The Rochester Regional Optics, Photonics, and Imaging Accelerator

Backgrounder for Stakeholders

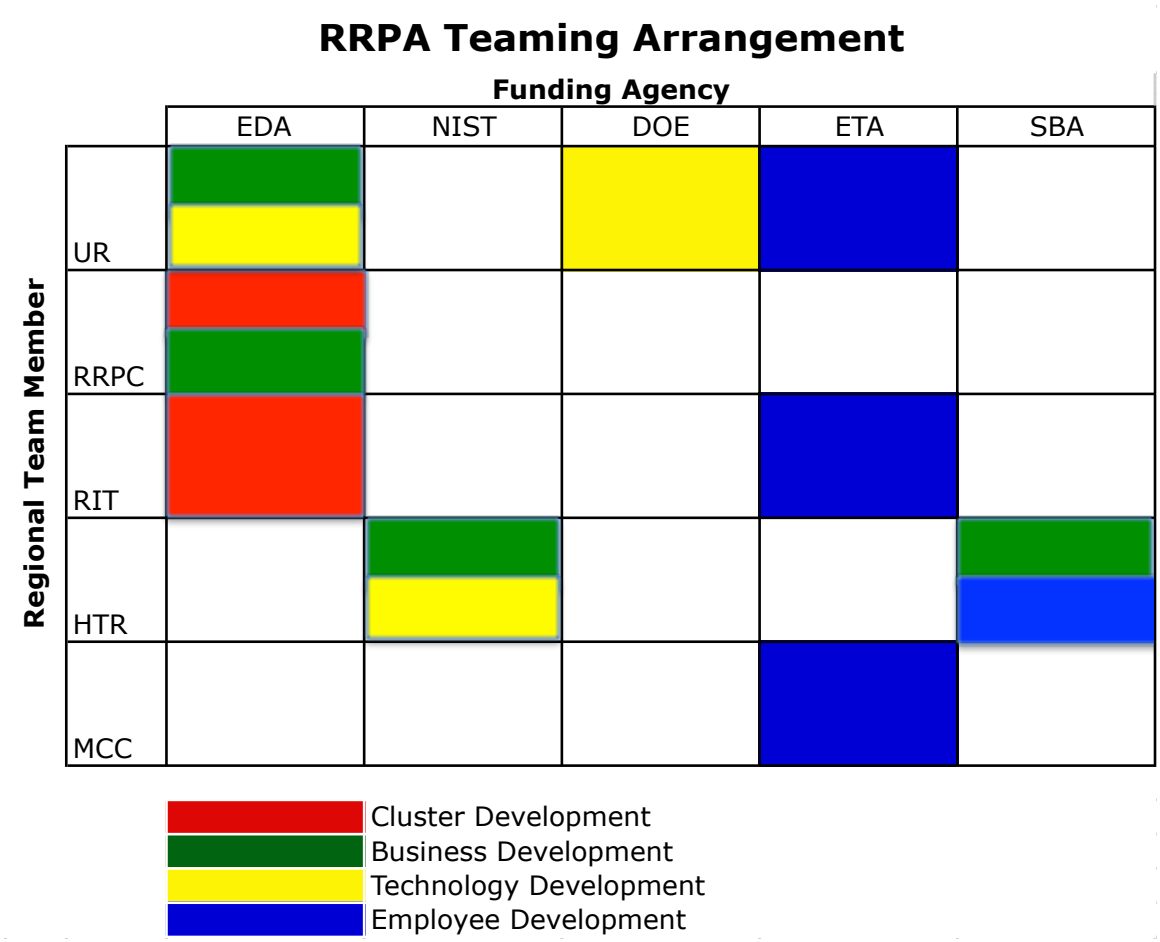
The Center for Emerging and Innovative Sciences (CEIS) at the University of Rochester has been awarded a three-year $1.88M grant from a group of 5 federal agencies to accelerate the growth of small- and medium-sized optics, photonics, and imaging companies in the Finger Lakes region. The funded program is known as the Rochester Regional Optics, Photonics, and Imaging Accelerator (RRPA). The applicants for this award are the University of Rochester, High Tech Rochester (HTR), and the New York State Department of Economic Development, Division of Science, Technology, and Innovation (NYSTAR). A team consisting of the University of Rochester, the Rochester Regional Photonics Cluster (RRPC), the Rochester Institute of Technology, Monroe Community College*, and HTR will carry out the work. The 5 federal funding agencies are the Economic Development Administration (EDA), the National Institute for Science and Technology (NIST), the Department of Energy (DOE), the Employee and Training Administration (ETA), and the Small Business Administration (SBA). In addition to the federal funding, New York State Department of Economic Development is providing $200K, and the partnering organizations are contributing $700K in matching funds, bringing the total funding for the program to $2.6M.

