co-workers. Regions and communities that are successful tourist destinations can also serve as marketing tools for other prospective businesses. Because companies considering relocation or expansion increasingly weigh quality of life factors, such as recreational and cultural assets, in their location decisions, an area that is a popular visitor destination will more naturally sell itself as a place where people also want to live and work. Important tourism and experience assets include:

- Taliesin, Frank Lloyd Wright's personal residence, and the Monona Terrace Community and Convention Center
- House on the Rock
- Overture Center, American Players Theatre, and other performing arts facilities and events
- Chazen Museum of Art, Madison Museum of Contemporary Art, and other fine arts facilities
- Madison Children's Museum
- International Crane Foundation
- Camp Randall Stadium and UW–Madison sports events
- Wisconsin State Capitol
- Wisconsin Dells
- Ho-Chunk Gaming
- Farmers markets and farm tours
- Downtowns
- Local breweries, wineries, and distilleries
- World-class cycling and triathlon opportunities, such as Ironman Wisconsin, Centurion Wisconsin, and Bike the Barns

An example of the linkages between tourism events and residents' quality of life is the Greater Madison Convention and Visitors Bureau's Madison Area Sports Commission, a non-profit organization tasked with increasing tourism spending through attracting sporting events and competitions to Dane County, as well as providing sports opportunities for area youth in the Madison area.

Ideas for expanded tourism opportunities and themes that surfaced during input include:

- Establishing additional cycling-oriented festivals, events, and races
- Expanding cultural tourism package offerings
- Leveraging the natural beauty for integrated ecotourism offerings

- Promoting regional bodies of water—rivers and lakes—as main sightseeing and experience destinations

Infrastructure: As discussed in the Competitive Assessment, the Madison Region is home to world-class cycling infrastructure. Further demonstrating the excellence of the region's cycling routes, when Chicago was bidding to be the site of the 2016 Olympic Games, the Madison Region was identified as the site where cycling road races would be held. Maintaining the infrastructure will be an important step in further developing cycling-oriented regional events and festivals.

However, beyond the coverage of bicycle lanes and trails, the Madison Region must more fully and efficiently connect its high-value tourism communities and sites. In addition, a major challenge to further developing and marketing the Madison Region's amenities and activities for visitors is the current low capacity and high cost of airfare at the Dane County Regional Airport. The expense of flying directly into the region is a significant hindrance to potential visitors who live more than a few hours away. For those staying overnight or multiple nights, the lack of hotel capacity is also well-documented, with strains occurring when numerous events are held simultaneously. In addition, the lack of Amtrak service to the region's core also poses a transportation concern.

This opportunity area has great potential to be more fully integrated into the region's nationally-recognized quality of life amenities and local food culture. Establishing and communicating a stronger identity as a place to visit and play will be a key strategy for this area. These efforts are already underway through discussions on creative placemaking, initiated by the chair of the National Endowment for the Arts and the Wisconsin Arts Board. Other key partners will include the Wisconsin Downtown Action Council and Wisconsin Rural Partners.

CONCLUSION

The Madison Region has historically been sheltered from major economic downturns like the Great Recession or declines in particular sectors due to its base of stable employment in government and education. However, as funding challenges threaten the region's reliance on public sector employment and wage growth, the Madison Region is now more than ever in need of a holistic approach to targeted economic development. This approach will be outlined in detail in the next **Advance Now** phase, the Strategy.

The target clusters and corresponding niches and opportunity area identified in this Target Cluster Analysis are Advanced Manufacturing, Agriculture and Food Systems, Health Care, Life Sciences, Design and Technology, and Tourism and Experience. These targets represent the highest-value opportunities for employment growth in the eight-county Madison Region. They merit prioritization in terms of time and resource investments from Thrive, its regional economic development partners, and the Madison Region's private sector business leadership.

Successfully developing and maintaining these clusters and taking advantage of competitive assets across many sectors requires varied but complementary strategies: existing business retention and expansion, small business and entrepreneurial development, research and development, talent development, and external marketing, attraction, and recruitment. Focusing efforts on only one or two of these target strategies will be inadequate to maximize the Madison Region's vast potential for growing these sectors and emerging as a top competitive region in each of its targets.

Key issues to tackle in the coming years of **Advance Now** implementation will be relatively low wages across the targets which pose threats to talent retention and recruitment, and crafting a strong marketing message that effectively conveys the competitive business sector strengths to internal and external audiences.

