



[Title to be selected]

Finger Lakes Regional Economic Development Council
Upstate Revitalization Initiative Plan Draft

Finger Lakes Regional Economic Development Council

August 19, 2015

This document is an early draft of the Finger Lakes URI plan framework and is subject to revision. The draft will be finalized in September for October 5 submission.

The Finger Lakes REDC is releasing this draft to solicit input from the public. Please access the FLREDC website to submit your feedback and title suggestions. Your input will be crucial to the refinement and success of our plan.

Table of Contents

1	Introduction	3
2	Readiness: The Finger Lakes Region is Ready for Transformative Progress	8
3	Growth Pillars: Key Industry Clusters	12
3.1	Optics, Photonics, and Imaging.....	12
3.2	Agriculture and Food Production.....	16
3.3	Next Generation Manufacturing and Technology	20
3.3.1	Eastman Business Park	21
3.3.2	Downtown Innovation Zone.....	24
3.3.3	Science and Technology Advanced Manufacturing Park (STAMP).....	27
3.3.4	Emerging Advanced Manufacturing Technology	29
4	Key Enablers	30
4.1	Pathways to Prosperity: Workforce Development.....	30
4.2	Entrepreneurship and Development.....	37
4.3	Higher Education and Research	40

1 Introduction

The Finger Lakes Region Is at a Crossroads and the URI Is Essential For Realizing Its Potential

This is a **decisive moment** for the Finger Lakes region and its urban core, Rochester. The region is at a crossroads between realizing its full potential and losing its hard-fought progress. The Upstate Revitalization Initiative (URI) is essential for the Finger Lakes region to capitalize on its strengths and overcome barriers to growth.

After decades of industrial decline, **progress is evident** in the Finger Lakes. Recent investments, including more than \$300 million in state support through the Finger Lakes Regional Economic Development Council (FLREDC), have helped to develop the region's strengths beginning with the creation of 20,000 new jobs since 2011. The city of Rochester is recouping its potential through investments in real-estate and restoration of historic properties and a gradual increase in jobs as more companies return to the city. Confidence in the region's promise is on the rise, as Rochester was recently announced as the headquarters of a new federally-designated institute for Integrated Photonics, which will bring \$115 million in State investment to the region. The region's best-in-class higher education and healthcare systems and a more diverse economy than in the past also highlight the progress the Finger Lakes accomplished.

While progress is evident, the region continues to **struggle with fundamental challenges**. For the last five years, private sector employment and wage growth in the Finger Lakes region have lagged behind state and national averages. **Rochester is a city of sharp contrasts:** vibrant neighborhoods and business districts are juxtaposed with high concentrations of poverty, unemployment, and substandard housing. A total of **66,000 residents live below the federal poverty line** in the city of Rochester, making Rochester's share of persons in poverty the third worst in the nation's 100 largest metros. **Half of Rochester children live in households in poverty** and nearly two-thirds receive public assistance. The Rochester City School District also has the lowest graduation rate in New York State, with **barely half of high school students graduating** in 2014.

URI support is critical to take recent progress to the next level for all citizens, build regional wealth by propelling long-term industry growth, create diverse job opportunities, and further develop a dynamically skilled workforce that will transform the region and reduce poverty – a key priority for Governor Cuomo and the Finger Lakes Regional Economic Development Council. **URI support is also essential for attracting additional investments.** If successful with its URI bid, the region will attract **private leverage** over the course of the next five years in innovative industries that will build on core regional strengths and benefit the entire New York State.

Simply put, the Finger Lakes' aspiration is to achieve job creation and increased regional wealth by galvanizing private investment **to benefit the entire community.**

Our Strategy Builds on the Region's Strengths and Competitive Advantages

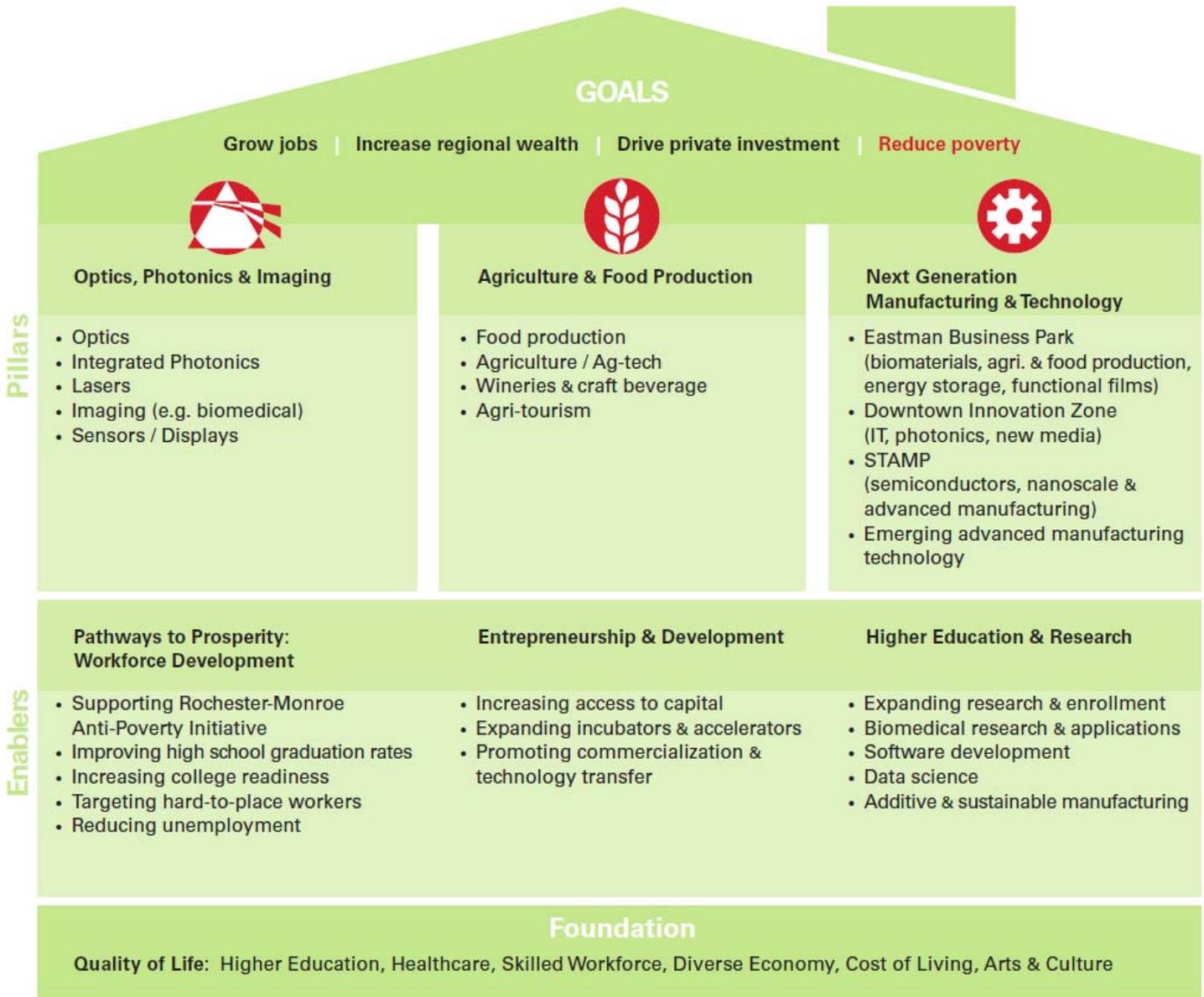
The Finger Lakes' URI plan is driven by four paramount goals:

- **Grow Jobs**
- **Increase Regional Wealth**
- **Drive Private Investment**
- **Reduce Poverty**

To develop a holistic URI regional strategy in which the Finger Lakes region realizes its transformative potential the plan uses the three goals required by the URI and adds a fourth – Reduce Poverty – inspired by the Rochester-Monroe Anti-Poverty Initiative which seeks to address poverty by transforming systems, programs, and policies in a coordinated, sustainable manner. Guided by the four goals, the region's URI strategy is focused on building on strengths and competitive advantages that will be further bolstered by the URI investment.

The URI plan emphasizes the capabilities that make the Finger Lakes unique within New York State and enable it to compete nationally and globally. In areas where the region is building on existing comparative advantages, the **URI funding will help position the Finger Lakes as a national and global leader.** In other areas, where the region is entering new fields, URI funding will enable the region to further develop expertise and establish itself for future growth.

Exhibit: The URI plan for the Finger Lakes regional economy is supported by a strategic framework reflecting our goals, priority pillars and key enablers



The URI plan has three industry clusters, or 'pillars', that will act as the core drivers of job and output growth. **The three pillars are:**

1. **Optics, Photonics, and Imaging (OPI):** With over a hundred small businesses driving innovation and growth in this space, advanced research at the University of Rochester and RIT, specialized programs at Monroe Community College, SUNY Polytechnic at Canal Ponds, the OPI sector is an innovation leader. As the headquarters of the Integrated Photonics Institute for Manufacturing Innovation winning coalition, the region will be the recipient of significant investment. In addition to award funds and the New York State commitment, URI investment will be used to fortify the region's leadership in this rapidly evolving field and improve commercialization and business attraction efforts **solidifying the Finger Lakes' position as the global center for OPI.**
2. **Agriculture and Food Production:** The sector has been an area of strength for the region with the Finger Lakes producing about a quarter of New York's total agricultural output. The region has a robust ecosystem encompassing all parts of the food value chain, from agriculture to food production to, increasingly, sustainable waste management. With ongoing transformation in the industry to focus on organic, natural foods, with the URI support, the region will be positioned to capture growth and **become the national center for innovative agriculture and food production.**
3. **Next Generation Manufacturing and Technology:** Significant progress has been made in three key next-generation manufacturing and technology hubs which are reinvigorating Rochester and the Finger Lakes region: Eastman Business Park (EBP), the Rochester Downtown Innovation Zone, and the Western New York Science & Technology Advanced Manufacturing Park (STAMP) in Genesee County. Within each hub, there is either existing activity or new, cutting-edge companies ready to move in. The URI will accelerate growth and help these hubs diversify into adjacent industries: energy storage, biomaterials, agriculture and food production, and functional films at EBP; IT, photonics, and new media in the Downtown Innovation Zone; and semiconductors, nanoscale and advanced manufacturing at STAMP. While initially focused on these three hubs, with the right combination of private and public investment, the URI funding will support other emerging hubs in the next five years. The URI investment in next generation manufacturing and technology opportunities will be critical to **position the Finger Lakes at the forefront of the next wave of industrial growth.**

To assess whether these areas are optimal targets for state investment, the Council focused on **three primary criteria: output, jobs, and wages.** The Council compared Finger Lakes' performance and **competitive advantage on these metrics against other Upstate regions and the United States.**

For each metric, the focus was both historic and forward looking. The identified industry clusters are those that make the Finger Lakes unique; they are **areas in which the region outcompetes the other regions in Upstate New York** based on economic data, and they are also industries in which the **Finger Lakes is positioned to win** against emerging competitors both domestically and abroad. The clusters were also evaluated in terms of their ability to help reduce poverty. Each potential cluster was analyzed for the types of jobs it would create to ensure the regional strategy was mindful of a broad range of skills and capabilities.

