



## Strategic Plan for Economic and Community Prosperity in Southwest Central Indiana

PREPARED BY:  
Battelle Technology Partnership Practice (TPP)

PREPARED FOR:  
Energy Systems Network

FUNDED BY:  
Lilly Endowment, Inc.

June 2014



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# Executive Summary

In today's fast paced, global knowledge economy, Southwest Central (SWC) Indiana<sup>1</sup> stands as a paradox. SWC Indiana possesses unique attributes upon which to build and chart its future. These attributes include:

- A **major research university** and its attractiveness to highly educated workers and its draw for students seeking to advance their education;
- A **unique federal laboratory** that maintains a central role in the U.S. defense operations;
- Substantial **natural and historical assets** that provide quality of life for the region's residents, and also offer the potential for tourism and recreational activities to diversify the economy;
- One of the most significant U.S. interstate highway development projects in the last two decades, the **extension of the I-69 Corridor** from Indianapolis to Evansville, has the potential to improve spatial connections within the region and generate new economic opportunities for accessing broader markets.

It is also a region that has developed highly concentrated industry clusters anchored by globally competitive firms and advanced significant technological assets. Specifically, eight SWC Indiana industry clusters offer unique and important opportunities upon which to grow the regional economy (Table ES-1).

**Table ES-1. Economic Development Potential of SWC Indiana Industry Clusters**

SWC Indiana Cluster	Economic Development Potential	
	Total Period 2001-2012	Post-Recession Period 2009-2012
<b>Technology</b>		
Biomedical	Current Strengths	Current Strengths
Information and Communications Technology	Emerging Strengths	Emerging Strengths
National Security/Defense	Current Opportunity	Current Strengths
<b>Manufacturing</b>		
Automotive/Heavy Vehicle Equipment	Higher Priority Ret Target	Current Strengths
Food Processing and Manufacturing	Current Strengths	Current Strengths
Furniture	Higher Priority Ret Target	Current Strengths
<b>Industrial Support Services</b>		
Transportation, Distribution, and Logistics	Emerging Strengths	Emerging Opportunities
<b>Quality of Place</b>		
Hospitality and Tourism	Emerging Strengths	Emerging Strengths

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

<sup>1</sup> Southwest Central Indiana is defined as the eleven county region southwest of Indianapolis - the region consists of Brown, Crawford, Daviess, Dubois, Green, Lawrence, Martin, Monroe, Orange, Owen and Washington counties.

Yet, the anticipated economic results that leverage this environment have fallen short. This points to a concern that SWC Indiana's ability to generate wealth and prosperity from its economy is not sufficiently competitive. Indeed, general economic indicators suggest that even compared to the sluggish national recovery, SWC Indiana is lagging. Just consider:

- While U.S. employment has grown by 2.6 percent since the economic recovery began in 2009, SWC Indiana has declined another 0.3 percent over the same 2009-2012 period.
- Per capita incomes in SWC Indiana were in \$34,657, fully 21 percent lower than the U.S. average per capita income.
- Without the population growth of Bloomington/Monroe County, the rest of SWC Indiana is growing much slower (1.8 percent), and even with Monroe County included, the region's 6.2 percent growth is less than either the State of Indiana (6.8 percent) or the U.S. (10.1 percent).

Recognizing this paradox, in the summer of 2013, a steering committee consisting of SWC Indiana regional leaders and stakeholders came together to identify opportunities, assets, and resources that can be better utilized and coordinated to provide economic opportunities for its residents and communities. The strategic planning effort was funded by a Lilly Endowment grant that was awarded to the Central Indiana Corporate Partnership Foundation, and managed by Energy Systems Network, a CICIP initiative. To assist in this effort, the Battelle Technology Partnership Practice (TPP) was selected to aid in the development of an economic strategy.

## Key Challenges Facing Economic Growth and Community Prosperity in Southwest Central Indiana

To better understand the region's challenges, Battelle examined more closely the dynamics behind SWC Indiana's industrial base, research base, entrepreneurial ecosystem, and regional economic development potential. This involved focused outreach and interviews with industry, the federal laboratory, universities, entrepreneurs, investors, as well as with community and economic development leadership. Focus groups were also engaged to further illuminate the environment in SWC Indiana for economic development.

Battelle's analysis points to five inter-related challenges confronting SWC Indiana which must be addressed as part of this strategic effort. These five development challenges are:

1. Industrial growth is being hindered by the lack of sufficient numbers of **skilled workers**.
2. The region has not yet fully taken advantage of the opportunity presented by the development of the **I-69 Corridor**.
3. Lack of robust, value-added **relationship between the region's two primary public research engines** hinders the region's ability to compete in the global economy, and also puts at risk the ability to retain the institutions' world-class assets in the future.
4. Lack of **sufficient entrepreneurial culture** hinders economic growth, limiting economic diversification and the stability and opportunities such diversity brings to a community.
5. **Lack of regionalism** hinders the coordination of efforts and does not allow for the benefits of critical mass.



The results of the close examination of SWC Indiana's economic position over the past decade suggests that there have been many gains for the region that can be built upon, but significant gaps persist that need to be addressed. Advancing the region's economy requires an active effort that addresses a number of key challenges facing the region. These challenges are interrelated; addressing one issue can have a cumulative impact on other areas. Another way to think about these challenges is that today they pose a "vicious cycle" creating real barriers to development that the region must overcome. As the region works to address these challenges, a "virtuous cycle" can emerge in which barriers come down in an accelerated fashion as progress is made.

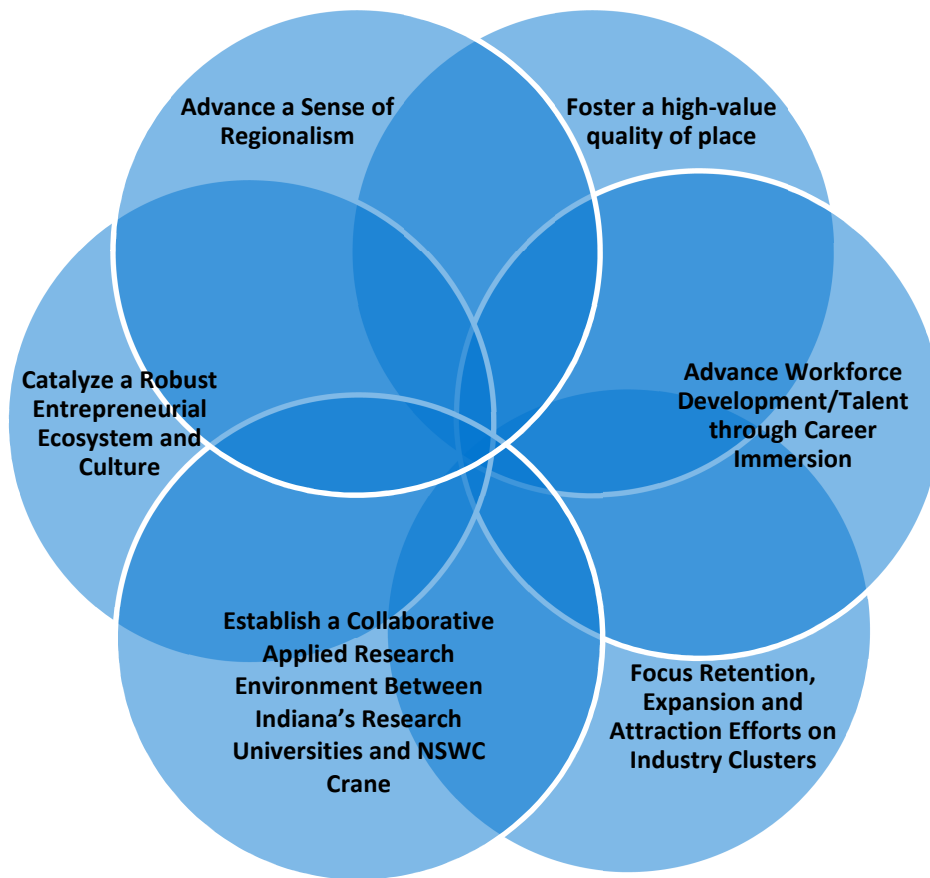
## Southwest Central Indiana's Strategic Economic Development Plan

The five development challenges identified for SWC Indiana stand as strategic priorities, which if effectively addressed will enable the region to ignite the growth of the region's economy. Therefore, it is proposed that SWC Indiana initiate a set of six strategies and an associated set of 25 actions to overcome its existing economic challenges and create long-term economic growth and community prosperity within the region. These strategies and actions are outlined in the following pages. The six strategies are as follows:

- **Advance a sense of regionalism**
- **Foster a high-value quality of place**
- **Advance workforce development/talent through career immersion initiatives aligned with federal, state and local efforts**
- **Focus retention, expansion and attraction efforts on those industry clusters that provide the greatest opportunity for economic growth in the region**
- **Establish a collaborative applied research environment between Indiana's research universities and Naval Surface Warfare Center Crane to leverage each other's assets to help ensure global relevancy of research and regional economic growth**
- **Catalyze a robust entrepreneurial ecosystem and culture.**

Figure ES-1 illustrates the interconnectedness of each of the six strategies. ***It is important to note that no one single strategy can be effective without the resulting efforts proposed under the other five strategies.***

**Figure ES-1. Inter-related Strategies for Growing SWC Indiana's Economy**



The strategic plan has been designed to be driven by industry and capitalize on SWC Indiana's comparative technological assets, while ensuring that future investments are focused on building the technology, knowledge, and capital that will ensure SWC Indiana's economic success for years to come. These strategies and subsequent actions are based, in part, on best practices from around the nation. However, the key strategic elements that provide specific solutions to SWC Indiana's industrial needs are unique for the region and are built on SWC Indiana's specific attributes and resources.

Table ES-2 clearly identifies for each strategy the actions proposed and the priority and timing of each.

- The classification of priority goes from critical for those actions that are essential for the success of the strategy, to significant for those actions that can make a major impact in advancing the strategy, to important for those actions that can contribute to the success of the strategy.
- The classification of timing goes from immediate to mid-term. Immediate actions are those that should be undertaken in the first year; short-term actions are those to be undertaken in the one- to three-year period; and medium-term actions are those to be implemented beginning in years three to five. However, a number of actions while implemented during the first five years will take a full ten years or more to begin to see measurable impacts.

**Table ES-2. The SWC Indiana Strategic Plan Matrix**

Strategy/Action	Priority	Timing
<b>Strategy 1: Advance a Sense of Regionalism</b>		
<b>Action 1:</b> Ascertain what structure is needed to advance a successful, unified, 11-county economic development initiative charged with creating an identity/brand for the region and coordinating all regional economic development efforts	Critical	Immediate
<b>Action 2:</b> Establish a centrally managed and coordinated Strategic Opportunity Fund for site and facility development to take advantage of the I69-Corridor using philanthropic and state and county public funds.	Critical	Short-term
<b>Action 3:</b> Create a rural development center of excellence at IU-Bloomington to leverage the unique international development, public policy, and health policy expertise resident in the region and apply it to solving rural issues of today.	Significant	Mid-term
<b>Action 4:</b> Launch a campaign to attract natives of SWC Indiana back to the region and advertise the region’s quality of life to attract high-skilled technical and managerial workers to the region.	Significant	Short-term
It is important to note that while Strategy 1 cannot be effective without the resulting efforts proposed under the other five strategies, particularly tightly linked actions include: Strategy 2, Actions 1 & 2 and Strategy 4, Actions 1, 2 & 3		
<b>Strategy 2: Foster a High-Value Quality of Place</b>		
<b>Action 1:</b> Initiate further infrastructure investments based on regional planning to take complete advantage of the I-69 Corridor opportunity and create live-work-play environments	Critical	Immediate
<b>Action 2:</b> Establish a region-wide tourism campaign that capitalizes on the region’s unique scenic, ecological, historical, cultural, and recreational advantages	Important	Immediate
<b>Action 3:</b> Examine the Internet and cellular connectivity in the region to determine needed improvements	Important	Short-term
Particularly tightly linked actions include: Strategy 1, Actions 1, 2, 3 & 4; Strategy 3, Actions 2 & 5; and, Strategy 4, Actions 1 & 2		

**Table ES-2. The SWC Indiana Strategic Plan Matrix, cont.**

Strategy/Action	Priority	Timing
<b>Strategy 3: Advance workforce development/talent through career immersion initiatives aligned with federal, state and local efforts</b>		
<b>Action 1:</b> Annually develop a projected occupational needs assessment of the targeted industry clusters validated by industry and accessible to consumers	Critical	Immediate
<b>Action 2:</b> Actively inform, educate, and train students, parents, and educators on career opportunities that exist in the identified industry clusters and the educational requirements and career pathways needed to access them, particularly targeting elementary and middle school students	Significant	Short-term
<b>Action 3:</b> Offer internships and co-op opportunities year-round to secondary and post-secondary students, and provide a marketplace to connect students with internship opportunities	Significant	Short-term
<b>Action 4:</b> Improve STEM education at the K-12 level across the region, leveraging current best practices, industry partnerships, and public institutions to scale programs to include every student at every school.	Significant	Mid-term
<b>Action 5:</b> Working with industry, develop curriculum and career pathways for secondary and post-secondary students through a career immersion industry/academic partnership for each targeted industry cluster.	Significant	Mid-term
<b>Action 6:</b> Work with Ivy Tech, Indiana University, University of Southern Indiana, Purdue University, and Vincennes University to develop additional higher-education partnerships with WestGate Academy and Battery Innovation Center to meet the workforce, education, and R&D needs of targeted industry clusters and NSA Crane.	Significant	Immediate
<b>Action 7:</b> Encourage youth to become entrepreneurs.	Significant	Short-term
Particularly tightly linked actions include: Strategy 1, Action 1; and Strategy 4, Actions 1 & 4		

**Table ES-2. The SWC Indiana Strategic Plan Matrix, cont.**

Strategy/Action	Priority	Timing
<b>Strategy 4: Focus retention, expansion and attraction efforts on those industry clusters that provide the greatest opportunity for economic growth in the region.</b>		
<b>Action 1:</b> Expand the footprint of targeted industry clusters and their related supply-chains in the region to create greater economic opportunities throughout the region	Critical	Immediate
<b>Action 2:</b> Develop a SWC Indiana branding/marketing campaign for targeted industry clusters	Critical	Short-term
<b>Action 3:</b> Explore the creation of a Regional Development Authority, which will require legislative approval and funding, as well as a county CEDIT and TIF or other legislatively authorized mechanisms	Significant	Short-term
<b>Action 4:</b> Expand and/or develop IU-Bloomington offerings in applied engineering, applied technologies, science, and systems engineering design and development areas, working in consultation with industry partners and NSWCC Crane	Significant	Short-term
Particularly tightly linked actions include: Strategy 1, Action 1; Strategy 2, Action 1; and, Strategy 3, Actions 1, 2, 3, 4 & 5		
<b>Strategy 5: Establish a collaborative applied research environment between Indiana’s research universities and Naval Surface Warfare Center (NSWC) Crane to leverage each other’s assets to help ensure global relevancy of research and regional economic growth.</b>		
<b>Action 1:</b> Establish an Applied Research Center with an organizational structure and related mechanisms to foster the ability to advance and sustain productive research enterprises, including dedicated personnel to further collaboration between Indiana’s research universities and NSWCC Crane	Critical	Short-term
<b>Action 2:</b> Leverage the close physical proximity of Indiana University and NSWCC Crane to explore and pursue federal research and translational opportunities in areas of mutual interest such as cyber security, radiation, and material sciences	Critical	Short-term
<b>Action 3:</b> Create programs that will facilitate the exchange of Indiana research faculty and NSWCC researchers between institutions	Significant	Short-term
<b>Action 4:</b> Create programs to support endowed chairs and eminent scholars in areas of overlapping strengths across technology areas of mutual interest	Significant	Medium-term

Particularly tightly linked actions include: Strategy 3, Action 6 and Strategy 4, Action 4

**Table ES-2. The SWC Indiana Strategic Plan Matrix, cont.**

Strategy/Action	Priority	Timing
<b>Strategy 6: Catalyze a Robust Entrepreneurial Ecosystem and Culture</b>		
<b>Action 1:</b> Establish Entrepreneurial Hubs, focused on cluster industries that are innovative or technology-based, that provide facilities and lab equipment, professional development, coaching and mentorship, and access to risk capital, thereby accelerating the rate of commercialization and the creation of start-up companies in the region	Critical	Short-term
<b>Action 2:</b> Establish and create linkages with a pipeline of commercialization tools and risk capital funds, including successful venture capital and private equity funds, to invest in entrepreneurial efforts in the region	Critical	Short-term
<b>Action 3:</b> Celebrate and market entrepreneurial successes	Significant	Immediate
Particularly tightly linked actions include: Strategy 1, Action 1 and Strategy 3, Action 7		

## A Time for Action

Now is the time for Southwest Central Indiana to lay the foundation for a sustained, high-growth recovery that enables the region to “leap forward” and become a leading job- and wealth-generating economy over the next decade. In today’s global knowledge-based economy, the recipe for economic success is quite simple—Southwest Central Indiana needs to focus its economic development efforts to ensure that not only can its existing industry drivers raise their level of competitiveness and added value, but that it can also identify new drivers of innovation to improve the region’s economic prospects.

The analysis suggests that a focus on the region’s challenges can serve as the basis for a successful economic development strategy. These development challenges are centered on the region’s ability to:

- Generate the talented workers that its industrial base demands.
- Take full advantage of the opportunity presented by the development of the I-69 Corridor.
- Develop a robust, value-added relationship between the region’s two primary public research engines.
- Foster a robust entrepreneurial culture to spur economic growth, and foster economic diversification.
- Embrace regionalism to prosper from the benefits of critical mass.

Addressing these development challenges requires a comprehensive effort spanning resource alignment, research focus, business and product development, innovation and commercialization, and branding and targeted attraction. To gain the support needed to make this initiative successful will require the broad support of a unified regional economic development organization as a top economic priority.

By working together, the opportunity for Southwest Central Indiana to grow its economic base and increase community prosperity is substantial. If successful, it is expected that what will emerge is a public-private partnership that will advance the region over the coming decades.

The economy of Southwest Central Indiana is at a crossroads – its ability to reshape itself through industrial restructuring driven by clusters that meet the demands of national and global markets is predicated on its ability to come together as a region with a unified purpose and dedication to improving the trajectory of its economy. The time is now to seize this economic development opportunity.



## Introduction

Best practice in economic development recognizes that each region has a set of target industry sectors or “industry clusters” in which it can differentiate itself thereby building comparative advantage within competitive global markets. Increasingly, emphasis is being placed on technology and innovation as drivers of 21st Century economic development. The ability of a region to lead in technology innovation and deployment in particular areas of industry (including both existing and emerging industries) is becoming a critical and defining driver of economic competitiveness. As the National Governor’s Association set out in advising states and regions across the nation on best practices for global competitiveness:

*Each state must exploit the unique advantages it has relative to other states and build on the strengths found in its local “clusters of innovation”—distinct groups of competing and cooperating companies, suppliers, service providers and research institutions.<sup>2</sup>*

At the same time, there is a growing recognition that the economic challenges to advancing an economy in the long-term are rising. Increasing globalization, the fast pace of technological change, and the growing strength of developing nations in generating highly educated and skilled talent are threatening the economic competitiveness of all regions in the U.S. As the 2013 report by the National Research Council Report, *Rising to the Challenge*, notes:

*U.S. regional economies face mounting global competitive challenges. No longer do U.S. states and cities primarily compete among themselves for talent, investment, and entrepreneurs in technology-intensive industries. They also compete against [foreign] national and regional governments that are executing comprehensive strategies that seek to create innovation clusters in many of the same important, emerging industries.<sup>3</sup>*

In today’s fast paced, global knowledge economy, Southwest Central (SWC) Indiana<sup>4</sup> stands as a paradox. It is a region that has developed highly concentrated industry clusters anchored by globally competitive firms and advanced significant technological assets; yet, the anticipated economic results that leverage this environment have fallen short. This points to a concern that SWC Indiana’s ability to generate wealth and prosperity from its economy is not sufficiently competitive.

Indeed, general economic indicators suggest that even compared to the sluggish national recovery, SWC Indiana is lagging. Just consider:

- While U.S. employment has grown by 2.6 percent since the economic recovery began in 2009, SWC Indiana has declined another 0.3 percent over the same 2009-2012 period.
- Per capita incomes in SWC Indiana were \$34,657, fully 21 percent lower than the U.S. average per capita income.

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<sup>2</sup> National Governor’s Association, “A Governor’s Guide to Trade and Global Competitiveness,” 2002.

<sup>3</sup> Charles W. Wessner and Alan Wm. Wolff, Eds. “Rising to the Challenge: U.S. Innovation Policy for the Global Economy”, 2012. The National Academies Press, Washington, DC., page 431

<sup>4</sup> Southwest Central Indiana is defined as the eleven county region southwest of Indianapolis - the region consists of Brown, Crawford, Daviess, Dubois, Green, Lawrence, Martin, Monroe, Orange, Owen and Washington counties.

## A Time for Action

Now is the time for SWC Indiana to lay the foundation for a sustained, high-growth recovery that enables the region to “leap forward” and become a leading job- and wealth-generating economy over the next decade. In today’s global knowledge-based economy, the recipe for economic success is quite simple—SWC Indiana needs to focus its economic development efforts to ensure that not only can its existing industry drivers raise their level of competitiveness and added value, but that it can also identify new drivers of innovation to improve the region’s economic prospects. This strategy is designed to address these challenges and identify the elements and ingredients to successfully position SWC Indiana to participate competitively in the emerging global economy, built on its strengths, seizing its opportunities, and putting into action a set of strategies to accomplish this.

## Background and Report Purpose

In the summer of 2013, a steering committee consisting of SWC Indiana regional leaders and stakeholders came together to identify opportunities, assets, and resources that can be better utilized and coordinated to provide economic opportunities for its residents and communities. The strategic planning effort was funded by a Lilly Endowment grant that was awarded to the Central Indiana Corporate Partnership Foundation, and managed by Energy Systems Network, a CICIP initiative. This work builds on an initial planning grant from Lilly Endowment, which was used to conduct asset mapping and data analysis on the defined region. While the initial results showed strong potential for enhanced growth, the steering committee recognized more work and engagement with regional leaders was required to develop a robust regional plan and shared vision for Southwest Central Indiana.

To assist in this effort, the Battelle Technology Partnership Practice (TPP) was selected to aid in the development of an economic strategy. Battelle TPP is the economic development consulting arm of the world’s largest independent non-profit research and development organization. Battelle TPP brings to this project a position as the national leader in cluster-driven economic development practice with an established track record in developing and advising many of the most successful modern development programs in the U.S.

This economic development strategic plan was developed with input from the Steering Committee, the Community Foundations in all eleven counties in the region, as well as other consultants engaged for this effort, including the Indiana Business Research Center at Indiana University and Thomas P. Miller & Associates. In addition, the Battelle project team interviewed more than 100 business, academic, and civic leaders to gain an understanding of SWC Indiana’s existing strengths and capabilities and to gather input on the types of activities needed to position the region as an economic leader in the future. The following strategy is the collective result of the input received.

This report is organized into four sections:

- The first section sets the context by providing an assessment of industry performance in SWC Indiana as well as an assessment of its existing research and development base that will help drive future developments.
- The second section considers tactical challenges that SWC Indiana faces in further advancing its economy.
- The third section considers strategies and actions that SWC Indiana should pursue to address these challenges and advance the region’s economy.
- The fourth section provides a detailed implementation plan and recommended organizational structure to help ensure the greatest likelihood of successfully implementing the strategy’s recommendations.

# Section 1: Situational Assessment

## Setting the Economic Context

The eleven county region of SWC Indiana is a microcosm of the economic conditions facing much of the Midwest. First, there is the dichotomy of having both urban and rural areas co-existing in the same region—a central city providing employment for a significant portion of the region while facing the same challenges of any urbanized area, and a more rural agricultural region providing connections to the past and a quality of life desired by many but facing challenges related to economic progress in the midst of stagnant smaller towns and an aging population. In addition, the region has a number of key employers, representing pockets of economic opportunity, but the limited connections between these firms, compounded by their dispersion across this fairly large geographic region, often makes collaborative efforts difficult, at best.

SWC Indiana also possesses unique attributes upon which to build and chart its future. These attributes include:

- A **major research university** and its attractiveness to highly educated workers and its draw for students seeking to advance their education;
- A **unique federal laboratory** that maintains a central role in the U.S. defense operations;
- Substantial **natural and historical assets** that provide quality of life for the region's residents, and also offer the potential for tourism and recreational activities to diversify the economy;
- One of the most significant U.S. interstate highway development projects in the last two decades, the **extension of the I-69 Corridor** from Indianapolis to Evansville, has the potential to improve spatial connections within the region and generate new economic opportunities for accessing broader markets.

This section begins to set the overall context by providing broad socio-economic information regarding the region and how it compares to the State of Indiana overall and to the nation. For some metrics, differences *within* the SWC Indiana region that may impact or shape strategic development initiatives are also examined.

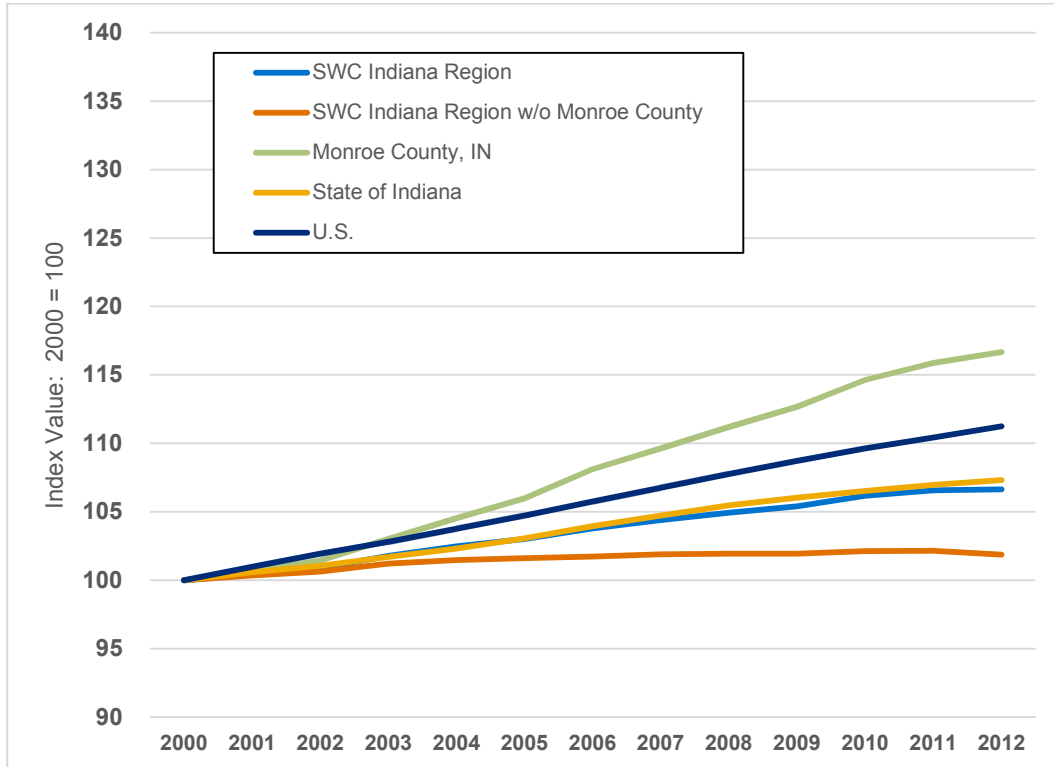
## Population Trends

As seen throughout the Midwest, changing demographics and population trends can have profound impacts on the development future of a region. In Figures 1, 2, and 3, a summary index is provided of changes in total population, population aged 20-29, and the population aged 65+ for SWC Indiana compared to both the State of Indiana and U.S.—these charts show a key regional challenge: a highly differential growth rate between Monroe County and the rest of SWC Indiana.

Overall, SWC Indiana has continued to grow slightly, adding just under 25,000 residents over the 2000-2012 period—a growth in regional population of 6.2 percent to 399,171 residents. This growth, however, continued to reinforce Bloomington as the region's population center as 81 percent of the population increase occurred in Monroe County. With this increase, Monroe County reached just over 141,000 residents and accounts for 35 percent of the region's total population.

Figure 1 also shows that ***without the population growth of Bloomington/Monroe County, the rest of SWC Indiana is growing much slower (1.8 percent), and even with Monroe County included, the region's 6.2 percent growth is less than either the State of Indiana (6.8 percent) or the U.S. (10.1 percent).***

**Figure 1. Comparison of Total Population Growth, 2000-2012**



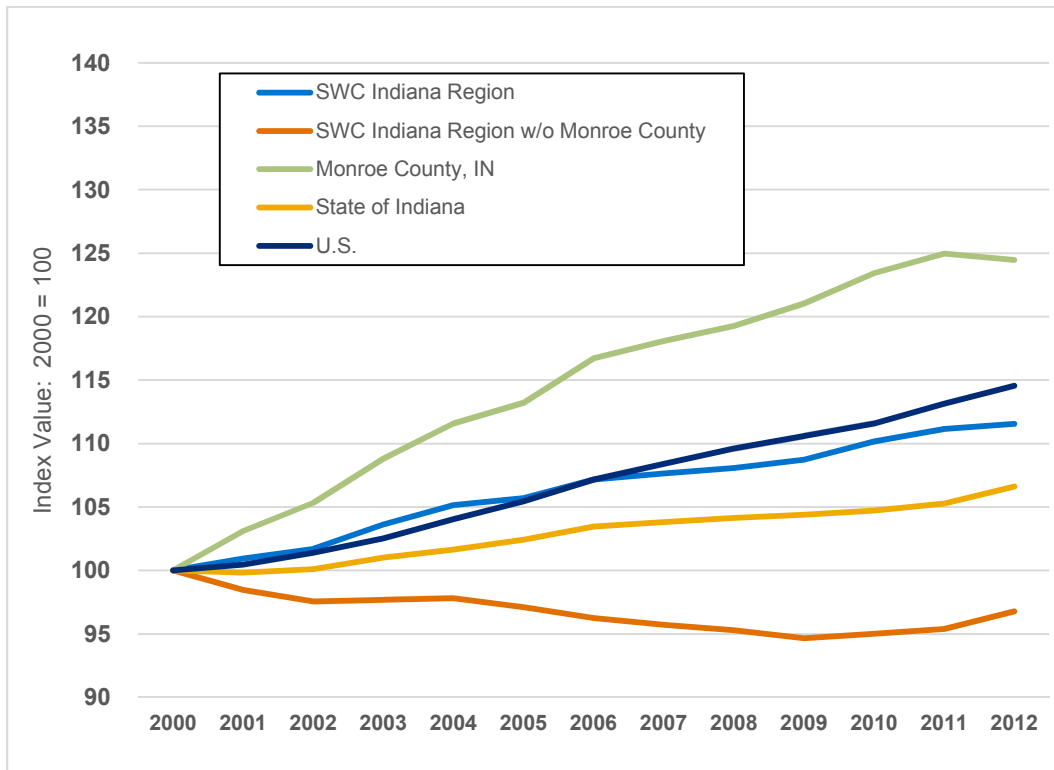
Source: U.S. Census Estimates, Battelle calculations.

It is critical to understand the role that the growth in the number of students at Indiana University-Bloomington plays in these regional demographics. Figure 2 shows a healthy 10.3 percent increase in the 20-29 year old population in SWC Indiana over the 2000-2012 period, a highly sought after population group to fuel future economic growth. This growth is close to the U.S. growth of 12.7 percent during this period, and strongly outpaces the growth in this age group in all of Indiana (6.2 percent).

Much of this gain is due to the continued growth of student enrollment at IU-Bloomington. While these students, who come from all over the world, are considered part of the region's demographic fabric, unless they are presented with career opportunities that entice them to stay in the region after graduation, these additional "residents" are simply regional economic consumers that are moving in and out every four to six years upon graduation, and not necessarily a core demographic asset to build upon (unless captured and retained).

Again the more detailed regional perspective shown in Figure 2 un.masks one of the key challenges of the region. Monroe County shows a substantial increase (19.7 percent) in 20-29 year old population, while this population cohort actually declined by 3.3 percent throughout the remainder of SWC Indiana.

**Figure 2. Comparison of Growth of 20-29 Year Old Population, 2000-2012**

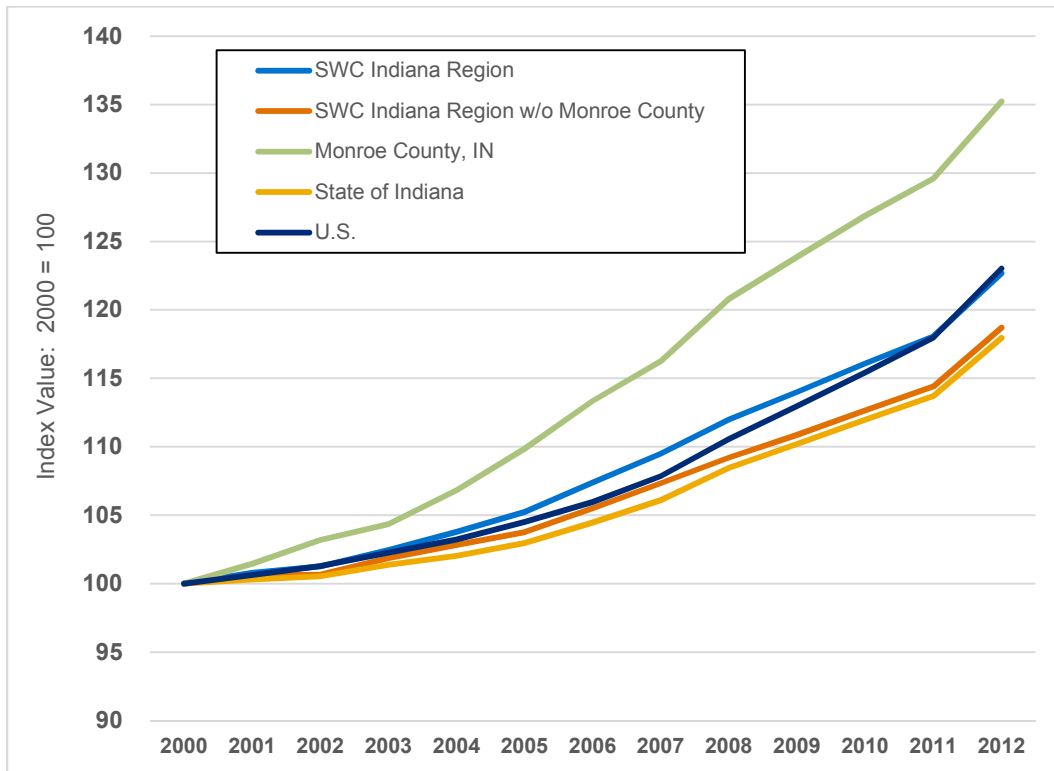


Source: U.S. Census Estimates, Battelle calculations.

The growth in “student” population does not tell the whole story, however. Figure 3 examines the growth in “retirement” aged population—those aged 65 or older. Since 2000, SWC Indiana’s population within this cohort grew by 18.5 percent, slightly below the U.S. growth of 18.7 percent and again exceeding the overall Indiana growth rate (15.7 percent).

What is striking is the dramatic growth in the age 65 or older cohort in Monroe County. Though smaller overall compared to the 20-29 year old group, this cohort grew by 26.1 percent from 2000-2012, reflecting general U.S. aging trends, but also likely representing a quality-of-life attractiveness (e.g., cultural amenities, senior/health care services, vibrancy of surroundings) found in Bloomington and Monroe County.

**Figure 3. Comparison of Growth of 65+ Year Old Population, 2000-2012**



Source: U.S. Census Estimates, Battelle calculations.

### Urban and Rural Context

SWC Indiana possesses a unique geographic context. The region accounts for nearly 4,500 square miles, with an overall population density of 89 people per square mile, similar to the U.S., but well below the State of Indiana's population density of 182 people per square mile. This 'regional' population density masks significant differences within the region as its key population center is at one end of the region. County-level population density ranges from 357 people per square mile in Monroe County to 31 people per square mile in Martin County and 35 people per square mile in Crawford County.

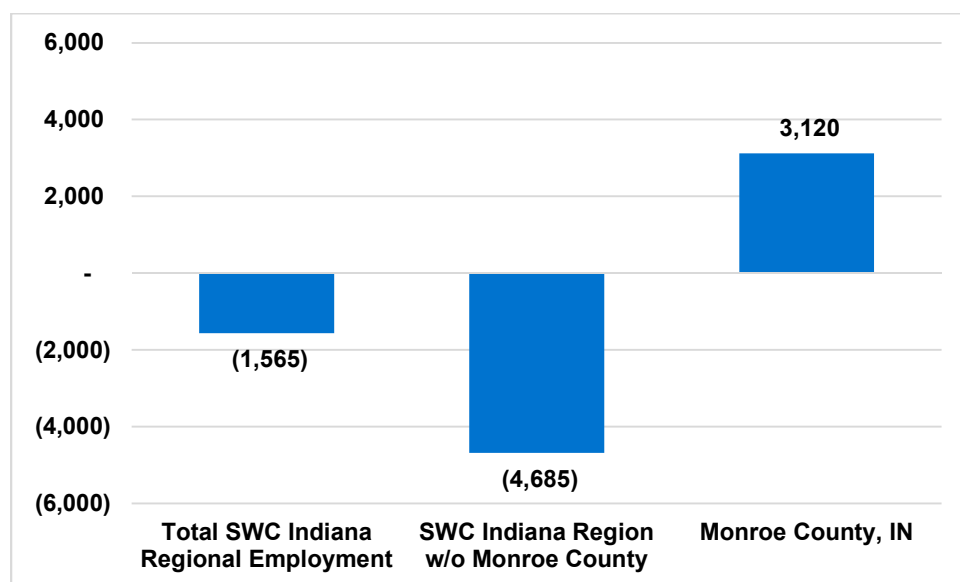
This variation in population density is further reflected in official U.S. Census defined urban and rural populations. **Overall, only 45 percent of SWC Indiana's population is considered to be living in an urbanized area, compared to 73 percent for State of Indiana, and 79 percent for the U.S.** Again, even this context varies dramatically throughout SWC Indiana. As expected, Monroe County is the most urbanized, but even it only has 77 percent of its population living in urban areas of the county. Three counties in the region, Brown, Crawford, and Owen are considered to be 100 percent rural (0 percent urbanized).

## Employment Trends

Though key industry cluster trends are considered later in this section, in assessing the current economic situation it is also important to understand broad employment trends. In this regard, SWC Indiana lost 1.1 percent of its employment, down 1,565 jobs to 147,791 total workers during the 2001-2012 period. While this rate of decrease significantly lags the U.S. performance (U.S. gained 1.8 percent in total employment), the region performed slightly better than the State of Indiana overall, which lost 2.1 percent of its jobs from 2001-2012.<sup>5</sup>

As with other metrics examined in this situational assessment, there is a distinct difference in performance between Monroe County and the rest of SWC Indiana (Figure 4). **From 2001 to 2012, Monroe County gained more than 3,100 jobs, growing by 5.1 percent. In contrast, the remaining 10 counties of the region lost nearly 4,700 jobs, declining by 5.4 percent.**

**Figure 4. Regional Employment Change by Sub-Region, 2001-2012**

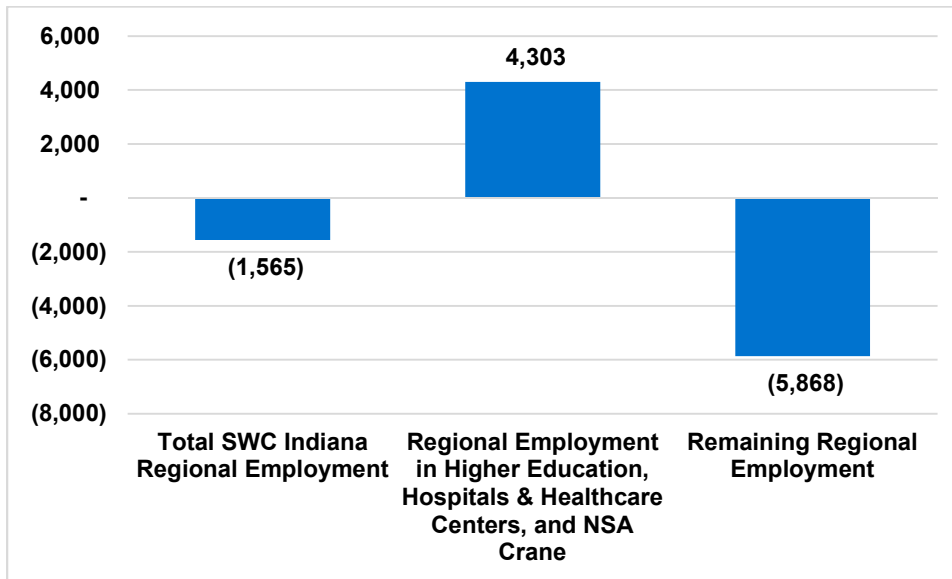


Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

Figure 5 takes a somewhat similar look at the data, but from a slightly different industry sector perspective. This assessment splits out the combined employment growth of three less-cyclical (and often public sector) industry sectors—Colleges and Universities, Hospitals and Healthcare, and NSA Crane—and compares their growth to the remaining sectors of SWC Indiana’s economy. The figure shows that these less-cyclical industry sectors have offset a much larger decline in regional (primarily private sector) industry employment.