As the decline of the national recession gradually reverses and the regional economies across the U.S. recover, competition for talent among regions will increase, particularly for highly-skilled workers critical to the Madison Region's targets. Long-term economic growth will be subject to the Madison Region's talent capacity to meet the demands of current and prospective employers. The high quality of life in the Madison Region makes it an attractive location for companies, research institutions, the present talent, and the imminent labor force currently enrolled in Pre-K–12 school and higher education, but the region must aggressively develop and

diversify its regional economy through well-paying job retention and creation in tandem with talent development and recruitment.

It is imperative to understand that targeting specific business clusters for growth does not rule out the pursuit of other quality economic opportunities that become available. However, a regional target-based approach does necessitate focusing resource allocations on a few key cluster areas with the greatest competitive advantages and long-term potential for growth and prosperity. The **Advance Now** Strategy will provide specific recommendations for the growth and development of the priority target clusters profiled in this report.

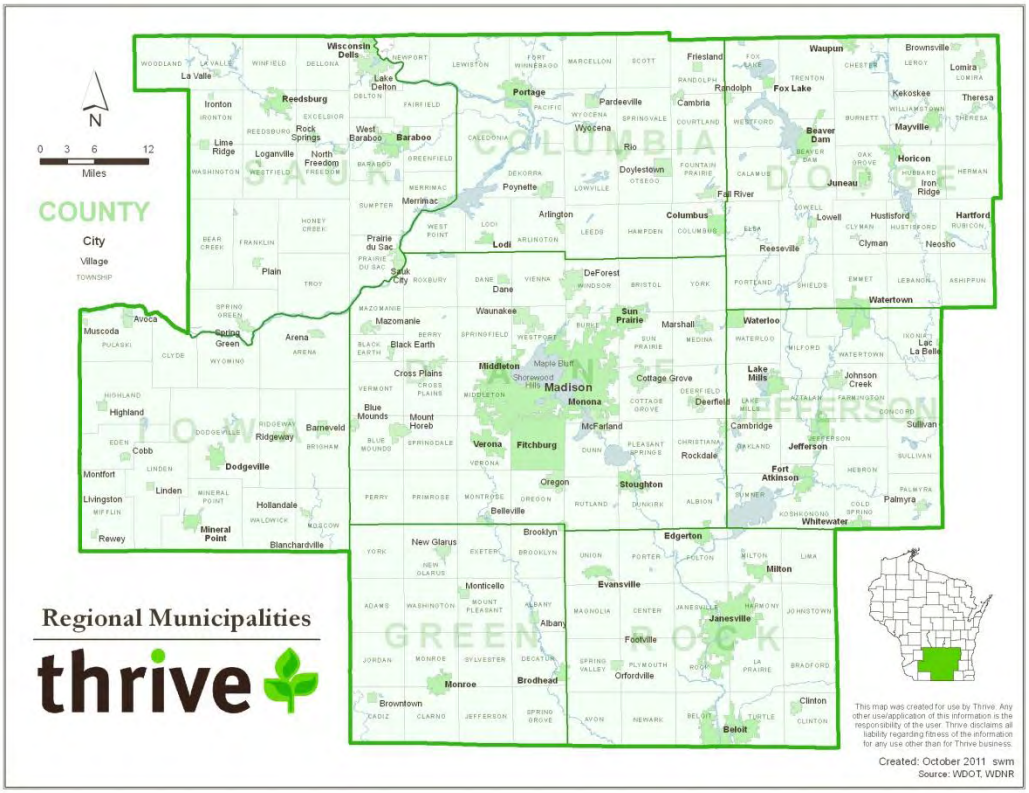
APPENDIX: METHODOLOGY

This appendix provides important background information on the geographies examined, data sources leveraged, and details on particular methodologies used in the research and data analysis of the Target Cluster Analysis report.

Geographies

The Madison Region is made up of Columbia, Dane, Dodge, Green, Iowa, Jefferson, Rock, and Sauk counties, shown in the following map. This report presents data for the Madison Region, and has made every effort to keep fidelity to the eight-county region. Unless otherwise noted, the data corresponds to the entire eight-county region.

MADISON REGION GEOGRAPHY



Map Source: Thrive

Data Sources

The quantitative portion of this review primarily utilizes data from the Quarterly Workforce Indicators (QWI) from the U.S. Census Bureau, the Quarterly Census of

Employment and Wages (QCEW) from the U.S. Bureau of Labor Statistics (BLS), Occupational Employment Statistics (OES) from the BLS, the National Center for Education Statistics, and the Wisconsin Department of Workforce Development (DWD). The QWI and QCEW provide information on regional employment and wage levels for all industries as defined as the North American Industrial Classification Systems (NAICS). Industries are defined broadly as 2-digit super-sectors, followed by 4-digit detail.

