

APPENDIX D. INNOVATION CRESCENT CASE STUDY



The Innovation Crescent Biotechnology Sector Initiative

Over the past decade, Georgia's Innovation Crescent has emerged as a unique hub of life science in the Southeast with top research organizations such as Georgia Institute of Technology, University of Georgia and Georgia State University; teaching institutions including Emory University and Morehouse School of Medicine; government entities and nonprofits like the Centers for Disease Control, and the American Cancer Society; public/private partnerships including the Georgia Research Alliance; plus a wide range of life science companies, large and small. Georgia was fortunate to have a non-profit, membership-based organization - Georgia Bio (Georgia Bio) - founded in 1989, that promotes the interests and growth of the life sciences industry. Members include companies, universities, research institutions, government groups and other industry associations involved in discovery and application of life sciences products and related services that improve the health and well-being of people throughout the world. Georgia Bio's mission is to advance the growth of Georgia's life sciences industry and foster strategic partnerships that can create a healthier world.

To accomplish this mission, Georgia Bio conducts business and economic development activities; advocates on behalf of the industry on public policy matters; educates the public about the benefits of life sciences research and product development; and provides a network for the exchange of ideas, information and opportunities.

Georgia's life sciences community is a rich mix of companies applying life sciences technologies to improving medicine and healthcare, agriculture, industrial and energy production, forestry, marine science and environmental management. At the start of the initiative, more than 250 companies called the Innovation Crescent home. At that time there had been a 140% growth in the life science industry since 1993 and Georgia ranked 7th in the total number of life science companies in the country. Today, there are more than 360 life sciences companies, most of them focused on healthcare applications, ranging from established to start-up pharmaceutical

biotechnology, medical device, diagnostic, medical supply and medical informatics companies; and contract laboratory, preclinical and clinical research organizations. 2400 bioscience jobs have been created in the last five years at 570 facilities employing 24,000 individuals.

HISTORY: The National Governors Association partnered with the National Network of Sector Partners and the Corporation for a Skilled Workforce to launch a new project on Accelerating State Adoption of Sector Strategies. In 2007, a year-long Policy Academy provided participating states with the opportunity to learn about important research, promising practices, and state policy options for establishing sector strategies.



Georgia was selected to develop and implement two Sector Strategies, Advanced Manufacturing and Biotechnology, as both were at critical junctures in economic growth within the state. The implementation team consisted of members of the Governor's Office, Fanning Institute, the Technical College System of Georgia, Georgia Bio, Georgia Department of Economic Development, Georgia Research Alliance, Atlanta Regional Commission and the life science industry. The Bioscience Industry was specified as a strategic sector for the state by the Commission for a New Georgia. The bioscience industry is localized in the region spanning Atlanta to Athens; 85% of the state's industry lies in this zone. Business cited a need for skilled technical labor, supporting the need for a Work Ready Region focused on developing this talent pool. The Georgia Department of Economic Development, the Metro Atlanta Chamber and the Gwinnett Chamber all named BioScience as a target industry for growth in the region and state.

SUMMARY: The Life Sciences (Biotechnology) sector strategy focused on the Atlanta/Athens/Clarke crescent, the home of numerous Biotechnology employers. At the same time these sectors were being developed, the Governor's Office implemented the Georgia Work Ready Initiative, which included Work Ready Regions focused on strategic industries. Four Work Ready Region Grants totaling \$1.3 million were received by the Atlanta Regional Commission to assist in the development of the Innovation Crescent initiatives.

The ultimate goal was to develop a sustainable workforce pipeline, from K-12 through Technical Colleges to area Universities, to have a viable life science workforce and to recruit emerging Life Sciences industries to the area.



The Innovation Crescent initiatives included:

- The establishment of Life Science career pathways in middle and high schools;
- Articulation agreements for Life Sciences programs between the Universities and the Technical Colleges;
- Sustainable communication between the Life Sciences industry and education;
- Establishment of a Life Sciences Industry Network; and
- Industry network skills upgrade and training.

Career Pathway accomplishments included: Development and approval of a biotechnology career pathway by DOE, development and approval of a biotechnology course as a science elective, development and approval of biotechnology tasks for middle school science, implementation of curriculum at 23 high schools throughout the IC with over 2000 students enrolled in biotechnology.