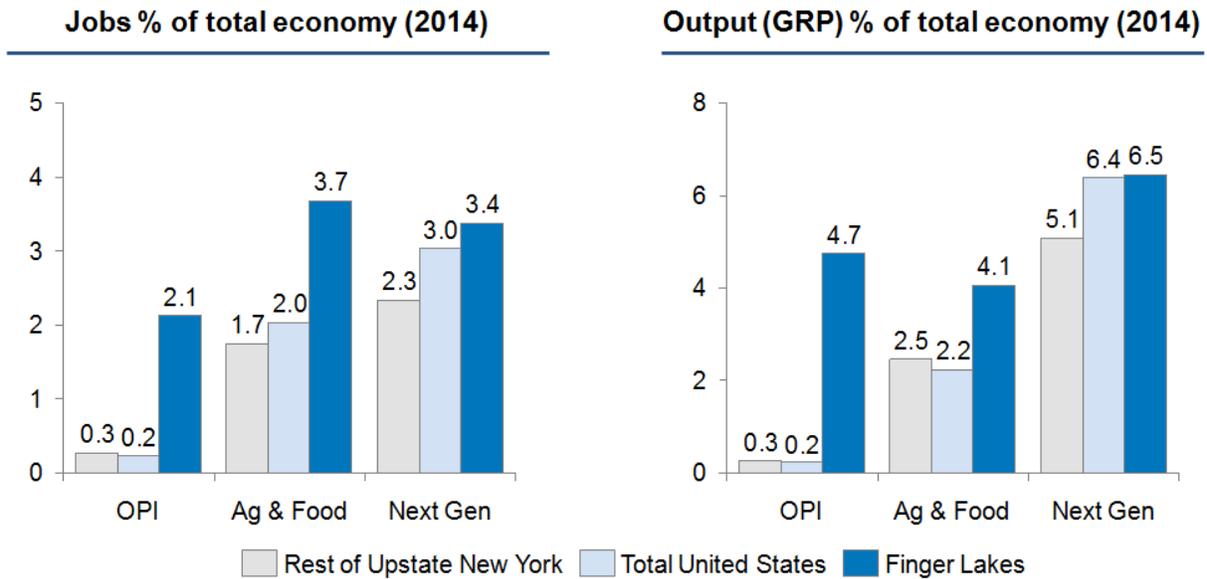


Exhibit: comparative performance of the Finger Lakes region against the rest of Upstate New York and the United States

The URI plan has three core enablers – areas that facilitate and further spur economic growth within key pillar industries and are critical to achieve the four URI goals. **The three enablers are:**

- A. **Pathways to Prosperity: Workforce Development:** The Finger Lakes region will strengthen its commitment to reducing poverty through coordination with the Rochester-Monroe Anti-Poverty Initiative and provide opportunities for success through targeted education and training efforts that ultimately link to job placement for workers of all skill levels.
- B. **Entrepreneurship and Development:** The region will strengthen its entrepreneurship ecosystem through incubating and accelerating new startups, increasing access to capital, and growing urban and regional wealth through supporting small businesses.
- C. **Higher Education and Research:** With 19 institutions of higher education and over \$2.5 billion in research funding over the past five years, the Finger Lakes region will amplify its ability to attract world class talent and drive cutting edge research within the selected URI key pillar industries as well as regional institutional strengths including biomedical research and applications, software development, data science, and additive and sustainable manufacturing.

2 Readiness: The Finger Lakes Region is Ready for Transformative Progress

Record of Success

After the decline of 63,000 jobs from major employers in the early 1990s, today the Finger Lakes region is poised and ready for transformative progress. The region has shown that in the face of the most recent economic crisis it is possible through the power of education, entrepreneurial spirit, and innovation to show not only resilience but also resurgence and growth.

Over the last four years, the region has created over 20,000 jobs and since the creation of the Finger Lakes Regional Economic Development Council in 2011, New York State has awarded the region over \$300 million in REDC funding, including last year's award of \$80 million and selection as a "Top Performer." The state has supported close to 400 projects covering industries such as agriculture, tourism, transportation, and manufacturing, providing new facilities, capital, and other support to local businesses. Illustrative examples of these projects include:

- Eastman Business Park, identified by the Council as the top, unanimous priority project every year since 2011, is a success story in large part due to state support recommended by the FLREDC. Thanks to early State support to address utility system and environmental liability issues the Park once a place on a path to growth is a focal point for economic revitalization, with Kodak determined to carry it forward. The Park is now home to 60 businesses across diverse industries including energy storage, biomaterials, functional films, and agriculture and food production. Non-Kodak businesses employ approximately 5,000 staff today and are projected to grow to approximately 70 companies by 2017.
- College Town is a 14-acre project which transformed a parking lot into a center for shopping, dining, business, and residential activity on the University of Rochester campus. College Town has brought more than 900 construction jobs to the City and will bring more than 320 permanent service and retail positions.
- The Genesee Valley Agri-Business Park, a 250 acre shovel ready site in Batavia, is now home to two major yogurt manufacturing facilities that located in the region with support from New York State. Thanks in large part to the concerted, strategic efforts by the Cuomo administration, New York has become the number one yogurt producer in the country and Genesee County has become the yogurt capital of New York. In a \$208 million project in 2012, Muller Quaker Dairy constructed a 350,000 square foot manufacturing plant, one of the largest in the country, which will add over 200 jobs. After a national site search, Alpina Foods constructed its first North American manufacturing facility in the region, a \$20 million 40,000 square foot facility.

Committed and Collaborative Community

The Finger Lakes already has a long record of collaboration and has the right people in place to act on the \$500 million state commitment. The region has also benefited from an exceptional population who generously volunteer their time, money, and expertise. With the third highest rate of volunteer service in America, the region's tradition of giving is rooted in Kodak founder George Eastman's commitment to quality of life. George Eastman not only founded the Community Chest (now the United Way of Greater Rochester) but also contributed lasting gifts to the region including the Eastman Dental Center and the Eastman School of Music.

The region's businesses and organizations have recently driven systematic change by leading local initiatives that have received national attention. A series of community successes speaks to the power of regional cooperation throughout the Finger Lakes region:

- The Finger Lakes Health System Agency was awarded a \$26.6 million grant, the largest in the nation, from the Center for Medicare and Medicaid Innovation which will serve as a national model for medical home delivery.
- The Community High Blood Pressure Collaborative, a key collaborative effort to make Rochester the healthiest community in America, has brought together over 160 volunteers from 66 organizations. In the five years since the effort began, the blood pressure control rate for adults has improved by over 14 percent, compared to national rates of one percent, recognized as a "phenomenal success" by the CDC's Million Hearts Initiative.
- Leaders throughout the community have unified around workforce development with dozens of executives pledging to drive the mission, including the CEOs of LiDestri, Paychex, Wegmans, and Excellus, the presidents of the University of Rochester, RIT, and MCC, the Mayor of Rochester and the County Executive of Monroe County. This commitment has translated into actions including the University of Rochester's recent agreement to act as superintendent of Rochester East High School to dramatically improve educational outcomes.

The region benefits from a talented, innovative workforce dedicated to success. Growing core industries will create jobs in the Finger Lakes that not only attract new residents to New York, but also retain the existing, highly capable workforce so that they do not leave New York State for other opportunities.

Our Foundation: Quality of Life

For over a million residents, Rochester and the greater Finger Lakes region provide an exceptional quality of life. Kiplinger named Rochester as the fifth best city in the US for families, and regional employers are continuously recognized for their commitment to their employees and the community. One of the region's largest companies, Wegmans Food Markets, is consistently ranked by Fortune as one of the best places to work in the nation. Through the focus on quality of life, URI strategies will continue to promote the city of Rochester and the Finger Lakes region as attractive places to invest, live, work, visit, and play.

Six key assets distinguish the Finger Lakes region: **education, healthcare, skilled workforce, diverse economy, low cost of living, and arts and culture.**

With 19 institutions of **higher education**, Rochester is one of the most productive regions in the country, ranking third in degrees per capita. High learning employers cite high quality of labor, high employee retention, low absenteeism, and short commutes as key productivity drivers. K-12 schools are also an asset for good part of the Finger Lakes population. Eleven Rochester **suburban high schools** were ranked by *Newsweek* in the top three percent of the country, and quality of education is among the primary reasons families decide to locate to the Finger Lakes. The strength in suburban Rochester schools is in stark contrast to the challenges faced by the Rochester City School District.

Healthcare in the Finger Lakes is exceptional for its high quality, low cost, and cutting edge research. The region is home to one of the world's leading academic medical centers, the University of Rochester Medical Center, which both pioneers innovative research and delivers top quality care. In parallel, the Rochester Regional Health System, focused on care delivery, is a leader in community-focused affordable healthcare, and has partnered with RIT to deliver innovative care by leveraging technologies such as big data analytics and advanced imaging. Rochester also has the lowest overall Medicare spending rate in the nation and commercial insurance costs are 30 percent lower than national average. The region's businesses are driving systematic change in the healthcare arena. The Rochester Business Association partnered with Wegmans for the Eat Well Live Well Challenge to improve the health of the local workforce. More than 200,000 employees have participated to date, making it the largest community wide wellness program in the world.

Rochester and the Finger Lakes have an impressively **skilled workforce** and the availability of highly skilled labor is often cited by businesses as one of the top reasons to locate in Rochester. 62 percent of the population has at least some level of college education with science, technology, engineering, and mathematics among the most popular fields. A US Department of Education 2013 study ranked Greater Rochester area as first for degrees per capita in the physical sciences and mathematics and second for degrees in biological and life sciences fields. The Brookings Institution ranked Rochester among the nation's top cities for patent generation and The Atlantic magazine named it as the 7th "Brainiest City in America" in 2013.

The Finger Lakes' ability to weather the most recent economic crisis is due, in large part, to its **diverse economy**. Where the region once relied on a small number of large employers, today it is a diversified economy led by small and medium size businesses in a portfolio of industries. This is evident in the growth of the non-manufacturing sector which added 44,000 jobs since 2000 largely in the education and healthcare sectors. While Kodak, Xerox, and Bausch & Lomb used to be the largest employers, today the University of Rochester, Wegmans Food Markets, Inc., Rochester General Health and others employ the highest share of the regions' labor.

Families and businesses throughout the Finger Lakes also benefit from the region's noteworthy **low cost of living**, with Rochester ranked by Forbes as the fourth most affordable city. With stable and affordable property values, the median home sales price of \$110,000 is 47 percent more affordable than the national average, and according to US Census data, Rochester has the second most affordable housing among the 52 major markets in the US.