Occupations are defined using the Standard Occupational Classification (SOC) system codes defined by the BLS. Current occupational data at the eight-county Madison Regional level was gathered from the OES by DWD and then aggregated to smooth out disclosure issues in individual counties and SOCs.

The U.S. Bureau of Labor Statistics provides data on employment, unemployment, labor force, and wages. The Quarterly Census of Employment and Wages (QCEW) is conducted by the BLS and provides detailed nonfarm employment data by sector. However, the BLS is careful to suppress employment in sectors where the number of establishments is less than or equal to three, or when a single employer represents more than 80 percent of total sector employment. The BLS will not publish data if it does not meet a state's disclosure policy.

Wisconsin's disclosure policy made it difficult to use the publicly available data. Suppression in multiple sectors made data analysis burdensome and incomplete. The Wisconsin Department of Workforce Development (DWD) assisted *Market Street* by providing data for the eight-county region. We received employment data for the two-digit and four-digit level North American Industrial Classification Systems (NAICS). The employment data presented in this document comes from the DWD.

The QCEW data figures present an accurate view of employment in the region. However, since the data only covers those workers who are covered by unemployment insurance, some workers will be left out. A contact at the DWD informed us that many work-study positions filled by students at University of Wisconsin and other higher education institutions would not be captured. Statewide that number could be near 100,000, with many in the Madison Region.

Suppression Tables: Age Pipeline

The following tables show which counties of the eight-county region have data that is suppressed. These tables correspond to the tables that show age pipeline ratios for each target. Counties for which disclosed data is available are denoted by an "x". Blanks denote subsectors in which data was suppressed, and thus could not be included in regional figures.

ADVANCED MANUFACTURING

NAICS Code	County							
	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Machinery and Materials								
3261	x	x	x			x	x	x
3272		x						x
3315		x	x					
3324	x							
3325								
3327		x	x	x		x	x	x
3331		x	x					
3332	x	x	x				x	x
3333		x	x			x	x	
3339		x	x			x	x	
4231	x	x	x			no 55-64	x	x
4238	x	x	x	x	x	x	x	x
Niche: Pharmaceutical and Chemical								
3251		x					x	
3252								no 14-99
3253		x						no 14-99
3254		x						
3259		x						
3391	no 25-34	x	only 25-34	x		no 14-99	x	only 55-64
4246	no 55-64	x	x	x		only 25-34	x	only 25-34
Niche: Instruments and Precision Components								
3334		x				only 25-34		
3353			x			x	no 14-99	
3359		x				only 25-34		only 25-34
3343				x				
3344		x				x		
3345		x			x	x		
4236	x	x				no 14-99	x	no 55-64
4251	x	x	no 55-64	no 25-34	x	x	x	x
5413	x	x	x	x	no 25-34	x	x	x
Target Support Operations								
4841	x	x	x	x	x	x	x	x
4931	x	x	x			x	x	x

HEALTH CARE

Code	County Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Medical Care & Wellness								
6211	x	x	x	x	x	x	x	x
6212	x	x	x	x	x	x	x	x
6213	x	x	x	x	x	x	x	x
6214		x	x	only 55-64		x	x	x
6215	no 14-99	x	no 55-64					
6216		x					x	x
6221		x	x				x	x
6231	x	x	x	x	x	x	x	x
6233	x	x	x	x	x	x	x	x
6239		x				only 55-64	x	only 25-34
6242	only 55-64	x			no 55-64	x	x	
Niche: Health Informatics								
5112		x	only 25-34		only 25-34	x	only 25-34	
5182	only 55-64	x					x	
Niche: Management & Support Operations								
4242	only 55-64	x			only 55-64			x
4234		x		no 55-64		x		x
4461	x	x	x	x	x	x	x	x
5242	x	x	x	x	x	x	x	x
5251		x						