<sup>5</sup> Battelle calculations using QCEW data provided by IBRC.

**Figure 5. Regional Employment Change by Industry Type, 2001-2012**



Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## Income and Wage Trends

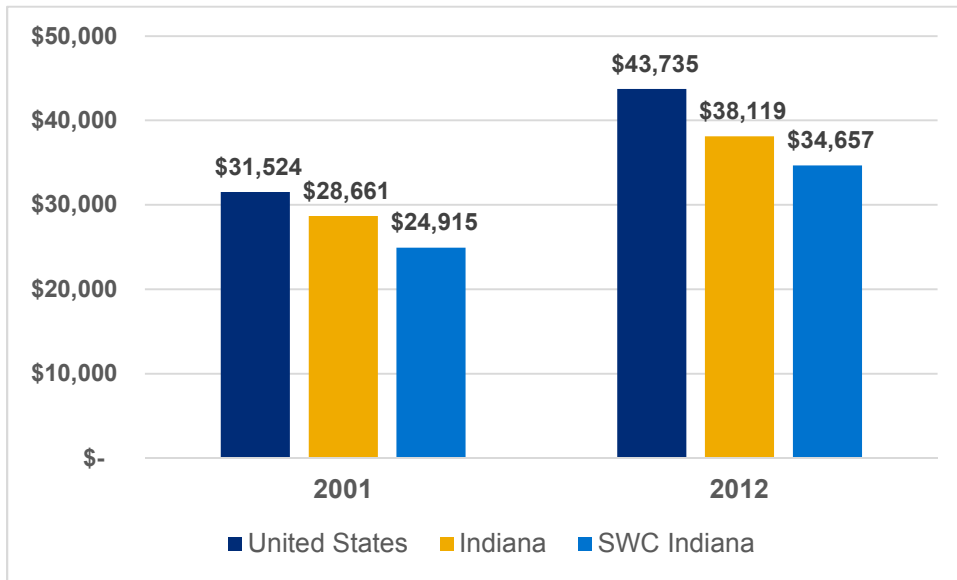
In fully assessing SWC Indiana's current situation, it is also important to understand the income and earning potential of the region, especially relative to the state and U.S.

Total personal income (comprising wages/salaries, interest/royalties/rents, and state and federal transfer payments, including social security and welfare) grew by 32.3 percent in SWC Indiana during the 2001-2012 period (or just under 3 percent annually). This level is less than the U.S. (34.6 percent), but still larger than the overall State of Indiana's growth (29.5 percent).

On a per capita basis, as shown in Figure 6, the overall growth in also reflected in SWC Indiana's per capita growth, growing 28.1 percent from nearly \$25,000 to more than \$34,600. Even at this level of growth, however, ***SWC Indiana has lagged both the State of Indiana and the U.S. in per capita total income since at least 2001.***



**Figure 6. Per Capita Personal Income by Region, 2001 and 2012**

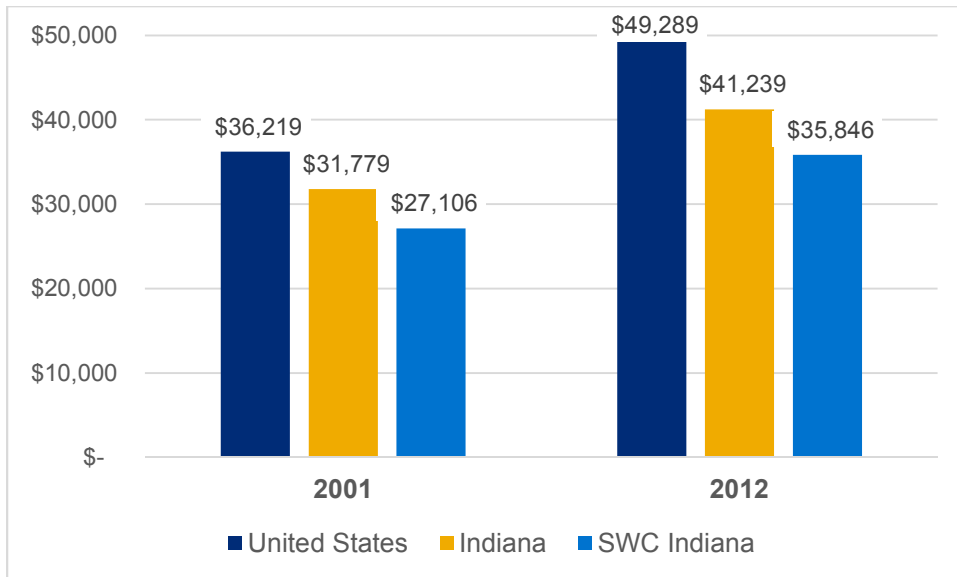


Source: U.S. Bureau of Economic Analysis, Local Personal Income Data, Battelle calculations.

Accounting for all types of personal income generation, the data for SWC Indiana also reveals some additional economic indicators that help identify further regional challenges. Mirroring overall population, more than one-third (34 percent) of all the personal income resides in Monroe County.

Focusing solely on employment-generated income (wages and salaries) paints a similar picture for SWC Indiana (Figure 7).

**Figure 7. Average Wage by Region, 2001 and 2012**

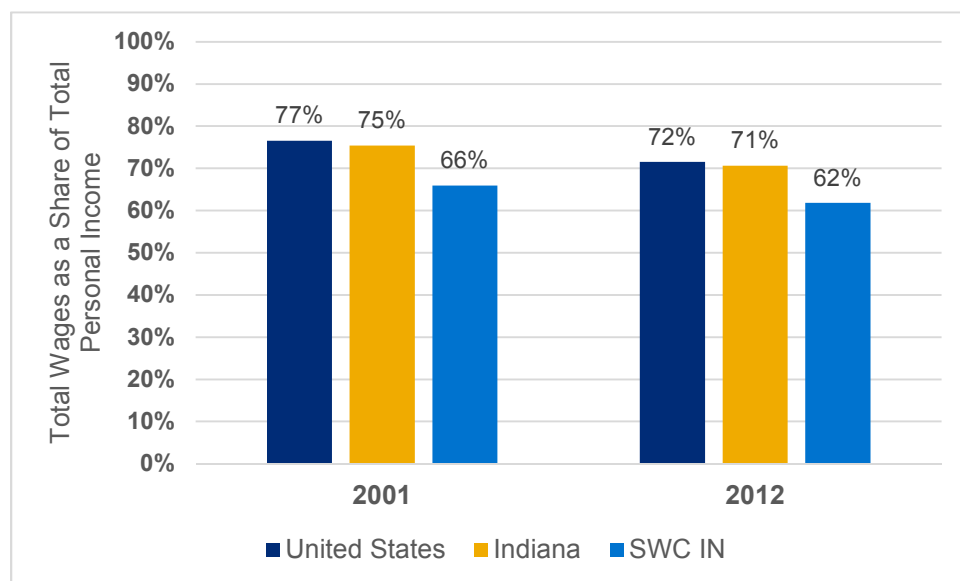


Source: U.S. Bureau of Economic Analysis, Local Personal Income Data, Battelle calculations.

Figures 8 and 9 are useful in considering another regional economic issue. Residents and regional leaders often tout SWC Indiana’s “lower cost of living” and suggest this offsets the lower regional personal incomes and wages. According to the 2013 C2ER (formerly ACCRA) Cost of Living Index information, both the State of Indiana as a whole and the Bloomington MSA have cost of living indices of approximately 90.<sup>6</sup> In other words, on average, the cost of living in Indiana and SWC Indiana is about 10 percent less than the national average. **While this lower cost of living is indeed an economic benefit, it falls short of making up the difference between SWC Indiana personal incomes and wages/salaries that are 21 percent and 27 percent below the U.S. average, respectively.**

Figure 10 illustrates that across all three regions examined, wage and salary income is becoming a smaller share of total personal income. Still SWC Indiana continues to rely more on non-wage and salary income than either the State of Indiana as a whole or the U.S. **The importance of this factor is that, unlike wage and salary incomes, interest/royalties/rents and federal transfer payments are “footloose” and can much more easily move out of the region if the recipients so desire.**

**Figure 10. Total Wages as a Share of Total Personal Income by Region, 2001 and 2012**



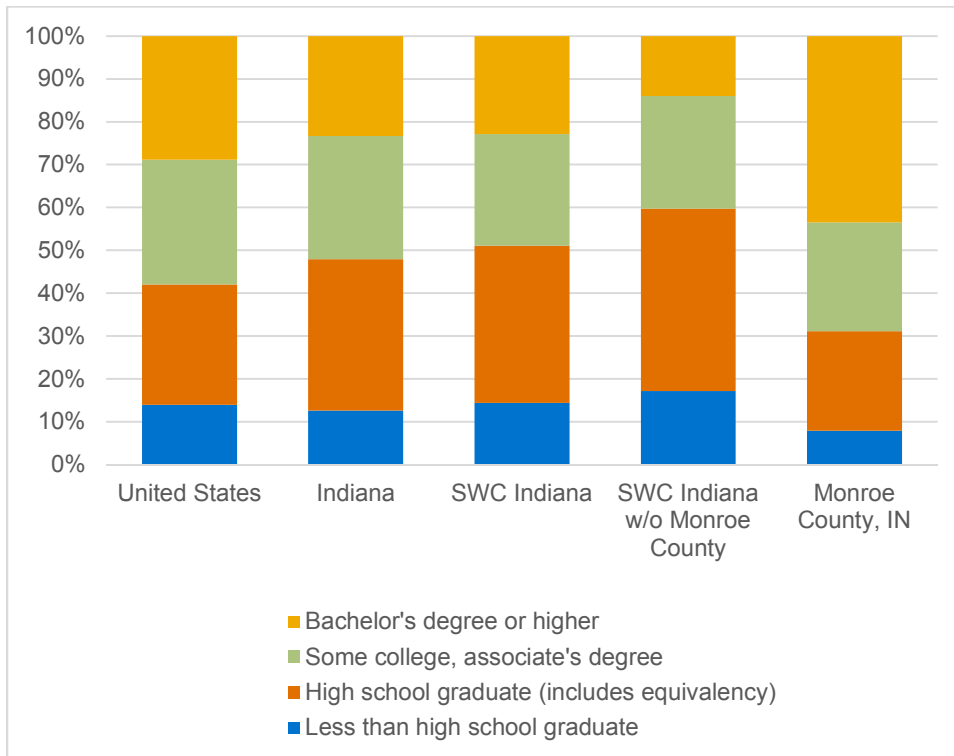
Source: U.S. Bureau of Economic Analysis, Local Personal Income Data, Battelle calculations.

## Educational Attainment

Finally, overall educational attainment is examined. Again strong differences within SWC Indiana may dictate strategic development options. Overall, the region shows a fairly similar educational attainment profile (Figure 11) as the state. A detailed examination of Monroe County compared to the remaining ten SWC Indiana counties, however, reveals some stark differences. Only 14 percent of the residents aged 25 or older within these ten counties possess a Bachelor’s degree or higher, compared to more than 43 percent in Monroe County. While this no doubt reflects the influence of Indiana University-Bloomington on Monroe County, it also shows that it may be difficult to find a more highly educated workforce in the region’s remaining counties.

<sup>6</sup> The Council for Community and Economic Research (C2ER), *2013 Cost of Living Index*, published January 2014. Note the data is only available at an MSA level. The Indiana average is calculated as the average of all the State’s MSA Cost of Living Indices which range from 88.1 to 92.5.

**Figure 11. Educational Attainment (Age 25 or Older) by Region, Five Year Average (2008-2012)**



Source: U.S. Census, American Community Survey, Five Year Average Estimate: 2008-2012, Battelle calculations.

As described above, SWC Indiana faces many challenges to its regional economic future. And while some are perhaps difficult to overcome, none of them are truly insurmountable. The ultimate difficulties lie in building a true sense of “region” within the eleven counties, leveraging the current and emerging assets available within the region, and developing plans for economic growth that “raise all ships”—people, companies, and industries. SWC Indiana must collectively begin down this path today or risk becoming even more fragmented with some areas falling well outside the economic mainstream of both the State of Indiana and the U.S.

The next section describes key “rays of hope” for economic and industrial growth that provide a wide variety of opportunities for the residents of SWC Indiana.

## Growth Opportunity Focus Areas

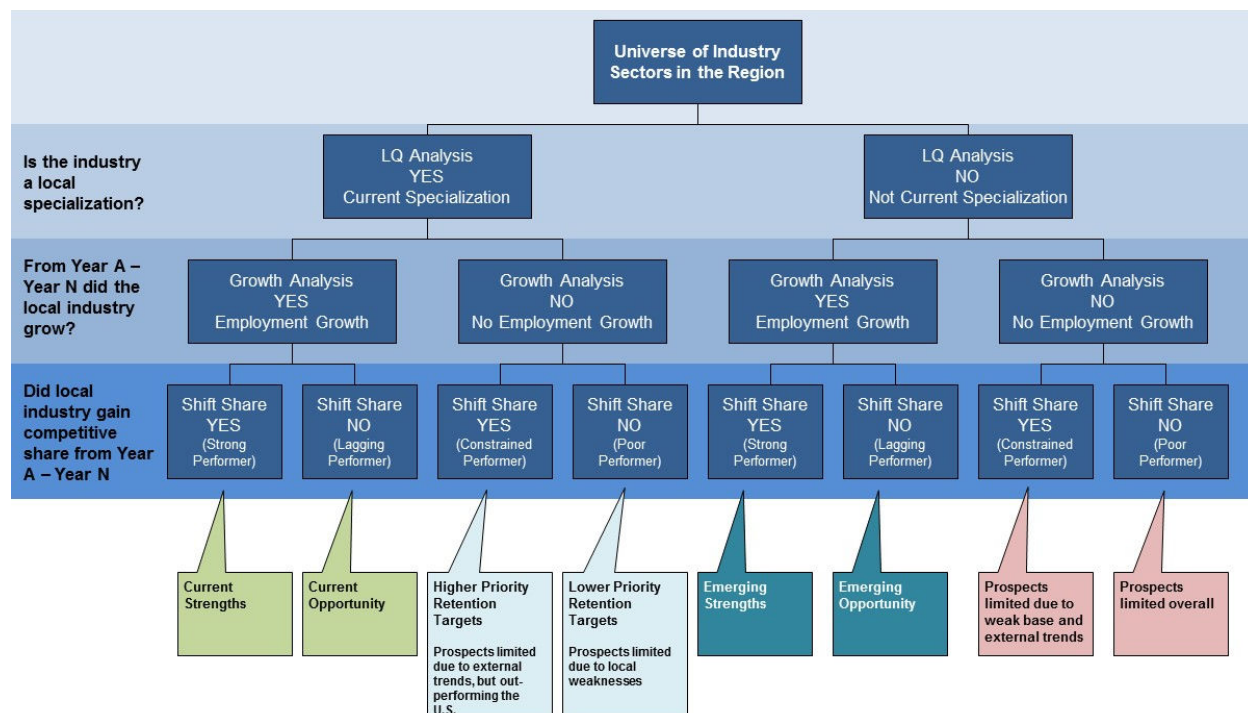
In today's globally-based economy, the key to success for regions is to identify those growth opportunities within its core industry sectors in which it is best positioned to differentiate itself and experience economic growth. While each of the fourteen industry clusters identified in SWC Indiana (see Appendix A) is an important economic driver for the region, they vary considerably in how they are positioned for economic and employment growth. More importantly, even in clusters that were hard hit by the recession, key component industries or subsectors may offer important growth opportunities, even when the overall industry or cluster has limited overall growth potential based on national or international economic trends. As a result, it is important to analyze SWC Indiana's industry clusters in more depth to examine how they are positioned for growth in the future.

## Overview of Industry and Cluster Analysis Methodology

From an economic development perspective, industry cluster analysis attempts to understand the interrelationships (both existing and potential) among firms and to what extent can these industry clusters be worked with, enhanced, and developed. While the ability to work with true industry clusters allows for significant economies of scale in the development process, it is important to recognize that not all establishments will be part of a group of similar firms and not all groups of firms are able to operate as an industry cluster. However, from an economic development and job opportunity perspective, these firms and groups of firms are often key economic assets in their own right. For this analysis, industry cluster and industry group are used interchangeably.

Figure 12 portrays in a visual format, the Battelle industry and cluster targeting analysis decision tree structure.

**Figure 12: Industry and Cluster Targeting Analysis: Decision Tree**



Building upon IBRC-provided data and analysis, Battelle refocused and recast a number of key industry segments into a revised set of fourteen potentially actionable clusters and potential growth areas to further examine using this decision tree approach. To better capture the historical and most recent industry dynamics, these clusters were examined for both the total 2001-2012 period as well as for the post-recession 2009-2012 period.

The results of the industry cluster performance-based decision tree provide a place to start for the overall assessment of cluster opportunities. Beyond the results of the decision tree-based analysis, the Battelle team further examined these clusters and, to the extent possible many of the individual firms within these clusters, to better understand the regional context and dynamics of the cluster (e.g., overall size of the cluster; is the cluster’s employment spread throughout SWC Indiana or primarily located in one county; growth limited to a single county) and the establishment nature of the cluster (e.g., does the cluster consist of many individual firms, a number of establishments of the same firm, or is the cluster based primarily on one or two key firms; are there key niches within a cluster that should be examined separately). Additionally, other information obtained through company and organization interviews and web-based research was used to help understand the context of various industry clusters.

Based upon this analysis, eight SWC Indiana industry clusters offer unique and important opportunities upon which strategic development efforts can be established (Table 1). Each cluster is categorized into one of four strategic areas – public technological asset development, value-chain enhancement, regional niche specializations, and quality of place.

**Table 1. Decision Tree Assessment of SWC Indiana Industry Clusters**

SWC Indiana Cluster	Decision Tree Assessment	
	Total Period 2001-2012	Post-Recession Period 2009-2012
<b><i>Public Technological Asset Development</i></b>		
Information and Communications Technology	Emerging Strengths	Emerging Strengths
National Security/Defense	Current Opportunity	Current Strengths
<b><i>Value-Chain Enhancement</i></b>		
Food Processing and Manufacturing	Current Strengths	Current Strengths
Transportation, Distribution, and Logistics	Emerging Strengths	Emerging Opportunities
<b><i>Regional Niche Specializations</i></b>		
Automotive/Heavy Vehicle Equipment	Higher Priority Retention Targets	Current Strengths
Biomedical	Current Strengths	Current Strengths
Furniture	Higher Priority Retention Targets	Current Strengths
<b><i>Quality of Place</i></b>		
Hospitality and Tourism	Emerging Strengths	Emerging Strengths

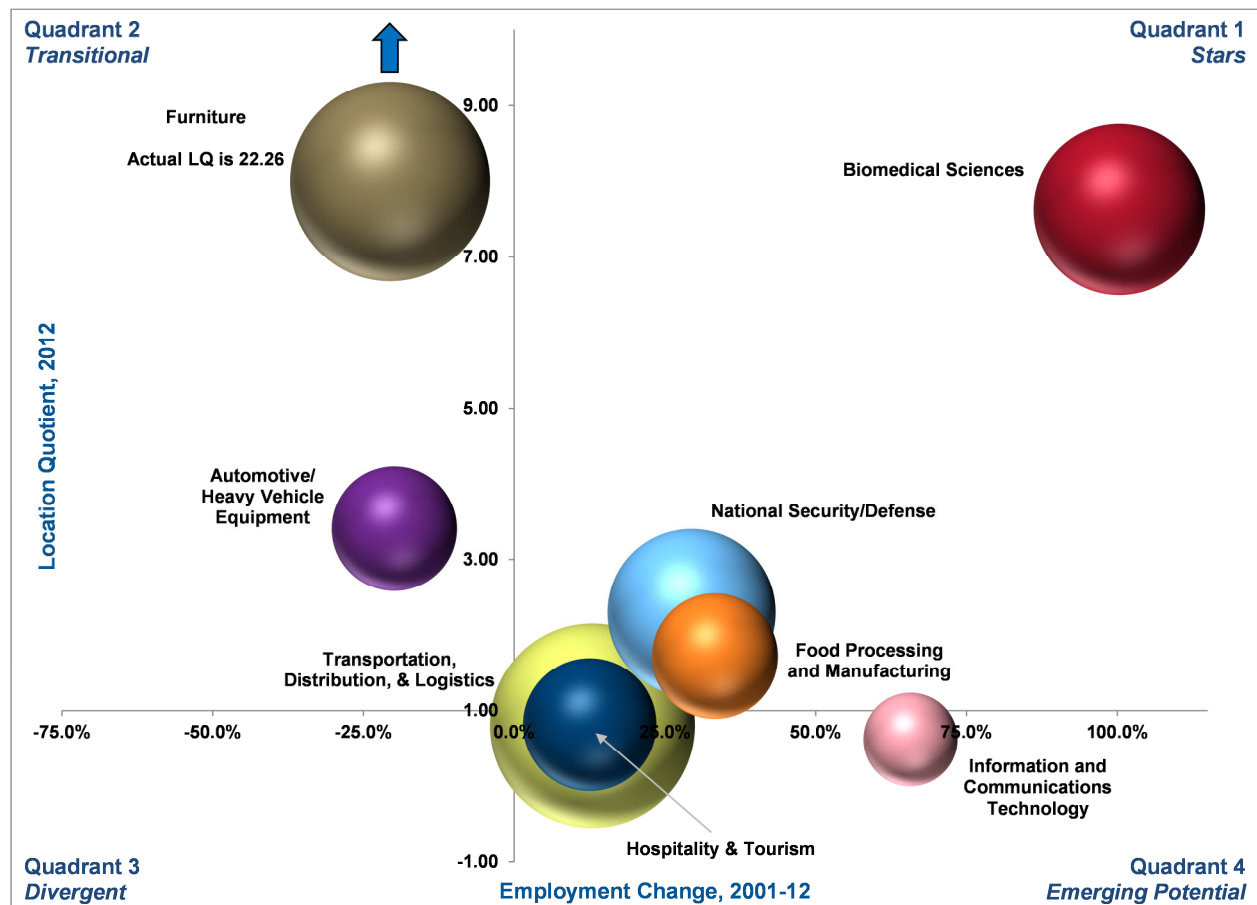
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

A good way to summarize and visualize the performance of these eight SWC Indiana clusters is through the use of an industry cluster bubble chart (Figure 13) that presents in one graphic three key

characteristics for assessing the region's current position and recent trends—size of employment in 2012 (size of bubble), employment growth or decline (represented on the horizontal axis), and employment concentration through the use of location quotients where a value of 1.00 indicates the region is just as concentrated in a cluster as the U.S. overall (location quotient on vertical axis). The figure is divided into four quadrants based upon the axis values:

- **Stars** – High performing clusters with above average concentrations (above 1.00) and positive growth rate over the 2001-2012 period. These represent strong regional strengths and opportunities for cluster growth.
- **Transitional** – Clusters that have an above average regional concentration, but have declined in employment over the 2001-2012 period. These clusters are typically revolve around mature industry segments. Often these clusters, while they have limited growth potential, provide significant regional employment and hence are key retention targets.
- **Divergent** – Clusters that have both below average regional concentrations and have declined over the 2001-2012 period. These clusters have very limited prospects for future growth.
- **Emerging Potential** – Clusters that have experienced employment growth over the 2001-2012 period, but whose overall concentration in the region is currently below average. Often, through industry and economic development growth strategies, these emerging clusters can expand to levels that increase their regional concentrations to above average levels.

**Figure 13. Current Performance of SWC Indiana Industry Clusters**



The following narrative provides details regarding the cluster development prospects within each strategic area. The sections begins with a brief overview of the strategic area, followed by a descriptive definition of each included cluster, a cluster economic performance summary, a discussion of the cluster's opportunities relative to its assets and connections to other clusters, as well as an overview of the market prospects for the particular cluster.<sup>7</sup>

## Public Technological Asset Development

The two clusters included within this category, information and communication technologies and national/security defense are related in that the growth and development of both clusters require the development and leverage of key public sources of technology development, namely Indiana University-Bloomington and NSA Crane. Though both clusters have significant private sector employment, it is the opportunities available to the region by leveraging these public assets that sets them apart.

### Information and Communications Technology

The information and communications technology (ICT) cluster includes computer hardware (including semiconductors and storage devices), communications equipment (including land-line and wireless equipment), other audio equipment, software development, software publishing, computer programming and systems design, and other computer or IT-related services.

Major employers include Cornerstone Information Systems, Cigital, Envisage Technologies, ModusLink Corporation. Emerging companies identified in this cluster include Wisdom Tools and MNB Technologies. The information technology cluster also includes firms that are key NSA Crane suppliers such as Camber and CACI.

### Cluster Performance

The region's ICT cluster has demonstrated strong historical growth, outpacing the U.S. both over the total period examined (2001-2012), but also in the post-recession period (2009-2012). The cluster is made up of 122 establishments, averaging 14 employees per establishment. At present, the cluster is not considered to be concentrated in the region—its location quotient of 0.62 indicates the region is 38 percent less concentrated than the U.S. average. This cluster has important potential as it currently is the highest paying among the clusters examined with an average wage of more than \$85,000.

**Table 2. Economic Summary Information and Communications Technology**

Region	2012 Metrics				Comparative Growth Rates	
	Establishments	Employment	Average Wage	Location Quotient	Total Period Change 2001-2012	Post-Recession Period Change 2009-2012
SWC Indiana Performance	122	1,743	\$85,582	0.62	65.7%	34.5%
U.S. Performance					4.3%	13.6%

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

Note: Employment does not include university employment related to ICT.

<sup>7</sup> For the overview of market prospects Battelle generally relies on market research intelligence from IBISWorld or BCC Research to identify faster growing market opportunities and specific market and technology challenges. The advantage of IBISWorld is that its industry research reports align well with the industry classification system and so focus on detailed industry product markets.

## Cluster Opportunity

Though currently limited in size and concentration, this cluster represents a unique opportunity for SWC Indiana. The ongoing growth and expansion of the Indiana University-Bloomington education and research assets in the broad information technology arena provide opportunities to leverage this experience to grow existing firms and ultimately to spawn new entrepreneurial ventures from the research activities occurring on campus. Research expenditures in math and computer science at Indiana University-Bloomington grew from just over \$3.8 million in 2001 to more than \$19.4 million in 2012, an increase of more than 407 percent. Much of this growth is related to the University's concerted efforts to expand in the ICT arena through the founding of the School of Informatics and Computing. Other University efforts such the Pervasive Technology Institute could also be leveraged to grow the ICT cluster in SWC Indiana.

Beyond leveraging Indiana University-Bloomington, the cluster also shows entrepreneurial promise. While venture capital investments in the region are severely limited—two small deals (less than \$500,000) were accomplished in the ICT area in Wisdom Tools, Inc. (an IU-Bloomington spin-out) and Envisage Technologies Corporation—industry cluster members have taken advantage of the federal Small Business Innovative Research (SBIR) program in a larger fashion to grow their firms. Since 2009, five SWC Indiana firms received a total of 16 SBIR awards for more than \$3.7 million. Nine of these awards went to Wisdom Tools totaling nearly \$1.8 million, while MNB Technologies received three awards totaling nearly \$930 thousand.

The opportunities stemming from the development of this cluster also relate to its potential to support and leverage other key clusters in the region, most notably the national security/defense cluster and the biomedical cluster.

## Cluster Market Prospects

### Market Outlook

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Though parts of the information technology market have seen their growth prospects dim over the past few years, the more specialized services are seeing extremely high growth rates and are expected to drive the overall growth of the IT sector for years to come. Much of this growth is based on being able to handle, integrate, and efficiently store large amounts of data.

### Key Drivers

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- Growth of software as a service and on-demand applications enabled by cloud computing
- Expanding amounts of data and the need for software able to process and analyze it

### Specific Market Segment Growth Forecasts

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Growth in specific market segments is detailed as follows:

**BIOINFORMATICS:** Globally, the market for bioinformatics is expected to continue seeing strong growth over the next five years as companies continue to adopt more cost-effective and productive methods of data sharing, security, customization, searching, and analysis. In 2012 the global bioinformatics market reached \$3.2 billion and is predicted to grow over the next five years at a CAGR of 18.7 percent to a market value of \$7.5 billion in 2017.<sup>8</sup>

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<sup>8</sup> BCC Research, *Bioinformatics: Technologies and Global Markets*, 2013



North America was the largest market for bioinformatics products in 2012 with a value of \$1.7 billion with the U.S. making up 96 percent of the total North American market and roughly half of all global sales. It is expected to play an even larger role in the market in 2017 where the U.S. will make up roughly 60 percent of the global market with a market value of \$4.5 billion.

**CYBER SECURITY:** Globally, the market for cyber security products is predicated to reach a value of \$95.6 billion in 2014 with North America having the largest share of the market. The segment is expected to continue to rise into 2019 at an average annual rate of 10.3 percent for a value of \$155.7 billion.<sup>9</sup> Given current trends, aerospace, defense, and intelligence verticals will continue to be the largest consumer of cyber security products. These products include: identity and access management, risk and compliance management, data encryption, data leakage prevention, data recovery, unified threat management, antivirus, intrusion prevention/detection systems, web filtering, firewalls, and vulnerability management.<sup>10</sup>

**ENTERPRISE CLOUD-BASED SERVICES:** Cloud-based services are expected to continue to see substantial growth over the next five-years. Globally, the market for enterprise cloud-based services will grow from \$18.3 billion in 2012 to \$31.9 billion in 2017 with year-on-year growth rates pegged at 17 percent over the next five-years. The sector is expecting growth rates to slow as we get closer to 2017 but with significant growth over the next few years.<sup>11</sup> Excluding cloud advertising (48 percent of the market), the largest sub-segments in cloud-based services are: business process services segment (BPaaS) at 28 percent of the market, software as a service (SaaS) at 14.7 percent, and cloud system infrastructure services (IaaS) at 5.5 percent.<sup>12</sup>

**BIG DATA ANALYTICS:** The global market for big data analytics is expected to grow at an astounding 25.5 percent annually, increasing its market value from \$14.9 billion in 2013 to just under \$46.3 billion in 2018.<sup>13</sup> Driving this high demand are companies that are beginning to bring on hadoop systems to process their large data sets. The market for hadoop systems is expected to grow from \$1.6 billion in 2012 to a value of \$13.95 billion in 2017 for an annualized growth rate of 54.9 percent.<sup>14</sup>

A potential short-term detriment to growth in this segment is the lack of trained professionals who can install and operate this software. This lack of qualified professionals is limiting the ability of the market to substantially increase the use of these systems even though there is a high demand for these products.<sup>15</sup>

**BUSINESS INTELLIGENCE:** The global market for business intelligence (BI) software is projected to grow nearly 7.7 percent over the next five years to reach \$19 billion by 2017.<sup>16</sup> According to Gartner, BI and analytics software have grown to become the fourth largest application software segment as more and more users have prioritized BI to help support business decisions analysis. Gartner expects this sector to

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<sup>9</sup> MarketsandMarkets, "Cyber Security Market (IAM, Encryption, DLP, Risk and Compliance Management, IDS/IPS, UTM, Firewall, Antivirus/Antimalware, SVM/SIEM, Disaster Recovery, DDoS Mitigation, Web Filtering, Security Services) - Global Advancements, Forecasts & Analysis (2014-2019)", 2014

<sup>10</sup> Securitycurrent, *Global Cybersecurity Market to Hit \$120.1 Billion by 2017*, 2014

<sup>11</sup> Analysys Mason, *Enterprise cloud services: worldwide forecast 2012-2017*, 2013

<sup>12</sup> Gartner, *Forecast Overview: Public Cloud Services, Worldwide, 2011-2016, 4Q12 Update*, 2013

<sup>13</sup> MarketsandMarkets, "Big Data Market By Types (Hardware; Software; Services; BDaaS - HaaS; Analytics; Visualization as Service); By Software (Hadoop, Big Data Analytics and Databases, System Software (IMDB, IMC): Worldwide Forecasts & Analysis (2013 - 2018)", 2013

<sup>14</sup> MarketsandMarkets, "By Hardware (Servers, Storage & Network Equipment); By Software (Packaged, Management, Application and Performance Monitoring); By Services (Professional, Technical & Cloud) - Global Advancements, Business Models, Technology Roadmap, Forecasts & Analysis (2012 - 2017)", 2012

<sup>15</sup> Forbes, *\$16.1 Billion Big Data Market: 2014 Predictions From IDC And IIA*, 2013

<sup>16</sup> Lucintel, *Global Business Intelligence and Analytics Software Industry 2012-2017*, 2012

continue to see strong growth as mid-sized businesses begin to start with the BI and analytic software build outs.<sup>17</sup>

### **National Security/Defense**

The national security/defense cluster, as developed and defined for SWC Indiana, obviously includes the federal employment of the commands and operations within NSA Crane (classified under NAICS 928110 – National Security including NSWC Crane, CAAA, NAVFAC, etc.). Combined these federal defense activities generated a business base of more than \$2 billion in FY 2013.

Through the analysis and interviews conducted by the Battelle team, it was determined that for this region the vast majority of firms and employment in engineering services (NAICS 541330) and search, detection, and navigation instruments (NAICS 334511) were also strongly connected to the national security/defense cluster as contractors providing support and development services to NSA Crane. Firms that fall into these components of the national security/defense cluster include regional locations of major national companies such as SAIC, URS Technical Services, and Sabre Systems and smaller and emerging regional companies such as Tri-Star Engineering, Raydar, Inc., and STIMULUS Engineering, among others.

### **Cluster Performance**

Though the cluster employment fluctuates based upon mission and base requirements, the more than 4,600 employees on base at NSA Crane account for the majority of the cluster’s SWC Indiana employment. Not surprisingly, the combined federal and private sector employment of nearly 5,600 represent a unique specialization for the region, with the region having 130 percent more national security/defense employment than the national average. With average wages over \$76,000, this cluster is the second highest paying cluster in the SWC Indiana region.

Though the cluster has exhibited strong growth over the total 2001-2012 period, overall its employment performance lagged the cluster on a national level.<sup>18</sup> In the post-recession period, the region’s cluster slightly outperformed the nation. There is concern, however, how sequestration and general declines in DoD spending (including declines in R&D spending) will impact the national security/defense cluster in the next few years.

**Table 3. Economic Summary for National Security/Defense**

Region	2012 Metrics				Comparative Growth Rates	
	Establishments	Employment	Average Wage	Location Quotient	Total Period Change 2001-2012	Post-Recession Period Change 2009-2012
SWC Indiana Performance	83	5,567	\$76,085	2.30	29.4%	3.2%
U.S. Performance					37.7%	2.3%

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

<sup>17</sup> Gartner, Forecast Analysis: Enterprise Application Software, Worldwide, 2011-2016, 4Q12 Update, 2013

<sup>18</sup> It should be noted, however, that given the unique definitional structure of this cluster for SWC Indiana region, some of this national growth could likely be unrelated to national security/defense activities.

## Cluster Opportunity

As both a federal “national laboratory” and a principal weapons depot, NSA Crane has historically been in the forefront of U.S. weapons development. Improving upon the region’s ability to grow and leverage NSA Crane’s existing and emerging technical competencies provides an important opportunity for regional economic development. Capabilities and capacity to potentially be leveraged include: advanced electronics (including DoD’s largest concentration of electronic warfare technology development and expertise), electro-optics (including sensors and other surveillance technologies), battery chemistry and related materials, information technology capabilities (including signal processing, digital communication, and cybersecurity), explosive and ordnance-related technologies and materials, and unique warfighter and in-theater technologies and specializations. Within these capabilities, NSA Crane (U.S. Department of Defense) has been granted 91 patents from 2009-2013.

A key facet of this national security/defense cluster-related economic development opportunity is that it is mutually supporting. Leveraging these NSA Crane assets, to the extent possible, will not only provide new private sector firms and employment opportunities in the region, but it will also lead to additional local support and contractor base for NSA Crane.

## Cluster Market Prospects

### Market Outlook

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Following sequestration, many defense budgets and contractors were greatly affected with declining revenues and market potentials for their products. While the more traditional defense products have seen reduced demand, many new technologies have seen significant growth as their products continue to improve their performance and the safety of its users. Some of these products are still in their infancy and can be expected to see double digit growth rates over the next decade as their products are brought into the mainstream with wearable support systems leading the way of this trend among defense related products.

### Key Drivers

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- Increasing efficiency and effectiveness of operations
- Providing uniform operating environment for decision makers, analysts, and operators
- Increasing budgets of foreign states
- New technologies that improve security and safety of force

### Specific Market Segment Growth Forecasts

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Growth in specific market segments and technologies are detailed as follows:

**ELECTRONIC WARFARE SYSTEMS:** The global electronic warfare system market is estimated to reach a market value of \$12.2 billion in 2014, and is anticipated to grow at a CAGR of 4.5 percent into 2020 to reach a value of \$15.6 billion.<sup>19</sup> One of the best growth opportunities in this segment is the digital radio frequency memory (DRFM)-based jammers, which is expected to grow at a CAGR of 10 percent into 2022.<sup>20</sup>

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<sup>19</sup> MarketsandMarkets, *Electronic Warfare Market (Electronic Support, Electronic Attack and Electronic Protection) - Global Forecast and Analysis 2014 – 2020*, 2013

<sup>20</sup> Strategy Analytics, *Conventional Airborne Electronic Warfare will be a Future Priority*, 2014

**CYBER WARFARE:** As the number of cyber-attacks between states continue to rise and become more sophisticated, more and more governments continue to invest in both offensive and defensive cyber capabilities. This has caused the global market for cyber warfare to see strong growth in recent years with rates expected to record a consistent growth of 3.9 percent into 2021. This growth is expected to bring the value of the cyber warfare market up to \$23.3 billion in 2021; up from \$15.9 billion in 2011.<sup>21</sup>

**SURVEILLANCE EQUIPMENT:** The global market for surveillance equipment reached \$81.3 billion in 2012, and is expected to grow at a CAGR of 9.4 percent to reach \$127.6 billion in 2017.<sup>22</sup> The countries with the fastest growth rates in this sector are: China, India, South Africa, and Turkey; who will each see growth in excess of 9 percent through 2016. Surveillance equipment in North America is expected to rise by 6.5 percent through 2016, trailing the global pace, but a significant improvement compared to the 2006-2011 period.<sup>23</sup>

Industrial and commercial users are the fastest growing and the largest group due to the potential savings due to theft prevention. The market for these industrial/commercial users was valued at \$51.8 billion in 2012 and is expected to increase at a CAGR of 10 percent through 2017. The military and government segment of the market was valued at \$10.5 billion in 2012 and should reach \$16.5 billion by 2017.<sup>24</sup>

**RADAR SYSTEMS:** The military radar systems market is comprised of four distinct categories: ground-based, naval, airborne and space-based. Out of these four categories, airborne radar based systems has the largest market share followed by ground-based radar systems. The value of the entire radar segment is estimated to have reached a value of \$9.1 billion in 2013 and is expected to grow at an annual rate of 1.6 percent into 2023 to reach a market value of \$10.7 billion.<sup>25</sup>

**WEARABLE SUPPORT SYSTEMS:** Wearable related technology is poised to greatly disrupt many consumer markets, as well as many non-consumer markets, specifically in defense and security. The global market for all wearable related tech reached \$5 billion in 2013 and is forecasted to reach \$9.2 billion at the end of 2014. It is forecasted to continue this fast growth into 2018 where the market is expected to reach a value of \$30.2 billion for a CAGR of 43.4 percent.<sup>26</sup>

According to BCC research, the global defense and security sub-sector – which includes virtual reality devices, smart clothing/fabrics, activity monitors, location trackers and wearable cameras – is expected to reach a value of \$1.0 billion in 2014. The market trend is expected to continue growing from a value of \$667 million in 2013, up to a market value of \$2.1 billion in 2018; a CAGR rate of 25.9. The largest consumer of wearable defense and security products during this time period will continue to be North America with a value of \$571 million in 2014 and an expected market value in 2018 of \$1.1 billion for a CAGR of 21.3 percent (2013-2018).