The Finger Lakes also offers a rich array of **arts and culture** attractions, including theater, museums, music, and festivals. Rochester has been ranked by the National Center for Arts Research as one of the top cities for arts vibrancy, a recognition supported by its diverse collection of museums and galleries. George Eastman House, International Museum of Photography and Film, is the number one video and photography museum in the world. From the relics of antiquity to works at the vanguard of contemporary movements, the Memorial Art Gallery's permanent collection of more than 12,000 objects has been called the best balanced in the state outside of New York City. In addition, there are more than 140 festivals in Rochester and the greater Finger Lakes region, covering almost every weekend from May to October. The Xerox Rochester International Jazz Festival has seen its attendance grow to 200,000, while the Rochester Lilac Festival, in partnership with the "I LOVE NY" program, brings visitors from across the world to enjoy more than 500 varieties of the flower. On the eclectic side, the Fringe Festival showcases unique culture of all types

and attracted 60,000 visitors in 2014, its third year of operations. The University of Rochester Eastman School of Music has regularly been ranked as the nation's leading music school.

3 Growth Pillars: Key Industry Clusters

To maximize the impact of investment, the Council has identified three industries to serve as economic growth pillars and act as the core drivers of job and output growth for the Finger Lakes region in coming years. The region's substantial assets and competitive advantages in these industries will generate growth that creates jobs not only directly within these industries, but also throughout the economy and in New York State more broadly from induced activity in supply chain fields.

The region anticipates broad-based growth, but industries identified as pillars drive major economic growth, and represent the optimal target for URI investment to catalyze economic transformation.

3.1 Optics, Photonics, and Imaging

The Optics, Photonics, and Imaging industry has been driving the Finger Lakes Economy for over a hundred years, placing the region on the forefront of innovation while creating thousands of jobs. Strategic, targeted investments will keep this industry strong for years to come.

Vision

The Finger Lakes has deep heritage, a large manufacturing base, a highly skilled and entrepreneurial workforce, cutting-edge research, preeminent academic institutions, and a thriving startup environment in the Optics, Photonics, and Imaging (OPI) industry. Since 2012, the region has won all four of the federal government's major advanced manufacturing jobs initiatives related to OPI: the Advanced Manufacturing Jobs and Innovation Accelerator Challenge (AMJIAC), the Advanced Manufacturing Technology Program (AMTech), the Investing in Manufacturing Communities Partnership (IMCP) program, and the National Network for Manufacturing Innovation (NNMI). Each of these awards was based on the region's strengths in OPI.

The region will build on momentum from the recently awarded American Institute for Manufacturing Integrated Photonics (AIM Photonics), a federal research center headquartered in Rochester, to expand the economic potential for the region and New York State in domains that fortify leadership in OPI globally. Strategic investment through the URI is targeted on activities that will enable the region to move up the value chain from our robust base of component and sub-system manufacturing to integrated systems that will fundamentally change how people communicate, interact with the world and access the information universe. The goal is to "build new brands" in the region, i.e., enterprises that touch the consumer. The URI will further allow the region to strengthen its leadership in this field and develop an even more robust OPI ecosystem that connects regional assets in life sciences, data sciences, energy innovation, and other fields to create synergies across the region and the nation.

Assets and Performance

For over a century, the Finger Lakes region has been the leading industrial center for optics and imaging. This created substantial wealth for the region, provided tens of thousands of jobs, and helped underlie the research strengths at the University of Rochester and Rochester Institute of Technology (RIT) that make them the great institutions that they are today. This has led to Rochester's recognition as the Imaging Capital of the World. The regional optics and imaging industry remains among the largest in the country and is internationally recognized. However,

employment in the large companies in this cluster began to fall in the 1980s due to a combination of factors such as outsourcing and offshoring. Despite these declines, the OPI sector is a major growth driver for the region with about five percent of economic output and approximately two percent of jobs (ten times the national rate). With over 110 companies present regionally in the OPI space, assets from legacy companies including industry-ready infrastructure at Eastman Business Park, a robust local supply chain, and a thriving small business community with jobs growing about four percent each year, the Finger Lakes is a global leader in the sector.

Global companies continue to look to Rochester to help develop new technologies, and larger local companies are expanding in the area. For example, Canadian-based IMAX has an R&D site in Rochester to help develop the newest laser-based IMAX system being rolled out this year.

With the Integrated Photonics Institute for Manufacturing Innovation award, or AIM Photonics, Rochester is transitioning from the global leader of imaging in the 20th century to be a key part of the consortium that will provide 21st century leadership. Rochester was chosen to be the headquarters of the \$600 million award, with \$115 million invested in Rochester, because of its unmatched combination of human capital, culture, and resources. The city will serve as the hub for its more than 90 industry and 18 academic partners. The Finger Lakes region will deliver critical global manufacturing leadership in a technology that is both essential to national security and positioned to provide a compelling return-on-investment to New York and the federal government. AIM Photonics will leverage historic strengths and assets in optics and imaging and drive economic development in Finger Lakes in three ways that will grow private employment: incubate new companies, expand existing ones, and attract new companies to the region. AIM Photonics will focus on equipment and standard development in optical packaging and assembly - the critical area of innovation in Photonic Integrated Circuits. The FLREDC encourages locating research and manufacturing near the headquarters in the Rochester region, which will increase the interconnectedness and effectiveness of the institute, and have a significant impact on the Finger Lakes economy. The FLREDC recommends carefully reviewing locations in the proposed Innovation Zone as the potential site for the headquarters of AIM Photonics.

Fueling the region's strength in OPI are local universities that contribute significant research, help develop expertise in the field, and catalyze new technologies and companies. The University of Rochester crosses a range of research, from The Institute of Optics, which was the nation's first optical science, engineering, and design program and has awarded over 2,400 optics degrees to date, more than half of the United States's total, to the Laboratory for Laser Energetics, which is home to the second most powerful ultraviolet fusion laser in the world and has attracted almost \$2 billion in federal funding. There have been over 220 companies started by 115 graduates, faculty, and staff of the Institute of Optics. Many of those companies, including Tropel (now part of Corning), Semrock (now part of IDEX), Lasermax, RPC Photonics and Gradient Lens Corporation are still in the Finger Lakes region. Sydor Instruments LLC, and Lucid, Inc., are just a few of the local companies that were created as a result of the LLE's technology and research.

RIT's Chester F. Carlson Center for Imaging Science is a unique, nationally recognized program engaged in a range of applications from energy physics to analysis algorithms. Imaging science research has also led to the formation of new companies in the region: a notable example is Pictometry, a Rochester-based company employing 300 that pioneered new geospatial imaging technology now used in a wide range of applications. RIT also supports advanced optical lithography through the Nanopower Research Labs, and capitalizes on the revolution in light

detection technology through the Center for Detectors. The Semiconductor Microsystems and Fabrication Lab at RIT will be expanded into integrated photonics in connection with AIM Photonics, and the Center for Electronics Manufacturing & Assembly is growing as well. These facilities tie closely to the research conducted at the RIT Nanophotonics Group and the Novel Material Photonics lab, which focuses on photonic computing and are closely related both to AIM Photonics and to other federal funding priorities.

SUNY Polytechnic's presence in the Finger Lakes region helps connect the Optics, Photonics, and Imaging industry to the nanoscience and advanced technology renaissance happening throughout the state. The Photovoltaic Manufacturing and Technology Development Facility in Rochester focuses on crystalline silicon photovoltaics, aligning Rochester's specialty in light with the capabilities of SUNY Polytechnic. In addition, the New York Power Electronics Manufacturing Consortium and the Smart System Technology & Commercialization Center, two other SUNY Polytechnic facilities located in the Finger Lakes, take advantage of Rochester's high-skill workforce to drive innovation in related fields.

With all these centers working together, Rochester leads the nation in per capita patents in OPI.

Opportunities for Growth

OPI is a \$500 billion global industry and is a key part of almost every modern technology. Many of the companies in the Finger Lakes photonics cluster already compete successfully on an international level. Growth opportunities in the OPI space are centered on three main areas of support that amplify the AIM Photonics award and will strengthen manufacturing and research:

- Support for large companies to expand or establish operations in the region
- Industrial research and technology development
- Availability of manufacturing facilities, equipment, capital, and development support for local companies and to attract new companies to the region

The primary objective of a URI investment in the Finger Lakes OPI sector is to leverage assets in optics and imaging to expand the size of the photonics industry and create thousands of new well-paying jobs over the next few years.

By expanding its photonics and optics industries, the Finger Lakes will increase exports to other states and other countries. A stronger Finger Lakes cluster will also drive more foreign investment into the region, as companies around the globe recognize Rochester as the center for OPI manufacturing and innovation.

The region has identified several gaps in support for companies and startups. Investments in providing facilities and equipment to small businesses will help them expand and grow. In high-tech fields such as OPI, the cost of equipment makes it difficult for small companies to innovate and expand into new areas. Investment in industrial R&D resources and user facilities will help bridge this gap and unlock significant new growth. Inducing collaboration between industry and academic research institutions will help push technology from invention to commercialization. In particular, regional strengths with high need for investment include advanced optics technologies such as optics materials surface finishing, imaging systems and analytics, and laser technology.

Increasing availability of capital for local companies will help unlock additional growth. Industry leaders have highlighted the difficulty of securing capital as a particular issue in this field, and a strategic state investment could help mitigate this challenge. Increasing capital availability to startups (through investment in a venture capital fund, or similar programs) as well as to more established local companies (through loan programs or capital purchase incentives) would help companies achieve increased growth. In the past few years, the region has incubated many new OPI companies including FCR, Ovitz, LighTopTech, and Clerio Vision, and increasing the support available would help further build on this momentum. For larger companies seeking to establish operations, providing incentives or capital support through the URI would also help attract economic activity and jobs to the region.

3.2 Agriculture and Food Production

The food industry is changing faster than ever before. More consumers are demanding healthy, high-quality, locally grown, organic food. This recent development offers the Finger Lakes Region and New York State an opportunity to be among the first to meet the needs of these consumers, using URI support to become the industry leader in the United States.

Vision

The Finger Lakes region is building a robust, interconnected food ecosystem crossing agriculture and food production across its nine counties, and offering job opportunities for workers of all skill levels. The region will continue as the **leading food producer in New York State**, the Northeast, and beyond. As the broader industry continues to transform to focus on organic, locally sourced, high-quality food, strategic investments in equipment and infrastructure will develop new capabilities that ensure next-generation production is headquartered in the Finger Lakes region. The region has the opportunity to make its agriculture and food production the best in the world, growing the local industry into a global leader. These benefits will be spread across the food value chain, starting with research from industry and institutions of higher education, through farms and food production companies across the region to retailers and consumers. Agriculture and food production is a growing industry for the Finger Lakes, making it a high priority target for strategic investment to grow jobs, wealth, and private investment.

Assets and Performance

The Finger Lakes food industry combines its significant natural assets, 1.5 million acres of farmland (21 percent of upstate New York's total), nutrient-dense soil and abundant fresh water, with a robust industry strong in agriculture, food production, and alcoholic beverages, creating about 19,000 jobs in the region. Consumer demand in the food industry is increasingly emphasizing **fresh, organic, and locally sourced** food. With 120 million people within 500 miles of the Finger Lakes, the region is well positioned to serve this demand. Today, **the Finger Lakes region has the highest output of any Upstate region in agriculture, both crop production and animal production**, and has the highest output in specialized food production domains including yogurt, nuts, canned goods, and wine. The region can build off of this tremendous strength to continue growing jobs and regional wealth. The food industry has high jobs density, creating about 10 jobs per \$1 million of economic output, and with an average wage of about \$34,000 per year, the industry creates employment opportunities for a **broad spectrum of workers** with varying degrees of training and expertise.

