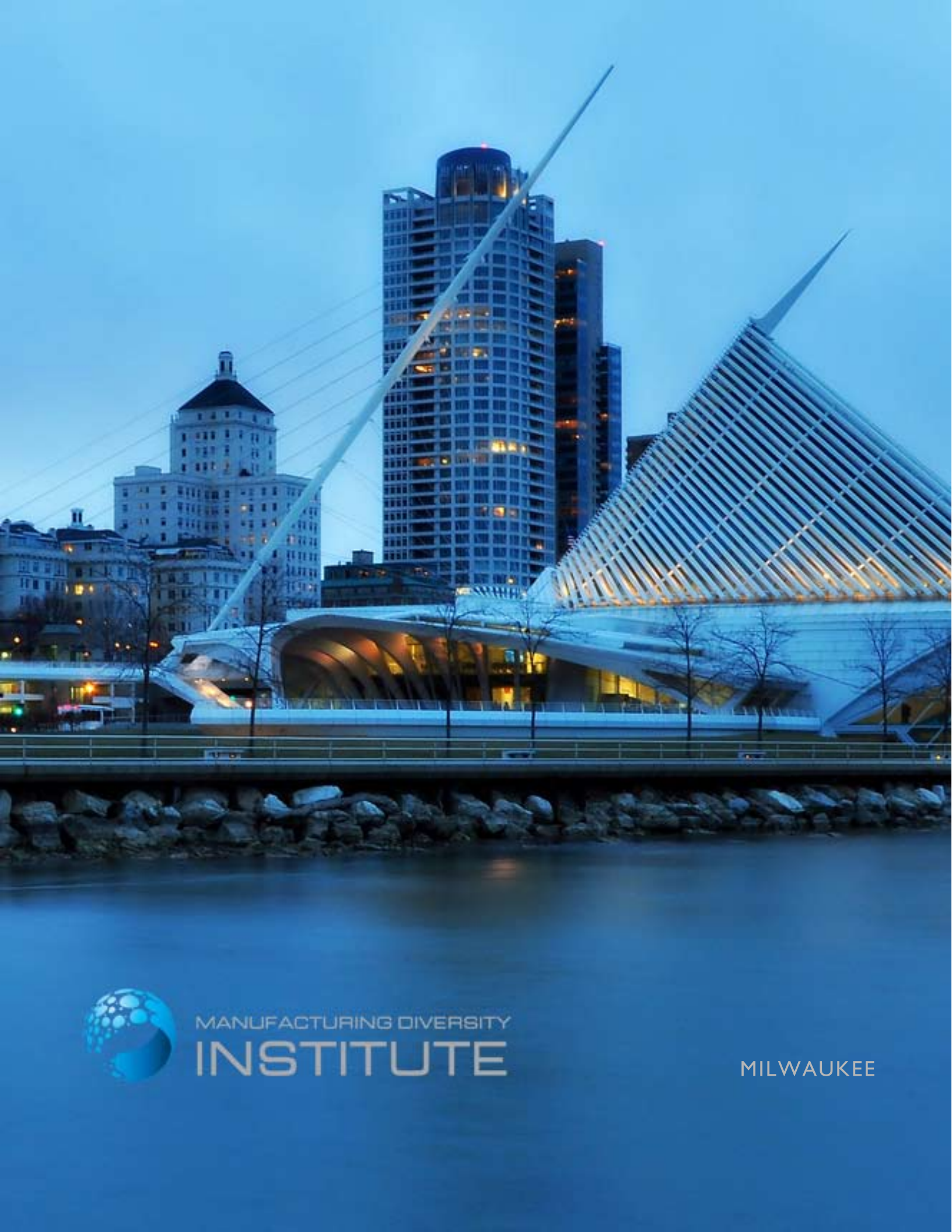
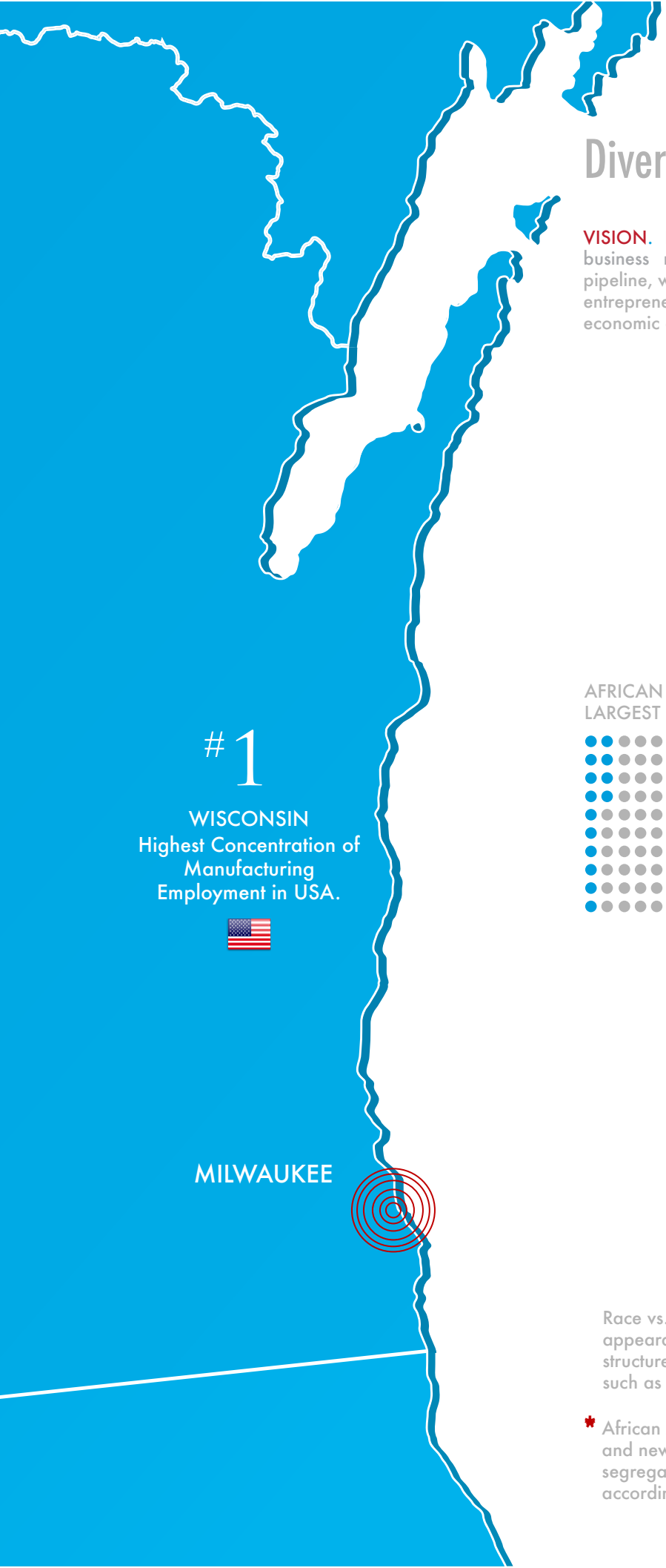


MANUFACTURING DIVERSITY
INSTITUTE

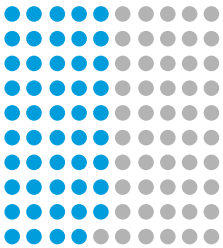
MILWAUKEE



Diversity is Manufacturing's Future

VISION. Foster innovation and entrepreneurship in underserved business markets by creating a research-driven, diverse talent pipeline, which intentionally and strategically links future leaders and entrepreneurs of color to advanced manufacturing's regional economic development.