This RRPA award is part of the federal government's Advanced Manufacturing Jobs and Innovation Accelerator Challenge and is one of only 12 made in the country this year. The goal of the Accelerator Challenge is to encourage the growth of regional industrial clusters throughout the US. The cluster of optics, photonics, and imaging (OPI) companies in the greater Rochester region is one of the oldest, largest, and most important industrial clusters in the country. The award recognizes the importance of OPI companies to the US and Finger Lakes region's economy, and it recognizes the ability of the 5 teaming organizations to define and carry out a comprehensive and coherent strategy for growing the Rochester OPI cluster.

The RRPA is three-year accelerator program. It is not the start of a new non-profit organization or a permanently funded program or center. It is an effort that combines the considerable existing resources of the 5 team members to catalyze accelerated growth rate of the over 50 small to medium sized enterprise (SME) OPI companies in the Finger Lakes region, incubate new companies, and attract others to the region. Currently these 50 companies are growing their employment at a rate of 5.5% per year. The goal of this accelerator program is to increase this growth rate to 7.5% by the end of the program and to set the stage for double-digit growth rate for the rest of the decade.

*MCC is an important part of this program but will not be receiving any funds directly from this grant. MCC's 2-year degree and certificate programs in Optical Systems Technology is well funded from other sources.

The types of activities that will be undertaken include cluster development, business development, technology development, and employee development. A teaming matrix showing how each team member is contributing to projects funded by the 5 federal agencies is shown below.



A summary of activities under each of the funding components is given below:

EDA – Enhancing Cluster Networks and Regional Assets

The EDA component will be managed by CEIS with participation from RRPC, the UR Department of Mechanical Engineering, the UR Center for Entrepreneurship, the RIT Mathematics Department, and Bausch and Lomb. The budget for this component is $1.14M over 3 years with funding coming from the EDA, NYSTAR, UR, RRPC, and B+L. The EDA money and matching funds will be used for cluster development, business development, and technology development.

In keeping with the objectives of the Advanced Manufacturing Jobs Accelerator, EDA will target investments that help distressed regions build on existing assets to create a supportive regional economic ecosystem for manufacturing firms and associated clusters to establish and grow, incorporate advanced processes, and create jobs. EDA especially encourages projects that will promote the repatriation of jobs back to the U.S., retain and grow domestic investment, attract foreign direct investment, and increase exports. Allowable activities include technical assistance, feasibility studies, asset mapping, planning activities, technology or process development, cluster networking, market expansion, and other activities critical for advancing the regional economic ecosystem necessary for advanced manufacturing and associated clusters to spur job creation, encourage economic growth, and foster global competitiveness.

