



# Georgia Department of Audits and Accounts Performance Audit Division

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## Why we did this review

This review of the Georgia Research Alliance (GRA) was conducted at the request of the Senate Appropriations Committee. The Committee asked that we address the following questions:

- How is GRA funded? What activities or projects are financed with appropriated state funds?
- What is the impact of state funded programs and the effectiveness of GRA in increasing economic development in Georgia?
- How are the proceeds from successful GRA projects distributed (e.g., patents, licensing fees, publication royalties, etc.)? Is this consistent with similar organizations in other states?

## About GRA

GRA was established in 1990 as an independent non-profit organization whose mission is to advance economic development by expanding cutting-edge research at Georgia's universities to facilitate the launch of new companies and creation of high-wage jobs. GRA accomplishes its mission by funding the recruitment of prominent scientists to six research universities; infrastructure for university laboratories to provide scientists with the tools and technology needed to conduct their work; and science and technology start-up companies to commercialize the most promising results of scientific research.

## Georgia Research Alliance

### Requested information on state-funded activities

#### What we found

There is evidence that Georgia Research Alliance's (GRA) current initiatives have had a positive impact on research and development and commercialization of innovative discoveries through the state's universities. The types of initiatives GRA invests in have evolved over time. Financed primarily with state funds, GRA currently has four primary economic development initiatives – GRA Eminent Scholars, Core Labs and Equipment, Matching R&D, and VentureLab. A comprehensive assessment of the impact and effectiveness of these initiatives was partially hindered by a lack of complete historical performance data and the need to rely on self-reported data from participant surveys conducted by GRA. Despite these limitations, we identified the following impacts using existing data and, in some cases, additional third party data:

#### Research and Development Activities

- Data reported to GRA by university research offices indicate that Eminent Scholars and their teams attracted approximately \$270 million in non-state research funding, which supported about 1,400 jobs at the universities in 2012.
- Data obtained from university research offices revealed that 112 of 145 GRA-funded researchers (Eminent Scholars, Distinguished Investigators, and other key researchers) were associated with 1,042 intellectual property disclosures, 1,207 patent applications, and 179 issued patents from 2000 to 2012.
- GRA expended approximately \$187 million between 2000 and 2012 to purchase specialized equipment, outfit or renovate laboratories, and construct research centers.

## Commercialization Activities

The VentureLab program funds start-up company initiatives in three phases – the first two being focused on feasibility and company formation and the final phase being loans to companies for debt financing. Of the 133 known companies funded through VentureLab between 2003 and 2011, 95 (71%) companies were actively doing business in the state in 2011 while 38 (29%) were identified as inactive or having no evidence of activity.

- Data needed to conduct an economic impact analysis was available for 59 of 95 active VentureLab companies. Based on an analysis conducted by Georgia State University's Fiscal Research Center (FRC), wages paid and revenues earned by these companies in 2011 supported a total of 389 direct and indirect jobs statewide, with a total statewide economic impact of roughly \$50 million.<sup>1</sup> Because of data limitations, FRC indicated that these results should be viewed cautiously.
- Using a combination of Department of Labor (DOL) employment data and self-reported information for 76 of the 95 active VentureLab companies, we identified 619 jobs associated with these VentureLab companies. Because VentureLab funding constitutes only a portion of participant companies' funding/revenue, the extent to which all of these jobs can be attributed to GRA cannot be determined.
- For the 95 active companies funded by VentureLab, we obtained DOL wage data for 63 of the companies and found that, overall, they paid average weekly wages that were higher than the state average.

Since its inception in 1990, GRA has received approximately \$565 million in state funding, including both state general funds and general obligation bond proceeds. Although GRA invests in researchers and lab and equipment purchases, GRA does not share in the proceeds generated from the licensing of intellectual property. Depending on the revenue-sharing policy of the university, revenues are split between the inventor, the inventor's school/college, and the university based on the amount of gross revenue received.

## What we recommend

This report is intended primarily to provide answers to questions posed by the Senate Appropriations Committee. While efforts have been made in the last five years to improve its data, GRA may wish to consider implementing methods that would improve the completeness of the data it collects and explore methods for collecting and validating information using third party sources. Continuing to improve the data it maintains should allow GRA to better assess its impact and the effectiveness of its initiatives. We hope that this report provides pertinent information to help inform policy decisions.

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<sup>1</sup> The multiplier analysis is based on wages, revenues, and direct jobs. The Department of Labor provided wage and jobs data for all 59 companies used in the analysis, but only 18 companies reported revenue data to GRA. According to GRA, early stage companies, particularly those in the life sciences industry, rarely have revenues to report.

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## Purpose of the Special Examination

This review of the Georgia Research Alliance (GRA) was conducted at the request of the Senate Appropriations Committee. The Committee asked that we address the following questions:

1. How is GRA funded? What activities or projects are financed with appropriated state funds?
2. What is the impact of state funded programs and the effectiveness of GRA in increasing economic development in Georgia?
3. How are the proceeds from successful GRA projects distributed (e.g., patents, licensing fees, publication royalties, etc.)? Is this consistent with similar organizations in other states?

A description of the objectives, scope, and methodology used in this review is included in [Appendix A](#). Unless otherwise noted, the data in this report captures all of GRA's state-funded initiatives except activities associated with its cancer research initiative (formerly known as the Georgia Cancer Coalition). A draft of the report was provided to GRA for its review, and pertinent responses have been incorporated into the report.

## Background

### Purpose of GRA

*GRA was created as a result of collaborative efforts of individuals representing state government, higher education, and private industry.*

The Georgia Research Alliance (GRA) was established in 1990 as an independent non-profit organization whose mission is to advance economic development by expanding cutting-edge research at Georgia's universities to facilitate the launch of new companies and creation of high-wage jobs. To accomplish its mission, GRA focuses its efforts in three interrelated areas:

- GRA assists in the recruitment of world-class scientists to one of GRA's six partner universities: Georgia Institute of Technology (GaTech), Georgia Health Sciences University (GHSU), Georgia State University (GSU), University of Georgia (UGA), Clarke-Atlanta University (CAU), and Emory University.
- GRA invests in state-of-the-art infrastructure for university laboratories to provide scientists with the tools and technology needed to perform groundbreaking work.
- GRA helps commercialize the most promising results of scientific research by providing seed capital to science and technology start-up companies.

### GRA Initiatives

#### Eminent Scholars

GRA established the Eminent Scholars Program in 1993 in an effort to recruit renowned scientists to Georgia to lead extraordinary research and development (R&D) programs with high potential for improving the state's economy. Recruited scholars tend to be highly productive individuals with many years of experience in their field, numerous credentials, and one or more prior inventions with strong

commercial potential. Currently, there are 72 GRA Eminent Scholar chairs. As shown in Exhibit 1, chair positions are concentrated among three of the six participating universities.

**Exhibit 1**  
**Eminent Scholar Chairs are Concentrated at Three Universities,**  
**December 2012**

University	Number of Chair Positions	Percent of Chair Positions Held
Georgia Institute of Technology	23	32%
University of Georgia	17	24%
Emory University	16	22%
Georgia Health Sciences University	9	13%
Georgia State University	6	8%
Clark-Atlanta University	1	1%
<b>Total</b>	<b>72</b>	<b>100%</b>

Source: GRA documents

**Selection Process**

Typically, the recruitment process is initiated by a university president who submits a letter to GRA describing an opportunity to establish a new Eminent Scholar chair. The letter includes potential economic outcomes of the opportunity, the source of matching private funds for the permanent endowment to be established for the scholar, and information about the academic department where the scholar will be housed. GRA reviews the university's proposal to ensure that the area of focus, preliminary candidate credentials, and source of matching funds align with GRA's priorities and the state's requirements. Ideally, the university would have a list of potential candidates that would be submitted in the initial opportunity letter. If not, the process of developing a potential candidate list begins with a campus search committee.

Once the university has selected its top candidate, the president submits a letter of support that includes the institution's justification for proposing a particular candidate and how the candidate will contribute to the university's research strategy and GRA's economic development goals. GRA's Eminent Scholar Advisory Group reviews each candidate's qualifications to determine if they meet GRA's requirements for academic research leadership, entrepreneurial record, publication, external connections, and scientific relevance. Upon consideration of the advisory group's recommendation, GRA advises the university of its decision. If approved, the university issues an offer letter to the candidate.

### **Eminent Scholar Selection Criteria**

#### ***Academic Research Leadership***

- Has or is eligible for rank of Professor
- Has record of outstanding grantsmanship
- Has strong potential for developing Center of Excellence
- Is a strong team builder and mentor

#### ***Entrepreneurial Record***

- Has formed sustainable companies
- Has developed intellectual property transferred to the marketplace
- Has created a sustainable, productive research enterprise

#### ***Publications***

- Broadly cited in academic literature over a sustained period

#### ***Connections***

- High-level connections with academia, industry, and government

#### ***Scientific Relevance***

- Acknowledged leader in an area of science that will be “hot” for at least five years

### **Recruitment Incentives**

Eminent Scholar recruitment packages may include a number of incentives designed to encourage candidates to accept the university’s offer. The recruitment package is a collaborative effort among the offering institution, GRA’s Board of Trustees, and GRA staff. The package may include grants from GRA to the university for equipment purchases or outfitting laboratories to suit the candidate’s needs. Grants may be made over a period of years and typically total more than \$1 million per candidate.

In partnership with GRA, the universities also establish an Eminent Scholar chair position for the benefit of the recruited candidate. GRA and its university partner each make a one-time investment of \$750,000 to create a permanent endowment of \$1.5 million for each Eminent Scholar chair. The universities fund these investments through private fund raising. The university invests the principal amount (which is restricted from use), and annual interest gained on the principal is either added to the principal or disbursed to the Eminent Scholar for project-related costs.

### **Vacancies and Split Endowments**

In the event of an impending vacancy in an existing GRA Eminent Scholar chair, the university president and GRA president confer with the departing scholar’s department head, other faculty, administrators, and stakeholders to discuss goals regarding the scholar’s area of concentration and potential new candidates. Once the goals are agreed upon, a campus committee is again convened to create a list of targeted candidates. The recruitment process adheres to the same policies and procedures used for new GRA Eminent Scholars. Since the program’s inception, GRA and the universities have had 22 vacancies due to separations from 19 chair positions. The vacancies caused by these separations have lasted from less than one year to seven years. As of December 2012, eight chair positions<sup>2</sup> were vacant

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<sup>2</sup> One of these chair positions has never been filled and seven are due to separations.

including four in cancer-related disciplines. Two of the currently vacant chair positions have remained vacant for four years, including one that has never been filled.

When an endowment investment matures, it may be large enough to split into two separate endowments. When this occurs, the university president and GRA's president meet with university personnel to discuss 1) the benefits of maintaining one sizeable endowment versus creating two smaller endowments, 2) the selection of the new chair's area of concentration, 3) the academic department where the chair will be housed, and 4) the chair's alignment with GRA's priorities. The recruitment process adheres to the same policies and procedures as for new GRA Eminent Scholars. Of the 72 current GRA Eminent Scholar chair positions, two resulted from split endowments. Although split endowments require no initial investment from the state, the recruitment packages do include GRA grants for equipment and infrastructure. [Appendix B](#) summarizes the activity of the Eminent Scholar chair positions since inception, including vacancies and split chairs.