U.S. CHILDREN UNDER FIVE

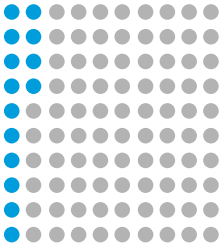


49%

People of Color

Racial & Ethnic Diversity

AFRICAN AMERICANS ARE THE
LARGEST RACIAL POPULATION OF COLOR

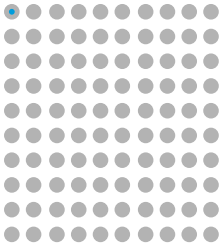


14%

AFRICAN AMERICANS

37 Million U.S Citizens *

MANUFACTURING INNOVATION AND
NEW VENTURES



.02%

AFRICAN AMERICANS

Race vs. Ethnic Diversity. Race refers to a person's physical appearance, such as skin color, eye color, hair color, bone/jaw structure etc. Ethnicity, on the other hand, relates to cultural factors such as nationality, culture, ancestry, language and beliefs.

* African Americans rank at the bottom in the areas of education and new venture creation, according to Census data. Urban segregation and continued discrimination contribute to this ranking according to the Brookings Institute.

MANUFACTURING DIVERSITY
INSTITUTE

WHITE PAPER

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TABLE OF CONTENTS

Mission	3
Challenge	4
Opportunity	11
Solution	14
- Overview	14
- Operations	15
Governance	18
Legal & Finance	19
Communications	19
Government Relations	20
Conclusion	20
Addenda	21
- Organizational Chart	22
- Manufacturing Diversity Careers Pipeline	23
- Advanced Manufacturing Careers	24
- Science & Technology Timeline	25
- Innovation Cluster Dynamics	26
- Federal Agency/Industry Constellations	27
- World Innovation Clusters	28
Bibliography	29

MISSION

The *Manufacturing Diversity Institute* will create a pioneering research-driven manufacturing diversity talent pipeline that will increase the participation of people from Milwaukee's African American and other communities of color in the manufacturing industry (as employees, innovators and entrepreneurs). The Institute will achieve this goal through outreach, education, entrepreneurship and leadership development; and by fostering the pursuit of advanced manufacturing, scientific and engineering careers; and new ventures. The Institute will emphasize leadership and entrepreneurship as the foundation for economic change in Milwaukee's Inner City. [1.]

[1.] The Manufacturing Diversity Institute supplements, enhances, and compliments existing regional workforce development.

THE CHALLENGE

Critical Skills Gap in U.S. Manufacturing

Manufacturers can no longer afford to wait. It is time to educate and train the next generation of manufacturing talent. Access to a highly skilled and educated workforce is the most critical element for innovation success. Increasingly, companies report they cannot find individuals with the skills required for today's advanced manufacturing workplaces. These skill shortages pervade all stages of manufacturing—from engineering to skilled production. Quantified, the skills gap represents:

- 82% of manufacturers report a moderate or serious gap in skilled production.
- 74% of manufacturers report this skills gap has negatively impacted their company's ability to expand operations.
- 69% of manufacturers expect the shortage in the skilled workforce to worsen in the next 3-5 years.
- 5% of all jobs in manufacturing remain unfilled due to lack of qualified workers.

Visualization of Milwaukee's 30th Street Industrial Corridor

Milwaukee's Inner City is a Place of Socioeconomic Extremes

Milwaukee is a city known for socioeconomic extremes like infant mortality rates (one of America's most fatal cities for infants), severe economic decline, poverty, and high school dropouts. In the eyes of many observers, Milwaukee is a dead end street for inner city residents: there is no way forward towards the middle class and prosperity. This is only compounded by the fact that Milwaukee has a weak manufacturing backbone running down the middle of its inner city neighborhoods, once supplying the labor that supported the city's manufacturing culture.

Today, Milwaukee inner city residents have a general unemployment rate of 35%. When broken down the unemployment rates are considerably more problematic for African American males (47%) and Hispanic or Latino males (35%) compared to white males (16%). According to a *January 2012 Working Paper* published by Marc Levine, University of Wisconsin-Milwaukee, Center for Economic Development, Milwaukee suffered the largest percentage point drop in African American males employment rates of the 40 metro areas listed in the study. The study reported that no metro area since 1972 has witnessed more decline in the number of employed African American males than Milwaukee.

In another published report, Milwaukee was nationally rated as number four in poverty. According to a 2011 *Forbes Magazine* study, Milwaukee is ranked dead last out of fifty two metro areas and listed as the "worst place for minority entrepreneurship" in the country. As the recipient of Forbes "booby prize" Milwaukee was cited for having fewer customers for its minority entrepreneurs, a declining population, and one of the worst job creation records among major metro areas. The *Forbes* study only confirmed for many the fact that there are few viable and sustainable minority business models in Milwaukee, especially in the African American community.

In addition, Milwaukee was mentioned in a December 2, 2011 *CNBC.com Report* as one of the "*20 Cities You Don't Want To Live In*" in the world. The worst cities were cited for experiencing extreme difficulty due to the global economic downturn, high crime rate, high unemployment, severe job loss, poor school performance, and poor health rates.

Milwaukee's Manufacturing Downturn Dramatically Affected the Inner City

Milwaukee County has lost almost 68 percent of its manufacturing jobs in the four decades since 1970. During our recessionary periods, African American workers along Milwaukee's 30th Street Corridor were hit especially hard. After years of struggle, they had finally moved into family-supporting factory jobs. When plants closed, African Americans suffered a disproportionate share of the losses. The result was a sharp increase in African American concentrated poverty even as the larger economy recovered. African American neighborhoods in Milwaukee that were vibrant family communities, growing to support manufacturing, became Milwaukee's major distress areas.

Throughout Milwaukee's rich industrial history there has never been a major manufacturing operation owned or operated by African Americans even though thousands spent their professional careers working in the manufacturing industry. However, there have been attempts by African-Americans in Milwaukee to establish small manufacturing operations.

Two examples are illustrative of the challenges faced by African American Entrepreneurs. The entrepreneurial efforts of Steeltech and Calvary Bindery Services met unfortunate ends, their failures neither well known nor well documented. The 1990 start-up of Steeltech Manufacturing turned out to be a disaster before it could really get properly launched. It was a light manufacturing effort specializing in metal fabrication work, Steeltech manufactured cargo beds which were used as a flatrack artillery drop off for the military during the First Iraqi War. The contract to build these cargo beds was through Super Steel Products and one its major customer: Oshkosh Truck Corporation, a leading truck supplier to the military.

According to a 1998 *New York Time* article, Steeltech's fall is attributed to a series of misfortunes. Some of the misfortunes included disproportionate company debt, grossly underestimated cost projections, excessive reliance on too few contracts, and misjudging competition.

Like Steeltech, Calvary Bindery Services' fate was predicated on a single client, Quad Graphics. Started in 1971, Quad Graphics is the world' second largest provider of print and multichannel solutions. During Quad's formative years, it contracted with Calvary Bindery Services to bind magazines and perform other binding services. However, after a short business relationship between Calvary Bindery Services and Quad Graphics, the contract was not renewed. Quad Graphics established its own state of the art binding services.

Calvary Bindery Services sought other contracts to keep its doors open. According to sources, the Bindery looked to provide packaging services to Miller Brewery. This was in direct conflict with several members of Calvary Baptist Church who openly expressed concern. A business venture that had ties to the church should avoid doing business with a company that sold alcohol related. Due financial and operational constraints, Calvary Bindery Services represented another high profile African American-led venture that failed.

Today, Milwaukee has a variety of low technology operations, owned by African

Americans and people of color, that focus on light assembly, packaging, and knitting services ranging from small companies to Goodwill Industries. Started in 2000 by an African American disabled Vietnam Veteran, CHRYSPAC (Chrysalis Packaging & Assembly Corp.) a ISO 9000 certified company located near Mitchell International Airport in the Aeropolis business district. It serves small to medium manufacturers by providing light assembly, knitting, labeling, shrink packaging, quality inspection, sorting, testing, and distribution fulfillment services.