**REMOTE SENSORS:** The global remote sensing products market was worth an estimated \$8.3 billion in 2011 and is projected to increase at a CAGR of 6.4 percent through 2017 to reach \$12.4 billion. The largest area in the remote sensing sector is the space based remote sensing technology which powers large applications such as: weather forecasting, climate studies/atmospheric research, and disaster

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<sup>21</sup> ICD Research, *The Global Cyber Warfare Market 2011-2021 - Market Size and Drivers: Market Profile*, 2012

<sup>22</sup> BCC Research, *Surveillance and Security Equipment: Technologies and Global Markets*, 2013

<sup>23</sup> Freedonia Group Inc., *World Security Equipment*, 2013

<sup>24</sup> BCC Research, *Surveillance and Security Equipment: Technologies and Global Markets*, 2013

<sup>25</sup> Strategic Defense Intelligence, *The Global Military Radar Market 2013-2023 - Market Size and Drivers: Market Profile*, 2013

<sup>26</sup> BCC Research, *Wearable Computing: Technologies, Applications and Global Markets*, 2014

management. In 2011, the space based sector was estimated at a value \$3.3 billion with growth expected at a CAGR of 6.8 percent until 2017 when revenues are projected to hit \$5.0 billion.<sup>27</sup>

## Value-Chain Enhancement

This category represents industry clusters whose existing prospects are currently strong, but have emerging potential to grow dramatically by enhancing the value-chain within each cluster. Though the type of value-chain enhancement is necessarily different between the two clusters: food processing and manufacturing and transportation, distribution, and logistics, there are areas in which strategic efforts could further enhance the development prospects for each.

### Food Processing and Manufacturing

From a definitional perspective, this cluster includes nearly all of NAICS 311 – Food Manufacturing as well as other industry segments such as beverage manufacturing. For SWC Indiana this cluster consists of key employment levels in poultry and other meat processing, grain milling, milk manufacturing (processing and bottling), and bakeries. Major employers headquartered or with operations in the region include Farebest Foods, Wabash Valley Produce, Perdue Farms, Tyson Foods, Corn Flour Producers, Grain Processing Corporation, and White Castle Systems.

#### Cluster Performance

The food processing and manufacturing cluster accounts for more than 3,100 jobs in total, with more than 2,000 jobs related to poultry/meat processing (including more than 1,400 specifically in poultry processing). As a key U.S. poultry processing region, the overall cluster employment yields a strong regional specialization, with 72 percent more employment in the cluster than would be expected if the region were at the U.S. average. This cluster has seen strong comparative growth over the total 2001-2012 period, with the region’s cluster growing by more than 33 percent while the cluster declined by 5 percent nationally.

**Table 4. Economic Summary for Food Processing and Manufacturing**

Region	2012 Metrics				Comparative Growth Rates	
	Establishments	Employment	Average Wage	Location Quotient	Total Period Change 2001-2012	Post-Recession Period Change 2009-2012
SWC Indiana Performance	47	3,117	\$39,330	1.72	33.3%	4.1%
U.S. Performance					-5.0%	1.4%

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

It is important to note that these cluster employment figures for SWC Indiana do not include the more than 6,800 jobs on family or incorporated farms in the region, which are also a critical component of the value chain and further enhances the opportunities to grow this cluster.

<sup>27</sup> BCC Research, *Remote Sensing Technologies and Global Markets*, 2011

## Cluster Opportunity

In the case of the food processing and manufacturing industry cluster, opportunities exist and have been recognized by industry members to better link the agricultural production resources of the SWC Indiana region and even the state with the region's food processing capabilities. Through industry interviews, the Battelle team learned that there is currently very limited value-added processing, for example, within the poultry supply chain—the vast majority of poultry products leaving the region are in the form of fresh/frozen products. Interviewees cited the fact that there was very limited downstream processing (e.g., using poultry/meat as an input to making frozen entrees, lunch meat, etc.) in the region or even the state. Fostering and engaging this capacity within the region is a unique development opportunity to enhance the cluster's value-chain. Similarly, from an animal feed perspective, poultry producers also described situations where they are buying feed/meal from out-of-state feed companies who are making the feed using grain/soybean inputs obtained from Indiana farmers.

## Cluster Market Prospects

### Market Outlook

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The agriculture and food production sector is comprised of a number of industries that start from the most basic inputs, to animal production, to processing and packaging the final goods for consumption. The market for these products are mixed, with some areas seeing slow growth (animal feed and animal processing) while others are expected to see strong growth over the next five-years (food processing and packaging equipment). The growth in this sector will be disproportionate as consumer's tastes and trends change with more consumers preferring organic foods and low-fat meats, which are expected to see strong growth, while more common staples (non-organic products, beef, and pork) will see flat growth.

### Key Drivers

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- Adoption of new technologies that extend shelf life and increase food quality and safety
- Increasing demand for fresh products as incomes rise
- Move towards lower fat-content meat (poultry)
- Popularity of organic food including meats
- Food security

### Specific Market Segment Growth Forecasts

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Growth in specific market segments is detailed as follows:

**ANIMAL PROCESSING:** The U.S. market for meat, beef, and poultry processing, which has seen slightly above average growth since 2009, is expected to top \$212 billion in 2014. Growth, however, is expected to slow into 2019 with an annual growth of 0.7 percent leading to a market value of \$219.9 billion.<sup>28</sup>

In 2014, poultry processing was the second largest market segment and made up 27.3 percent of the animal processing market. Its value for 2014 was just shy of \$58 billion and is expected to grow at a slightly higher rate than animal processing as poultry production rises from 2014 into 2019.<sup>29</sup>

**ANIMAL FEED PRODUCTION:** The U.S. market for farm animal feed production has seen robust growth of 3.7 percent annually from 2007-2012 and is expected to see modest growth into 2017 growing at 1.4 percent per year. This will lead the farm animal feed market to grow from \$31.7 billion in 2012 to \$34.0

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<sup>28</sup> IBISWorld, *Meat, Beef & Poultry Processing in the US*, 2014

<sup>29</sup> IBISWorld, *Chicken & Turkey Meat Production*, 2014

billion in 2017.<sup>30</sup> Over three-quarters of feed production will be used for either dairy and beef cattle feed, or for poultry feed, with both areas controlling more than 37.5 percent of the market.

**FOOD PROCESSING EQUIPMENT:** Globally, the market for equipment used in food processing reached \$8.6 billion in 2012 and \$9.1 billion in 2013.<sup>31</sup> Growth is expected to continue in this sector and is projected to reach a value of \$12 billion in 2018; a five-year compound annual growth rate (CAGR) of 5.8 percent.

Food processing equipment, which is used to transform raw plant and animal materials into products for human consumption, is spread relatively evenly across three primary markets: North America (\$3 billion in 2013); Europe, Middle East, and Africa (EMEA) (\$3.7 billion, 2013); and Asia-Pacific (\$2.3 billion, 2013). The greatest growth will come from the North American market which is expected to grow annually by 7.6 percent from 2013 to 2018. The EMEA market will also grow considerably at a rate of 5.6 percent over the same time period and is expected to remain the largest consumer into 2018.

**FOOD PACKAGING EQUIPMENT:** Like the food processing equipment industry, the food packaging equipment industry has seen strong growth over the past few years as more and more foods are processed and packaged for later consumption. According to BCC Research, the global market for food packaging equipment in 2012 reached \$13.1 billion and in 2013 it reached just shy of \$14 billion. By 2018, the market for these products is expected to reach \$19.3 billion for a CAGR of 6.7 percent.

As with food processing equipment, the food packaging equipment market is spread across three primary markets with the European, Middle East, and Africa (EMEA) market leading the way with \$5.1 billion in revenues in 2013. The EMEA market is will continue to be the largest consumer of these products into 2018 and is expected to reach \$7.1 billion by then (CAGR of 6.7 percent). North America is the second largest consumer of packaging equipment and had a market value of \$4.9 billion in 2013 and is expected to top \$6.6 billion by the end of 2018 (CAGR 6.3 percent).<sup>32</sup>

### ***Transportation, Distribution, and Logistics***

The transportation, distribution, and logistics (TDL) cluster is primarily identified by NAICS 42 – Wholesale Trade (Distribution), the freight-related (i.e., not including the passenger-related or pipeline-oriented) components of NAICS 48 – Transportation, and NAICS 49 – Warehousing. It also includes specific components related to packaging, warehouse equipment, and logistics consulting.<sup>33</sup> Firms in this cluster provide freight transport and logistics services (e.g., trucking and warehousing companies) and wholesale distribution operations (both third party and manufacturer owned). Major SWC Indiana firms include Stens, Styline Transportation, Nancy Baer Trucking, and numerous local/regional branches of major national firms.

#### ***Cluster Performance***

The TDL cluster in SWC Indiana accounts for nearly 8,300 jobs and is the second largest cluster of the 14 examined in terms of employment. The cluster includes many smaller companies, with the average establishment size of 12 employees—with the 684 establishments the largest number of establishments of any SWC Indiana cluster, by far. The current level of specialization based upon the cluster's location quotient places the region at 80 percent of the national average concentration. The TDL cluster's employment has grown over both the total 2001-2012 period and since the 2009 recession. Over the total period, it far outpaced the U.S. cluster growth, but slightly lagged U.S. growth since the recession.

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<sup>30</sup> IBISWorld, *Farm Animal Feed Production*, 2012

<sup>31</sup> BCC Research, *Global Markets for Food Processing and Food Packaging Equipment*, 2014

<sup>32</sup> BCC Research, *Global Markets for Food Processing and Food Packaging Equipment*, 2014

<sup>33</sup> This definition is similar to one previously used by Battelle to analyze the Central Indiana Transportation, Distribution, and Logistics cluster.

From a wage perspective, the TDL cluster, at an annual average wage of more than \$46,000, pays less than some of the high tech-oriented clusters in the region, but better than most of the other manufacturing-based clusters and nearly \$11,000 more per year than the region's average wage.

**Table 5. Economic Summary for Transportation, Distribution, and Logistics**

Region	2012 Metrics				Comparative Growth Rates	
	Establishments	Employment	Average Wage	Location Quotient	Total Period Change 2001-2012	Post-Recession Period Change 2009-2012
SWC Indiana Performance	684	8,271	\$46,410	0.80	12.9%	2.3%
U.S. Performance					-0.5%	2.7%

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

### *Cluster Opportunity*

The development opportunity for this cluster is marked by the unique opportunity of the extension and completion of the I-69 Corridor. The completion of the full artery from Evansville to the Interstate hub and spokes surrounding Indianapolis will provide the SWC Indiana region's TDL firms with faster and more economical routes reaching throughout the Midwest and with much improved national access. This transportation infrastructure improvement will also yield benefits to other SWC Indiana clusters as nearly 3,900 of these TDL jobs are related to distributing products of other industry clusters.

That being said, it is important to note that the current TDL cluster appears to focus on fulfilling an otherwise unmet industrial support service need by the food processing, automotive/heavy vehicle equipment, furniture, and to a lesser degree, national security/defense clusters. In other words, the existing TDL cluster provides a support capability to the primary industry clusters rather than a stand-alone strength. By national standards, in order to compete for a major TDL site location, a region needs at least two high volume lanes intersecting, and ideally one or more intermodal connection points. Even with the completion of the I-69 Corridor, the SWC Indiana's infrastructure will not rise to that level of capacity.

As a result, SWC Indiana should focus its efforts on retaining the TDL capacity that exists to ensure the continued support services that will be required for the attraction and growth of the primary industry clusters, but not focus on TDL as an opportunity for independent growth apart from the other clusters.

### *Cluster Market Prospects*

#### **Market Outlook**

The market for trucking services is expected to be robust over the next five-years as the domestic economy recovers, and as trade with other nations begins to come around again. The storage and warehousing market is also expected to grow significantly, though more specialized warehousing, such as farm products, will see slower growth as demand and production will remain relatively constant.

#### **Key Drivers**

- Improving industrial production
- Domestic economy rebounds increasing demand for all goods.
- Increasing funding for highways to make transportation via roadways more efficient.
- International trade volume is expected to continue increasing.



## Specific Market Segment Growth Forecasts

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Growth in specific market segments is detailed as follows:

**TANK AND REFRIGERATED TRUCKING:** The market for tank and refrigerated trucking, which consists of firms that provide long-distance transportation of cargo that require specialized equipment (frozen goods, milk, chemicals, etc.), is expected to reach \$36.8 billion in 2014.<sup>34</sup> After seeing strong growth from '09-'14 of 5.1 percent, the tank and refrigerated trucking industry is expected to see a slightly lower growth rate over the next five years of 2.3 percent. This will put the market value for this segment at \$41.2 billion in 2019.

According to IBISWorld, 38 percent of the market share for the segment belongs to insulated refrigerated vans which transport products such as: meat, poultry, dairy products, pharmaceuticals, and medical supplies. About 1/6th of the trucking companies that specialize in tank and refrigerated trucking are based in the Great Lakes region with 3.1 percent of all U.S. firms in this segment based in Indiana.

**LOCAL FREIGHT TRUCKING:** Local freight firms, which specialize in trips within a metro region, saw strong growth the past five years ('09-'14) growing by 5.0 percent per year. In 2014 the U.S. market for local freight reached \$40.1 billion and is expected to grow at a robust 3.9 percent into 2019 where its market value will reach \$48.6 billion. Over half (58.5 percent) of the local freight market is based on full truckload transportation with less-than-truckload transportation representing 27.2 percent of the market. The largest consumers of these products are the manufacturing sector (36.7 percent) and retail & wholesale sector (31.0 percent) with agriculture a distant third at 12.1 percent.<sup>35</sup>

**LONG-DISTANCE FREIGHT TRUCKING:** Long-distance freight carriers have seen the highest growth over the past five-years, growing at a fantastic 7.6 percent from '09-'14. The revenue these carriers generated in 2014 was equal to \$180.5 billion and \$9.4 billion in profits. Looking forward, the long-distance freight carriers are expected to grow annually at a rate of 3.8 percent reaching a market value of \$217.7 billion in 2019.<sup>36</sup>

In 2014, the majority of long-distance freight was hauled by truckload carriers, which accounted for 62.1 percent of the entire market, or \$112.1 billion in revenues. Less-than-truckload carriers made up 25.7 percent of the market value (\$46.4 billion) in 2014. As with local freight carriers, manufacturing and retail & wholesale sectors made up over half of all goods transported over long distances. Due to its central location and high proportion of establishments, the Great Lakes region has over 1/5th of the long-distance carriers. Proportional to its population size, the Great Lakes region has the highest concentration of establishments vs. population in the United States.

**WAREHOUSING AND STORAGE:** The global warehousing and storage industry has seen significant growth over the past five-years driven by the increase in trade and improving domestic demand for products. It is expected to continue its growth over the next five-years growing at a robust CAGR of 5.8 percent into 2017. If this growth rate holds it will see the segment grow from a market value of \$535.3 billion in 2012 to \$709.7 billion in 2017.<sup>37</sup> The regions with the highest projected growth rate globally are Asia and Latin America, due to increased trade in both the developed, and emerging economies.<sup>38</sup>

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<sup>34</sup> IBISWorld, *Tank & Refrigeration Trucking*, 2014

<sup>35</sup> IBISWorld, *Local Freight Trucking*, 2014

<sup>36</sup> IBISWorld, *Long-Distance Freight Trucking*, 2014

<sup>37</sup> Lucintel, *Global Warehousing and Storage Industry 2012-2017: Trend, Profit and Forecast Analysis*, 2012

<sup>38</sup> First Research, Inc., *Warehousing & Storage*, 2014

A key sub-sector of the warehousing and storage segment in regards to SWC Indiana is the farm product storage and warehousing industry. The farm-related storage/warehousing industry had revenues that reached \$910 million in 2013 and are expected to grow at a modest 1.6 percent into 2018. A majority of the market is comprised of grain elevator services and on-farm storage with corn and soybean storage representing over three-quarters of the farm storage market.<sup>39</sup>

## Regional Niche Specializations

Three SWC Indiana clusters—automotive/heavy vehicle equipment, biomedical, and furniture—are unique regional specializations and offer significant employment opportunities for the region’s residents. These three clusters provide diversity and historical stability to the region’s economy. However, the nature of these three clusters is that much of the employment is concentrated in one or two firms and/or is concentrated in one or two counties, limiting (though not completely) the prospects for building these clusters throughout the region. These clusters having shown post-recession growth, currently offer development opportunities in terms of expansion, may warrant attention to assist in their efforts to improve productivity, and *are important retention targets as key regional employers*.

### Automotive/Heavy Vehicle Equipment

The definition of the automotive/heavy vehicle equipment cluster includes all of the motor vehicle (including automotive, truck, and heavy equipment) assembly, body manufacturing, and parts manufacturing. Additionally, key areas of metal fabrication are also included. There are three major SWC Indiana employers in this cluster: Jasper Engine, Carlisle Brake & Friction, and GM Powertrain.

#### Cluster Performance

A key aspect of the SWC Indiana automotive/heavy vehicle equipment cluster is its diversified nature in terms of products and in terms of markets served (e.g., major OEMs, first tiers, and aftermarket). The region’s nearly 3,100 jobs lead to a regional specialization of 3.41 or more than 240 percent more concentrated in the region than the cluster is nationally.

The diversified nature allowed the region’s cluster to better weather the overall declines in U.S. automotive manufacturing over the last decade or more, and in fact, helped the cluster rebound faster and at a greater rate after the recession.

**Table 6. Economic Summary Automotive/Heavy Vehicle Equipment**

Region	2012 Metrics				Comparative Growth Rates	
	Establishments	Employment	Average Wage	Location Quotient	Total Period Change 2001-2012	Post-Recession Period Change 2009-2012
SWC Indiana Performance	11	3,083	\$62,017	3.41	-19.9%	27.6%
U.S. Performance					-35.6%	16.6%

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

<sup>39</sup> IBISWorld, *Farm Product Storage & Warehousing*, 2013

## Cluster Opportunity

The principal opportunity for this cluster is the retention and continued expansion of the key firms. The nature of this cluster also lends itself to broader manufacturing-oriented development options.

## Cluster Market Prospects

### Market Outlook

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The market for automotive parts is looking up after hitting a recession-related low in 2009. Manufacturers of original automotive parts and aftermarket parts have seen some of the most robust growth recently and will see continued, albeit slower, growth over the next few years. Firms based on rebuilding/remufacturing parts will fare less well over the next few years as consumers replace older vehicles reducing demand for rebuilt parts.

### Key Drivers

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- Strength of transportation market, particularly among automotive firms
- Increasing average age of vehicle fleet in the U.S. will create demand for rebuilt and OEM parts, as well as new vehicles
- Increasing price of crude oil creating demand for more fuel-efficient vehicles

### Specific Market Segment Growth Forecasts

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Growth in specific market segments is detailed as follows:

**ENGINE REBUILDING & REMANUFACTURING:** Demand for rebuilt and remanufactured engines is expected to cool over the next five years into 2018 due to an improving economy. As the economy improves, demand for these products wanes as consumers are better able to afford new, more fuel efficient, cars.

In 2014 the market for rebuilt and remanufactured engines in the U.S. is expected to reach \$1.9 billion, a decline of 5.5 percent compared to the year before.<sup>40</sup> The decline will continue into 2018 at an expected CAGR of 5.0 percent settling at a market value of \$1.6 billion.

**AFTERMARKET PARTS:** The market for automotive aftermarket parts in North America is expected to reach \$85.5 billion in 2016, an annual growth rate of 3.2 percent.<sup>41</sup> The largest growing sector in segment will be electronic products (controls, modules, and sensors) while mechanical aftermarket products will continue to be the largest sector with 38 percent of all sales in 2016. Demand for these mechanical products is expected to be tempered due to improved quality of the original parts.

**AUTO PARTS MANUFACTURING:** The future of the auto parts manufacturing segment will follow that of the automakers over the next five-years and is expected to see increased market value into 2019. In 2014 the market for these products in the United States are expected to reach \$55.5 billion, growing more than 10.8 percent from 09-14. This growth is expected to continue into 2019 at an annualized rate of 4.1 percent for a value of \$67.8 billion.<sup>42</sup>

**ENGINE MANUFACTURING:** Engine and engine part manufacturers are poised for improved growth over the next five-years as automakers rebound from the depressed 2009 period. The demand for these products

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<sup>40</sup> IBISWorld, Engine Rebuilding & Remanufacturing, 2013

<sup>41</sup> Freedonia Group, *Automotive Aftermarket*, 2012

<sup>42</sup> IBISWorld, Auto Parts Manufacturing, 2014

in the United States in 2014 will reach \$28.2 billion growing close to 10 percent from its low in 2009. Though slowing, growth will continue for this segment into 2019 where it will reach a market value of \$31.7 billion for an annualized growth rate of 2.4 percent.<sup>43</sup>

Over half of all engines and parts manufactured in the United States in 2014 are expected to go to one of the big three domestic manufacturers (General Motors, Ford, Chrysler) with Toyota the only foreign manufacturer to crack the top 4 in demand with 14.9 percent of the market. The majority of these engines will be built in the Great Lakes region (IL, IN, MI, OH, WI) with 66.2 percent of the segments revenue being generated in this region.

### ***Biomedical***

The biomedical industry cluster represents a unique regional specialization and offers significant employment opportunities for the region’s residents. The biomedical cluster definition includes medical and electromedical instruments, medical supplies and devices, drugs and pharmaceuticals, and biotech/bio R&D firms. In the SWC Indiana region, three companies account for the largest share of establishments and employment. Cook Group has a number of establishments in the region including Cook Medical, Cook Pharmaca, and Cook Urological (Vance Products), while Baxter Healthcare/ Biopharma Solutions and Boston Scientific/SciMed also have significant operations in the region. Other smaller and emerging firms include Aeon Imaging, Biomedix, Eight Medical, and Morris Innovative. It is also important to note that several other major regional employers that are part of other industry clusters have very close supply chain relationships to the biomedical cluster, including Kimball Electronics and Cook Polymer Technology.

### *Cluster Performance*

With nearly 5,800 employees, the SWC Indiana biomedical cluster represents a significant employer and a significant specialization for the region, over seven times as specialized as the nation. However, at present nearly all of the cluster’s employment (98 percent) is located in Monroe and Owen counties. In terms of historical and recent growth, the cluster has dramatically outpaced the nation, with the growth since the recession particularly impressive.

**Table 7. Economic Summary for Biomedical**

Region	2012 Metrics				Comparative Growth Rates	
	Establishments	Employment	Average Wage	Location Quotient	Total Period Change 2001-2012	Post-Recession Period Change 2009-2012
SWC Indiana Performance	26	5,791	\$50,958	7.63	100.4%	43.3%
U.S. Performance					30.0%	0.9%

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC and IMPLAN Group, LLC.

### *Cluster Opportunity*

The biomedical cluster offers SWC Indiana a number of key innovative firms upon which to build, but the concentration in only two counties does limit opportunity for broad regional development. It will, however,

<sup>43</sup> IBISWorld, Automobile Engine & Parts Manufacturing, 2014

be critical to the region's employment base to ensure that the existing companies are retained in the region, and that to the extent possible, expansions occur in the region.

To date, interviews have suggested there are limited connections among the major employers in the biomedical cluster and the Indiana University-Bloomington campus (primarily due to the Medical School's presence in Indianapolis). However, the Bloomington campus likely represents some opportunities for collaboration as they have worked over the past 12 years to enhance the level of life sciences research occurring in Bloomington—increasing by nearly 120 percent and reaching more than \$41 million in 2012. Most of this growth, however, is primarily due to NIH funding for basic biology, versus focused medical research. As IU-Bloomington pursues more applied technology programs, it will be important for the university to understand and meet the growing needs of this important regional industry cluster.

The innovative nature of the region's firms is most directly demonstrated by patent activities. The Cook Group (Cook Medical) and Boston Scientific/SciMed, together account for 413 patents from 2009-2013, nearly half of all patents issued to regional inventors. Smaller innovative firms have been engaged to a limited extent in the federal Small Business Innovative Research program with 5 firms, receiving a total of 10 awards for \$5.3 million from 2009-2013.

### *Cluster Market Prospects*

#### **Market Outlook**

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The biomedical industry, which is comprised of a wide-range of medical products, is expected to continue to see strong growth over the next five years despite uncertainty from healthcare reform and the taxation associated with it, as well as the expiration of patents from a number of large pharmaceutical companies. The fastest growth in the sector will be in the molecular-based diagnostics industry with exceptional annual growth rate of 12.6 percent into 2018.

#### **Key Drivers**

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- Patent Expiration
- Healthcare reform and taxation
- Increased foreign trade
- Hybrid technologies that incorporate pharmaceutical products and surgical equipment
- Instrument miniaturization
- U.S. medical device excise tax

#### **Specific Market Segment Growth Forecasts**

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Growth in specific market segments is detailed as follows:

**SURGICAL INSTRUMENTS AND EQUIPMENT:** Though facing regulatory concerns, the surgical instruments and equipment industry in the US is expected to grow at an average annual rate of 3.9 percent through 2018 to a market value of just under \$111 billion. For comparison, the 2013 US market is valued at \$91.7 billion.<sup>44</sup>

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<sup>44</sup> IBISWorld, *Medical Instrument & Supply Manufacturing*, 2013

A key growth segment in surgical instruments is minimally invasive surgical devices and instruments, with a CAGR of 7.9 percent through 2016 and substantial revenues of \$14.4 billion in 2011. The largest segment is cardiothoracic surgery with 68 percent of the market for these devices and instruments.<sup>45</sup>

**IMPLANT DEVICES:** Due to the specialization of implantable devices, this niche is best viewed through its key application markets. The cardiovascular implant market is valued at an estimated \$85 billion, but is set to see substantially slower growth with a CAGR of 2.8 percent through 2015.<sup>46</sup> Another large but slower growth sector is the orthopedic market with a market value of \$28 billion and a CAGR of 2.7 percent through 2015.<sup>47</sup> A quickly growing field in the implant devices niche is the neuromodulation sector with a global value of \$3 billion and a forecasted annual growth rate of 16 percent from 2011-2015.<sup>48,49</sup>

**MOLECULAR-BASED DIAGNOSTICS:** Globally, the market for molecular-based diagnostics is estimated to reach revenues of \$17.3 billion in 2012. It is expected to grow at a compound annual growth rate of 12.6 percent for a market value of \$36.5 billion by 2018.<sup>50</sup> As of 2012, 75 percent of the global market is controlled by nine companies with Roche diagnostics leading the way at 30 percent of the market.

Leading the molecular diagnostics market, the PCR-based diagnostic assays had revenues of \$8.3 billion in 2012 with an estimated CAGR of 11.5 percent until 2018 when the market is expected to reach \$16.3 billion. The fastest growing product in this market though is the biochip – also known as a lab-on-a-chip (LOAC) – which is expected to grow from a market value of \$1.7 billion in 2012 up to a value of \$4.6 billion in 2018 for a compound annual growth rate of 17 percent.

**PHARMACEUTICAL PREPARATION AND MANUFACTURING:** The pharmaceutical preparation and manufacturing industry is typically separated into two separate spheres: brand-name pharmaceuticals and generic pharmaceuticals. Brand-name pharmaceuticals, which includes recognizable companies such as Pfizer, Johnson & Johnson, and Eli Lilly, have seen growth stall and slightly decline over the past five years ('08-'13) as patented drugs lose their protection. In 2013, the market value in the United States for brand-name pharmaceuticals was \$165.0 billion with growth expected to return over the next five years in the range of 2.0 percent per year into 2018. This growth is expected to bring the market value up to \$182.5 billion in 2018.<sup>51</sup>

Generic pharmaceuticals, which have slightly less familiar names such as: Actavis, Teva Pharmaceuticals Industries, and Mylan, has seen very strong growth the past five years ('09-'14) as they have been able to enter into markets that were once protected by patents leading to an annual growth rate of 6.8 percent. Going forward, growth is expected to slow slight but will continue at a robust rate of 4.8 percent into 2019, when the generic market will grow from a value of \$42.7 billion in 2014 up to \$53.9 billion in 2019.<sup>52</sup>

## Furniture

The furniture cluster is defined around the industrial segments of NAICS 337 – Furniture and Related Product Manufacturing. The SWC Indiana cluster includes firms engaged in designing and manufacturing household, office, and institutional furniture (all materials), kitchen cabinets, other casework, and custom architectural woodwork and millwork. Key regional firms include Kimball International, MasterBrand Cabinets, Best Chairs, Paoli, the Jasper Chair Company, and Indiana Furniture.

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<sup>45</sup> BBC Research, *The Market for Minimally Invasive Medical Devices*, 2011

<sup>46</sup> BCC Research, *Cardiovascular Devices: Technologies and Global Markets*, 2009

<sup>47</sup> BCC Research, *Advanced Orthopedic Technologies, Implants and Regenerative Products*, 2011

<sup>48</sup> Visiongain, *Neuromodulation Devices: World Market Prospects 2011-2021*, 2011

<sup>49</sup> TechNavio, *Global Neuromodulation Market 2011-2015*, 2012

<sup>50</sup> BCC Research *Molecular Diagnostics: Technologies and Global Markets*, Mar 2013

<sup>51</sup> IBISWorld, *Brand Name Pharmaceutical Manufacturing in the US*, 2013

<sup>52</sup> IBISWorld, *Generic Pharmaceutical Manufacturing in the US*, 2013

### Cluster Performance

With nearly 7,900 jobs, the SWC Indiana's furniture cluster is the largest, private-sector-oriented cluster in the region. The SWC Indiana region is considered to be one of the nation's key furniture manufacturing region's as demonstrated by its extreme specialization of 22.26—the furniture industry is 22 times more concentrated in the region than it is in the U.S. overall. With this extreme level of specialization comes concern over cyclicality. While the region's cluster has faced a decline since 2001, it did so at rate less than half that of the overall U.S. combination. Furthermore, these declines since the recession have now stabilized amid continuing U.S. declines.

As with the other regional niche specialization clusters, the furniture industry is not only specialized from an employment perspective, but is also concentrated geographically. Fully 80 percent of the SWC Indiana furniture cluster's employment is located in DuBois County.

**Table 8. Economic Summary for Furniture**

Region	2012 Metrics				Comparative Growth Rates	
	Establishments	Employment	Average Wage	Location Quotient	Total Period Change 2001-2012	Post-Recession Period Change 2009-2012
SWC Indiana Performance	93	7,880	\$36,053	22.26	-20.6%	0.7%
U.S. Performance					-46.0%	-8.1%

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

### Cluster Opportunity

A hallmark of the SWC Indiana's furniture industry is its custom nature and design integrity. For example, Kimball International is one of the region's largest patent holders with more than 60 design patents from 2009-2013. While the cluster's employment mainstays are the two large wood office furniture and kitchen cabinetry manufacturers, the cluster has diversified since 2001, more than doubling the total number of establishments since 2001.

### Cluster Market Prospects

#### Market Outlook

The global market for furniture is expected to continue growing into 2016 with a strong annualized growth rate of 3.53 percent.<sup>53</sup> Much of this demand will come from the developed nations with an increasing amount of furniture goods being imported from developing nations, though domestic producers who focus on quality goods are expected to see growth during this time. Cabinetry will be the strongest sector in the United States due to the level of customization and the cost of shipping large fabricated goods.

<sup>53</sup> TechNavio, *Global Furniture Market 2012-2016*, 2013

## Key Drivers

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- Improving home sales market and home improvement market
- Timber shortage
- Demand for custom and high-quality furniture and cabinetry

## Specific Market Segment Growth Forecasts

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Growth in specific market segments and technologies are detailed as follows:

**OFFICE FURNITURE:** The global market for office furniture reached a value of \$50 billion in 2012 with global exports reaching \$9 billion.<sup>54</sup> The largest exporters of office furniture continue to be China, followed by Germany, Canada, and the United States, though only China and the rest of Asia have seen their share of exports rise in recent years.

The U.S. market for office furniture is projected to reach \$23.3 billion in 2014 and go up to \$24.5 billion in 2019 for a CAGR of 1.0 percent.<sup>55</sup> According to IBISWorld, the majority of the demand will come from domestic consumers with exports only making up 6.3 percent (\$1.5 billion) of the demand in 2014. The Great Lakes region has the second highest percentage of office furniture manufactures in the United States with 18.8 percent of all firms located in the region. This is due in large part to the logistical infrastructure of the region, as well as the proximity to major Canadian markets.

**CABINETRY:** The U.S. market for cabinetry manufacturing reached \$10.3 billion with growth forecasted to rise by 8.2 percent annually through 2016 for a projected market value equal to \$15.3 billion.<sup>56</sup> While the cabinetry industry is not known for their exportable goods, they did manage to export \$122.8 million worth of goods in 2014, with Canada accounting for 85.8 percent of the exports (\$105.3 million).<sup>57</sup> The largest market sector in this industry are kitchen cabinetry, which made up 37 percent of all revenues for the industry in 2014.

**HOUSEHOLD FURNITURE:** In the U.S., the market for household furniture, which includes upholstered and non-upholstered furniture goods, is anticipated to reach \$25.5 billion in 2014 following strong growth since 2009 that averaged 2.4 percent per year.<sup>58</sup> Demand for domestically produced furniture is expected to wane in the industry and the market is expected to decline by 1.5 percent per year into 2019 when revenues will decline by \$1.9 billion to \$23.6 billion; during this time imports are expected to replace the supply of domestic manufacturers to meet growing demand.

## Quality of Place

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The quality of place industry grouping reflects the unique context of the hospitality and tourism cluster. By its nature, it can be an economic base activity, attracting visitors and their spending from outside of the region. It however, also plays a key role in defining the region's qualities and enhancing the quality of life of the region's residents.

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<sup>54</sup> Global Information Inc., *Office Furniture: World Market Outlook*, 2012

<sup>55</sup> IBISWorld, *Office Furniture Manufacturing in the US*, 2014

<sup>56</sup> Freedonia, *Cabinets to 2016 - Industry Market Research, Market Share, Market Size, Sales, Demand Forecast, Market Leaders, Company Profiles, Industry Trends*, 2012

<sup>57</sup> IBISWorld, *Cabinet & Vanity Manufacturing in the US*, 2014

<sup>58</sup> IBISWorld, *Household Furniture Manufacturing in the US*, 2014



## Hospitality and Tourism

The hospitality and tourism is a broadly defined cluster primarily built around NAICS 71 – Arts, Entertainment, and Recreation, and NAICS 721 – Accommodations.<sup>59</sup> The SWC Indiana cluster includes hotels, tourism infrastructure, and visitor attractions. Key employers in the region include the French Lick Springs Resort & Casino, Jasper Inn & Convention Center and Big Splash Adventure. Additionally, the major national hotel chains have locations throughout the region. However, similar to the regional niche specialization clusters, hospitality and tourism is also somewhat geographically concentrated. Nearly 65 percent of the cluster’s employment is located in Orange and Monroe counties.

### Cluster Performance

A significant and growing employer, the SWC Indiana hospitality and tourism cluster exceeds 3,500 jobs. The region’s cluster has continued to grow over the 2001-2012 period, strongly outpacing the U.S. industry during both the entire period as well as since the end of the recession.

Though the average wage is only \$24,777, as a highly seasonal and often part time employer, these wages, nevertheless, exceed the region’s restaurant and retail average wages.

**Table 9. Economic Summary Hospitality and Tourism**

Region	2012 Metrics				Comparative Growth Rates	
	Establishments	Employment	Average Wage	Location Quotient	Total Period Change 2001-2012	Post-Recession Period Change 2009-2012
SWC Indiana Performance	181	3,506	\$24,477	0.82	12.6%	12.9%
U.S. Performance					3.1%	3.0%

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

Note: Employment related to on-campus sports and arts activities at Indiana University (e.g., football and basketball, concerts and museums) are not included in these data. Employment in off-campus hotels used by these visitors are included in these data.

### Cluster Opportunity

Two specific initiatives will likely cause changes in the SWC Indiana hospitality and tourism cluster. First, a growing and concerted effort to expand the tourism-related offerings of the region will increase the size and employment of the cluster. The growth seen in the cluster as the French Lick Springs Resort and Casino have come on line is evidence of this potential. Second, the extension and completion of the I-69 Corridor could have both positive and negative effects on the cluster, especially the hotel components of the cluster. The I-69 Corridor will indeed spur the development of additional hotel properties along the interstate. Indeed, a new property is currently planned at the interchange near the Westgate Technology Park/NSA Crane. While this will lead to additional employment for counties along I-69, to the extent that these new properties serve visitors who currently stay in Bloomington/Monroe County, it would be a zero-sum gain for the region as a whole.

<sup>59</sup> The definition specifically excludes most transportation (other than scenic/sightseeing transportation) and locally-oriented recreation segments such as health clubs and bowling centers. It also does not include restaurants that may be oriented toward serving non-resident visitors. Please see Appendix B for the NAICS code details of this cluster.

## Cluster Market Prospects

### Market Outlook

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The market for hospitality and tourism in the United States is expected to grow at a slow but steady pace over the next five-years as the domestic economy recovers and travelers begin to explore local sites and book more weekend trips. The fastest growth will be seen in national and state parks as government funding returns to boost revenues generated at these sites. The majority of these sectors demand will continue coming from domestic travelers with casinos and historic sites in large cities being the only sectors to attract a significant amount of international travelers.

### Key Drivers

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- Increased domestic tourism
- Acceptance of gambling by a majority of the U.S. public
- Specialty websites promoting alternative accommodations and destinations
- Local, state, and federal government investment and funding

### Specific Market Segment Growth Forecasts

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Growth in specific market segments are detailed as follows:

**CASINOS:** The U.S. market for casinos is expected to reach a high of \$60.1 billion by 2019 growing from \$54.9 billion in 2014 at an annual rate of 1.8 percent.<sup>60</sup> During the previous five years (2009-2014), the market for casinos saw a slower growth rate of 1.5 percent per year as both domestic and international travelers reduced their spending.

The majority of revenues at casinos in the U.S. come from slot machines (55 percent) with table games, which are preferred by high-rollers, generating 15 percent of the market. Over the past five years, casino operators have seen strong growth in non-gambling related activities with accommodations leading the way with 11 percent of all revenue generated in the industry. Many casinos are also turning into complete destination areas by offering a range of amenities like spas, golf courses, theater shows, retail shopping, and fine dining restaurants.

**HOTELS & MOTELS:** The market for hotels and motels in the United States in 2014 is estimated to reach a total market value of \$144.4 billion with room rentals at large hotels (25+ rooms) making up close to two-thirds of the 2014 revenue and motels making up 12.6 percent for over three-quarters of the market.<sup>61</sup> Looking ahead five years into 2019, the revenues generated by hotels & motels is expected to top \$167 billion for an annualized growth rate of 3.0 percent from 2014-2019, this following a robust growth rate of 2.5 percent from 2009 into 2014.

According to IBISWorld, close to half of all revenue will be generated by domestic leisure travelers with business travelers making up close to a quarter of the revenue and the final 27.5 percent of revenues being generated by international travelers and meetings and events. Most of the revenue in this industry will be generated in large cities with cities on the east and west coast, as well as Texas, having the greatest percentage of revenues.