The region is home to several major food production companies with large operations locally including Constellation Brands (650 local employees) and LiDestri Foods (800 employees). There are dozens of other established companies in the Finger Lakes region creating employment and attracting investment, and at least **57** of these **companies plan to invest** in the region in the next five years. Companies like Wegmans Food Markets, with 700 employees working in food production and several thousand more in retail, link multiple steps of the food ecosystem. These and other established companies plan to invest significant incremental spending across the Finger Lakes region over the next five years. This investment **impacts the entire region**, helping to spur economic development not only in the city of Rochester, where food and beverage companies like LiDestri

and North American Breweries are expanding, but also in the more rural outlying counties, where agriculture and food production are major sources of employment and investment.

The strengths of Finger Lakes food industries **span the food value chain**, beginning with research. Research strengths tied to food, such as RIT's Food Processing Industry Cluster Initiative, RIT's Center for Sustainable Packaging, and the New York State Pollution Prevention Institute at RIT, the New York State Agricultural Experiment Station in Ontario County, and the Wegmans Organic Farm, which develops new farming techniques and trains local farmers, form the knowledge-based foundation of the industry.

Customer preferences are shifting in favor of organic products, with national sales growing by more than 20 percent per year. The Finger Lakes region's position as a **center for sustainable, organic agriculture** will help capture significant market share by building on momentum in several areas including Yates County, which leads New York State in organic product sales. The region's broad strengths in agriculture and food production create synergies and unlock significant growth potential, as growth in one area triggers growth in others. With increasing emphasis on sustainable waste management – growing thanks to commercial pressures, as well as through state programs such as Cleaner Greener Communities – the biomaterials cluster at Eastman Business Park will grow in parallel with the local food industry.

Dairy, wine, and beer are leading industries for the region and the state. In the dairy industry, a combination of private and state investment has led to significant impact. New York is the third largest dairy producing state and the largest yogurt producing state, with the **Finger Lakes producing the most yogurt of any region in the state**. As a most recent example of the region's leadership in yogurt manufacturing, state investment in the Genesee Valley Agri-Business Park attracted new companies including Alpina Foods and Müller Quaker Dairy to the region, spurring private spending and new jobs anchored in the healthy food revolution.

The Finger Lakes is a national leader in wine, beer, and distilleries. New York State produces more than half of all East Coast wine, and the Finger Lakes region is responsible for more than 80 percent of state production. The **alcoholic beverages industry** supports 2,000 regional jobs, and has **grown nine percent per year** over the past five years. This production involves all nine counties of the Finger Lakes and continues into the neighboring Southern Tier, helping to link the region with the rest of the state. Wine has potential to grow into a significant growth driver for the region, as is a unique asset compared to the rest of the eastern United States.

The wine, beer, and spirits industry serves not only as a source of exports, but also attracts tourism to the region. The region has already been recognized for its unique wine assets: *Wine Enthusiast* magazine named it the **top wine destination in the world** this year, Governor Cuomo hosted his Wine, Beer, Spirits, and Cider summit in the Finger Lakes in 2014, and several prominent wine investors such as Paul Hobbs recently made vineyard acquisitions in the region, further boosting the confidence in the industry. Wine tourism in the Northeast is relatively fragmented; as such, strong potential exists for the Finger Lakes to take the lead and attract travelers from cities along the eastern seaboard. The region also has a strong and growing craft brewing cluster. Since no region in the country is yet known as the craft brewing hub, with proper funding and emphasis, the Finger Lakes could establish itself as the **center for craft brewing**, a growing and profitable niche industry that would also support the tourism industry.

Connected to expansions in wine and agri-tourism, the **hotel industry is growing** in the Finger Lakes. Supported by state investment in 2013 and 2014, the \$120 million Canandaigua Lakefront Redevelopment includes two hotel and resort complexes under construction at Canandaigua Lake. Another planned resort and attached casino in Seneca County, the Lago resort, could potentially draw \$420 million of private investment and attract significant tourism to the region. At Keuka Lake, a \$30 million project supported by the CFA process is building a hotel, high-end housing units, and a marina. These examples highlight both the confidence of the private sector and the network effects of growth in the wine and agriculture industry.

Opportunities for Growth

There are critical opportunities to maintain the region's competitive advantage and further strengthen the agricultural food production ecosystem with targeted strategies specific to the industry and broader strategies aligned to economic enablers. These strategies include increasing availability of capital, fostering further collaboration within the industry, and growing the workforce pipeline.

Significant growth in demand for natural and organic food products is profoundly changing farming and manufacturing practices, and a shift towards sustainable and locally sourced food is impacting operations and distribution. As next-generation technologies become necessary across agriculture and food production, the cost of capital equipment has increased. Industry leaders have emphasized **challenges accessing capital** to purchase equipment needed to enhance production capability, improve output, and remain competitive.

To help solve this challenge, **larger regional companies** have stepped in, using the strong local ecosystem to **help smaller companies** grow. For example, LiDestri has entered several partnerships:

- In 2015, through the Regional Council process, LiDestri acquired High-Pressure Processing (HPP) equipment at Eastman Business Park, committing about \$10 million of capital, and made it accessible to local food producers, broadly increasing regional productivity by providing access to the only machine in New York State available for tolling.
- In April 2015, Governor Cuomo announced LiDestri Foods Inc. of Fairport and G's Fresh Ltd. of the United Kingdom have partnered to form Love Beets USA, LLC, a \$17 million Rochester-based joint manufacturing venture for the processing and packaging of fresh, marinated and organic beets and beet products. The new partnership, supported by \$2.5 million in state incentives, will create 140 jobs over the next five years, is based at Eastman Business Park, and is guaranteeing beet purchases to local farmers to reduce volatility.

A broader capital program would amplify the significant positive effects seen so far, and work to further increase collaboration within the ecosystem and improve productivity.

The involvement of LiDestri and Wegmans in helping smaller companies procure capital is part of a broader trend: the **increasing connectivity of the food sector** within the region. While the Finger Lakes region currently includes companies from across the food value chain, links between these companies are still developing. The success stories from Wegmans and LiDestri point to the significant benefits of increasing these connections: by maintaining a local value chain, companies can work together to align production, decrease costs, and mitigate risk.

Today, the **wine industry** draws tourists to its three wine trails spread across the Finger Lakes, but could further benefit from a **more cohesive marketing strategy** to help its growth, connect the region and city of Rochester, and make it more attractive to potential visitors. The industry has grown and will continue to do so—but a more uniform strategy crossing marketing and local operations would help make that growth even more pronounced.

Having the right workforce available is a critical element of the food industry and with increasing retirements (an estimated 33 percent of the 15,000 regional agriculture employees will retire in the next 10 years), some risks exist. To preempt these challenges, regional stakeholders have developed policies and programs to continue to foster a healthy workforce pipeline. Monroe Community College offers programs in Agriculture and Food Studies and in Food Management, while Finger Lakes Community College recently launched a Viticulture and Wine Center with \$3.25 million in support from New York State, the only program of its kind in the Northeast. RIT is leading a workforce development initiative to help bridge the gaps between worker skills sets and the qualifications required by regional business in agriculture and food production through its Finger Lakes Food Processing Cluster Jobs Accelerator Program. With nearly \$2 million in federal funding, RIT trained 418 individuals including 53 veterans, 14 disabled and 100 unemployed individuals, including 17 long term unemployed. In addition, 73 new jobs were created, and filled, by the individuals trained. Further investments in **training** and efforts to **better connect workers to jobs across the region** (e.g., improving connections between where people live and work) would fill gaps in this resource for companies, and help create viable career opportunities across the community.

3.3 Next Generation Manufacturing and Technology

The two growth pillars described so far, Optics, Photonics, and Imaging, and Agriculture and Food Production were selected from over 400 potential industries as the region's most well-established economic strengths. Strategic investments will preserve the region's leadership and keep the Finger Lakes at the forefront of innovation in these fields.

The third pillar, Next Generation Manufacturing and Technology, follows a focused approach to initially support industries within three key innovation hubs, and will focus on other emerging areas over the course of the five year investment period. The three hubs – Eastman Business Park (EBP), the Rochester Downtown Innovation Zone, and the Science and Technology Advanced Manufacturing Park (STAMP) – will each act as a nexus for growth in industries such as energy innovation, life sciences, nanotechnology, semiconductors, and sustainable manufacturing. The hubs capitalize on a strong track record of growth over the past four years and unify the next generation manufacturing and technology assets throughout the region, including companies, academic institutes, and shared expertise. At Eastman Business Park, the investments will be deployed to attract new tenants within the energy storage and biomaterials space and stimulate further job growth building on over 1,300 new jobs created since 2011. Within the Downtown Innovation Zone, investments will focus on job creation within IT, photonics, software and new media, and help accelerate the residential, retail and commercial activity already taking place downtown; and within STAMP, URI funding would help attract new tenants and build on \$33 million of committed state support to date.

While the three hubs are currently the most competitively positioned for growth, over the course of the URI investment and later, the Council will continue to support the most promising industry growth areas across the nine counties. The three hubs represent the strongest starting point rather than an exclusive area of focus for the Next Generation Manufacturing and Technology pillar. As the region's economy continues to evolve, Finger Lakes will build momentum within the most promising innovation hubs driving future long-term growth. Our proposed investment leverages our region's extensive innovation capacity and precision manufacturing infrastructure.

3.3.1 Eastman Business Park

Thanks to well-timed, targeted state investment recommended by the Finger Lakes REDC, Eastman Business Park has been saved. There are 5,000 non-Kodak employees at the Park today, and continuing to invest in attracting businesses will create even more jobs and grow the park into an economic engine for the region.

Vision

Eastman Business Park (EBP), today one of the Finger Lakes region's most important industrial development sites, will be the centerpiece of a broader network of advanced manufacturing cutting across industries such as biomaterials, energy storage, agriculture and next-generation food production, and functional films, allowing the region and New York State to lead globally in these fields. Through investments in user facilities and private capital assistance, portions of the 1,200 acres and 2.5 million square feet of industrial space originally built for Kodak will be repurposed to support a large, diverse set of innovative companies, growing from approximately 5,000 jobs created to date.

Assets and Performance

EBP was originally constructed by the Eastman Kodak Company to support research and production of still and motion picture film. The park's abundant space is complemented by physical infrastructure designed to facilitate advanced manufacturing, including a 120-megawatt power plant, water processing and supply, waste treatment, on-site fire and safety, and rail services. For the past four years, Eastman Business Park has been the highest priority project for the Finger Lakes REDC, and this investment has come to fruition. Through substantial state investment and assistance with utility and environmental issues, rather than abandoning the park Kodak will operate it both as a landlord and to manufacturing film. Today, there are about sixty companies on-site (with the count more than doubling since 2011) employing approximately 5,000 staff including:

- Natcore Technology, a thin-film solar cell manufacturer
- American Fuel Cell, an energy storage manufacturing
- Cerion, an industrial biochemicals and nanomaterials manufacturing company

To support these companies and attract new ones, the site includes facilities and employs experts covering a range of fields:

- Biomaterials: EBP offers the ready access to power, water, treatment, and disposal facilities required to support biomaterials work, with chemicals and testing services available. Companies like Novomer, ATRP, and FermCo are currently on-site.
- Energy storage: EBP is home of the NY-BEST battery commercialization center, a \$23 million center that opened in 2014 thanks to a \$7 million state investment in battery manufacturing equipment and is supported by a consortium of 130 industry, academic, and government partners.
- Agriculture and food production: The easily accessible utilities, waste management, and logistics resources at EBP make it an ideal site for next-generation food production. Several companies, including LiDestri, already operate advanced food production facilities on-site, and EBP has the potential to add many more.

