PURDUE
CENTER FOR
REGIONAL DEVELOPMENT

Race to the Future:

The Statewide Impact

of

Motorsports in Indiana

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Executive Summary

Indiana and the Central Indiana region in particular, are known as the 'Racing Capital of the World.' Traditionally, this designation exists due the presence of the Indianapolis Motor Speedway and the annual running of the Indianapolis 500.

In preparing this report for the Motorsports and Vehicle Production Network project, we learned that motorsports touches nearly every corner of Indiana and is indirectly responsible for over 421,000 jobs while the cluster directly employs over 23,000 individuals in the state and pays an average wage of nearly $63,000, exceeding the average state wage by over $13,000.

One challenge that project staff faced is that there was no pre-existing definition of a 'motorsports cluster.' To address this, a compilation of company information was compiled from databases supplied by Conexus and the Indiana Motorsports Association. 172 unique 6-digit NAICs codes were obtained and the most frequent NAICS codes were processed through an input-output table for Indiana. From this we were able to identify significant value and supply chain linkages. Motorsports related patents were studied to identify their NAICS codes; available literature on motorsports was studied; and input from IMA members was received. This list was refined to 120 6-digit NAICS codes to create a definition for the motorsports cluster. A further refinement based on survey input became the definition for the core motorsports industries.

From this process, we were able to document the extended industry supply chain that includes vehicle production facilities and other suppliers as well as a smaller group of companies that are more exclusively aligned with motorsports.

Indiana is one of the top three locations in the world where the motorsports industry is concentrated. But, unlike England and North Carolina, the other two motorsports capitols, Indiana's motorsports companies are linked to other industries such as defense and aerospace, passenger vehicle manufacturing, and orthopedics. So, while there is a 'core cluster' of motorsports firms that is very directly engaged in motorsports, the industry cluster is broader because it includes firms that supply to or buy from the industry, but aren't exclusively motorsports.

Motorsports in Indiana also helps to spur innovation. Inventions and innovations in the racing industry are often transferred to other industries to solve problems. Race helmet design, for example, is helping to produce football helmets that may minimize concussions. But, a major challenge facing efforts to transfer technology from motorsports to other industries is a relative lack of intellectual property protection: innovation occurs so fast within motorsports that there isn't time to seek patent protection before the next variation is designed.

Another critical aspect of motorsports companies in Indiana is that their footprint extends beyond the state. Racing teams domiciled in Indiana travel all over the country for races, bringing dollars back. And companies that are involved in supplying the motorsports cluster are also sending their wares around the globe with customers in over twenty countries. It is also the case that spectators come from all over the globe to witness race events in Indiana: not just events at the Indianapolis Motor Speedway, but at venues all around the state.

Motorsports touches 91 of Indiana's 92 counties in some way or another. Beyond racetracks, there are race teams, fabricators, manufacturers, research and development firms, welding companies, suppliers, marketing and public relations firms, and service providers who compose the whole of the motorsports footprint in the state.

The challenge and opportunity for Indiana and many communities is: 'how do we expand and grow the motorsports assets we already have?'

The authors spoke to a number of companies within the cluster and discovered that, while many of them are expecting to grow in the next five years, their growth may be threatened by a number of factors:

- There is a potential lack of qualified candidates for existing job openings and within the next five years, the baby boom cohort retirements will affect motorsports companies' growth plans;
- While there are a number of training entities in the state, they are not always well connected to the motorsports companies and some of them are under-capacity;
- The industry is facing a number of non-traditional challenges: motorsports is now part of a vast entertainment milieu, which now includes video games, other sports, movies, television, etc. The entertainment dollar that goes to motorsports is shrinking. The industry needs to diversify its income streams and should look to technology transfer and commercialization of intellectual property to generate new revenue streams;

- Local economic development officials need assistance to identify the motorsports assets in their backyards and need help developing a toolkit for helping these companies grow and for directing resources and business advice to small motorsports companies.

Indiana has a number of assets and resources that can be mobilized to secure this industry cluster's place in the state's economy and to help it grow. This study can serve as a call to action for policy makers, local economic development and elected officials, and to the state's institutions of higher education to rise to this opportunity and help grow this industry.

Introduction

Motorsports, as the name implies is about the sport of racing. In economic terms, the sport of racing (or motorsports) is unique in the world of sports. Motorsports, especially at its highest level, is about technology and ongoing innovation. Thus while the driver is important, so is the engineer, the mechanic, the fabricator, and the innovator in a small shop on Gasoline Alley, in Martinsville and in virtually all other parts of Indiana. In simple terms, football uses pigskin, baseball uses cowhide and motorsports uses Kevlar. While bats and balls remain the same, the race car is remarkably different than it was even 20 years ago. It is this commitment to innovative technology that makes the motorsports cluster so fundamentally different than other sports.

Because motorsports is committed to innovative technology and production, the motorsports cluster contains a wider range of industry sectors and its economic contribution is spread over a broader geography than other sports. While the core motorsports industries, including race tracks and events, racing leagues, race teams, media, and marketing are similar to other sports, the rest of the motorsports cluster is much different and includes a wide range of high technology engineering and manufacturing firms, as well as firms that provide materials and parts and service firms that benefit from financial and technical interactions with firms directly involved in the sport of racing.

Understanding the relationship between the core racing industry and the motorsports cluster is critical to this analysis. The core racing industry is limited to firms directly involved in the sport of racing, these firms would not exist but for the sport of racing. The motorsports cluster consists of the core racing industry and firms that provide benefits to and firms that benefit from economic and technical interaction with the core racing firms. In addition to the firms in the core racing industry, the motorsports cluster includes firms in 120 six digit NAICS codes that provide or purchase services,

materials, and/or parts to or from core racing industries. For example a race team, a race track, or a parts manufacturer whose existence depends on purchases from racing teams is part of the core racing industry. They are joined in the motorsports cluster by all the other firms, including vehicle production firms, that buy from and sell to racing firms, that share similar technology, use the same labor pool and supply chains. This also includes support services such as legal, financial, and marketing firms.

The Motorsports Cluster

Motorsports is a unique activity because it cannot be associated with any single industry code which has been previously defined by the North American Industry Classification System (NAICS). It is part sports, part precision manufacturing, part industrial design, part research and development, part advertising and marketing, part recreation, part organization of large events and so on. It is one distinctive economic activity with various facets. Identification of an industry cluster around such diverse economic and sporting activity is a challenging task. In Indiana we're fortunate to have the Indiana Motorsports Association and CONEXUS, which maintained a list of businesses and industries engaged in motorsports and allied activities.

The first task of this project was to identify the specific NAICS codes for these industries and businesses. Doing this gave us important insight into how diversified the motorsports actually is with 170 different 6-digit NAICS codes. At the same time, we conducted a review of the published literature and followed a methodology which has been used previously by several cluster studies. An Input Output analysis was conducted on the most frequent NAICS codes to identify significant supply and value chain linkages to other industries. An Indiana specific Input Output table developed by the Economic Modeling Specialists, Inc. (EMSI) was used. And finally, we also looked into the patent database and identified motorsports-related patents and their associated NAICS codes. This helped us narrow down the

preliminary large list of NAICS codes. The research team reviewed and discussed the list internally. Input from IMA members was sought and the list was further refined to 120 NAICS codes that includes industries which are directly and indirectly associated to motorsports activities.

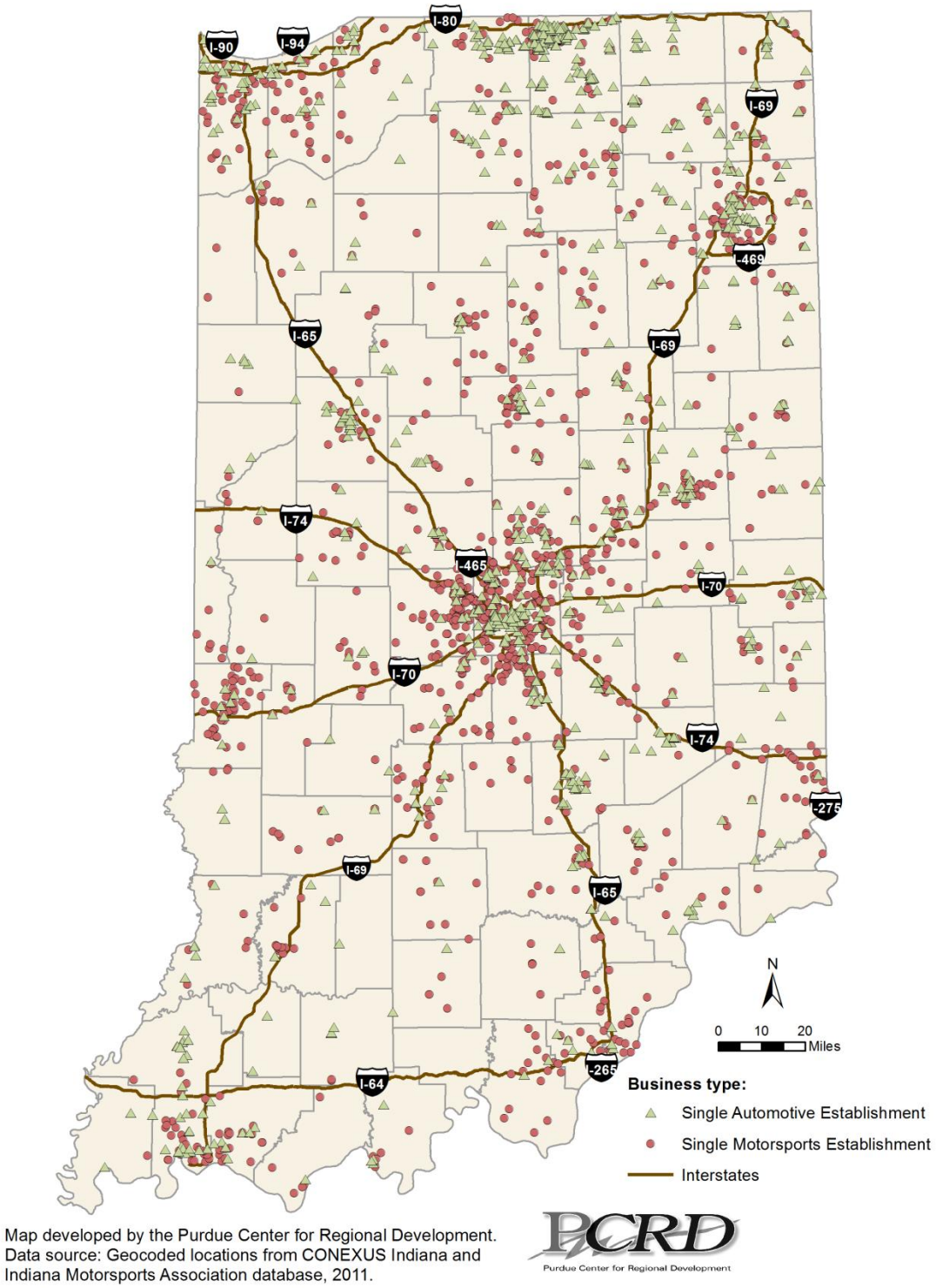
The motorsports cluster is important to Indiana's economy in its size and diversity. Per EMSI, in 2011 there were 24,474 firms in the motorsports cluster. The 2010 estimate for employed individuals in this cluster was 421,472. The EMSI estimate for average annual earnings in 2012 for this cluster is $62,878. The estimated statewide average annual earnings is $50,208[1] In spite of common perceptions that associated motorsports with the Indianapolis Motor Speedway and the central Indiana region, the cluster reaches across the state. As shown in Figure 1, nearly every county in the state benefits from having individuals employed in the motorsport cluster. 28.6% of all motorsports firms are in the Indianapolis region (MSA, 10 counties according to Census TIGER file 2009); 71.4%, representing 17,468 firms and 314,209 jobs are located outside the Indianapolis region.[2]

Core Racing Industry

The core racing industry within the motorsports cluster consists of the 2,130 establishments associated with the sport of racing. The core racing industry represents approximately 8.7 percent of the firms in the motorsports cluster. 23,000 individuals are employed in the core racing industry which represents 5.5 percent of total employment in the motorsports cluster. Annual average earnings of $67,667 in the core racing industry compares favorably to both the motorsports cluster and statewide average earnings. As with firms in the greater motorsports cluster, many of the premier racing teams and facilities are located in central Indiana, but core industries are also located all across the state. The geocoded map of IMA and CONEXUS databases shows that 91 of Indiana's 92 counties have at least one racing industry-related firm (please refer to Figure 1).

[1] EMSI
[2] EMSI

Figure 1: Locations of businesses involved in motorsport industry in Indiana, 2011.



Map developed by the Purdue Center for Regional Development.
Data source: Geocoded locations from CONEXUS Indiana and Indiana Motorsports Association database, 2011.

Core racing industries as defined in this study include race teams, race tracks, racing leagues, race car design and assembly, parts manufacturers and suppliers, and engineering firms. The core racing industry also includes a small group of radio and television broadcast companies, marketing firms, and apparel and equipment manufacturers (for both drivers and fans) that rely on racing for their livelihood. The definition, for the purposes of this study, does not include a number of charitable foundations associated with racing. It also does not include legal and accounting firms and medical/physical therapy specialists that provide services to core racing industry firms.

The Motorsports cluster is important to Indiana's economy

While its size alone makes the motorsports cluster a key component of Indiana's economy, there are other elements that combine to enhance its importance to Indiana's economic future. Among these elements are:

- The links between core racing industries and the motorsport cluster and between manufacturing and technology in Indiana is unique to the United States and rare internationally;
- The international nature of racing enhances Indiana's international image, attracts human capital and foreign investment, and engenders the business relationships necessary to globalize the market for local products;
- Motorsports is a statewide industry;
- The high-technology, high skill nature of the cluster attracts engineers and innovators to Indiana;
- The advanced manufacturing and advanced technology component of motorsports supports Indiana's manufacturing base and provides an exciting opportunity for those wishing to make their living through labor;

- The many examples of innovative development and technology transfers suggest that with some strategic refinement a much wider range and number of technology transfer opportunities could be developed; and,
- The highly skilled workforce in the cluster is potentially supported by an increasingly large collection of technology and business related programs across a wide range of universities and community colleges.