**BED AND BREAKFAST ACCOMMODATIONS:** While the accommodation market is dominated by hotels and motels, there are other options available to travelers with bed and breakfasts being a common option in

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<sup>60</sup> IBISWorld, *Casino Hotels in the US*, 2014

<sup>61</sup> IBISWorld, *Hotels & Motels in the US*, 2014

the U.S. Travelers typically choose bed and breakfasts over other accommodations due to their value and better amenities such as: scenic views, gardens/landscaping, architecture, historical significance, and their significantly better food. In the United States, the market for bed and breakfast accommodations reached \$1.2 billion at the end of 2013, and is expected to grow at a CAGR of 1.3 percent till 2018 with an expected value of \$1.25 billion.<sup>62</sup>

**NATIONAL AND STATE PARKS:** Following a decline of 3.0 percent in funding over the past five years (2009-2014) due to the federal budget sequestration, the funding for national and state parks is expected to increase by 2.0 percent into 2019. This will increase the funding for these parks from \$41.5 billion in 2014 to \$45.8 billion in 2019 with much of the funding going towards national parks (48.2 percent).<sup>63</sup>

**HISTORIC SITES:** In the U.S., the market for visitors going to historic sites reached a value of \$761.7 million in 2013 and is expected to grow at an annual rate of 2.4 percent over the next five years (2013-2018), this following a decline of 0.4 percent from 2008-2013. This annual increase in revenues will bring the market value for historic sites up to a value of \$857.9 million by 2018.<sup>64</sup> According to IBISWorld, this growth will be influenced by the increasing number of domestic travelers to these attractions, as well as by the budgets of all levels of government as historic sites receive 20 percent of their revenue from government funding.

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<sup>62</sup> IBISWorld, *Bed & Breakfast & Hostel Accommodations in the US*, 2013

<sup>63</sup> IBISWorld, *National & State Parks in the US*, 2014

<sup>64</sup> IBISWorld, *Historic Sites in the US*, 2013

## Section 2: Key Challenges Facing Economic Growth in Southwest Central Indiana

The strong desire by SWC Indiana's leaders to strategically focus significant investments in an effort to catalyze economic growth and community prosperity is understandable. The growth of a number of the region's key industry clusters, coupled with the potential to leverage the significant research assets of both a Tier 1 Research University and a major Federal laboratory, positions the region for economic growth for decades to come. However, there are challenges facing SWC Indiana's ability to effectively grow its economy, as evidenced by a number of lagging economic indicators presented in the previous section.

To better understand these challenges, Battelle examined more closely the dynamics behind SWC Indiana's industrial base, research base, entrepreneurial ecosystem, and regional economic development potential. This involved focused outreach and interviews with industry, the federal laboratory, universities, entrepreneurs, investors, as well as with community and economic development leadership. Focus groups were also engaged to further illuminate the environment in SWC Indiana for economic development.

Battelle's analysis points to five inter-related challenges confronting SWC Indiana which must be addressed as part of this strategic effort. These five development challenges are:

1. Industrial growth is being hindered by the lack of sufficient numbers of **skilled workers**.
2. The region has not yet fully taken advantage of the opportunity presented by the development of the **I-69 Corridor**.
3. Lack of robust, value-added **relationship between the region's two primary public research engines** hinders the region's ability to compete in the global economy, and also puts at risk the ability to retain the institutions' world-class assets in the future.
4. Lack of **sufficient entrepreneurial culture** hinders economic growth, limiting economic diversification and the stability and opportunities such diversity brings to a community.
5. **Lack of regionalism** hinders the coordination of efforts and does not allow for the benefits of critical mass.

### Industrial growth is being hindered by the lack of a sufficient numbers of skilled workers.

SWC Indiana's companies, particularly in advanced manufacturing and other high tech industries, cannot find enough qualified workers within the existing regional labor pool of candidates. Many industrial leaders interviewed indicated that due to the lack of a readily available qualified pool of candidates they have either already expanded outside the region or are strongly considering expansion in other regions in the future. The inadequate supply of a qualified labor pool is being driven by multiple factors:

- Educational attainment in SWC Indiana is below the State, with at least half the adult population having a high school diploma or less in 10 of the 11 counties in the region.
- Talent issues are further exacerbated by the number of 20-somethings that leave the region and the limited ability to attract talent to the region.

- As the region has lost large scale manufacturing employers, many people have either left the region over time or lost current skill sets through long-term unemployment or under-employment.
- While there are a number of interesting partnerships between industry and higher education institutions in the region that could serve as best practices, the programs are in essence one-offs with limited coordination to serve a broader cluster of firms, best practice facilitation among the educational services providers, or effective communication to the broader regional audience.
- Many industrial leaders who were interviewed voiced concern that as a result of state standards and changes to curriculum requirements, K-12 systems are becoming further removed from teaching relevant career technical skills, and that the innovative programs that do exist are not connected into a cohesive educational delivery system guided by employers' needs.
- Concern was expressed that many parents and students in the region did not understand the opportunities that exist within the strong industry clusters present in the region, and as a result, there is a lack of hope that often turns to apathy with regards to economic opportunities for the future.

### **The region has not yet fully taken advantage of the opportunity presented by the development of the I-69 Corridor to catalyze economic growth.**

The on-going extension and completion of I-69 between Evansville and Bloomington is one of the most significant new U.S. interstate infrastructure projects of the last few decades—one that will change the landscape of the region and the communities along the I-69 Corridor forever. To date, the region overall has not yet taken full advantage of the potential economic opportunities presented by planned development of the Corridor. While there are broader regional efforts such as the I-69 Innovation Corridor initiative that are beginning to address some broad issues, as well as one site-specific locational development around WestGate/Crane, much more can be done within the SWC Indiana region to realize the potential that I-69 represents to connect and “define” the SWC Indiana region for future economic growth. For instance:

- SWC Indiana is geographically well located for industry clusters to access substantial national markets, population, and industrial centers. The development of I-69 Corridor only strengthens the region's logistics position.
- However, there is limited ability to maximize recent investments in I-69 due to lack of planning, infrastructure development (currently no products to sell), and lack of zoning. It is important to note that in recent developments, Daviess County has adopted countywide zoning and several of the other LEDOs are participating in a joint land-use study that could serve as a basis for future planning and zoning improvements in other counties as well.
- There is a real potential for unplanned or undesirable development along the I-69 Corridor to impinge on the region's on-going development activities. For example, the WestGate Technology Park's location at an I-69 interchange will become a major selling point. However, the form and function of non-Park development in the area could strongly influence the view and attractiveness of the location in the future.
- Concern that completion of I-69 will only make Bloomington or Evansville locations more attractive, and not necessarily bring manufacturing/R&D/technical growth to the “in between” region. Quality development of the Corridor will be required to avoid this outcome.

## Lack of robust, value-added relationship between the region's two primary public research engines hinders the region's ability to compete in the global economy, and also puts at risk the ability to retain the institutions' world-class assets in the future.

There are two significant research drivers in the region. IU-Bloomington generates more than \$150 million in annual research expenditures and the Naval Surface Warfare Center at NSA Crane undertakes approximately \$1 billion in military activities each year of which research and development comprise between \$200 million to \$300 million annually. However, to date, there has been limited collaborative research between the two organizations, partly due to differences in research capabilities and partly due to organizational policies and procedures. As an example, going back to 1998, there has been no identified joint publications between an IU-Bloomington faculty/staff member and a representative from NSA Crane.

- NSWC Crane is highly focused on innovative and leading-edge engineering solutions around technology areas of electronics, sensors, optics/lasers, communications/antennas/radio frequency, weapons systems, batteries, and testing and manufacturing methods.
- IU-Bloomington stands out in its research activities in the areas of computer sciences, biology, chemistry, physics and the social sciences. IU-Bloomington today does not offer engineering programs and so its focus on technology solutions is from a more applied sciences perspective.
- Despite these different technology orientations, there are opportunities for collaboration in which the more basic and applied sciences strengths of IU-Bloomington can effectively partner with the more engineering strengths found at NSWC Crane. Among the areas of note are:
  - Radiation sciences is an increasingly important area of focus at NSWC Crane, particularly from the perspective of the effects of radiation on the performance and reliability of electronic components used in various military systems. IU-Bloomington Center for the Exploration of Energy and Matter is an experimental physics center with a shared-use cyclotron and linear accelerator facility that supports a Radiation Effects Research Program (RERP).
  - Applications in informatics and cybersecurity are becoming increasingly important dimensions of NSWC Crane's technology activities and IU-Bloomington has one of the nation's strongest computer sciences department. Among the strengths of IU's computer sciences efforts are in cybersecurity, computer networking and modeling and visualization involving Big Data – all areas of increasing importance to the military missions supported by NSWC Crane.
- While there are fledgling efforts in the radiation science area and there are IU-Bloomington faculty who serve as technical consultants to NSWC Crane, what is missing is the close collaborations found among universities in regions with strong DoD research and development facilities, such as University of Alabama Huntsville with Redstone Arsenal or University of Dayton with the Air Force Research Lab at Wright Patterson or University of Maryland with the National Security Agency.
- Discussions to further partnerships/collaborations between NSA Crane and IU-Bloomington have been ongoing for years. The overwhelming view on both sides is that key policies and bureaucratic processes will need to be overcome in order to break down the barriers and achieve a productive relationship – with possibly the need for new intermediary mechanism to play an effective role in further partnerships.

## **Lack of a sufficient entrepreneurial culture hinders economic growth, limiting economic diversification and the stability and opportunities such diversity brings to a community.**

The most efficient manner in which to add new firms and employment opportunities to a region are to “grow your own.” Indeed, the region has numerous examples of successful home grown firms that continue to thrive today and even lead to additional spin-outs, such as Cook Group. However, there is a general consensus that overall such entrepreneurial vigor is lacking in the region—from new ideas and the people to launch and develop them to the support and financial infrastructure to help make them a reality. While there has been a growing focus on entrepreneurial efforts, particularly in the Bloomington area, entrepreneurship in general is being hindered across the region by the following factors:

- Perception of a current lack of entrepreneurial acumen—both serial entrepreneurs and C-level talent—although noting that many of the region’s industrial leaders were start-ups less than 50 years ago.
- General lack of business start-ups (“churn”) compared to other regions, which in turn drives a lack of critical mass/deal flow.
- Limited investment of risk capital, correlated to lack of deal flow.
- Lack of entrepreneurial assistance infrastructure to catalyze activity and scalability, i.e., incubators, formalized mentorship, accelerators.
- What entrepreneurial efforts do exist are widely dispersed and not coordinated – lack of shared vision.
- Very difficult to develop entrepreneurial connections/serendipity in a region of this size (11 counties). Such efforts typically requires a “center of gravity”.

## **Current lack of regionalism hinders the coordination of efforts and does not allow for the benefits of critical mass.**

Historically, the economic, topographical, and political realities of the region have resulted in a dearth of collaborative efforts. The general perception is that there is no current/inherent sense of a “natural region” and that instead efforts to create such a region will be met with uncertainty and mistrust, if not outright hostility. As a result, developing a sense of regionalism within these 11-counties will take both concerted effort and time. Regionalism is currently being hindered by the following factors:

- Perception that there is no current/inherent sense of rallying around this newly defined region for economic development or educational purposes. Limited coordination among economic development entities – e.g., a lot of “one-off” projects instead of strategic focus.
- Number of disparate organizations working to market region, but activities are not well coordinated and assets are not bundled into regional packages.
- Zero sum game mentality – lack of trust – few believe that a rising tide raises all ships.

## Section 3: Southwest Central Indiana's Strategic Economic Development Plan

The results of the close examination of SWC Indiana's economic position over the past decade suggests that there have been many gains for the region that can be built upon, but significant gaps persist that need to be addressed. Advancing the region's economy requires an active effort that addresses a number of key challenges facing the region. These challenges are interrelated; addressing one issue can have a cumulative impact on other areas. Another way to think about these challenges is that today they pose a "vicious cycle" creating real barriers to development that the region must overcome. As the region works to address these challenges, a "virtuous cycle" can emerge in which barriers come down in an accelerated fashion as progress is made.

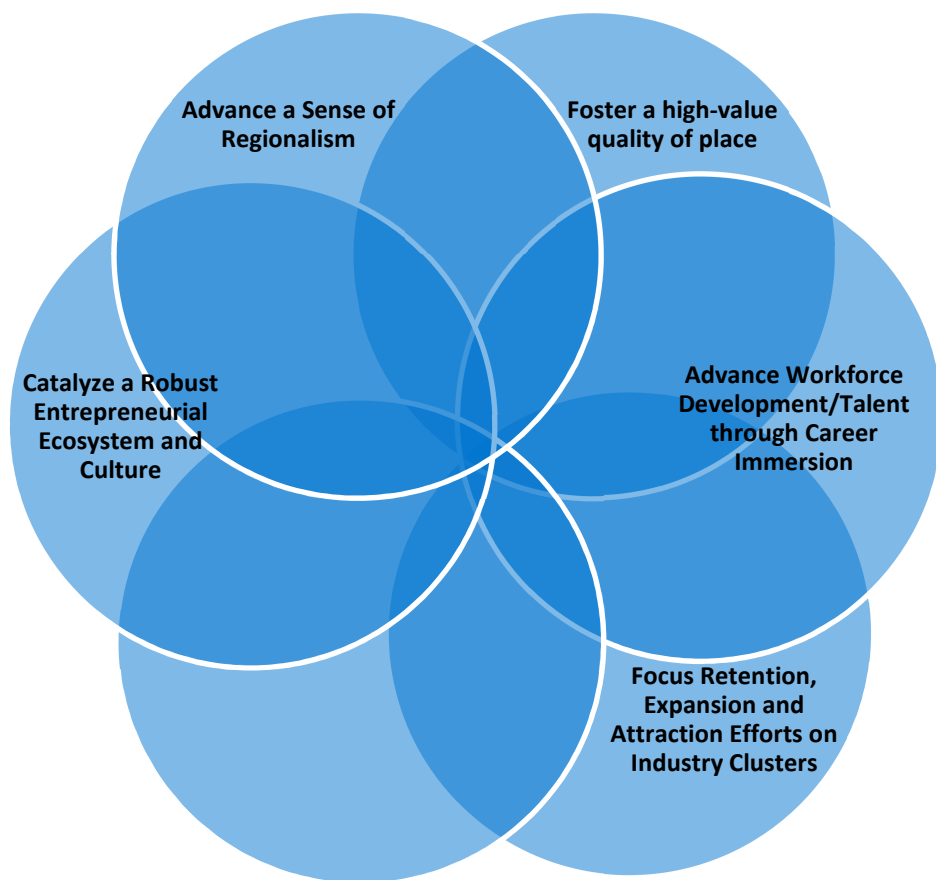
The five development challenges identified for SWC Indiana stand as strategic priorities, which if effectively addressed will enable the region to ignite the growth of the region's economy. Therefore, it is proposed that SWC Indiana initiate a set of six strategies and an associated set of 25 actions to overcome its existing economic challenges and create long-term economic growth and community prosperity within the region. These strategies and actions are outlined in the following pages. The six strategies are as follows:

- **Advance a sense of regionalism**
- **Foster a high-value quality of place**
- **Advance workforce development/talent through career immersion initiatives aligned with federal, state and local efforts**
- **Focus retention, expansion and attraction efforts on those industry clusters that provide the greatest opportunity for economic growth in the region**
- **Establish a collaborative applied research environment between Indiana's research universities and Naval Surface Warfare Center (NSWC) Crane to leverage each other's assets to help ensure global relevancy of research and regional economic growth**
- **Catalyze a robust entrepreneurial ecosystem and culture.**

Figure 14 illustrates the interconnectedness of each of the six strategies. ***It is important to note that no one single strategy can be effective without the resulting efforts proposed under the other five strategies.***



**Figure 14. Inter-related Strategies for Growing SWC Indiana's Economy**



The following strategic plan has been designed to be driven by industry and capitalize on SWC Indiana's comparative technological assets, while ensuring that future investments are focused on building the technology, knowledge, and capital that will ensure SWC Indiana's economic success for years to come. These strategies and subsequent actions are based, in part, on best practices from around the nation. However, the key strategic elements that provide specific solutions to SWC Indiana's industrial needs are unique for the region and are built on SWC Indiana's specific attributes and resources.

It is anticipated that these strategies would be implemented over a five-year period. Immediate actions are those that should be undertaken in the first year; short-term actions are those to be undertaken in the one- to three-year period; and medium-term actions are those to be implemented beginning in years three to five. However, a number of actions while implemented during the first five years will take a full ten years or more to begin to see measurable impacts.

**Table 10. SWC Indiana’s Economic Development Strategies and Actions**

Strategy	Action	Timing
<p><b>Strategy One</b></p> <p><b>Advance a Sense of Regionalism</b></p>	<p>Action 1: Ascertain what structure is needed to advance a successful, unified, 11-county regional economic development initiative charged with creating an identity/brand for the region and coordinating all regional economic development efforts</p>	<p>Immediate</p>
	<p>Action 2: Establish a centrally managed and coordinated Strategic Opportunity Fund for site and facility development to take advantage of the I69-Corridor using philanthropic and state and county public funds</p>	<p>Short-term</p>
	<p>Action 3: Create a rural development center of excellence at IU-Bloomington to leverage the unique international development, public policy, and health policy expertise resident in the region and apply it to solving rural issues of today</p>	<p>Mid-term</p>
	<p>Action 4: Launch a campaign to attract natives of SWC Indiana back to the region and advertise the region’s quality of life to attract high-skilled technical and managerial workers to the region</p>	<p>Short-term</p>
<p><b>Strategy Two</b></p> <p><b>Foster a High-Value Quality of Place</b></p>	<p>Action 1: Initiate further infrastructure investments based on regional planning to take complete advantage of the I-69 Corridor opportunity and create live-work-play environments</p>	<p>Immediate</p>
	<p>Action 2. Establish a region-wide tourism campaign that capitalizes on the region’s unique scenic, ecological, historical, cultural, and recreational advantages</p>	<p>Immediate</p>
	<p>Action 3: Examine the Internet and cellular connectivity in the region to determine needed improvements</p>	<p>Short-term</p>

**Table 10. SWC Indiana’s Economic Development Strategies and Actions (continued)**

Strategy	Action	Timing
<p><b>Strategy Three</b></p> <p><b>Advance workforce development/talent through career immersion initiatives aligned with federal, state and local efforts</b></p>	<p>Action 1: Annually develop a projected occupational needs assessment of the targeted industry clusters validated by industry and accessible to consumers</p>	<p>Immediate</p>
	<p>Action 2: Actively inform, educate, and train students, parents, and educators on career opportunities that exist in the identified industry clusters and the educational requirements and career pathways needed to access them, particularly targeting elementary and middle school students</p>	<p>Short-term</p>
	<p>Action 3: Offer internships and co-op opportunities year-round to secondary and post-secondary students, and provide a marketplace to connect students with internship opportunities</p>	<p>Short-term</p>
	<p>Action 4: Improve STEM education at the K-12 level across the region, leveraging current best practices, industry partnerships, and public institutions to scale programs to include every student at every school</p>	<p>Mid-term</p>
	<p>Action 5: Working with industry, develop curriculum and career pathways for secondary and post-secondary students through a career immersion industry/academic partnership for each targeted industry cluster</p>	<p>Mid-term</p>
	<p>Action 6: Work with Ivy Tech, Indiana University, University of Southern Indiana, Purdue University, and Vincennes University to develop additional higher-education partnerships with WestGate Academy and Battery Innovation Center to meet the workforce, education, and R&amp;D needs of targeted industry clusters and NSA Crane</p>	<p>Immediate</p>
	<p>Action 7: Encourage youth to become entrepreneurs</p>	<p>Short-term</p>

**Table 10. SWC Indiana’s Economic Development Strategies and Actions (continued)**

Strategy	Action	Timing
<p><b>Strategy Four</b></p> <p><b>Focus retention, expansion and attraction efforts on those industry clusters that provide the greatest opportunity for economic growth in the region</b></p>	<p>Action 1: Expand the footprint of targeted industry clusters and their related supply-chains in the region to create greater economic opportunities throughout the region</p>	<p>Immediate</p>
	<p>Action 2: Develop a SWC Indiana branding/marketing campaign for targeted industry clusters</p>	<p>Short-term</p>
	<p>Action 3: Explore the creation of a Regional Development Authority, which will require legislative approval and funding, as well as a county CEDIT and TIF or other legislatively authorized mechanisms</p>	<p>Short-term</p>
	<p>Action 4: Expand and/or develop IU-Bloomington degrees and related offerings in applied engineering, applied technologies, science, and systems engineering design and development areas, working in consultation with industry partners and NSWC Crane</p>	<p>Short-term</p>
<p><b>Strategy Five</b></p> <p><b>Establish a collaborative applied research environment between Indiana’s research universities and Naval Surface Warfare Center (NSWC) Crane to leverage each other’s assets to help ensure global relevancy of research and regional economic growth</b></p>	<p>Action 1: Establish an Applied Research Center with an organizational structure and related mechanisms to foster the ability to advance and sustain productive research enterprises, including dedicated personnel to further collaboration between Indiana’s research universities and NSWC Crane</p>	<p>Short-term</p>
	<p>Action 2: Leverage the close physical proximity of Indiana University and NSWC Crane to explore and pursue federal research and translational opportunities in areas of mutual interest such as cyber security, radiation, and material sciences</p>	<p>Short-term</p>
	<p>Action 3: Create programs that will facilitate the exchange of Indiana research faculty and NSWC researchers between institutions</p>	<p>Short-term</p>
	<p>Action 4: Create programs to support endowed chairs and eminent scholars in areas of overlapping strengths across technology areas of mutual interest</p>	<p>Medium-term</p>

**Table 10. SWC Indiana’s Economic Development Strategies and Actions (continued)**

Strategy	Action	Timing
<b>Strategy Six</b>  <b>Create a Robust Entrepreneurial Ecosystem and Culture</b>	Action 1: Establish Entrepreneurial Hubs, focused on cluster industries that are innovative or technology-based, that provide facilities and lab equipment, professional development, coaching and mentorship, and access to risk capital, thereby accelerating the rate of commercialization and the creation of start-up companies in the region	Short-term
	Action 2: Establish and create linkages with a pipeline of commercialization tools and risk capital funds, including successful venture capital and private equity funds, to invest in entrepreneurial efforts in the region	Short-term
	Action 3: Celebrate and market entrepreneurial successes	Immediate

### Strategy 1: Advance a Sense of Regionalism

The need for regionalism, or area wide planning and coordination, is rooted in a number of related challenges:

- Problems often cannot be solved within municipal boundaries, and decisions made by one municipality can have adverse impacts on other municipalities. In more rural regions, this shortcoming hampers the coordination of services and ability to achieve efficiency of operations and economies of scale.
- Many problems/issues are too large or complex for any one unit of government to address. Issues such as economic development, broadband connectivity, and preservation of the quality of life in the region are examples of challenges that require regional cooperation. This problem is heightened in rural areas where the relative small size of the local units of government compared to the geographic area under their jurisdiction may hamper their ability to address important planning and implementation issues.
- As municipal budgets are strained and programs suspended or curtailed, cooperative program delivery schemes that provide for the coordination of services and the pooling of resources become more important. Long-term and area-wide planning for the delivery and combining of these services become critical in the task of maintaining services by improving the efficiency of delivery and cost-effectiveness through economies of scale. Regional entities are prime venues for discussing, planning, and implementing such area wide solutions.

As already noted, the greatest threat to the successful implementation of this economic development strategy is the current lack of regionalism and collaboration among the various components of SWC Indiana’s economic ecosystem. Much of the success of this strategy is predicated on building a critical mass of strength in order to differentiate SWC Indiana from the ever increasing number of global competitors for innovation, talent, and capital.

Therefore, it will be imperative that strong collaborations and partnerships be created across the region to foster economic growth and community prosperity for all.

## Actions to Pursue

1. Ascertain what structure is needed to advance a successful, unified, 11-county regional economic development initiative charged with creating an identity/brand for the region and coordinating all regional economic development efforts.
2. Establish a centrally managed and coordinated Strategic Opportunity Fund for site and facility development to take advantage of the I69-Corridor using philanthropic and state and county public funds.
3. Create a rural development center of excellence at IU-Bloomington to leverage the unique international development, public policy, and health policy expertise resident in the region and apply it to solving rural issues of today.
4. Launch a campaign to attract natives of SWC Indiana back to the region and advertise the region's quality of life to attract high-skilled technical and managerial workers to the region.

### Action 1: Ascertain what structure is needed to advance a successful, unified, 11-county regional economic development initiative charged with creating an identity/brand for the region and coordinating all regional economic development efforts

In order for this strategy to be successful, a unified regional economic development initiative must be formed. This will require the buy-in and organization of key champions and stakeholders from targeted industry clusters, serial entrepreneurs, the entire educational system continuum, NSWC Crane, and local economic development leaders that can spearhead and lead the various components of strategy implementation.

One option in forming a unified regional economic development initiative would be to expand Radius Indiana's activities to encompass all 11 counties within SWC Indiana. If for some reason it is determined that Radius Indiana should not be expanded to encompass the additional three counties, then a separate entity that can unite the region will need to be formed. This will, however, cause significant overlap and duplication of efforts, as well as possibly cause confusion in the market place.

Regardless of the ultimate initiative formed to implement the strategy, the plan will need to be socialized with informed opinion leaders, key stakeholders, and the citizenry of the region. An internal education campaign will be needed to increase the region's knowledge and understanding of the targeted industry clusters; the role the clusters plays in SWC Indiana's economic future; the opportunities they provide for them and their children; and the role new discoveries and inventions will play in their lives. It will be particularly important to brief local officials so that they understand the impact investments can have on their constituents. The internal campaign should be aligned with the branding and marketing campaign described in Strategy 4 Action 2, but it will require a distinct set of activities. These could include public service announcements, a cluster ambassador program to reach schools and local civic organizations, regular monthly and quarterly events, and a website to keep citizens informed of implementation developments.

Finally, significant coordination with other key organizations will be required if the strategy is to be implemented to its full potential. In addition to coordination with the two key research anchors, IU-Bloomington and NSWC Crane, a unified regional economic development initiative will also need to play

an active role in helping to coordinate the efforts of the cluster initiatives in partnership with industry, as well as regional efforts around specific career immersion and entrepreneurial opportunities.

## Action 2: Establish a centrally managed and coordinated Strategic Opportunity Fund for site and facility development to take advantage of the I-69 Corridor using philanthropic and state and county public funds

When conducting attraction campaigns, it is very important to have ready sites as well as financial assistance available up front. Ready sites are increasingly important drivers of economic development in a global economy where there are so many choices available to a company seeking to expand or relocate. Currently, outside of a few communities, SWC Indiana's economic development efforts do not involve much in the way of land banking or speculative site development, even along the I-69 Corridor.

As a result, it is recommended that a Strategic Opportunity Fund be established that would enable a unified regional economic development organization to develop sites and facilities for select projects. One key component of the Fund would be a pool of \$10 to \$20 million available annually to provide a flexible source of funding for strategic infrastructure and major business development support. The needs for such strategic infrastructure and major business development support can be expected to vary by primary industry cluster. It is recommended that the initial investments be concentrated around development projects around the I-69 Corridor to take advantage one of the most significant U.S. interstate highway development projects in the last two decades and the potential economic growth that could result from business attraction and expansion projects if sites and infrastructure were available.

One potential funding model for such an effort could be modeled after Daviess County's Economic Development Income Tax (EDIT), which could be expanded to all 11 counties. A regional EDIT could create an economic development pool of funds to support strategic infrastructure investments, including land acquisition, infrastructure improvements, shell building construction, and specialized tenant improvements for ready sites. Through the EDIT in Daviess County, the land and improvements that have resulted in WestGate @ CraneTechnology Park were made possible.

Potential targeted cluster development projects might include:

- National security/defense might require additional build-out of WestGate
- Transportation, distribution, and logistics might require intermodal transportation facilities.
- Information and communication technology, along with closely associated clusters, such as financial services and business management and administrative services, might require data centers.
- Hospitality and tourism might require large-scale tourist attractions involving multiple features (hotels/conference centers, lake shore development, all-terrain vehicle trails as well as hiking/biking trails, preservation of unique ecosystems, etc.). For instance, it has been noted that the lack of a hotel facility at Westgate is a barrier to further developing the national security/defense cluster.

### Action 3: Create a rural development center of excellence at IU-Bloomington to leverage the unique international development, public policy, and health policy expertise in the region and apply it to solving rural issues of today

IU-Bloomington serves as an extremely unique asset due to the level of world-class social science research, particularly around emerging economies and international development. Programs within the Areas Studies Program, along with the School of Public and Environmental Affairs, College of Education, and the newly created School of Public Health, which specializes in rural health-related issues, provides an unprecedented amount of knowledge and focus on the long-term socio-economic issues of rural development.

It is recommended that these assets be utilized to help preserve the rural identity of America. Much like IU-Bloomington teams of experts specialize along geographic boundaries of third world and emerging countries and regions of the world, a Center should be created that would focus this knowledge and talents to studying, analyzing, and solving the issues facing rural America. SWC Indiana could serve as a case study of these issues. The Center should be focused on exploring the region's common issues that detract from the quality of place today—housing, including affordable housing; senior citizen engagement; poverty; generational unemployment; substance abuse; healthcare; education policy; educational attainment; literacy; and beautification and redevelopment of downtowns, to name just a few. SWC Indiana could then serve as an experimentation test bed, positioning itself as one of the most progressive rural regions in the nation working to improve its quality of place at a time in which many similar regions are declining both economically and socially. It is important that the Center work with practitioners from local and regional community groups and non-profits in order to ensure that the academic research mission is complemented by an ability to effectively engage citizens at the ground level.

### Action 4: Launch a campaign to attract natives of SWC Indiana back to the region and advertise the region's quality of life to attract high-skilled technical and managerial workers to the region.

Because of the out-migration that has occurred from SWC Indiana, many natives of the region have undertaken successful careers elsewhere, yet many of these people may wish to return to the region if an opportunity to do so was presented. Of particular interest would be those people who have successfully started and managed businesses or that have technical skills which are needed by SWC Indiana's targeted industry clusters.

Other regions have pursued efforts to reach out to publicize the quality of career opportunities, quality of place, and even help in matching workers to jobs in their regions. This includes state efforts such as Project Boomerang in Oklahoma and the Iowa Careers Consortium. In Huntsville, Alabama, home to the Army's Redstone Arsenal, the regional Chamber of Commerce has an active marketing campaign to attract high-skilled workers to the region, focusing on Huntsville as "a smart place". In this effort, it features all of the live-work-play advantages that Huntsville offers to technology and other high-skilled professionals, plus features a "find a job" website that provides information about civilian jobs at Redstone Arsenal and features a job matching service for job seekers and employers. A more hands-on focus to match workers with specific skill sets to employers is the Pittsburgh Digital Greenhouse, which in its early years focused on talent recruitment for firms coming to Pittsburgh to pursue lab-on-a-chip technology development, and later focused more broadly on electronics and robotics. What has been learned from these efforts is the importance of creating a public-private partnership which develops and maintains dynamic databases of jobs and skilled workers, conducts outreach marketing and serves as a key point of access for job seekers and employers in selected areas.



It is proposed that a unified regional economic development organization work with the region's universities to identify alumni that might be interested in joining a firm, starting a firm, or encouraging their employer to consider SWC Indiana as a location in which to expand. Consideration should also be given to undertaking a limited marketing campaign that advertises the region as an alternative location for workers or companies interested in the type of quality of place that SWC Indiana provides. Finally, for those alums who it is not feasible to attract back to the region, but that are high net worth individuals, consideration should be given to seeking investments in risk capital for start-up ventures in the region.

## Strategy 2: Foster a High-Value Quality of Place

Quality of place indicators can paint a very unique picture of a particular region. Both potential employers and employees must factor in not only the industrial strengths and research assets of a region, but also elements such as recreation, cultural arts, education, crime, environment and climate. SWC Indiana is rich in outdoor recreation opportunities and has a wonderful natural landscape. The region also has made strategic investments in its historical facilities and has a thriving cultural arts scene, driven by IU-Bloomington's world-renowned fine arts programs, in addition to Brown County's Art District.

Despite these advantages, the region suffers from a deficit in terms of the kinds of amenities which younger knowledge workers demand – loft-like or studio apartment rental housing, coffee shops, outdoor cafes, gallery spaces, health clubs, and restaurants. The region does have one sizeable downtown, Bloomington, which has made significant investments to develop a vibrant downtown that is attractive to younger knowledge workers. However, most of the rest of the region does not offer the same amenities.

However, quality of place issues do not center solely on issues affecting the young professional. Regional leaders interviewed also expressed concern regarding the lack of senior housing and assisted living programs for the elderly. In addition, it was noted that the lack of start-up homes severely impact young families, in addition to the concerns expressed over the lack of daycares, pre-schools, and early-education programs.

Needless to say, SWC Indiana must focus on creating a quality environment for its citizens if true community prosperity is to be obtained.

### Actions to Pursue

1. Initiate further infrastructure investments based on regional planning to take complete advantage of the I69 Corridor opportunity and create live-work-play environments.
2. Establish a region-wide tourism campaign that capitalizes on SWC Indiana's unique scenic, ecological, historical, cultural and recreational advantages
3. Examine the Internet and cellular connectivity in the region to determine needed improvements

### Action 1: Initiate further infrastructure investments based on regional planning to take complete advantage of the I-69 Corridor opportunity and create live-work-play environments

One of the most significant U.S. interstate highway development projects in the last two decades, the extension of the I-69 Corridor from Indianapolis to Evansville, has the potential to improve spatial connections within the region and generate new economic opportunities for accessing broader markets.

However, concerns exist among industry leaders and key stakeholders regarding the ability to leverage this opportunity in the face of some significant development barriers, which include:

- Lack of I-67 connector (Rt 231) between Jasper and I-69
- Lack of land-use planning
- Lack of zoning
- Lack of infrastructure development (currently no product to sell)
- Lack of interchange amenities, including hotels, restaurants, conveniences
- Lack of housing
- Lack of live-work-play environments that are attractive to the younger workforce

It is recommended that a Master Land-Use Development Plan be developed for SWC Indiana's portion of the I-69 Corridor to help ensure that the infrastructure, policies, and planning tools that are needed to effectively develop the region for value-added growth that will lead to community prosperity are in place. Particular focus should be placed on the interchange adjacent to Crane and the West Gate Technology Park. This will also greatly enhance the likelihood that the Strategic Opportunity Fund proposed in Strategy 1 has a greater chance of successfully attracting the type of development the region is seeking. It is important to note that Crane recently announced that it will be undertaking its own Joint Land Use Planning exercise. This effort will need to be done in coordination with that effort as its results could have significant implications for the region.

## Action 2: Establish a region-wide tourism campaign that capitalizes on SWC Indiana's unique scenic, ecological, historical, cultural, and recreational advantages

Specialized recreational development with significant tourism benefits is already occurring in SWC Indiana with activities such as mountain biking, hunting and fishing, and golf at highly acclaimed privately developed courses in French Lick. In addition, there are numerous historical and cultural offerings readily available, as well as a luxury resort and casino complex. These activities are widely spread over the region, thereby offering multiple and varied tourism and recreational opportunities throughout SWC Indiana. Tourism is drawing primarily from the larger regional metropolitan markets of Cincinnati, Louisville, Indianapolis, Lexington, Nashville, St. Louis, and Chicago. However, because of the world class amenities, particularly around the fine arts programs at IU-Bloomington and the resort/golf amenities at French Lick, the region has been able to attract national/international events, all of which provide opportunities for investors/business leaders from other localities to experience and learn about the region and its business opportunities.

Currently, the marketing of the region from a tourism/destination standpoint is rather fragmented with a number of discreet and siloed activities. Much as there is a need to establish a singular economic development brand and marketing campaign, so too is there a need to develop region-wide tourism campaign that accurately reflects all that the region has to offer. Furthermore, through more effective marketing, the hospitality and tourism industry cluster will have the chance to grow and prosper, thereby bringing economic benefit and growth to the more rural regions of SWC Indiana.

A unified regional economic development organization needs to be tasked with developing an 11-county wide tourism/hospitality branding/marketing campaign and then working with the variety of other existing tourism organizations in the region to develop collaborations and a unified message.

### Action 3: Examine the Internet and cellular connectivity in the region to determine needed improvements

Individuals interviewed for this project had widely varied answers when asked about connectivity issues in SWC Indiana. Some expressed concern regarding the lack of high-speed Internet connectivity/service in the more rural sections of the region, particularly the last mile to private residences, as well as the lack of cellular services. However, others interviewed indicated that there had been great strides in the last few years with regards to connectivity, and that the problem areas were becoming fewer and further between. The interviews did not unveil any businesses that had difficulty obtaining services. The issue appears to be predominantly focused on private usage.

Leveraging the recently created Indiana Rural Broadband Working Group, a comprehensive study of the existing Internet and cellular connectivity infrastructure is warranted. This study should examine, test, and map key utility components including electrical power quality and reliability and the availability, costs of high-speed Internet, and cellular coverage. Other utility functions (e.g., telephone, gas, water, and sewer) could also be included in this study to provide a detailed understanding of their existing condition (useful for detailed marketing/site location efforts, but also for investment planning by real estate developers and service providers who may need to upgrade these systems before new firms enter the area).

### Strategy 3: Advance Workforce Development/Talent through Career Immersion Initiatives Aligned with Federal, State and Local Efforts

In a global economy where jobs are outsourced from one continent to another, it is appropriate to ask whether workforce is a relevant competitive factor. Is labor a commodity like utilities or access to capital, and thus unable to create any competitive differentiation or advantage, or can it be unique to a firm or region, like location or intellectual property, and confer a significant competitive advantage?

Workforce can and must be an essential part of any strategy by a firm or region to create a competitive advantage. If a firm does not use its workforce as anything more than a low-skill, low-wage, and high-turnover commodity, then it will not generate or retain any type of enduring market advantage in a marketplace that is increasingly emphasizing the use of high-tech tools that add value for suppliers and end customers. It is a market truism that cost-based commodity factors of production do not generate any advantage among domestic competitors. Therefore, how does workforce enter into domestic competition?

This question is simple to answer but difficult to implement. Simply put, workforce is one of the few market factors that are locally based and have the potential to create a comparative advantage that can differentiate a region or firm from its competition. SWC Indiana cannot change its physical location, so its location advantages are fixed. Firms can purchase new and emerging technology; but, if these are “off-the-shelf” technologies, then they are available to the competition. In contrast, talent/workforce is a locally provided and locally managed resource, thus able to be differentiated from other regions. In addition, workforce is an essential element in implementing advanced technology solutions. The quantity, quality, and management of talent/workforce are competitive factors very much in local control.

Unfortunately, in SWC Indiana there is a lack of trained workers that meet the needs of many of the region’s leading firms. This in part is driven by the changing demographics of the region, but is also in part due to a lack of understanding and preparation for the jobs that are available. A report by the National Governors’ Association noted that “the traditional approaches to worker preparation are rooted in the supply side of the labor market, building the skills of job entrants with minimal input from employers or regard for how these skills are further developed and used in the workplace. A wide gap has emerged between the public training and employment services system and the human resource development

strategies and operations of firms. There is growing consensus that the nation's public workforce development system needs to:

- Be more closely aligned with the standards and practices that are part of firms' internal human resources systems;
- Move beyond initial job preparation and placement to include ongoing skill development and career progressions for employed workers;
- Provide post-employment training closely linked to employers' needs; and,
- Create career pathways to further education and upward mobility for all workers."<sup>65</sup>

Improving the effectiveness of the workforce development system will require adopting a "demand-side strategy" that will build on employers' economic interests.

**The bottom line is that the industry cluster initiatives outlined in Strategy 4 will not have a high likelihood of success unless there is an adequate workforce available to support and retain these growing industries.** Until educational and community leaders understand and agree upon the economic and occupational importance of these clusters, it is unlikely to receive much attention or support from the regional system of education and training because their experience tells them that many of these clusters are (a) not a viable industry or career path in the first place or (b) its jobs are uniformly unattractive. These perceptions must be met head on and diffused. While much work is being done at the State level, including engaging regional works councils to assist in developing demand driven workforce solutions at the local level, more needs to be done in the 11 county region to align strategies and leverage federal, state, and local investments.