- **Functional films:** A legacy of the innovation that occurred at Kodak, EBP has multiple roll-to-roll processing, printing, and deposition facilities on site, with Kodak-employed experts to enable facility usage. These technologies are used in applications ranging from displays to solar panels to chemical sensors.

The water and waste treatment capabilities at EBP also make the site ideal for advanced agriculture and food production, allowing companies to operate in an environmentally friendly way compatible with state programs like Cleaner Greener Communities. Columbia Care was awarded one of New York State's five medical marijuana licenses to operate at EBP. AquaTerRen, a salmon farming company, may install a fishery at EBP to grow organic salmon, and the waste from AquaTerRen can then be processed and reclaimed by biofermentation facilities at EBP, enabling a sustainable, profitable network of businesses at the Park.

These assets link strongly to resources across the community. RIT's Golisano Institute for Sustainability, which houses the NYS Center of Excellence in Sustainable Manufacturing, provides complementary resources for local manufacturing companies by developing innovative technologies for more efficient and sustainable products. Additionally, the New York State-supported Battery Prototyping Center at RIT, a \$1.5 million facility which opened in 2015, gives companies a resource for building prototype pouch-cell batteries – similar to the technology found in cell phones – and testing the batteries in environmental chambers. Once prototyped, the technology can be transferred to the NY-BEST commercialization center at EBP.

The resources at EBP and across the community are already attracting new companies. NOHMs Technologies, a recipient of a \$2 million CFA award in 2012, relocated into Eastman Business Park in 2013 and is expected to create about 100 jobs. NOHMs cited "testing facilities where we can get world class equipment ... that represent millions and millions of dollars that have already been invested by Eastman Kodak" as well as "the availability of a highly skilled and talented workforce in Rochester." By continuing to invest in these resources centered at Eastman Business Park, and leveraging other state programs such as START-UP NY to make EBP the most attractive place for industrial companies to locate, the Finger Lakes region will develop concentrated and self-sustaining industry ecosystems that serve as significant drivers of job growth at Eastman Business Park. These investments will help the Finger Lakes region to fulfill the challenge of Global NY: attracting foreign businesses looking to invest, and competing on the global export market.

Opportunities for Growth

The Finger Lakes region's key strengths in the cutting-edge manufacturing industries supported by Eastman Business Park focus on new technology development and prototyping driven primarily by small businesses and innovative startups. As such, for small companies, high capital costs required for prototyping and testing often stand in the way of commercialization efforts. Shared production and testing facilities would help resolve this issue if further deployed within EBP.

The NY-BEST Commercialization Center at EBP makes resources available to companies that help prepare technologies for mass production, including a battery testing facility to certify performance of prototypes. However, the testing facility at the site is not fully optimized. For example, critical safety tests (e.g., battery stability at extreme heat ranges) cannot be conducted, and as such, the site is unable to comprehensively evaluate batteries before they go to market. Also, some of the production

equipment previously used by Kodak for chemicals manufacturing and repurposed for battery production are not current-generation and lack capabilities required by the market. Upgrades would help local companies expand and enhance production.

Another opportunity revolves around attracting large tenants to EBP. While enabling startups helps keep the Finger Lakes on the leading edge of technology, innovation attracting large companies would serve as a major driver of new jobs. The assets available at Eastman Business Park make the region very competitive for many chemicals and manufacturing companies, but making capital available to further incentivize companies to move could spur significant economic growth. Twenty-five companies across a variety of industries are currently in talks to relocate to Eastman Business Park. Supporting these moves would help ensure both investments are jobs are kept New York State.

3.3.2 Downtown Innovation Zone

Downtown Rochester is the heart of the Finger Lakes region. URI investments will connect the bright spots of downtown Rochester – the thriving Neighborhood of the Arts, historic properties such as the Sibley Building, and many others – into a vibrant core that attracts people to live, work, and play.

Vision

The development of a Downtown Innovation Zone will catalyze the broader revitalization of the city of Rochester. Over the next five years, the region will initially focus on revitalizing the Midtown area, beginning with Main Street. The primary goal will be to attract new businesses, create jobs, and spur retail activity thereby increasing the number of people that not only work but also reside downtown. By leveraging assets including research universities, incubation facilities, and recent investments in AIM Photonics which will be headquartered in Rochester, the region will make significant progress over the course of the URI support. The region's investments in downtown will link closely with incentives provided by START-UP NY to focus on sustainable growth. Through helping create new jobs primarily in the IT, photonics, software and new media industries, the URI investment will serve as a vehicle for a longer term transformation that will integrate the Innovation Zone into a broader commercial, retail, and residential ecosystem downtown. Over time, the Innovation Zone will help connect areas along East Avenue towards Alexander Street, linking newer development to existing retail and residential activity and in parallel expanding westward toward the convention and arena facilities and attracting not only new residents but also new visitors to Rochester.

Assets and Performance

The city of Rochester already has notable assets in place to build upon through the URI support. These include new real-estate and mixed-use developments, historic properties, and projects that will further integrate the activity downtown.

More than **\$800 million in real estate development** is currently being invested in downtown Rochester, and approximately 80 growing companies classified as “innovative” or “creative class” have recently located downtown. This number is growing, in part, because of the START-UP NY locations, entrepreneurial and technology commercialization activity driven by the Rochester Institute of Technology and the University of Rochester, and a number of business incubation and entrepreneurial support facilities.

New mixed-use developments have already begun transforming downtown Rochester: 40 downtown commercial buildings are being or have been converted to residential and mixed-use properties and nine new residential projects have been constructed. Residential vacancy rates have fallen to under three percent as downtown’s residential population has nearly doubled to about 6,000 residents since 2000. The population is expected to increase by an additional 30 percent over the next few years. While the growth in commercial development has not yet caught up to this strong residential momentum, commercial vacancies are also on the decline, with nearly 48,000 people now working downtown. Price per square foot is especially attractive in comparison to nearby cities, and office asking rates that remain around \$12 per square foot make Rochester substantially more affordable than either large cities, such as New York at \$47, and smaller peer

cities, such as Pittsburgh at \$20. A number of keystone real estate projects are already underway, including:

- Tower280: \$59 million redevelopment into retail and office space along with nearly 200 apartments in a formerly vacant 17-story building
- Chase Tower: \$35 million renovation of mixed-use commercial and residential space
- Alexander Park North: \$25 million construction of over 200 residential units along with first floor retail and commercial office space surrounding a court yard

Historic midtown properties such as the Sibley Building and 40 Franklin Street will provide a cornerstone for the Innovation Zone, anchoring a critical mass of businesses and residents. Covering a full block and containing more than 1,000,000 square feet, the Sibley Building is undergoing a comprehensive \$200 million restoration, with over \$23 million committed from NY State, that will transform the largest building in Monroe County into a mix of office and retail space, affordable and market-rate apartments, an outdoor roof terrace, an urban farmers' market, and underground parking. The renovated Sibley Building will house the University of Rochester's Finger Lakes Business Accelerator Cooperative, a comprehensive incubation and business support facility that is expected to foster 100 new tech startups and create 1,000 new direct jobs over the next five years. RIT's downtown facility at 40 Franklin Street, a 47,000 square foot building that formerly housed the Rochester Savings Bank, is the new home of RIT's Center for Urban Entrepreneurship, which builds community wealth by facilitating growth for local businesses. RIT is also renovating 40 Franklin Street facilities to house startups. Rochester's first START-UP NY company, Datto, has already moved into the site.

The development of the **Inner Loop East Project** is connecting vibrant activity in Rochester's East End to the rest of the city. With nearly \$25 million in investment from New York State along with the US Department of Transportation and the City of Rochester, the development is creating a boulevard with wide sidewalks and dedicated bicycle facilities, making Rochester a more walkable, livable city. In addition to improving traffic safety, the Inner Loop is promoting further development by opening mixed-use land with the potential for 800,000 square feet of commercial and residential development adjacent to an area that offers lively dining, entertainment, and nightlife.

Opportunities for Growth

Leading urban transformation examples from cities including Los Angeles, St. Louis, Philadelphia, and Pittsburgh serve as best practice models for Rochester. These examples point to a set of common prerequisites that help spur job creation within the urban core. These prerequisites include improving safety and security in order to draw in more businesses and real estate investments, incentivizing and attracting further commercial and retail activity, and improving common and neighborhood infrastructure.

Developers and businesses cite safety and parking availability as common barriers to locating to downtown Rochester. Increasing safety efforts as well as developing amenities such as well-lit streets, revitalized abandoned properties, and improved parking facilities, would serve as a starting point for more businesses to locate within the Innovation Zone. Expanding programs such as START-UP NY to include broader parts of the Sibley Building and other key developments in the area as well as developing similar incentive structures for sales tax abatement would attract new tenants. Downtown currently has a few large anchor tenants including Xerox and Windstream, but

has room to attract more. Attracting a critical mass to target properties will be crucial for driving demand for services and attracting more new businesses to the area.

Leading examples also point to the need to concentrate revitalization efforts in a narrowly focused geographic and industry area. Cortex Innovation Community in St. Louis, a bioscience and technology innovation district with close parallels to Rochester, is the result of a focused and carefully managed effort over more than 15 years to attract new businesses and large anchor tenants. Maintaining the focus on the Sibley Building and its immediate surroundings, exploring brownfield developments when possible and integrating new tenants and developments into a coherent strategy will not only yield positive results in a short time frame but also be critical to the long term success of the Innovation Zone.

3.3.3 Science and Technology Advanced Manufacturing Park (STAMP)

Thanks to state investment, STAMP has been developed into a site ready to attract large, high-investment tenants. Further investment will build on and go beyond the current level of development. Specifically, strategic, targeted URI investment will make the site ready for more, larger tenants, unlocking thousands of jobs and driving growth in the Finger Lakes and the Western New York region.

Vision

The Finger Lakes will host a large, commercially successful semiconductor and nanoscale production mega-site as the centerpiece of a broader, cross-regional nanotechnology and advanced manufacturing cluster. A growing semiconductor/nano network is developing across New York State along the I-90 corridor, and STAMP is well-positioned to capture significant market share from the massive private investment available – winning against global competitors – in these new, advanced manufacturing industries.

Assets and Performance

STAMP, the Science and Technology Advanced Manufacturing Park, in Genesee County is a 1,250-acre greenfield production site designed to attract multiple, large manufacturing facilities.