However, small light assembly operations that hire low skilled entry level employees cannot meet the mounting 21st century employment demands of Milwaukee's inner city residents. African Americans in Milwaukee find themselves in an "economic perfect storm." This perfect storm is characterized by:

- A debilitating skills gap defined by low skilled workers who are unable to transition into higher skilled advanced manufacturing operations.
- There is little collaboration between local educational systems at all levels and industry.
- Finally, there is no community-wide agreed upon collaborative system to deliver a flexible and nimble Science, Technology, Engineering, Math (STEM) educational experience that would position Milwaukee as a city that responded to the challenge of preparing a workforce ready for the global advanced manufacturing culture.

People of Color are the New Majority

Our nation, including Milwaukee, is in the midst of two great demographic shifts. First, the largest generation of Americans—Baby Boomers—is reaching retirement age and will leave the workforce en masse within the next two decades. The retirement of the Baby Boom generation will create millions of replacement job openings, at the same time that advanced manufacturing's growth creates the need for additional workers to fill newly created jobs.

Second, as the demand for workers increases in manufacturing our nation is becoming more demographically diverse. African Americans and other people of color make up a growing share of the population that will be entering their prime working years over the next two decades. With large numbers of manufacturing jobs demanding STEM education and skills, these individuals and their children will reshape the available workforce, and play a vital role in sustaining economic growth.

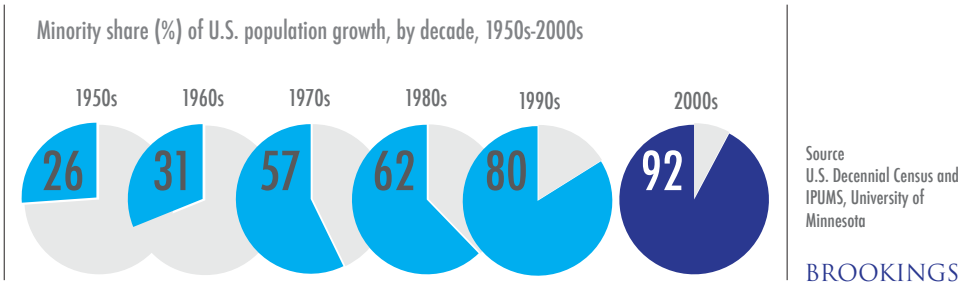
In the 2000s, 92% of US population growth came from communities of color. "One of the things the census really tells us is that diversity is in our future," says demographer

William H. Frey. "All of the growth we have in the child population in this last decade comes from minority groups. I think this is a huge statement for where we're going for the rest of this century." Indeed, significant changes are occurring. According to a Brookings Institute analysis, 50% of the population in 22 large metro areas and 50% of infants under age five are people of color, making the US a "majority minority" nation.

Immigration Reform and the New America

If enacted, the immigration reform bill will further increase diversity levels. According to the Census Bureau, roughly 20 million immigrants will come to the U.S. under the current law. The Congressional Budget Office expects another 16 million immigrants to arrive under the proposed new provisions—thereby boosting the increase in non-Europeans. Hispanics are projected to become 30 percent of the U.S. population by 2050. We would hit that mark sooner under proposed immigration reforms. In addition, immigration will be more global—attracting more people from different countries.

As the diversification of America continues (even without passage of new immigration laws) it is understandable some people might feel anxious. Change can be unsettling. But unless a strong commitment is made to maximize the development of the skills and capabilities of people—regardless of their race or ethnicity—we run the very real risk that our country, state and communities will divide along educational and economic lines, not ethnic ones. Because educated people intermarry at higher rates, our country, state and communities could consist of a small educated cosmopolitan class with low ethnic boundaries and a fair amount of integration in white- collar workplaces; and a much larger, less-educated, more-balkanized population that experiences high residential and professional segregation and more ethnic hostility. Ultimately this educational/economic divide will make it more difficult to remain competitive in a global economy that is also becoming more racially and ethnically diverse. Our human resources are our greatest asset. If the U.S. is to remain economically competitive, we must ensure as many human beings as possible are adding to the bottom line rather than subtracting from the bottom line.



Children of Poverty Require Unique Education and Training

While a disproportionate share of youth in the inner city come from low-income families, our educational system has been geared to middle-income children. Our curriculum, textbooks and recognized teaching methods are all aimed at the experiences and values of middle-class children. But the instructional program that is good for

middle-income children is not necessarily good for children whose background is one of poverty.

Children living in poverty have not had many of the simple experiences we assume are common to all youngsters. They likely have not been taught at home to place a high value on education, and to think of education as the key to success because their parents likely may not have finished high school or received post-secondary education from a technical or four-year college, or a trade training program. Instead of being prepared for school with a home full of books, magazines, and newspapers their childhood experiences is often filled with illness, hunger, threats of eviction, instability and danger. Because of the low status society has accorded them and their families, these children are likely to have a low self-image, and lack the motivation to succeed—at least in terms of what is considered success in middle-class terms. The most severe handicap these children face is their lack of verbal communication skills achieved by reading and writing. Without these skills it is difficult to think critically, and use more advanced software (digital design, modeling and simulation) to visually express creativity and analysis.

Inner City Education's Effect on Entrepreneurship

The realities of inner city education directly affect the participation of African Americans and people of color in the labor market. It is one of the most studied topics by economists, sociologists and other social scientists over the past several decades. Interestingly, however, much less attention has been paid to the participation of African Americans in the main alternative form of making a living—business ownership/ entrepreneurship.

More than one out of every 10 working-age adults in the United States owns a business. The difference between the rate of business ownership among African-Americans and whites is striking. Approximately, 11.6 percent of white workers are business owners, whereas only 3.8 percent of African American workers are business owners. Several recent studies have examined the causes of the dearth of African American-owned businesses and found relatively low levels of education, assets, and parental self-employment are partly responsible. For example, Census estimates indicate African American-owned firms have lower revenues and profits, hire fewer employees, and are more likely to close than white-owned businesses.

The relative lack of success of African American-owned businesses in the United States is a major concern among policymakers. It is particularly troubling because business ownership has historically been a route of economic advancement for disadvantaged groups. It has been argued, for example, that the economic success of earlier immigrant groups in the United States—such as the Chinese, Japanese, Jews, Italians, and Greeks—is due, in part, to their ownership of small businesses. In addition, many states and the federal government are currently promoting self-employment as a way for families to leave the welfare and unemployment insurance rolls. The lack of business success among African Americans also contributes to racial tensions in urban areas throughout the United States.

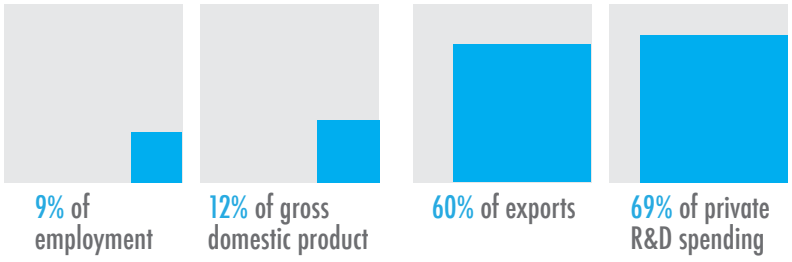
OPPORTUNITY

Importance of Manufacturing to the Nation

Manufacturing has the potential to stage a renaissance and once again become a career of choice for the most talented. Exploding demand in developing economies and a wave of innovation in materials, manufacturing processes, and information technology are driving today's new possibilities for "advanced" manufacturing. Nanotechnologies that make possible new types of microelectronics and medical treatments, 3D printing, and emerging new materials and methods will revolutionize how products are designed and made.

Manufacturing is essential to the U.S. economy because it is the main source of innovation and global competitiveness for the United States. Simply put, manufacturing is the U.S. pipeline for new products and productivity-enhancing processes. While the sector makes up just 12 percent of the economy, manufacturers conduct 69 percent of private sector R&D. And on average, 22 percent of manufacturers introduce new processes to increase productivity compared to just eight percent of non-manufacturers. This is important because innovation that emerges from America's manufacturing sector also fuels growth within the service sector because intermediary goods—the machines used by services (e.g. automated self check-out kiosks at grocery stores)—drive service sector productivity.