The following actions attempt to begin to address the lack of a skilled workforce that meets the needs of the region's targeted industry clusters—the greatest impediment to future economic growth vocalized by industry leaders during interviews and focus groups.

### Actions to Pursue:

1. Annually develop a projected occupational needs assessment of the targeted industry clusters validated by industry and accessible to consumers.
2. Actively inform, educate, and train students, parents, and educators on career opportunities that exist in the identified industry clusters and the educational requirements and career pathways needed to access them, particularly targeting elementary and middle school students.
3. Offer internships and co-op opportunities year-round to secondary and post-secondary students, and provide a marketplace to connect students with internship opportunities.
4. Improve STEM education at the K-12 level across the region, leveraging current best practices, industry partnerships, and public institutions to scale programs to include every student at every school.
5. Working with industry, develop curriculum and career pathways for secondary and post-secondary students through a career immersion industry/academic partnership for each targeted industry cluster.
6. Work with Ivy Tech, Indiana University, University of Southern Indiana, Purdue University and Vincennes University to develop additional higher-education partnerships with WestGate

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<sup>65</sup> National Governors' Association, State Strategies for the New Economy, 1999.

Academy and Battery Innovation Center to meet the workforce, education, and R&D needs of targeted industry clusters and NSA Crane.

7. Encourage youth to become entrepreneurs.

### Action 1: Annually develop a projected occupational needs assessment of the targeted industry clusters validated by industry and accessible to consumers

An industry cluster must develop and disseminate its current and future workforce requirements so that the larger workforce system, as represented by the educational community and public workforce agencies, can support an adequate workforce response. Otherwise, the cluster's workforce needs will be at the mercy of general labor market dynamics and probably overshadowed by the more articulate and better understood workforce demands of other sectors. Lack of awareness of a particular industry's workforce opportunities and demand will further exacerbate the employment recruitment barriers previously discussed. Such an articulation of workforce need is a prerequisite to mount an effective career awareness, marketing, and recruiting campaign.

An annual occupational needs assessment of the targeted industry sectors is necessary for many reasons. Without knowledge of the jobs that currently exist in the region, it is impossible to market the various targeted clusters as a career, to construct attractive career paths, to convince educational institutions to dedicate scarce resources to education and training programs, to help career counselors and parents to understand and encourage careers in this sector, to raise resources to support further workforce development, and to comprehend the workforce needs of the firms in the region. An annual workforce and occupational survey is an essential element in a campaign to make the clusters more visible, more defined, and more attractive to many important audiences.

Such a survey can be implemented using the Internet, focus groups, secondary labor market information, and a quarterly sample of personal interviews. The role of the survey is multiple, in that the audiences that it will inform and the policies that it will shape are far ranging. Understanding the volume of each type of position, projected growth, and age profile will help inform the development of educational and training programs. Understanding the different types of positions and their positive and negative aspects will help with recruitment, career counseling, and developing appropriate career paths between different jobs. Understanding their economic impact will help secure public support for this and related initiatives.

It will be important to test and adjust the methodology over time. In addition, due to the reported significant shortage of middle-skilled employees in the region, a more comprehensive survey to determine middle-skill gaps should also be undertaken and updated annually, at least until the shortage subsides.

### Action 2: Actively inform, educate, and train students, parents, and educators on career opportunities that exist in the identified industry clusters and the educational requirements and career pathways needed to access them, particularly targeting elementary and middle school students

The lack of understanding of employment opportunities within the targeted industry clusters, as well as middle-skilled jobs in general, is a problem with respect to workforce attraction, recruitment, and retention. To help overcome this issue, the region and the industry must begin a gradual, multi-faceted communications campaign. Using a range of communication and organizing tactics, this campaign will target not only educational providers, such as teachers throughout the K-12 system, administrators, and guidance counselors, but also the students, parents, regional leadership and community thought leaders about employment opportunities within the targeted industry clusters or through entrepreneurial endeavors. The following suggests some potential elements of this campaign.

**Regional Workforce Conferences.** Drawing on industry-specific occupational, marketing, and communications material, the region needs to convene a series of conferences focused on the targeted industry clusters and their current and future workforce challenges based on the initial workforce survey results. In the future, the conferences could be an annual event releasing findings and trends from each year's survey.

**Employee/Entrepreneurial Ambassadors.** Current employees and entrepreneurs are important targets for an industry education campaign. Providing speakers at various educational events and community gatherings (chambers, service organizations, etc.) will be an important component of spreading the word about career opportunities.

**Creation of Higher Education Career Councils.** Another essential marketing and communications target is the leadership, staff, and students of the regional college and universities. It is essential that each industry cluster create a formal and ongoing connection to the region's higher education institutions. One step could be the creation of higher education careers councils. Members of the council could be university and college leaders, key department chairs, selected academic instructors, and appropriate career counseling staff. As a formal mechanism to involve academic leadership as well as career counseling staff from the region's college and universities, this council would provide a forum for an ongoing dialogue about the employment, education, and training issues facing the targeted industry clusters. The council need not meet more than annually, but written communication could be monthly and committees could be formed on special topics of concern.

**Internet Presence.** Many employment sectors have created excellent marketing and recruitment initiatives that SWC Indiana should review and possibly emulate. Given that young people are intensely involved with online media, providing career and employment information via the Internet is an increasingly common, cost-effective, and often very useful marketing channel to explore. An excellent example of a career website presence is the efforts of the Virginia Career Education Foundation through their efforts at [www.KnowHowVirginia.org](http://www.KnowHowVirginia.org). The website has content tailored for students, parents, as well as offers excellent resources for teachers and educators regarding career opportunities.

In summary, there are a host of communication techniques available to significantly increase targeted industry cluster visibility, especially with respect to the existing and new workforce. It will be important for the region to leverage state resources, such as the Career Workforce Councils, and utilize occupational and workforce data.

### Action 3: Offer internships and co-op opportunities year-round to secondary and post-secondary students, and provide a marketplace to connect students with internship opportunities

One way to build and retain talent is to establish personal relationships with students while they are still in school, whether it be high school, two-year programs, undergraduate, or graduate programs. Experience shows that efforts such as internships and co-op programs can be effective in increasing the retention rate of graduates, reducing their out-migration to other states and regions. SWC Indiana's firms need to increase the level and scale of efforts of these types of programs. Such an effort not only will keep students in the region, but also will expose firms to new skills and approaches as they address their product development needs.

Many in SWC Indiana have recognized the importance of such experiential learning activities. For example, the Vincennes University Jasper Campus (VUJC) and seven local manufacturing companies (Jasper Engines and Transmissions, Indiana Furniture Industries, OFS, Wabash Valley Produce, Masterbrand Cabinets, Kimball International, and Jasper Rubber) recently developed the Career

Advancement Partnership (CAP). As a result of the partnership, students enrolled in the technical maintenance associate degree program are employed part-time at one of the partnering companies while enrolled at VUJC full-time. Companies in the region gain an increased supply of qualified, skilled workers with built-in connections to local employers. Students in the two-year program gain:

- An Associate in Science Career-Technical degree.
- Two years of paid work experience (part-time).
- Training in advanced technologies.
- Mentoring by experienced technicians.
- Preference for full-time employment.
- Financial support for tuition & fees.

Other examples exist in the biotech, healthcare, and hospitality clusters, to name just a few. However, most are individual company partnerships, and not consortia arrangements. While such individual programs are very valuable to the students and companies they serve, a more region-wide systemic and structured internship/co-op initiative could provide a matchmaking service to link targeted industry cluster firms with students across SWC Indiana's education institutions. These co-ops and internships should be viewed as an integral part of the curriculum. Active training collaborations between educational institutions and companies in the region should underpin these co-ops and internships through (1) use of industry professionals who serve as adjunct faculty to help teach courses and (2) active industry involvement in the curriculum to meet the demands of the workplace. SWC Indiana needs to develop its co-op and internship programs to encourage students to stay in the region upon graduation; to entice students leaving the region for college to come back; and to otherwise increase partnerships between industry, education, and students. For example, the programs at Crane that attract students from across the nation could be better leveraged to help recruit employees for the broader national security/defense cluster.

Many benefits could accrue from an enhanced internship/co-op function, including the following:

- Increasing the perceived value of a SWC Indiana education, to both prospective students and parents. Parents increasingly desire evidence that their child is receiving both a theoretical and practical set of experiences and an education that will prepare him or her ultimately for the world of work.
- Providing important real-world feedback to curriculum and instruction, helping to ensure that course content, programs of study, and laboratory experiences are high quality.
- Increasing graduate retention rates.

The bottom line is that internships and other experiential learning activities help make students aware of local employers and also help local employers recruit future workers. An added benefit is that internships can provide students needed job experience that employers value very highly. And, specific to SWC Indiana, in a DoD job market, a successful internship at the end of a student's junior year in an undergraduate program, or after the first year of a master's program, can allow the time needed to gain security clearances.

## Action 4: Improve STEM education at the K-12 level across the region, leveraging current best practices, industry partnerships, and public institutions to scale programs to include every student at every school.

Engaging students in scientific or technological careers is seen as a difficult challenge across the country. It is recognized that a child should be introduced at an early age to mathematics and the sciences; otherwise, he or she will quickly fall behind and be unprepared to enter post-secondary engineering or scientific curricula. Many State Boards of Education, including in the State of Indiana, and others are extensively studying the issues that currently face the nation's K-12 system, and their efforts should be supported. As various recommendations are developed, potential initiatives to improve education should be examined. Included among areas to be examined and further reviewed are the following options:

- Developing programs and initiatives designed to interest students and parents in technology. It is generally agreed that students choose early in their educational careers to take the necessary math and science classes to prepare them for advanced work in technological fields. Therefore, it is very important that technology careers are promoted so that students can see the benefits of pursuing a scientific course of study. Schools should have "invention" laboratories supporting broad career exploration, authentic strategies for academic instruction, and opportunity for student creativity in solving problems. Student experiences (technology competitions, technology mentors, higher education summer enrichments, etc.) contribute to a climate of high expectations and opportunities. The targeted industry clusters should support middle, junior, and high school student and teacher experiences in relevant technological fields.

### Aligning Regional Resources via Career Pathways

"Career pathways" is a term for a framework by which regions can better align publicly supported [education and workforce] systems to build a workforce customized to the needs of local labor markets. A career pathway is a series of connected education and training programs and support services that enable individuals to secure employment within a specific industry or occupational sector, and to advance over time to successively higher levels of education and employment in that sector.

Career pathways target jobs in industries important to local economies. They are designed to create both avenues of advancement for current workers, jobseekers and new and future labor market entrants and a supply of qualified workers for local employers. They also serve as a strategy for strengthening the "supply chains" that produce and keep a region's knowledge workforce up to date. The specific form and content of a career pathway will depend on the particular industries targeted, the requirements of employment and advancement in the target sectors, and the existing infrastructure for education and workforce development in those sectors.

Jenkins, D. "Career Pathways: Aligning Public Resources to Support Individual and Regional Advancement in the Knowledge Economy." Workforce Strategy Center. August 2006.

### Common Features of Career Pathways

Career pathway programs and structures vary greatly, given the variation between industry and job targets; however, common elements are as follows:

- Jointly produced occupation "road maps" that show how education and industry intersect for occupation and advancement potential
- User-friendly linkages between remedial, educational and occupational training
- Heavy reliance on specific occupational data, job progression patterns, and job requirements
- Course content defined in terms of competencies required for jobs and, where possible, tied to industry skill standards and certifications
- Training and education offered in modules that represent clear stepping stones to advancement
- Training offered at times, places, and with support services to enable maximum participation
- Outreach and bridge building to middle, high, and vocational schools
- Blending of private and public funding



- Using distance education technology to bring high-quality math and science instruction to students in all parts of SWC Indiana. While it may be unrealistic for every community in the region to provide advanced science and math courses, students should be given the opportunity to take such courses via distance learning technology.
- Instituting a differential pay scale or incentive system that allows science and math teachers to be more highly compensated. It can be difficult to recruit math and science teachers given the opportunities available to people with scientific and technical degrees. Yet, improving math and science education will require the ability to recruit teachers with math and science credentials.
- Consideration should be given to providing a salary differential or other financial incentives for math and science teachers.

There are numerous initiatives that are underway across the region that attempt to address many of the STEM-related concerns, including activities related to the Indiana Afterschool Network, Radius' CELL grant, the growing number of New Tech schools, and Project Lead the Way efforts, the University of Southern Indiana's SwiSTEM Resource Center, and Vincennes University Jasper Campus Learning Experience in Applied Fields (LEAF) initiative. However, many of these efforts represent one-off programming for specific schools or geographic areas. Efforts need to be undertaken to ensure that STEM education is incorporated systematically throughout the entire region.

### Action 5: Working with industry, develop curriculum and career pathways for secondary and post-secondary students through a career immersion industry/academic partnership for each targeted industry cluster.

As the economy becomes more complex and competitive, the labor market becomes more complex and confusing – for students, parents, job seekers, employers, and educational leaders. For younger and many middle-aged employees and employees-to-be, the rules of job success and likely career paths in the economy they are entering are significantly different than the economy that shaped their parents' experience and careers. This is one place where it is difficult for older generations to pass on experience and knowledge to the next generation. Previous education and career paths do not work as well, or in some cases are not even available, in the global economy.

This substantive change in labor market expectations and pathways has very significant implications for SWC Indiana's targeted industry clusters. When there is confusion and lack of knowledge in any marketplace, people will fall back on the tried-and-true "certainties" that they believe they know, and they will avoid areas that are unfamiliar to them (or their parental or educational advisors). This risk-avoiding behavior is natural, and the labor market is no exception. In this case, it means that students, parents, employees, and institutions will tend to gravitate toward educational activities and careers in "known" fields with clear career paths and industry awareness, such as healthcare, public administration, teaching, and retail. In contrast, many of SWC Indiana's targeted industry clusters are not as well known and understood.

On an institutional level, the educational and workforce training career structures, linkages, and job advancement practices that served to provide skills and knowledge to a past generation are now no longer effective for a new generation of employees, and a new set of economic challenges. The labor market rules of success and failure have been and are continuing to be reinvented by the forces of globalization. Because of this, there is an important need to reinvent not only individual knowledge of how the labor market now works ("career literacy"), but also to create a new set of structural relationships between students, employees, educational institutions, and industry. Many would argue that it is misleading to put students through an education and training process designed for the economy of the

1960s to 1980s, and expect them to succeed in the dramatically reinvented global economy of 2010 and beyond.

One relatively new tool essential in helping SWC Indiana adapt its workforce to this new economy is the creation and support of “career pathways.” Career pathways are a new and somewhat multipurpose term covering activities focused on more effectively coordinating a community’s or region’s educational institutions with the workforce needs of the economy. If SWC Indiana aspires to build a competitive advantage based on its workforce and human capital assets, then developing a set of defined career pathways with local K-12 systems, community colleges, and 4-year institutions is a critical action step.

Given the range of employment and career paths within SWC Indiana’s targeted industry clusters, each career pathway will need to be individually tailored. However, the following are several core tasks that would be involved in building each career pathway:

- Create a joint industry, education, and public sector collaboration to illuminate in detail the region’s workforce supply and demand situation and, with that information, to select the most pressing employment and career pathways for industry focus.
- Create a series of linked education and training opportunities and curricula so that students from middle school through college can see the kind of knowledge they need to acquire to create career opportunities for themselves in the targeted industry cluster.
- At the same time, develop a detailed understanding of the internal recruiting, internal corporate training, promotion, and job progression path that exists within and among companies for existing employees (the “internal” workforce pathways).

It should be noted that there is no single type of career pathway. Career pathways vary both because this is a new tool for education-industry partnerships to use and because different jobs require different education and skill levels. For instance, a career pathway for occupations that primarily require certificates (e.g., truck driving and a commercial driver’s license) differs significantly from that for jobs that require formal, post-graduate education (e.g., computer software programmer).

In addition, the ability of students to move seamlessly from one level of education to the next in their chosen field of study without missing a beat in obtaining their ultimate educational goal, whether it be an associate’s degree, bachelor’s degree, or advanced degree, is critical. This seamless integration is achieved through enhancing real partnerships between all educational institutions in SWC Indiana across the various levels that result in students achieving their long-term learning goals.

It is important to note that a number of the region’s higher education institutions either have already instituted similar career pathways for various industry sectors in the region, or are in the planning stages. For instance, Ivy Tech has developed biotechnology, hospitality, and advanced manufacturing programs to meet specific industry-defined needs. Vincennes University offers comprehensive manufacturing education at its Vincennes Campus. The proposed Advanced Manufacturing & Technology Center on the Jasper Campus will allow VU to better serve manufacturers in Dubois and the wider region with programming. However, the significant barrier to a full career path is the limited connections into the K-12 system. Developing this full career pipeline will be critical for the region if it is to solve its skilled workforce labor pool problems.

## Action 6: Work with Ivy Tech, Indiana University, University of Southern Indiana, Purdue University and Vincennes University to develop additional higher-education partnerships with WestGate Academy and Battery Innovation Center to meet the workforce, education, and R&D needs of targeted industry clusters and NSA Crane

NWSC Crane, in recognition of the importance of continued education and training of its highly technical workforce, is establishing a "Crane Division University" (CDU) concept. CDU is being modeled after successful corporate training and education programs across the country. CDU will offer tailored training programs to meet very specific needs of the workforce relating to specific technologies and taking into consideration the unique processes and culture that exists inside the federal lab.

CDU will also establish links with appropriate colleges and universities to offer degree programs in select fields of study. Crane has a longstanding and successful relationship with Indiana University's School of Public and Environmental Affairs (SPEA) that offers a cohort-based program leading to a Master's in Public Affairs. It is Crane's intention to build upon this model to offer a wider range of degree programs to their employees in technical and business fields. While some of Crane's educational programs will be highly specialized to meet specific mission needs, others will have wide applicability to others across the region. This effort to link with local colleges and universities, both on campus and at a satellite facility near NSA Crane, could be integrated into a broader regional effort to increase access to relevant educational opportunities to improve workforce readiness.

For example, IU-Bloomington brings a significant capacity not only in specific subject areas for education and training, but in the actual technology of instruction and learning. Through the Department of Instruction Learning Technology in the School of Education, IU-Bloomington offers a highly accomplished expertise in the development of instructional materials and assessment tools that can research and evaluate which technologies— analog, digital, and conceptual—can make specific learning environments and strategies most successful for different organizations and groups of students.

There is also a strong capacity at IU-Bloomington to deliver learning technology solutions through IU's University Information Technology Services (UITS). The Learning Technologies Division of UITS undertakes the following services at the Bloomington and Indianapolis campuses and has the capacity to work with key collaboration partners to:

- design, equip, and maintain learning spaces;
- consult on the design/redesign of formal and informal learning spaces and the design of integrated AV/IT systems;
- provides service for videoconferencing, digital media streaming, and digital collaboration;
- provide comprehensive support for the instructional design and development of online courses; and
- provide training and instructional support through its campus centers for teaching and learning and IT Training.

But most importantly, IU-Bloomington is at the cutting-edge of applied information technology and informatics, through its Pervasive Technology Institute (PTI). PTI pairs fundamental academic computational research with the widely known strengths of IU-Bloomington through innovations and service delivery in networking and high performance computing. By means of organization into research and service centers, PTI encourages collaboration that crosses center boundaries, where practice informs the science, and science advances the practice, the results of which advance the university, state, and nation as a whole. PTI is a collaboration of the School of Informatics and Computing, Maurer School of Law, College of Arts and Sciences, University Information Technology Services (UITS), and

Office of the Vice President for Information Technology (OVPIT, where PTI reports within IU's administrative structure).

Among the current PTI Centers are the:

- Center for Applied Cybersecurity Research (CACR), which leads the creation of IT security policy, security tools, and secure applications in critical areas of cyber infrastructure, including health. CACR is affiliated with PTI, the Maurer School of Law, OVPIT, and UITS.
- Center for Research in Extreme Scale Technologies (CREST), which develops new technologies for high-capability computing systems and applications and exascale computing environments. CREST is affiliated with PTI, the School of Informatics and Computing, the OVPIT, and UITS.
- Data to Insight Center, which focuses on the life cycle of digital data while furthering tools for discovering and gaining insight from the vast quantities of data now produced in digital form. D2I is affiliated with PTI, the School of Informatics and Computing, OVPIT and UITS, and works closely with the IU Libraries.
- Digital Science Center (DSC), which advances cloud computing and network science and is home to the well-known FutureGrid. DSC is affiliated with PTI, the School of Informatics and Computing, and OVPIT.

Given this capacity at IU-Bloomington in learning technologies and in applied information technology research and education, there appears to be significant opportunities for collaboration with the WestGate Academy approach being advanced by NSWC Crane.

Another example of a potential higher-education partner is the University of Southern Indiana (USI). Through USI's Center for Applied Research and Economic Development, a department within the Division of Outreach and Engagement, the resources of the University can be mobilized, including its faculty, students, and staff, to help regional businesses and organizations thrive. Specifically, its Applied Engineering Center has expertise and capabilities related to: material processing; welding; machining; and plastics technology, all with direct relevancy to a number of the targeted industry clusters. The Center also has specific capacity as a result of its Automation Lab (PLC, process control, MPS); Precision Measuring Lab (CMM); CAD Lab; Additive Manufacturing; and, Printed Circuit Board Factory. As a result of the specific capabilities and expertise, USI already offers numerous certificate and degree programs that could be tailored to meet the needs at WestGate.

Finally, both IvyTech Community College and Vincennes University Jasper Campus have developed numerous programs to meet specific industry cluster needs throughout the region overtime (many of which have been highlighted elsewhere in this report). As NSWC Crane's occupational needs analysis study is completed, additional specific training requirements may be uncovered that could best be served by these two regional academic partners.

The bottom line is that there is a need to not only support Crane but also targeted industry cluster's workforce needs through cooperative competition offerings across the higher education spectrum at Westgate.

## Action 7: Encourage youth to become entrepreneurs

Entrepreneurship is a key driver of any economy. Wealth and a high majority of jobs are created by small businesses started by entrepreneurially minded individuals, many of whom go on to create big businesses. People exposed to entrepreneurship frequently express that they have more opportunity to

exercise creative freedoms, higher self-esteem, and an overall greater sense of control over their own lives. As a result, many experienced business people political leaders, economists, and educators believe that fostering a robust entrepreneurial culture will maximize individual and collective economic and social success on a local, national, and global scale.<sup>66</sup>

By providing experiential, entrepreneurial education opportunities, starting as early as elementary school and progressing through all levels of education, youth are encouraged to be creative problem solvers and potential entrepreneurs of the future. Entrepreneurial education provides progressively more challenging educational activities to students; experiences that will enable them to develop the insight needed to discover and create entrepreneurial opportunities; and the expertise to successfully start and manage their own businesses to take advantage of these opportunities.

As a result, exposing youth to entrepreneurial efforts throughout the K-12 system will be an important component of any talent strategy. One program that is being implemented in Daviess County is the CEO program. While not specifically targeted at only entrepreneurial endeavors, the program does provide experiential business learning opportunities to youth, which in turn expands their understanding of the opportunities related to entrepreneurial efforts and the possibility of becoming an entrepreneur themselves. In addition, the Gayle and Bill Cook Center for Entrepreneurship at IvyTech-Bloomington should be leveraged.

#### **Best practice lessons: CEO (Creating Entrepreneurial Opportunities)**

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Modeled after a successful Illinois-based entrepreneur education program developed by the Midland Institute for Entrepreneurship in Effingham, the Daviess County CEO program is a business immersion experiential learning opportunity. Students are immersed in real life learning experiences with the opportunity to take risks, manage the results, and learn from the outcomes. Area business professionals serve as mentors and also serve as guest instructors. In its first year of operation in the region, the Daviess County CEO program is being provided by the area businesses and the Daviess County Economic Development Foundation.

## **Strategy 4: Focus Retention, Expansion and Attraction Efforts on those Industry Clusters that Provide the Greatest Opportunity for Economic Growth in the Region**

### **Why Focus on Industry Clusters**

Clusters offer regions the opportunity to specialize by gaining specific core competencies and knowledge that allow the region to compete effectively, and by allowing public investment and other resources to be focused where they will bring the most economic benefit. The value of cluster development is found both in advancing a region's economic competitiveness and in helping to organize its economic development efforts.

**Clusters are a key driver of regional economic growth.** Michael Porter, one of the nation's leading experts in business and regional competitiveness, explains:

*Clusters are a striking feature of virtually every national, regional, state and even metropolitan economy, especially in more economically advanced nations... Clusters are not unique, however; they are highly typical—and herein lies a paradox: the enduring*

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<sup>66</sup> National Content Standards for Entrepreneurship Education. "Importance of Entrepreneurship Education." [http://www.entre-ed.org/Standards\\_Toolkit/importance.htm](http://www.entre-ed.org/Standards_Toolkit/importance.htm)

*competitive advantages in a global economy lie increasingly in local things—knowledge, relationships, motivation—that distant rivals cannot match.*<sup>67</sup>

**Clusters are a powerful means for organizing a region’s economic development efforts.** Pursuing cluster development provides more than just a focus for regional economic development efforts, they provide an organizing framework. This framework includes:

- Rather than assisting one firm at a time, cluster development efforts require solving related problems and addressing common needs of groups of firms.
- Cluster development makes it essential that a region define its identity, which can be a powerful tool for outreach marketing and attraction efforts.
- Cluster development, because of its broad reach within a region, calls for the importance of public-private partnerships that in turn can leverage resources and bring the region together for a common purpose.
- Most important, cluster development brings a new level of accountability to economic development that requires having an impact at a broad scale that can advance the economic well-being and quality of life in a region.

Often overlooked, a focus on cluster development also offers regions a strategy for evolving into new growth industries of the future. Regions across the nation have been able to identify specific areas in which they possess the basic ingredients to be successful, making key investments and seeing economic returns. This has happened with biotechnology in Maryland and San Diego, biofuels in Iowa, electronics in Austin, medical devices in Warsaw, robotics/computers in Pittsburgh, and semiconductors in Oregon. Clusters are a powerful means for organizing a region’s economic development effort. High-value industry clusters drive the regional economy by:

- creating jobs
- driving employment in business support industries such as finance, insurance, and real estate, and in population serving industries such as retail and food services
- serving as a catalyst for innovation
- being a source of entrepreneurship.

**The value of a strong cluster is that it spurs growth and competitive advantage. With a vibrant cluster, the typical economic gains are substantial, including:**

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- Rising productivity of companies in the cluster, creating a competitive edge for the region;
- Accelerating pace of innovation resulting in new products and services;
- More frequent start-up of new, high-growth-potential businesses;
- Stronger supplier –networks, increasing the economic multiplier impact of the cluster for the region;
- Larger pools of specialized workers and education and training programs geared to the particular cluster needs, introducing significant cost savings for firms and increasing the breadth and depth of employment opportunities for workers in the cluster; and,
- Growing demand for high-wage professional services such as legal, accounting, marketing, management consulting and finance, as well as for many other support services such as conferences, restaurants, and entertainment.

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<sup>67</sup> Michael Porter, Harvard Business School Professor, “Clusters and the New Economics of Competition,” Harvard Business Review, November-December 1998.

Table 11 provides a summary of the cluster analysis found in Section 1 illustrating the position of SWC Indiana’s targeted industry clusters.

**Table 11. Identified Growth Opportunity Clusters for SWC Indiana**

SWC Indiana Cluster	Decision Tree Assessment	
	Total Period 2001-2012	Post-Recession Period 2009-2012
<b><i>Public Technological Asset Development</i></b>		
Information and Communications Technology	Emerging Strengths	Emerging Strengths
National Security/Defense	Current Opportunity	Current Strengths
<b><i>Value-Chain Enhancement</i></b>		
Food Processing and Manufacturing	Current Strengths	Current Strengths
Transportation, Distribution, and Logistics	Emerging Strengths	Emerging Opportunities
<b><i>Regional Niche Specializations</i></b>		
Automotive/Heavy Vehicle Equipment	Higher Priority Retention Targets	Current Strengths
Biomedical	Current Strengths	Current Strengths
Furniture	Higher Priority Retention Targets	Current Strengths
<b><i>Quality of Place</i></b>		
Hospitality and Tourism	Emerging Strengths	Emerging Strengths

Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## Actions to Pursue

1. Expand the footprint of targeted industry clusters and their related supply-chains in the region to create greater economic opportunities throughout the region.
2. Develop a SWC Indiana branding/marketing campaign for targeted industry clusters.
3. Explore the creation of a Regional Development Authority, which will require legislative approval and funding, as well as a county CEDIT and TIF or other legislatively authorized mechanisms.
4. Expand and/or develop IU-Bloomington degrees and related offerings in applied engineering, applied technologies, science, and systems engineering design and development areas, working in consultation with industry partners and NSWC Crane.

## Action 1: Expand the footprint of targeted industry clusters and their related supply-chains in the region to create greater economic opportunities throughout the region.

As previously noted, the region's industrial base represents strong specializations and employment growth which creates opportunities related to expansion, attraction, and supply chain development. However, in order to maximize the region's growth potential, SWC Indiana's regional and local economic development efforts need to be organized to most effectively engage and focus on the needs and opportunities of specific industry clusters across the region. Particularly important is advancing an integrated regional economic development approach for each industry cluster that focuses broadly on retention and expansion, business attraction, and new company formation and is tailored to maximize the opportunities presented by each specific industry cluster's position in the global marketplace.

Radius Indiana is a regional economic development partnership representing 8 counties in South Central Indiana: Crawford, Daviess, Dubois, Greene, Lawrence, Martin, Orange, and Washington Counties. Formed in 2009, Radius Indiana leads regional collaboration by leveraging the diverse assets of Southern Indiana to drive attraction, retention and expansion of business, thereby increasing employment and investment opportunities and quality of life within the region. The organization currently focuses its industry cluster activities on three primary sectors:

- **Defense** – Radius Indiana maintains a base office and develops relationships with Crane base officials at WestGate @ Crane Technology Park and East Gate Business and Technology Center with a focus on key Department of Defense opportunities, such as attracting original equipment manufacturers (OEM) and capitalizing on opportunities related to construction of the I-69 interstate highway in the region.
- **Tourism** –Radius Indiana works with state officials and local and regional groups interested in developing the region's tourism.
- **Manufacturing** – Radius Indiana works to retain and expand businesses in the region by both supporting the efforts of local economic development organizations to identify and assist at-risk companies as well as working with the Indiana Economic Development Corporation to attract business to the region.

To advance a regional industry cluster development approach, a broader 11-county regional economic development entity needs to provide cluster-specific knowledge and expertise, interact with cluster members to understand needs and gaps in the existing cluster, and target services to specific industry clusters. One of the key characteristics of clusters is that they are industry/sector specific and thus specialized. As such, it is imperative that SWC Indiana have access to individuals with specialized knowledge of cluster business operations and needs—individuals able to provide advice on cluster business needs, gaps in the cluster supply chain, key location factors influencing cluster business location decisions, policies and regulations impacting the cluster, real estate needs of typical cluster businesses, etc. Since, by definition, each of the priority clusters has a significant presence of existing business entities within the region, SWC Indiana contains business leaders with extremely valuable knowledge and business contacts.

Depending on the specific needs and opportunities of each industry cluster, a tailored approach to strengthening the region's economic development efforts in support of an industry cluster can be undertaken from a regional perspective, such as:

- Identifying common needs through dialogue with companies in the cluster, and then focusing on shaping ways to provide more common services to the industry cluster, such as addressing technical assistance for modernization, access to markets, business service gaps, regulatory issues, etc.
- Providing guidance for local economic development staff on cluster-based development.



- Serving as the portal/coordinated effort for attraction and expansion opportunities to ensure that seamless and unified information and services are provided.
- Targeting out-of-state supply-chain and strategic partners of existing SWC Indiana firms who are seeking to expand or make business location decisions and therefore would be targets for business recruitment efforts and help existing firms by filling supply chain gaps by locating in the region.
- Aggregating and then addressing an industry cluster's education, training, and workforce needs to impact curriculum, program development, and experiential learning with K-12 and higher-education institutions (fully addressed in Strategy 3), helping education institutions by offering pools of skills needed to be addressed.
- Staying abreast of emerging business issues impacting the cluster, including federal regulatory changes, legislative issues, foreign trade issues, etc. and providing a base for common education and advocacy with elected officials and others.
- Develop branding/marketing strategies focused on pro-active outreach marketing for each of the industry clusters.

For each targeted industry cluster, it is proposed that through a regional unified economic development organization industry cluster resource teams be formed and supported by dedicated employees. Upon formation of this organization, the region's business attraction and cluster expansion activities would be the primary responsibility of the industry cluster resource teams, while retention activities would be managed jointly with the local economic development organizations. The industry cluster resource teams would involve:

- Industry cluster representatives, potentially chosen from those who choose to become involved in the industry-led cluster councils
- Representatives of state or regional industry groups or economic development organizations that have an existing focus on the specific cluster
- Indiana Economic Development Corporation specialized personnel
- Relevant educational and research assets.

For each targeted industry cluster, SWC Indiana industry cluster resource teams should meet quarterly to provide development staff with advice on specific projects and opportunities and guide strategic cluster development. The cluster resource teams should come together twice per year as a collective group, forming a SWC Indiana Economic Development Team to discuss and prioritize needs and activities relevant to overall cluster development and the environment for business growth and expansion in the region. A high profile SWC Indiana business leader should be appointed to lead the SWC Indiana Economic Development Team. It also is important to bring other state and local government services into the discussion, involving key regulatory, workforce, and education providers.

In instances where SWC Indiana pursues proactive external marketing and spends significant resources promoting a cluster in concert with other economic development groups, it would be advisable to negotiate a formal teaming agreement specifying in advance the disposition and handling of leads that may result from such shared marketing activity.

Finally, a key advantage of business clusters is the agglomeration of economies afforded by regional supply chains. As a cluster builds, various companies in the vertical supply-chain interact to fulfill one-another's business needs. Despite the advantages of regional supply and demand relationships, it is often the case that a company in a specific location is unaware of the capabilities to supply, or the local demand potential, of other businesses regionally. An important role that economic developers can play is to provide "regional supply chain" services to work with purchasing departments within cluster companies

to identify manufacturing or service inputs that are currently provided by providers external to the community that could actually be fulfilled by local suppliers.

It is recommended that the unified regional economic development organization's industry cluster resource teams undertake supply chain needs analyses to identify gaps in the regional supply chain—whereby certain products or services are currently unavailable locally and have to be purchased outside of the region. These gaps may represent opportunities for infill inward investment projects to further build-out and reinforce the supply chain. Once gaps and opportunities are identified and prioritized, they should feed into the marketing/recruitment efforts of the unified regional economic development organization.

## Action 2: Establish a SWC Indiana branding/marketing campaign for targeted industry clusters

Cluster-based economic development branding and marketing focuses on recruiting businesses into the region based upon detailed input/output supply chain analyses of what existing firms are missing in the supply firms and identified targeted firms to attract. Such targets will prove much more likely to consider the region because they immediately have buyers and sellers of their products/processes with which to work, and provide improved competitive advantage to existing firms in the region through attraction of these targets. SWC Indiana is home to multiple successful businesses and the region can thus market itself as a legitimate “center” to attract further businesses to the cluster. The marketing message must be fine-tuned for each industry cluster—highlighting key assets in terms of premises, supply chain and business services, market access, and access to available and skilled labor. To the extent that a priority cluster is also focused on research and innovation, the marketing must also emphasize connectivity of the cluster to local R&D resources (through entities such as Crane, IU-Bloomington, Cook, etc.).

**In establishing an externally and internally focused brand name campaign, a series of coordinated activities must occur to position Southwest Central Indiana and communicate key messages on the depth and breadth of the targeted clusters in the region.** Radius Indiana has already begun to develop branding and collateral pieces, and there are also several different organizations focused on various tourism regions. However, a more formalized, strategic effort that encompasses the entire 11-county region must incorporate the following elements:

**Brand name:** A brand name or theme is needed for SWC Indiana to develop an awareness of and credibility for the region's economic development opportunities. For example, the Knoxville-Oak Ridge "Innovation Valley" brand and the St Louis's "BioBelt" brand has successfully positioned those regions as a leader in cluster development. The 18 counties of northeast Wisconsin have developed the "New North" brand to approach the market as a cohesive region. Another effective branding technique to establish a sense of place, such as Research Triangle Park or Silicon Valley, that connotes the value of the region for economic development. SWC Indiana needs to develop a regional "brand name" that is widely adopted and carried through in collateral materials, including brochures, targeted handouts, trade show exhibits, videos, and Web sites. Consideration will also need to be given to the I-69 Innovation Corridor branding initiative, and how it might affect the SWC Indiana branding efforts. At a minimum, the efforts will need to be complimentary and not at odds with one another, which could lead to confusion in the marketplace.

**Community support and involvement:** Initial efforts should focus on building local awareness of the strengths of SWC Indiana in the targeted industry clusters. Internal education and awareness-building efforts are often key to effectively shaping outsiders' views of the region. The most frequent and effective marketers of SWC Indiana are its residents who have ongoing contacts with those outside the region. The internal education efforts should be closely aligned with the overall branding campaign, but they also require a distinct set of activities. Efforts such as creating a cluster ambassador program to reach schools and civic organizations and holding regular monthly and quarterly events are among the types of activities to be pursued. A key goal is to make meaningful connections between the region's cluster resources and the broader community, especially students and their families, and the overall business community.

**Earned media campaign:** Additionally, an earned media campaign should be pursued after completion of this strategy. A magazine or newspaper article focusing on the opportunities, strengths, and efforts underway in SWC Indiana around cluster development creates a significant amount of "buzz." The placement of such articles requires an active public relations outreach to key publications and active development of news stories. A monthly cluster update in the region's daily and weekly business and general press should also be considered to ensure that local awareness also stays strong.

**Building on the branding activity, SWC Indiana also must undertake a marketing campaign** that will communicate to key audiences, regionally, nationally, and internationally, the depth and breadth of SWC Indiana's targeted cluster assets and the unique resources and opportunities that the region provides for industries and their core drivers.

Economic development marketing for targeted industry clusters requires a new set of techniques and approaches termed "alliance marketing" or simply unified marketing efforts. Alliance marketing involves all of the key institutions supporting economic development, from local economic development organizations to technology park managers to academia to developers to utility companies, just to name a few. These key organizations must be coordinated in generating marketing leads, developing cluster-specific newsletters and marketing materials, and selling potential business prospects on the advantages of SWC Indiana.

## Other Region's Branding/Marketing Initiatives

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- **Knoxville-Oak Ridge Innovation Valley** – builds upon the region's heritage of innovative science and technology breakthroughs at Oak Ridge National Lab and the University of Tennessee and solid, business-friendly values to promote East Tennessee as a prime business location in the Southeast.
- **St. Louis's BioBelt: The Center of Plant and Life Sciences** – builds upon the strengths of the region driven by anchors such as Washington University in St. Louis, the Donald Danforth Plant Science Center, Monsanto Company, and the Nidus Center for Scientific Enterprise.
- **New North** – both a brand and a regional marketing and economic development organization for the 18 counties of Northeast Wisconsin. The brand "unites the region both internally and externally around talent development, brand promotion and business development, signifying the collective economic power behind our 18 counties."

Radius Indiana currently undertakes regional marketing for the eight-county region, focused in part on the three targeted industry sectors. This effort must be expanded to all 11 counties through a unified regional economic development organization coordinating the variety of key organizations that represent each cluster. SWC Indiana must address as part of this marketing effort the following components:

Develop a consistent and active media presence in national and tri-state business and cluster publications as well as local print media markets relaying information such as announcements of SWC Indiana company accomplishments and generally raising the awareness of SWC Indiana's branding efforts. It is estimated that for a region of this size, \$1 to \$2 million annually will be required for this branding/marketing and business development effort.

As a first step, an active earned-media campaign should be undertaken directly after release of this strategy. Articles should appear in newspapers and magazines nationwide describing SWC Indiana's strategic plans to pursue the advancement of the targeted industry clusters. The placement of such

#### **Best practice lessons: The Greater Dayton Ohio Region**

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Alliance branding/marketing has been strongly embraced in the Greater Dayton region, home to the Wright Patterson Air Force Base (WPAFB). Today, Dayton promotes itself through a public-private partnership—comprised of the City of Dayton, Montgomery County, the University of Dayton, CityWide Development Corp., and the Dayton Development Coalition—as the “Ohio Aerospace Hub for Innovation and Opportunity.” The vision of the Aerospace Hub is to become the “magnet for aerospace entrepreneurs, innovators and business owners seeking opportunity in a live-work-play-learn environment that fosters creativity and growth.” It focuses on its key technology and industry cluster strengths, and has organized a set of local, state and federal benefits to create a sense of place and to offer real incentives for companies to locate in the region.