The site's location was designed from the ground up to maximize attractiveness to companies:

- Direct access to high-capacity utilities, including low-cost power via the New York Hydro-Power zone, connections to the Empire gas pipeline, and planned installation of high-capacity water and sewer facilities
- Connection to Buffalo and Rochester workforces, with a combined population of 2.1 million
- Access to a well-trained workforce from the 57 nearby colleges with 17,500 enrolled engineering students such as RIT's Microsystems engineering degree, and complementary degrees (e.g., AAS in Nanotechnology) at local community colleges
- Very large, nearly shovel-ready mega-site (1,250 acres) able to attract a diverse portfolio of large companies including nano, semiconductors, displays/imaging, photovoltaics, bio-manufacturing, and others.

STAMP'S attractiveness to developers has been validated by industry, with multiple potential tenants in discussions to relocate there. The STAMP project is among the highest priorities for the Finger Lakes Regional Economic Development Council.

The Finger Lakes region and New York State have made a substantial investment in developing the STAMP mega-site, with \$11.4 million spent to date. An additional \$33 million was allocated in the 2014-15 State budget and re-appropriated in the 2015-16 State budget. State support is critical to ensure this site has the right infrastructure in place to compete with regions across the world that are vying for multi-billion dollar projects. The site is not yet shovel-ready for additional projects, and further investment would enable new companies to quickly move in.

This strong asset serves as the center of a broader semiconductor and nanoscale manufacturing network. The RIT Microelectronics Engineering program was the country's first undergraduate

program specializing in semiconductor fabrication, and now graduates about 30 students per year. Beyond graduates, research at the Semiconductor and Microsystems Fabrication Lab and the Nanopower Research Labs along with the Center for Electronics Manufacturing Assembly at RIT makes the region a center for development and innovation. These programs link with related degree programs at Monroe and Genesee Community College, to produce a strong workforce at both the mid- and high-skill level.

At the University of Rochester, URnano is a user facility that offers a unique set of nanofabrication tools for lithography, deposition, etch, and characterization. URnano also offers training for faculty, students, and outside researchers to become certified in the use of these tools. By making these tools accessible to a wide range of users, including industry, the University of Rochester trains current and future generations of technologists, furthers research in a variety of fields, and helps businesses translate that research into viable, innovative solutions.

SUNY Polytechnic also operates a facility within the Finger Lakes. The Smart Systems Technology & Commercialization Center (STC) was created in 2010 and operates in Canandaigua, NY. The facility includes 26,000 square feet of cleanroom space, including semiconductor and optoelectronic foundry equipment, and helps position New York State as a global leader in smart systems and smart devices.

Opportunities for Growth

STAMP is in discussions with potential anchor tenants, but the site requires additional investment to attract this private capital and allow companies to move into the site. At the Genesee Valley Agri-Business Park, support from New York State was instrumental to attracting Müller Quaker Dairy, which indicated that a major driver of their decision to locate in the region was state support that enabled a short turn-around time to becoming operational. The Ag Park is now at full capacity. A similar achievement at STAMP, bringing the site to full capacity, would draw 8,500 to 26,500 jobs to the area depending on industry.

3.3.4 Emerging Advanced Manufacturing Technology

Eastman Business Park, the Downtown Innovation Zone, and STAMP have become nexuses for emerging industries in the Finger Lakes. As these hubs represent locations where the region is most poised for growth, they will be the initial focus of the URI investment. However, as the region's economy continues to transform and grow, new industries will emerge, with strengths spread across the region. Industries including sustainable technologies, additive manufacturing, and life sciences are becoming increasingly important to the region thanks to local strengths and state support. As these industries continue to evolve, the Council will identify potential new areas for innovation across the entire Finger Lakes region where URI investment could have the greatest impact. The City of Batavia and the City of Geneva for example are working with stakeholders involved in planning the Rochester Downtown Innovation Zone to create similar areas in their cities focused on the entrepreneurial activities in agriculture and food production industries.

4 Key Enablers

In order to achieve transformative economic development, the region must have the right set of talent, expertise, and processes in place to support growth in key industries. Rapidly changing industries also require many powerful community assets, including a dynamic workforce pipeline, support for business expansion, and institutions driving industry innovation. Rochester and the Finger Lakes region already have people and organizations working tirelessly to advance economic development. The Council has identified a set of further enablers that, through URI investment, will allow the region to achieve transformative growth both through targeted support for key industries and broader efforts to robustly develop the economy.

4.1 Pathways to Prosperity: Workforce Development

The URI is a once-in-a-lifetime opportunity to transform the economy of the Finger Lakes and make the region a leader in several key industries. By investing in workforce development, the region can supply the job demand from growing pillar industries and ensure all members of the community share in this success, fulfilling the challenge of Governor Cuomo's Anti-Poverty Initiative to make the promise of economic mobility a reality.

Vision

Guided by the efforts of the Rochester-Monroe Anti-Poverty Initiative (RMAPI), the Finger Lakes region is committed to reducing poverty and providing opportunities for success through targeted education and training efforts that directly link to employment. At the core of this approach is the relationship between education, employment, and poverty. The unemployment rate in Rochester for those without a high school diploma is 23 percent, over five times higher than for college graduates, and only five percent of Rochester City School District graduates are deemed ready for college or employment upon graduation. The consequences of this lack of educational attainment follow residents into adulthood, magnifying their economic and community impact.

For achievable, sustainable impact, under the URI, the region will focus on efforts that will make a step change in **improving high school graduation rates, increasing college and employment readiness, reducing unemployment, and reducing poverty**. These efforts will be critical in facilitating key regional industries including food production and advanced manufacturing by providing the region's employers with the dynamically skilled workforce they need to support growth.

To maximize impact, the region will take a **results-based portfolio approach by scaling successful efforts and conditionally supporting new ideas** based on results, participants, and funding. The URI presents an opportunity to catalyze these efforts by providing a portion of the resources needed to create partnerships and coordinate efforts among key stakeholders. RMAPI, a partner whose efforts the Finger Lakes Regional Economic Development Council endorses and supports, will be critical in this process.

To focus these efforts where they are needed most, the Finger Lakes region will target distinct hard-to-place populations. For **high school students at risk of not graduating**, efforts will scale successful early intervention programs that improve graduation rates, increase readiness, and expand access to employment opportunities by providing mentorship and connections to first jobs. For **the**

working poor and the unemployed, efforts will provide industry demand driven skills training and direct job placement, further removing barriers to maintaining employment through coordination with RMAPI. For **veterans**, efforts will support integration into the community, including targeted job training and placement.

Assets and Performance

The Finger Lakes region has a strong legacy of collaboration as evidenced by its volunteerism and activism rates, and a key set of assets on which to build, including organizations that specifically serve hard-to-place populations, the commitment of employers, and the involvement of community members.

To **improve high school graduation rates as well as college and employment readiness**, the Finger Lakes region will build upon initiatives that have already demonstrated success, and have the potential to scale up throughout the region with targeted support, including **Hillside Work-Scholarship Connection**. Hillside currently enrolls over 2,400 students and has employed over 400 high school graduates so far this year. In its 28-year history, Hillside has successfully improved retention and graduation rates for high-risk students enrolled in the Rochester City School District through the provision of social and academic support systems, including school-based youth advocates, job training and placement, and mentoring at job sites. The region will also conditionally support the development of newer programs including the **Educational Partnership Organization** established at East High School by the University of Rochester, which aims to double the graduation rate from 42 percent to 84 percent over a seven year period. Another innovative high school program, **P-TECH Rochester**, is a six year "9-14" program where students are matched with a business mentor, take college classes, and gain professional work experience. Launched in Rochester in the fall of 2014 and serving approximately 95 students, graduates earn both a New York State Regents diploma and an associate's degree from Monroe Community College. The model has received both state and national attention through President Obama's 2013 State of the Union Address and Governor Cuomo's commitments to expand the program across New York State. Regional universities are also making commitments to improve college enrollment from the city of Rochester through programs including RIT's City Scholars and the University of Rochester's Rochester Promise, programs which provide free tuition to qualified graduates of the Rochester City School District.

The **FLREDC Workforce Development Work Group** has demonstrated remarkable success in implementing advances in **reducing unemployment** through education, training, and placement. The work group has been meeting on a weekly basis for the past two years with 54 members representing 39 different organizations including high schools, colleges, employers, charitable foundations, non-profits, organized labor, veterans, and government. Its results-oriented approach has focused on creating access to meaningful long-term employment for both student populations and adult learners. Through efforts such as **sponsoring the first Jobs and Career Fair targeting Rochester high school seniors** that drew more than 460 students and 50 businesses, the work group exceeded their annual job placement goal last year by placing over 350 individuals including veterans and Hillside students with jobs in high demand areas such as advanced manufacturing.

The Finger Lakes region is committed to providing specialized education and training opportunities for hard-to-place worker populations, including the **deaf and hard-of-hearing**. There are an estimated 43,000 deaf and hard-of-hearing individuals in the greater Rochester area, and at 3.7

percent of residents, Rochester has the largest deaf and hard-of-hearing per capita population in the country among those ages 18 to 64. However, the percentage of deaf and hard-of-hearing 18- to 25-year-olds attending postsecondary education, 61 percent, is almost double the national average, and the region has seen tremendous success in **reducing poverty and unemployment** for this population. This is in large part due to RIT's National Technical Institute for the Deaf (NTID), which is among the leading research and training institutions of its kind. With more than 1,200 students and 100 faculty and staff who are deaf or hard-of-hearing, RIT has the largest staff of professional sign language interpreters of any college program in the world. NTID is also exceptional for its commitment to job placement, making the Institute a valuable resources for the hard-to-place worker community.

In its efforts to **reduce unemployment** through targeted job training, the Finger Lakes region works with a robust network of **community colleges**: Monroe Community College (MCC), Finger Lakes Community College, and Genesee Community College. A nationally recognized leader in workforce training, MCC is ranked in the top two percent of US community colleges for most associate degrees awarded, and the MCC-educated workforce adds approximately \$510 million in income to Monroe County each year. In 2014, MCC worked with more than 170 employers and organizations in the public and private sectors to provide targeted workforce training throughout the Finger Lakes. MCC's **SkillBuild** educates young adults about in-demand careers in advanced manufacturing, health care and the skilled trade. With investment to expand capacity, the program could annually serve over 2,000 students in the region. MCC's **Bridges** program is an innovative educational outreach effort to extend a skill-based career pathway to disadvantaged and underrepresented populations within Rochester's urban center. The program will establish a network of accelerated college remediation programs in partnership with the City of Rochester, Veterans Outreach Center, Ibero-American Action League, MCC, and other community colleges and organizations.

Box 1: A Unique Asset: Rochester-Monroe Anti-Poverty Initiative

The Finger Lakes region URI application has the advantage of incorporating the efforts of the Rochester-Monroe Anti-Poverty Initiative (RMAPI), an initiative unique to Rochester and spearheaded by Governor Cuomo, which seeks to **reduce poverty** by transforming systems, programs, and policies in a coordinated, sustainable manner. RMAPI is collaborating with several members of the URI Steering Committee and the FLREDC Workforce Development Workgroup to ensure clear channels of communication and synergy. Success in Rochester is of particular importance as it has the potential to be replicated elsewhere, providing a scalable model for implementation in other cities throughout New York State.