### Other Key Scientists

#### Distinguished Investigators Program

Through this program, GRA provides incentives to recruit and retain emerging scientists conducting research in areas deemed important to GRA, the university, and the state. The program has two tracks: recruitment and retention.

- **Recruitment** incentives are directed toward researchers at the assistant professor/early professor level who have independently attracted funding from external sources, have demonstrated accomplishments in publications, clinical trials or patents, and are conducting innovative research. GRA provides \$500,000 over a three-year period, which the host university matches in the same time frame. GRA funds may be used at the discretion of the university and the candidate to support his/her research program. Since the program's inception in 2005, five Distinguished Investigators have been named in the recruitment program. No recruitment awards were made during fiscal year 2012.
- **Retention** efforts are employed when the university has reason to believe a researcher is being recruited by other universities or has the potential to be recruited away. Retention candidates possess similar qualities as recruitment candidates but must also demonstrate a potential and interest in applying their R&D outcomes to commercial opportunities. GRA partners with the university to create a permanent endowment valued at \$250,000, with GRA providing \$125,000 to match private endowment funds raised by the university. In addition to the endowment funds, GRA awards the candidate a grant in an amount ranging from \$50,000 - \$100,000 as part of the "start-up package". Since the program's inception in 2005, six Distinguished Investigators have been named in the retention program. In fiscal year 2012, GRA awarded grants to three retention candidates valued at \$100,000 each.

#### Eminent Scholar Challenge Grants

This program was initially created as an incentive to encourage Eminent Scholars from different universities to collaborate in preparation for major grant applications



and commercialization opportunities. Challenge grants were eliminated in 2010 due to budget cuts but were reinstated in smaller amounts for postdoctoral students in 2012. In fiscal year 2012, GRA awarded four grants totaling \$69,232.

### Matching R&D

When submitting major R&D grant applications to non-state sponsors, research faculty at GRA's six partner universities may seek a "contingent" investment from GRA. These investments, which are contingent upon a grant being awarded, are intended to help attract large R&D awards from federal agencies, foundations, and other private organizations. To qualify for a contingent investment, researchers must apply for multi-year, major R&D opportunities deemed important to the university and conduct research in areas aligned with GRA's strategic goals. Preference is given to opportunities that 1) are led by GRA Eminent Scholars, 2) build on previous GRA investments in research infrastructure, and 3) involve more than one partner university.

These grants typically cover costs of new equipment and lab renovation necessary to carry out the proposed R&D work. In fiscal year 2012, GRA awarded five grants in amounts ranging from \$100,000 - \$300,000.

### Core Labs and Equipment

This program is a complement to GRA's Eminent Scholar and Distinguished Investigator Programs. GRA makes grants to fund equipment purchases and infrastructure costs as part of a recruitment or retention package. The grant funds are used to purchase specialized equipment, outfit or renovate laboratories, and construct research centers. In fiscal year 2012, GRA awarded one grant for \$150,000.

### VentureLab

GRA launched the VentureLab Program in 2002 in an effort to facilitate the formation of companies around university-based technology. The program has two goals: 1) to move university-based technologies out of the lab and into commercial markets and 2) to grow university-based start-up companies in Georgia to create a vibrant industrial base and high-quality jobs.

VentureLab directors at each of the six universities identify technologies and intellectual property developed at the university that can potentially be commercialized through the creation of a start-up company. The directors submit funding proposals for consideration by a team of VentureLab directors and GRA staff, and an external advisory committee.

Approved projects generally enter the VentureLab program at one of two funding phases described below. Participation in Phase III generally requires previous receipt of Phase I or Phase II funding. Each phase is designed to progress into the next and serves as a decision point for continued funding.

- **Phase I** – GRA awards grants of up to \$50,000 to universities to establish proof of concept and study the feasibility of forming a company. In fiscal year 2012, GRA awarded 40 grants totaling \$1,089,320 to its university partners.
- **Phase II** – GRA awards grants of up to \$100,000 to universities for costs related to developing a prototype. GRA requires one-to-one matching

*Technology transfer offices are university offices that assist researchers in patenting, licensing, and marketing intellectual property.*

funds to demonstrate external market validation. In fiscal year 2012, GRA awarded 17 grants totaling \$810,875 to its university partners.

- **Phase III** – Through the Seed Capital Fund of the Advanced Technology Development Center (ATDC), GRA awards loans of up to \$250,000 in debt financing to private companies to provide needed financial support while they seek outside investments and work toward profitability. Companies must have received a Phase I or II grant and be formed from a university-based technology or intellectual property. In fiscal year 2012, GRA awarded eight loans totaling \$1,446,125 to private companies.

Beginning in 2009, GRA began dividing the maximum grant amounts for each phase into smaller grants, requiring that universities meet project milestones before receiving any subsequent grant funds. This milestone-based approach ensures that projects remain on track and minimizes GRA's investments in the event a project falls off track and is subsequently terminated.

### Discontinued Initiatives

GRA started several other R&D and commercialization initiatives over the years that have been discontinued either due to budget cuts or because they did not produce the desired results.

- *Technology Partnerships* began in 2005 as a way to encourage private companies to enter into contracts with GRA's partner universities for research services. The private company could make an annual investment that was matched by GRA. According to GRA officials, the initial awards did not stimulate future contracts and the initiative was ultimately discontinued in 2009. Between fiscal years 2005 and 2009, 49 companies received 78 grants ranging from approximately \$11,400 to \$250,000.
- *Business Incubators* received funds to purchase shared equipment and outfit business incubator space. Business incubators provide on-campus office and lab space for start-up companies based at GSU, UGA, Emory, GHSU, and GaTech. GRA grants were used to build and equip these university-owned spaces. Between fiscal years 2000 and 2009 each incubator received multiple awards, the total value of which ranged from \$35,000 to \$6.5 million.
- *Vaccine Initiative/Collaboration* was an effort to enhance Georgia's R&D and commercial potential in vaccines and therapeutics. The initiative began in fiscal year 2008 when GRA was appropriated an additional \$10 million in state funds to create more Eminent Scholar chairs and Distinguished Investigator designations and to make R&D infrastructure purchases in collaboration with the Centers for Disease Control and Prevention and the National Institutes of Health (NIH). In fiscal year 2009, the funding was reduced to \$5 million, and by fiscal year 2011 the entire program was eliminated due to state budget cuts.

## Other GRA-related Activities

### GRA Venture Fund, LLC

*ATDC's Seed Capital Fund also has the authority to make loans, which it does on behalf of GRA in the form of VentureLab Phase III loans.*

Companies that successfully complete VentureLab may be considered for subsequent investment by the GRA Venture Fund, LLC (the Fund), a separate corporation funded largely by private investors. While investment decisions are the sole responsibility of the Fund's Board of Directors, GRA staff provide information on companies in its VentureLab portfolio and provide "back office" management for the Fund. Initial investments for the Fund included \$7.5 million from the State of Georgia made through ATDC's Seed Capital Fund, which is authorized by O.C.G.A. §10-10-4 to make equity contributions to investment entities. Private investors also participated to create a total fund of \$20 million.

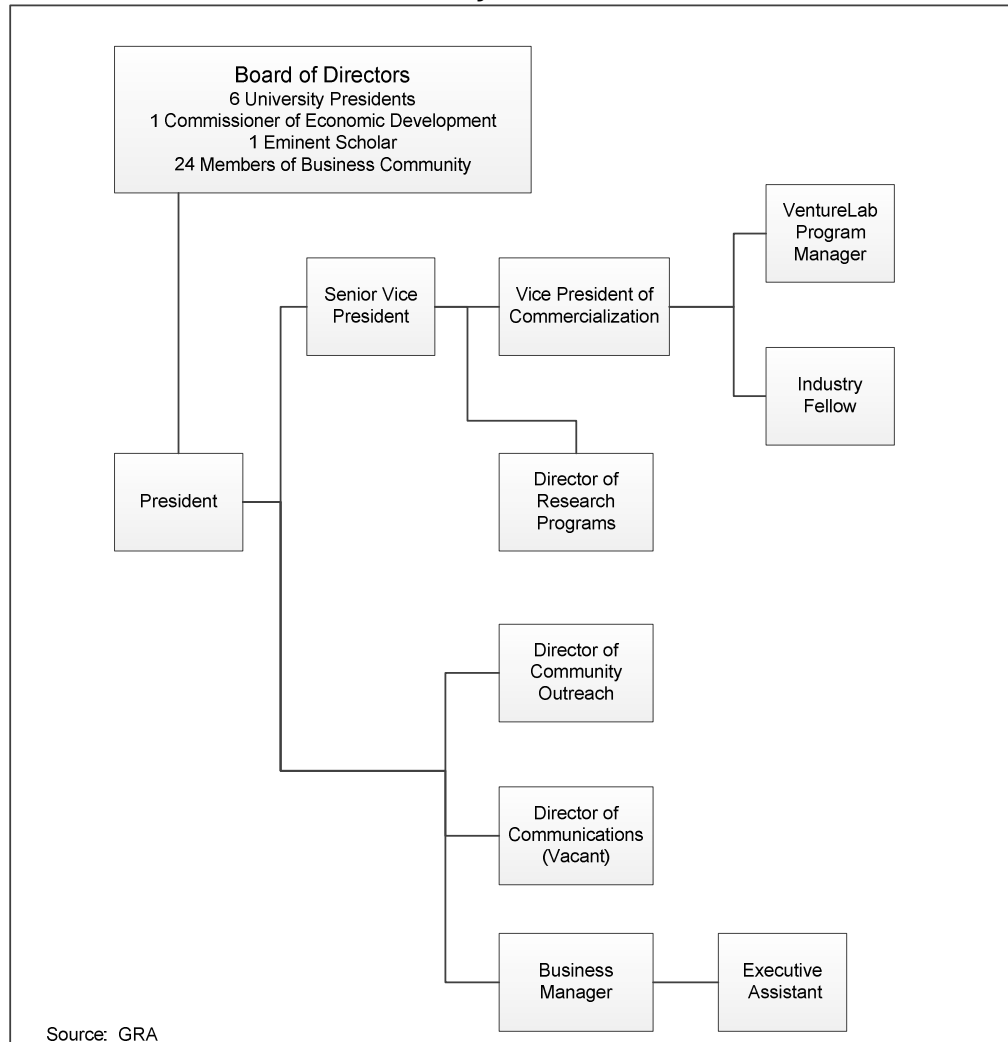
### Georgia Cancer Coalition

The Georgia Cancer Coalition (GCC) was created as a non-profit organization in 2002 in an effort to reduce the number of cancer-related deaths in Georgia. While GRA and the GCC had worked together for many years, each had operated as an independent entity with some overlapping programs. In an effort to align the state's economic development resources, GCC was formally integrated with GRA in January 2012 and became one of its major initiatives. GRA now maintains a separate operating budget and staff for its cancer-related programs.

## Organization and Staffing

In July 2011, GRA entered into a contract with the Georgia Department of Economic Development (GDEcD) to conduct economic development activities including but not limited to supporting Georgia-based companies and university research. GRA remains an independent, non-profit organization under the oversight of a separate 32-member Board of Trustees whose members include the presidents of the six partner universities, the GDEcD Commissioner, an Eminent Scholar, and members of the business community. As shown in **Exhibit 2**, GRA employs nine full-time staff, including a president and two vice-presidents, five professional staff, and an administrative assistant. Four of GRA's staff positions are loaned from the University System of Georgia. In addition to its full-time staff, GRA also employs an industry fellow.