Compared to other motorsports clusters, Indiana is uniquely positioned

By most accounts, Indiana, North Carolina, and England are recognized as the three leading international motorsports economies. England is generally acknowledged as the epicenter of Formula One and the most advanced racing technologies. North Carolina is generally recognized as a NASCAR hub (although NASCAR's most prominent event, the Daytona 500, and its corporate headquarters are located in Daytona, Florida). Indiana, while generally known as the home of open wheel oval racing (including open wheel's most prominent event, the Indianapolis 500 and its corporate leadership in the form of the Indianapolis Motor Speedway and Indy Car), has a much more diverse motorsports culture including sprint cars, midgets, karting, power boats, motorcycles, the NHRA and many other forms of racing. Compared to North Carolina and England, historically, there has been a significant concentration of automotive industries and transportation equipment manufacturing (RVs, Trucks and Trailers) industries in Indiana. This is one of the unique competitive advantages for Indiana.

When looking beyond the core racing industry, Indiana is much better positioned than North Carolina to capitalize on the racing industry's relationship with the high technology, and advanced manufacturing elements of the motorsports cluster. 16.53 percent of Indiana's workforce is engaged in manufacturing compared to 10.91 percent of North Carolina's.[3] The concentration of manufacturing firms likely

[3] EMSI

contributes to the highly-skilled and specialized work force that was the most commonly cited reason by those interviewed for why racing industry firms located in Indiana. It is also likely that other manufacturing firms benefit from exchanging workers and technology with racing industry firms.

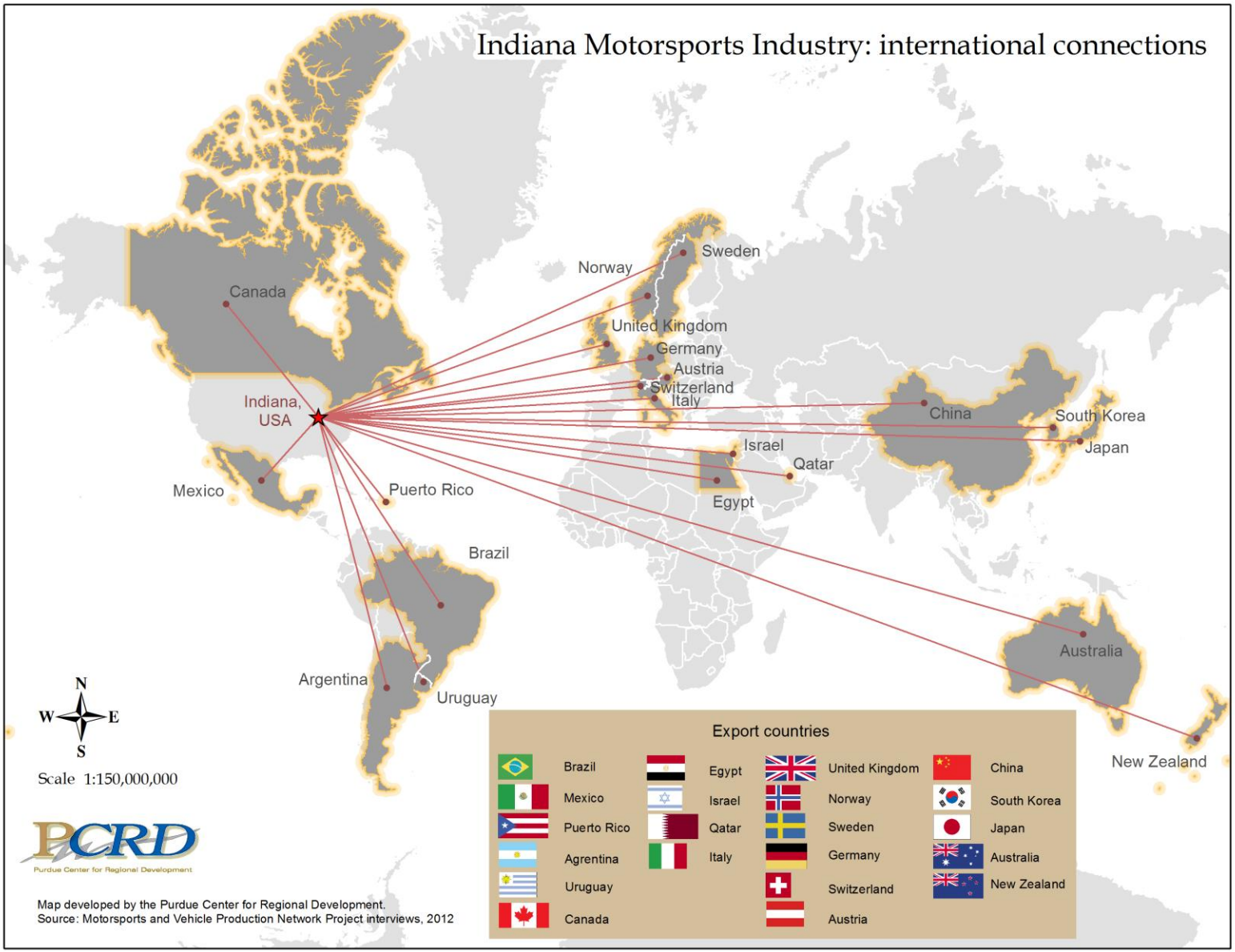
Indiana motorsports is international

In this global economic era, cities and states relentlessly seek to develop international reputations, attract foreign investment, and develop international export markets. While many in Indiana think locally when it comes to motorsports, it may actually represent one of the most internationally advanced industry clusters in the state. The racing industry attracts human capital from all over the world, exports high-technology value added products across the globe, and brings foreign direct investment to Indiana. International connections revealed during our interviews with racing industries are shown in Figure 2.

Because Indiana enjoys a preeminent position as one of the big three in the international racing community and has such a broad range of motorsports elements, it has been able to attract not only some of the best racing drivers but also some of the brightest racing engineers and entrepreneurs from all over the world. During our interviews with core racing firms, we came across a number of examples. We met an individual who relocated from England in order to help design Indy Cars. Another interviewee migrated from Australia to build chassis and compete in the NHRA. Dallara has brought a number of its Indy Car support staff from Italy to its new facility in Speedway, Indiana.

The ability to attract human capital from all parts of the world enhances Indiana's international image and also contributes directly to the economy by attracting innovators who develop new products and start new companies. Furthermore, the influx of different cultures indirectly benefits the economy by contributing to the ongoing development of a diverse population and culture.

Figure 2. International connections of racing industry in Indiana based on interviews.



In addition to importing human capital, Indiana's motorsports cluster exports many products. The motorsports exporters represent many sizes of companies. MagTech, a small firm has experienced growing demand from racers located in Australia, New Zealand, and Canada, with little or no marketing. Vance and Hines, a much larger firm, ships products to most of Europe, Australia, and ships to the growing markets in China and Japan. In addition to exporting technology and finished products, there also are firms, such as A.E.D. Motorsport Products, that ship unfinished materials across the globe. Firms such as Maingate sell merchandise and apparel globally. A number of export firms are located outside the Indianapolis region. Lingenfelter Performance Engineering in Decatur recently exported high performance Corvettes to Saudi Arabia and Russia and Lafayette-based McKinney Corporation designs and builds drag racing chassis that ship globally, most recently to an emerging Brazilian market.

There also are many examples of racing-related direct foreign investment. For example, Xtrac, Inc. has a facility in Indianapolis. Headquartered in England, this company realized that to compete effectively in the Indy Car and sports car markets, it must be located in Indiana. REGO-Fixed Tools, with corporate offices in Switzerland and known for its CNC tools craftsmanship, located a facility in Indianapolis to better serve the racing industry as well as other firms that use CNC machine tools. Finally, Dallara located its Indy Car assembly facility in Speedway (Indiana), and in a typical month purchases parts, materials or services from approximately 25 firms located in Indiana. Dallara will eventually locate its Indy Car related engineering facility in Speedway, as well.

Motorsports is a statewide industry

Many think of Indiana's motorsports cluster as being centered in and around Indianapolis and the Indianapolis Motor Speedway. And while there is a very dense cluster of racing industry firms located in the central part of the state, motorsports is actually very much a statewide cluster. For example Hoosier Racing Tire is located in Lakeville and employs approximately 250 individuals. Jasper Engines and

Transmission is located in Jasper and employs approximately 300. Landrum Performance Springs is located in Mentone and ships its products to NASCAR teams outside Indiana. Moser Engineering and Performance Tools, Inc. are sister companies with 40 employees located in Portland (Indiana). These firms engage engineers in the design and production of performance axels and precision gauges. Haulmark Industries has 50 employees, is located in Bristol and is the second largest producer of racing trailers in the United States. AFCO Racing Products in Boonville employs approximately 20 individuals. In addition to the racing teams and production companies scattered throughout Indiana, there are many racing facilities. Also of note, the New Castle Motorsports Park is owned by former Indy Car racer Mark Dismore and hosts a number of national karting events.

In fact there are approximately 1,339 core racing industry firms and 17,468 motorsports cluster firms located outside the Indianapolis region and these firms employ approximately 12,032 in core industries and 314,209 in the motorsports cluster respectively.

As shown in Figure 1, the non-metro Indianapolis motorsports and core racing firms are dispersed throughout the state. There are at least 25 individuals employed in the motorsports cluster in nearly all of the state's 92 counties.

Motorsports is a highly innovative, hi-tech, education and skill intensive industry

Motorsports is an industry that relies on constant innovation and improvement. In a 2004 report on motorsports industry in Indianapolis[4] it was suggested that while patents are the most commonly used measure of innovation, it is not an effective measure of innovation in motorsports. There are surprisingly few motorsports related patents because the pace of innovation in the motorsports industry is so rapid that a new part or technology is often obsolete before the patent application process can be completed. Virtually every individual we interviewed who was involved in production addressed the

[4] Motorsports in the Indianapolis Region, Drew Klacik, Center for Urban Policy and the Environment 2004.

notion that everyone in the company from the design engineer to a worker on the assembly line needs to be focused on making their parts better. The company that develops the parts that make a car faster, safer, and more enduring is going to succeed and thrive.

The necessity for constant improvement and innovation requires a well-educated, well trained and highly motivated workforce. Those interviewed suggested that the quality of Indiana's racing industry workforce coupled with the state's ability to attract some of the best and brightest racing workers results in a major competitive advantage for the state's racing industries. The 2004 motorsports study revealed that contrary to the 1950s notion of the greasy racing mechanic, nearly 70 percent of all individuals employed at racing firms had at least an Associate's degree. Among the specific skills required by those interviewed in 2004 and in 2011 are:

- 3D and computer-aided design
- Aerodynamic engineering
- Mechanical engineering
- Electrical engineering
- Tungsten Inert Gas (TIG) Welding
- CNC machine programming
- Flow analysis
- Fabrication
- Marketing
- Accounting
- Logistics
- Business management

The list of skills and specialties in the motorsports cluster clearly displays its linkages to other mechanical production sectors. This suggests an opportunity for worker and idea exchange with other business in the motorsports cluster. It also suggests the potential for technology transfers, especially when those within the cluster can address a simple but critical difference between core racing firms and the rest of the cluster. That key difference being that racing firms produce parts in in limited supply and at high rates of return per part. Other firms rely on mass production accompanied by a low rate of return per piece.

Some of the skills sought by racing firms are business-related rather than technology related. The demand for those skills were identified more frequently 2011 than in the 2004 interviews and suggest a growing awareness that innovation accompanied by sound business practices is likely to create a more sustainable operation.

Motorsports supports advanced manufacturing and technology transfers

As mentioned above, motorsports and especially core racing industry firms must constantly improve their products or lose business. As a result, all production firms have adopted a mantra of constant improvement that serves as the foundation for advanced manufacturing. Motorsports also provides those advocating for advanced manufacturing a hot and trendy industry to use to attract much needed skilled laborers into training programs and the labor pool.

The pace of innovation presents a wide range of potential technology transfers. However, while much of the emphasis appears to be on taking products invented by racing industry firms and transferring them to other applications, we believe there may be greater potential in having motorsport cluster and other firms approach the core racing industry firms with specific requests for innovative new parts and technology. Having other firms approach with specific requests is important because the motorsports

focus is not on the mass production of parts. For example, Cummins approached Bo-Mar Industries with the need for a new oil filter to fit their new fuel efficient diesel engine. Bo-Mar was able to quickly develop a customized part that Cummins was able to reproduce.

There are many examples of the potential for transferring technology from the motorsport industry to other industrial sectors including:

- Comlux is using Kevlar in their rehabilitation and remodeling of executive and luxury aircraft;
- Bill Simpson is helping to develop of a potentially safer football helmet based on his race helmet experience;
- Shields Premier Windshield performs ongoing research and design work to develop lighter and more durable windshields that are used by NASCAR in their race cars, and by Caterpillar and John Deere in their tractors;
- Klotz Synthetic Lubricants in Fort Wayne provides Indy Car teams with engine additives that increase horsepower and mileage.
- Auto Research Center: ARC's engineers used the technology they learned about drag, air flow, etc. for racing and took it to the transportation industry. As they tried to figure out how to make semi-trucks and trailers more aerodynamic they designed the fins that are attached to the bottom of trailers allowing the fuel efficiency to be increased.
- C&R: C&R designs and manufacturers several components for the racing industry including oil pans, coolant systems, etc. for NASCAR. C&R has been able to do some minor modifications to their designs and are now manufacturing these same components for the Ford Shelby Cobra Mustang.
- McKinney Corporation: Currently designs and manufactures chassis for the top levels of NHRA drag racing. McKinney Corp took some of the same designs for mounting components in race

cars to Caterpillar and is now providing parts for the heavy vehicle industry. McKinney Corp also designed a new device that holds an iPad in place on a pilot's leg while flying and has sold thousands of these to the airline industry.