Manufacturing is a crucial engine of job creation and economic growth



Perhaps most important, manufacturing is becoming more "democratic," and thus more appealing to bright young people with an entrepreneurial bent. Not only has design technology become more accessible, but an extensive virtual infrastructure exists that enables small and medium-size companies to outsource design, manufacturing, and logistics. Large and small companies alike are crowd-sourcing ideas online for new products and actual designs. "Maker Spaces"—shared production facilities built around a spirit of open innovation—are proliferating.

Manufacturing Industry is Wisconsin's Crown Jewel

The two advanced manufacturing industry "clusters" that are central to the Institute's regional diversity efforts are the Wisconsin Energy Research Consortium (WERC) and the Water Council. A cluster is defined as a geographical concentration of interconnected companies with close supply links, specialist suppliers, service providers, related industries and institutions.

WERC is an eight state regional consortium. The consortium fosters the growth of the advanced manufacturing power, automation and controls cluster. WERC is focused on

the cluster's use of new technologies and innovation, market research, workforce development, public policy support, organizational development and strategic collaboration.

WERC has over 50 members and partners, including leading industrial members such as Rockwell Automation, Johnson Controls, Eaton, Briggs & Stratton, Kohler, DRS Technologies, and Cooper Power Systems. The regional cluster is comprised of 235 businesses with over 18,000 employees. Occupations supporting this cluster represent 38% of the regional manufacturing industry's employment. Exports totaled over $3 billion.

Milwaukee lies on the shores of the greatest single source of fresh water on the planet – the Great Lakes. Situated along Lake Michigan and uniquely spanning both the Great Lakes and the Mississippi watersheds (the two largest watersheds in the U.S.), the Milwaukee region is blessed with abundant fresh water resources, world-class research institutions and the highest concentration of water-related companies in North America. The water industry represents a $483 billion dollar worldwide market, covering a spectrum of industries from water and sewage filtration, to water pumps, valves and meters.

The Water Council is a consortium that brings together the regional fresh water research community and water related industries, establishing the Milwaukee region as the "world water hub" for water research, economic development, education and policy. The Water Council serves over 150 water technology companies—including five of the 11 largest water firms in the world—and 100 academic scientists and researchers. The Water Council is completing a $23 million investment that will transform a downtown Milwaukee industrial building into a state-of-the-art business accelerator and research center.

Making Manufacturing the "Go-To" Industry

Once upon a time, ambitious young people with a knack for math and science went to work in manufacturing. They designed planes, computers, and spacecraft, figured out how to lay out an assembly line, helped to make new cars faster and airplanes more efficient. They pushed the limits of computer chips, invented new medicines, and new consumer technologies, like tablets and smartphones.

Milwaukee can dramatically benefit from renewed federal and state efforts to develop advanced manufacturing. Wisconsin has the highest concentration of manufacturing employment in the U.S., and the region is home to over 3,530 manufacturing companies

that employ 160,000 individuals. Of that number, only 40 in the state are African-American owned according to data from Wisconsin Manufactures & Commerce (WMC). While Milwaukee's African Americans and other people of color were deeply affected by manufacturing's downturn, there remains within those communities an appreciation for the opportunities manufacturing offers.

To inspire the pursuit of manufacturing careers by all racial and ethnic groups, there needs to be substantial change in the cultural image of the manufacturing industry. When the National Association of Manufacturers conducted a survey of high-school students in Indianapolis, Indiana the results were alarming: only three percent of students said they were interested in careers in manufacturing.

Outreach to African Americans and other people of color with programs designed and tailored specifically to their educational needs is an imperative for manufacturing and their participation in the industry.

SOLUTION

Fostering the Nation's First Manufacturing Diversity Cluster

Education and training are, of course, the keys to closing the manufacturing talent gap and fostering entrepreneurship. While there are several examples of innovation in manufacturing technology education by single institutions, they are still too small and fragmented to meet the demand levels of employers. There are also isolated examples of small networks of educational institutions, and of progressive employers. All of these need to be undertaken on a larger scale.

The solution to this problem will require concerted—and connected—efforts by government, employers, schools, and individuals themselves. Outreach to African Americans and minorities with programs designed and tailored specifically to their educational needs is an imperative for manufacturing. A diversity-driven renaissance in manufacturing education needs to incorporate:

- More technology-infused postsecondary education alternatives, meeting students and working learners "where they are" and "when they can learn;"
- A heightened focus on Science, Technology, Engineering and Math (STEM) and critical thinking using modeling and simulation software;
- More competency-based, post-secondary pathways with opportunities to earn industry endorsed credentials with value in the workplace;
- Accelerated pathways to credentials and more "on and off" ramps to postsecondary education;
- More internships and mentorships to align secondary and post secondary education with industry competencies, skill certifications, and entrepreneurship.

Manufacturing Diversity's Think & Do Tank

The *Manufacturing Diversity Institute*, operating as a non profit, is modeled after the *Institute for Innovation, Creativity, and Capital (IC^2), University of Texas at Austin*. Over 30 years ago, IC^2, a trans-disciplinary think-and-do tank, began pioneering what is now called Innovation Clusters. Their "Technopolis Framework" remains the leading paradigm for technology-driven economic development, emphasizing interlocking relationships between academia, business, government and communities.

The analytical and creative application of this economic development framework fostered the transformation of Austin, Texas, and incubated companies such as Dell and Whole Foods. From our perspective, focused on Milwaukee, the framework provides a practical way to foster new kinds of relationships among consortia, universities, research centers, large corporations, start-ups; federal, state, and local government; support groups; and key influencers. (See Addenda for Visual Models of Science and Technology Roadmap, Innovation Cluster Dynamics, and World Innovation Clusters)

The Institute's Operations & Programs

The *Institute* offers specific manufacturing sector-based solutions that inspire and foster the development of science, engineering, entrepreneurship and leadership talent. Operations are divided into three distinct programs (outreach, education and entrepreneurship). When taken together as a continuum, these programs form the manufacturing diversity talent pipeline. Supporting programs include interdisciplinary research and program evaluation. (See Addenda for Visual Models of the Organizational Chart and Manufacturing Diversity Pipeline)

Within each program area, we use a conservative process to launch specific projects so that they provide near-term results, locally and nationally, as well as long-term value.

(1) Recognizing the urgency, we ***adopt*** existing solutions from across the county and deploy them in Milwaukee's inner city.

(2) After running each solution for a period of time, we evaluate (in situ) the results and ***adapt*** the solution to the needs of African Americans and other people of color.

(3) Finally, after careful analysis, we ***extend*** the adopted/adapted solution by creating a novel, commercially viable solution, that is informed by original, interdisciplinary research.

Outreach

Our outreach efforts, specifically focused on inspiration and motivation, are complimentary and interlocking with the region's industry, as well as university and technical college programs. It is essential that manufacturing career exploration solutions be relevant and valuable to industry as well as relevant and inspirational to youth. If

African American and youth of color are to pursue manufacturing careers and start manufacturing businesses that fit their skills, interests, and personalities, manufacturing career exploration needs to go beyond college guidance and occupational information. Motivational solutions, such as inspirational presentations, career coaching and career roadmaps are needed. (See Addenda for Visual Model of the Workforce of the Future)

Two examples of outreach solutions that we are considering are offered by the *National Association of Manufacturers* and the *Kauffman Foundation*, respectively. Working with the *National Association of Manufacturers*, the *Institute* may rollout the *Dream It Do it* program across Milwaukee's Inner city. The *Dream It Do it* program is designed to help change the perception of manufacturing careers to attract and recruit the next generation of leaders and entrepreneurs.

In partnership with the *Kauffman Foundation*, we can inspire youth to learn about entrepreneurship using their acclaimed *Ice House Entrepreneurship Program*. It is a revolutionary new online learning program designed to inspire and engage youth of color in the fundamental concepts of an entrepreneurial mindset and the unlimited opportunities that mindset can provide.