Cluster Development

- Expand RRPC membership (RRPC)
- Host networking events and seminars (RRPC and CEIS)
- RRPC monthly newsletter (RRPC)
- Update RRPC and CEIS web sites (RRPC and CEIS)
- Hold a workshop and technology showcase on the Future of Imaging (CEIS)

Business Development

- Increase presence of RRPC at domestic tradeshows (RRPC)
- Enable RRPC presence at foreign tradeshows (RRPC)
- Host foreign trade promotion trips with help from DOC (RRPC)
- Conduct market research and issue reports to cluster companies (CEIS and UR Center for Entrepreneurship)

Technology Development

- Support student design projects for optics manufacturing and help set the stage for a Center for Advanced Optics Manufacturing (UR Mechanical Engineering Dept.)
- Support for collaborative research between Bausch + Lomb and the RIT Mathematics Department on the use of freeform optics for contact lenses (RIT and B+L)

NIST – Assistance to Small and Medium Sized Enterprises

The NIST component is funded through the Manufacturing Extension Partnership (MEP) program. NYSTAR is responsible for the MEP program in New York State and has designated HTR as the MEP center for the Finger Lakes region. HTR will run the NIST portion of the RRPA program. The objective of the MEP funding for this program is to ensure that small and mid-sized manufacturers are fully engaged in growing cluster activities, and that these efforts receive support from existing MEP Centers

where there is mission alignment. The allocation for this project is $375K over three years and comes entirely from NIST.

Under this effort HTR will work with its partner organizations to develop a target list of manufacturing companies in the optics, photonics and imaging cluster. HTR will target its outreach to these companies, via its existing sales and business development process, and will leverage a Salesforce.com CRM system to track progress and results. Once engaged with these companies, HTR will provide targeted services to 12-15 companies per year, based upon each individual company's specific needs. Activities include:

Business Assessments: Typically a 3-5 day project to provide a top-to-bottom evaluation of the business and make specific recommendations for how to grow.

Innovation Engineering: Starting with a 100-day "Jumpstart" program, HTR will work with client company teams ó day per week to lead them through the Innovation Engineering Management System to come up with new growth ideas, assess them, and implement them. Intense services (~$4000/month x 3 months = $12,000) would be provided to 8-10 companies annually.

Continuous Improvement: Working to optimize manufacturing operations. This activity will include completion of a value stream map to document the entire production / operational flow of the business, followed by analysis for areas of improvement, and implementation of lean manufacturing and quality systems to improve profitability and free up capacity for new initiatives.

Technology Acceleration: Focus on commercializing new technologies and products, by 'infusing' them into existing manufacturing businesses or by accelerating the growth of new, manufacturing-based startup companies. HTR will work with client companies to establish a two-way connection with local research institutions, as well as the National Innovation Marketplace, through which the client company's technology needs can be identified, defined, and satisfied.

DOE – Reducing Technical Risk

The DOE component will be managed by the Institute of Optics at UR and work will be done at the Institute, the UR Laboratory for Laser Energetics (LLE), and Flint Creek Resources, Inc. There will be close collaboration between the university researchers and several local optics manufacturers. The allocation for this component is $448K over three years with funding coming from the DOE and NYSTAR.

The objective of the DOE funding is to support industry cluster activities working to develop, demonstrate, and exploit energy efficient, rapid, and flexible manufacturing technologies to advance U.S. competitiveness in critical areas. Specific manufacturing technology goals include improving existing processes, materials, and products, and enabling new capabilities and new products. Using advanced manufacturing technologies to improve performance, increase flexibility, and lower costs by increasing

throughput and reducing materials use and life-cycle energy cost may achieve the overall objectives of the DOE and enhance the competitiveness of U.S. manufacturing.

DOE funding will be used to support two research efforts at UR to develop and implement advanced manufacturing innovations at the region's OPI companies. Project 1 will accelerate the work on freeform optics currently being carried out at the Institute of Optics. This is an advanced optics technology that will give local companies the ability to design and manufacture optical components and systems of unprecedented accuracy, allowing them to compete more effectively on a global scale. Project 2 will develop and test technologies for the reclamation and disposal of slurries containing rare earth elements used for the grinding and polishing of optical lenses. Reduction in the use of rare earth elements has become a national priority due to the export restrictions and tariffs imposed by the Chinese government.