AGRICULTURE AND FOOD SYSTEMS

NAICS Code	County							
	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Plant & Animal Cultivation								
1111	only 14-99	x	x	x	x		x	only 14-99
1112		x		only 55-64		x	only 55-64	only 25-34
1114	no 25-34	x	only 55-64	no 14-99		x	x	no 14-99
1121	x	x	x	x	x	x	x	x
1122		no 14-99						x
1123		only 25-34				x		
1129		x			no 14-99	no 14-99		only 25-34
1151	only 25-34	no 55-64			x		only 14-99	x
1152		x	x	only 25-34	only 55-64	only 55-64	x	x
3253		x						no 14-99
3331		x	x					
Niche: Food Processing								
3111	x	x				x		
3113	x	x						no 55-64
3116	no 14-99	x	x	x		x	x	
3118	x	x	no 55-64	x	no 14-99	no 14-99		only 55-64
3119		x				x	x	
3121	only 55-64	x		x		x		
Niche: Food Systems Development & Distribution								
4244		x	x	x	x	x	x	x
4249	x	x	x	x	x	x	x	x
4245	no 25-34	x	x	x	no 14-99	x		no 25-34
4248		x						
4452	x	x	x	x		x	x	x
4451	x	x	x	x	x	x	x	x
4453	only 14-99	x	x	only 55-64	only 55-64	no 55-64	x	no 25-34
4931	x	x	x			x	x	x
7221	x	x	x	x	x	x	x	x
7222	x	x	x	x	x	x	x	x
7223	x	x	x			x	x	x
7224	x	x	x	x	no 55-64	x	x	x

LIFE SCIENCES

NAICS Code	County							
	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Research, Development, & Testing								
6215	no 14-99	x	no 55-64					
5413	x	x	x	x	no 25-34	x	x	x
5417		x				no 14-99		
Niche: Production & Distribution								
3112								
3251		x					x	
3252								
3253		x						no 14-99
3254		x						
3345		x			x	x		
3391	no 25-34	x	only 25-34	x		no 14-99	x	only 55-64
4242	only 55-64	x			only 55-64			x
4234		x		no 55-64		x		x
4246	no 55-64	x	x	x		only 25-34	x	only 25-34
4842	x	x	x	x	x	x	x	x
4921		x	no 14-99		x		x	

DESIGN AND TECHNOLOGY

NAICS Code	County							
	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Technology & Software								
5112		x	only 25-34		only 25-34	x	only 25-34	
5182	only 55-64	x					x	
5416	x	x	x	x	x	x	x	x
5415	no 55-64	x	x	no 55-64	no 55-64	x	x	x
5419	x	x	x	x	no 55-64	x	x	x
Niche: Arts & Design Services								
5121	x	x	no 25-34		no 25-34	no 55-64	no 55-64	no 55-64
5414	no 14-99	x	no 14-99			no 14-99	no 55-64	no 25-34
5418	only 55-64	x	no 14-99	x	no 14-99	only 14-99	x	x
5413	x	x	x	x	no 25-34	x	x	x
5151		x					x	
7111		x				x		x
7115	no 14-99	x		only 55-64	only 14-99	x	only 14-99	
Niche: Direct-to-Consumer & Specialty Retail								
4251	x	x	no 55-64	no 25-34	x	x	x	x
4541		x		x		only 55-64	x	x
4452	x	x	x	x		x	x	x
4543	no 25-34	x	x	x	no 55-64		x	
4921		x	no 14-99		x		x	
4931	x	x	x			x	x	x

Suppression Tables: Hiring Dynamics

The following tables show which counties of the eight-county region have data that is suppressed. These tables correspond to the tables that show hiring dynamics for each target. Counties for which data is available - that was disclosed - is denoted by an "x". Blanks denote subsectors in which data was suppressed, and thus could not be included in regional figures.

ADVANCED MANUFACTURING

NAICS Code	County							
	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Machinery & Materials								
3261	x	x	x	x		x	x	x
3272	no hire data	x					x	x
3315		x	x	no hire data		x		
3324	x	x	x	no separation data		x		
3325								x
3327	x	x	x	x		x	x	x
3331	x	x	x			x	x	x
3332	x	x	x	x	x	x	x	
3333		x	x			x	x	
3339		x	x	x		x	x	x
4231	x	x	x	x		x	x	x
4238	x	x	x	x	x	x	x	x
Niche: Pharmaceutical and Chemical								
3251	x	x		x		no separation data	x	
3252								x
3253	x	x		x				x
3254		x		x		no hire data	x	
3259		x	x					
3391	x	x	x	x		x	x	x
4246	x	x	x	x		x	x	x
Niche: Instruments and Precision Components								
3334	x	x	x			x	x	
3353			x	no separation data		x	x	x
3359	no hire data	x	no hire data			x		x
3343		x		x				x
3344	x	x	x			x		x
3345		x			no hire data	x		
4251	x	x	x	x	x	x	x	x
5413	x	x	x	x	x	x	x	x
Target Support Operations								
4841	x	x	x	x	x	x	x	x
4931	x	x	x	x	x	x	x	x