Building upon *Dream It Do it* and the *Kauffman Foundation's Ice House Entrepreneurship Program*, the *Institute* will seeks to create a Diversity-driven Career Exploration Program that brings the future of Wisconsin's Manufacturing industry and the "real world of work" to life. Our plan is to combine (1) large group, high impact presentations, (2) manufacturing industry-focused career coaching, (3) an industry mentorship program, and (4) career roadmap classes.

Additionally, the Institute will collaborate with Milwaukee Public Schools, Project Lead The Way; Society of Minority Engineers; UW-Extension Science, Technology, Engineering, and Math (STEM) groups and UW Extension's First Robotics and First Lego League.

Education & Certification Programs

To meet the future demands of manufacturing, traditional education pathways will increasingly need to align with the requirements of industry-based certifications. Industry certifications link education and work, ensuring that graduates have the skills required for jobs in today's manufacturing economy. Students earn not only education credentials, but also industry-validated, nationally-portable certifications with real value in the marketplace.

For example, the *Manufacturing Institute (A unit of the National Association of Manufacturers*) has done a remarkable job creating a *Skills Certification System* to address the skills gap and to promote a renaissance of manufacturing education across the country. The *Skills Certification System* is a system of stackable credentials that can apply to all sectors in the manufacturing industry. Working with Milwaukee's universities, technical colleges and industry partners, we would help launch the *Manufacturing Institute's Skills Certification System* as a demonstration project that can inform future development of the certification system.

Future development may include new certifications designed to serve WERC and Water Council industry partners. Working together, the *Institute* and regional clusters can design and develop regional industry certifications with national accreditation and appeal. Each certification will be "stackable"—building on a foundation of basic academic and workplace requirements, followed by cross-cutting technical competencies and then more specialized, occupationally specific skills. The sequence will be capped with professional and managerial certifications offered at the baccalaureate and graduate levels.

Entrepreneurship Services

The Institute's Entrepreneurship Services will focus on two areas: Business Model Acceleration and New Business Incubation. Business Model Acceleration will help African Americans and other people of color leverage new technologies and create relationships by studying and "packaging" advanced manufacturing opportunities. The business model will be designed collaboratively by the program participants—which will help them develop team-building skills.

New Business Incubation will offer an array of technical assistance with special emphasis on addressing hard to solve entrepreneurial manufacturing problems faced by African Americans and other people of color who are starting or growing their business. For instance, entrepreneur coaching will provide manufacturing sector business intelligence and market advice to entrepreneurs who are building high potential start-ups. (See Addenda for Visual Models of Science and Technology Timeline and Innovation Cluster Dynamics).

We also plan to help African American entrepreneurs and other entrepreneurs of color acquire the skills they need to open international markets. Our model builds on the widely successful efforts of *IC2 Global Commercialization Group*. The Group has created and delivered a multitude of educational and development programs in thirteen different

countries. *IC2 Global Commercialization Group* facilitates the growth and development of innovative technology-based businesses by providing commercialization education and know-how to local partner organizations. (See Addenda for World Innovation Clusters)

Interdisciplinary Research

A multi-domain research effort will inform the programs of the Manufacturing Diversity Talent Pipeline (outreach, education, and entrepreneurship). Research efforts and partnerships will focus on the intersection of domains such as advanced learning technologies, data visualization, global competitiveness, modeling and simulation, and social sciences.

Program Evaluation

Globalization, technology advancements and shifts in workforce demographics are among a number of drivers transforming traditional models of work. Because of this dynamic activity, the expectations of both employers and employees are evolving—creating new demands on talent management, work arrangements, visionary leadership and professional development. These drivers and issues will frame how we evaluate our success.

The evaluation team will be led by the Institute for Innovation, Creativity and Capital, (IC^2) University of Texas at Austin, working in collaboration with local experts such as *The Center for the Study of the Workplace*, School of Continuing Education at the University of Wisconsin-Milwaukee.

Governance

The structure and function of our non-profit board of directors and how the board relates to the senior staff is critical. The contemplated board membership will be comprised of individuals who have international and national recognition; as well as those with local ties to Milwaukee's community. The Institute needs the leadership, legitimacy, and competence that a well-designed board offers in order to grow into a nationally recognized organization.

Our intellectual infrastructure—combining board members with members of the advisory network—requires that we contemplate a hybrid form of governance. Combining a corporate model (i.e. maintaining constant market orientation and competitive advantage) with the emergent cellular model (i.e. flexibility and responsiveness to information) offers a framework where we can create an efficiency and effectiveness that constantly improves our own best practices across programs and sponsored projects, and help us achieve a maximum return on stakeholder investments. In an increasingly knowledge-based economy our governance needs to be knowledge and relationship based: highly adaptable, entrepreneurial, and supportive of innovation. (See Addenda for Visual Model of Organizational Chart)

Legal & Finance

The *Institute* will operate as a 501(c)(3) to achieve its mission. Board members and executive management will assume their roles as funds permit. The organizational structure (See Addenda for Visual Model of Organizational Chart) is designed to adjust to the nuanced funding interests of individuals, federal agencies, state agencies, corporate sponsors, and non-government organizations.

Founding Sponsors. The *Institute* has significant ties to the region and will benefit from a small group of founding sponsors who share our vision and can help raise awareness.

Annual Corporate Memberships and Sponsored Projects. Each corporate partner will pay a monthly fee to support the operating budget of the *Institute*. Corporate partners may also sponsor specific project proposals (sponsored projects) that are submitted to them individually or as a small group.

Federal/State Funding & Non Profit Grants. As federal and state relations are developed, we will be positioned to win federal and state contracts and funding. As the *Institute* gains national exposure, grant makers will be approached to fund key aspects of the program.

Communications

Strategically, the communications program will position the *Institute* to (1) serve as a ***catalyst*** to develop programs and strategies that significantly increase and sustain the number of African Americans and other people of color working in Wisconsin's manufacturing sector; (2) serves as a ***coordinator*** to facilitate regional collaboration on diversity issues, and (3) be an ***advocate*** for Wisconsin African American and other manufacturers of color both nationally and internationally.

We will achieve these goals programmatically speaking, by using *Idea Labs*, *Keynote Speaker's Circuit* and a *Manufacturing Diversity Chapter Network*. Idea Labs are an "inclusive" solution used to bring community, education, and corporate teams together to collaboratively come up with ideas that will help manufacturers benefit from Milwaukee's diverse workforce of the future. Each Idea Lab will have three components: (1) issue identification and agenda development, (2) a 2-day group discussion, and (3) white paper development. Thought leaders will be drawn from organizations such as WERC, Water Council, BIZStarts, Revolution Labs, Milwaukee Institute, Minority Chambers, WHEDA, MWIB, Milwaukee's African-American faith based entities, M7; regional colleges and universities, professional associations in the STEM fields—including associations whose membership is made up of people of color in those fields, Milwaukee County, and the City of Milwaukee.

The national and international *Keynote Speaker's Circuit* will address the issue of diversity and how it plays a signature role in U.S manufacturing's Renaissance. Highlighting the *Manufacturing Diversity Institute* as a national demonstration project, the Keynote will place Milwaukee in the vanguard based on the fact that it organized the nation's first manufacturing diversity cluster.

The *Manufacturing Diversity Chapter Network* will be launched at key universities and colleges where African American and other people of color will increasingly have a strong impact on the manufacturing industry. Via manufacturingdiversity.org the social network will be developed as a communications hub and knowledge network, that offers student and professional opportunities and resources such as annual conferences, webinars, white papers from contributing authors, online training and quarterly newsletter.

Government Relations

Government Relations will link the *Institute* to the federal world in Washington, D.C. that includes a network of federal agencies, think tanks, lobbying groups, and associations focused on advanced manufacturing, science and technologies, and future workforce needs.