For the first time, chambers and economic development entities in the 13-county area came together as the Innovation Crescent Regional Partnership (ICRP) to market under one brand, “The Innovation Crescent” (www.innovationcrescent.com). Collateral material, videos and communication networks, such as Facebook and Twitter were created by the ICRP. Members from the diverse county area traveled to Boston and as far as China to market the “Innovation Crescent” as a region – not individual counties. The Chambers formed a 501c3 organization for marketing the IC and represent the Innovation Crescent at Bio International.

The IC Industry Network, which was comprised of company officials from Immucor, Elan, Noramco, Merial Select, CryoLife, and Porex in addition to CDC and Emory identified critical occupations in need, common training needs, common recruitment problems and was a standing committee of GeorgiaBio. Additionally, the Industry Network became a sustainable network and received \$25,000 in industry training funds from the newly established Georgia Work Ready State Industry Network. 95 employees from 6 different life science companies were enrolled in Microsoft Project and Project Management Training.

A 2007 USDOL Community Job Training Grant received by Gwinnett Technical College and Athens Technical College in conjunction with the Atlanta Regional Workforce Board helped to expand biotechnology curriculum offerings and provide equipment for teacher training and served as the springboard for the strategy. Both Technical colleges continue as active partners in curriculum development and teacher training with multiple workshops occurring throughout the summer.

Activities funded by the Grant and conducted in the Innovation Crescent include: (1) Summer Academies for bioscience middle and high school teachers introducing state-of-the-art scientific techniques and equipment (2) Loan of bioscience equipment to Middle and High School classes as well as curricula for experiments with bioscience pharmaceutical and agricultural projects (3) Development of the Georgia Bioscience Technology Institute with certificate and degree programs at both Athens and Gwinnett Technical Colleges.

VISION AND MISSION

Vision: The Innovation Crescent is internationally recognized as a unique hub of life science talent.

Original goals:

- Retention and expansion of existing life science industries
- Integrated and seamless education and workforce system supporting the life science industry cluster
- Creating an environment that fosters fast-growth entrepreneurs
- Alignment of education and workforce development resources to support the life science industry cluster
- Grow high-wage jobs

CORE PARTNERS AND THEIR ROLE

Technical Colleges: Atlanta Technical College, Athens Technical College, Chattahoochee Technical College, Georgia Piedmont Technical College, Gwinnett Technical College, Lanier Technical College – Work Ready assessments and job profiling, leadership team, Bioscience student training and teacher training, equipment loan program, bioscience curriculum development

K-12 Education Systems: DeKalb, Gwinnett, Cobb, Clayton, Walton, Fulton, Barrow, Atlanta Public Schools - Work Ready assessments, bioscience curriculum development team, bioscience curriculum student enrollments (1900), teacher training and development.

Chambers of Commerce, county departments of Economic Development and Development Authorities: Atlanta, Barrow, Clarke, Clayton, Cobb, DeKalb, Fulton, Gwinnett, Jackson, Madison, Morgan, Oconee, Oglethorpe and Walton Counties – Innovation Crescent Regional Partnership formed to promote the Innovation Crescent, marketing and recruitment; assisted with Work Ready certifications for county

Workforce Boards: Atlanta Regional, CobbWorks, DeKalb Workforce, Fulton Workforce, Northeast Georgia – Leadership team, Work Ready assessments, fiscal agent

Colleges and Universities: Georgia State University, Georgia Tech, University of Georgia

State Government: Georgia Department of Economic Development including the Centers for Innovation – leadership, curriculum assistance and tech transfers

Associations: Georgia Bio - leadership team, lead career pathway development and teacher training, led industry network now a part of Georgia Bio, led industry training



GOALS AND CORE DELIVERABLES IDENTIFIED AS THE INITIATIVE MATURED:

- Maintain and strengthen the Innovation Crescent's visibility and global brand
- Further implement career pathways for students and workers in, and seeking to enter, life sciences-related careers
- Increase the number of teachers receiving STEM training
- The region's teachers understand and convey real life applications of Science, Technology, Engineering and Math disciplines
- A sustainable industry network which receives active support from key members of the region's life sciences community
- Continue working to align and strengthen other regional and statewide programs related to life sciences
- All counties in the region become Certified Work Ready Communities
- An increased proportion of the region's Work Ready exam takers achieve gold level certifications
- A deep pool of areas leaders to champion and implement the Work Ready initiative