## Exhibit 2 GRA's Activities are Conducted by Nine Full-time Staff



### GRA's Program Model Compared to Other States

GRA's core initiatives – Eminent Scholars, Core Labs and Equipment, Matching R&D, and VentureLab – are geared toward the development and commercialization of innovative discoveries through the state's research universities. GRA's commercialization initiative, VentureLab, focuses on companies in the early stages of development. For start-up companies, the early stages are commonly referred to as the "valley of death" because companies often have not generated sufficient capital to sustain their operations. Companies in the "valley of death" may require years before they are able to show measurable growth and financial stability.

Exhibit 3 summarizes the R&D and commercialization activities managed by entities similar to GRA in six states, including four states identified by GRA as peers (Maryland, North Carolina, Ohio, Pennsylvania) and two states (Kentucky and Utah) viewed by the State Science and Technology Institute as having a structure

similar to Georgia. As the exhibit shows, all six states provide assistance to move university-based research into the marketplace. However, unlike Georgia, all six also work directly with established companies to commercialize technology. Four of the six states provide funding for equipment and infrastructure and only two have programs dedicated to the recruitment of highly skilled research faculty.

Like GRA, these entities are generally sub-units of the state's Department of Economic Development. In addition, services provided by these entities are among the many economic development tools used to create and attract companies to the state, as is the case in Georgia. A mixture of tax incentives, venture capital, and community development initiatives are often used in tandem with GRA-type technology commercialization grants to create and attract businesses.

**Exhibit 3**  
**Research and Development and Commercialization Efforts in Other States**

Program Design	Funded Activities	GA	MD	NC	OH	PA	UT	KY
<b>University Specific</b>	Technology Transfer	✓	✓	✓	✓	✓	✓	✓
	Equipment & Infrastructure	✓	X	✓	✓	✓	✓	X
	Faculty Recruitment	✓	X	✓	X	X	✓	X
<b>Non-University Specific</b>	Technology Transfer	X	✓	✓	✓	✓	✓	✓
	Equipment & Infrastructure	X	X	X	✓	✓	X	X
	Venture Capital (state funded)	✓	✓	✓	✓	✓	N/A	✓
	K-12 Specific Programs	X	X	✓	X	X	X	✓
	City/Region Specific Programs	X	✓	X	X	✓	N/A	N/A
<b>Office Structure</b>	Governed as a State entity <sup>1</sup>	X	✓	X	✓	✓	✓	✓/ X

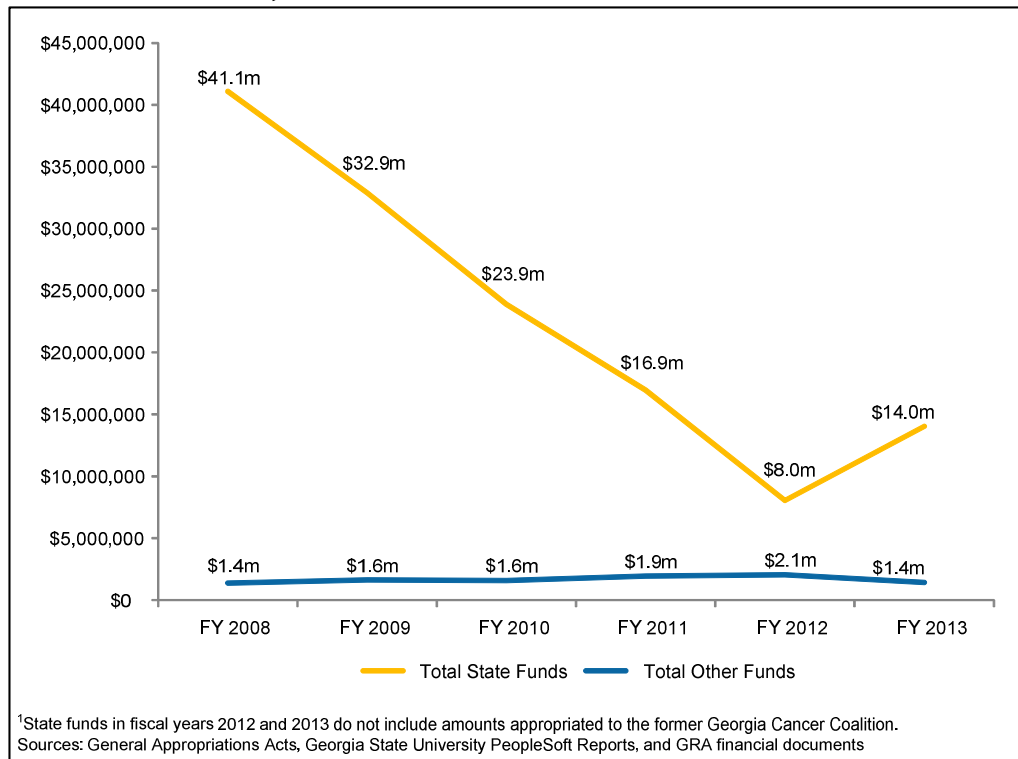
<sup>1</sup>Kentucky's programs are managed by a mix of both state and non-profit entities.  
Source: Review of other state's websites and interviews with other state officials

## Requested Information

### How is GRA funded? What activities or projects are financed with appropriated state funds?

Since its inception, GRA has received state funds totaling \$565 million.<sup>3</sup> However, GRA’s state funds have decreased over time. **Exhibit 4** shows the decrease in state funds since fiscal year 2008. Despite the decrease, the majority of GRA’s revenues are still from state funds.

**Exhibit 4**  
**GRA’s State Funds, FY 2008-2013<sup>1</sup>**



As shown in **Exhibit 5**, GRA’s core initiatives were almost equally funded from state general funds and general obligation (GO) bond authorizations in fiscal year 2011. In fiscal year 2012, an additional \$7.7 million in state funds was included in GRA’s budget for the former Georgia Cancer Coalition.

Other funding sources accounted for approximately 10% and 11% of GRA’s total revenues in fiscal years 2011 and 2012, respectively. These sources include contributions from university foundations, private foundations and corporations, and investment income. GRA also benefits from services provided by industry professionals who assist in assessing proposals submitted to GRA for consideration, commercialization of university research, strategic planning, and other special

<sup>3</sup> This excludes amounts designated for the former Georgia Cancer Coalition added to GRA’s budget in fiscal years 2012 and 2013.

projects directed by GRA. In fiscal years 2011 and 2012, in-kind services GRA received were assessed a total fair market value of \$146,934. GRA estimates it will raise approximately \$1.4 million in other revenues for fiscal year 2013, excluding in-kind services.

**Exhibit 5**  
**State Funds Account for the Majority of GRA's Budget, FY 2011-2013**

<b>Fund Sources</b>	<b>FY 2011</b>	<b>FY 2012</b>	<b>FY 2013</b>
<b>State Funds<sup>1</sup></b>			
GRA Core Initiatives			
General Funds	\$8,444,319 <sup>2</sup>	\$4,412,300	\$6,028,300
Eminent Scholar Trust Fund	-	1,529,315	-
GDEcD Contract	-	139,228	-
Total General Funds	\$8,444,319	\$6,080,843	\$6,028,300
GO Bonds <sup>3</sup>	<u>8,500,000</u>	<u>3,000,000</u>	<u>8,000,000</u>
<i>GRA Core Subtotal</i>	<i>\$16,944,319</i>	<i>\$9,080,843</i>	<i>\$14,028,300</i>
GCC Programs			
Tobacco Settlement Funds	-	7,694,624 <sup>4</sup>	6,837,444
<b>Total State Funds</b>	<b><u>\$16,944,319</u></b>	<b><u>\$16,775,467</u></b>	<b><u>\$20,865,744</u></b>
<b>Other Funds</b>			
Other <sup>5</sup>	1,934,431	2,057,440	1,435,000
<b>Total Funds</b>			
Total GRA Core and GCC <sup>6</sup>	<b><u>\$18,878,750</u></b>	<b><u>\$18,832,907</u></b>	<b><u>\$22,300,744</u></b>
<b>GRA Fund Balance<sup>7</sup></b>			
Unrestricted	\$2,884,754	\$2,733,274	NA
Restricted	<u>1,136,771</u>	<u>929,939</u>	NA
Total Fund Balance	<b><u>\$4,021,525</u></b>	<b><u>\$3,663,213</u></b>	NA
<sup>1</sup> Amounts shown are for management information purposes and may not agree with amounts as shown in audited financial statements. <sup>2</sup> Figure shown is unaudited and based on the amount appropriated for GRA's purposes. <sup>3</sup> Figures refer to the amount authorized in that year. Bonds may be issued or used in subsequent years. <sup>4</sup> Figure represents \$7,668,946 appropriated for GCC's purposes plus \$25,678 deferred from FY11. <sup>5</sup> Other funds include foundation grants and other revenues raised by GRA. Figures shown for fiscal years 2011 and 2012 are audited revenues. Figure shown for fiscal year 2013 is an estimate based on GRA's private fund raising goal. Figures reported in fiscal years 2011-2013 do not include in-kind services. <sup>6</sup> GCC received state funds in fiscal year 2011, but was not a part of GRA at the time. <sup>7</sup> Reported fund balance is from audited financial statements. The fund balance may include funds from sources other than state funds.			
Source: GRA financial audit for fiscal year 2012, State General Appropriations Acts, and GRA budget documents			

Any balance of state funds remaining at the end of the year can be retained by GRA. With the exception of funds designated for Eminent Scholars, any remaining funds

are added to GRA's fund balance or deferred for use in subsequent fiscal years. As shown in **Exhibit 5**, GRA's fund balance was approximately \$3.7 million as of June 30, 2012. According to GRA officials, \$2.7 million is unrestricted from private sources (\$1.5 million of which is designated for a reserve fund; \$500,000 is designated for special initiatives; and \$733,000 is for GRA operations) and approximately \$1 million is restricted for other purposes. In addition, GRA deferred approximately \$1.05 million of state general funds received in fiscal year 2012 for VentureLab awards made in fiscal year 2013.

Unspent funds originally designated for the purpose of recruiting Eminent Scholars to Georgia are deposited into the Georgia Eminent Scholars Endowment Trust Fund managed by the Board of Regents and are, therefore, not reflected in **Exhibit 5**. The funds are to be used exclusively to endow academic chairs in an effort to attract scholars to the six research universities. Once a scholar has been identified and approved for hire, all principal and interest are transferred to the hiring university. As of November 30, 2012, the fund held a market value of approximately \$770,000 for endowments associated with GRA's Eminent Scholar Program.

### Funding process

Prior to fiscal year 2012, state general funds designated for GRA's purposes were appropriated to BOR's Research Consortium. The Research Consortium directed funds allocated for GRA to Georgia State University, which distributed the funds to award recipients at GRA's request. New general obligation (GO) bonds authorized for GRA's initiatives related to the funding of equipment and R&D infrastructure at the six research universities were also appropriated to BOR. Beginning fiscal year 2012, state general funds designated for GRA's purposes were appropriated to the Department of Economic Development (GDEcD). GDEcD contracts with GRA to conduct research and development and commercialization activities and remits contract funds to GRA in 12 equal installments. New bonds authorized for GRA's purposes are still appropriated to BOR.