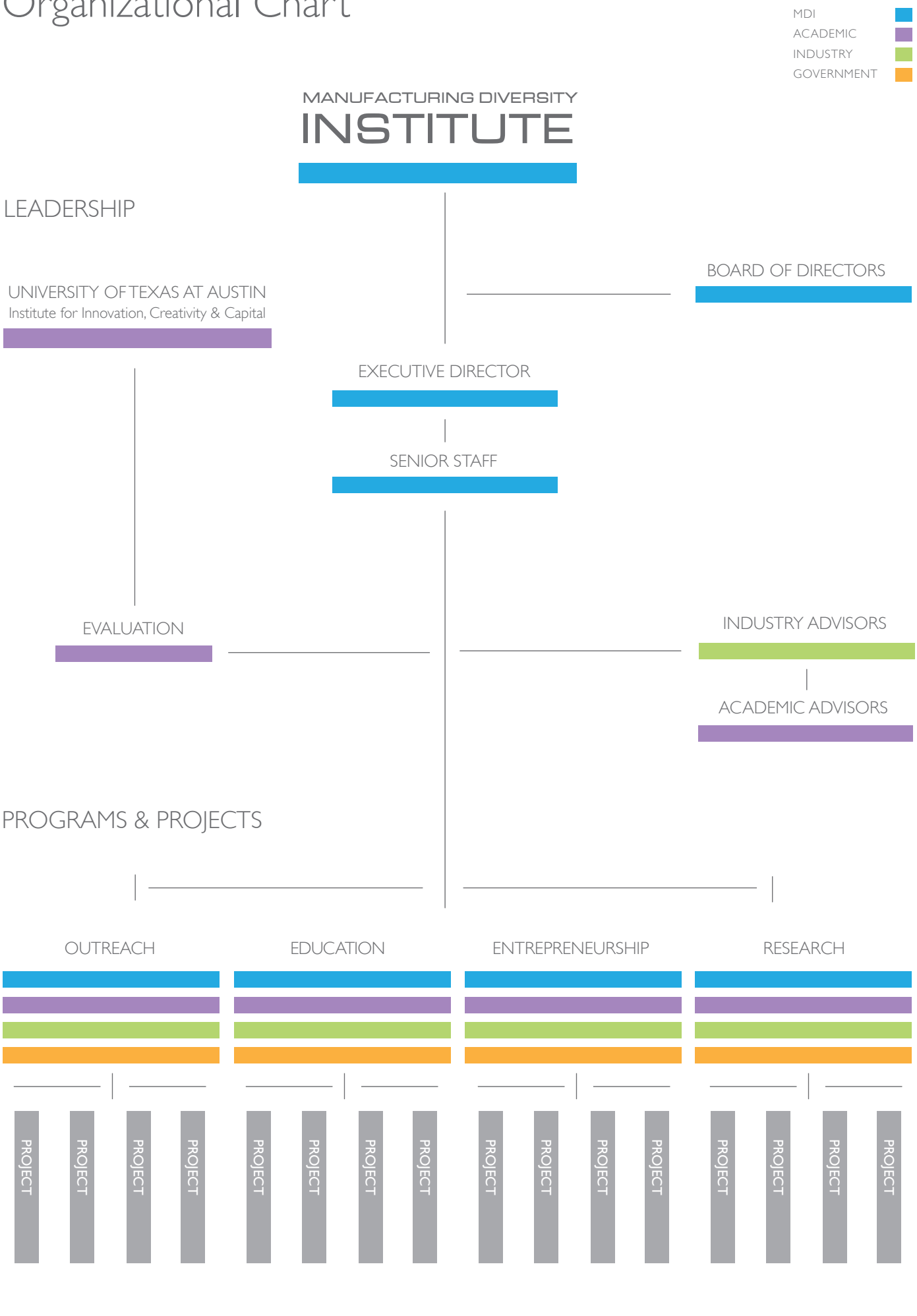
Government Relations' goals are threefold (1) communicate the mission of the *Institute* to the federal world; (2) apply the collective knowledge and competitive intelligence from the federal world to further develop regional corporate relations, the *Institute*, and its entrepreneurs; and (3) source future federal monies from agencies such as the Department of Commerce, Department of Defense, Department of Education, Department of Labor, and National Science Foundation. (See Addenda for Visual Model of Federal Agency/Industry Constellations)

CONCLUSION

Given the demands of day-to-day commerce, the advanced manufacturing industry cannot leverage diversity by itself. We believe the Institute can play a significant role in helping advanced manufacturers both fill their short term labor needs and position themselves for long term success by helping them benefit from the inevitable population diversification. Being on the leading edge of this demographic wave is critical for Wisconsin's regional economic development. Policies and programs that foster balanced and sustainable economic growth at the regional level, and forge connections between communities of color and regional economic opportunities will be key to global competitiveness and long-term prosperity.

ADDENDA

Organizational Chart



Manufacturing Diversity Talent Pipeline

In inner city neighborhoods, the workforce of the future will require a unique p ipeline system that intentionally includes them in the regional economy, helps them overcome educational and economic deficits, and gain the skills necessary to function effectively in the advanced manufacturing environment.

STUDENTS
- Middle School
- High School
- College

MANUFACTURING DIVERSITY TALENT PIPELINE

Perception/Motivation | Education & Embedded Certifications | Leadership/Start-ups

OUTREACH

Outreach must address the motivational factors impacting STEM career development. The Institute will help do this through such programmatic solutions as motivational presentations, career coaching and career roadmaps.

EDUCATION

To meet the future demands of manufacturing as well as the needs of African Americans and other people of color interested in employment in this industry, traditional education pathways will increasingly need to be aligned with the requirements of industry-based certifications so students will not only earn education credentials, but also industry-validated, nationally-portable industry certifications with real value in the marketplace.

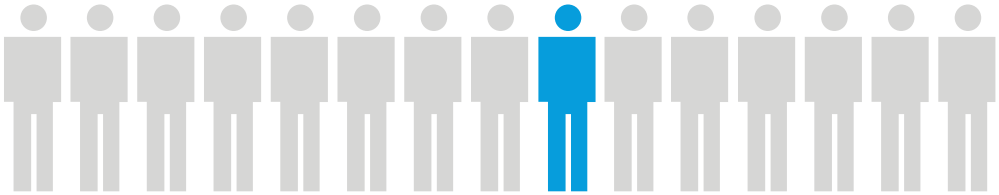
ENTREPRENEURSHIP

The Institute will assist aspiring entrepreneurs by helping them uncover business intelligence, and develop the marketing and business strategy they need to launch high potential manufacturing companies.

Workforce of the Future

Education with Embedded Industry-Validated Certifications

Tomorrow s engineering and scientific workforce must increase their proficiency by learning manufacturing s tools and technologies earlier in their education. To meet the demands of the manufacturing industry, traditional education pathways need to align with the requirements of industry-based certifications. Industry certifications link education and work, ensuring graduates have the skills required for jobs in a science and engineering-driven economy.



What Is Advanced Manufacturing?

A family of activities that depend on the use and coordination of information, automation, computation, software, sensing, and networking, and/or make use of cutting edge materials and emerging capabilities enabled by the physical and biological sciences, for example, nanotechnology, chemistry, and biology.

NANOTECHNOLOGY

One viable future for manufacturing is at the nano or molecular and atomic levels. Such small-scale production could have a big impact in multiple industries, especially semiconductors.

PHOTONICS

The science involving the conversion of information carried by electrons to photons and back has transformative applications in telecom, data storage, lighting and consumer electronics.

BIOMANUFACTURING

Creating new biological processes to manipulate living organisms in a way that creates new inorganic structures, food, drugs and fuel.

ROBOTICS

From Google s testing of robotic cars to Amazon s experimenting with the use of robotics in its warehouse, the long-delayed promise of robotics is closer to becoming a working reality.