- Raytheon is a major player in the defense industry. Locally, Raytheon works on the F-16 fighter jet. Raytheon has been able to bring some of their aerospace technology to the Indy Car Series.
- Hyperco is the leader in springs in all forms of motorsports. Technology they designed for motorsports is adapted through their military division for use in several military vehicles.

Occasionally, technology transfers work in the opposite direction, originating in non-motorsports industries and making their way to racing industry firms. In one prominent example, Indy Car teams adapted components made by Raytheon for the F-16 fighter jet into their aerodynamic package.

Universities are developing a wide range of technology and business related programs to support the cluster

While the quality of Indiana's racing industry workforce is frequently cited by those we interviewed as a significant competitive advantage, many of those interviewed also expressed concerns about increased demand for workers and an aging workforce. One means to address this issue is the development of proactive training and education programs. Many of Indiana's public and private universities have developed racing industry programs. IUPUI developed the nation's only motorsport engineering degree program. Rose-Hulman Institute of Technology, Trine University and Purdue University have automotive engineering courses. Marian University, Indiana State University and the University of Indianapolis have developed business-related motorsports programs focused on issues such as attracting sponsorships and managing a racing team budget. Many of these programs are taught by adjuncts from the racing industry and serves to both attract students form out of state and provide in-state students with exciting educational opportunities. Ivy Tech Community College of Indiana, Vincennes University,

and Lincoln Technical Institute provide technical training in many of the high skill production processes that manufacturing firms in the motorsports cluster require.

Indiana has made progress but challenges still remain

The core racing industry and the motorsports cluster in Indiana remain strong and globally competitive. However, state and local economic development leaders must work to capitalize on these advantages in order to maximize economic benefits. For much of its history Indiana's state and local leaders have taken the motorsports industry for granted, assuming that the state's stature as the motorsports capital of the world would assure continued economic progress. Only in the last decade have state and local leaders begun to work in partnership with those in the racing industry to maximize its economic potential. And while Indiana made progress though a major economic downturn, there are challenges that remain and opportunities that must be realized.

Progress

In the years since the initial report on motorsports in Indiana there has been much progress. The industry created the Indiana Motorsport Association to represent and advocate for the industry. The state legislature now has a motorsport caucus. The Indiana Economic Development Corporation has dedicated a staff person to the motorsports industry. Many local governments have focused on growing motorsports in their area. Many of the state's universities have developed and refined motorsports related programs in manufacturing, engineering, and business support. Indianapolis has recaptured or regrown its motorsport trade show which hosts over 23,000 visitors each December[5]. And while jobs have been lost and companies have closed their doors, the diversity of Indiana's racing industry and the

[5] Indiana Motorsports Association

surrounding motorsports cluster has kept Indiana from experiencing the depth of economic challenges that have affected the North Carolina motorsports industry.

Challenges Remain

While complacency may no longer be a problem, there are still issues that must be addressed in order to fully capitalize on the economic potential of the core racing industry and the motorsports cluster in Indiana. These issues can be categorized as those directed towards the racing industry and those intended to more fully integrate racing into the motorsports cluster.

Many of the critical issues confronting the racing industry are related to the unique aspects of the sport, especially the size of the firms. Racing firms are, for the most part, relatively small firms. Only six of the nearly 170 firms identified through our interviews and survey had over 100 employees. Smaller firms often have challenges related to employee health and life insurance and other competitive benefit packages. Start-up racing firms tend to be small and are not likely to catch the attention of state and local development programs focused on a volume of capital investment or of employees. The result is that motorsports firms may not receive the help they need in those early formative years. This appears to be especially true in terms of job training, but may also affect access to tax abatement and other economic development tools.

Additionally, while most successful racing companies are innovative, many are more interested in helping someone to go fast than they are on entrepreneurial development. This means that many new firms survive because of product development rather than strategy and others fail because they lack the business acumen that many serial entrepreneurs seems to possess. Furthermore, in many cases, even when a racing business survives and begins to mature the owners are more interested in technology creation than job descriptions, credit ratings and other business basics.

Finally, the core racing industry provides the state with one of its most recognizable brands both nationally and globally. It attracts many overseas visitors and also generates overseas trips by locals: many of these visits, especially when they are focused on the business of racing rather than on a race, present gateways to additional economic development opportunities. Sometimes it can be an immediate business partnership. Other times it may be a marketing opportunity. In both cases it appears that there is no strategy in place to more fully capitalize on these opportunities. Even more importantly, there does not appear to be a strategy in place to maximize the share of research and development captured in Indiana while reducing the amount of this work that leaks out of the state.

Many of those interviewed suggested that a stronger and well-funded Indiana Motorsports Association is critical to maximizing the economic potential of the core racing industry. The Indiana Motorsport Association provides a key link between the firms in the racing industry, state and local economic development officials, as well as the universities and colleges that wish to participate in growing the industry. A critical developmental component for the Indiana Motorsports Association is a strategic planning process focused on internal and external clients.

The project team

The Motorsports in Indiana project team represents a partnership among Purdue University (Purdue Center for Regional Development), Indiana University (IU Public Policy Institute) and the Indiana Motorsports Association (IMA). Each of these organizations brought unique skills including Purdue's primary academic work regarding cluster analysis, IU's applied research experience regarding motorsports and the IMA's insider knowledge of and relationships with firms in the motorsports cluster. In addition to their unique experiences the organizations also had many common characteristics including a commitment to quality, unbiased work, dedication to making the partnership work, and enthusiasm for exploring the economic potential of the motorsports industry.

Perhaps most importantly, the seamless integration of the IMA into the Purdue/IU partnership meant that we had a level of access to and cooperation from the motorsports industry that enabled us to develop a full understanding of the opportunities to more fully energize Indiana's motorsports economy as well as the issues that have hindered our ability to fully capitalize on those opportunities. The relationships built during our research will serve as a long term asset as we strive to develop the infrastructure and strategies required to activate and accelerate the full economic potential of the motorsport industry.

The primary project team was provided with project specific advice and counsel by the Indiana Economic Development Corporation, Indiana Office of Community and Rural Affairs, American Structure Point, Rose-Hulman Institute of Technology, officials from the town of Speedway, and several of the state's leading practitioners of local economic development.

Motorsports and Vehicle Production Network (MVP) Action Plan

In the original proposal, 'Race to the Future:' Integrating Central Indiana's Motorsports and Vehicle Design & Manufacturing Assets into a Motorsports & Vehicle Production Network, the overall project design called for a four phase approach:

1. Articulating the MVP Network – identifying the cluster and an analysis of the network;
2. Activating the MVP Network – mobilizing and convening stakeholders within the MVP network;
3. Accelerating the MVP Network – targeting investments and identifying public and institutional policies to accelerate activity within the network; and,
4. Assessing the MVP Network – to track progress over time and make adjustments as necessary.

As often happens when assumptions are confronted by reality, assumptions fall by the wayside. That is the value of conducting research to test whether assumptions, even those that were long-held and intuitively believed, match reality.

Early in the initiation of the MVP study, one major assumption about motorsports in Indiana fell to objective reality: the assumption that motorsports in Indiana is exclusive to the greater Indianapolis region.

When two significant databases of motorsports assets were geo-coded and plotted on a map of Indiana, we learned that motorsports touches nearly all of Indiana's ninety-two counties.

The Motorsports and Vehicle Production Network study was initiated with a number of implicit assumptions in place:

- That motorsports assets were concentrated almost exclusively in Central Indiana; an assumption formed by the presence of two major venues in the region, the Indianapolis Motor Speedway and Lucas Oil Raceway Park and the presence of a number of highly visible Indy Car teams;
- That the high degree of innovation occurring within motorsports companies readily positions these companies to leverage intellectual property into new commercial ventures and innovations that can cross into other vehicle platforms; and

- That the motorsports cluster in Indiana is relatively self-contained; i.e. that motorsports companies generate much of their own innovation, easily attract talent because of their high visibility, and that the industry is relatively self-sustaining.

We learned early in the research that many of our initial assumptions were misdirected and that our early expectations about how to proceed to support and grow the industry in Indiana underestimated the extent of the cluster.

Our initial assumptions also discounted the degree to which the motorsports cluster in Indiana is significantly challenged by workforce availability. Many of the companies we interviewed indicated that expansion plans, and perhaps even their ability to maintain their current market position, are threatened by lack of talent. The workforce shortage is a challenge addressed today by importing workers from other markets or by the movement of top talent from one company to another. The impending retirement of the baby-boom cohort represents a serious concern for these firms.

Because our image and understanding of the size, scope and complexity of the motorsports cluster in Indiana evolved substantially during Phase One of this project, our projection of how to proceed has consequently evolved since our original project proposal.

Phase Two, 'Activating the Network,' and Phase Three, 'Accelerating the Network,' now seem to be two conjoined action steps that need to be implemented in tandem.

As we contemplate next steps it seems crucial to simultaneously convene and mobilize the motorsports network toward action. For Phase Two, *Activating the Network* a first critical step is the release and dissemination of this report to critical audiences in Indiana. Helping to create an accurate image of the size, scope and impact of motorsports in the state is an important foundation for building collaboration and momentum.

Given our current understanding of the motorsports industry in Indiana and the action steps that need to be initiated, coordinating members of the network should include:

The Indiana Motorsports Association - The IMA is the convener and 'voice' for motorsports around the state. The IMA was formed by members of the motorsports industry to represent the industry's interests on a variety of issues and has been a critical partner during Phase One of this project;

The Indiana Economic Development Corporation – The IEDC is the marketing and coordinating entity for economic development within Indiana state government;

The Purdue Center for Regional Development – PCRD has been the managing partner and staff for Phase One of this project and is generally recognized as an 'honest broker' and convener for initiatives such as this;

Indiana Office of Community and Rural Affairs – OCRA has played a critical role in Indiana in the last eight years by developing leadership capacity in Indiana's rural areas;

And as we prepare to 'activate the network' the members of the extended network will include:

Town of Speedway – the perceived 'epicenter' of motorsports in Indiana;

Conexus Indiana – Conexus is the industry-led group formed to address workforce needs within the advanced manufacturing sector in Indiana;

Eco 15 – A coalition of 10 southeast Indiana counties organized and led through the Community Education Coalition in Columbus to address advanced manufacturing training needs;

The Indiana Economic Development Association – IEDA is the professional association for local economic development officials (LEDO's) in Indiana. IEDA offers professional development for its members among other services;

Universities and Colleges – Universities and colleges, depending upon their missions, will be engaged to address workforce issues or assist with technology transfer or both. Institutions include, but may not be limited to:

Indiana University – Purdue University at Indianapolis (IUPUI)

Purdue University and the Purdue Research Foundation

Indiana University (including regional campuses at Kokomo and Richmond) and the IU Research and Technology Corporation

Rose Hulman Institute of Technology and Rose Hulman Ventures

Vincennes University

Ivy Tech Community College – Corporate College

University of Evansville

University of Southern Indiana

Trine University

University of Notre Dame

Marian University

University of Indianapolis

Indiana State University

Motorsports Caucus of the Indiana General Assembly –A self-identified group of state senators and representatives who monitor and champion legislation directed to the motorsports cluster in Indiana;

Crane Naval Surface Warfare Center - Crane NSWC is an installation in South Western Indiana that focuses on technology support for the Navy.

For Phase Three, *Accelerating the Network*, an action plan to support the motorsports cluster in Indiana should focus on three fundamental issues:

1. Workforce and Talent Pipeline and Training;
2. Technology Transfer and Commercialization Into and Out of the Cluster; and,
3. Tools and policies to support statewide and local efforts to grow the cluster.

Throughout the mobilization of the motorsports network, we will employ the facilitation process known as *Strategic Doing* to meld planning and action into a dynamic process. An overview of Strategic Doing is available as Appendix 7.

Workforce and Talent Pipeline and Training

As a cluster that sits atop the advanced manufacturing cluster, it should not have been a surprise to learn that motorsports faces some of the same talent challenges that have been plaguing advanced manufacturing in Indiana for the past decade. The challenges facing the motorsports cluster in Indiana are more daunting because the workforce for companies within the motorsports cluster are operating at a sophistication and precision level that in some cases, surpasses even the other advanced manufacturers in the state.

The challenges faced by the motorsports cluster parallel those of other advanced manufacturing firms (quantity of applicants, pending retirement of the baby boom cohort) and are in some ways unique (unique skill sets for workers/quality, adaptability).

A unique opportunity for the motorsports cluster is the cache the industry has; an image that it has not leveraged as a tool for creating a unique talent pipeline for the cluster and for other forms of advanced manufacturing.

Indiana likewise has a unique mix of institutions of higher education that may provide the intellectual capital needed by the motorsports industry, but with one major exception (IUPUI) these institutions have not consistently packaged their offerings to cater specifically to the cluster.

Even though there are many programs that may meet the existing needs of the motorsports cluster, a comprehensive connection between high schools, colleges, universities and the motorsports cluster has not been effectively facilitated.

Initiatives already underway through Conexus, an advanced manufacturing cluster support entity, to connect high school students to advanced manufacturing careers, are piloting efforts to address the pipeline issue. It may be that these initiatives could be augmented with a direct connection to motorsports.

For example, Conexus' Hire Technology curriculum would seem to fit the profile of a pipeline activity, focusing efforts in eight pilot high schools around the state and bringing students into junior and senior year classes that allow them to earn nationally recognized industry credentials and dual high school and technology credits.

Conexus is also managing a statewide program, *A+ Partners* that matches advanced manufacturing companies with an Indiana high school or career center to better promote jobs in the manufacturing sector and to assist educators and parents in directing students to these jobs.

In both cases, the visibility of motorsports could provide additional leverage and bring new attention to these programs. Given that we now understand that motorsports is a statewide industry, there are likely opportunities to engage with the pilot schools already participating in the Conexus pilot. This is also an opportunity for motorsports companies to act in their own self-interest by engaging in activities to grow the talent pipeline.