### Bonds

The General Assembly authorizes new GO bonds for GRA's purposes each year as part of BOR's budget. Although the specificity of authorizing legislation varies from year to year, the purpose of the bonds is related to *the purchase of equipment and research and development infrastructure*. In preparation for bond issuance, university research administrators create lists of their institutions' infrastructure needs, which may include specialized equipment, lab outfitting, or renovation for new Eminent Scholars and other key researchers; equipment and/or lab infrastructure for new R&D programs; and equipment identified as having important industry relevance. GRA, in consultation with the research administrators and university presidents, creates a single prioritized list of projects to be funded, depending on the amount of bond funds available.

Once bond proceeds become available, GRA issues an "intent to award" notice that notifies the university of its intent to make an award for a specific approved project. Before GRA issues a final award letter, the university must submit a copy of the purchase order to GRA as an indication that it is ready to move forward with the project. Bond proceeds are disbursed on a reimbursement basis, so the universities must make their purchases up front and are reimbursed by the Georgia State Finance and Investment Commission (GSFIC) once the equipment and/or services have been



received and inspected. Most funded projects have a long lead time so, according to GRA officials, bond funds may not be issued or used in the year authorized. The time lag between authorization, bond issuance, and expenditures in fiscal years 2011, 2012, and the first half of 2013 is shown in Exhibit 6. GRA records indicate that all of the available bond funds in fiscal year 2013 have been designated for specific R&D projects. Because GO bonds issued for GRA projects are taxable, they are not subject to federal requirements for when the proceeds must be used.<sup>4</sup>

### Exhibit 6 GRA Bond Activity, FY 2011-2012 and Partial FY 2013

Summary of Activity	Fiscal Year 2011 (Actual)	Fiscal Year 2012 (Actual)	Fiscal Year 2013 <sup>1</sup> (July-Dec)
<b>Authorization<sup>2</sup></b>			
Prior Authorizations	-	\$6,000,000	-
New Authorizations	\$8,500,000	3,000,000	\$8,000,000
<b>Issuance and Usage</b>			
<b>Beginning Balance – Start of FY</b>	\$7,391,037	\$3,687,589	\$7,335,881
Total Issuances	2,500,000	9,000,000	8,000,000
<b>Subtotal</b>	<b><u>\$9,891,037</u></b>	<b><u>\$12,687,589</u></b>	<b><u>\$15,335,881</u></b>
Expenditures	\$6,203,448	\$5,351,708	\$5,554,490
<b>Ending Balance</b>	<b><u>\$3,687,589</u></b>	<b><u>\$7,335,881</u></b>	<b><u>\$9,781,391</u></b>

<sup>1</sup>Fiscal Year 2013 issuances and expenditures are as of December 2012.  
<sup>2</sup>Authorization refers to approval given by the General Assembly to issue bonds in a given fiscal year. The bonds may be issued and expended later, sometimes in subsequent fiscal years. All bonds authorized for GRA's purposes have a 5-year maturity date.  
Source: GSFIC records

#### Use of State Funds

State general funds are used to fund GRA's core initiatives and program administrative expenses. As shown in Exhibit 7, 85% and 72% of GRA's state general funds expended in fiscal years 2011 to 2012, respectively, were used to cover costs associated with R&D and commercialization activities. The remaining general funds were used to cover administrative costs, including salaries and benefits for the four staff on loan from USG institutions, marketing activities, and sponsorships. A portion of general funds was also used to cover approximately \$241,000 and \$262,000 of expenses resulting from GRA's management of the GRA Venture Fund in fiscal years 2011 and 2012, respectively.

<sup>4</sup> GRA projects are not tax-exempt and, therefore, are not restricted by federal requirements to spend 5% of bond proceeds within six months of issuance and 85% of proceeds within three years of issuance.

**Exhibit 7**  
**72% to 85% of State General Funds are Designated for GRA's Core Initiatives, FY 2011-2013**

Category	Fiscal Year 2011 Actual	Fiscal Year 2012 Actual	Fiscal Year 2013 Budgeted
<b>Revenue</b>			
State General Funds	\$8,444,319	\$6,080,843	\$6,028,300
<b>Expenditures</b>			
<b>Research and Development</b>			
Eminent Scholars	\$1,750,000	\$1,529,315	\$1,500,000
Core Labs and Equipment	-	-	-
Matching R & D	-	-	-
Other Talent	375,000	200,000	450,000
Eminent Scholar Challenge Grants	-	69,232	-
<i>Total R&amp;D</i>	<b>\$2,125,000</b>	<b>\$1,798,547</b>	<b>\$1,950,000</b>
<i>Percentage of Total</i>	<b>25%</b>	<b>36%</b>	<b>32%</b>
<b>Commercialization</b>			
VentureLab Grants	\$2,166,246	\$624,225	-
VentureLab Loans	2,627,881	1,170,894	-
Other Commercialization	232,020	22,000	-
<i>Total Commercialization</i>	<b>\$5,026,147</b>	<b>\$1,817,119</b>	<b>\$2,974,754<sup>1</sup></b>
<i>Percentage of Total</i>	<b>60%</b>	<b>36%</b>	<b>50%</b>
<b>Program Administration</b>			
Program Management	\$1,051,766	\$1,016,877	\$853,546
GRA Venture Fund	241,406	262,602	250,000
Other	-	139,228 <sup>2</sup>	-
<i>Total Program Administration</i>	<b>\$1,293,172</b>	<b>\$1,418,707</b>	<b>\$1,103,546</b>
<i>Percentage of Total</i>	<b>15%</b>	<b>28%</b>	<b>18%</b>
<b>Total</b>	<b>\$8,444,319</b>	<b>\$5,034,373</b>	<b>\$6,028,300</b>
<b>Deferred Revenue</b>	-	<b>\$1,046,470<sup>3</sup></b>	<b>NA</b>
<sup>1</sup> Detail on commercialization activities was not included in GRA's fiscal year 2013 budget. <sup>2</sup> Amount related to a contract with GDEcD to evaluate Centers for Innovation. <sup>3</sup> As stated in Note 1 of the June 30, 2012 audited financial statements, these funds were utilized by GRA subsequent to June 30, 2012. Source: GRA Financial tracking documents, GRA fiscal year 2013 budget, and General Appropriations Acts			

As shown in Exhibit 8, general obligation bonds authorized for GRA's purposes ranged from \$3 million to a high of \$8.5 million in the last three fiscal years. Exhibit 8 represents GRA's plans for how proceeds will be used by the year in which the bonds were authorized. Bond proceeds are used to cover the costs of capital assets for research and development. Capital assets include equipment and infrastructure to retain and recruit Eminent Scholars and other talent (i.e., Distinguished

Investigators and other key researchers) as well as other equipment and infrastructure important to the research and development activities of the universities.

### Exhibit 8

#### Planned Use for General Obligation Bonds Authorized in FY 2011-2013<sup>1</sup>

Category	Fiscal Year 2011	Fiscal Year 2012	Fiscal Year 2013
<b>New Bond Authorizations</b>			
<b>Total Authorizations</b>	<b>\$8,500,000</b>	<b>\$3,000,000</b>	<b>\$8,000,000</b>
<b>Designated Use of Bond Funds</b>			
Eminent Scholars	\$6,240,000	\$1,850,000	\$6,300,000
Other Talent	280,000	100,000	500,000
Core Labs and Equipment	880,000	150,000	-0-
Matching R&D	<u>1,100,000</u>	<u>900,000</u>	<u>1,200,000</u>
<b>Total R&amp;D</b>	<b>\$8,500,000</b>	<b>\$3,000,000</b>	<b>\$8,000,000</b>

<sup>1</sup>Figures represent GRA's plan for bond proceeds for the year the bonds were authorized. Bond funds may not be used in the year authorized.  
Source: GRA financial records

*GRA's Response:* Regarding its unspent bond balance, GRA notes that most of the bond balance has been encumbered, meaning purchase orders have been issued. However universities are often awaiting delivery, installation and certification of highly specialized equipment before using bond proceeds to pay vendors. The balances are cleared only after vendors are paid by GSFIC.

### What is the impact of GRA's state-funded programs and the effectiveness of GRA in increasing economic development in Georgia?

While GRA's strategies for increasing economic development in the state have changed over time, we found evidence that GRA's current initiatives have had a positive impact. However, a comprehensive assessment of the impact and effectiveness of these initiatives was partially hindered by a lack of complete historical performance data and the need to rely on self-reported data from surveys of participants conducted by GRA. It should be noted that in the past five years, GRA has improved its efforts to collect and track information related to the impact of Eminent Scholars and VentureLab programs. GRA also publishes an annual report of its accomplishments.

### Research and Development Activities

#### Research Expenditures

According to GRA, an important measure of the impact of its Eminent Scholars and Distinguished Investigators is their ability to attract additional investment by external, non-state funding sources. In addition, research expenditures are a widely accepted indicator of measuring the productivity of faculty and programs, according to the Center for Measuring University Performance at Arizona State University.

### **Limitations to Measuring Impact and Effectiveness**

Despite the state's significant investment in GRA of \$565 million since 1993, the state has not required reporting by GRA until recently. Only since fiscal year 2012 has GRA been required to report on its "use of state funds" as part of its contract with GDEcD. The contract, however, does not specify whether GRA is to report descriptive statistics of expenditures by activity or whether it should also report information on outcomes and impacts. GDEcD's fiscal year 2013 strategic plan includes goals and measurable objectives related to GRA's activities.

It should be noted that, for its own purposes, GRA publishes an annual report of its accomplishments. It also conducts annual surveys of Eminent Scholars and VentureLab participants on their activities. Surveys of Eminent Scholars began in 1998 and have evolved over time to rely less on self-reported data and more on information provided by university research offices. Surveys of VentureLab participants began in 2007 and primarily include self-reported data, although the information is not complete. Data provided to GRA by the research offices (on Eminent Scholars) and VentureLab participants served as the starting point for our analysis. The limitations associated with GRA's data and our analyses based on this data are detailed below:

- We did not verify the accuracy of data reported to GRA through surveys of Eminent Scholars, university research offices (on Eminent scholars), and VentureLab companies. As a result, the accuracy of the data reported is unknown.
- Our assessment of the impact of GRA's research and development efforts was limited because GRA has not established a formal mechanism for tracking activities related to its investments of approximately \$187 million since 2000 in laboratory equipment and infrastructure through its Core Labs and Equipment and Matching R&D initiatives. As a result, we were able to provide only some anecdotal information on how these expenditures have been used. According to GRA officials, past efforts to track activities associated with its investments in lab equipment and infrastructure have been unsuccessful. They noted that, in 2003, a team of administrators representing GRA's university partners concluded that accurate data to demonstrate the measurable impact of GRA's investments in infrastructure cannot be provided because some of the equipment is widely used and the numbers would either be overstated or understated.
- Our assessment of the impact of GRA's commercialization efforts was limited because GRA does not have complete data on participants funded through the VentureLab Program. Data on this program from its inception in 2002 to 2007 was not maintained. Also, there was inconsistent participation in the surveys conducted in 2008, 2010, and 2011. The response rates during the survey periods ranged from a high of 83% (91 of 110) in 2008 to a low of 44% (88 of 201) in 2011. In addition, those participants in VentureLab who completed surveys are most likely to be associated with active ventures. As a result, we could not ensure that the results of our analyses are representative of all participants. According to GRA officials, there was very little to report in the early years of the VentureLab program because funded projects had not yet reached the point of forming companies and hiring employees. They also noted that companies and projects are aware that future grant funding and consideration for loans or GRA Venture Fund investment is contingent upon the annual submission of information to GRA.