The region is aggressively seeking out prime contractors to expand and relocate in the Dayton region. Noted within the Dayton Development Coalition's 2011 report were the expansion of GE Aviation to locate a new R&D Center in the region and the attraction of two out-of-state companies, Virginia-based EWA Government Systems, Inc. and Security Innovations, Inc. Dayton is also placing a strong focus on supporting and attracting SBIR companies aligned with the Air Force Research Laboratory.

articles, however, will require an active public relations effort to develop news stories and reach key publications.

Create a marketing team to collaborate with regional groups participating in industry trade shows, developing lead-generation efforts, recruiting emerging firms, and developing and maintaining databases of SWC Indiana relationships with out-of-state firms or core drivers across all targeted industry clusters. Direct marketing needs to be persistent, not a sporadic one-time activity. It is important that SWC Indiana maintain contact with target businesses through at least bi-annual mailings of marketing materials.

Conduct trade missions in targeted domestic and foreign markets, focusing on companies with specific cluster-related supply chain needs, and conduct reverse trade missions inviting foreign businesses to tour SWC Indiana infrastructure assets. In addition, SWC Indiana economic developers should also seek to identify specialist site location consultants who are preferred providers of site selection services to cluster businesses. Developing relationships and hosting cluster specific familiarization tours in SWC Indiana should be a priority activity. Leading SWC Indiana companies operating within each cluster may be a source for identifying relevant site location consultants.

### Action 3: Explore the creation of a Regional Development Authority, which will require legislative approval and funding, as well as a county CEDIT and TIF or other legislatively authorized mechanisms

Indiana offers several legislative tools to finance infrastructure and other capital investments. In order to retain, attract and expand targeted industry clusters, this report highlights a number of important key investments, some of which may be financed by state and local tax dollars.

Much like the Regional Development Authority (RDA) in Northwest Indiana, consideration should be given on whether this model might be effective for this 11 county region. State appropriations and support of certain investments, particularly as they impact the I-69 corridor, could be delivered via an RDA that would be established by the Indiana legislature. With targeted missions, the RDA could operate as an 11 county advocate, focusing on the development of key assets. It allows state funds to be leveraged and supported by private, philanthropic, local and federal funds. Operating as a development agency, it is one potential structural model that may work well for the region.

In addition to the creation of an overarching RDA, counties should consider the adoption of a County Economic Development Income Tax (CEDIT). While county specific, and very much dependent on the political and financial climates in the individual 11 counties, the adoption of such a tax allows a local funding source for individual and specific projects thought to enhance smaller geographic areas in the region, while still contributing to the overall development strategies adopted by the region. As a team player in the overall development plan, each county and the private sector businesses located in those counties, can have an impact in creating a more robust business climate.

Finally, in even smaller subsets of the region, where redevelopment commissions have been established, and for specific projects, the creation of Tax Increment Finance (TIF) districts could be another source of directed funding. Limited in use and duration by statute, they allow counties to develop key investments contributing to economic development.

### Action 4: Expand and/or develop IU-Bloomington offerings in applied engineering, applied technologies, science, and systems engineering design and development areas, working in consultation with industry partners and NSWC Crane

A key concern among many of the SWC Indiana's regional clusters is their ability to innovate, increase their productivity, and in certain instances move up the value chain within their clusters. A related issue voiced by industry leaders is the lack of engineering expertise in the region. While most companies and organizations in the region requiring engineering talent have relationships with either Purdue University or other regional engineering schools (typically by hiring graduates), the distance often limits potential further interactions and partnerships. It was also cited that the lack of any engineering or applied technology "connection point" with IU-Bloomington makes it more difficult for regional manufacturers to find avenues in which to engage the University.

An opportunity exists to launch an exploratory dialog between industry leaders within key SWC Indiana clusters, NSWC Crane, and the leadership of IU-Bloomington to explore the possibilities of bridging this current gap in educational programming, talent generation, and applied research/technical assistance within the region. IU-Bloomington has already begun internal discussions regarding the need to expand into applied focus areas that support regional industry clusters, and these conversations need to seek the input of regional industry as they move forward. Given the historical sensitivities as well as resource constraints, there are potentially numerous hurdles and challenges to overcome in launching such an endeavor. However, as IU-Bloomington is being challenged more and more to find external funding resources, especially from the private sector, the reality is that these value-added partnerships are difficult to create when most industry connectivity with universities across the nation occur through the traditional engineering disciplines.

The goal of this action is not to pursue the duplication of the engineering strengths found elsewhere, but instead to meet a need expressed by the region's industrial base for a more applied engineering, applied technology, science, and systems engineering skills, coupled with legal and business acumen, set to help spur economic growth. The exploratory discussions stemming from this action would be to provide IU-Bloomington with guidance, direction, and potential programming areas for consideration as the first step in a complex process. In concert with IU-Bloomington pursuing a more applied sciences approach, it might make sense to eventually create an Applied Sciences Institute to harness these intermediary functions and extend them into deeper activities in concert with NSWC Crane as well as other targeted industry clusters in SWC Indiana.

### **Strategy 5: Establish a collaborative applied research environment between Indiana's research universities and Naval Surface Warfare Center (NSWC) Crane to leverage each other's assets to help ensure global relevancy of research and regional economic growth**

The Naval Surface Warfare Center (NSWC) Crane is one of ten warfare center divisions across the U.S. within the Naval Sea Systems Command. With over \$1 billion in activity, it is the largest tenant located at the Naval Support Activity (NSA) Crane. NSWC not only directly employs over 3,000 government workers, it also involves more than 1,500 contractors, making it one of Indiana's largest employers. The base itself is quite large, being situated on 100 square miles that spans four of the eleven counties comprising SWC Indiana.

The focus for NSWC Crane is to provide the technical, innovative, leading-edge engineering solutions for many of the systems that protect and enable critical military missions. These missions include:

- Electronic Warfare/Information Operations Mission at NSWC Crane that provides the technology solutions to enable the U.S. military to control the electromagnetic spectrum critical to modern command and control systems used on the battle field. NSWC's capabilities develop the solutions to destroy an adversary's combat capability, gather intelligence and enable friendly use of the electromagnetic spectrum.
- Strategic Missions at NSWC Crane provides the Navy's preeminent facility for the design and testing of radiation hardened electronics, including every subsystem of the Navy's Trident submarines' strategic weapons system.
- Special Missions at NSWC Crane is a major supplier of weapons, sensors and equipment used by U.S. Special Forces.

For NSWC Crane to thrive and be a world-class technology hub for the U.S. military, it requires the broader community in SWC Indiana to offer a location rich in science and technology resources. As an informational brochure from NSWC explains: "Our partnerships with industry and academia are increasing our capability to support technology development across the entire life cycle [of military systems development] while building affordable solutions." NSWC is not guaranteed resources for its activities. Much of NSWC Crane's project work needs to be awarded by others in the Navy and across other branches of the military based on the technical expertise, quality, innovativeness and cost-effectiveness that NSWC Crane can provide in advancing technical solutions. In this regard, NSWC Crane must stay competitive or risk losing support.

Other military bases providing advanced, innovative technical solutions found across the nation have forged very significant relationships with universities to ensure that they can thrive in fast moving technology areas. For instance, the University of Dayton, a historically undergraduate-focused institution, has transformed into one of the leading universities in the nation in material sciences research in order to support the needs of Wright Patterson Air Force Base, headquarters of the Air Force's Research Lab. Similarly, the University of Alabama, Huntsville was created in 1969, for the sole purpose of supporting

Redstone Arsenal, which is a leading center for military rocket research and development. Today, the University of Alabama, Huntsville generates close to \$90 million in research expenditures, focused in two primary areas: \$31 million in aerospace engineering and \$22 million in computer sciences, both critical technologies for Redstone Arsenal.

However, it is not only direct research and development activities that benefit from these close collaborations between local universities and military bases. Perhaps the most important technology transfer asset from local universities for the military and its broader contractor community is the talent that they generate.

Currently NSWC Crane does not have strong academic research ties to SWC Indiana, and the limited active research partnerships that do exist with Indiana's research universities are not happening at facilities within the region. The region's leading university research driver, Indiana University-Bloomington, has had limited collaborations with Crane. Part of this reflects the differences in research competencies between what Crane requires and what IU-Bloomington focuses on in its research activities, especially given that the university does not conduct research in engineering fields and has a limited focus in applied sciences. There is also a limitation in tapping the talent generation from IU, since the skills advanced at IU are not focused on advancing engineering solutions. Still, there are promising areas for research collaboration—particularly in radiation sciences and in computer sciences—yet, even these opportunities are limited by policies, business practices, and culture. Chief among these is the Indiana University prohibition on doing classified-related defense work at university owned facilities. Beyond Indiana University, other research universities in the state including, Purdue University have, engaged collaboration with Crane, but meaningful and ongoing research partnerships generating valued technology transfer has been limited.

The importance of overcoming these issues and creating sustained and value-added collaborations in the near-term is essential. Establishing a dedicated Applied Research Center within SWC Indiana will offer a more focused model for Indiana University and other research universities to engage in broader and deeper research and technology transfer activities with Crane and have the fruits of this work more directly impact the region. A likely location for standing up a Center would be at the West Gate Technology Park where laboratory and other assets can be leveraged at the Academy and Battery Innovation Center. Over the longer course of time, with this new collaborative relationship in place, there is then the opportunity to develop new capacities—as was done at the University of Dayton and the University of Alabama, Huntsville—that build upon these initial efforts.

## Actions to Pursue

1. Establish an Applied Research Center with an organizational structure and related mechanisms to foster the ability to advance and sustain productive research enterprises, including dedicated personnel to further collaboration between Indiana's research universities and Naval Surface Warfare Center (NSWC) Crane
2. Leverage the close physical proximity of Indiana University and NSWC Crane to explore and pursue federal research and translational opportunities in areas of mutual interest such as cyber security, radiation, and material sciences
3. Create programs that will facilitate the exchange of Indiana research faculty and NSWC researchers between institutions

Create programs to support endowed chairs and eminent scholars in areas of overlapping strengths across technology areas of mutual interest

## Action 1: Establish an Applied Research Center with an organizational structure and related mechanisms to foster the ability to advance and sustain productive research enterprises, including dedicated personnel to further collaboration between Indiana's research universities and Naval Surface Warfare Center (NSWC) Crane.

The starting point for establishing sustained and value-added collaborations between NSWC Crane and Indiana's research universities is to address the mechanisms needed to mitigate and overcome the barriers presented by existing policies, business processes, and culture. Formulating these mechanisms can only be undertaken with an understanding of what is holding back collaborations.

The overall cultures of universities and department of defense research organizations are fundamentally different. University faculty have a lot of freedom in how they pursue their work and are judged based on building a body of scholarly work resulting in publications and in the generation of research grants. A key goal is to move research results into the public domain, though many faculty members recognize the need for first addressing any intellectual property protections needed before making their results public. These academic outcomes do need to measure up to peer-review, but this standard is a broad one rather than precisely meeting specific deliverables on a fixed time schedule. Advancing collaborations for faculty is done on a more individual basis, often through interactions at academic conferences and through their network from prior graduate and post-doctoral studies. In a typical collaboration, there is a lot of flexibility to work together to generate papers, pursue joint grants or even to become part of larger research grant activity of a collaborator.

NSWC Crane, meanwhile, functions in a very different operating environment. NSWC Crane has just one client, the military, and must compete for work being authorized by program managers in the Navy and other branches of the military outside of NSWC. This very client-centric focus of NSWC requires developing a specific knowledge of key requirements and desired outcomes for solutions to specific military needs and challenges. Often these specific solutions are considered classified and have restrictions in how they can be made public.

So the way that each organization operates and generates results, as well as the overall organizational culture, is very different. This can lead to misperceptions on how collaborations will proceed. Also, faculty who do not work frequently on classified projects are not used to having to restrict what knowledge and research results they can and cannot make public.

In addition, there are more specific barriers to work around. For instance, Indiana University faculty and their research teams must have in place security clearances to conduct defense-related classified work and often foreign graduate students, post-docs and faculty are excluded from doing this work. Many academic institutions who work regularly with the military can help their faculty, graduate students and post-docs apply for these security clearances. IU-Bloomington does not have this capacity. Moreover, IU-Bloomington restricts the use of university owned research facilities for defense-related classified work. This is not an unusual policy for a university, but it creates difficulties in conducting military research for faculty.

Based on discussions among leaders of NSWC Crane and IU-Bloomington, the need for an intermediary mechanism to navigate the differences in the operating approaches between NSWC Crane and IU-Bloomington was identified. This intermediary mechanism of an independent Applied Research Center is critical to facilitate relationship building so that the burden does not fall on individual faculty members or Crane technical staff to navigate. Furthermore, the Center model offers a way to engage faculty from multiple institutions and technical disciplines in a more focused manner without navigating across multiple university contractual and administrative cultures.



Specific activities to be undertaken include:

- Having site miners at each participating university and Crane to identify specific needs and expertise at each institution that can be matched together.
- Creating a project coordination capacity that focuses on the day-to-day needs of supporting collaborative activities, such as organizing meetings, providing support in getting security clearances, assisting in proposal development, monitoring the status of pending and ongoing activities and, most importantly, maintaining active communications among technical staff at Crane and faculty..
- Advancing regular exchanges between Crane technical staff and researchers participating in the Applied Research Center, including a topical seminar series in defined focus areas, offering internships to graduate and post-docs, and growing the efforts to have PhD candidates drawn from Crane's technical staff.

These initial collaborative efforts should leverage and expand the existing Partnership Intermediary Agreement (PIA) between NSWC Crane and participating universities. A PIA is a memorandum of understanding that a military entity can enter into with a partnership intermediary to perform services for the Federal laboratory that increase the likelihood of success in the conduct of cooperative or joint activities. At first no monies would be exchanged, but as contract activities grow there would be joint research projects funded through defense-related projects.

This Center approach can also be greatly enhanced by creating actual research capacity through having endowed chairs in specific areas of interest to both NSWC Crane and Indiana research universities, who would be outstanding research faculty with security clearances, and dedicated secure laboratory facilities at West Gate Technology Park for collaborative research activities.

A great example of a university who has pursued this model is the University of Dayton, through the creation of the University of Dayton Research Institute (UDRI). The founding of UDRI has ties to the Air Force. In 1949, a mathematics professor at the University of Dayton saw an Air Force request for research assistance as an opportunity to play a role in America's postwar reconversion economy—as well as to provide new opportunities for faculty and jobs for students paying their way through school. Three years later, the University of Dayton hired five full-time researchers to support its growing number of contracts—a bold move for a small Midwest Catholic university focused on undergraduate teaching—and in 1956, with 20 sponsored projects underway, the need for a centralized research organization became clear.

On Sept. 1, 1956, the University of Dayton Research Institute was created. Sponsored research has grown from \$1 million from those 20-plus contracts in 1956 to more than \$100 million from nearly 1,500 contracts today; cumulative research revenue topped the \$1-billion mark in 2003. This is especially significant in that UDRI, its research and its 400 engineers, scientists and support staff, are funded solely by contracts and grants from external customers.

In many ways, UDRI works as a contract R&D firm, with one of its major clients being Wright Patterson Air Force Base. It focuses on providing its customers quality research outcomes and engineering solutions to the most demanding problems, on budget and on time. Unlike many universities, UDRI distinguishes itself by offering customers quick and flexible contracting options. Depending on the scope of the project and customer requirements, UDRI can work through purchase orders, as well as through firm-fixed-price, time-and-materials or cost-reimbursement contracts. UDRI also offers its government customers the following contract vehicles:

- A GSA Schedule that allows federal customers to efficiently contract professional engineering services

- The Design and Engineering Support Program (DESP) administered through the Sustainment Technologies Integration Office.

UDRI understands the value of proprietary information and will work under publication restrictions. UDRI has a flexible approach to intellectual property rights that is significantly less restrictive than most university-based organizations. Most importantly, UDRI has evolved with the changing technology challenges facing the Air Force Research Laboratory and its contractor community. It has already established a nationally recognized strength in material sciences. It has evolved in fuel technology research, and recently it has partnered with GE Aerospace to develop a capacity in power electronics.

The UDRI/Wright Patterson Air Force Research Laboratory model of collaboration could serve as an organization model as IU-Bloomington and NSWC Crane pursue the development of an organizational structure and related mechanisms to foster the ability to advance and sustain productive research partnerships.

## Action 2: Leverage the close physical proximity of Indiana University and NSWC Crane to explore and pursue federal research and translational opportunities in areas of mutual interest such as cyber security, radiation, and material sciences.

Collaboration through multidisciplinary research teams is increasingly driving the research enterprise in both higher education, federal labs, as well as industry. Individuals with backgrounds and expertise in diverse fields are being brought together to address numerous scientific and technical challenges. Indiana's research universities are already recruiting interdisciplinary teams of talent and expertise. To the extent that this expertise can be brought together with the assets of NSWC Crane, SWC Indiana can more quickly build its capacity in certain core technology areas through collaboration. "Networks" of collaborators can result from these efforts, which contribute to building a critical mass of research expertise and, ultimately, a critical mass of technologies, product expertise, and firms nearby. Concentrations of research knowledge and related industry strengths already have begun to form, and further focus can further speed and scale these efforts.

One way to foster the development of the region's research capacity is by encouraging academic/federal lab joint ventures to seek and secure federal funds and designations that create centers, institutes, and major programs in SWC Indiana. It is recommended that Indiana University and NSWC Crane pursue major federal research funding and seek translational opportunities focused in areas of overlapping strengths, such as cyber security, radiation, and materials sciences. The area that appears to hold the greatest near-term promise based on current capabilities and relationships is the area of radiation.

Electronic components are highly susceptible to radiation damage, yet many critical military, scientific, and commercial electronic component applications are exposed to radiation whether on nuclear weapon systems or military and commercial satellites or unmanned or manned spacecraft. Often these electronics must withstand long periods of time—measured in one to two decades—of being exposed to radiation without failing.

The continued technological advancements in small-scale electronic components based on nanotechnology is requiring ever more complex analysis of failure mechanisms and new testing approaches compared to classical electronic components.<sup>68</sup> Ultimately, the ability for a product to survive radiation comes down to different tests and the data they provide. A notably significant trend in radiation hardness design and assurance is a greater sophistication in the approach to more accurately simulate the specific environments and mission requirements in which electronics are exposed to

radiation, such as in space with a strong feedback into the design and development of electronic components.<sup>69</sup>

With this backdrop, it is easy to understand why radiation sciences is an increasingly important area of focus at NSWC Crane, particularly from the perspective of the effects of radiation on the performance and reliability of electronic components used in various military systems.

IU-Bloomington, through its Center for the Exploration of Energy and Matter, offers one of the longest-standing experimental physics centers in the nation involved in radiation sciences. Established in 1938, IU-Bloomington constructed one of the world's first cyclotrons for accelerating hydrogen nuclei—or protons—as they travel rapidly in a circle flanked by powerful magnets.

Most recently, IU's Center for the Exploration of Energy and Matter is collaborating with NSWC Crane in a design effort of an Advanced Electron Photon Facility (ALPHA) to serve the military's requirement for testing radiation effects as well as serving IU's interests for probing the structure and properties of biological and condensed matter systems. One of the key advances of ALPHA is meeting enhanced requirements, including the uniformity of the electron radiation doses and producing X-ray fluxes which are a factor of 10,000 times greater than traditional methods.

This effort has the potential to create a major DoD-focused university research center in radiation sciences. Beyond the initial design of ALPHA, IU-Bloomington and NSWC Crane have developed and submitted a White Paper to the Navy to advance the ALPHA concept. From discussions with NSWC Crane and IU-Bloomington, this effort requires more advanced diagnostic equipment for testing and increased accelerator physics research capacity beyond even the development of the ALPHA facility.

There are a range of approaches to advance this concept. One approach would be to establish a Multi-Disciplinary University Research Initiative (MURI) center. MURI's efforts involve teams of researchers investigating high priority topics and opportunities that intersect more than one traditional technical discipline. For many military problems, this multidisciplinary approach serves to stimulate innovations, accelerate research progress, and expedite transition of results into naval applications.

Another approach is to pursue a public-private partnership effort, linking military research labs to universities, along with involving industry contractors. Such an approach was undertaken in the case of creating the Von Braun Center for Science & Innovation in Huntsville, Alabama. Formed in 2006, this Center facilitated and provided program management to advance the design and development of engineering concepts and prototypes to serve key federal customers.

Dayton, Ohio also has advanced such a public-private partnership effort through the Institute for the Development and Commercialization of Advanced Sensor Technology (IDCAST). IDCAST is a world-class center of excellence in remote sensing and Chemical, Biological, Radiological, Nuclear and Explosive (CBRNE) sensing technology. IDCAST was established as a Wright Center of Innovation through a \$28 million Ohio Third Frontier award. The center aims to build on Ohio's existing Federal, academic and industrial strengths in sensor technology, resulting in more rapid commercialization of sensor technology for medical, environmental, and military applications.

Mobilizing Indiana-based resources and industry support can be a critical means to advance the research center in radiation sciences. State and industry resources could be used to further the capability of the proposed Center so that it can compete effectively for DoD university research funding.

### Action 3: Create programs that will facilitate the exchange of Indiana research faculty and NSWC researchers between institutions.

Another approach to catalyzing higher education-federal lab partnerships is to develop an initiative to support a fellows program. This program would encourage scientific interactions, including exchanges of personnel, between Indiana's research universities and NSWC Crane. The visiting scientists would give seminars and interact with faculty, students and administrators on campus. North Carolina Biotech Center supports such a program, the Visiting Industrial Scientists program, whose primary goal is to foster interaction between faculty and students at North Carolina colleges and universities and scientists from biotechnology companies.

Another way to encourage interactions between universities and NSWC Crane would be to create a specialized post-doctoral program. A key element of any successful cluster is access to highly trained workers. An excellent source of such talent is post-doctoral students, who are seeking further research experience. Many of these post-doctoral students, however, may be attracted to a program that also trains them for the national security industry, including seminars on research project management, leadership development, business aspects and hands-on experience working with industry. Such a program could also help produce more of the management talent that is needed in SWC Indiana.

### Action 4: Create programs to support endowed chairs and eminent scholars in areas of overlapping strengths across technology areas of mutual interest.

Increased competition for outstanding faculty has only intensified in recent years with the creation of major new programs, centers, and institutes at numerous major research institutions in the country. For Indiana's research universities to compete, they must be able to offer substantial start-up packages and support. Indiana University and Indiana's other research universities ability to attract key researchers with interests relevant to NSWC Crane would be considerably enhanced if a steady source of funding could be offered for a combination of start-up package support and/or endowed chairs.

Most major research universities are undertaking capital campaigns to address the need for additional faculty, endowed chairs, and efforts to attract star faculty. It is estimated that a well-endowed chair now runs \$3 to \$5 million, compared with \$1 million just a few years ago. Start-up packages, including costs of equipment and support for a period of three to five years, can typically average \$2 million. However, these figures can escalate by 50 percent or more for key faculty recruitments of "star" quality. Typical faculty teams now involve one senior faculty member and three research staff who are fully covered by income from grants. Therefore, the leverage impact of "star" faculty is easily seen.

To fully position SWC Indiana and leverage the collaboration potential of Indiana research universities and NSWC Crane, the Applied Research Center will need funding support that is targeted on hiring key faculty in mutual areas of technical interest. Areas to be addressed include the need to recruit and retain senior and emerging "star" faculty and to enhance key disciplines and research areas critical to building stature and reputation. Furthermore, bolstering Indiana University's expertise in areas of overlapping strength like cyber security, radiation, and materials sciences could strengthen relationships with NSWC Crane while offering broader benefits to the region by enhancing university's applied technology offerings.

## Strategy 6: Catalyze a Robust Entrepreneurial Ecosystem and Culture

Entrepreneurship is a driving force of innovation and economic growth with small businesses continuing to be the engines for net job growth in the United States. Entrepreneurial activity is critically important to regional economic development, because it drives industrial innovation and new business formation. Almost by definition, the founders of start-up companies are innovators—focused on capitalizing on commercial opportunities arising from introducing a new product, enhancing a service, making a delivery system or production process more efficient, more user-friendly, or less expensive. The founders of start-up companies typically come from established, larger companies, motivated by the identification of an unexploited commercial opportunity and willingness to take the risk that the larger company is not. It is, therefore, not surprising that entrepreneurial activity and innovation are strongly correlated.

Entrepreneurial activity is specifically critical to the growth of the two identified research-intensive industry clusters in SWC Indiana, Information and Communication Technologies and National Security/Defense, because entrepreneurs and their management teams provide the critical commercialization knowledge needed to access product and capital markets that can turn discoveries into viable businesses. With a few notable exceptions such as Austin and San Diego, the entrepreneurial climate necessary to generate high-growth enterprises has not developed fully and sustainably through market forces alone. Building a critical mass of entrepreneurial management talent in a locality depends on providing the resources that must be amassed and the services needed to successfully build a company.

However, catalyzing entrepreneurial activity is a challenge for many regions. It is often stated that entrepreneurship is a “contact sport”, and the barriers and obstacles to being able to scale a firm is significant, particularly technology firms. The three areas that entrepreneurs indicate are their greatest obstacles are talent, capital, and sales. Of these, the most significant obstacle to creating and growing entrepreneurial companies is the lack of experienced management talent. For SWC Indiana, there simply is a lack of experienced, serial entrepreneurs who know how to turn an idea or a product into a successful venture. While the region can point to its largest industrial employers and go back only a few decades to when these now anchor firms were start-up companies, today there are far fewer start-up companies being formed, and those that are often do not stay in the region. Such serial entrepreneurs are needed not only to lead new ventures but also to serve as mentors to help fledgling entrepreneurs develop their skills and increase their chances of success. They have contacts in the investor community, can recognize quality deals, and help to generate deal flow that help firms access capital markets.

The second challenge facing entrepreneurs is access to capital. Entrepreneurs require access to capital at each stage of their development, from early-stage, proof-of-concept and prototype development to Series A and B venture financing. SWC Indiana has seemingly not been able to access risk capital over the last decade, with only 4 SWC Indiana firms having received venture capital funding since 2001 (all located in Bloomington). In addition, while there have been efforts to catalyze the level of angel investing in the region, the efforts have been slow to take off with efforts finding it difficult to organize and/or be linked to deal flow. Regions that have limited risk capital in which to invest end up leaving their entrepreneurial companies on the “runway” unable to take off and reach their growth potential. In a more rural region such as SWC Indiana, there is also a need for sufficient working capital (debt) to enable new firms to start, before revenue from sales are sufficient, as well as funds to finance equipment and facilities. A regional working capital fund, supported by many financial institutions may be of assistance.

The third challenge that entrepreneurs face is to find customers and markets. Entrepreneurial assistance programs usually focus primarily on providing financial, business planning, and incubator support to start-up companies to increase their chance of survival. And indeed, start-up companies face many obstacles. But, just because a start-up company remains in existence doesn't mean that success has been achieved. For many of these companies, the real challenges come when they are ready to grow. Once they have a management team and an organization in place, have obtained investment capital, and are ready to move to the next level, fewer resources are available to assist these companies in finding

customers, identifying new markets, and generally increasing sales—all factors that will determine the level of their contribution to the economic health of the communities in which they reside. In addition, firms have difficulty keeping up with the competition, being aware of new discoveries that may affect their markets, and supporting continued product development, obstacles which can be lessened through closer interactions with universities and their researchers.

Overall, the interviews conducted suggest that it can be difficult to access in SWC Indiana sophisticated, value-added entrepreneurial support services as well as risk capital across the financial continuum. Finding different and unique ways to support entrepreneurs and the growth of entrepreneurial companies must be a critical component in SWC Indiana's efforts to build and sustain its targeted industry clusters, especially the Information and Communication Technologies and National Security/Defense clusters. Through the creation of new endeavors and the job opportunities this affords, this will also enhance the region's ability to attract alumni back to the region as well as retain students upon graduation.

## Actions to Pursue

1. Establish Entrepreneurial Hubs, focused on cluster industries that are innovative or technology-based, that provide facilities and lab equipment, professional development, coaching and mentorship, and access to risk capital, thereby accelerating the rate of commercialization and the creation of start-up companies in the region
2. Establish and create linkages with a pipeline of commercialization tools and risk capital funds, including successful venture capital and private equity funds, to invest in entrepreneurial efforts in the region
3. Celebrate and market entrepreneurial successes

### Action 1: Establish Entrepreneurial Hubs, focused on cluster industries that are innovative or technology-based, that provide facilities and lab equipment, professional development, coaching and mentorship, and access to risk capital, thereby accelerating the rate of commercialization and the creation of start-up companies in the region

To catalyze entrepreneurial activity in the region, it will be critical to develop robust, sophisticated service offerings through a concentrated mechanism in order to attempt to overcome the lack of serial entrepreneurs that currently exist in the region. This will require creating focal points for entrepreneurs by encouraging the current disparate existing efforts that are providing assistance to start-ups and entrepreneurs to coordinate and possibly even be co-located to use their resources collectively to create critical mass.

To most effectively undertake this type of service offering, due to the geographic size of the region and the reality that there is synergy in proximity among entrepreneurial endeavors, it is recommended that two “centers of gravity” or “Entrepreneurial Hubs” be created initially, each focused on one of the two most promising targeted industry clusters for entrepreneurial activity - Information and Communication Technologies and National Security/Defense.

At this time, it is recommended that an Information and Communication Technology Entrepreneurial Hub be created within the Bloomington Certified Technology Park, leveraging the strengths of Indiana University's School of Informatics and University Information Technology Services, as well as private initiatives such as SproutBox. The National Security/Defense Entrepreneurial Hub should be created within the WestGate@Crane Technology Park, leveraging the strengths of NSWC Crane, the Battery Innovation Center, and the WestGate Academy.

As entrepreneurial activities begin to grow and deal flow is increased throughout the region, additional Entrepreneurial Hubs should be created to meet the growing demand for entrepreneurial services – possibly in other targeted industry clusters. For instance, the Daviess County Food Processing Institute could be leveraged to offer sophisticated entrepreneurial assistance to the food processing entrepreneurial endeavors in the region.

The Entrepreneurial Hubs, regardless of their industry focus, should be designed with some similar components. All entrepreneurial firms need many resources, including management talent, capital, and professional expertise. They often need assistance in determining economic feasibility and identifying markets and distribution channels. They may also need access to specialized equipment and laboratories and to expertise to solve technical issues that arise during product development. They must be able to recruit key personnel and have access to small amounts of pre-seed capital and/or working capital. With this in mind, below is a discussion of the general types of entrepreneurial assistance services that each Entrepreneurship Hub should incorporate into its operations. Following this discussion, industry cluster-specific models will be discussed.

**Business Development and Commercialization Support.** Each Entrepreneurship Hub should ensure that comprehensive, in-depth business development and commercialization support services are readily available and easily accessible to entrepreneurs and start-up companies. Start-up and emerging companies need access to professional expertise, assistance in conducting market research and developing marketing strategies, and help in determining economic feasibility. They also need access to quality facilities with specialized equipment, the ability to recruit key personnel, a support infrastructure familiar with scalable businesses, and access to small amounts of pre-seed capital.

Business development and commercialization support can help increase deal flow, make entrepreneurs more investment-grade deal ready, and increase the level of private investments in regional firms. It is proposed that the Entrepreneurship Hub serve as a single point of entry for start-up companies that can assess their needs, guide them through the commercialization process, and link them to a comprehensive network of commercialization assistance services. Services of the Entrepreneurship Hub should include conducting technology and market assessments and providing specialized SBIR assistance, business mentoring, and matchmaking support. In return for providing business development assistance, the Entrepreneurship Hub could share in the royalty/equity stream should a client successfully develop its company.

**Business Mentoring and Managerial Support.** The Entrepreneurship Hub should also play a role in addressing companies' needs for business mentoring and managerial support. Interviewees noted that SWC Indiana lacks seasoned entrepreneurs experienced in scaling a company. The lack of such talent in the region may result in firms moving elsewhere in search of managerial talent.

One innovative solution to the lack of serial entrepreneurs would be for the Entrepreneurship Hub to develop a team of seasoned cluster-specific professionals to serve as a talent pool for start-ups in SWC Indiana (entrepreneurs-in-residence). Whether recruited from inside or outside of the region, this team of experienced cluster-specific executives would accept the position with the understanding that within 12 to 18 months they would likely be placed in the role of senior leadership in one of SWC Indiana's start-up, firms. Until this occurred, the individual would serve as a mentor to an existing firm and assist in the implementation of the Entrepreneurship Hub's initiatives. It is envisioned that the EIR program could leverage Radius Indiana's planned investment in Elevate Ventures.

**Develop a network of advisors resident in SWC Indiana with technology, market and business expertise.** To augment the work of the EIRs, there exists in SWC Indiana a number of technology domain and entrepreneurial experts with a range of skills. Some of these technology experts are employed by the region's technology clusters and anchor research assets, while others simply call the region home and either work outside the region or have retired. These experts can be tapped to bring expert teams of

entrepreneurial mentors and advisors together to assess and mentor entrepreneurs in the formation of new businesses. An excellent example is the network that the Boulder County Innovation Center (now known as the Innovation Center of the Rockies) has organized to assess and mentor local early stage companies. The Innovation Center has developed a database of more than 1,000 screened and qualified advisors with specific technology domain expertise to support local early stage companies and to inform the commercial assessment of early stage innovations to guide its commercialization approach, including connecting it with investors and management teams.

**Engage consultants who can perform market assessments and offer likely commercialization paths.** To help fill the gaps in the network of advisors and EIRs, and to provide more detailed market assessment, it is recommended that based on recommendations of the advisors, a more systematic review by consultants or a market research firm be undertaken to provide an initial systematic assessment and path to commercialization. One example is the use of an existing market research firm as done by the Small Business Innovation Office of Connecticut Innovations to offer assistance to early stage technology companies, many of whom are considering pursuing SBIR funding. Through a contract with Foresight Science and Technology, Connecticut Innovations offers funding for a Go/NoGo® early stage weeding tool for disclosures or ideas that identifies significant barriers and potential paths to commercialization. These reports evaluate competitiveness, intellectual property, and marketability and can provide validation that a company's idea is sound and worthy or prevent further time and investment in an idea without merit. Most importantly they are completed within a 3 to 4 week period, so are timely.

While each Entrepreneurship Hub is envisioned to provide overarching entrepreneurial services that are cluster-agnostic, it is also understood that each Entrepreneurship Hub's organizational model will evolve differently depending on the targeted industry cluster it intends to serve. It is envisioned that the **Information Technology and Communications Entrepreneurship Hub in Bloomington** will focus on a quick-turn, high-churn model focusing on the idea generation stemming from IU's faculty, alumni, graduate, and undergraduate population, whose entrepreneurial potential will only increase with the proposed addition of applied science and system engineering design and development programs. The key will be determining how to bring ideas to the market quickly and then keep them in the region as they scale. However the Hub is created, it will be important for it to have the significant involvement of IU-Bloomington, in particular IURTC's increasing commercialization and entrepreneurial initiatives, such as the Spin-Up Program, Innovate Indiana Fund, as well as the School of Informatics BEST (Building Entrepreneurs in Software and Technology) Competition. One model that has applicability to this situation and has shown significant success is Innovation Work's AlphaLab in Pittsburgh.

Innovation Works (IW), located in Pittsburgh, is a venture development organization that invests risk capital, business expertise and other resources into high-potential companies with the greatest likelihood for regional economic impact. In 2008, recognizing that the rapid-pace of software development, including internet application, was an opportunity for entrepreneurs in Southwestern Pennsylvania, IW launched an initiative entitled AlphaLab. AlphaLab is a startup accelerator that helps capital-efficient startup companies in the IT domain launch quickly and successfully.

Twice a year, six to eight companies in the software, web, mobile, entertainment technology, or hardware space are selected to participate in an intensive 20-week program. During these weeks, companies rapidly iterate on their products and work with mentors, advisors, and the AlphaLab team to hone their business models. The program culminates in the AlphaLab Demo Day: a chance for companies to pitch what they've been working on to angel investors, VCs, and press outlets from around the nation.

Specific business services that companies receive include:

- \$25,000 investment from Innovation Works in exchange for 5 percent common stock in their company
- Mentoring and hands-on assistance



- Weekly educational sessions during which speakers talk exclusively to AlphaLab companies about a wide range of topics including, sales, investment, design, branding, and accounting.
- Access to IW's broad network of advisors, investors, alumni and community partners
- Office space within AlphaLab's 5,000 sq. ft. facility, and
- Start-up legal services.

The companies are expected to remain in the region after the end of the AlphaLab program, and the terms of the investment includes pay-back provisions if the company decides to relocate. IW's goal is to help the entrepreneur build a successful IT company and to add to the critical mass of flourishing IT companies in the Pittsburgh region.

Over the first three years of operation (more recent data is not available publicly), AlphaLab has attracted more than 600 applications from entrepreneurs in 35 states and seven countries interested in starting their businesses in Pittsburgh. The program helped mostly first-time entrepreneurs launch 38 new companies, trained more than 120 entrepreneurs, hosted over 80 events annually that attracted more than 1,000 participants, and helped more than half of its graduates raise follow-on funding. AlphaLab has met with such success that a second accelerator has recently been launched by IW, Alphaslab Gear, which focuses on hardware and robotic start-ups.

But possibly even more important than the metrics, AlphaLab's office has become a community hub of entrepreneurship and technology in the region. AlphaLab has become a focal point for the community of entrepreneurs, and created a viral environment where groups of developers and organizations of entrepreneurs have come together. It has in effect created a way for that community to network and develop critical mass where before there existed less activity with little cohesion.

SWC Indiana should develop a similar type model within the Bloomington Certified Technology Park. The focus should be on IT cluster start-ups that are capital-efficient and can scale quickly. The terms for participation in the program should be retention of the company in SWC Indiana upon graduation from the program.

**The National Security/Defense Entrepreneurship Hub at WestGate** would best be served by following a slightly different model. This effort will need to leverage the technology transfer efforts of NSWC Crane, as well as leverage the ongoing relationships with Southern Indiana University's Applied Research Center, as well as IU-Bloomington and Purdue. Best practices recognize that for start-up endeavors related to the national security/defense industry cluster, technology commercialization is a critical complement to the process of identifying discoveries and then protecting those discoveries as intellectual property and finally managing the licensing of that technology to new or existing companies. Technology commercialization recognizes that there is a major gap—or valley of death—between technology transfer and developing technologies into products that can have market success. This involves a number of activities, such as assessing the technology and its potential markets against current products in the marketplace (e.g., technology and market assessments). It also involves developing the product itself, and optimizing its engineering and design to meet price points of the marketplace. More importantly it involves mentoring and helping to develop the business and management team and securing the sources of equity and working capital that will carry the product and/or firm through various stages of maturity until it becomes an established company/product in larger domestic and global markets.

An excellent example of a commercialization-focused entrepreneurship model is Oklahoma's Innovation to Enterprise (i2E) effort under contract to the State of Oklahoma. i2E, while not specifically focused on the national security/defense industry cluster, does play an important role in positioning Oklahoma technology entrepreneurs to grow viable businesses. One key way of preparing them is by helping them focus their business plans and strategies through hands-on mentoring and entrepreneurial assistance to move through a technology commercialization model linked to business success. It also helps through a

concept fund that i2E manages for the State, which is designed to provide Oklahoma start-up companies with pre-seed, proof-of-concept funding, in incremental stages, to develop a marketable concept or product. Funding amounts range from \$25k to \$200k and require a dollar-for-dollar match. This investment allows for the commercialization of new products and processes.

i2E also helps entrepreneurs secure angel financing and has established a certified Service Provider Program, which identifies proven, quality service providers—representing fields of intellectual property law, corporate law, business consulting, marketing, engineering, science, and financial consulting—interested in providing assistance and support to technology entrepreneurs. The most important contributions of i2E are both helping to stimulate investment deal flow and improving the quality of deal flow to private investors.