Freeform Optics. The scope of work is to create a new optics design, simulation and optimization computer simulation tool that incorporates the mathematics of freeform surfaces. Freeform optics has been called the third wave in lens technology, following spherical lenses and aspheres. The focus of the work will be on the front- and back-end of the core optics raytrace, optimization, and simulation tools. With a research-based source code that will be available to a wide range of academic and industrial researchers, targeted proposals for science and innovation in FFO spanning design to fabrication, assembly, and test can proceed. **The results of this research will help position Rochester as the leading global center for freeform optics and help grow local companies, incubate new ones, and attract existing optics companies to set up operations in the region**. In addition to the transfer of technology, this research will give students extensive knowledge and training on the design and manufacture of FFO components and systems and provide local industry with a talented pool of future employees.

Reclamation of Slurries Used in Optical Manufacturing Operatoins. The optics fabrication industry has a critical dependence upon the availability of rare earth oxide materials, in particular Cerium oxide, for use in grinding and polishing of high precision optics. China, which accounts for 95% of the REOs sold internationally, has begun to greatly limit the export of such materials for a variety of environmental, economic and strategic reasons and this has a significant impact on all those using REOs, especially the US optics companies manufacturing lenses and optical systems for military and commercial applications. Flint Creek Resources, Inc. a local recycling company has worked with a local optics manufacturer, Sydor Optics to successfully recover cerium oxide abrasive from slurry waste. The reclaimed abrasive was tested by the company and found to be as effective or better than the original product at polishing. In this activity, Scientists from the Laboratory for Laser Energetics will work with Flint Creek Resources to expand reclamation of polishing abrasive slurries to additional regional optics companies.

ETA – Building a Highly-Skilled and Diverse Workforce

The ETA component combines the educational resources of the University of Rochester,

RIT, and Monroe Community College to create a set of training programs for incumbent and new workers for the Finger Lakes region's OPI companies. This represents the first time all three of these schools have coordinating their considerable resources to provide a comprehensive set of courses that meet the needs these companies needs. The program leverages the existing degree and continuing educational programs at UR, RIT, and MCC with new continuing education courses at RIT and UR. The budget for the training at UR and RIT is $400K over 3 years and comes from the ETA. The MCC Associates Degree and certification programs in Optics Systems Technology are an important and integral part of the overall optics training strategy for the region but they are not receiving funding from RRPA because they are well funded by other government, corporate, and non-profit sources.

ETA is providing funds to support training for occupations within the advanced manufacturing workforce. The ETA is using is their "H-1B Technical Skills Training Grant Program" to fund this activity. This program is designed to provide education, training, and job placement assistance in occupations and/or industries that have high-growth potential for which employers are using H-1B visas to hire temporary, high-skilled foreign workers, and the related activities necessary to support such education, training, and placement activities. CEIS has identified a number of positions at regional OPI companies that fit this description. The courses enabled by the RRPA have received strong endorsement from local OPI companies and meet their needs for training existing and new employees.

Our plan is to ensure there is adequate training at all levels and at a wide range of topics that are important to the cluster companies. Training components include:

UR Institute of Optics Summer School Part of this grant will go towards expanding enrollment in the Institute of Optics Summer School, which has been in existence for over 50 years. The School offers 8 courses and runs the last week in May and the first week in June. This grant will allow for a significant increase in the number of scholarships not only for current employees of OPI companies, but for people who would like to enter the industry. These courses are targeted at people with a technical background. Money will also be used to add a course on optical component manufacturing based on the curriculum developed at MCC.

RIT Continuing Education Short Courses

RIT will prepare and deliver three new continuing education short courses focused on optics, photonics, and imaging as part of the RRPA program. These courses will be offered in the summer, and the schedule and content are designed to complement the UR Optics Summer School.

The first RIT course is in optics and photonics manufacturing. This course is based on a continuing education short course on microelectronic manufacturing given by the Electrical and Microelectronic Engineering Department. It will be tailored to optics and photonics manufacturing, which uses many of the same pieces of equipment and processing steps as optics and photonics manufacturing. Examples of this are thin film

deposition, metrology, vacuum technology, and clean room protocol. The course is aimed at degreed engineers and workers with some experience in high technology manufacturing. It will be offered twice over the three-year accelerator program.