While data collection efforts over the last five years have improved, GRA may wish to consider implementing methods that would improve the completeness of the data it collects and explore methods for collecting and validating information using third party sources. Continuing to improve the data it maintains should allow it to better assess its impact and the effectiveness of its initiatives.

Data obtained by GRA from the university research offices showed that 64 Eminent Scholars and their research teams (including Distinguished Investigators, other key researchers, and research centers led by the scholars<sup>5</sup>) expended approximately \$270 million in non-state research funding during fiscal year 2012. Of the total reported, approximately \$108 million was associated with the scholars themselves, with the remaining \$162 million resulting from the work of the scholars' teams and the research centers. In addition, according to the data reported by the research offices, these expenditures supported approximately 1,400 jobs, including faculty and post-doctoral appointments. Because the data provided by the research offices does not identify the sources of the non-state funds expended or the ultimate goals of the awarding entities, we were unable to determine the extent to which the funds were intended to 1) advance research in a particular area of need or 2) contribute to promising research that potentially could result in commercialization of research products, which is consistent with GRA's mission. However, investment by sources other than GRA suggests that the research conducted by scholars and their teams is deemed important by others.

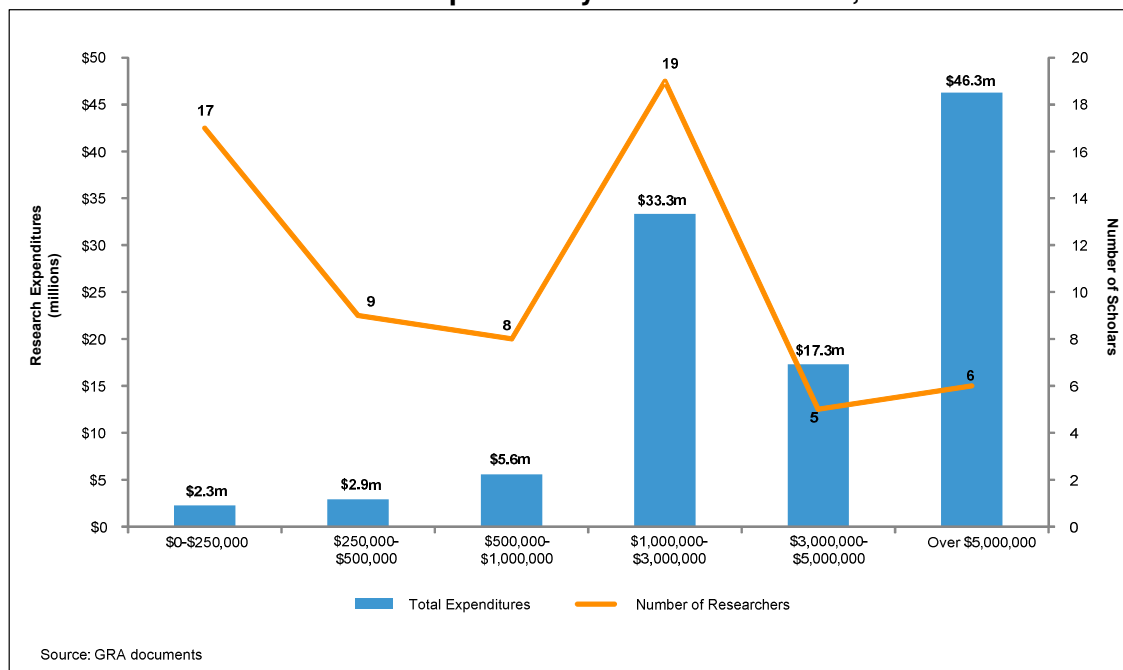
Our analysis of the survey data suggests that some Eminent Scholars have attracted significantly more investment than others. Of the approximately \$108 million in non-state funded research expenditures associated with the scholars themselves, \$46.3 million (43%) was associated with six scholars who expended more than \$5 million each in fiscal year 2012, as shown in Exhibit 9. An additional 24 scholars were reported as having non-state funded expenditures ranging from \$1 million to \$5 million and expended a total of \$50.6 million. The remaining 34 scholars had non-state funded expenditures of less than \$1 million, expending a total of \$10.8 million. It should be noted that five vacant chair positions in fiscal year 2012 may have limited the potential impact of total scholar research expenditures.

According to GRA, its investments in R&D helped to leverage some portion of external funding. While we were unable to determine from the surveys whether these expenditures included amounts leveraged with GRA funding, we were able to identify examples of projects in which significant investment by GRA helped to encourage additional investment by other funding sources. For example, according to GRA documents, GRA's investment of \$3.1 million helped GaTech leverage an additional \$5 million in multi-year awards from sponsors to upgrade a highly controlled laboratory and purchase and install an Electron Beam Nano-scale Lithography System. [Appendix C](#) includes additional examples of projects in which GRA funds were used to leverage additional investments.

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<sup>5</sup> According to GRA officials, these centers are generally led by Eminent Scholars who are largely responsible for the center's operations.

### Exhibit 9 Non-State Research Dollars Expended by Eminent Scholars, FY 2012



### Intellectual Property

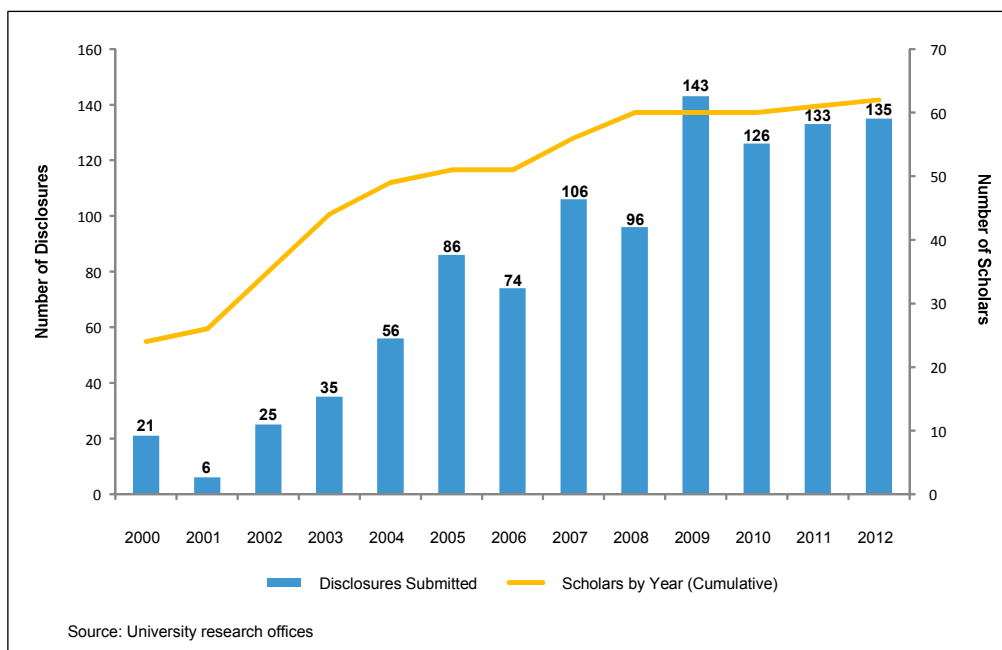
Based on information provided in response to our survey of five university research offices<sup>6</sup>, 112 of the 145 GRA-funded researchers (Eminent Scholars, Distinguished Investigators, and other researchers) were associated with 1,042 intellectual property disclosures, 1,207 patent applications, and 179 issued patents from 2000 to 2012. In addition, 254 commercial agreements based on issued patents were executed during this period.

**Intellectual Property Disclosures.** Our survey of research offices revealed that scholars, investigators, and other key researchers submitted 1,042 intellectual property disclosures to their university's technology transfer office between 2000 and 2012 as notification that they had created potentially patentable intellectual property.<sup>7</sup> As shown in Exhibit 10, the number of disclosures submitted since 2000 has increased, with significant spikes in 2005, 2007, and 2009. The overall increase reflects the increase in the number of scholars, investigators, and other key researchers over time and an increase in the number of disclosures at two universities – GaTech and UGA.

<sup>6</sup> To ensure confidentiality, we excluded Clark-Atlanta University because it houses only one GRA Eminent Scholar.

<sup>7</sup> Potentially patentable intellectual property created with university support must be disclosed to the university.

### Exhibit 10 Intellectual Property Disclosures and GRA Eminent Scholars, 2000-2011



**Patent Applications Filed.** According to the data provided by the university research offices, 1,207 patent applications related to the work of scholars, investigators, and other key researchers have been filed since 2000, ranging from 31 to 637 filings among the five universities.<sup>8</sup> As shown in Exhibit II, the number of patent applications filed increased steadily from 30 in 2000 to 155 in 2012. As with disclosures, GaTech and UGA accounted for more than 80% of patent applications filed. Including Emory University, the three institutions combined make up more than 90% of applications filed.

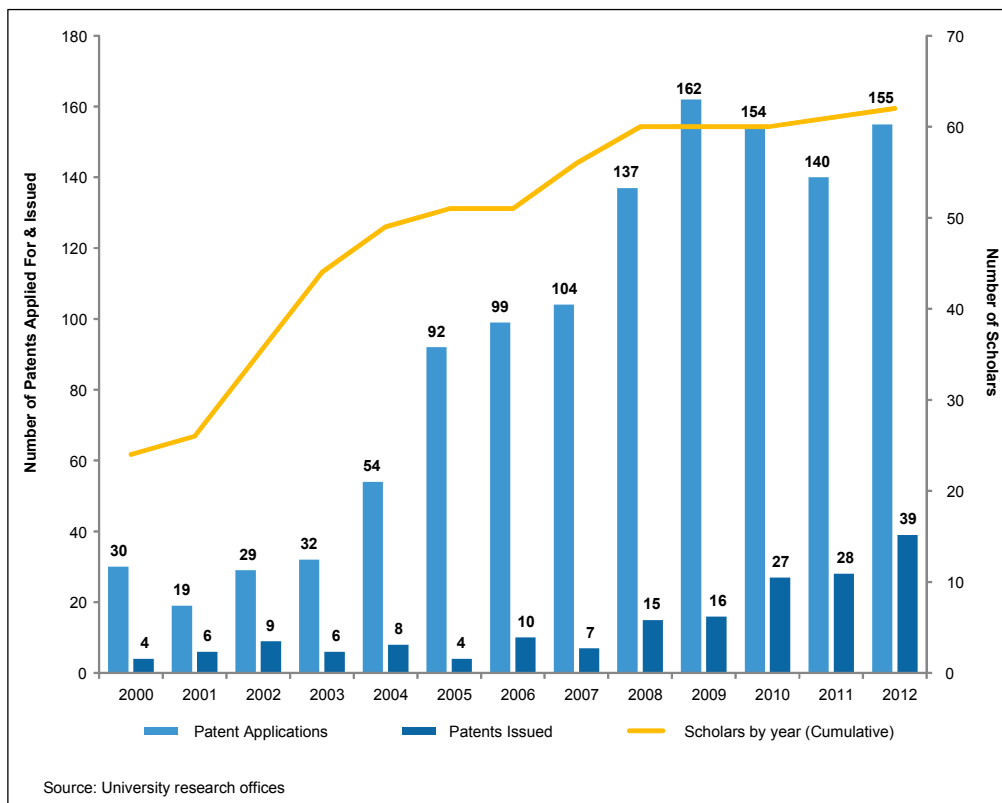
**Patents Issued.** University research offices reported that 179 patents were issued by the U.S. Patent and Trademark Office and patent offices in foreign countries during the 10-year period we reviewed. As shown in Exhibit II, the number of patents issued followed a similar trend, though patent issuances occurred on a much smaller scale and the annual increase in the number of patents was much more modest. GaTech and UGA were again largely responsible for the increase in patent activity, accounting for all but 20% of activity reported. The universities own the patents relating to scholar investigators, and other key researchers work.