Existing training and workforce assets in the state include:

- The Indiana Center for Applied Technology (ICAT)/Haas Center at Vincennes University that focuses on a two-year degree program for CNC operators, CAD/CAM, welding and other industry demanded skills training;
- Engineering degrees at Purdue, Trine, Rose Hulman Institute and University of Evansville, and University of Southern Indiana;
- Certificate programs in CNC and other advanced manufacturing skills through Ivy Tech Community College;
- The Corporate College at Ivy Tech that will offer on-demand, industry specific training packages;
- The Motorsports Bachelor of Engineering at Indiana University – Purdue University at Indianapolis (IUPUI);
- And other for-profit technology schools such as Lincoln Tech, Indiana Tech, etc. that may provide some level of support.

(See Appendix 5 for an initial listing of course offerings, curricula, available certifications, etc.)

One of the biggest challenges facing motorsports and advanced manufacturing in Indiana is generating enough candidates for the higher education and skills training programs currently available and operating at less than capacity. Not enough high school students select career paths that lead to careers in motorsports and advanced manufacturing. Vincennes University estimates that their ICAT/Haas Center is operating at approximately one-third of its student capacity. While motorsports companies speak glowingly about graduates of the VU program, they wish there were more graduates to meet their needs.

Two initiatives in Indiana are attempting to address the challenge of encouraging more young people to choose careers in advanced manufacturing: Conexus, which is initiating a pilot project in eight Indiana

high schools and Eco 15, a project operating in 10 counties in Southeast Indiana. These programs, while different, have a goal of working with educators, industry, parents and students to create a more robust talent pipeline to supply advanced manufacturing companies in Indiana with the skilled and trained workers they need.

As we have reviewed efforts to 'fill the pipeline ' for advanced manufacturing we have wondered if branding some of these opportunities as 'motorsports' would confer a level of prestige upon these skill sets and career options that may not be present for advanced manufacturing.

Even if the pipeline were to be filled today, Indiana still lacks a comprehensive review of industry training and skills needs. An appropriate mechanism for connecting motorsports firms to training must be created and a catalog of existing training offerings could be produced to streamline the connection between motorsports and educational opportunities.

Specific Action Steps – Training Curriculum

1. Assemble a compendium of certificate programs, two year, four year, and custom training options that fit within the motorsports cluster. This initial compendium will serve as a starting point for further review.
2. Through the Indiana Motorsports Association, convene a review panel composed of motorsports companies to review the training offerings. Identify outdated or inappropriate offerings and identify gaps.
3. Conduct in-depth interviews with motorsports companies to develop a more thorough understanding of training and talent needs.
4. Convene the colleges and universities to meet with industry representatives to review the training recommendations, identify new needs and opportunities, and talk about models for recruiting students to existing programs.

5. Develop and implement a 'motorsports training consortium' that will facilitate the creation of a motorsports training marketing plan. The plan would focus on highlighting careers in motorsports for high school students and their parents and link those careers to specific training opportunities at Indiana institutions. Additionally, the consortium will facilitate the development of new, industry-specific training options that support motorsports and will work as a liaison between motorsports firms and educators.
6. Create a motorsports talent 'brand' to better promote career opportunities within the industry and to promote the wide variety of career opportunities available in Indiana. Use the 'brand' to make more students and educators aware of the small firms in the state. Ongoing refinement of the industry skills needs would lead to the development of a 'motorsports career ladder.'

Specific Action Steps – Motorsports 'Talent Pipeline'

1. Working with Conexus and with Eco 15, identify 2 – 4 pilot sites where the typical advanced manufacturing promotion is supplemented with 'motorsports' marketing. The goal of this activity would be to test the idea that motorsports may be a more effective attractor for recruiting students to training programs that have previously only been marketed as 'advanced manufacturing.'
2. Working with Conexus' A+ Partners program, recruit motorsports companies to serve as partners with select schools. Identify a minimum of 4 – 5 companies in two pilot regions to explore the feasibility and effectiveness of the program as a recruitment opportunity.
3. Because many of the motorsports firms are relatively small, it is difficult for them to establish a 'presence' at career days or on university campuses. A motorsports career booth should be created to promote the industry in general, but also specific opportunities with individual companies to acquaint students with job opportunities within Indiana. This booth

could be staffed and managed by the Indiana Motorsports Association. The project could have further impact if drivers and engineers spent time in the booth.

4. Continue efforts already in place at Purdue to place engineering students with IndyCar teams.

Technology Transfer and Commercialization Action Opportunities

In the original model for the Motorsports and Vehicle Product Network project, project planners assumed that the motorsports cluster generates a considerable amount of intellectual property. And to a degree, that assumption is correct: intellectual property is generated by race teams and companies supporting them. But, unexpectedly, intellectual property is not routinely protected with patents: the industry moves too fast during the race season, innovates on a weekly basis, and the patent process is too slow to keep up with the speed of innovation required.

Additionally, companies in the motorsports cluster don't look to universities for technical assistance or research and development for a related reason: university processes and bureaucracy can't meet the need for speed and quickness required by the competitive motorsports industry.

Consequently, one of the principle aims of this project – exploration of technology transfer opportunities – will not be easily accomplished within the current industry and university structures. While there are scattered examples of technology transfer, the hope of transferring technology out of the motorsports cluster and into passenger vehicles is difficult given the current lack of patent protection within motorsports. This doesn't mean that innovation within motorsports couldn't be applied to other vehicle platforms; it's just that the current lack of IP protection limits that opportunity. It is nearly impossible to know what innovations are present that could be applied outside of motorsports.

Yet, given the rising costs of fielding a motorsports operation, an opportunity to generate additional cash-flow through licensing and commercialization could be a welcome infusion of cash for cash-strapped motorsports entities.

The potential opportunity to commercialize motorsports innovation may also help to expand the industry in the state and create new ventures in communities outside of the greater Indianapolis area.

To facilitate technology transfer out of the motorsports cluster into other industries or to commercialize technology, an intermediary must be created to leverage the process. Motorsports companies have not, up to this point, identified technology transfer and commercialization as a desirable opportunity and a mechanism for facilitating the process does not exist.

A unique model that has been deployed within universities, or within specific companies, but not across an industry, is the model of a 'technology harvester.' A technology harvester is an individual (or team) that reviews technology holdings within a company to determine whether intellectual property held by the company has commercial potential. In most cases, the harvester categorizes intellectual property that must be held, that which has no commercial potential, that which could be licensed, and that which could be sold outright.

Within the context of this project, a harvester team could be deployed to review technology and intellectual property within the race team organizations, engineering and R&D firms and identify intellectual property with commercial potential.

Be aware, only a small percentage of technology that is initially identified as having some commercial potential is actually ever commercialized. Companies have a difficult time identifying whether a technology is non-essential or may have some future application that would require it be kept in-house. Further, companies, particularly those as competitive as motorsports companies, have a difficult time

convincing them that technology sold into the marketplace won't someday be used by a competitor to establish a competitive advantage.

But, for those companies that successfully license or commercialize orphaned technology, a new revenue source is created that can help motorsports firms whose cash-flow is somewhat seasonal generate a more stable and diversified revenue source.

Generating new start-ups that could become potential suppliers to these companies may help stabilize the supplier network, grow local economies, and reduce shipping and warehousing costs for the end user.

Given the dynamics of the motorsports industry, the harvester model would best be deployed in the off-season when time demands are diminished somewhat.

Action Steps to Increase Technology Transfer and Commercialization

1. Create a pilot team of engineers, university researchers and/or entrepreneurs with motorsports and/or automotive background. This team must be able to pass extensive security checks to inspire confidence and trust from the companies that they will be working with.
2. Assemble a cadre of IP attorneys who will assist in a pilot project by offering reduced legal rates to assist companies in filing patent applications.
3. Promote the technology transfer opportunity to motorsports companies through the Indiana Motorsports Association and assemble a group of pilot companies that are willing to participate in a pilot project.
4. Within the companies that have agreed to participate in the project, the harvester team will interview mechanics, engineers, researchers or others who have worked on inventions and innovations and who can adequately describe the underlying technology.

5. Because identifying commercial applications can be challenging, this pilot project can be a good opportunity to engage entrepreneurship programs at Ball State, Purdue, and Indiana University to allow students to review IP portfolios and brainstorm market opportunities for individual technologies.
6. Following a model created by the Purdue Research Foundation, technology available for licensing could be assembled into a 'technology road show,' in which potential investors are invited to a 'show and tell' display where potential technologies are explained and demonstrated.

Another challenge within the motorsports cluster is the constant need for innovation. It would seem as though there would be ample opportunities to connect the motorsports industry with the research assets at the universities in Indiana, but the motorsports teams report that the bureaucracy and slow pace within the universities make it difficult to work with them.

As part of the research, we visited with Crane Naval Surface Warfare Center. Crane is a technology center that provides a variety of services to the Navy, particularly in upgrading technology for legacy systems. Crane is a unique asset that could address a variety of innovation and technology for a variety of motorsports assets in Indiana.

Rose Hulman Ventures (RHV) is another unique resource available to Indiana companies. Rose Hulman Ventures, operating in tandem with Rose Hulman Institute for Technology, deploys student teams under contract with specific companies to solve technical challenges. These student teams are supervised by distinguished faculty and work to solve real-world, technical challenges.

In working with both universities and Crane, the challenges should be able to be addressed. What will be needed is to create a 'translation' mechanism that can serve as an intermediary between the motorsports companies and the university and Crane assets. University researchers and the technicians

at Crane often use terminology that is unique to their endeavors and that doesn't easily translate to industry.

Action Steps for Increasing Innovation Connections with Motorsports Companies

1. Work with Purdue Technical Assistance Program (TAP), Crane NSWC, Rose Hulman Ventures and the Indiana Motorsports Association to create a 'concierge' model that will facilitate connections between TAP, Crane , and RHV;
2. Facilitate a review of technical assistance expertise that resides within the universities, Crane, and RHV to create a working inventory of potential assistance models for the purpose of shortening the time between industry need and university/Crane response. While the inventory may not anticipate all industry needs, informed anticipation of industry needs may shorten the response time. While the model may initially be focused on motorsports, it if is successful, it may be extended to other industries as a way to better facilitate technical assistance. Students in the Motorsports Engineering Program at IUPUI might be able to serve assist as an inventory team which would further engage them with the industry.

Statewide and Local Motorsports Economic Development

When the motorsports assets in Indiana were first mapped for this project, project participants were pleasantly surprised by how geographically dispersed motorsports assets are across the state. In the process of conducting this project, additional assets were discovered. We now understand that motorsports touches 91 of Indiana's 92 counties. The assets include race tracks and sole-proprietorships, but also include engineering firms, fabricators, race teams, tool and die shops, marketing firms, research and development, and other economically viable firms.

Because 'motorsports' is a highly visible industry, the presence of these assets around the state create an economic development opportunity that may positively affect not just the Indianapolis, Speedway, and Brownsburg area of the state where many visible firms are located, but creates a new opportunity to generate economic growth.

The Indiana Economic Development Corporation has in place a motorsports division that has concentrated on providing support and recruitment for motorsports assets in the state. But a unique opportunity exists to further extend the model into areas of the state where motorsports is not typically understood as an asset: our research indicates that the assets are potentially more widespread than first understood.

To facilitate growth in outlying areas of the state, local economic development officials (LEDO's) will need help in identifying viable motorsports assets in their areas and in determining whether these assets represent viable growth opportunities.

Action Steps to Grow and Support Motorsports Assets

1. The creation of the MVP Motorsports Asset Map is a critical first-step in helping to establish opportunities for local economic development. The underlying databases from the Indiana Motorsports Association and Conexus provide a list of assets that can help local officials to identify opportunities in their communities.
2. Engage the Indiana Economic Development Association to develop workshops to be offered to its members at IEDA events. These workshops would target issues specific to motorsports companies and assist local economic development officials in identifying companies in their counties and learning to provide assistance to them.
3. We would recommend selecting three pilot areas in Indiana to focus upon for growing motorsports assets:

- The I-70 Corridor stretching between Terre Haute and Indianapolis where there is an obvious concentration of motorsports assets. This corridor includes major urban areas as well as predominantly rural areas;
- Northeast Indiana where motorsports assets are most logically also connected with the defense and orthopedics industry in that region; and
- A predominantly rural area of the state where motorsports could create a significant impact by attracting a sophisticated workforce and where growing the industry could yield significant economic impact on the regional economy. Southeast Indiana is a predominantly rural area that would include motorsports, auto manufacturing, but that would also encompass watercraft manufacturing and racing along the Ohio River.

- This mix of areas would create a diverse laboratory for fostering opportunities to grow motorsports firms and for growing the supply chain within Indiana.

4. Within selected regions, the pilot project should work with local economic development officials to better identify the motorsports companies in their area, to create a more detailed understanding of their supply chain and customer base to begin to identify local suppliers and customers for these companies.
5. Pilot project administrators would help local economic development officials develop a template that would target assistance needs for local motorsports firms and would facilitate statewide connections to training assistance, technical assistance, business support, or connections to other companies as needed.
6. Looking at two to three areas in the state where there is a geographic clustering of motorsports teams (Central Indiana, Terre Haute and Greater Fort Wayne) economic development corporations should explore the creation of a virtual incubator process to foster the creation of new motorsports firms. Given the potential existing wealth within the cluster, it is possible that

dedicated angel networks could be formed to foster motorsports start-ups, existing business support networks could be adapted to assist these start-ups and in some cases it might be preferable to create a motorsports-specific incubator that would cluster diagnostic equipment, basic tools and facilities while also providing access to business, legal and financial advice.

7. Given the extensiveness of the motorsports assets in Indiana, there is a unique opportunity to create a motorsports tourism initiative. Indiana is home to many old and unique race tracks, the Indianapolis Motor Speedway Museum as well as race team facilities that could be packaged in concert with major events at the IMS to create weekend tourism events that could create benefit to a number of smaller communities in Indiana.