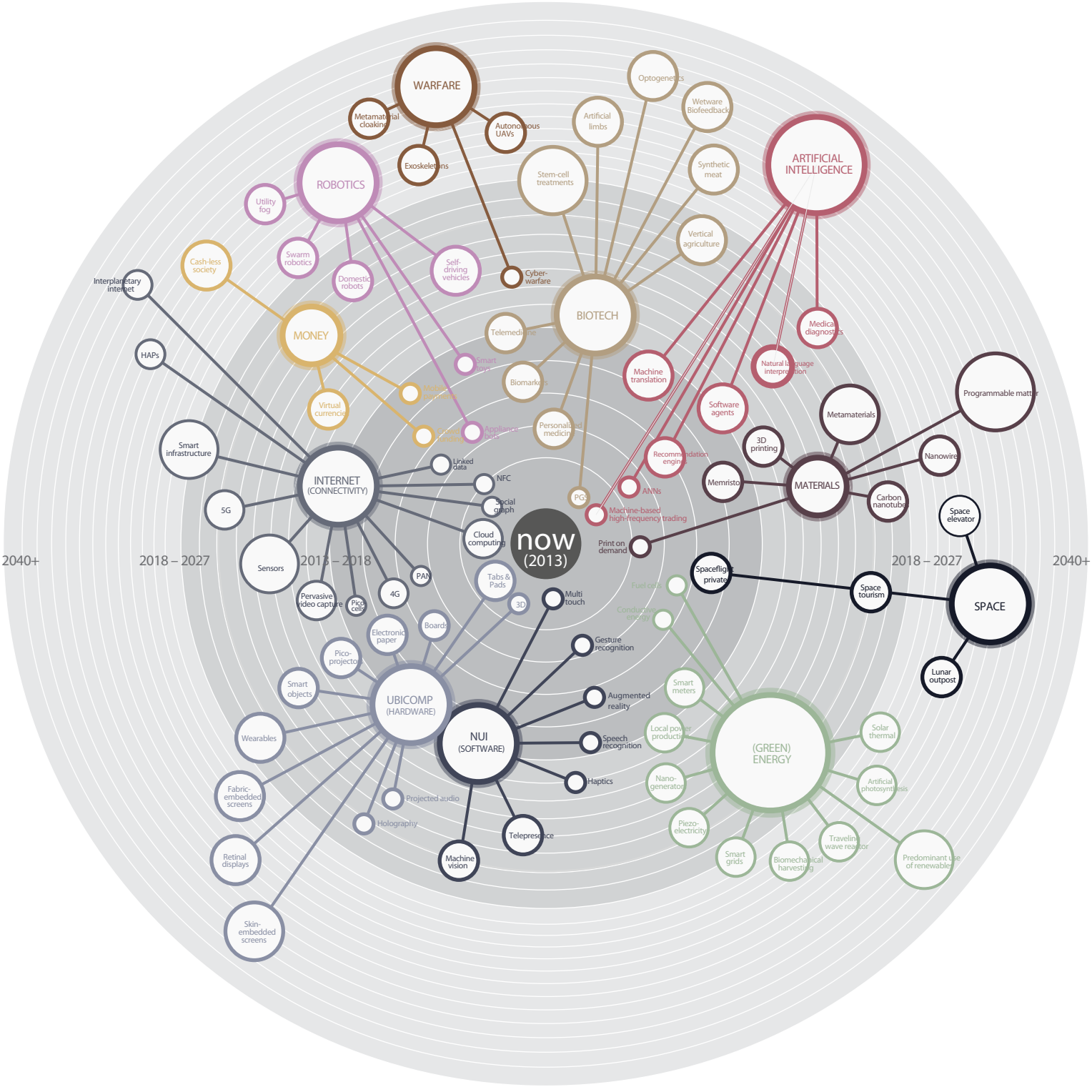
INNOVATIVE MATERIALS

These artificial met a-materials have unique properties that have innovative applications such as lighter but just as strong jet engine blades.

Science & Technology Timeline

Accelerating Discovery and Innovation

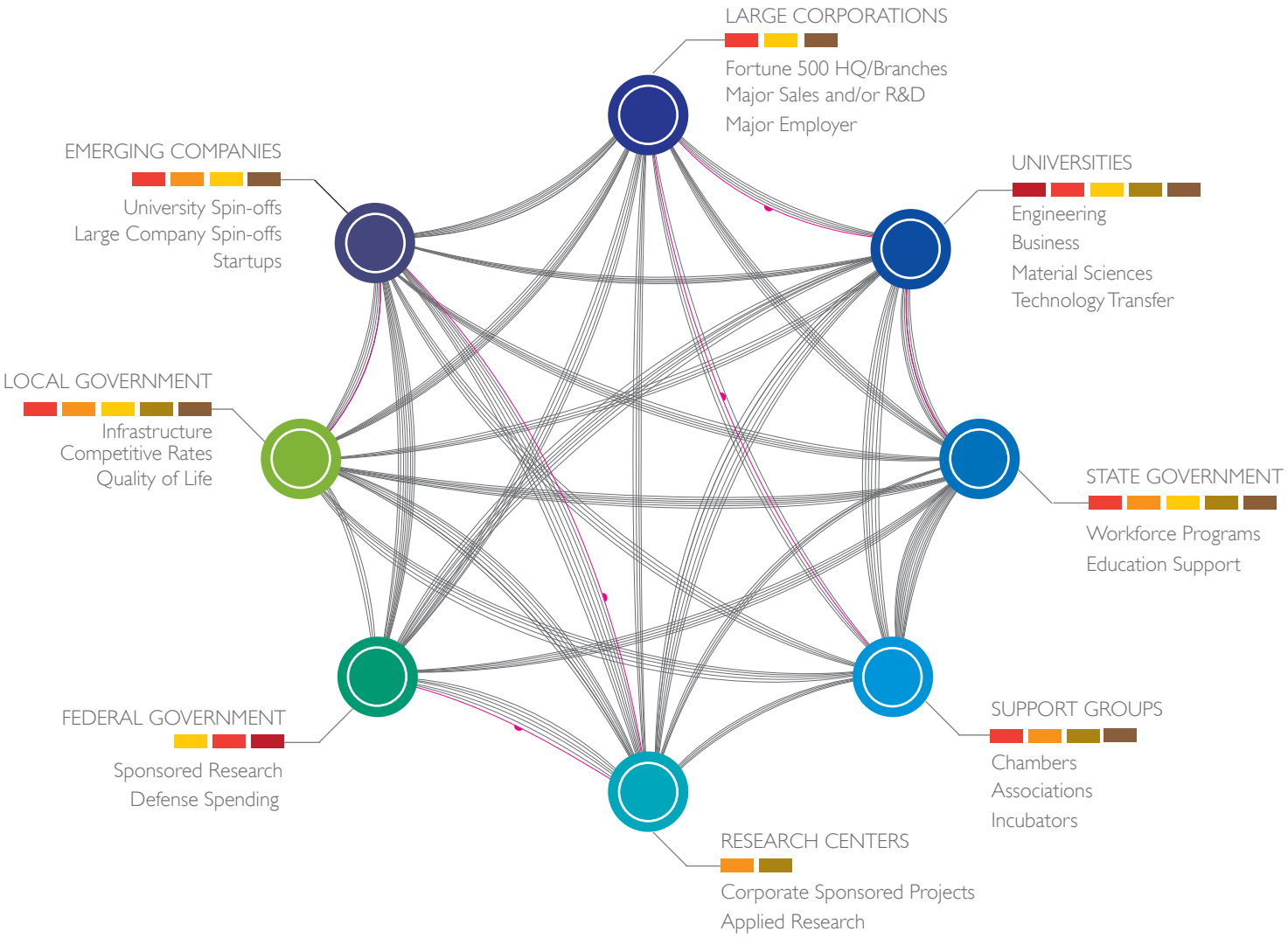
An assessment of the history of technology shows that technological change is accelerating exponentially. Given this accelerating change, how do federal agencies select and finance the discovery of the next breakthrough? To keep our nation at the forefront of innovation, a dynamic relationship must exist between thought leaders in the private sector, civil servants, and such agencies as the National Science Foundation (NSF), Defense Advanced Research Projects Agency (DARPA) and Advanced Research Projects Agency-Energy (ARPA-E).