It should be noted that the number of patents issued does not necessarily relate to patent applications filed in that year. According to staff of UGA's Research Foundation (UGARF), filing for a patent is a time-consuming and expensive process with time frames ranging from three to nine years from the point the invention is initially disclosed. For example, based on estimates provided by UGARF, patents issued in 2012 likely represented inventions that were initially disclosed between

<sup>8</sup> Figures include applications for provisional patents and other types of patent applications.

2003 and 2008. ([Appendix D](#) illustrates the patent process, including the length of time between various points in the process.)

### Exhibit 11 Patent Applications Filed, Patents Issued, and GRA Eminent Scholars, 2000-2011



**Licensing and option agreements.** According to the university research offices, 254 licensing and option agreements related to the research of Eminent Scholars, investigators, and other key researchers have been established since 2000. As discussed in more detail later in the report, because the sponsoring universities own the patents relating to the work of these individuals, they receive any revenues resulting from the licensing agreements. As shown in [Exhibit 12](#), licensing agreements have generated approximately \$6.1 million in gross revenues for their respective universities. It should be noted that the licensing agreements have the potential to generate additional revenue if the technology underlying the licensing agreement becomes a commercial success. However, it is also possible that the licensing agreements do not result in any more additional revenue.



**Exhibit 12**  
**Licensing Agreements Generated Approximately \$6.1 million in Gross Revenues, 2000-2012**

Sponsoring Institution	Gross Revenue
Emory University	\$4,110,846
University of Georgia	\$1,195,501
Georgia Health Sciences University	\$376,756
Georgia Institute of Technology	\$289,581
Georgia State University	\$115,632
<b>Total</b>	<b><u>\$6,088,316</u></b>

Source: University research offices

We identified examples of specific projects that have generated patent activity and related commercial agreements. For instance, scientists at UGA's Complex Carbohydrate Research Center, which is the recipient of several GRA awards totaling approximately \$9 million, made discoveries that have resulted in 27 issued U.S. patents, according to information provided by a UGA representative. In addition, a total of 36 commercial agreements based on those patents were executed in fiscal years 2000-2012, with more agreements currently being negotiated.

## Commercialization Activities

### Status of VentureLab Participants

Using GRA's VentureLab surveys, financial records, and annual reports, we compiled a list of 201 known participants funded through VentureLab from 2003 to 2011.<sup>9</sup> It should be noted that due to GRA's recordkeeping practices in the early years (2003-2006) of the VentureLab Program, performance of projects that received VentureLab awards were not consistently tracked. As a result, some participants may not be included in our analysis. (See [Appendix E](#) for a complete listing of the 201 known participants we identified as having received funding through VentureLab from 2003 to 2011.)

*Participants were considered active if they had employees in 2011, filed tax returns in 2011, filed withholdings in 2012, or completed a VentureLab survey in 2011.*

Based on our review of VentureLab surveys and business information obtained from the Department of Labor (DOL), and Department of Revenue (DOR), we found that 50% (101) of the 201 known participants in VentureLab were actively doing business in Georgia or in the process of starting a business at the end of calendar year 2011, as shown in [Exhibit 13](#). Of the remaining 100 participants, we found evidence to indicate that 30 (15%) were inactive and 70 (35%) had no evidence to indicate they were active in Georgia in 2011.

<sup>9</sup> We excluded participants initially funded in 2012 because it is too early to see the results.

**Exhibit 13**  
**Number of Known Participants by Last Phase of Funding Received, 2003-2011**

Last Phase Awarded	Active	Not Active	No Evidence of Activity	Total	Total Funding
Phase 0 <sup>1</sup>			4	4	\$38,500
Phase I	37	19	56	12	\$5,325,083
Phase II	32	7	8	47	\$5,068,011
Phase III	31	3	1	35	\$12,406,652
TP/O <sup>2</sup>	<u>1</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>\$225,000</u>
<b>Total</b>	<u>101 (50%)</u>	<u>30 (15%)</u>	<u>70 (35%)</u>	<u>201</u>	<u>\$23,063,246</u>

<sup>1</sup> From 2006 to 2009, GRA issued grants referred to as Phase 0 for very early stage projects; however, GRA determined it was not effective and it was discontinued.

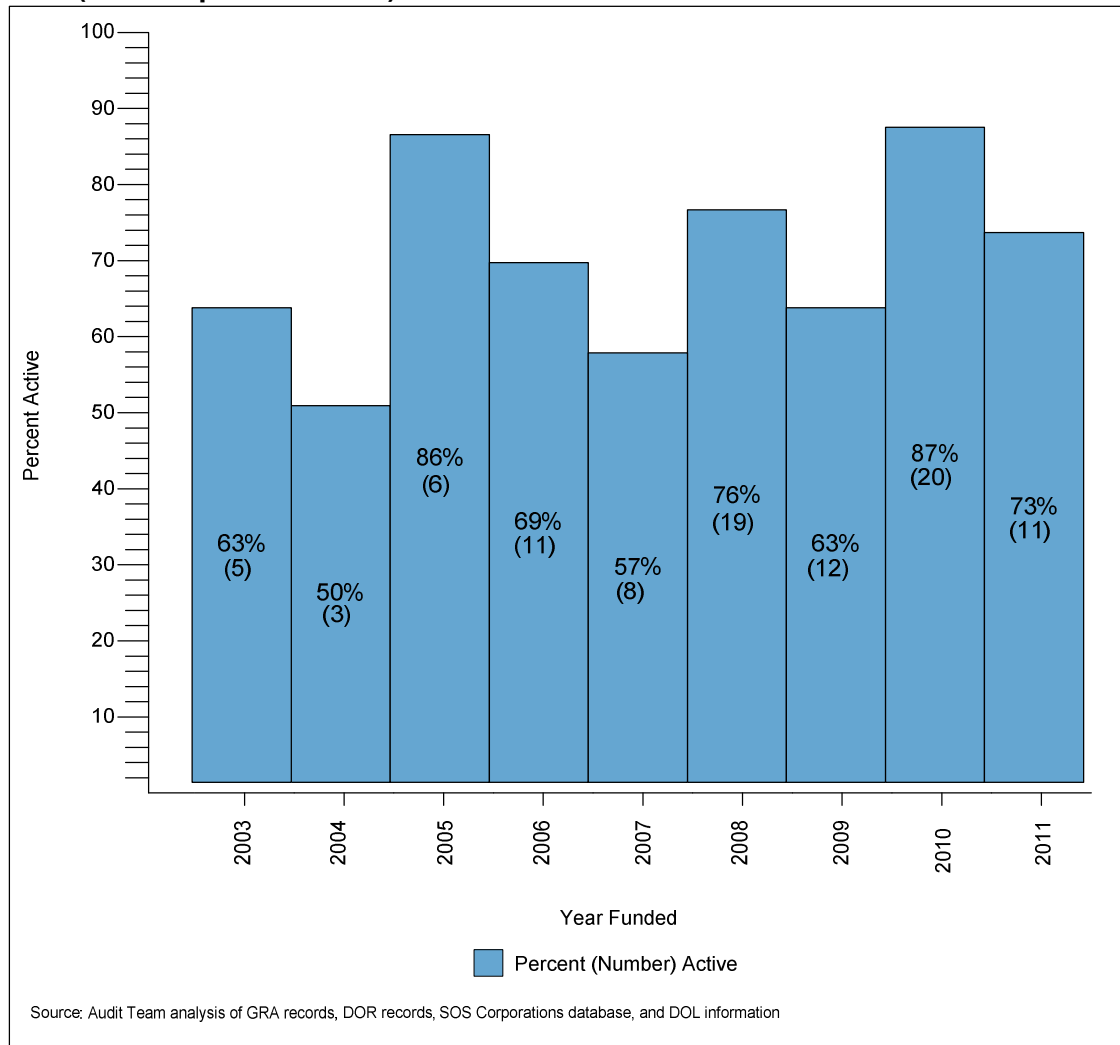
<sup>2</sup> Refers to VentureLab companies that also received Technology Partnership or other commercialization funding.

Source: GRA Records and Review Team Analysis

Of the \$23 million invested in the 201 known VentureLab participants from 2003 to 2011, the 101 active participants accounted for 71% (\$16.4 million) of the total while the remaining 29% of funding (\$6.6 million) was awarded to the 100 participants we identified as inactive/no evidence of activity. Of the \$6.6 million, \$875,000 was in the form of Phase III loans awarded to four participants. Our review of GRA's documents found that it converted loans made to three participants totaling \$750,000 into equity, meaning that GRA converted debt to a share of ownership in the participants' companies.

Based on our review of business information obtained from DOL and DOR, we determined that 133 of the 201 known participants funded through VentureLab between 2003 and 2011 are companies. Ninety-five (71%) of these companies, which had been funded one to nine years prior, were actively doing business in Georgia as of September 2012. Exhibit 14 shows the percentage of active VentureLab companies according to the year in which they received initial funding. For example, 63% (5) of the companies funded in 2003 were still active nine years later and 87% (20) of the companies funded in 2010 were still active two years later.

**Exhibit 14**  
**Percent and Number of Active VentureLab Companies Funded from 2003 to 2011 (as of September 2012)**



## Economic Impact Analysis of VentureLab Companies

*A multiplier analysis, which is an accepted method of studying economic impact, seeks to measure the relationship between an initial increase in spending in one sector of the economy, such as GRA's investment in start-up companies, and the total increase in spending and income that results from that initial increase. Technically, a multiplier is a number used to multiply an initial increase in spending to estimate by how much total spending will increase. Multipliers may measure total changes in output (e.g., VentureLab company revenues), income, employment, or value added (includes employee compensation, proprietary income, other proprietor income, and indirect business taxes).*

According to an economic impact analysis conducted by Georgia State University's Fiscal Research Center (FRC) at our request, 59 of the 133 VentureLab companies contributed an estimated \$50 million to Georgia's economy in calendar year 2011. The analysis was based on IMPLAN modeling software, which allows the estimation of the multiplier effects of a \$1 change in output by one industry on all other industries within Georgia.