The second summer short course at RIT will be on the theory, design, packaging and assembly of the photonics/optoelectronics devices. The course will given by the RIT Center for Electronics Manufacturing and Assembly and is also aimed at degreed engineers and workers with some experience in high technology manufacturing. It will be offered twice over the three years.

The third summer short course offered by RIT will be an overview of Imaging Sciences offered by the Carlson Center for Imaging Sciences. This four-week course takes students comprehensively through the imaging chain culminating in a capstone project in which students demonstrate system level expertise in imaging. Topics include an overview of the imaging chain, an introduction to imaging statistics, the human visual system, colorimetry, radiometry and photometry, geometric optics, tone-transfer function, sensors, image processing, image analysis, displays and output systems, imaging evaluation, psychophysics, and experimental design.

MCC Optical Sysems Technology Program. Since 1962, MCC has offered an Associates Degree to train technicians to work in the optics industry. This comprehensive program includes training in manufacturing, design and function of optical components, optical instruments, electronics, and experimental techniques. The training complements what is offered by RIT and UR. MCC works closely with the local optics industry to make sure the content is responsive to their needs. MCC also works with both UR and RIT to enable students to go on for a Bachelors degree as well. MCC also offers a certificate program.

SBA –Assisting Entrepreneurial Development in Disadvantaged/Underserved Communities.

The SBA component of the program will be administered by HTR and include coordination with the local Procurement Technical Assistance Center (PTAC) and outreach to the local Small Business Development Center, Rochester Regional Veterans Business Council and Urban League of Rochester, NY. Efforts will be targeted at helping eligible small and disadvantaged businesses that would like to manufacture OPI products or provide some type of manufacturing support to OPI companies leveraging existing business development organizations. Funding for this component

Activities include:

Targeted Outreach/Entrepreneurial Training: Events will include matchmaking between established OPI companies and small disadvantaged/underserved companies, support for registrering to do business with the government, and entrepreneurial training through The Entrepreneurs Network (TEN) Boot Camp Program

Business Development Services: HTR will provide support to 5 disadvantaged/underserved OPI companies annually with technical and business planning assistance to include market research and product commercialization assistance.

SBIR/STTR Education and Proposal Support: HTR will provide 3 small/disadvantaged OPI companies annually intensive SBIR/STTR topic matchmaking and Phase 1 or 2 grant writing support.

Program Management

The RRPA program is managed by the Center for Emerging and Innovative Sciences at the University of Rochester under the direction of Dr. Paul Ballentine. The management of the 5 components and the projects within those components is shown in the chart on the following page. Resumes of key individuals are attached.

An Advisory board will provide guidance on overall direction, periodically review progress, and make necessary changes to the activities. The members of the advisory board are:

Donald Golini
Adjunct Professor at the University of Rochester Simon School of Business
Founder and former CEO of QED Technologies

Duncan Moore, University of Rochester
Vice Provost for Entrepreneurship; Rudolf and Hilda Kingslake Professor of Optical Engineering; Professor of Biomedical Engineering, Professor of Business Administration; and Area Coordinator, Entrepreneurship

Robert Clark, University of Rochester
Dean of the Hajim School of Engineering and Applied Sciences

Mark Bocko, University of Rochester
Director, Center for Emerging and Innovative Sciences; Chair, Professor, Electrical and Computer Engineering

Stefi Baum, Rochester Institute of Technology
Professor, Director of the Center for Imaging Science

Todd Oldham, Monroe Community College
Vice President, Economic Development and Innovative Workforce Services VP Office

Peter Pecor, Rochester Works
Executive Director

John Hart,Lumetrics, Inc.
President & CEO

David Zorn, Genesee/Finger Lakes Regional Planning Council
Executive Director