Finally, because the generation of a critical mass deal flow is an issue in Oklahoma, much like it currently is in SWC Indiana, i2E has collaborated with the Oklahoma Center for the Advancement of Science and Technology, the University of Oklahoma's Office of Technology Development, Oklahoma State University's Office of Intellectual Property Management and Licensing, and Cowboy Technologies, LLC to develop a regional Proof-of-Concept Center (POCC). Combining i2E's venture advisory and investment teams with university technology commercialization staff, the POCC identifies promising technologies developed at the two comprehensive public research institutions and accelerates the commercialization of those technologies. The project is designed to determine optimal market alignment, create a commercialization road map and ascertain the amount of funding required to achieve initial product development and market entry.

The POCC is an innovative model for accelerating commercialization of promising Oklahoma technologies, not just those originating in the two comprehensive public research universities, but other research institutions and research support organizations. i2E has executed a Memorandum of Understanding with the University of Oklahoma, Oklahoma State University and Cowboy Technologies, LLC to outline the projects goals, objectives and commitment of resources for the fiscal year.

Partners agreed to allocate and provide resources to develop the content and processes, and implement the POCC project to:

- Identify pre-commercial opportunities within universities' technology disclosures and portfolios
- Evaluate relevant markets for identified technologies
- Develop pre-market prototypes utilizing industry and potential customer input
- Produce a Minimum Viable Product using fewer iterations
- Place prototypes in front of ideal first customers quickly to obtain direct market validation
- Work with innovation coaches and business builders to create the foundation for and launch viable startups
- As appropriate, provide focused pre-seed and seed capital to high priority opportunities, accelerating those projects' ability to meet specific milestones and increase value.

Since beginning its operations in 1998, i2E has served over 580 entrepreneurs and start-up companies. Among its key metrics are:

- **Economic Impact:** The Oklahoma Department of Commerce recently completed a study of the economic impact of 11 Oklahoma companies receiving \$4.5 million in SEED Funding from i2E. The Department of Commerce concluded the direct economic impact to be \$37.3 million with additional indirect impact of \$11.8 million, indicating a total economic impact of almost

\$50 million. i2E investment of \$20.9 million in Oklahoma companies has leveraged an additional \$478 million in private investment.

- **High Quality Job Growth:** i2E assisted companies experienced 31 percent job growth in FY2013 with an average wage of \$73,395 compared to 1.3 percent job growth statewide and an average wage of \$38,250.
- **Increased New Firm Success Rate:** The failure rate for small business start-ups nationwide is slightly over half in the first 4 years. Companies funded by i2E see a much better success rate with more than 2/3 making it past the 4 year mark...an increase of almost 41 percent.

SWC Indiana should develop a similar type model within the WestGate @ Crane Technology Park. The focus should be on national security/defense cluster start-ups that have connections to Crane that are scaleable. The terms for participation in the program should be retention of the company in SWC Indiana upon graduation from the program. Based on programs of similar size, it is anticipated that approximately \$10 million over five years would be needed for each Entrepreneurial Hub to begin the program, with an additional \$1.5 to \$2 million annually thereafter to sustain them.

## Action 2: Establish and create linkages with a pipeline of commercialization tools and risk capital funds, including successful venture capital and private equity funds, to invest in entrepreneurial efforts in the region

Most people realize that the discovery process that results in the development of a new business can be an expensive process, particularly if it is based on a new technology. What many people do not realize is that the costs associated with developing and taking the product or service to market are also very substantial. Major costs incurred after the ideation or research has been completed include the cost of assessing the market to determine the competition, the likely market, and the price points for competitive advantage; developing a prototype; preparing a marketing and sales plan; and scaling up for manufacturing if applicable. Finally, actual product distribution, sales, and marketing must be undertaken. These activities require the availability of sufficient capital to finance business growth and economic development.

Yet, few sources of funding bridge the gap between the points at which (1) a discovery has been identified and demonstrated and (2) a business case has been validated and venture or other debt capital can be obtained. It is also difficult to obtain seed and early-stage investment because venture funds, as they have become larger, tend to make larger, later-stage investments. As a result, angel investors have also moved downstream (further away from pre-seed and seed investments), making more post-seed and later-stage investments than previously. This trend has been exacerbated during the recession which has caused venture firms to invest primarily in their portfolio companies who do not have other options for accessing capital. So, in addition to the difficulty of obtaining translational research and pre-commercialization funding, firms are facing a gap at the start-up phase, as well.

To help overcome this shortage of investment capital, SWC Indiana must both focus on creating indigenous sources of capital, but also create connections to sources of capital that have been established in other areas of the state, primarily Indianapolis. Specific recommendations are:

### **Create Technology Commercialization Tools at each Entrepreneurial Hub**

The creation of a proof-of-concept or commercialization fund has already been proposed under the Entrepreneurial Hub model (see above). In addition, it will be important to the region that IURTC's recent efforts to develop early-stage sources of capital through its various initiatives must continue to be a priority on the Bloomington campus, particularly focused on information technology opportunities.

The funding, in general, will be used to:

- Evaluate relevant markets for identified technologies
- Develop pre-market prototypes utilizing industry and potential customer input
- Produce a Minimum Viable Product using fewer iterations
- Place prototypes in front of ideal first customers quickly to obtain direct market validation
- Work with innovation coaches and business builders to create the foundation for and launch viable startups.

However, it is important to note that the costs to start firms and finance them through their development cycles will be quite different at each of the hubs as a result of the differences in business models and product development life cycles. For instance, it is anticipated that spin-offs and entrepreneurial efforts related to the national security/defense cluster at WestGate may require greater levels of initial investments due to physical capital requirements as well as specialized equipment and labs. It will be critical to leverage the investments in shared-use infrastructure already made at the Battery Innovation Center in order to develop comparative advantage for these efforts in the region. If assets both inside and outside the gate can be leveraged into a competitive advantage for the region, consideration should then be given to increase deal flow by attracting successful SBIR-related companies from across the nation to locate within the region.

### **Organize a Regional Angel Investment Fund**

There is considerable concern, noted in Battelle's interviews, that the number of angel investors in the region is still quite small and not broadening fast enough. Unless there are some success stories, e.g., successful exits, entrepreneurs may face not only insufficient venture fund availability but angel funding availability as well. For these reasons, more angel investors need to become involved in these investments and an organized angel fund needs to exist in the region.

There are ongoing efforts both in Bloomington and in Jasper to create a formal angel network; however, due to lack of deal flow it has been difficult to develop a model that is of interest to investors. One solution would be to syndicate deals from other larger angel investor networks in Indianapolis, Louisville, etc. so that regional investors begin to feel comfortable with the process and more likely to fund entrepreneurs in the region through the Entrepreneurial Hubs.

Efforts of other angel investment networks demonstrate the ability of regional efforts to turn ideas into new enterprises. However, there needs to be a coordinating focus of these efforts and sustained brokering, coordinating, screening and review, and coaching set of roles, to maintain and expand these angel networks. An angel investor network is critical to moving ideas into enterprises in SWC Indiana.

Professional management of such a fund would help undertake the screening and review of ideas for presentation to angels; to seek and secure the involvement of potential angel investors; and to provide linkages to various technology-based economic development organizations. The objective is to establish an angel fund with \$4 to 5 million available to make investments in the range of \$250,000 to \$500,000. In addition, once networks are more formerly organized, ways in which to leverage the recently passed

#### **Best practice lessons: ECOTAF (East Central Ohio Tech Angel Fund)**

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ECOTAF is an investment fund focused on opportunities in East Central and Southeast Ohio, the rural Appalachian region of the state. With twenty-seven investors, the fund is one of the largest rurally focused investment funds in the country. With close ties to the Ohio Technology Angel Fund (the largest angel group in the nation with 280 investors and \$23 million invested), ECOTAF has been able to leverage the expertise of OTAF and syndicate deals in order to develop a level of comfort, increase deal flow, and mitigate risks for its own investors. This in turn has helped to create an environment conducive to stimulating risk capital investment in the region.

Indiana crowd-funding legislations should be pursued as a means to increase the level of risk capital available in the region.

### **Create Pre-Seed, Seed and Working Capital (Debt) Funds**

As the amount of deal flow increases through the efforts of the Entrepreneurial Hubs and as a result of the earlier stage financing, the risk capital ecosystem of the region will need to be prepared to tap into statewide/regional pre-seed funds, and as deal flow increases, consider creating a SWC Indiana regional pre-seed fund. In addition, it will be important to address the needs for working capital (debt) manufacturing, supply chain support firms, and non-tech firms as other targeted-industry clusters begin to see entrepreneurial growth. A regional working capital fund, supported by many financial institutions may be of assistance.

### **Action 3: Celebrate and market entrepreneurial successes**

There is general consensus that SWC Indiana does not have a strong entrepreneurial culture. Creating such a culture will require that the region's citizens understand the importance of entrepreneurship and the opportunities it offers for developing the region's economy. It will also be important for the region to understand that failure is often the result of such endeavors, but with each failure, knowledge is gained and future pursuits are enhanced. Finally, successful entrepreneurs, which can become important role models, need to be celebrated and encouraged.

A number of different initiatives can be undertaken to promote an entrepreneurial culture, including:

- Celebrating and communicating entrepreneurial success stories. As part of the earned media campaign described in Strategy 4, efforts should be pursued in local newspaper media markets to place entrepreneurial success stories, entrepreneurial news, and human interest stories in general. While it is understood that the region does not have its own TV media markets, efforts should also be pursued to develop earned media for major events/successes in the larger regional markets.
- Facilitate networking of entrepreneurs, investors, and researchers through awards, business plan competitions, prizes, etc. Establish an Entrepreneur of the Year award and heavily publicize throughout the region. Continue to build on the success of IU's BEST competition, Bloomington's Start-up Weekend, and consider developing additional entrepreneurial business plan competitions to further foster an entrepreneurial culture. The MIRA Awards in Indianapolis is another successful event that could be replicated in SWC Indiana.

## Conclusion

Now is the time for Southwest Central Indiana to lay the foundation for a sustained, high-growth recovery that enables the region to “leap forward” and become a leading job- and wealth-generating economy over the next decade. In today’s global knowledge-based economy, the recipe for economic success is quite simple—Southwest Central Indiana needs to focus its economic development efforts to ensure that not only can its existing industry drivers raise their level of competitiveness and added value, but that it can also identify new drivers of innovation to improve the region’s economic prospects.

The analysis suggests that a focus on the region’s challenges can serve as the basis for a successful economic development strategy. These development challenges are centered on the region’s ability to:

- Generate the talented workers that its industrial base demands.
- Take full advantage of the opportunity presented by the development of the I-69 Corridor.
- Develop a robust, value-added relationship between the region’s two primary public research engines.
- Foster a robust entrepreneurial culture to spur economic growth, and foster economic diversification.
- Embrace regionalism to prosper from the benefits of critical mass.

Addressing these development challenges requires a comprehensive effort spanning resource alignment, research focus, business and product development, innovation and commercialization, and branding and targeted attraction. To gain the support needed to make this initiative successful will require the broad support of a unified regional economic development organization as a top economic priority.

By working together, the opportunity for Southwest Central Indiana to grow its economic base and increase community prosperity is substantial. If successful, it is expected that what will emerge is a public-private partnership that will advance the region over the coming decades.

The economy of Southwest Central Indiana is at a crossroads – its ability to reshape itself through industrial restructuring driven by clusters that meet the demands of national and global markets is predicated on its ability to come together as a region with a unified purpose and dedication to improving the trajectory of its economy. The time is now to seize this economic development opportunity.



## Appendix A. Cluster Analysis Details

The following information provides detailed information, including maps representing employment levels, regarding the 14 clusters examined in detail by Battelle. Six of the 14 examined clusters were not included in the final detailed analysis. These include:

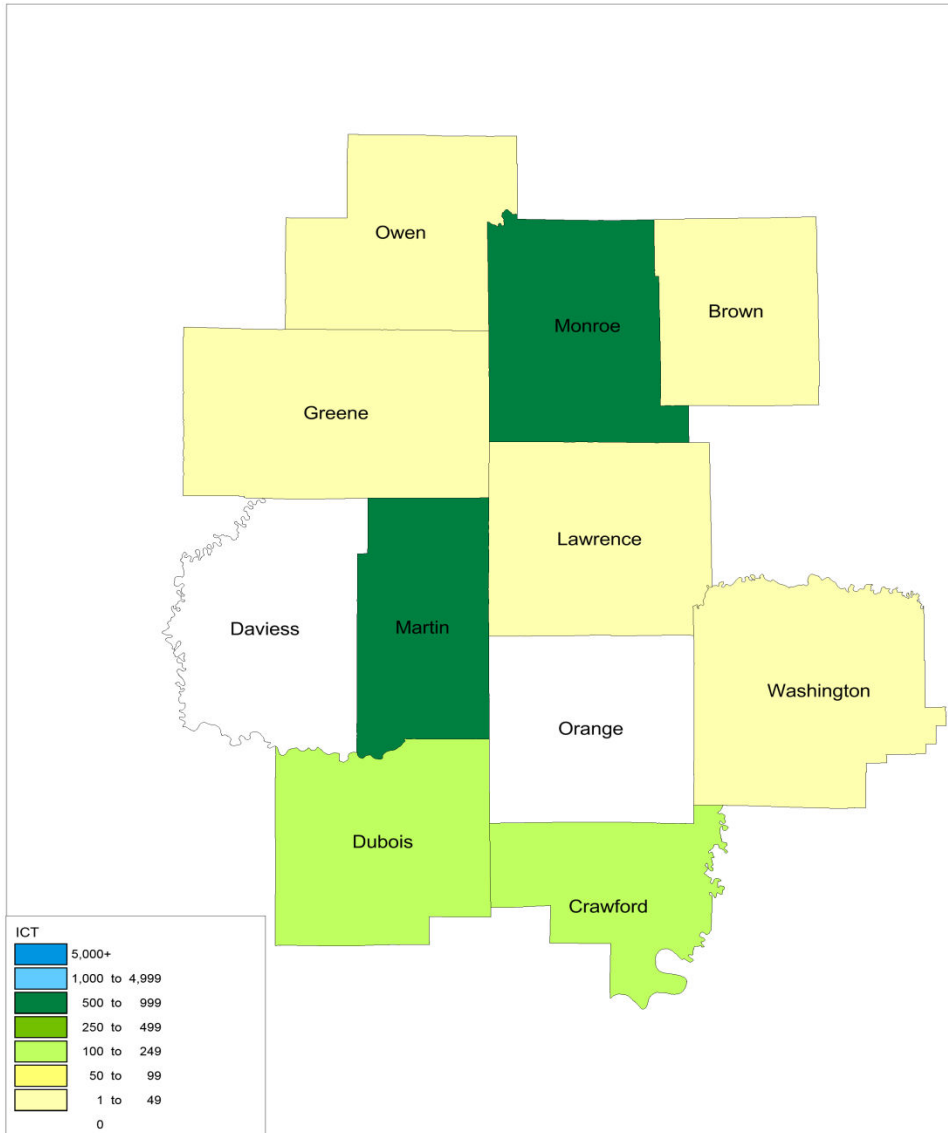
- **Colleges and universities cluster.** The colleges and universities cluster includes the employment of Indiana University-Bloomington, Vincennes University-Jasper Campus, and the Ivy Tech-Bloomington Campus. The cluster is important in terms of its overall employment (as detailed in the previous section) and as a source for education, research, and innovation for the region. However, given the nature in which colleges and universities operate, this cluster does not lend itself to strategic economic development plans in the same manner as other “industry” clusters.
- **Hospitals and healthcare centers cluster.** The hospitals and healthcare centers cluster, while also a growing sector, is similar in nature to the colleges and university cluster.

The remaining four clusters offer diverse employment opportunities for SWC Indiana residents, and hence, should continue to be nurtured through local economic development efforts and monitored for signs of stress or opportunities for growth.

- **Construction and building products cluster.** The construction and building products cluster as defined combined a broad range of industry segments including companies ranging from quarries and drywall manufacturers to lumber mills and window manufacturers. In the end, this cluster, though forming a significant level of regional employment, is likely too diverse to develop meaningful supportive actions.
- **Electric/electronic components, Precision metalworking, and Rubber and plastic products.** These final three clusters were initially examined to understand the extent to which they provided a supporting bridge among other regional clusters (e.g., automotive/heavy vehicle equipment; national defense/security). While these clusters are indeed key suppliers to other regional industry clusters, the small number of establishments and employment make each of them an unlikely focus for a strategic initiative.

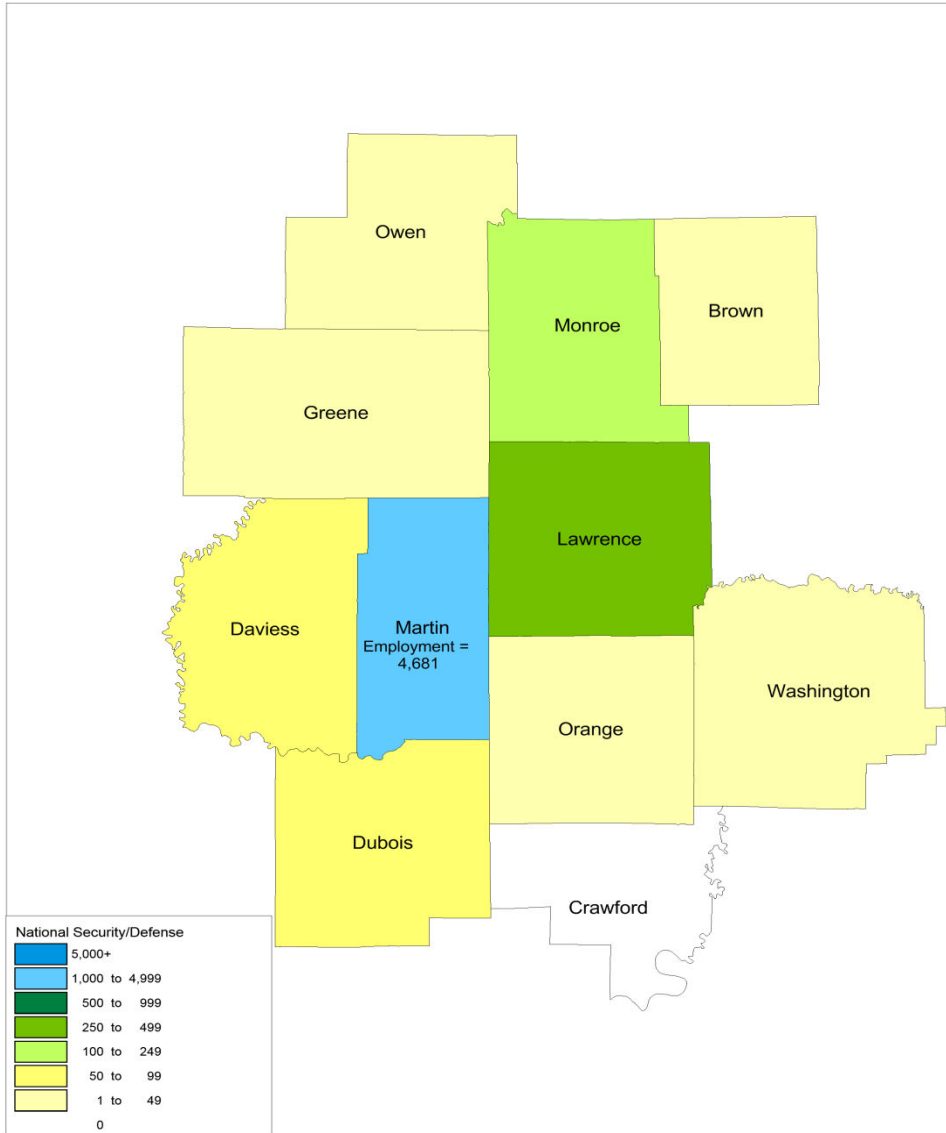


## Information and Communications Technology - 2012 Cluster Employment by County



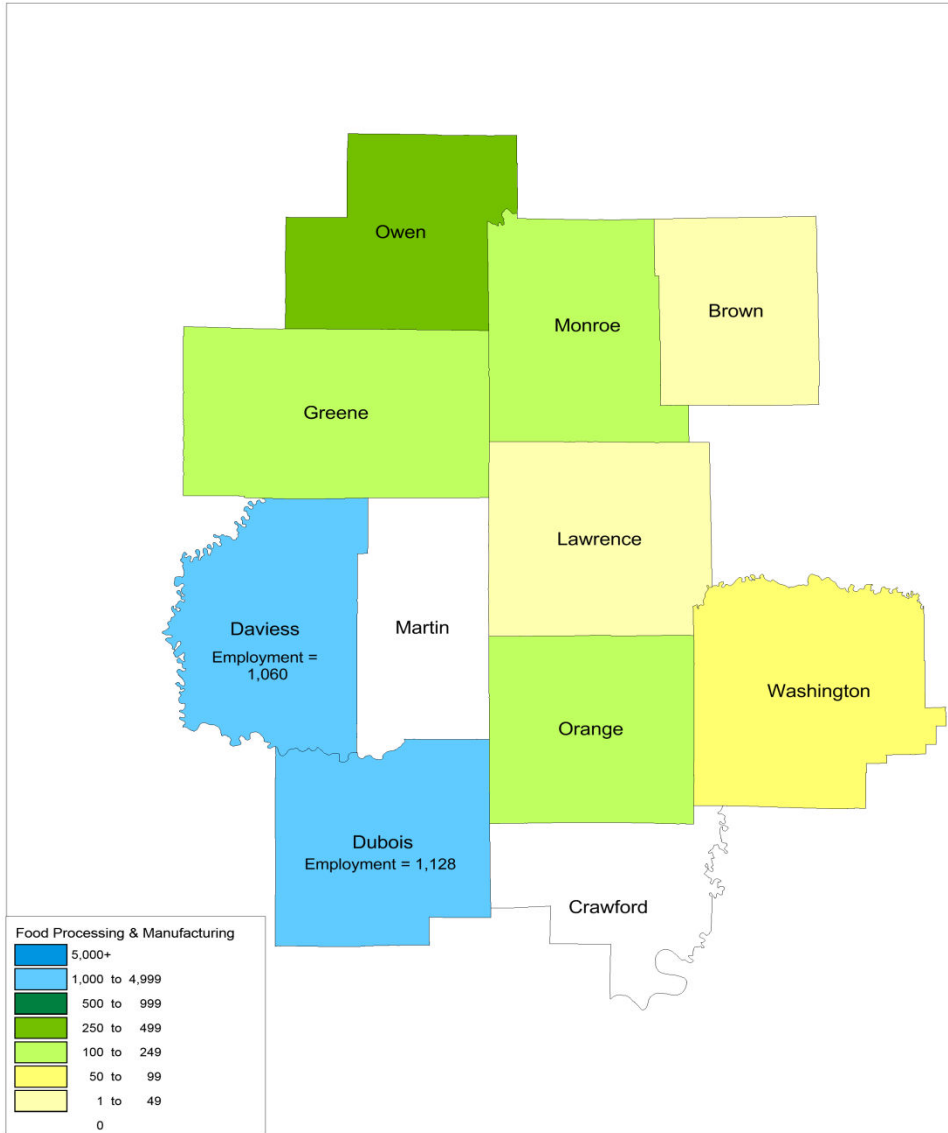
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## National Security/Defense - 2012 Cluster Employment by County



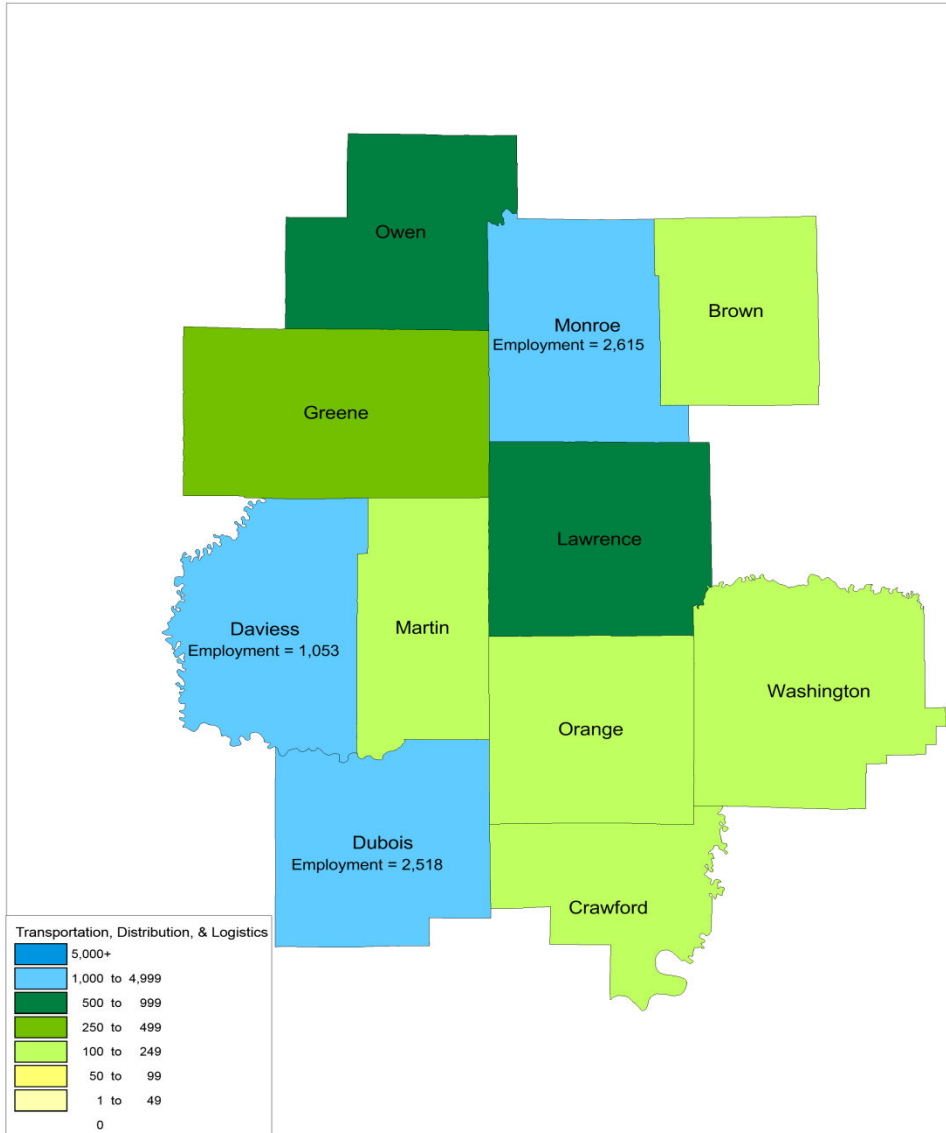
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## Food Processing and Manufacturing - 2012 Cluster Employment by County



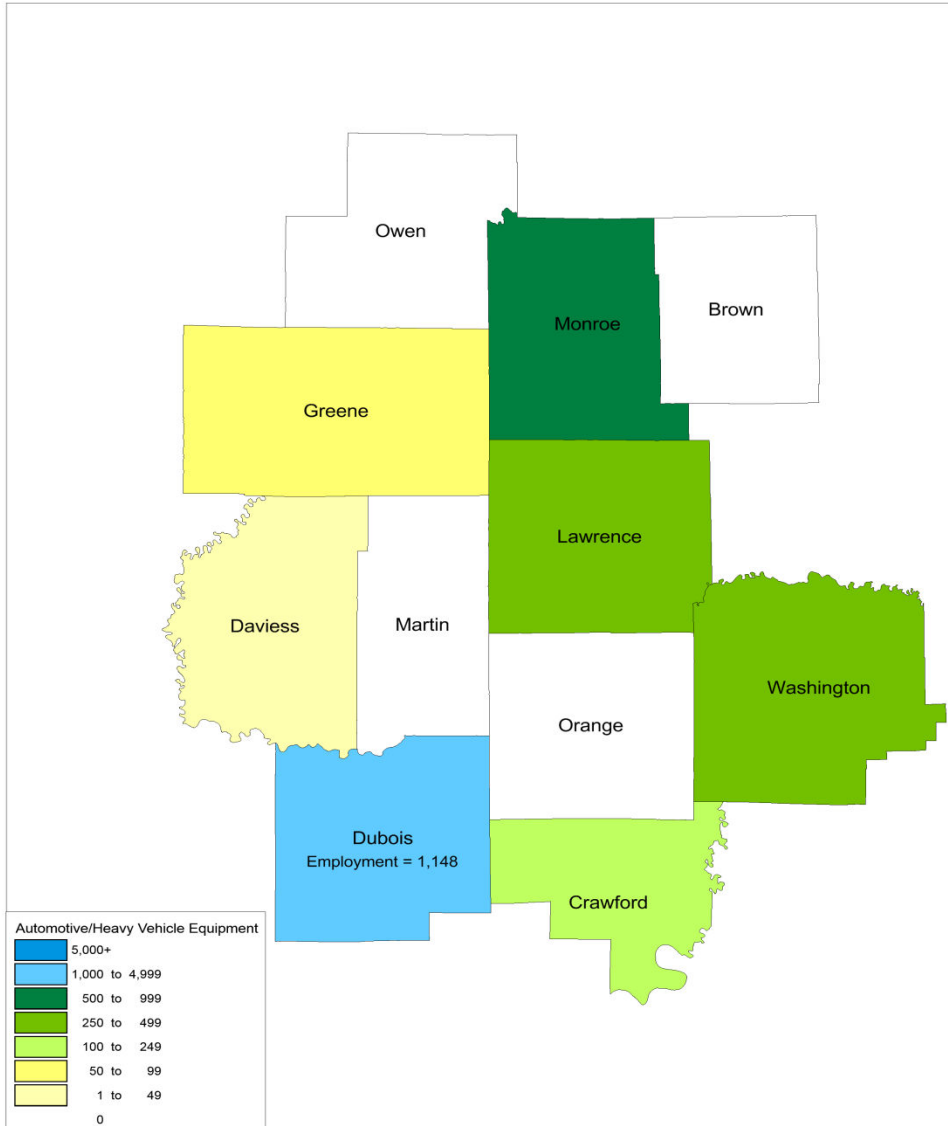
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## Transportation, Distribution, and Logistics - 2012 Cluster Employment by County



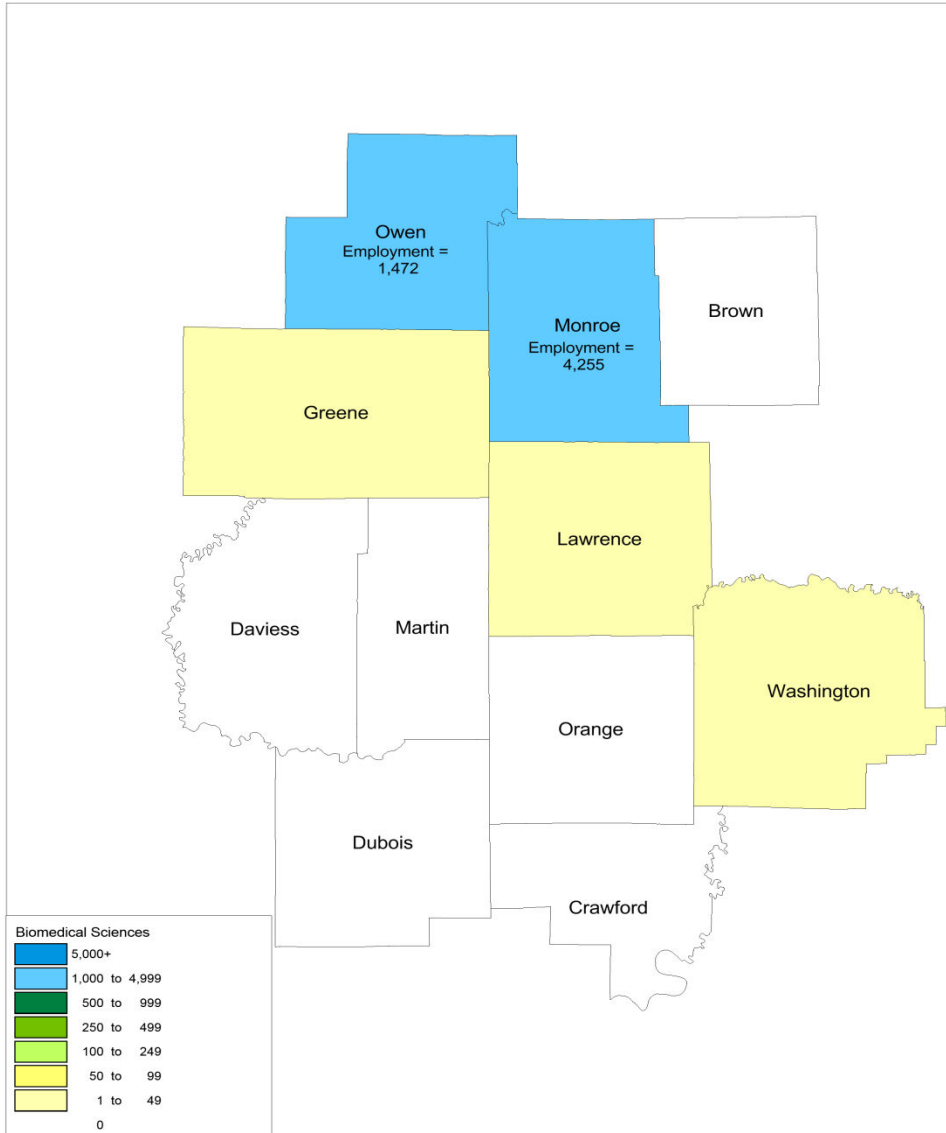
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## Automotive/Heavy Vehicle Equipment - 2012 Cluster Employment by County



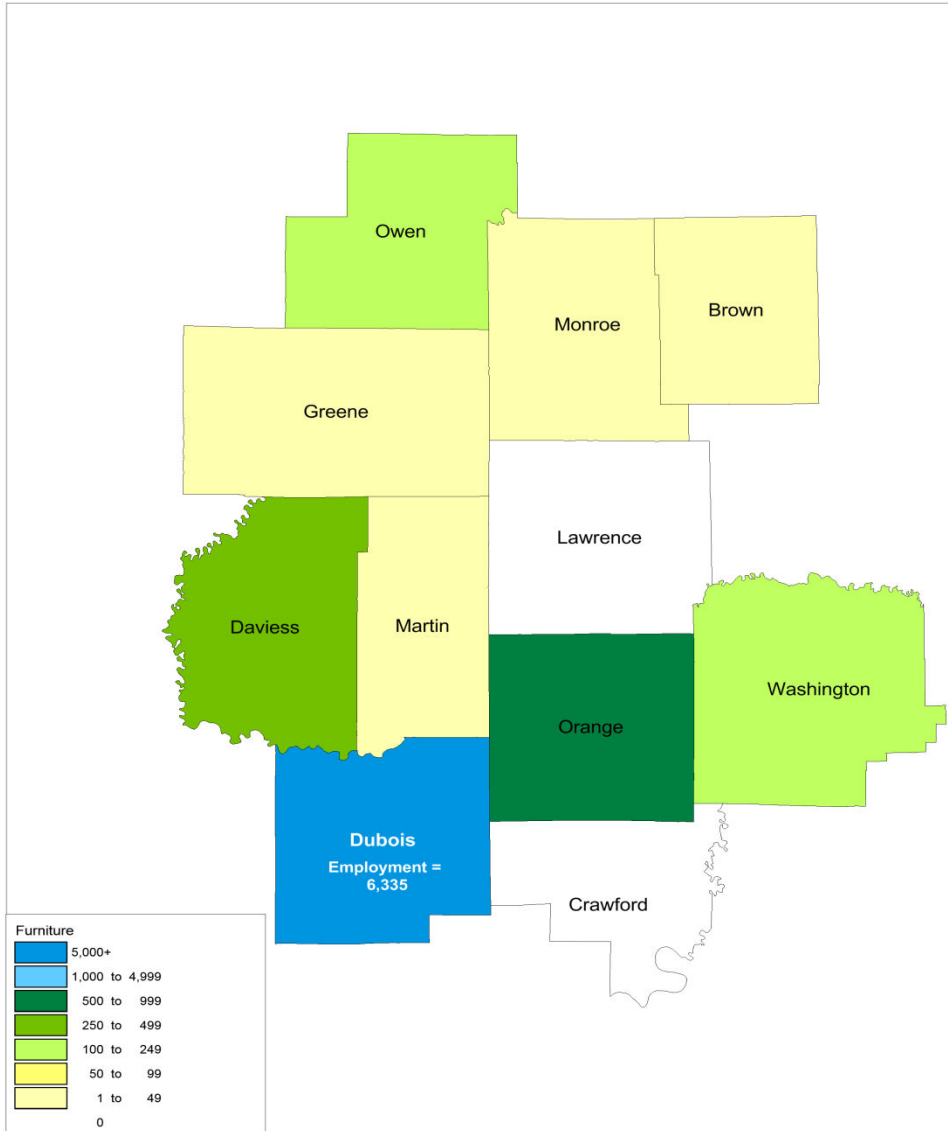
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## Biomedical - 2012 Cluster Employment by County



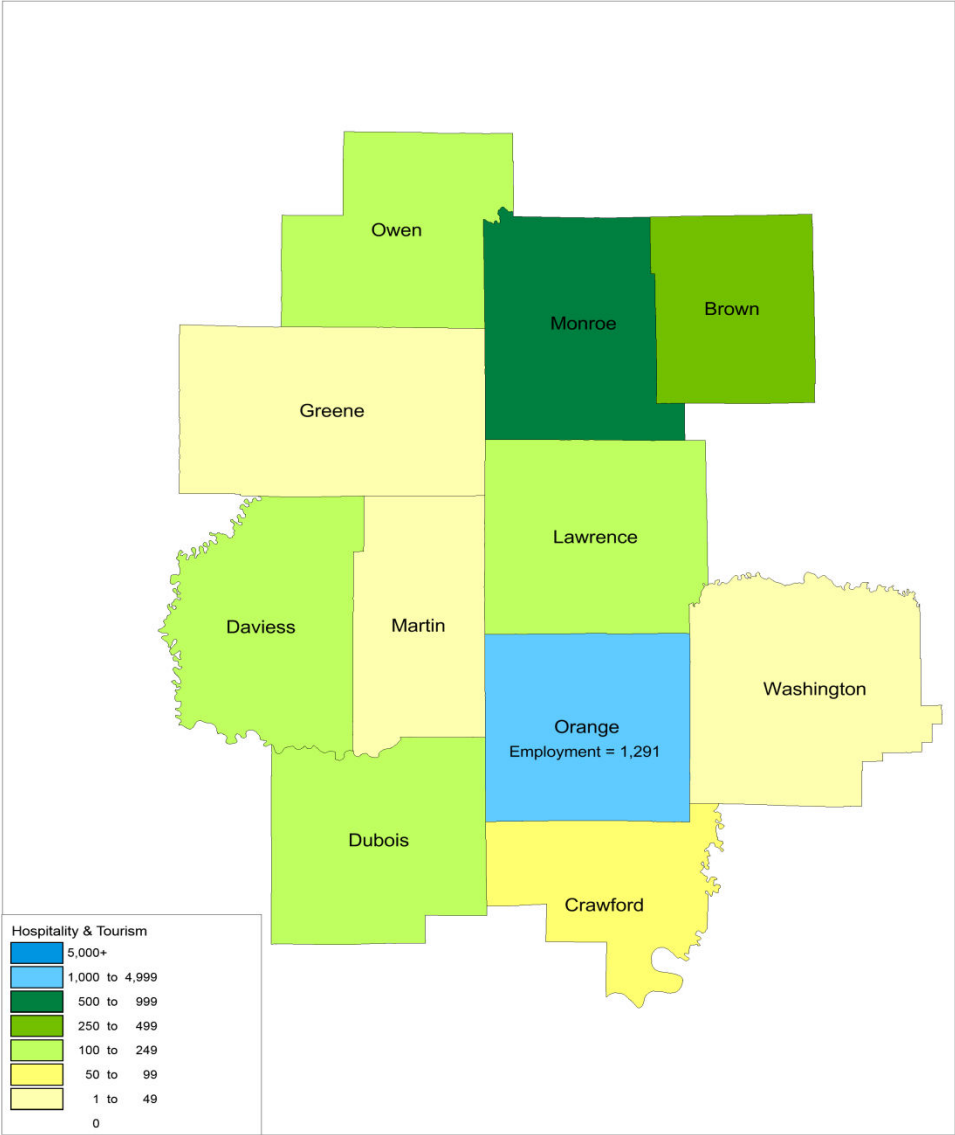
Source: Battelle analysis of Bureau of Labor Statistics QCEW data from IBRC and IMPLAN Group LLC, and company sources.