Based on data obtained from DOL and self-reported revenue data obtained from GRA's VentureLab

surveys, we found that the 59 companies paid wages of \$21.7 million and reported revenues of \$18.6 million in 2011. Using this data, FRC's analysis found that the wages and revenue generated by these firms in 2011 supported a total of 389 jobs statewide, with a total statewide impact of roughly \$50 million, as shown in Exhibit 15. As shown in the exhibit, FRC conducted the same analysis for 2010. (A complete discussion of the methodology used in our analysis is provided in [Appendix A](#).)

### Exhibit 15 Economic Impact of 59 VentureLab Companies on Georgia's Economy, 2010-2011

Activity	2010	2011
Direct Jobs	118	131
Total Jobs	348	389
Output	\$43,587,399	\$50,016,158

Source: Fiscal Research Center and IMPLAN

According to Fiscal Research Center staff, this analysis is a relatively standard use of the IMPLAN model. However, because the companies being analyzed are considered start-ups, the results of the analysis have the following limitations:

- All revenue figures were self-reported and companies may have an incentive to either over- or under-report revenue. Because the estimated economic impacts reported by the model are dependent on the accuracy of the self-reported revenue, the results should be viewed with caution.
- Because revenue figures are not reported for all active VentureLab companies, induced effects (changes in statewide spending resulting from the additional wages generated from other business sectors being spent throughout the economy) account for a large part of the total economic impact and employment generated by the model. However, because induced effects are not industry-specific, any source of additional wages in the same

amount (other than VentureLab companies) paid to residents of the state would generate the same induced effects in the model.

### Employment Activity of VentureLab Companies

Based on our review of GRA's VentureLab surveys and employment information from DOL, 76 of the 95 surviving VentureLab companies reported 619 wage and salary jobs in 2011, less than one percent of total wage and salary employment in Georgia's economy. We could not determine the extent to which these jobs resulted from the companies' participation in VentureLab. In addition, there are indications that a small number of jobs existed for a small number of companies prior to receiving initial funding.<sup>10</sup>

It should be noted that while all 95 surviving companies reported employment data in at least one year from 2008 to 2011, 68 companies were missing one or more years of employment data over the four-year period.<sup>11</sup> In addition, the above employment figure does not make a distinction between full-time and part-time employees or contain independent contractors or temporary staff employed by the companies. As a result, total employment figures may be biased. This bias may be either positive or negative and the magnitude of the bias is unknown.

Overall, employment in the 95 companies doubled from 304 in 2008 to 619 in 2011, compared to a decrease of 6% in overall employment in Georgia during this same time period. To determine the extent to which individual companies experienced growth, we analyzed changes in the companies' employment from one year to the next. When companies had missing data in a given year, the companies were excluded from analysis. Of the active companies that reported employment information in each of the four years we reviewed, a little more than half of the companies experienced a positive change in employment, as shown in Exhibit 16.

We also analyzed employment data for the 27 companies for which employment data (including self-reported information) was available each year from 2008 to 2011. Our review found that the 27 companies experienced a 77% increase in employment from 221 in 2008 to 391 in 2011.

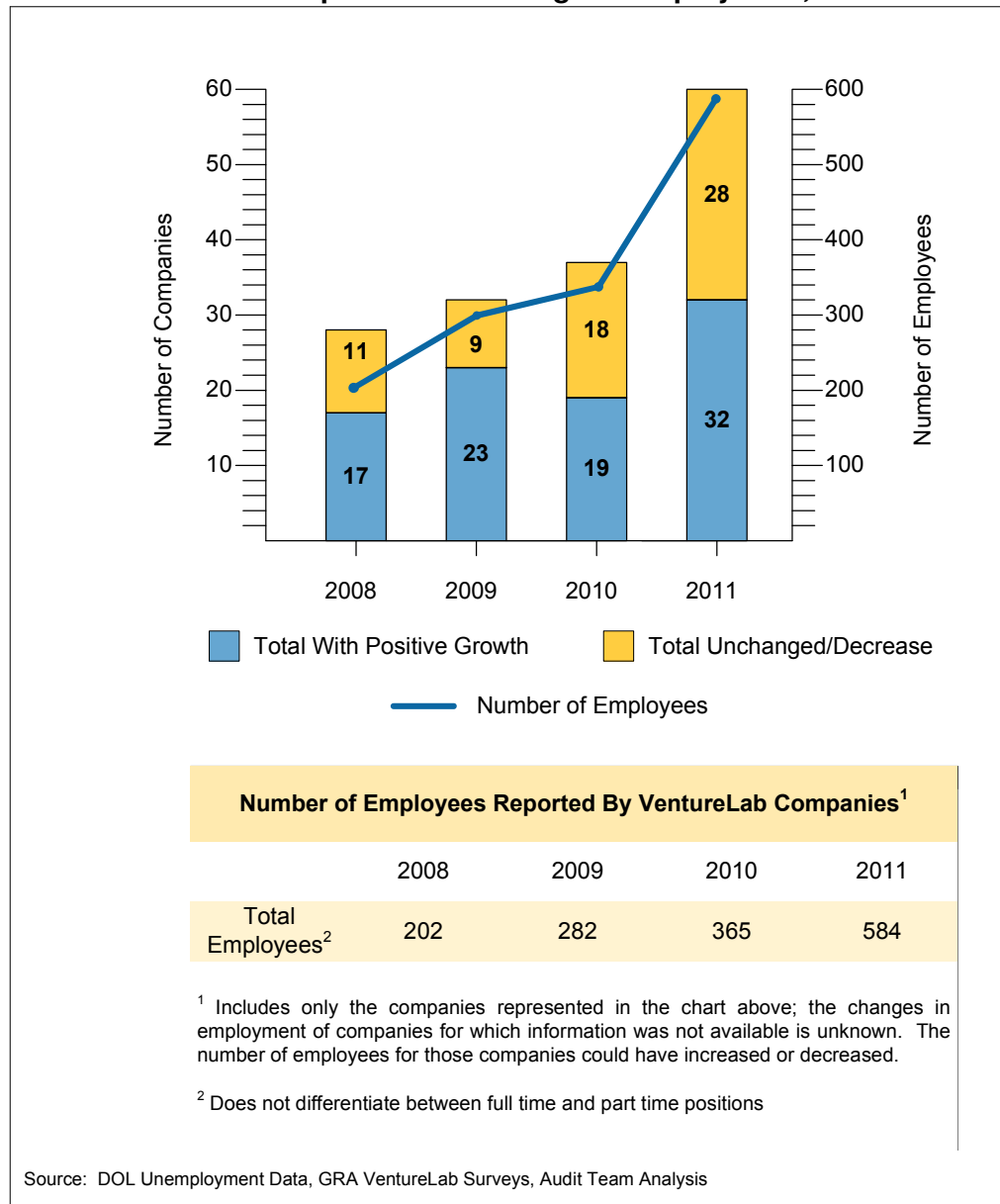
***GRA's Response:** GRA reports that the majority of VentureLab companies would not exist were it not for this program. Many faculty members are not aware of the commercial potential of their technologies-it takes VentureLab/university staff to uncover potential market applications. And most of the projects are so early stage and high-risk when VentureLab gets involved, they could not attract seed funding from other sources.*

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<sup>10</sup> Based on our limited assessment of available employment data, we identified approximately 47 jobs associated with 13 VentureLab companies prior to their entry into VentureLab (based on the first year they received funding), an average of 3.6 jobs per company.

<sup>11</sup> Missing data may be due to companies falling below the threshold for reporting employment data to DOL or companies not completing a VentureLab survey.

**Exhibit 16  
Number of Active Companies and Change in Employment, 2008-2011**



**Wages Paid by VentureLab Companies**

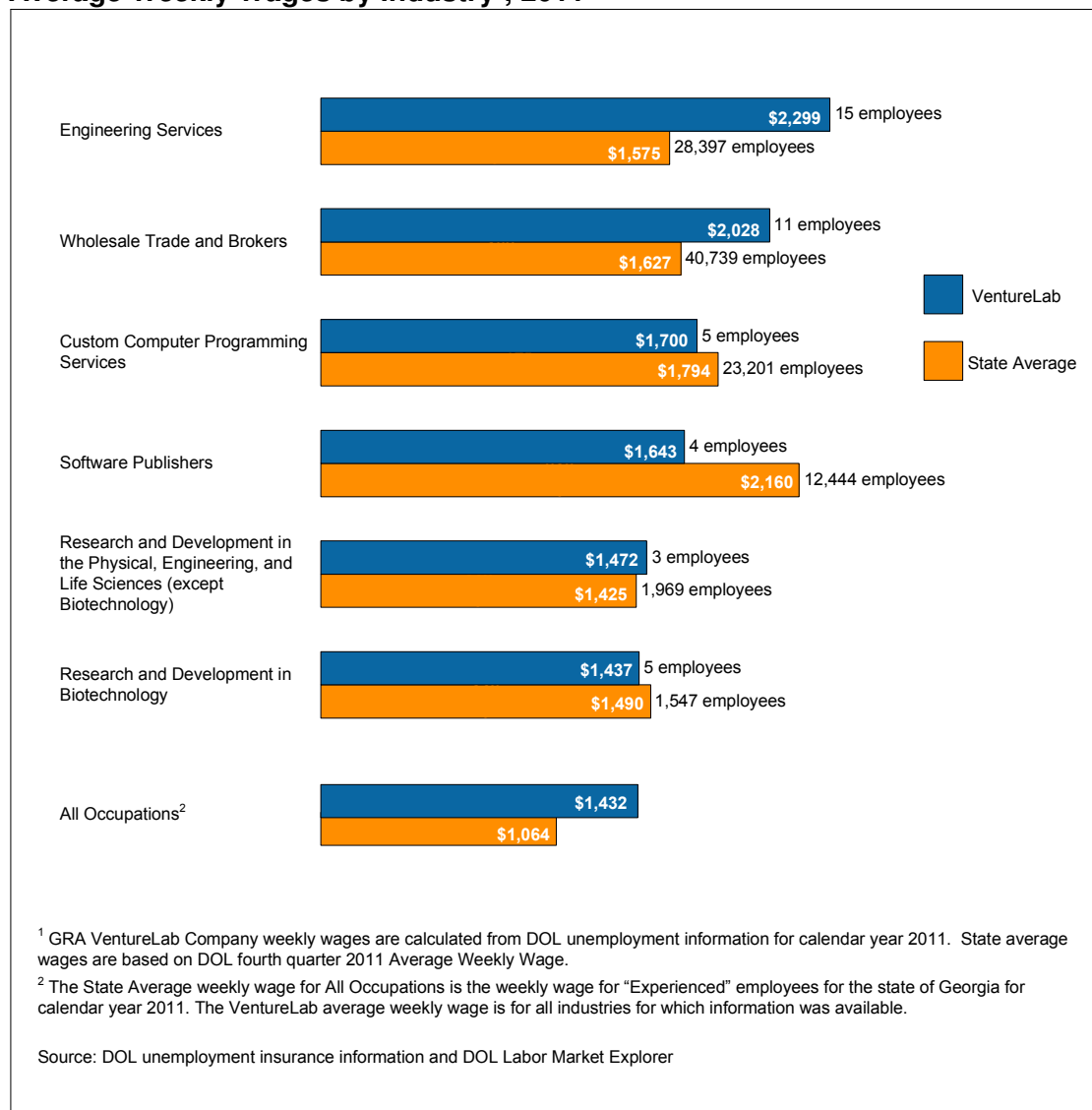
Our analysis of 2011 quarterly wage information on 63 surviving VentureLab companies for which data were available from DOL found that employees of these companies earned average weekly wages of \$1,432. As shown in Exhibit 17, the average weekly wages varied by industry ranging from \$1,437 to \$2,299 in 2011.