HEALTH CARE

NAICS Code	County							
	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Medical Care & Wellness								
6211	x	x	x	x	x	x	x	x
6212	x	x	x	x	x	x	x	x
6213	x	x	x	x	x	x	x	x
6214	x	x	x	x		x	x	x
6215	x	x	x				x	x
6216	x	x	x	x		No Hire Data	x	x
6221		x	x			No Hire Data	x	x
6231	x	x	x	x	x	x	x	x
6233	x	x	x	x	x	x	x	x
6239	No Hire Data	x		x		x	x	x
6242	x	x	x		x	x	x	x
Niche: Health Informatics								
5112		x	x		x	x	x	
5182	x	x				x	x	
Niche: Management & Support Operations								
4242	x	x			x	x		x
4234	x	x			x	x	x	x
4461	x	x	x	x	x	x	x	x
5242	x	x	x	x	x	x	x	x
5251		x						

AGRICULTURE AND FOOD SYSTEMS

NAICS Code	County							
	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Plant & Animal Cultivation								
1111	x	x	x	x	x	No hire data	x	x
1112		x		No hire data	x	x	x	
1114	x	x	x	x	x	x	x	x
1121	x	x	x	x	x	x	x	x
1122		x	x					x
1123		x	x			x	No separation data	x
1129		x	x		x	x	x	x
1151	x	x	x	x	x		x	x
1152	x	x	x	x	x	x	x	x
3253	x	x		x				x
3331	x	x	x			x	x	x
Niche: Food Processing								
3111	x	x	x	x		x	x	No separations
3113	x	x						x
3116	x	x	x	x		x	x	x
3118	x	x	x	x	x	x	No hire data	x
3119	no separations data	x	x		no hire data		x	
3121	no separations data	x		x	x	x	x	x
Niche: Food Systems Development & Distribution								
4244	no hire data	x	x	x	x	x	x	x
4249	x	x	x	x	x	x	x	x
4245	x	x	x	x	x	x	x	x
4248	x	x				x	x	x
4452	x	x	x	x	x	x	x	x
4451	x	x	x	x	x	x	x	x
4453	x	x	x	x	x	x	x	x
4931	x	x	x	x	x	x	x	x
7221	x	x	x	x	x	x	x	x
7222	x	x	x	x	x	x	x	x
7223	x	x	x	x	x	x	x	x
7224	x	x	x	x	x	x	x	x

LIFE SCIENCES

NAICS Code	County							
	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Research, Development, & Testing								
6215	x	x	x				x	x
5413	x	x	x	x	x	x	x	x
5417		x				x	no hire data	x
Niche: Production & Distribution								
3112						x		
3251	x	x		x		no separation data	x	
3252								x
3253	x	x		x				x
3254		x		x		no hire data	x	
3345		x			no hire data	x		
3391	x	x	x	x		x	x	x
4242	x	x			x	x		x
4234		x	x	x		x	x	x
4246	x	x	x	x		x	x	x
4842	x	x	x	x	x	x	x	x
4921		x	x		x		x	x

DESIGN AND TECHNOLOGY

NAICS Code	Columbia	Dane	Dodge	Green	Iowa	Jefferson	Rock	Sauk
Niche: Technology & Software								
5112		x	x		x	x	x	
5182	x	x				x	x	x
5416	x	x	x	x	x	x	x	x
5415	x	x	x	x	x	x	x	x
5419	x	x	x	x	x	x	x	x
Niche: Arts & Design Services								
5121	x	x	x	x	x	x	x	x
5414	x	x	x			x	x	x
5418	x	x	x	x	x	x	x	x
5413	x	x	x	x	x	x	x	x
5151	x	x	x	x	x	x	x	x
7111		x	x		x	x		x
7115	x	x		x	x	x	x	
Niche: Direct-to-Consumer & Specialty Retail								
4251	x	x	x	x	x	x	x	x
4541	no separation data	x	x	x		x	x	x
4452	x	x	x	x	x	x	x	x
4543	x	x	x	x	x	x	x	x
4921		x	x		x		x	x
4931	x	x	x	x	x	x	x	x

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