Motorsports Cluster Definition Process

This section describes the process for defining the motorsports cluster. According to Kosheleva, various statistical methods are available for classifying industry clusters, which include Input Output Analysis, Cluster Analysis, and the Graph Theoretic methods (Kosheleva, 2005). These methods are mainly applicable on the input-output transactions table and hence explore value chain linkages among industry sectors. However, industries within a cluster might have diverse linkages in addition to the value chain and supply chain connections. Nolan et al. (2007) describes that clusters, in general, are regional concentrations of competitive firms that:

- Buy and sell from each other
- Use similar technologies
- Share same labor pool and supply chains
- Require similar and complimentary knowledge and skill-sets
- Include supporting services, specialized infrastructure, and institutions
- Include both high and low-value added employment
- Produce for export outside the region; and
- Drive the creation of wealth in a region

Within an industry cluster, there is a healthy amount of competition and rivalry which also leads to innovation, new ideas, knowledge-spillovers and spill-ins. Clusters can also be described as a network where individual firms and institutions are the nodes and various transactions and connections are the links. Indiana's motorsports cluster exhibits similar characteristics. Motorsports may give an image of zooming cars, celebrity drivers and festive racing events; however behind-the-scene, a variety of industries and businesses are contributing to motorsports activities. The research team identified industries and businesses that are connected to the motorsports by exploring various linkages mentioned above. We followed a hybrid approach of quantitative and qualitative methods so that we could uncover different linkages within the motorsports cluster. This included the following steps:

- Literature review
- Identification of North American Industry Classification System (NAICS) codes for Indiana Motorsports Association (IMA) and CONEXUS databases

- Input Output (IO) analysis to identify backward and forward linkages for selected industry sectors
- Study of motorsports-related patents and identification of NAICS codes
- Discussions within the research team
- Input from the IMA board members

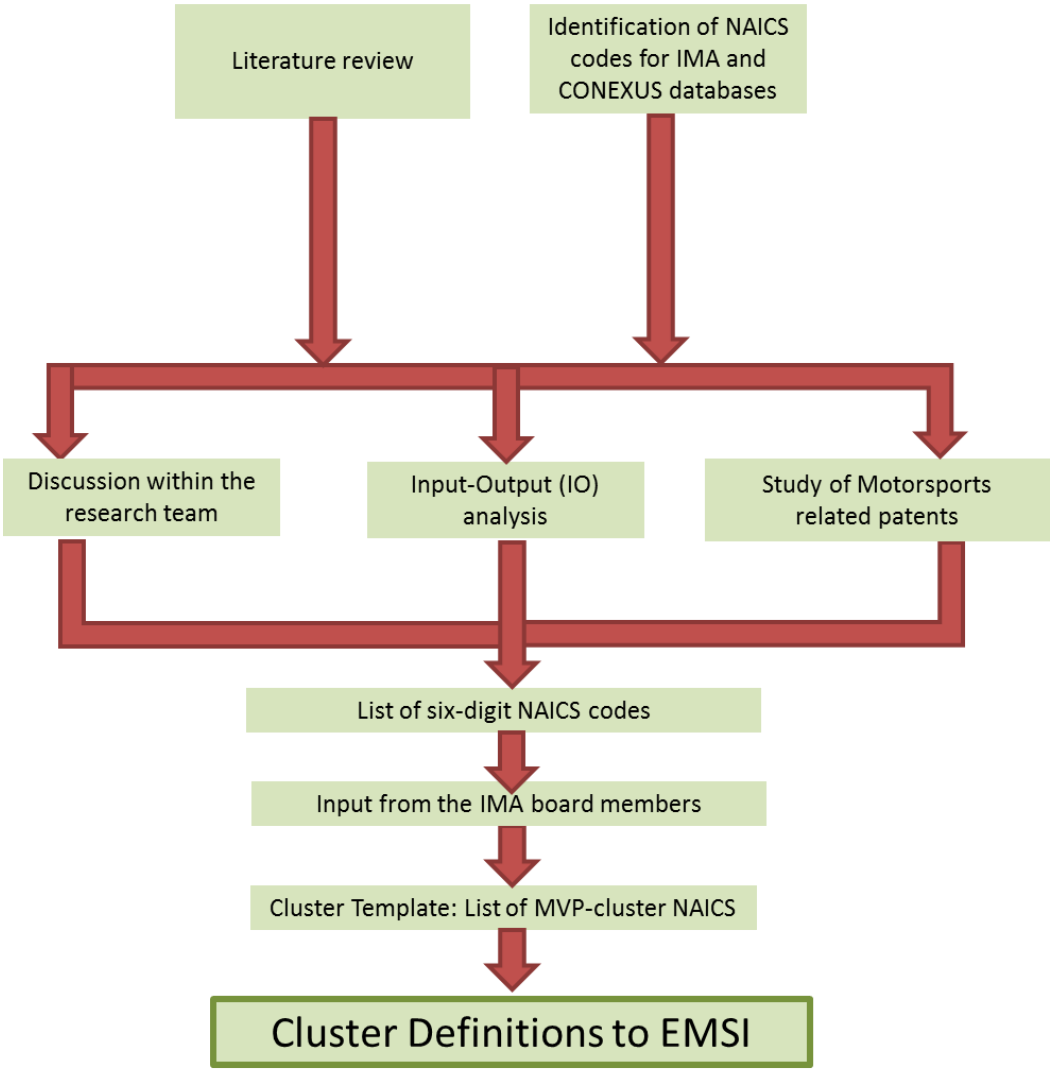
Figure 1 shows a schematic diagram of the cluster definition process. The following paragraphs describe the literature review and methodology in detail.

Literature Review:

Compared to motorsports, numerous studies have been published on automotive cluster studies including U.S. and international case studies. Within motorsports, several studies are available on economic impact analyses, however a comprehensive study on definition of the motorsports cluster was not found. Previously, the motorsports industry has been defined for purposes of economic impact analysis. For example, Connaughton and Madsen defined motorsports industry in North Carolina as a combination of around 40 "Impact Analysis for Planning" (IMPLAN) industries, which included more than 40 different 3-, 4-, and 5-digit NAICS codes to assess statewide economic impacts of the motorsports industry (Connaughton, 2004 and 2006). Similarly, during a study of the motorsports industry and university linkages in terms of knowledge interactions, Viljamaa recognizes the team-firm nature of NASCAR teams that employ a highly skilled workforce and engage in diverse activities in-house, such as R & D and advertising (Viljamaa, 2007). Motorsports race teams and shops are firms with diverse activities which cannot be defined with a single NAICS code. Any economic analysis needs to account for this unique aspect of the motorsports cluster. Mitchelson and Alderman, in their "Mapping NASCAR Valley" paper, emphasize the diversity of innovations taking place within the motorsports cluster and also recognize that racing team garages are at the heart of this cluster (Mitchelson, 2011). Research also reveals that motorsports industries have large economic impacts on the Charlotte region. The study by Connaughton and Madsen found that the motorsports industry's total output impact was $5.9 billion and the total employment impact was slightly over 27,000 jobs in 2005 (Connaughton, 2006). This includes direct expenditures and the associated indirect and induced effects. Another aspect of motorsports is the faster pace of innovation, which was recognized by Klacik and Cook in their study of motorsports industry in the Indianapolis region, an important hub of motorsports activities in the U.S.

(Klacik, 2004). They found that the pace of invention and rate of obsolescence were faster than the patent granting process. This also explains why the keyword search in the United States Patent and Trademark Office (USPTO) database resulted in small number of patents. Klacik and Cook's 2004 study found about 8,800 jobs in the motorsports industry in the Indianapolis region. This literature review illustrates the diversity in motorsports and also reveals that a systematic study to identify industries with linkages to motorsports is needed.

Figure 1: Cluster Definition Process



Identification of NAICS codes for IMA and CONEXUS databases:

Purdue Center for Regional Development (PCRD) geocoded the motorsports and automotive businesses and industries obtained from Indiana Motorsports Association (IMA) and CONEXUS databases in 2011. These databases included more than 2,300 establishment locations represented by more than 140 unique NAICS (2007) six-digit codes. We identified and assigned NAICS codes to every establishment and business in the database. Many firms were engaged in diverse activities and they could only be defined through more than one specific six-digit NAICS code. We found a few firms so diverse that they were assigned up to seven different six-digit NAICS codes. The identification of secondary, tertiary and even four and five different NAICS codes reveal that many firms are engaged in varied activities related to motorsports. It should be noted that motorsports industry does not have a single NAICS code. In fact, diverse industries from various NAICS groups participate in motorsports-related activities and hence constitute the motorsports cluster. We use six-digit NAICS codes, the most detailed classification for industries, for developing the motorsports cluster definition. Please refer to Appendix 1 for methodology of the IMA and CONEXUS database construction.

IO Analysis for Selected Industry Sectors:

The combined database from the IMA and CONEXUS is exhaustive; however, it is based on membership and voluntary disclosure of information. They might not capture different kinds of industries which could be linked to motorsports-related activities in economic and many other ways mentioned previously. The IO analysis facilitates identification of economic linkages or purchasing and selling patterns between industries. It is also known as backward and forward linkages between industries which reveal who they are “purchasing from” and who they are “selling to”. In a way, the IO table shows the embedded supply chains and also reveals the value chain of industries as “production function” for any industry can be derived from an IO table.

We ran a frequency analysis for various NAICS codes present in the combined IMA and CONEXUS database. Racing teams and race tracks defined as “Other Spectator Sports or NAICS 711219” emerged as the most frequent with 901 establishments in the combined database. However, we also found that many NAICS codes had only one establishment. The IO analysis was conducted for the nine most frequent NAICS codes. The economic linkages between industries (NAICS codes) in an IO table are represented by a square matrix with industries in rows and columns and transaction values in dollars ($) as cell entries. For this study, we obtained the IO transactions table for Indiana from Economic Modeling

Specialists, Inc. (EMSI, 2011), which is comprised of 1,120 × 1,120 square matrix of 6-digit NAICS codes. It should be noted that the IO transactions matrix for Indiana contains more than one million cells; however, IO transactions are vacant for those industries not existing in Indiana. For the top nine most frequent NAICS codes with higher frequencies, we analyzed their backward and forward linkages. If the amount of transactions was $100,000 or more in backward (purchasing) as well as forward (selling) linkages, those NAICS codes were retained as candidate NAICS codes having strong economic linkages with the primary NAICS codes. NAICS codes with transaction value of less than $100,000 between industries were excluded. Next, all industries with $ 100,000 or more transactions both in backward and forward linkages were compiled into one list and duplicates were excluded. The list was further reduced by excluding industries with location quotient values of less than one (LQ < 1). This criterion removed those industries which were not export oriented.

The IO analysis revealed interesting linkages. For example, health sector NAICS codes turned out to be linked to motorsports and automotive sectors. Specific NAICS codes in health sector included surgical appliance and supplies manufacturing, which is the NAICS code for protective safety helmets manufacturing.

Study of motorsports-related patents:

A lot of research on innovation has included “patents” including assessing its pros and cons as an indicator for innovation. The arguments against patents include a considerable lag between invention of a product and the granting of a patent and lack of easily accessible data on inventors and their inventions. Hence patents have some limitations in reflecting ongoing and most up-to-date innovations in a discipline. Nevertheless, the usefulness of patents as one of the indicators or a barometer of trends in innovation has been proven. Many research projects including “Innovation Index” in the Economic Development Administration (EDA) funded project “Crossing the Next Regional Frontier: Information and Analytics Linking Regional Competitiveness to Investment in a Knowledge-Based Economy”, has used “patent activity” as one of the output indicators for innovation. In this project, patents are explored to identify types of industries and their NAICS codes, which have been developing new products associated with the motorsports.

We used the USPTO database that has provisions for keyword search including both the Patent Full-Text and Image Database (PatFT). This database contains full-text information on patents since 1976. A search by “motorsports” keyword in the full-text revealed 152 patents. The TIFF image patent database,

which has patent information since 1790, is not convenient for searching by keywords. These patents were further studied to identify their NAICS codes. The objective is to identify those industry sectors, which have been developing innovative products in the motorsports. Specialized apparel and footwear, protective racing suits and protective body-guards constituted many patents. Several patents were also in the category of gasoline engine and engine parts manufacturing, motor vehicle electrical and electronic equipment manufacturing, brake systems, protective helmets, tail lens of motor cars, and computer programs. Please refer to Appendix 2 for title, NAICS code, keyword, and other details for the selected patents.

Discussion:

Statistical methods are dependent on the availability of data, such as inter-industry transactions table of an input-output table. However, qualitative methods, such as industry surveys and interviews can uncover hidden linkages, assets, and issues that are not so easily captured by the quantitative analysis. The research team conducted surveys of motorsports firms including racing teams, specialized garages and events insurance companies. The insights from surveys informed the motorsports cluster definition process.

The industries identified from the literature review, IMA and CONEXUS databases, input output analysis and patents were combined into one database of 172 6-digit NAICS codes. These industry sectors were further analyzed by **location quotient for 2010**, the employment concentration factor; **ratio of state average earnings to national average earnings**, the economic prosperity factor; and **percentage employment change from 2001 to 2010**, the employment growth factor. San Diego Association of Government's (SANDAG) cluster project recommends assessment of candidate industry sectors by using these economic variables. The location quotient is used to measure export potential of an industry sector and whether it can generate wealth by bringing outside dollars into the region. Ratio of earnings indicates remuneration potential of that industry sector and finally a positive employment change means that the industry sector is growing in the region. Any industry sector with either LQ >= 1; or ratio of earnings >=1; or positive employment growth was retained as candidate for the motorsports cluster definition. These candidate industry sectors were further assessed intuitively whether they belonged to motorsports or another type of cluster and those with stronger ties to other clusters were removed. For example, residential remodelers and commercial and institutional building construction sectors were removed despite IMA-CONXUES database and the IO analysis had identified those NAICS codes. Similarly, museums and health industry sectors were removed since they belonged to arts and tourism

and life sciences-related clusters respectively. Industry sectors that had lesser employment or did not meet any of the three criteria were also excluded. Regardless of 6-digit NAICS codes used in the definition, individual industries are broad groups by themselves. For example, NAICS 611310 or "colleges, universities and professional schools", is a grouping of various educational institutions. This is retained in the definition because Indiana has various programs related to motorsports engineering and research. The number of faculty, scientists, engineers, staff, and students engaged in the motorsports programs can only be obtained through a detailed survey. The IO analysis as well as the IMA and CONEXUS databases identified linkages to NAICS 336412 or "aircraft engine and engine parts manufacturing", which is an interesting insight. The detailed motorsports cluster definition for Indiana resulted in 120 industry sectors of 6-digit NAICS codes. Please refer to Appendices "4" for a complete listing of NAICS codes included in the detailed motorsports cluster definition and "5" for explanations and formulae of the three criteria.