PARTNERSHIP BUILDING AND PUBLIC STAKEHOLDER ENGAGEMENT

Challenges faced engaging education (secondary and postsecondary) and county/community partners:

Education challenges:

- the sheer size of the region's secondary educational system;
- school district leadership inaccessible and not bought into Work Ready because they don't see business requiring it;
- insufficient resources in manpower and funding support to reach out to high schools directly

Challenge successes:

- successes came with STEM activities
- partnered with mid-level administrators in limited numbers of schools – essentially they self-selected due to their interests and recognition of the opportunity
- Focused more on deep interactions in smaller number of schools rather than trying to reach everyone.

Partner challenges:

Engagement varied by county by levels of participation. Work Ready continued to be a challenge in Clarke, DeKalb, Fulton and Clayton counties. School systems were engaged in these counties; however, problems continued with private sector support and Gold level certificates. Through efforts of the IC team leaders, progress was made in Clayton County with a new county team leader who was also with the County Economic Development department and saw the value in county certification. IC team leaders sought to provide assistance to Fulton and DeKalb, but private sector certificates as well as gold certifications are still problematic. Each county initiated strategies as well as requested support with initiatives, such as chamber breakfasts, outreach materials, etc.

Common Training

IC offered shared training in topics selected by the industry network, which later became an industry partnership. Training was offered initially in:

- Regulatory Strategies/FDA communication (6/9/09)
- Problem-Solving for Managers (9/24/10)
- Presentation Skills (10/29/10)
- Basics of Project Management (10/5, 10/6, 10/25)
- Effective Communication Skills (10/14, 10/21)
- Leadership (11/4/10)
- Building Strategic Relationships: Influencing and Conflict Resolution (11/16/10)
- Communicating with impact: Tools for Improving Presentations (11/16/10)

These courses reached 109 individuals from 14 different companies.

The Industry Partnership received its first grant for shared training in May 2011. The following training was offered through that grant:

- **Basics of Project Management** (3 days; 21 hours). This course served 43 individuals from 6 companies in three different sections offered May through June 2011.
- **Introduction to Microsoft Project** (1 day; 7 hours) This course served 42 individuals from 6 companies in three sections offered in June and July 2011.

Industry Partnership

The approach to engaging an industry network initially was to gather the bioscience employers with the largest number of employees for a series of meetings about shared needs to develop a set of recommendations to the Governor as required by the grant in its early days. Over time, it was realized that the diversity among these companies in employment needs was a problem, so the IC developed a subgroup and recruited members focused on manufacturing. With that group, progress was made in development of shared training programs. The IP consisted of Alkermes (formerly Elan Pharmaceuticals); Cryolife, Immucor, Merial Select, Noramco and Porex. Other members included the CDC, Emory University, etc.

Challenges: There have been several acquisitions among member employers; keeping the members engaged and willing to attend planning meetings was a challenge due to the large geography of the region. Conference calls were utilized every other meeting to increase participation.

Greatest success: Immucor developed a deep relationship with Gwinnett Technical College as a result of being introduced through the Industry Partnership. In addition to the job profiling, GTC has conducted training for Immucor in other business and technical areas, including transferring an internal technical training program to the lab at GTC. The company is also using its job profiles to define internal training needs and design new training programs.

All employers completed an annual industry survey. They also completed an initial training needs survey. In addition, in every class evaluation, employees were asked to indicate interest in various training subjects. This information was provided to the Industry Partnership as a means of promoting discussion about future programs. In addition, an inventory of training in bioscience-related topics at area educational institutions and nonprofit organizations was developed and provided to industry partnership members.

CAREER PATHWAYS

IC staff helped develop the career pathway for Biotechnology R&D under Healthcare Sciences at the Georgia Department of Education, and utilized a teacher/post-secondary educator group to fine tune the curriculum to submit for approval by the Board of Regents as a fourth science for graduation.