Innovation Cluster Dynamics

The Social Physics of Collective Behavior

New institutional alliances (denoted by segments and linkages), driven by the rapid increase in and diversity of technologies, are altering the strategy and tactics for determining how our government funds discovery and innovation. Looking at patterns, not people, in the way that physicists observe atoms offers a basic, yet revolutionary way to understand the ways in which we all live together. Our collective behavior follows mathematical patterns with surprising precision.



MAJOR ROLES OF KEY PLAYERS

- Federal Scientific & Economic Development
- Develop and Maintain Emerging Industries
- Create Small and Take-off Companies
- Improve U.S. World Class Industries
- Improve Training and Education
- State/Community Economic Development

ROLE OF INFLUENCERS

Network Linkages
The ability to link each institutional segment is most critical.

First Tier Influencers
They provide leadership in their specific segment and cross-segment linkages because of their wide-scale, recognized success.

Second Tier Influencers
They provide cross-segment linkages between business, academia, government and local community interests.

Federal Agency/Industry Constellations

New Forms of Public/Private Partnerships

Each federal agency serves numerous industries and their non-profit associations, policy groups, local and state government counterparts. Understanding how these relationships combine offers the potential for new opportunities.

National Institute of Health
$28 Billion

Department of Defense
$500 Billion

- Agriculture
- Aerospace
- Biotechnology
- Healthcare
- Information Technology
- Medical Devices
- National Intelligence
- Petroleum & Energy
- Pharmaceuticals
- Semiconductor
- Telecommunications
- Transportation
- Weather

National Oceanic & Atmospheric Administration
$3.6 Billion

World Innovation Clusters

- Strong IP Protection
- Good Weather
- Liberal Immigration Laws
- Entrepreneurial Culture
- Flag Government Cluster

Global Competition is Driving New Government Programs

Innovation Clusters are places with webs of interconected research centers, universities, technology companies, customers, and suppliers. As global competitiveness heats up, government financiing of new clusters is designed to rapidly increase intercoonections, improve innovation and commercial opportunities.

SILICON VALLEY

Venture Capital: $11.2 Billion

Top Companies: Google, Apple

Key Facts:
64% Foreign Workers
17 IPOs in 2012

BOSTON

Venture Capital: $3.6 Billion

Top Companies: Akamai, Genzyme

Key Facts:
Most U.S. Biomedical Funding
85 Colleges & Universiies

TECH CITY LONDON

Venture Capital: $161 Million

Top Companies: Techstars, Last.fm

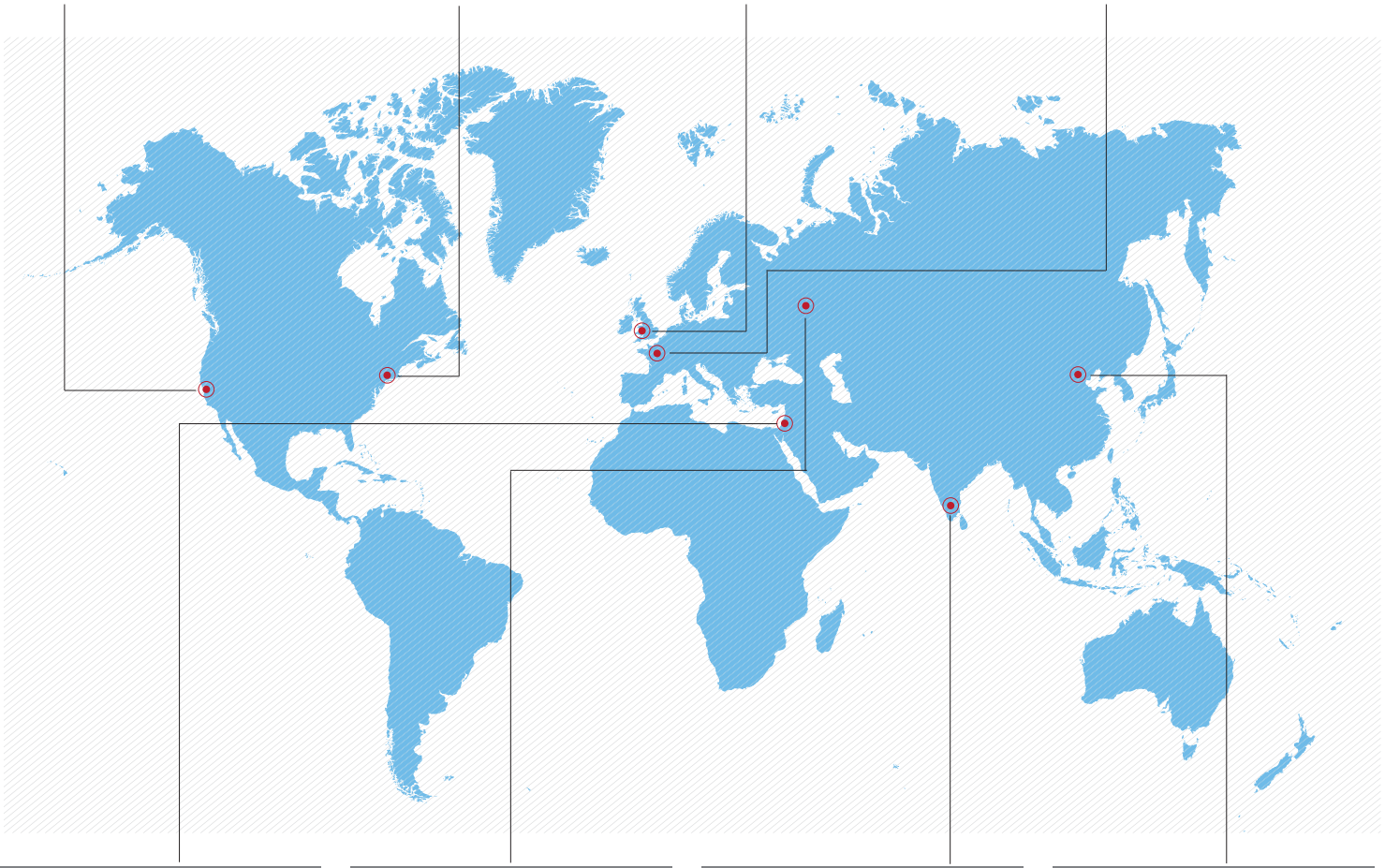
Key Facts:
Start Up Initiative Created in 2010
140 Technology Companies
Tax Breaks for Private Investors

PARIS-SAGLAY

Government Funding: $3.25 Billion

Top Companies: EADS, Siemens

Key Facts:
Construction Began in 2013
Two-Square Kilometer Campus
Merged Six Engineering Schools



ISRAEL

Venture Capital: $1 Billion

Top Companies: Waze, Teva

Key Facts:
230, 000 High-Tech Workers
Compulsory Military Training
$25 Billion in Technology Exports

SKOLKOVO INNOVATION CITY

Government Funding: $2.5 Billion

Top Companies: IBM, Rusnano

Key Facts:
Founded in 2010
900-acre Innovation Center
University Designed by MIT

BANGALORE

Venture Capital: $300 Million

Top Companies: Infosys, Wipro

Key Facts:
Internet Users Up 26% Per Year
$3,876 Per Capita Income (India)
Over 10,000 Local Millionaires

BEJING

Venture Capital: $1.4 Billion

Top Companies: Baidu, Lenovo

Key Facts:
70 Colleges & Universities
30% of China s Venture Funding
14.5 Million Internet Users

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"Enterprise is not free if
it is not lived and taught by
elders to future generations"
Dick Cheshire