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Appendix 1: **IMA & CONEXUS Database Construction**

The data for MVP database were obtained from Indiana Motorsports Association and CONEXUS Indiana Automotive Industry Database (2011). These databases have a list of businesses involved in motorsports or automotive industries. Databases included information about business location, contact information and other pertinent information. Also databases have description of business' activity area. The following steps were taken to construct a database for further Input-Output, GIS mapping and spatial analysis:

1. Two databases were merged into a single list that had 2,695 records.
2. In the next step NAICS codes were assigned to each business on the basis of description in the database. If description was vague or insufficient, business description was looked up in MANTA or D&B databases (available on-line at www.manta.com and www.dandb.com respectively). Each business was assigned a six-digit NAICS 2007 industry code. Some of the business operations could only be defined through multiple NAICS six-digit codes as they had diverse activities. We found as many as seven different NAICS codes (six-digit) associated with businesses. . After assigning NAICS codes duplicate businesses (have the same name, location, and NAICS) were removed from the list. However, if the same business operated in different areas (e.g. auto repair and race team), then all unique records were retained in the combined database. Also 13 businesses' NAICS were undetermined due to no description of their activity or due to being unrelated to motorsport/automotive industry, and thus those were removed. Database without duplicates and unknown types has 2,351 records with 2,234 unique businesses.
3. Then data were transposed to a table where each record represented unique business and with unique NAICS code. Also 3, 4, and 5 digit NAICS codes were added to each record as well as NAICS codes' descriptions. This can facilitate querying and data retrieval by industry type as well as by hierarchy. Resulted table has 3015 unique records.
4. Next, data were prepared for geocoding in ArcGIS software where address should be separated into different fields in the table: street, city, state, and zip code. After geocoding each record with unique address was mapped as a point on the map with 160 locations mapped to zip code area centroid (that is no actual address was found for the business).

Appendix 2: Selected Patent Listing with Motorsports Keyword

Title	NAICS Code	NAICS Keyword	Note
Adjustable shock absorber	336399	All Other Motor Vehicle Parts Manufacturing	
Adjustable universal operating lever extension	336399	All Other Motor Vehicle Parts Manufacturing	
Anthropomorphic manikin head skull cap load measurement device	811198	All Other Automotive Repair and Maintenance	Automotive safety inspection services
Apparatus and process for a computer input device	334119	Other Computer Peripheral Equipment Manufacturing	Computer input/output equipment (except terminals) manufacturing
Apparatus for testing a moving vehicle	336322	Other Motor Vehicle Electrical and Electronic Equipment Manufacturing	
Apparatus for towing motorcycles	336399	All Other Motor Vehicle Parts Manufacturing	Towing bars and systems manufacturing
Assembly for a motorized vehicle	336111	Automobile Manufacturing	Automobiles assembling on chassis of own manufacture
Automotive wheel	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Buffering content on a handheld electronic device	334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Airborne radio communications equipment manufacturing
Caster-camber plate assembly	332611	Spring (Heavy Gauge) Manufacturing	Automobile suspension springs, heavy gauge metal, manufacturing
Clamp for tubular member and the like	332996	Fabricated Pipe and Pipe Fitting Manufacturing	Couplings, pipe, made from purchased metal pipe
Competition involving slot less race track and remote controlled motorized vehicles	541511	Custom Computer Programming Services	Applications software programming services, custom computer
Composite data cartridge drive belt	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Cover for vehicle seat handle	336360	Motor Vehicle Seating and Interior Trim Manufacturing	Automobile seat covers manufacturing
Decorative replica motorsports helmet	339113	Surgical Appliance and Supplies Manufacturing	Helmets (except athletic), safety (e.g., motorized vehicle crash helmets, space helmets), manufacturing

Title	NAICS Code	NAICS Keyword	Note
Deep insertion vented earpiece system	339113	Surgical Appliance and Supplies Manufacturing	Nose and ear plugs manufacturing
Digital camera and time lag setting method	334119	Other Computer Peripheral Equipment Manufacturing	Digital cameras manufacturing
Distributor cap adaptor for after-market distributors	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Distributor rotor	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Electroplating method	332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	
Exhaust header system	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Exhaust muffler for an internal combustion engine	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Extensible cargo rack for vehicle bed	336212	Truck Trailer Manufacturing	Demountable cargo containers manufacturing
Fluidic stabilizer with remote control	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Folding toy hauler tent trailer	336214	Travel Trailer and Camper Manufacturing	Tent trailers (hard top and soft top) manufacturing
Fold-over thermal laminate for footwear	316219	Other Footwear Manufacturing	
Front face of vehicle wheel	336399	All Other Motor Vehicle Parts Manufacturing	Rims, automotive, truck, and bus wheel, manufacturing
Garment with display feature	315292	Fur and Leather Apparel Manufacturing	Garments, leather or sheep-lined (except apparel contractors), manufacturing
Gas-fuel nozzle	336312	Gasoline Engine and Engine Parts Manufacturing	Fuel injection systems and parts, automotive and truck gasoline engine, manufacturing
Helmet with improved shield mount and precision shield control	339113	Surgical Appliance and Supplies Manufacturing	Helmets (except athletic), safety (e.g., motorized vehicle crash helmets, space helmets), manufacturing

Title	NAICS Code	NAICS Keyword	Note
Hill hold method and system	336340	Motor Vehicle Brake System Manufacturing	Air brake systems and parts, automotive, truck, and bus, manufacturing
Hybrid motorsport garment	315299	All Other Cut and Sew Apparel Manufacturing	
Inferring hierarchical descriptions of a set of documents	518210	Data Processing, Hosting, and Related Services	Automated data processing services
Integrated buckle strap receiver for footwear	316219	Other Footwear Manufacturing	Footwear, athletic (except rubber or plastics soled with fabric upper), manufacturing
Interior shield on the lid of the trunk of a vehicle to prevent the lid of the trunk from being damaged by the contents contained beneath the lid	333319	Other Commercial and Service Industry Machinery Manufacturing	Frame and body alignment equipment, motor vehicle, manufacturing
Location-aware distributed sporting events	334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Video camera (except household-type, television broadcast) manufacturing
Low-profile intake manifold	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Lug mount	336399	All Other Motor Vehicle Parts Manufacturing	Rims, automotive, truck, and bus wheel, manufacturing
Manifold alternator generator	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Manual fuel valve	336312	Gasoline Engine and Engine Parts Manufacturing	Fuel injection systems and parts, automotive and truck gasoline engine, manufacturing
Memorial container	339995	Burial Casket Manufacturing	Burial caskets and cases manufacturing
Method and apparatus for testing a moving vehicle	334290	Other Communications Equipment Manufacturing	Remote control units (e.g., garage door, television) manufacturing
Method and system for valuing advertising content	541511	Custom Computer Programming Services	Applications software programming services, custom computer
Method for distributing sports entertainment	334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Video camera (except household-type, television broadcast) manufacturing
Method for making a safety seat having a molded shell and a safety restraint system integral thereto	336360	Motor Vehicle Seating and Interior Trim Manufacturing	Automobile seat covers manufacturing

Title	NAICS Code	NAICS Keyword	Note
Method of communicating data from virtual setting into real-time devices	517210	Wireless Telecommunications Carriers (except Satellite)	Wireless data communication carriers, except satellite
Method of distributing sports entertainment	334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Video camera (except household-type, television broadcast) manufacturing
Method to efficiently process and present possible arrangements of a set of contiguous peer-to-peer links	518210	Data Processing, Hosting, and Related Services	Automated data processing services
Method, system and apparatus to facilitate conditional purchase orders with bounce back functionality	541511	Custom Computer Programming Services	Applications software programming services, custom computer
Method, system, and device for optimizing a vehicle's suspension	332611	Spring (Heavy Gauge) Manufacturing	Automobile suspension springs, heavy gauge metal, manufacturing
Methods and apparatus for controlling hazardous and/or flammable materials	325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	Fire extinguisher chemical preparations manufacturing
Methods and apparatus for developing a vehicle suspension	332611	Spring (Heavy Gauge) Manufacturing; Automobile suspension springs, heavy gauge metal, manufacturing	
Molded gasket for footwear	316219	Other Footwear Manufacturing	Footwear, athletic (except rubber or plastics soled with fabric upper), manufacturing
Molded safety seat	336360	Motor Vehicle Seating and Interior Trim Manufacturing	Automobile seat covers manufacturing
Motorcycle frame	336991	Motorcycle, Bicycle, and Parts Manufacturing	Motorcycles and parts manufacturing
Motorcycle swingarm	336991	Motorcycle, Bicycle, and Parts Manufacturing	Motorcycles and parts manufacturing
Motorcycle wind and rain deflector	336991	Motorcycle, Bicycle, and Parts Manufacturing	Motorcycles and parts manufacturing
Multimedia racing experience system	334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Airborne radio communications equipment manufacturing
National remote controlled stock car racing association	334290	Other Communications Equipment Manufacturing	Remote control units (e.g., garage door, television) manufacturing
Novelty head covering	339113	Surgical Appliance and Supplies Manufacturing	Helmets (except athletic), safety (e.g., motorized vehicle crash helmets, space helmets), manufacturing

Title	NAICS Code	NAICS Keyword	Note
Oligomeric silicon coating compositions, articles coated therewith and method for forming coating composition and coated articles based thereon	325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	Inhibitors (e.g., corrosion, oxidation, polymerization) manufacturing
Portable tire bead breaker	333220	Plastics and Rubber Industry Machinery Manufacturing	Tire making machinery manufacturing
Process for repairing body parts on vehicles or the like	336370	Motor Vehicle Metal Stamping	
Protective collar	339113	Surgical Appliance and Supplies Manufacturing	Helmets (except athletic), safety (e.g., motorized vehicle crash helmets, space helmets), manufacturing
Protective film systems and kits for vehicular windows and window assemblies and methods using the same	811122	Automotive Glass Replacement Shops	Window tinting, automotive
Protective head guard	339113	Surgical Appliance and Supplies Manufacturing	Helmets (except athletic), safety (e.g., motorized vehicle crash helmets, space helmets), manufacturing
Protective helmet	339113	Surgical Appliance and Supplies Manufacturing	Helmets (except athletic), safety (e.g., motorized vehicle crash helmets, space helmets), manufacturing
Racetrack bridge	711212	Racetracks	Automobile racetracks
Removable tailgate extender net	336214	Travel Trailer and Camper Manufacturing	Automobile transporter trailers, single car, manufacturing
RFID enabled tire control system and method	326212	Tire retreading	
Rocker-arm having perpendicular geometry at valve mid-lift	336312	Gasoline Engine and Engine Parts Manufacturing	
Selectively positionable gearshift and method	336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	Gears (e.g., crown, pinion, spider), automotive, truck, and bus, manufacturing
Shock absorber	336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	
Smart padding system utilizing an energy absorbent medium and articles made therefrom			
Snowmobile slide	336999	All Other Transportation Equipment Manufacturing	Snowmobiles and parts manufacturing

Title	NAICS Code	NAICS Keyword	Note
Spanner tool	333513	Machine Tool (Metal Forming Types) Manufacturing	Machine tools, metal forming, manufacturing
Sparkplug boot and wire protector and assembly	336322	Other Motor Vehicle Electrical and Electronic Equipment Manufacturing	Spark plugs for internal combustion engines manufacturing
Sports safety helmet	339113	Surgical Appliance and Supplies Manufacturing	Helmets (except athletic), safety (e.g., motorized vehicle crash helmets, space helmets), manufacturing
Spray bar pair assembly	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
Steering damper	332322	Sheet Metal Work Manufacturing	Dampers, sheet metal (except stampings), manufacturing
Supercharging assembly for an internal combustion engine of a motor vehicle	336312	Gasoline Engine and Engine Parts Manufacturing	Internal combustion engines, automotive and truck gasoline, manufacturing
System and method for automated proposal evaluation	541512	Computer systems	
System and method for presenting content on a wireless mobile computing device using a buffer	334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	Airborne radio communications equipment manufacturing
System and method for providing a display utilizing a fast photon indicator	334290	Other Communications Equipment Manufacturing	Alarm system central monitoring equipment manufacturing
System and method of synthesizing carbon nanotubes	327999	All Other Miscellaneous Nonmetallic Mineral Product Manufacturing	
System and methods for enhancing the experience of spectators attending a live sporting event, with contextual information distribution capability	334419	Other Electronic Component Manufacturing	LCD (liquid crystal display) unit screens manufacturing
System and methods for enhancing the experience of spectators attending a live sporting event, with gaming capability	512110	Motion Picture and Video Production	Instructional video production
System, method, and apparatus for continuous synthesis of single-walled carbon nanotubes	325510	Paint and Coating Manufacturing	
Tail lens assembly	339115	Ophthalmic Goods Manufacturing	Lens grinding, ophthalmic (except in retail stores)
Taillight assembly	335110	Electric Lamp Bulb and Part Manufacturing	Automotive light bulbs manufacturing