Using WRR funds, staff worked with a cohort of teachers who would offer this curriculum for the first time in fall 2009. They worked together to receive training in lab techniques, develop pacing guides and equipment/supply lists, and interact with each other and the author of the adopted textbook. In addition, staff commissioned the preparation of a Resource Guide by one of the teachers to provide details and tips about the course after his first year of offering. This Guide is available on the GDOE website, and has been disseminated broadly by the IC and GDOE to both science and CTAE teachers.

The IC provided equipment and supply funding to a number of schools to pilot this course, and also provided additional training for teachers from all other the state, not just the IC. As a result, by its third year of operation the course had reached 2000 students enrolled in 23 schools in 13 districts.

In addition to the high school activities, during the term of the IC grant, the technical colleges' bioscience training capacities have greatly increased.

- Gwinnett Tech's biotech enrollment grew from 6 in 2007 to 140 in 2011
- Athens Tech's biotech degrees conferred grew 87%
- Atlanta Tech received a \$4.8 million USDOL grant in October 2011 to begin a new bioscience degree program.

GBTI, the joint program of Athens and Gwinnett Tech, developed a national presence among the biotech programs at community colleges over this period, and was selected in 2011 to be a dissemination site for two national programs:

Cold Spring Harbor Laboratory's Genomics Summer Teachers Institute. This is a one week training being offered at several sites around the country.

Bridge to Biotech program developed by NSF. This program provides intense preparation in math and science to students who are deficient in these areas to increase program completers.

Georgia was one of a few states that did not have a state-approved biotechnology course available to its high schools. The IC studied other states' curricula as part of the writing process. This lack, coupled with the industry need for more skilled technicians, and the newly established Georgia Bioscience Technology Institute at Athens and Gwinnett Technical Colleges supported the development of this career pathway for the state. The GDOE also approved this pathway development as part of Phase III of its career pathway roll out.

The curriculum development team had two members from industry on it. In addition, the curriculum was sent out for review by about ten industry persons before it was submitted to GDOE for adoption.

Career Exploration Activities, Teacher Internships, Student Competitions, Special Programs, etc.

The IC also developed a set of biotechnology tasks for existing science classes using a teacher group funded by WRR. These tasks were approved by the state and are available aligned to the Georgia Performance Standards on the GDOE website. In addition over 200 teachers were trained in the use of these tasks in their classrooms. Several school districts, including Atlanta Public Schools, Cobb, DeKalb and Gwinnett have conducted training for large groups of their middle and high school teachers on using these tasks.

Accomplishments:

As of 2011, 1955 students enrolled in biotechnology curriculum at the high school level in 22 schools in 13

districts. This number was 0 when the IC began the Work Ready regional project. The development and launch of a new statewide high school biotechnology Research and Development career pathway, approval by the DOE for both CTAE and Science credit was initiated by the Career Pathways team led by Cinda Herndon-King.

The construction of the Georgia BioScience Training Center in Newton County. The Georgia BioScience Training Center is a signature building that declares to a global audience Georgia’s commitment to supporting research, technology transfer, and providing the trained workforce critical to bioscience and biomanufacturing operations. A unique feature of this project—operated by Georgia Quick Start, a division of the Technical College System of Georgia—is that the Center is not only used for training Baxalta employees, but also serves as a highly visible component of Georgia’s strategic plan to brand the State as a global destination for bio-related industries, and to recruit new such industries to locate and create jobs in Georgia.



The construction of two new Life Sciences Buildings, which opened at Athens Technical College and Gwinnett Technical College in 2011.



Using WRR funds, the IC supported the Georgia Bioscience Technology Institute’s equipment loan and teacher training activities, including summer institutes for high school teachers. These activities reached:

- 334 teachers trained in summer academies
- 325 teachers using loaned equipment and kits
- 211 participating schools
- Over 25,500 students impacted
- Another 7700 students participants in science fairs, classroom visits, and career visits

Georgia Bio and secondary educators developed a bioscience career pathway curriculum for high schools and bioscience tasks for middle schools. The middle school tasks have been part of training for all Atlanta Public School middle school life science teachers. In addition, Gwinnett Public Schools is training middle school teachers on these tasks as part of a program with Gwinnett Technical College in the 2011/2012 school year.