RMAPI seeks to reduce poverty, and is unique among other initiatives for its practical, collaborative approach: aiming for a coordinated system overhaul, following a data-driven approach, and leveraging participation from community members in poverty. While many poverty alleviation efforts focus on isolated, downstream solutions, RMAPI presents a novel approach by bringing together service providers with the populations they serve. In addition to RMAPI's integrated systems and community approach, two critical factors, structural racism and the effects of past and present trauma, have been explicitly called out to be included in the design principles. All recommendations and implementation plans will be assessed against these two factors to ensure that they are deliberately addressed.

RMAPI has formed work groups for the eight key drivers of poverty, tasked with the following objectives:

- Identifying and prioritizing key barriers and challenges that keep people in poverty
- Creating recommendations to counter the highest impact barriers for each driver
- Identifying current assets and initiatives that can be leveraged in support of the recommendations
- Identifying the resources required and obstacles that need to be removed at the state and local level in order to implement these recommendations
- Establishing key measures for determining success

RMAPI's commitment to participation is reflected in the structure of the work groups: each group has 25 members, including local providers, subject experts, and at least five community members who are currently affected by poverty. RMAPI also gains insight from members of the community and affected families, through one-on-one interviews, focus group discussions, neighborhood meetings, community input forums, and a survey (with over 500 responses) as well as engaging community members to help determine the criteria used to rank and prioritize recommendations.

RMAPI has used a data-driven approach to identify and target the population affected by poverty, particularly the working poor. The demographic profile of significant sub-populations will be a key determinant in terms of which recommendations are critical for the first phase of this initiative. RMAPI is further committed to measuring and being accountable for improved outcomes by setting and tracking success metrics for solutions coming from the work groups.

To coordinate the solutions emerging from the work groups and provide a sustainable framework for eliminating poverty in the long term, RMAPI has established a systems design team that brings together community stakeholders from the business, government, education, and non-profit sectors to address how to affect the major program and policy shifts that will enable broadly implementable solutions. The support and coordination of the State will be critical to the success of this work. The State Task Force, appointed by the Governor, will leverage State resources for Rochester's work, while local efforts will be led by Assembly Majority Leader Joseph Morelle, Mayor Lovely Warren, County Executive Maggie Brooks, and convened by the United Way of Greater Rochester. In addition to other community members who sit on the board, RMAPI has hired three full time staff members to drive the initiative.

Preliminary Recommendations

The eight work groups developed 32 recommendations that are now being assessed across the agreed criteria to build a phased implementation plan. The first phase of the plan will address the needs of the working poor to help them move from and stay out of poverty. These recommendations are coalescing into several overarching objectives and recognize the need to address the two critical underlying issues that keep many individuals and families on the poverty treadmill; specifically structural racism and the effects of past and present trauma.

Given the complexity and breadth of these issues, the final report will take an ‘and/both’ approach to contain specific recommendations on each one, as well as a design principle that all recommendations be screened for their efficacy in addressing both issues.

Another common issue across all work groups is the lack of coordination, integration or alignment across the system of social supports (including infrastructure, policies and regulations). Silos across government agencies, non-profit providers and community support structures (e.g., faith and neighborhood communities) inhibit awareness, accessibility, eligibility and participation in the patchwork of services and programs needed to enable economic mobility and the move out of poverty. One of the first barriers to overcome is the lack of a central data repository able to present a 360 degree view of both the services/support received and the results and outcomes of those services.

Phase 1 recommendations will include several components to address this barrier:

- Single point of access and consistent mentoring / ability to link persons affected by poverty to needed or expert resources.
- Centralized data-base to enable 360 view of needs, services and results for persons impacted by poverty/moving out of poverty.
- Prioritized plan of attack for most critical areas of alignment and coordination (e.g. childcare and other benefit reduction versus salary increase).
- Flexibility and localized decision ability to make existing benefits/funds responsive to individual and unique circumstances.

Although the work to develop the interim report and definitive recommendations for the RMAPI plan is still in progress, it shares some overlapping objectives with Upstate Revitalization, especially the Pathways to Prosperity enabler. These overlaps are:

- Ensuring effective pipelines are in place between training/credentialing programs for living wage jobs (both in secondary education and adult educational opportunities).
- Connecting the working poor with effective mentoring services to successfully navigate the continuous barriers to stable employment that arise for persons emerging from poverty
- Improving the accessibility and affordability of childcare and transportation – two of the critical enablers to stable employment
- Improving accessibility and cultural relevance of many social and health supports by locating them in ‘Neighborhood Centers’ and employing neighborhood residents

Preliminary Proposed Funding Model

A critical element of success for the RMAPI recommendations is having a sustainable funding mechanism. While the proposed funding model is still a work in progress, the preliminary approach relies on a mix of both state and private support. Given the strong intersections with the Pathways to Prosperity enabler, select RMAPI recommendations will be funded through the URI support while others will rely on funding specific to RMAPI. In both instances, and across the initiatives, efforts will be made to galvanize private funding in support of proposed recommendations. Private funding is expected to come in the form of donations, private foundation matches, and other sources.

Opportunities for Growth

The URI presents a significant opportunity to build on existing assets that promote regional prosperity by supporting efforts to improve high school graduation rates, reduce poverty, and reduce unemployment. Targeted investment will follow a portfolio approach by scaling successful efforts and conditionally supporting new initiatives. Rochester has long endured some of the lowest **high school graduation rates** in the country, and dropping out of high school incurs a significant cost both to the individual and to the community. Substantially lower employment and earnings lead to greater poverty levels, greater reliance on public services, and poorer health outcomes. Most adults affected by poverty with limited education are concentrated in high poverty areas across the region, which are often found in and around Rochester. Because the employment opportunity set is highly limited for those without a high school diploma, it is critical to provide early interventions to improve high school graduation rates. Scaling successful initiatives to provide mentorship and connections to first jobs will make a significant outside-in impact on improving graduation rates.

Reducing unemployment will require **closing the growing skills gap** so that workers can be matched with employment, as employers in growing industries increasingly look for workers with specialized training. Of the region's more than 10,000 yearly job openings that pay a minimum of \$30,000, 87 percent require training or a degree beyond high school. Half of these jobs require mid level skills and an associate's degree, post-secondary education, or commensurate training, rather than a bachelor's degree. To maximize benefit to the regional economy and reduce unemployment, workforce development efforts must be **connected to key industry growth**. Growth in the agricultural and food industries will require greater numbers of workers throughout the Finger Lakes region, and many occupations in these industries provide ideal entry level employment opportunities for those with limited training, and enable workers to create value on their first day. An aging population is also contributing to gaps between industry demand and the available workforce in key industries. Notably, manufacturing is expected to lose almost a quarter of its workforce, more than 8,500 workers, to retirement in the next decade. Targeting training programs to younger workers provides an opportunity to make growth in these industries more sustainable. Training institutions are working to better match skills supply and demand by improving ties to industry through efforts such as co-designing training, establishing apprenticeship programs, and developing feeder models between community colleges and employers. Developed in partnership with local businesses, Finger Lakes Community College's Accelerated Mechatronics Technology Program is a 12-week program that bridges the skills gap by teaching students technical math, mechanical fundamentals, electrical schematics, and other skills needed to fill open positions in regional advanced manufacturing

companies. To sustainably close this skills gap, the region requires URI support to scale successful training programs and develop infrastructure for matching workers directly with relevant employment.

4.2 Entrepreneurship and Development

Small businesses are increasingly fundamental to the Finger Lakes economy. Through strategic investments ensuring access to capital, facilities, and support, the region will catalyze growth across sectors targeted by the URI.

Vision

The Finger Lakes region will develop a robust entrepreneurship ecosystem that captures the region's entrepreneurial potential and supports the growth of key pillar industries. With a legacy of innovation and a collection of university assets including research commercialization and incubation facilities, the region will foster the growth of new businesses and promote expansion of existing ones. More specifically, the region will help accelerate growth and expansion within priority industries including photonics, agriculture, food production, energy, and additive and sustainable manufacturing. For these industries, efforts will focus on improving access to capital, equipment, and testing and commercialization facilities in order to offset cost and capital barriers for smaller businesses. In parallel, and through the development of the Downtown Innovation Zone, efforts will also focus on growing entrepreneurial activity, retaining the region's university graduates, and focusing on startup growth in the City of Rochester as well as the outlying counties.

Assets and Performance

The Finger Lakes region has a rich **history of innovation** rooted in commercial giants including Kodak, Xerox, and Bausch and Lomb, which served not only as major regional employers, but also as engines for world-class research and development. Despite their reduced corporate presence in the Finger Lakes, these companies established a legacy of innovation that their employees have expanded throughout the region through more than 120 startups in the Optics, Photonics, and Imaging field. This resilience is reflected in the thousands of former employees who have remained in the region and worked to champion innovation through patent development and small business creation. Despite the downsizing of Kodak, the region's patent leader for decades, the Finger Lakes region has greatly increased its patent development, outpacing state and national benchmarks: for every 10,000 workers, the Finger Lakes region produces 30 patents, exceeding the upstate New York average of 19 and national average of 12.

Embedded within its universities and startup community, Rochester has a wealth of assets to support the region's **business incubation and acceleration** efforts. Organizations such as RIT Venture Creations, the University of Rochester's High Tech Rochester incubator, RIT's Center for Urban Entrepreneurship, Excell Partners, and others play a pivotal role not only in incubating and supporting regional businesses, but also in driving the development of the downtown Innovation Zone. These entities have a track record of success in targeting, incubating, and funding emerging businesses that either go on to be acquired by leading national companies or continue to grow and expand their footprint in the Finger Lakes region.

RIT Venture Creations, part of RIT's START-UP NY campus plan, is an incubator for mid-seed stage companies, providing them with experienced mentors and connections with investors. Entrepreneurial students and faculty have access to RIT's world class research and testing facilities. Venture Creations has graduated five to seven companies per year since 2010. As of June 2015, over

400 people are employed in current tenants and graduate companies, including Vnomics, recognized in 2014 by the Rochester Business Alliance as the second-fastest growing privately held company.

University of Rochester's High Tech Rochester (HTR) is a nonprofit, whose mission is to be a catalyst for entrepreneurship and innovation-based economic development by applying business expertise and network connections to aid in the formation and profitable growth of companies in the Finger Lakes region. HTR is sponsoring the Business Accelerator Cooperative located in the Sibley Building that is expected to create 1,000 new jobs in the first five years of operation. The University of Rochester operates a student incubator based at HTR that advances student-run businesses through a collaborative, interdisciplinary environment and interaction with mentors and local entrepreneurs. The incubator will be moving to the Sibley Building in downtown Rochester along with HTR when it relocates in 2016. UR's Kauffman Entrepreneurial Year also provides a fifth tuition-free year for selected students to pursue an entrepreneurial endeavor.