## Furniture - 2012 Cluster Employment by County



Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

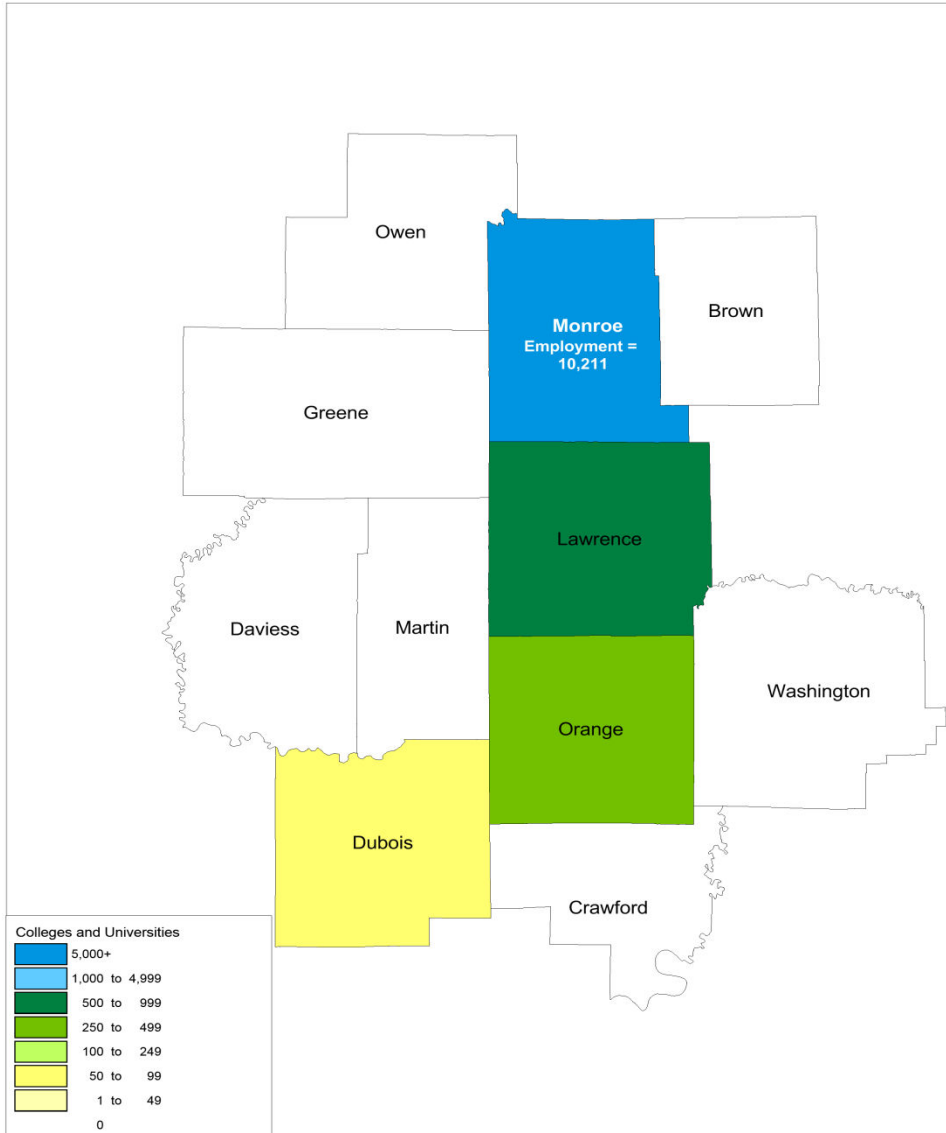
# Hospitality and Tourism - 2012 Cluster Employment by County



Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

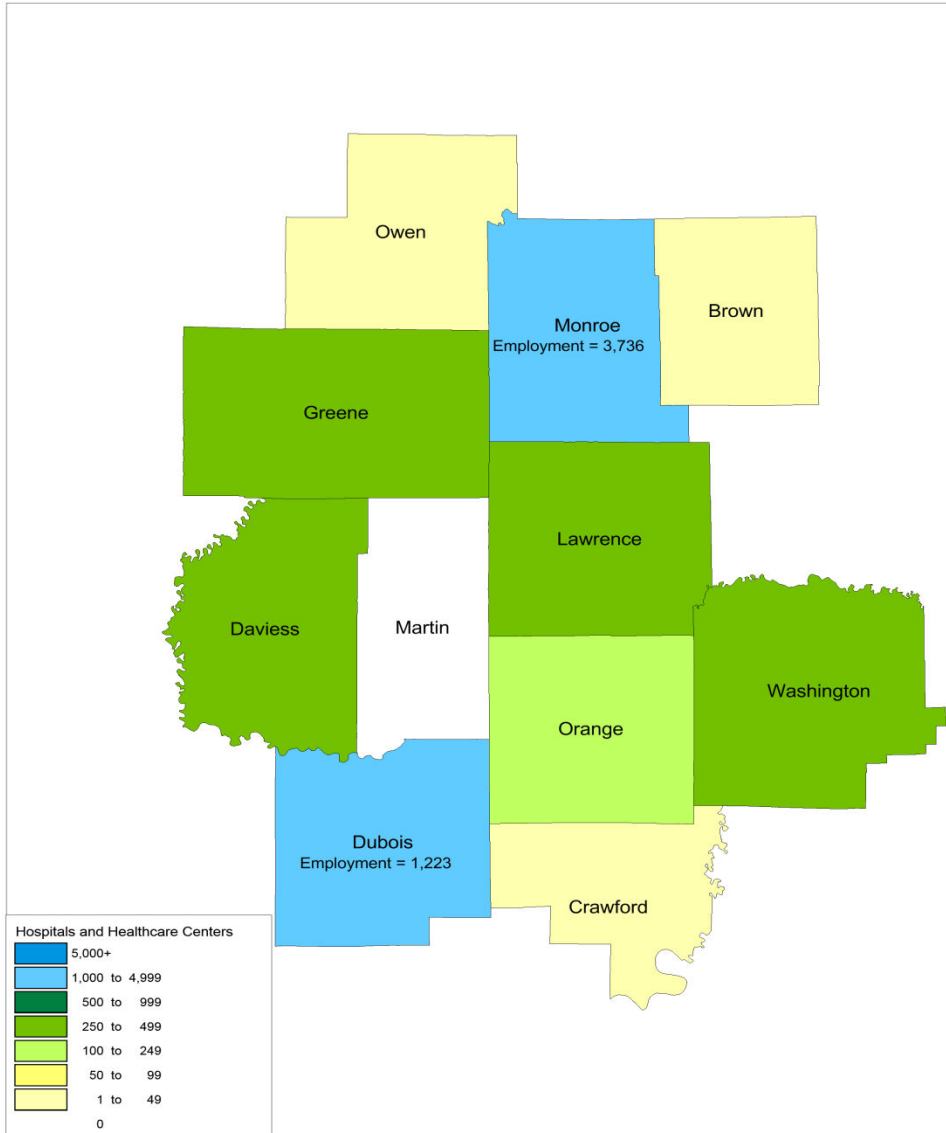


## Colleges and Universities - 2012 Cluster Employment by County



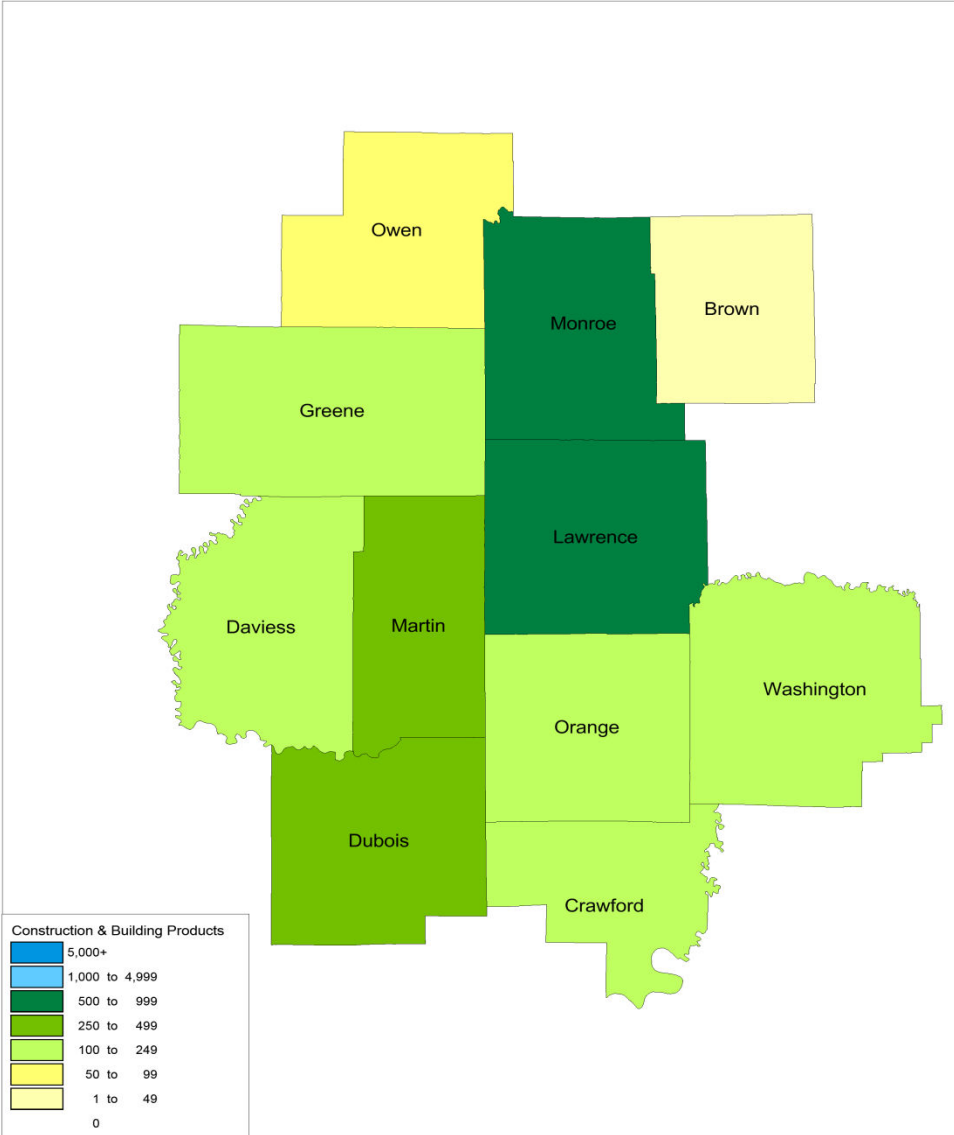
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## Hospitals and Healthcare Centers - 2012 Cluster Employment by County



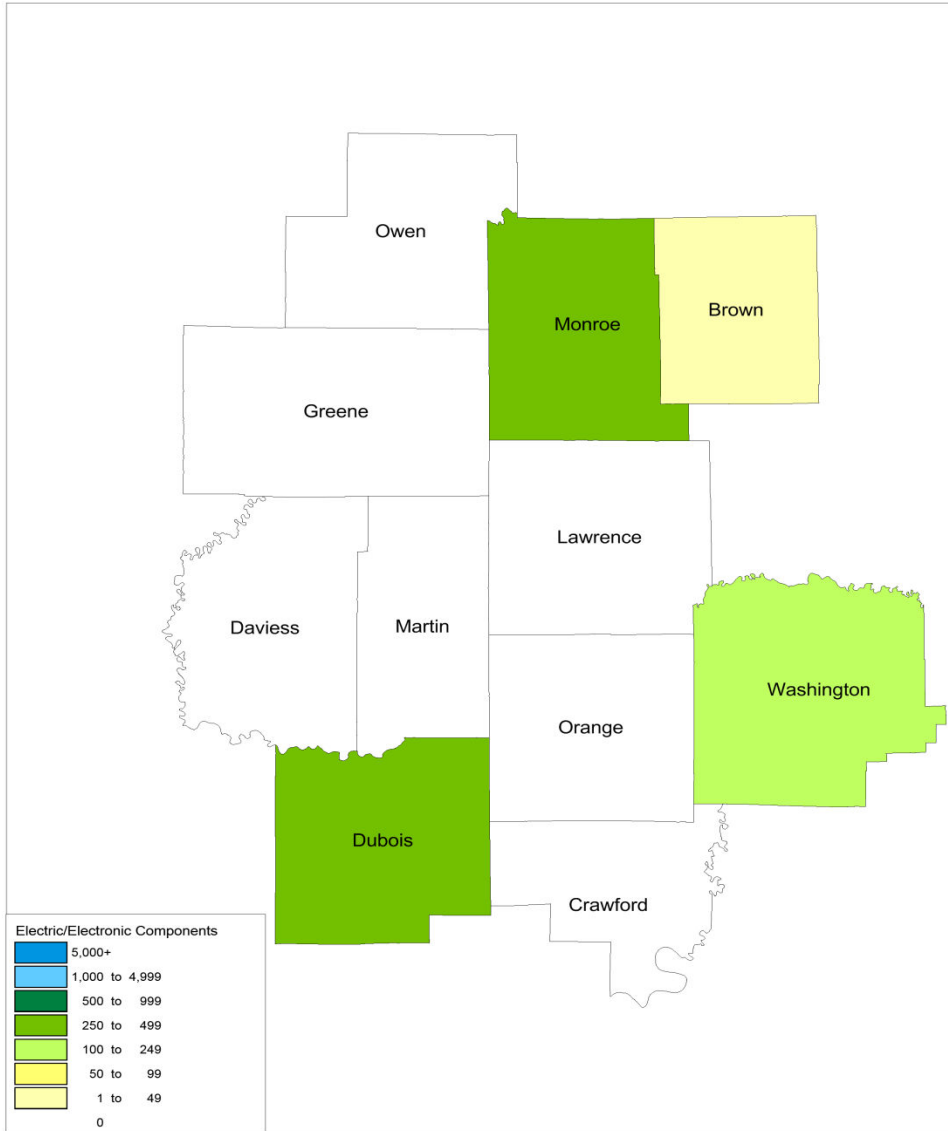
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

# Construction and Building Products - 2012 Cluster Employment by County



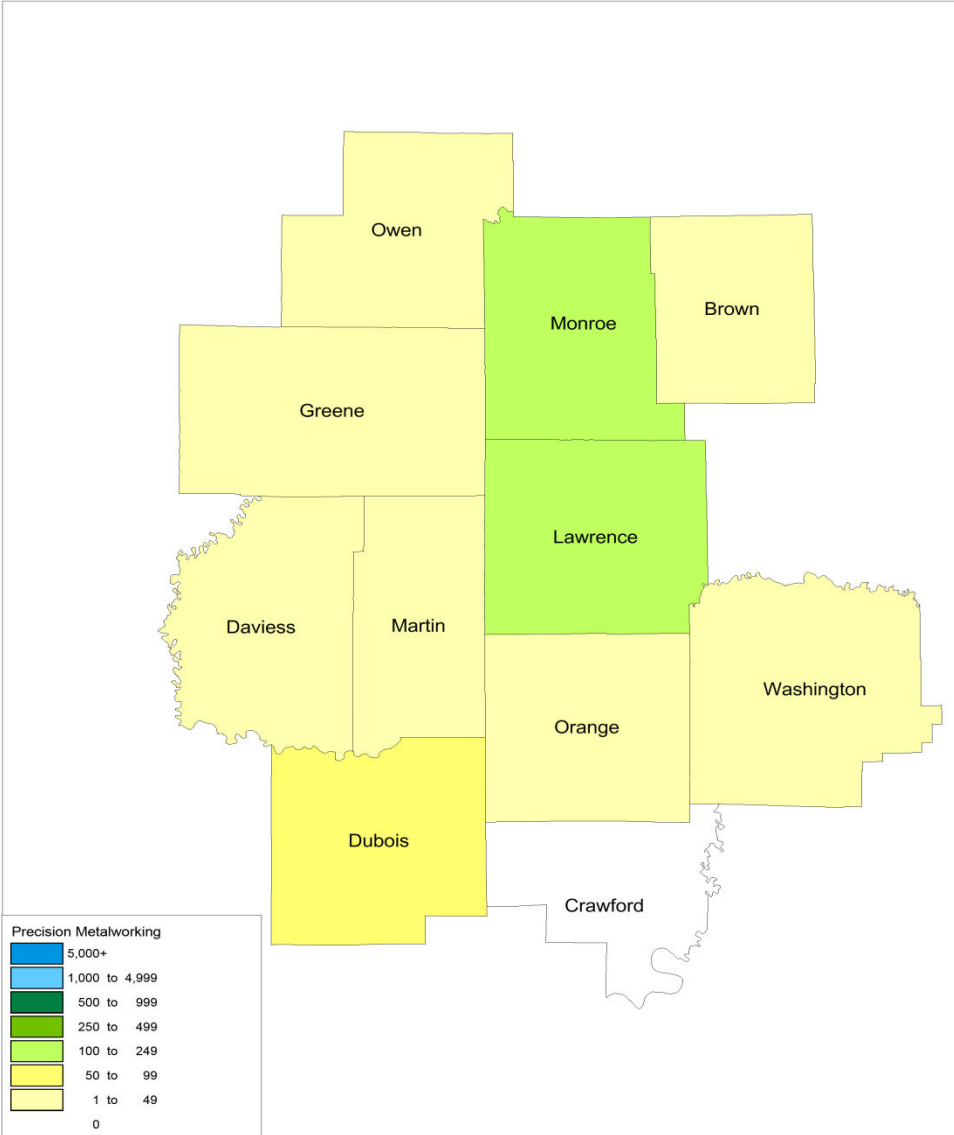
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

## Electric/Electronic Components - 2012 Cluster Employment by County



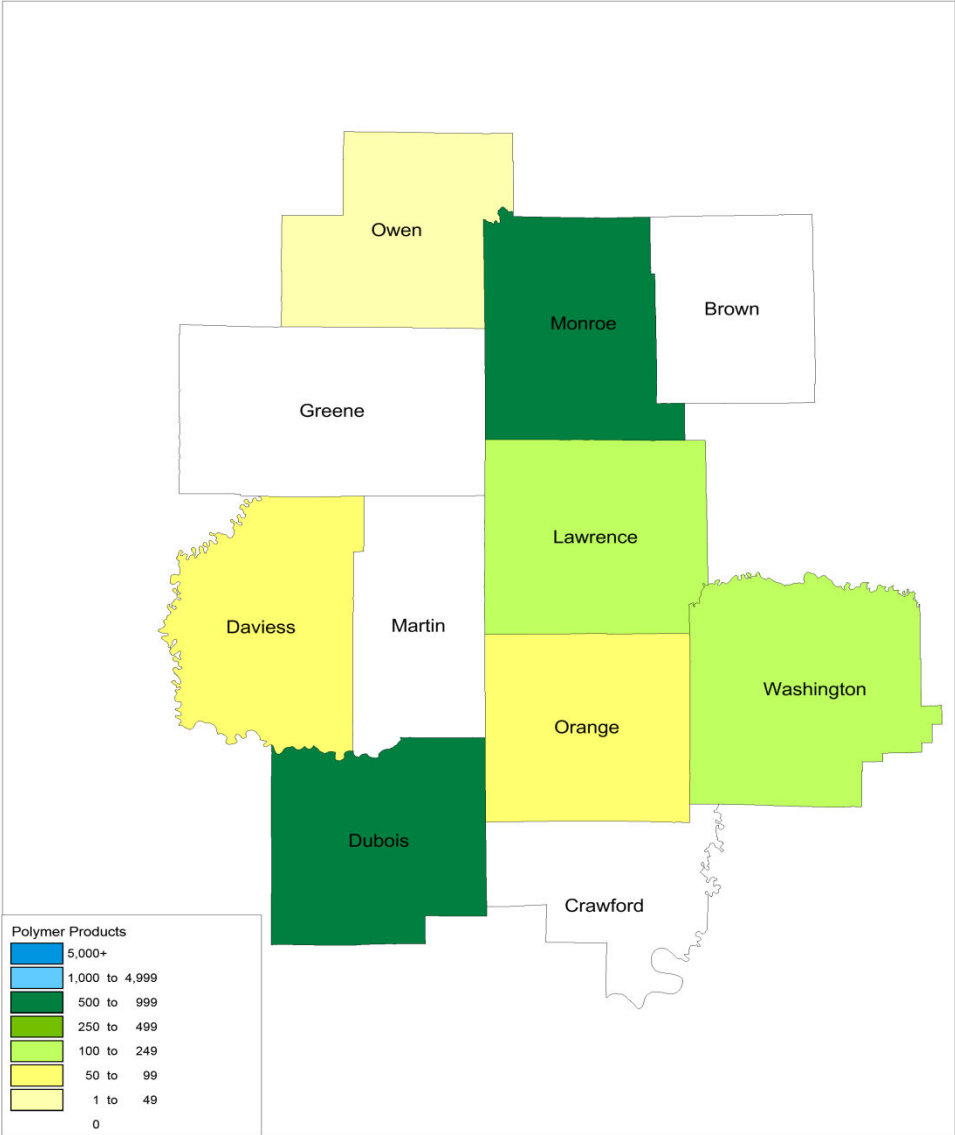
Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

# Precision Metalworking - 2012 Cluster Employment by County



Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

# Rubber and Plastic Products (Polymers) - 2012 Cluster Employment by County



Source: Battelle analysis of Bureau of Labor Statistics, QCEW data from IBRC.

Southwest Central Indiana 2012 Establishment Cluster Matrix												
Battelle Cluster	Brown	Crawford	Daviess	Dubois	Greene	Lawrence	Martin	Monroe	Orange	Owen	Washington	Regional Grand Total
<b>Total, All Industries</b>	<b>352</b>	<b>174</b>	<b>828</b>	<b>1,280</b>	<b>598</b>	<b>861</b>	<b>231</b>	<b>3,005</b>	<b>389</b>	<b>289</b>	<b>465</b>	<b>8,472</b>
Automotive/Heavy Vehicle Equipment	-	1	1	1	1	4	-	2	-	-	1	11
Biomedical Sciences	-	-	0	-	2	2	-	18	-	3	1	26
Colleges and Universities	-	-	-	1	-	1	-	3	1	-	-	6
Construction and Building Products	3	9	14	24	11	41	5	25	12	6	17	167
Electric/Electronic Components	1	-	0	2	0	0	-	3	0	-	1	7
Food Processing and Manufacturing	5	0	7	10	3	2	0	13	3	2	2	47
Furniture	1	0	29	35	3	0	3	8	7	1	6	93
Hospitality and Tourism	30	9	11	15	5	16	3	70	13	5	4	181
Hospitals and Healthcare Centers	1	1	4	9	2	5	-	34	3	2	3	64
Information and Communications Technology	8	1	0	11	4	2	11	83	0	1	1	122
National Security/Defense	1	0	6	14	7	12	11	25	2	2	3	83
Precision Metalworking	2	0	5	4	2	6	1	7	1	3	3	34
Rubber and Plastic Products	-	-	2	5	0	4	-	7	1	1	4	24
Transportation, Distribution, and Logistics	15	18	86	150	47	61	21	170	32	39	45	684

Southwest Central Indiana 2009-2012 Employment Percent Change Cluster Matrix												
Battelle Cluster	Brown	Crawford	Daviess	Dubois	Greene	Lawrence	Martin	Monroe	Orange	Owen	Washington	Regional
												Grand Total
<b>Total, All Industries</b>	<b>-3.8%</b>	<b>3.1%</b>	<b>0.0%</b>	<b>1.0%</b>	<b>-16.4%</b>	<b>3.7%</b>	<b>5.8%</b>	<b>-0.2%</b>	<b>-0.1%</b>	<b>-8.2%</b>	<b>6.2%</b>	<b>-0.3%</b>
Automotive/Heavy Vehicle Equipment	-	-21.9%	69.2%	28.3%	-	108.1%	-	-5.2%	-	-	128.9%	27.6%
Biomedical Sciences	-	-	-	-	169.0%	-51.3%	-	193.6%	-	-7.5%	-	87.9%
Colleges and Universities	-	-	-	6.0%	-	-14.2%	-	4.4%	0.3%	-	-	2.9%
Construction and Building Products	40.0%	190.0%	-12.5%	-13.9%	-7.0%	9.7%	46.2%	53.8%	12.7%	-11.0%	27.3%	17.3%
Electric/Electronic Components	-93.3%	-	-	0.2%	-	-	-	45.3%	-	-	161.1%	25.3%
Food Processing and Manufacturing	-40.9%	-	-0.9%	3.8%	-3.5%	200.0%	-	51.5%	18.0%	3.5%	3.2%	4.1%
Furniture	-90.0%	-100.0%	27.5%	0.8%	183.3%	-	-86.2%	-22.7%	6.1%	159.7%	-31.3%	0.7%
Hospitality and Tourism	68.7%	1.1%	-2.4%	-1.8%	20.7%	-3.0%	-60.0%	0.0%	26.9%	11.4%	-50.0%	12.9%
Hospitals and Healthcare Centers	100.0%	0.0%	-24.1%	-14.8%	-17.0%	-70.1%	-	2.7%	-19.8%	111.8%	-32.8%	-15.3%
Information and Communications Technology	107.1%	5050.0%	-	-1.8%	-95.5%	-92.9%	49.2%	85.3%	-100.0%	-	-12.5%	34.5%
National Security/Defense	-83.3%	-	-39.1%	-3.5%	-93.7%	146.5%	20.2%	5.0%	-93.8%	-73.8%	-66.7%	3.2%
Precision Metalworking	33.3%	-	41.7%	2.1%	162.5%	-33.8%	-93.2%	44.7%	-75.9%	138.9%	-27.3%	-16.2%
Rubber and Plastic Products	-	-	41.9%	11.9%	-	18.1%	-	58.5%	5.9%	12.9%	64.9%	34.1%
Transportation, Distribution, and Logistics	-10.0%	25.3%	4.1%	7.1%	10.7%	6.7%	-13.9%	3.9%	-0.9%	-21.7%	-8.6%	2.3%

Southwest Central Indiana 2012 Employment Location Quotient Cluster Matrix												
Battelle Cluster	Brown	Crawford	Daviess	Dubois	Greene	Lawrence	Martin	Monroe	Orange	Owen	Washington	Regional
												Grand Total
<b>Total, All Industries</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>
Automotive/Heavy Vehicle Equipment	0.00	18.37	0.67	7.00	1.73	4.33	0.00	2.15	0.00	0.00	13.34	3.41
Biomedical Sciences	0.00	0.00	0.00	0.00	1.36	0.18	0.00	14.20	0.00	58.17	0.29	5.92
Colleges and Universities	0.00	0.00	0.00	0.07	0.00	1.94	0.00	6.13	1.60	0.00	0.00	2.81
Construction and Building Products	1.33	10.21	2.77	1.95	2.28	9.69	5.05	1.64	2.63	2.64	5.31	2.99
Electric/Electronic Components	0.20	0.00	0.00	4.70	0.00	0.00	0.00	1.60	0.00	0.00	9.64	1.89
Food Processing and Manufacturing	0.37	0.00	8.07	3.43	1.39	0.02	0.00	0.26	1.45	6.73	1.39	1.72
Furniture	0.14	0.00	12.67	98.66	1.11	0.00	0.23	0.23	44.07	15.76	15.63	22.26
Hospitality and Tourism	4.32	1.60	0.53	0.28	0.19	0.35	0.07	0.54	6.03	1.68	0.11	0.82
Hospitals and Healthcare Centers	0.09	0.06	0.68	0.87	1.13	0.46	0.00	1.16	0.38	0.15	0.92	0.84
Information and Communications Technology	0.53	2.79	0.00	0.22	0.08	0.02	4.12	0.76	0.00	0.16	0.07	0.62
National Security/Defense	0.02	0.00	0.46	0.19	0.45	2.20	39.29	0.19	0.03	0.28	0.05	2.30
Precision Metalworking	0.38	0.00	0.43	0.97	0.89	2.27	0.22	0.48	0.26	2.53	0.38	0.77
Rubber and Plastic Products	0.00	0.00	0.91	3.53	0.00	2.48	0.00	2.14	1.17	1.22	5.34	2.11
Transportation, Distribution, and Logistics	0.54	0.92	1.41	1.35	0.60	0.58	0.32	0.61	0.41	1.62	0.46	0.80



## SWC Indiana Cluster NAICS Codes

SWC Indiana Cluster (Battelle Definition)	NAICS 2012	NAICS Description
<b>Automotive/Heavy Vehicle Equipment</b>	331523	Aluminum Die-Casting Foundries
	336111	Automobile manufacturing
	336112	Light truck and utility vehicle manufacturing
	336120	Heavy duty truck manufacturing
	336211	Motor vehicle body manufacturing
	336212	Truck trailer manufacturing
	336213	Motor home manufacturing
	336214	Travel trailer and camper manufacturing
	336310	Carburetor, Piston, Piston Ring, and Valve Manufacturing
	336320	Vehicular Lighting Equipment Manufacturing
	336330	Motor vehicle steering and suspension parts
	336340	Motor vehicle brake system manufacturing
	336350	Motor vehicle power train components mfg.
	336360	Motor vehicle seating and interior trim mfg.
	336370	Motor vehicle metal stamping
336390	Motor Vehicle Air-Conditioning Manufacturing	
<b>Biomedical Sciences</b>	325411	Medicinal and botanical manufacturing
	325412	Pharmaceutical preparation manufacturing
	325413	In-vitro diagnostic substance manufacturing
	325414	Other biological product manufacturing
	334510	Electromedical apparatus manufacturing
	339112	Surgical and medical instrument manufacturing
	339113	Surgical appliance and supplies manufacturing
	339114	Dental equipment and supplies manufacturing
	541711	Research and development in biotechnology
	621511	Medical laboratories
<b>Food Processing and Manufacturing</b>	311111	Dog and cat food manufacturing
	311119	Other animal food manufacturing
	311211	Flour milling
	311212	Rice milling
	311213	Malt manufacturing
	311221	Wet corn milling
	311224	Soybean Processing
	311225	Fats and oils refining and blending
	311230	Breakfast cereal manufacturing
	311313	Beet sugar manufacturing
	311314	Sugarcane Mills
	311340	Nonchocolate confectionery manufacturing
	311351	Chocolate/Confectionery Manufacturing from Cacao Beans
	311352	Confectionery Manufacturing from Purchased Chocolate
	311411	Frozen fruit and vegetable manufacturing
	311412	Frozen specialty food manufacturing
	311421	Fruit and vegetable canning
	311422	Specialty canning
	311423	Dried and dehydrated food manufacturing
	311511	Fluid milk manufacturing
	311512	Creamery butter manufacturing
	311513	Cheese manufacturing
	311514	Dry, condensed, and evaporated dairy products
	311520	Ice cream and frozen dessert manufacturing
	311611	Animal, except poultry, slaughtering
	311612	Meat processed from carcasses
	311613	Rendering and meat byproduct processing
	311615	Poultry processing
	311710	Seafood Canning

SWC Indiana Cluster (Battelle Definition)	NAICS 2012	NAICS Description
	311811	Retail bakeries
	311812	Commercial bakeries
	311813	Frozen cakes and other pastries manufacturing
	311821	Cookie and cracker manufacturing
	311824	Flour Mixes/Dough Manufacturing from Purchased Flour
	311830	Tortilla manufacturing
	311911	Roasted nuts and peanut butter manufacturing
	311919	Other snack food manufacturing
	311920	Coffee and tea manufacturing
	311930	Flavoring syrup and concentrate manufacturing
	311941	Mayonnaise, dressing, and sauce manufacturing
	311942	Spice and extract manufacturing
	311991	Perishable prepared food manufacturing
	311999	All other miscellaneous food manufacturing
	312111	Soft drink manufacturing
	312120	Breweries
	312130	Wineries
	312140	Distilleries
<b>Furniture</b>	337110	Wood kitchen cabinet and countertop mfg.
	337121	Upholstered household furniture manufacturing
	337122	Nonupholstered wood household furniture mfg.
	337124	Metal household furniture manufacturing
	337125	Household furniture, exc. wood or metal, mfg.
	337127	Institutional furniture manufacturing
	337211	Wood office furniture manufacturing
	337212	Custom architectural woodwork and millwork
	337214	Office furniture, except wood, manufacturing
	337215	Showcases, partitions, shelving, and lockers
<b>Hospitality &amp; Tourism</b>	487110	Scenic and sightseeing transportation, land
	487210	Scenic and sightseeing transportation, water
	487990	Scenic and sightseeing transportation, other
	532292	Recreational goods rental
	561510	Travel agencies
	561520	Tour operators
	561591	Convention and visitors bureaus
	561599	All other travel arrangement services
	561920	Convention and trade show organizers
	711110	Theater companies and dinner theaters
	711120	Dance companies
	711130	Musical groups and artists
	711190	Other performing arts companies
	711211	Sports teams and clubs
	711212	Racetracks
	711219	Other spectator sports
	711310	Promoters with facilities
	711320	Promoters without facilities
	711510	Independent artists, writers, and performers
	712110	Museums
	712120	Historical sites
	712130	Zoos and botanical gardens
	712190	Nature parks and other similar institutions
	713110	Amusement and theme parks
	713210	Casinos, except casino hotels
	713290	Other gambling industries
	713910	Golf courses and country clubs
	713920	Skiing facilities
	713930	Marinas

<b>SWC Indiana Cluster (Battelle Definition)</b>	<b>NAICS 2012</b>	<b>NAICS Description</b>
	713990	All other amusement and recreation industries
	721110	Hotels and motels, except casino hotels
	721120	Casino hotels
	721191	Bed-and-breakfast inns
	721211	RV parks and campgrounds
	721214	Recreational and vacation camps
<b>Information and Communications Technology</b>	334111	Electronic computer manufacturing
	334112	Computer storage device manufacturing
	334118	Computer Terminal Manufacturing
	334210	Telephone apparatus manufacturing
	334220	Broadcast and wireless communications equip.
	334290	Other communications equipment manufacturing
	334310	Audio and video equipment manufacturing
	334413	Semiconductors and related device mfg.
	511210	Software publishers
	519130	Internet publishing and web search portals
	541511	Custom computer programming services
	541512	Computer systems design services
	541513	Computer facilities management services
	541519	Other computer related services
<b>National Security/Defense</b>	332992	Small arms ammunition manufacturing
	332993	Ammunition, except small arms, manufacturing
	332994	Small arms manufacturing
	334511	Search, detection, and navigation instruments
	336992	Military armored vehicles and tank parts mfg.
	541330	Engineering services
	541712	Other physical and biological research
	928110	National Security
<b>Transportation, Distribution, &amp; Logistics</b>	321920	Wood container and pallet manufacturing
	322211	Corrugated and solid fiber box manufacturing
	322212	Folding paperboard box manufacturing
	322219	Setup Paperboard Box Manufacturing
	333922	Conveyor and conveying equipment mfg.
	333923	Overhead cranes, hoists, and monorail systems
	333924	Industrial truck, trailer, and stacker mfg.
	423110	Motor vehicle merchant wholesalers
	423120	New motor vehicle parts merchant wholesalers
	423130	Tire and tube merchant wholesalers
	423140	Used motor vehicle parts merchant wholesalers
	423210	Furniture merchant wholesalers
	423220	Home furnishing merchant wholesalers
	423310	Lumber and wood merchant wholesalers
	423320	Masonry material merchant wholesalers
	423330	Roofing and siding merchant wholesalers
	423390	Other const. material merchant wholesalers
	423410	Photographic equip. merchant wholesalers
	423420	Office equipment merchant wholesalers
	423430	Computer and software merchant wholesalers
	423440	Other commercial equip. merchant wholesalers
	423450	Medical equipment merchant wholesalers
	423460	Ophthalmic goods merchant wholesalers
	423490	Other professional equip. merchant wholesalers
	423510	Metal merchant wholesalers
	423520	Coal and other mineral merchant wholesalers
	423610	Elec. equip. and wiring merchant wholesalers
	423620	Electric appliance merchant wholesalers
	423690	Other electronic parts merchant wholesalers

SWC Indiana Cluster (Battelle Definition)	NAICS 2012	NAICS Description
	423710	Hardware merchant wholesalers
	423730	HVAC equip. merchant wholesalers
	423740	Refrigeration equip. merchant wholesalers
	423810	Construction equipment merchant wholesalers
	423820	Farm and garden equip. merchant wholesalers
	423830	Industrial machinery merchant wholesalers
	423840	Industrial supplies merchant wholesalers
	423850	Service estab. equip. merchant wholesalers
	423860	Other transport. goods merchant wholesalers
	423910	Sporting goods merchant wholesalers
	423920	Toy and hobby goods merchant wholesalers
	423930	Recyclable material merchant wholesalers
	423940	Jewelry merchant wholesalers
	423990	All other durable goods merchant wholesalers
	424110	Printing and writing paper merch. whls.
	424120	Office supplies merchant wholesalers
	424130	Industrial paper merchant wholesalers
	424210	Druggists' goods merchant wholesalers
	424310	Piece goods merchant wholesalers
	424320	Men's and boys' clothing merchant wholesalers
	424330	Women's and children's clothing merch. whls.
	424340	Footwear merchant wholesalers
	424410	General line grocery merchant wholesalers
	424420	Packaged frozen food merchant wholesalers
	424430	Dairy product merchant wholesalers
	424440	Poultry product merchant wholesalers
	424450	Confectionery merchant wholesalers
	424460	Fish and seafood merchant wholesalers
	424470	Meat and meat product merchant wholesalers
	424480	Fruit and vegetable merchant wholesalers
	424490	Other grocery product merchant wholesalers
	424510	Grain and field bean merchant wholesalers
	424520	Livestock merchant wholesalers
	424590	Other farm product raw material merch. whls.
	424610	Plastics materials merchant wholesalers
	424690	Other chemicals merchant wholesalers
	424710	Petroleum bulk stations and terminals
	424720	Other petroleum merchant wholesalers
	424810	Beer and ale merchant wholesalers
	424820	Wine and spirit merchant wholesalers
	424910	Farm supplies merchant wholesalers
	424920	Book and periodical merchant wholesalers
	424930	Nursery and florist merchant wholesalers
	424940	Tobacco and tobacco product merch. whls.
	424950	Paint and supplies merchant wholesalers
	424990	Other nondurable goods merchant wholesalers
	425110	Business to business electronic markets
	425120	Wholesale trade agents and brokers
	481112	Scheduled freight air transportation
	481212	Nonscheduled air freight chartering
	482111	Line-haul railroads
	482112	Short line railroads
	483111	Deep sea freight transportation
	483112	Deep sea passenger transportation
	483113	Coastal and Great Lakes freight transport.
	483114	Coastal and Great Lakes passenger transport.
	483211	Inland water freight transportation

SWC Indiana Cluster (Battelle Definition)	NAICS 2012	NAICS Description
	484110	General freight trucking, local
	484121	General freight trucking, long-distance TL
	484122	General freight trucking, long-distance LTL
	484210	Used household and office goods moving
	484220	Other specialized trucking, local
	484230	Other specialized trucking, long-distance
	488190	Other support activities for air transport.
	488210	Support activities for rail transportation
	488310	Port and harbor operations
	488320	Marine cargo handling
	488330	Navigational services to shipping
	488390	Other support activities for water transport.
	488490	Other support activities for road transport.
	488510	Freight transportation arrangement
	488991	Packing and crating
	488999	All other support activities for transport.
	492110	Couriers and express delivery services
	492210	Local messengers and local delivery
	493110	General warehousing and storage
	493120	Refrigerated warehousing and storage
	493130	Farm product warehousing and storage
	493190	Other warehousing and storage
	541614	Process and logistics consulting services
	561910	Packaging and labeling services