Gwinnett Tech’s biotech program enrollment grew from 6 in 2007 to 140 in 2011

Athens Tech’s biotechnology degrees conferred increased by 87%

Approval of a new bioscience technology program at Atlanta Technical College in addition to award of \$4.8 million USDOL grant for biotechnology

Gwinnett Tech selected as a beta site for the NSF-funded “Bridge to Biotech” Project. Bridge to Bio, entry level courses for students without scientific background to increase pathway completers; Gwinnett Technical College in first cohort of adopters. The IC supported the development of Bridge to Bio by sending program leaders at Gwinnett Tech, Atlanta Tech and Athens Tech to the Bio-Link national conference for training in summer 2011.

Supported field trips for 125 high school biotechnology students from four districts to attend Georgia Life Sciences Summit on September 27 in Atlanta

Supported 15 Therrell School of Health Sciences and Research students to attend the Health Occupations Students of America (HOSA) bioscience competition at Athens Technical College

The Innovation Crescent Regional Partnership. The 13 county Chambers of Commerce and Development Authorities formed a 501(c) (3) as a result of the branding of the Innovation Crescent. This is a first ever partnership of economic development entities that has garnered national attention. The partnership was responsible for branding the regional, the production of brochures, websites, Youtube, Facebook, etc. The partners attend national/global Bio International Conferences as a cohesive group with Innovation Crescent cards rather than their own county business cards. They have travelled globally promoting the Innovation Crescent as a region.

The Innovation Crescent was named an Innovation Award winner by the National Association of Development Organizations, a nation trade association of 500+ regional development agencies, and was showcased at its annual meeting in October 2011 in Miami, FL. The IC was nominated by the Atlanta Regional Commission for this award.

EXAMPLES OF SUSTAINABILITY AFTER THE GRANT ENDED

January 2012 - Gov. Nathan Deal announced 11 winners of Innovation Fund grants, a \$19.4 million competitive grant program created through Georgia's Race to the Top (RT3) plan. Winner -Gwinnett County Public Schools STEM Targeted Education Program (STEP) Academy at Sweetwater Middle- an accelerated coursework, mentoring, and Biotechnology Research and Development career pathway program through a partnership with Gwinnett Technical College and the Gwinnett Chamber of Commerce. Targets underperforming 8th graders at high risk for dropping out, and puts them in a STEM academy to get them back up to grade level. By 11th grade, students are in dual enrollment with Gwinnett Tech. Expanding this to 3 clusters of 240 students, and are using the Biotech CTAE pathway as the program of study.

Athens Technical College received a University System Teacher Quality Grant beginning February 1, 2012 and concluding May 31, 2013. ATC will continue to host

summer biotechnology academies in which teachers are taught a modern biotechnology content and lab skills that are integrated in other subject areas such as health, agriculture, and math; 2) expand by partnering with GYSTC and sustain the current equipment loan program to teachers throughout the academic year; 3) continue to provide teacher support in implementing biotechnology labs in the classroom; 4) evaluate the effectiveness of teacher training; 5) assess effectiveness of teacher training on student attitudes and learning of biotechnology labs.

Microscopy Training Session for teachers at Gwinnett Tech, March 2012, 25 educators from the IC learned techniques which can be applied immediately in the classroom; Participation in the Georgia Science Teachers Association

Two week Georgia Bioscience Technology Institute Summer Academies at Gwinnett Tech beginning June 4 2012 for 2 weeks for approximately 80 teachers, Possible assays for the week of June 4th-8th Included: Red Algae, Cell growth/abiotic factors, Antimicrobial properties of red algae, Pigment separation: Paper Chromatography, Chemical analysis of pigments: Chlorophylls and phycoerythrin, Chemical analysis of polysaccharides: Viscosity method, Chemical analysis of proteins: Lowery method.

Sustaining Innovation Crescent Partnership - 501C3 with 13 Chambers of Commerce that continue to market and promote the IC; newly revamped website (at <http://georgiainnovationcrescent.com>) and Facebook page

Gwinnett Chamber of Commerce - Innovation Crescent Newsletter

Georgia Bio website featuring Innovation Crescent

Georgia Bio Education Institute ownership of Innovation Crescent Teacher Training and Equipment; A new director was hired in 2016 with expanded responsibilities and continued emphasis on increase in schools offering biotechnology curriculum