RIT's Center for Urban Entrepreneurship (CUE) is helping reshape the regional economy and build wealth within the urban community by ensuring anyone with the passion to create a business or social venture has the opportunity to reach his or her entrepreneurial goals. CUE aims to empower urban entrepreneurs and develop a pipeline of local businesses that can further grow and support the development of the regional economy. Through the Capacity Building program, CUE has stimulated growth in 10 local businesses by providing mentors and workshops for a nominal fee to urban entrepreneurs who have been in business for at least a year. RIT has committed \$1 million over five years, and CUE is planning to expand existing successful programs, as well as add offerings through increased collaboration with local organizations including Pathstone, which provides microloans to small businesses, and the Urban League, which assists local entrepreneurs in developing business plans.

Through these entities, the Finger Lakes region has seen a number of successes that reflect both the strength of its assets and the power of collaboration. Sweetwater Energy, a producer of low cost sugars for the biofuels, bio-plastics, and bio-chemical industries, has raised more than \$17 million, and signed \$600 million in contracts to date. RIT's Center for Integrated Manufacturing Studies helped the company develop its first prototype and recruit its first president, while HTR assisted in developing the original business plan and pursuing grant funding. Datto, a Connecticut-based provider of backup and business continuity solutions, was founded by an RIT alumnus who chose to set up a satellite operation in Rochester to have greater access to the regional workforce.

Finally, while much of this entrepreneurship activity is tied to downtown Rochester and the two large university players, efforts are underway to **incorporate the entire nine county region** into the broader ecosystem that links closely with these programs and with state initiatives like START-UP NY. HTR's Hub and Node Network with partner node facilities throughout all nine counties will create an entrepreneur ecosystem that shares support services among members and the entrepreneurship community. This program would provide services to new startup growth companies housed within the HTR Accelerator facility and services to hundreds of companies that interact with the Accelerator Cooperative. At the moment, the Accelerator offers video conferencing connectivity to all nine counties, allowing the region to tap into and share best practices.

Opportunities for Growth

While the entrepreneurship ecosystem is well underway in the Finger Lakes region, there are several areas that would further enable it to attract and support startup activity, most notably access to capital.

Despite the abundance of intellectual capital generated throughout the Finger Lakes region, lack of **access to capital** prevents the development of a burgeoning startup scene, as entrepreneurs and businesses struggle to expand business in the region. The Finger Lakes annually receives over \$350 million in research and development expenditures, 22 percent of total Upstate New York expenditures, but has a gap in venture capital availability. Excell Partners, a Rochester-based fund that invests in seed and early stage high-tech startups, has successfully funded 43 companies that have created more than 200 jobs with average salaries over \$60,000. In Rochester, Excell has leveraged over \$120 million from \$3.6 million in investment, demonstrating the promise of regional investment and the necessity of scaling up funding operations. Earlier this year, Governor Cuomo announced that Excell was selected to manage a \$2 million Minority and Women Owned Business Enterprises (MWBE) Investment Fund that will make seed and pre-seed investments in startups with a focus on the fields of advanced materials, clean technology, life sciences and medical devices, increasing opportunities for minority and women owned businesses throughout New York State. Excell was also selected as a participant in the New York State Innovation Venture Capital Fund and Innovate NY Fund investment programs. While Excell's success is notable, access to capital at the later, revenue stage often poses a challenge for companies. Creating a funding support model that acts as a funnel and ensures access to capital throughout the startup life cycle would ensure that more entrepreneurial activity is both generated and retained within the region. This model will connect both startups and entrepreneurs to private capital, and to supporting programs like the newly created New York Ventures initiative.

Further growth of the Finger Lakes region's **angel network** through greater leverage of successful university alumni would ensure not only an additional set of funding resources, but also a network of mentors and advisors for first-time business owners.

4.3 Higher Education and Research

With 19 institutions of higher education, the industry is a significant part of the Finger Lakes economy, drawing students and researchers to the region. Investing in the region's flourishing research facilities at leading institutions will attract federal research dollars, create jobs, promote commercial activity at startups, and help retain students.

Vision

The Finger Lakes region will leverage its higher education assets to continue to attract and retain world class talent, driving innovation and economic activity in key regional strengths including life sciences, software development, and data science. Through growth and collaboration, our network of institutions of higher learning will establish the Finger Lakes as a leader in research and innovation. **Expanding research activity** will not only propel innovation in the region, but also attract investment and create jobs from sponsored research funding. **Growing student enrollment**, with particular focus on successful programs in key science, technology, engineering, and mathematics (STEM) fields, will continue to draw top talent to the region and create significant economic impact through tuition revenue and the creation of new employment opportunities.

Assets and Performance

The Finger Lakes is home to **19 institutions of higher education**, including leading research universities, private liberal arts colleges, SUNY campuses, and community colleges. These institutions serve a variety of economic and community development roles and serve as drivers of employment, research, and industry innovation. The sheer number of institutions makes higher education a powerful force in the regional economy: the 19 institutions of higher education are spread geographically throughout the region, and many colleges and universities serve as major county employers. Independent colleges and universities contribute over \$5.5 billion in economic impact, and \$3.1 billion in payroll. The University of Rochester and its affiliates employ nearly 27,000 full or part-time employees, making it the largest employer in the Finger Lakes region, the largest private employer based in Upstate New York, and the eighth largest private employer in all of New York State.

Rochester has attracted more **external research funding** than any other city in upstate New York, and the Finger Lakes spends \$277 of research and development expenditures per capita, far exceeding benchmark comparisons of \$182 for upstate New York and \$170 for the United States.

Finger Lakes higher education institutions enroll more than **86,000 students** every year. The region's universities are particularly strong in the STEM fields, with 26 percent of degrees awarded in these fields, compared to 20 percent for upstate New York and 18 percent for the United States. The CFA process has supported the expansion of STEM programs and facilities throughout the region that has helped build a strong workforce pipeline, with funded projects including the NextGen Sciences Initiative at Roberts Wesleyan College, which will allow increasing science and nursing enrollment by over 50 percent, and the Integrated Science and Health Sciences Building at St. John Fisher College, where nearly 80 percent of science and nursing graduates continue on to work in New York State. The Rochester Institute of Technology (RIT) is the second largest producer of STEM degrees among private universities in the nation, and enrollment has grown over 10 percent in last five years. This STEM specialization supports growing regional industries

including computing and software development, for which RIT awards nearly 800 degrees every year. RIT also leads innovative research efforts in key STEM fields, and has produced over \$70 million in engineering research and over \$50 million in physical sciences research over the last five years.

Universities play a pivotal role in **driving industry innovation**. Companies in the Finger Lakes region have the benefit of access to unique academic assets such as RIT's Golisano Institute for Sustainability (GIS), one of the transformational projects previously designated by the Finger Lakes Regional Economic Development Council. GIS has received \$15 million in NYS capital funding, along with significant private sector and industry support to advance cutting edge research in sustainable production technologies. These investments enabled GIS and RIT to be invited as a Tier One partner in one of the first NNMI's to be designated by the Federal Government in Digital Design and Manufacturing (DMDII). In its first year of operation, the DMDII has awarded four research projects to GIS, leveraging federal and corporate funding and enabling GIS to transition new technologies to several NYS companies. GIS houses five research centers, including the NYS Center of Excellence in Sustainable Manufacturing and the NYS Pollution Prevention Institute (NYSP2I), and works with local manufacturing firms to increase their global competitiveness by helping them develop and implement more sustainable products and environmentally efficient manufacturing processes. Its industry outreach arm, the Center for Integrated Manufacturing Studies, has a long track record of applied research and technology transfer dating back to 1992. One of the companies spun out of CIMS, Vnomics, was recognized in 2014 as the second fastest growing company in the greater Rochester region, and is poised to add at least 100 employees over the next two years.

The University of Rochester received more than \$350 million in research funding in 2014 and has received more than \$1.9 billion in research funding over the last five years from the National Institutes of Health (NIH), contributing to its recognition as one of the top 10 universities in the nation for the impact of its **life sciences** research based on the number of licenses, licensing/royalty revenue, the number of startups, and the number of awards received. The University of Rochester Medical Center produces cutting edge research across a breadth of topics, with particular strengths in neuroscience, orthopedics, and immunology and vaccines. Notable technologies include the world's first cancer vaccine, Prevnar, Gardasil, Ceravix, and advancements in LASIK surgery that have improved the vision of tens of thousands of people. In 2014, the University of Rochester received \$25 million in licensing revenue and 155 invention disclosures, more than a 10 percent increase over 2013. These disclosures were received from 250 university inventors, as well as 51 external collaborators from 28 institutions, agencies, and corporations. Since 1996, 56 companies have been created using University of Rochester licensed technologies, including iCardiac Technologies, Vaccinex, Lucid, Inc., and QED Technologies.

RIT's Center for Media, Arts, Games, Interaction, and Creativity (MAGIC) is establishing the Finger Lakes region as a leader in the rapidly growing **software and digital media** industry. The Center provides a dedicated environment for the construction, experimentation, and design of digital media, and MAGIC Spell Studios is linking RIT's internationally ranked academic programs with the high-tech facilities needed to commercialize computer gaming, film and animation, and imaging sciences projects. The Studio has received a \$13.5 million in funding from New York State, \$3 million from Dell and \$12.4 million from Cisco Systems Inc. MAGIC is projected to graduate one company per year from its incubator, creating an estimated 50 new jobs over the next five years.

Thanks to support from Governor Cuomo and the New York State Legislature, the University of Rochester is among the top 15 most powerful university-based supercomputing sites in North America, and home to the most advanced computer system dedicated to health research in the nation, the Health Sciences Center for Computation Innovation, developed in partnership with IBM. The University of Rochester is also home to New York State's Center of Excellence in Data Science, and these unique **data science** capabilities have already generated more than \$330 million in research funding over the last six years and involve more than 650 faculty, students, and research staff from more than 40 departments. Annual research awards associated with the University of Rochester's super computing technology and infrastructure have tripled in the last three years. Grant funding awarded is projected to exceed \$1 billion for University faculty who utilized the Goergen Institute for Data Science's core competencies and facilities, which includes the Center for Integrated Research Computing and the HSCCI.

Opportunities for Growth

This broad base of assets means that the region's universities will further grow enrollment in keystone STEM programs and attract research funding and top tier faculty. More than a quarter of the degrees awarded each year in the Finger Lakes are in STEM fields, an increase of over 60 percent from the year 2000. This trend is supported by regional strengths in research and development, and the expansion of such research programs provides room to grow the number of students who come to study at the region's 19 colleges and universities. Focusing student recruitment efforts on hallmark STEM programs also provides a talent pipeline for growing regional industries. Surveys and interviews reveal that many graduates are leaving the region, in part, because they are unable to find relevant long-term career opportunities, a challenge which URI support will address by creating new employment opportunities throughout the region. Efforts are underway to systematically embed this talent into the regional economy by creating pathways for students directly through both internships with local businesses and the support for student-led startups through incubator and accelerator programs. RIT's cooperative education program places 2,500 students per year in co-op positions, many of which lead to permanent job offerings, and about 40 percent of these positions are in the region.

Universities are agents for change through their ability to translate academic discoveries into applications that spur economic growth. Rochester's universities are particularly strong in research and development, and there is significant room to grow translation efforts into economic activity. Expanding sponsored research activity through URI support will create jobs as the activity of sponsored research alone creates a number of employment opportunities, including expanded teaching positions and full time research positions, and further drives the creation of jobs in related industries.