Title	NAICS Code	NAICS Keyword	Note
Test system for dynamically analyzing a vehicle under simulated road conditions	541511	Custom Computer Programming Services	Applications software programming services, custom computer
T-handle hex wrench	332212	Hand and Edge Tool Manufacturing	Wrenches, hand tools, non-powered, manufacturing
Torque arm apparatus and suspension system	336350	Motor Vehicle Transmission and Power Train Parts Manufacturing	Axle bearings, automotive, truck, and bus, manufacturing
Track guide for mounting to a bed of a trailer	336399	All Other Motor Vehicle Parts Manufacturing	Hitches, trailer, automotive, truck, and bus, manufacturing
Trike body	336991	Motorcycle, Bicycle, and Parts Manufacturing	Bicycles and parts manufacturing
Tubed lamination heat transfer articles and method of manufacture	333415	Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing	Evaporative condensers (i.e., heat transfer equipment) manufacturing
Turbocharger for high performance internal combustion engines	336312	Gasoline Engine and Engine Parts Manufacturing	Assembly line rebuilding of automotive and truck gasoline engines
Upper body protector	339920	Sporting and Athletic Goods Manufacturing	Protectors, sports (e.g., baseball, basketball, hockey), manufacturing
Valve lifter	336311	Carburetor, Piston, Piston Ring, and Valve Manufacturing	Engine intake and exhaust valves manufacturing
Ventilated safety helmet with progressively crushable liner	339113	Surgical Appliance and Supplies Manufacturing	Helmets (except athletic), safety (e.g., motorized vehicle crash helmets, space helmets), manufacturing
Vertically stowable modular multi-purpose trailer	336214	Automobile transporter trailers, single car, manufacturing	
Water feature device	713940	Fitness and Recreational Sports Centers	Wave pools
Wheel	336399	All Other Transportation Equipment Manufacturing	Rims, automotive, truck, and bus wheel, manufacturing
Wheel chock	336999	All Other Transportation Equipment Manufacturing	

Appendix 3: Detailed Definition of Motorsports Cluster

NAICS-2 digit	NAICS-3 digit	NAICS-6 digit	Definitions	Source	Other References
23	237	237310	Highway, Street, and Bridge Construction		IO
		315299	All Other Cut and Sew Apparel Manufacturing	IMA-CONEXUS database	Motorsports-related patents
31	316	316219	Other Footwear Manufacturing		Motorsports-related patents
32	323	323110	Commercial Lithographic Printing	IMA-CONEXUS database	IO
		323113	Commercial Screen Printing	IMA-CONEXUS database	
	324	324191	Petroleum Lubricating Oil and Grease Manufacturing	IMA-CONEXUS database	
		325510	Paint and Coating Manufacturing		IO, Motorsports-related patents
		325520	Adhesive Manufacturing	IMA-CONEXUS database	
		325998	All Other Miscellaneous Chemical Product and Preparation Manufacturing	IMA-CONEXUS database	IO, Motorsports-related patents
		326199	All Other Plastics Product Manufacturing	IMA-CONEXUS database	IO
	326	326211	Tire Manufacturing (except Retreading)	IMA-CONEXUS database	IO
		326220	Rubber and Plastics Hoses and Belting Manufacturing	IMA-CONEXUS database	
	327	327215	Glass Product Manufacturing Made of Purchased Glass	IMA-CONEXUS database	IO
		327993	Mineral Wool Manufacturing	IMA-CONEXUS database	
		331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding	IMA-CONEXUS database	
		331521	Aluminum Die-Casting Foundries	IMA-CONEXUS database	IO

NAICS-2 digit	NAICS-3 digit	NAICS-6 digit	Definitions	Source	Other References
		331524	Aluminum Foundries (except Die-Casting)	IMA-CONEXUS database	IO
33	332	332116	Metal Stamping	IMA-CONEXUS database	IO
		332212	Hand and Edge Tool Manufacturing	IMA-CONEXUS database	Motorsports-related Patents
		332312	Fabricated Structural Metal Manufacturing	IMA-CONEXUS database	IO
		332313	Plate Work Manufacturing	IMA-CONEXUS database	IO
		332322	Sheet Metal Work Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		332611	Spring (Heavy Gauge) Manufacturing	IMA-CONEXUS database	Motorsports-related Patents
		332710	Machine Shops	IMA-CONEXUS database	IO
		332812	Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers	IMA-CONEXUS database	IO
		332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	IMA-CONEXUS database	Motorsports-related Patents
		332912	Fluid Power Valve and Hose Fitting Manufacturing	IMA-CONEXUS database	
		332919	Other Metal Valve and Pipe Fitting Manufacturing	IMA-CONEXUS database	
		332996	Fabricated Pipe and Pipe Fitting Manufacturing	IMA-CONEXUS database	Motorsports-related Patents
		333298	All Other Industrial Machinery Manufacturing	IMA-CONEXUS database	
		333511	Industrial Mold Manufacturing	IMA-CONEXUS database	
		333515	Cutting Tool and Machine Tool Accessory Manufacturing	IMA-CONEXUS database	
		333611	Turbine and Turbine Generator Set Units	IMA-CONEXUS database	

NAICS-2 digit	NAICS-3 digit	NAICS-6 digit	Definitions	Source	Other References
			Manufacturing		
		333612	Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing	IMA-CONEXUS database	IO
		333613	Mechanical Power Transmission Equipment Manufacturing	IMA-CONEXUS database	
		333618	Other Engine Equipment Manufacturing	IMA-CONEXUS database	IO
		333911	Pump and Pumping Equipment Manufacturing	IMA-CONEXUS database	
		333995	Fluid Power Cylinder and Actuator Manufacturing	IMA-CONEXUS database	
		333999	All Other Miscellaneous General Purpose Machinery Manufacturing	IMA-CONEXUS database	IO
		334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	IMA-CONEXUS database	IO
		334290	Other Communications Equipment Manufacturing		Motorsports-related Patents
		334310	Audio and Video Equipment Manufacturing	IMA-CONEXUS database	
		334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	IMA-CONEXUS database	
		334519	Other Measuring and Controlling Device Manufacturing	IMA-CONEXUS database	
	335	335110	Electric Lamp Bulb		Motorsports-related Patents

NAICS-2 digit	NAICS-3 digit	NAICS-6 digit	Definitions	Source	Other References
			and Part Manufacturing		
		335312	Motor and Generator Manufacturing	IMA-CONEXUS database	IO
		335911	Storage Battery Manufacturing	IMA-CONEXUS database	
	336	336111	Automobile Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336112	Light Truck and Utility Vehicle Manufacturing	IMA-CONEXUS database	IO
		336120	Heavy Duty Truck Manufacturing	IMA-CONEXUS database	IO
		336211	Motor Vehicle Body Manufacturing	IMA-CONEXUS database	IO
		336212	Truck Trailer Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336213	Motor Home Manufacturing	IMA-CONEXUS database	IO
		336214	Travel Trailer and Camper Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336311	Carburetor, Piston, Piston Ring, and Valve Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336312	Gasoline Engine and Engine Parts Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336321	Vehicular Lighting Equipment Manufacturing	IMA-CONEXUS database	IO
		336322	Other Motor Vehicle Electrical and Electronic Equipment Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336330	Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336340	Motor Vehicle Brake System Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336350	Motor Vehicle Transmission and	IMA-CONEXUS database	IO, Motorsports-related Patents

NAICS-2 digit	NAICS-3 digit	NAICS-6 digit	Definitions	Source	Other References
			Power Train Parts Manufacturing		
		336360	Motor Vehicle Seating and Interior Trim Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336370	Motor Vehicle Metal Stamping	IMA-CONEXUS database	IO, Motorsports-related Patents
		336391	Motor Vehicle Air-Conditioning Manufacturing	IMA-CONEXUS database	IO
		336399	All Other Motor Vehicle Parts Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		336412	Aircraft Engine and Engine Parts Manufacturing	IMA-CONEXUS database	IO
		336612	Boat Building	IMA-CONEXUS database	
		336991	Motorcycle, Bicycle, and Parts Manufacturing	IMA-CONEXUS database	Motorsports-related Patents
		336992	Military Armored Vehicle, Tank, and Tank Component Manufacturing	IMA-CONEXUS database	
		336999	All Other Transportation Equipment Manufacturing	IMA-CONEXUS database	Motorsports-related Patents
		339112	Surgical and Medical Instrument Manufacturing	IMA-CONEXUS database	IO
		339113	Surgical Appliance and Supplies Manufacturing	IMA-CONEXUS database	IO, Motorsports-related Patents
		339115	Ophthalmic Goods Manufacturing		Motorsports-related Patents
		339991	Gasket, Packing, and Sealing Device Manufacturing	IMA-CONEXUS database	
42	423	423110	Automobile and Other Motor Vehicle Merchant Wholesalers	IMA-CONEXUS database	IO
		423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers	IMA-CONEXUS database	IO
		423130	Tire and Tube	IMA-CONEXUS	

NAICS-2 digit	NAICS-3 digit	NAICS-6 digit	Definitions	Source	Other References
			Merchant Wholesalers	database	
		423510	Metal Service Centers and Other Metal Merchant Wholesalers	IMA-CONEXUS database	IO
		423830	Industrial Machinery and Equipment Merchant Wholesalers	IMA-CONEXUS database	IO
		423840	Industrial Supplies Merchant Wholesalers	IMA-CONEXUS database	IO
		424710	Petroleum Bulk Stations and Terminals	IMA-CONEXUS database	IO
		424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	IMA-CONEXUS database	IO
44	441	441110	New Car Dealers	IMA-CONEXUS database	IO
		441120	Used Car Dealers	IMA-CONEXUS database	IO
		441221	Motorcycle, ATV, and Personal Watercraft Dealers	IMA-CONEXUS database	IO
		441229	All Other Motor Vehicle Dealers	IMA-CONEXUS database	IO
		441310	Automotive Parts and Accessories Stores	IMA-CONEXUS database	IO
		441320	Tire Dealers	IMA-CONEXUS database	IO
	447	447190	Other Gasoline Stations	IMA-CONEXUS database	IO
45	451	451110	Sporting Goods Stores	IMA-CONEXUS database	IO
	452	452990	All Other General Merchandise Stores	IMA-CONEXUS database	IO
		484121	General Freight Trucking, Long-Distance, Truckload	IMA-CONEXUS database	IO
52	524	524210	Insurance Agencies and Brokerages	IMA-CONEXUS database	
54	541	541110	Offices of Lawyers	IMA-CONEXUS	IO

NAICS-2 digit	NAICS-3 digit	NAICS-6 digit	Definitions	Source	Other References
				database	
		541330	Engineering Services	IMA-CONEXUS database	IO
		541380	Testing Laboratories	IMA-CONEXUS database	
		541420	Industrial Design Services	IMA-CONEXUS database	
		541511	Custom Computer Programming Services		Motorsports-related Patents
		541513	Computer Facilities Management Services	IMA-CONEXUS database	
		541613	Marketing Consulting Services	IMA-CONEXUS database	
		541614	Process, Physical Distribution, and Logistics Consulting Services	IMA-CONEXUS database	
		541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)		IO
		541910	Marketing Research and Public Opinion Polling	IMA-CONEXUS database	IO
		541922	Commercial Photography	IMA-CONEXUS database	
		541990	All Other Professional, Scientific, and Technical Services		IO
56	561	561920	Convention and Trade Show Organizers	IMA-CONEXUS database	
		561990	All Other Support Services	IMA-CONEXUS database	IO
	562	562910	Remediation Services	IMA-CONEXUS database	IO
61	611	611310	Colleges, Universities, and Professional Schools	IMA-CONEXUS database	IO
71	711	711212	Racetracks	IMA-CONEXUS database	IO, Motorsports-related Patent
		711219	Other Spectator Sports	IMA-CONEXUS database	IO

NAICS-2 digit	NAICS-3 digit	NAICS-6 digit	Definitions	Source	Other References
		711310	Promoters of Performing Arts, Sports, and Similar Events with Facilities	IMA-CONEXUS database	
		711410	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures		
81	811	811111	General Automotive Repair	IMA-CONEXUS database	IO
		811112	Automotive Exhaust System Repair	IMA-CONEXUS database	
		811113	Automotive Transmission Repair		IO
		811118	Other Automotive Mechanical and Electrical Repair and Maintenance	IMA-CONEXUS database	IO
		811121	Automotive Body, Paint, and Interior Repair and Maintenance	IMA-CONEXUS database	IO
		811198	All Other Automotive Repair and Maintenance	IMA-CONEXUS database	IO, Motorsports-related Patents
		811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	IMA-CONEXUS database	IO

Appendix 4: Explanation and Formulae of Variables

- Location quotient (LQ) – The formula for LQ is

$$LQ = \left(\frac{R1}{R2}\right) \Big/ \left(\frac{N1}{N2}\right)$$

Where: R1 = Regional Employment in Industry X

R2 = Total Regional Employment

N1 = National Employment in Industry X

N2 = Total National Employment

If LQ < 1, region is less specialized in industry X, and needs to import goods to satisfy the local demand; if LQ = 1, region produces just enough in industry X to satisfy the local demand; and if LQ > 1, region is more specialized in industry X and exports the industry's output to other regions.

- Ratio of state average earnings to national average earnings (E_r)

$$E_r = \frac{Es}{En}$$

Where: Es is $ average earnings at state level in industry X

En is $ average earnings at the national level in industry X

If Er <1, the average earnings at the state level is less than the national level for industry X; if Er = 1, the average earnings at the state and national levels are the same; if Er>1, the average earnings at the state level is greater than the national level for industry X. Earnings include wages, salaries and supplements.

- Percentage employment change from 2001 to 2010 (E_{ch})

$$E_{ch} = \left(\frac{Emp2010 - Emp2001}{Emp2001}\right) \times 100$$

Where: Emp2010 and Emp2001 are employment in years 2010 and 2001 respectively in the state for industry X. A positive rate for percentage employment change means employment in industry X has increased between 2001 and 2010 and vice versa.

Appendix 5 – Training Assets in Indiana with potential application for motorsports

Course offerings and industry certifications at Ivy Tech Community College

- Technical Skills
    - Manufacturing Skills Standards Council (MSSC)
        - Certified Production Technician
        - Certified Logistics Associate
        - Certified Logistics Technician
    - National Institute for Metalworking Skills (NIMS)
        - CNC Machine Operator
        - CNC Milling
    - Welding Fundamentals
    - Machining Fundamentals
    - Blueprint Reading
    - Quality Assurance
- Business Administration
    - Business Fundamentals
    - Business Marketing & Writing
    - Business Analysis, Introduction
    - Business Law for the Small Business Owner
- Management & Supervisory Skills (based on our Management & Supervisory Institute curriculum)
    - Tools of Management
    - Results Oriented Communication
    - Conflict Resolution
    - Employee Development
    - Presentation Skills
- Professional Development
    - Team Building
    - Problem Solving
    - Excellence in Customer Service
    - Time Management
    - Writing for Effective Communication

- Computer Skills
    - Microsoft Office Suite (Excel, Word, Outlook, Power Point)
    - QuickBooks
    - Web Design (Ivy Tech Certificate Program)
        - Adobe Dreamweaver I & II
        - Introduction to Design
        - Flash Design
    - Graphic Design (Ivy Tech Certificate Program)
        - Adobe Photoshop I & II
        - Adobe Illustrator
        - Basic Graphic Design

Indiana Center for Applied Technology (ICAT) at Vincennes University

ABB Robotics Lab at Vincennes University:

• IRB 140 w/IRC5 w/External Axis Capability and Motor Package 10

• IRB 4600 w/IRC5 Controller 2

• IRB 260 w/IRC5 w/PickMaster 5 Prepared 4

• FlexArc 250R Welding Cell 2

• FlexArc M1 Welding Cell 4

A few of the classes that are offered at the ABB Robotics Lab located at Vincennes University are:

• IRC 5 Robot Basic Programming: This course is intended for personnel responsible for starting and operating the robot creating and editing programs.

• IRC5 Advanced Programming: The goal of this course is to provide instruction in high level programming features and techniques. Designed for students who have successfully completed the IRC5 Robot Basic Programming class and who need a greater depth of knowledge. It does not provide a review of basic programming.

• IRC5 Electrical Service: The course is designed to teach students how to identify the electrical components, theory of operation, and introduce proper trouble shooting procedures on the ICR5 controller. Approximately 50% of the course is hands-on troubleshooting of actual robot system and controller.

• IRC5 Basic Robot Welding: The goal of this course is to train the student to safely use the teach pendant to create weld programs, set and change weld data, and edit existing programs.

Advanced CNC Manufacturing

Advanced CNC Manufacturing at Vincennes University is an accelerated 14 week summer course of study that provides students with nearly 600 additional contact hours of advanced CAD/CAM programming and CNC machining.

Instruction is provided in Vincennes University's state-of-the-art Technology Center located on the VU main campus. This facility houses the Haas Technical Education Center (HTEC), made possible through the Lilly Tech Works Partnership Fund, which includes 15 Haas machining and turning centers as well as a wire EDM.

Students program and machine complex 2, 3, 4, and 5-axis parts using the latest version of Mastercam X and the Haas CNC machine tools. Projects are designed to make use of the latest in high speed machining in collaboration with companies specializing in die making, mold making, aerospace, medical, and the motorsports industry.

Computer Integrated Manufacturing & Robotics

Graduates of the Computer Integrated Manufacturing Program or the Industrial Maintenance Program can find employment opportunities with companies that manufacture or use green energy systems. Examples are manufacturers of wind mill systems, companies that install and maintain wind mills,

companies that produce alternative fuels, and companies that generate energy from alternative methods.

Precision Manufacturing

Precision Manufacturing is a highly skilled occupation in which raw material is machined and transformed into a specialized piece of industrial tooling.

Vincennes University offers the most comprehensive Precision Manufacturing Technology program in Indiana, and it is one of the very few in the United States to offer specialized training in building metal stamping dies and plastic injection molds.

Students have the opportunity to develop a solid background in machine shop practices, and to learn set-up and operations for all basic types of manual and CNC machine tools. Classroom discussions focus on theory, terminology, and calculations.

The type and quality of equipment used in our labs include traditional machine tools as well as the latest in computer machining equipment— identical to that found in industry. In addition, our faculty has extensive background in education, teaching, and industry, to ensure that you receive instruction in both theory and practical applications.

Precision Manufacturing graduates have the option of applying for acceptance into our 14 week summer Advanced CNC Manufacturing program, providing them with an additional 600 hours of hands on CNC training, as well as a second Associates degree.

Product Design and Production Processes

Drafters design products or special tooling required to manufacture a new product. These designs, usually based on specifications and rough sketches prepared by engineers, are the blueprints for

manufacturing. It's a career that can be challenging and rewarding since you are involved in the creating and development of new ideas.

Welding Technology

The Welding Technology boasts of new welding stations with new Lincoln Electric multi-process welding equipment. Vincennes University and Lincoln Electric have created an exciting new partnership to ensure the welding program maintains the latest in state of the art welding equipment used in industry today.

Welding Technology is a comprehensive two-year A.S. or A.A.S program designed to prepare the student for gainful employment in the welding field. Emphasis is placed on preparation for the A.W.S. (American Welding Society) Certifications. Graduates also have the opportunity for transfer to a baccalaureate degree program.

Students are trained in OAW (Oxy Acetylene Welding), SMAW (Shielded Metal Arc Welding), Gas Metal Arc Welding), and GTAW (Gas Tungsten Arc Welding). Plasma arc cutting, air carbon arc cutting, and print reading are covered. Advanced inspection and fabrication methods, along with automation are covered to achieve the extensive discipline demanded within the welding profession. A major portion of the lab time is devoted to developing skills in all structural and pipe welding positions.

The one-year certificate program provides nine months of concentrated training with approximately 20 hours per week in welding lab, the majority of which will be devoted to hands-on training. The student's skills needed to perform welds that comply with A.W.S. standards will also be developed.

Motorsports Engineering Degree at IUPUI

This 4-year Bachelor of Science of Degree in Motorsports Engineering degree program was just approved in May, 2008. This program, which aims to prepare graduates for careers in the motorsports industry, as well as automotive-related companies, will focus on teaching fundamentals of engineering and will include hands-on projects that involve designing, analyzing, and building of actual systems.

The Motorsports Engineering program is 127 credit hours including a foundation of 70 semester hours in engineering and engineering course work. Motorsports specific classes include:

- Introduction to Motorsports
- Business of Motorsports I & II
- Motorsports Design
- Data Acquisition in Motorsports I & II
- Dynamic Systems and Signals
- Computer Aided Engineering
- Control Systems Analysis and Design
- Automotive Control
- Vehicle dynamics
- IC Engines
- Capstone Design Project
- Internship

Appendix 6

INDIANA MOTORSPORTS TIMELINE

1909: The founders, Carl G. Fisher, James A. Allison, Arthur C. Newby and Frank H. Wheeler, pooled their ideas and resources to build the Indianapolis Motor Speedway, which would become the world's greatest racecourse. Fisher's vision was to build an automobile testing ground to support Indiana's growing automotive industry.

June 5, 1909: The first competitive event to take place at the Indianapolis Motor Speedway was actually a gas-filled balloon race. In the handicap division, Dr. Goethe Link and Russ Irvin's "Indianapolis" won. John Berry and Paul McCullough won the National Championship race with the "University City."

Aug. 14, 1909: The first motorized races - using motorcycles - took place on the recently completed IMS oval, which had a racing surface composed of crushed stone sprayed with tar. A.G. Chapple won the first race, a five-mile handicapped race with seven competitors, on an Indian motorcycle. The two-day event was originally scheduled to begin on Friday, Aug. 13 but was rained out. Because competitors would not compete on Sundays in that era, the final day of competition was rescheduled for Monday the 16th, but the day's activities were canceled due to track surface conditions.

Aug. 19, 1909: The Speedway opened for three days of auto racing, the first automobile races in track history. The first auto race was a two-lap, 5-mile standing start "dash" won by Louis Schwitzer. Accidents in the initial events, however, convinced the management that a paved surface was necessary for the safety of drivers.

Late 1909: In a span of 63 days, 3.2 million paving bricks, each weighing 9.5 pounds, were laid on top of the crushed rock and tar surface to upgrade the Speedway. The job was completed in time for another series of races scheduled for Dec. 18, but sub-freezing weather forced cancellation of the event.

May 30, 1911: The first Indianapolis 500-Mile Race, initially named the "International Sweepstakes," was won by Ray Harroun at an average speed of 74.602 mph. Except during America's involvement in World Wars I and II, the Indianapolis 500 has been an annual event ever since. Many historians believe that this race marked the first use of a pace car to start a race. It is also believed that Harroun's Marmon "Wasp" was the first automobile to use a rearview mirror.

1935: The Indianapolis Motor Speedway was the first track in the world to install safety-warning lights. Also in 1935, helmet use became mandatory at the Speedway, a first for motor racing worldwide.

Nov. 14, 1945: Tony Hulman of Terre Haute, Ind., obtained control of the Indianapolis Motor Speedway, purchasing it from Eddie Rickenbacker for $750,000. Hulman would help elevate the Indianapolis 500 and the month of May to a new level. Wilbur Shaw was named president and general manager. Shaw would later popularize the tradition of announcing, "Gentlemen, Start Your Engines" in the early 1950s.

1960: Indianapolis Raceway Park, a multi-purpose racing facility is opened just eight miles west of the Indianapolis Motor Speedway in Clermont, Indiana. IRP was located on 267 acres of land and consists of

three race tracks: oval, drag strip and road course. The first event was held on the ¼ mile drag strip. The first oval race (on dirt) was held in 1961 and won by AJ Foyt.

1978: Robert and Joyce Newton raised the capital needed to build the world's first and only factory solely devoted to the production of racing tires and launched Hoosier Tire. Located in Plymouth, Indiana, just down the road from the corporate office in Lakeville, the factory began production in 1979.

1981: IRP hosts the first ever NASCAR event in Indianapolis when the Grand National Series comes to town.

1989: Gary Ornsby, Don Prudhomme and Larry Minor operate their NHRA teams out of shops in central Indiana. In 1999, Prudhomme built his race shop in Brownsburg and the following year Bill Simpson built the first of several race shops in Hendricks County. Since Prudhomme's move in 1999 several others have followed because of the central location, cost of doing business and talent pool available in Indiana. Those teams are: Kenny Bernstein Racing, John Force Racing, Don Schumacher Racing, Pedregon Racing, Vance & Hines and Bob Vandergrift Racing. These teams employ hundreds of Hoosiers and several suppliers have also followed their move to Indiana creating even more jobs.

March 11, 1994: Tony George, president of the Indianapolis Motor Speedway, announced plans for a new racing series, the Indy Racing League, to begin competition in 1996. The Indianapolis 500 is its cornerstone event.

Aug. 6, 1994: The inaugural NASCAR Brickyard 400 race was won by Jeff Gordon.

Sept. 24, 2000: Michael Schumacher won the inaugural United States Grand Prix Formula One race at Indianapolis before a sellout crowd estimated at 225,000. Schumacher's Ferrari teammate, Rubens Barrichello, finished second and Heinz-Harald Frentzen was third in the Jordan Grand Prix entry.

May 1, 2002: The Speedway announced that the groundbreaking SAFER (Steel And Foam Energy Reduction) Barrier was in place in all four of the Speedway oval's corners for the beginning of practice for the 86th Indianapolis 500. Under development by the Indy Racing League and the University of Nebraska-Lincoln's Midwest Roadside Safety Facility since 1998, the SAFER Barrier is designed for multiple impacts by Indy Racing League cars and stock cars during an event. NASCAR joined in the development of the project in September 2000. The barrier is also used during the Brickyard 400.

May 1, 2006: Leaders of the industry create the Indiana Motorsports Association, Inc. The IMA is a not for profit that will promote the motorsports industry throughout the state of Indiana.

Sept. 14, 2008: Six-time MotoGP World Champion Valentino Rossi won the inaugural Red Bull Indianapolis GP, which officials ended after 20 of the scheduled 28 laps due to high winds and heavy rain brought on by the remnants of Hurricane Ike. Rossi became the MotoGP/500cc rider with the most wins in history with his 69th victory in that class, surpassing fellow Italian legend Giacomo Agostini. 2006 MotoGP World Champion and Owensboro, KY native Nicky Hayden finished a season-best second, and Jorge Lorenzo was third.

Appendix 7

STRATEGIC DOING

Strategic Doing is a process which enables civic leaders to form collaborations quickly, guide them toward measurable outcomes, and make adjustments along the way.

During a ***Strategic Doing Workshop*** participants are led through a structured set of conversations and guided by workshop exercises, which define 5 things:

- Opportunities
- At least one outcome with characteristics and metrics
- At least one initiative or project
- A complete action plan
- A plan to meet again

The process focuses on four key questions:

WHAT COULD WE DO TOGETHER?

- Look first at assets within the group at the table.
- Next look to see how combining the known assets might offer new opportunities.
- Evaluate who is not at the table but might have an interest or resources helpful to the solution.

WHAT SHOULD WE DO TOGETHER?

- Define an outcome with SMART goals and metrics.
- Evaluate the options for action and help the group narrow the scope of activity by suggesting the group focus on no more than three goals initially.
- Analyze the suggested activity to see if it is appropriate for the assembled group (e.g. – is some other entity already working on the project or is the proposed project something that needs higher authority approval).

WHAT WILL WE DO TOGETHER?

- Draft an activity/action plan including the first action step, the responsible entity and a "due date."
- Make a public commitment to "do" the action step

WHAT'S OUR 30/30?

- Decide how the group will communicate (face-to-face, internet, email, weblogs, etc.).
- Set a date, in the next 30 days, for follow-up, reporting and adjustments.

Strategic Doing allows your community, organization or network to create an action plan, with measurable outcomes and accountability, in a 3-6 hour period.

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