For comparison purposes, we used DOL data to calculate the state’s overall average weekly wage and the average weekly wage of workers employed by companies in industries in which VentureLab companies are operating. Based on our analysis of

the DOL data, we found that the average weekly wage for all workers in Georgia was \$1,064, 26% lower than the average weekly wage paid by VentureLab companies.

Depending on the industry, some VentureLab companies paid higher wages and some paid lower wages than their industry average in Georgia. As Exhibit 16 shows, VentureLab companies classified as engineering services and wholesale trade and brokers paid higher weekly wages than all similarly classified businesses in the state. Conversely, companies classified as software publishers paid a lower weekly wage than the statewide industry average. Wages paid by VentureLab companies and all companies in the computer programming services and R&D industries were more comparable, with only slight differences between them.

**Exhibit 17**  
**Average Weekly Wages by Industry<sup>1</sup>, 2011**



*GRA's Response:* GRA stated that during the formative years of VentureLab, GRA and its universities jointly managed the program, and performance tracking on the relatively small number of projects and companies was generally in the form of anecdotal evidence rather than formal, written documentation. By 2008, VentureLab had grown to the point that GRA needed comprehensive oversight of the program, and a staff member was added to the GRA team. A database was created in 2008 which is carefully maintained, and records all state investments in the VentureLab Program (and its projects and companies) dating back to 2003, along with milestones and performance indicators for companies and projects that demonstrate high-growth potential. Companies and projects that do not have on-going operations, or have been deemed to be too high-risk to continue receiving GRA funding are generally not tracked by GRA (after funding is discontinued).

**How are the proceeds from successful GRA projects (patents, licensing fees, publication royalties, etc.) distributed? Is this consistent with similar organizations in other states?**

Despite its contribution to the research activities of Eminent Scholars and Distinguished Investigators, GRA does not receive any proceeds generated from the works of these individuals. Of the approximately \$39 million in state funds appropriated for GRA's purposes since fiscal year 2011, 61% (\$23.8 million) have been (or are planned to be) invested in R&D activities, including funding for Eminent Scholar endowments and laboratory equipment and infrastructure. However, according to the policies of GRA's partner universities, intellectual property created by university employees or non-employees (e.g., students) who made significant use of university resources is considered property of the university, and any associated income is typically distributed between the university and the inventors. As a result, GRA received none of the \$6.1 million in licensing revenue generated by the universities on the inventions of its Eminent Scholars, Distinguished Investigators, and other funded researchers from fiscal year 2000 to 2012.

Based on our review of the universities' revenue-sharing policies, revenues are first used to offset out-of-pocket expenses incurred by the university in applying for, obtaining, and defending a patent and in developing and negotiating license agreements during the life of the patent. As of fiscal year 2012, our survey of university research offices found that, in total, universities' expenses have exceeded licensing revenues by \$1.6 million. In the case of any remaining net revenue (revenue in excess of expenses related to protecting the invention), the net amount is to be shared between the inventor and the university. As shown in Exhibit 18, the universities follow the same general process for distributing the revenue: a portion goes to the inventor, a portion goes to the inventor's department/college, and a portion goes to the university or the research foundation. However, the manner in which revenue is distributed among these parties varies across universities. In addition, with the exception of GHSU, universities have a graduated system for distributing the revenue based on the amount of revenue generated.

There are opportunities for others to share in the proceeds generated from licensing activities. For example, according to UGA's policy, sponsored project agreements



(between the universities and project funders) often contain specific provisions with respect to ownership of intellectual property developed during the course of such work, in which case the terms of the sponsored project agreement shall establish ownership. In cases when the sponsored project agreement is silent on the matter, the university acquires all rights to the property. However, we were unable to determine the extent to which any of the licensing revenue generated by the institution was distributed to project sponsors.

**Exhibit 18**  
**Revenue is Distributed Among the Inventor and Various Units of the University**

University	Revenue <sup>1</sup>	Inventor	Inventor's Department	Inventor's College	University	Research Foundation
GaTech	\$0 to \$2,500	100%	-	-	-	-
	\$2,501 to \$500,000	33%	17%	-	-	50%
	\$500,001 to \$1,000,000	33%	27%	-	-	40%
	\$1,000,001 +	33%	40%	-	-	34%
UGA	\$0 to \$10,000	100%	-	-	-	-
	\$10,001+	25%	10%	-	-	55% <sup>2</sup>
GSU	\$0 to \$20,000	100%	-	-	-	-
	\$20,001+	33.33%	23.33%	10%	-	33.33%
Emory	\$0 to \$25,000	100%	-	-	-	-
	\$25,001 to \$3,999,999	33%	33%	10%	24%	-
	\$4,000,000+	25%	33%	17%	25%	-
GHSU	NA	35%	10%	-	35%	20%
CAU	\$0 to \$100,000	50%	10%	-	40% <sup>3</sup>	-
	\$100,001+	40%	15%	-	45% <sup>3</sup>	-

<sup>1</sup> Based on gross revenue.  
<sup>2</sup> According to UGA's policy, 15% goes to UGARF Operations and 40% goes to the UGARF Research Fund.  
<sup>3</sup> According to CAU's policy, 15% goes to Research and Sponsored Programs Division.

Source: University policies

Our review of revenue-sharing practices in six other states found that few require a stake in any licensing revenue generated by universities. Based on information we obtained from representatives in Maryland, North Carolina, Ohio, Pennsylvania, Kentucky and Utah, only Maryland receives licensing revenue from projects it funds. According to information published by the Maryland Technology Development Corporation (TEDCO), universities that receive a University Technology Development Fund (UTDF) grant, which provides financial resources to support pre-commercialization research on university intellectual property, are required to share revenues with TEDCO on property created or developed with a UTDF grant. Universities must pay TEDCO 25% of revenue received after the UTDF grant award until it has repaid an amount twice the original grant amount. As a result, a university that receives a grant of \$50,000 (a typical UTDF grant amount) would repay in 25% increments until it has paid \$100,000.

## Appendix A: Objectives, Scope, and Methodology

### Objectives

This report examines the activities of the Georgia Research Alliance (GRA). Specifically, our audit set out to determine the following:

- How is GRA funded? What activities are or projects are financed with appropriated state funds?
- What is the impact of the state funded programs and the effectiveness of GRA in increasing economic development in Georgia?
- How are the proceeds from successful GRA projects (patents, licensing fees, publication royalties, etc.) distributed? Is this consistent with similar organizations in other states?

### Scope

This audit generally covered activity related to GRA that occurred from 2000 to 2012, with consideration of earlier or later periods when relevant. Information used in this report was obtained by reviewing relevant laws, rules, and regulations; interviewing agency officials and staff from GRA, the Department of Labor (DOL), the Department of Revenue (DOR), the Georgia State Financing and Investment Commission (GSFIC), the Fiscal Research Center (FRC), University of Georgia (UGA), Georgia Institute of Technology (GaTech), Georgia Health Sciences University (GHSU), Georgia State University (GSU), Emory University, and the Board of Regents (BOR); analyzing data and reports by GRA, DOL, DOR, and BOR; reviewing Secretary of State (SOS) corporation information; reviewing GRA surveys of Eminent Scholars and VentureLab companies; surveying UGA, GaTech, GHSU, GSU, and Emory; and interviewing personnel representing similar programs in Maryland, North Carolina, Ohio, Pennsylvania, Utah, and Kentucky.

Our analysis of GRA's programs was hindered by the following limitations.

- We did not verify the accuracy of data reported to GRA through surveys of Eminent Scholars, university research offices (on Eminent scholars), and VentureLab companies. As a result, the accuracy of the data reported is unknown.
- Our assessment of the impact of GRA's research and development efforts was limited because GRA has not established a formal mechanism for tracking activities related to its investments of approximately \$187 million since 2000 in laboratory equipment and infrastructure through its Core Labs and Equipment and Matching R&D initiatives. As a result, we were able to provide only some anecdotal information on how these expenditures have been used.
- Our assessment of the impact of GRA's commercialization efforts was limited because GRA does not have complete data on participants funded through the VentureLab Program. Data on this program from its inception in 2002 to 2007 was not maintained. Also, there was inconsistent participation in the surveys conducted in 2008, 2010, and 2011. The response rates during the survey periods ranged from a high of 83% (91 of 110) in 2008 to a low of 44% (88 of 201) in 2011. In addition, those participants in VentureLab who completed surveys are most likely to be associated with active ventures. As a result, we could not ensure that the results of our analyses are representative of all participants.

## Methodology

To determine how GRA is funded and what activities or projects are financed with appropriated state funds, we interviewed staff at GRA, BOR, and GSFIC; reviewed Appropriations Acts, Governor's Budget reports, GRA financial audits, GRA budget documents, and reports from Georgia State University, BOR, and GSFIC. While we concluded that the information was sufficiently reliable for the purposes of our review, we did not independently verify the data.

To determine the impact of state-funded programs and the effectiveness of GRA in increasing economic development in Georgia, we interviewed GRA staff about Eminent Scholars, VentureLab, and other significant investments made by GRA.

### Eminent Scholars:

- In order to determine the productivity of Eminent Scholars, Distinguished Investigators, and other key researchers and their impact of on university research funding, we obtained the results of GRA's survey of Eminent Scholars in which university research offices reported the non-state research funding expended by Eminent Scholars and other GRA-funded researchers in fiscal year 2012.
- In order to determine the impact of research conducted by Eminent Scholars, Distinguished Investigators, and other key researchers, we obtained a listing of these individuals for each of GRA's university partners from GRA and used those lists to survey staff at the research offices of Emory, GSU, GaTech, UGA, and GHSU to obtain information related to the number of intellectual property disclosures submitted, patents awarded and applied for, and licenses executed from 2000 to 2012 by Eminent Scholars and Distinguished Investigators funded by GRA.

### Other Investments:

- In order to determine the impact of significant capital investments made by GRA we contacted staff at the technology offices of Emory, GSU, GaTech, UGA, and GHSU and asked them to provide anecdotal summaries of the financial, academic, and commercial impacts of these investments on university programs, research facilities, and eminent scholars.

### VentureLab:

- In order to determine the survival rate for VentureLab companies, we searched the SOS Corporations database for VentureLab company registrations, obtained wage and employment data from DOL for VentureLab companies for 2008, 2009, 2010, and 2011, obtained information related to income tax returns filed and withholding payments filed with DOR for VentureLab companies for 2008, 2009, 2010, 2011, and 2012, and obtained results from GRA's 2010 and 2011 surveys of VentureLab companies. Companies were considered active and still in business if they had employees in 2011, filed tax returns in 2011 or filed withholdings in 2012, had a current registration with the SOS, or completed the 2011 GRA VentureLab survey.
- In order to determine employment growth in VentureLab companies, we used jobs reported in GRA's annual reports for 2007 and 2008 and in GRA

VentureLab surveys for 2010 and 2011. We also obtained independent employment information from DOL for 2008 through 2011.

- In order to determine how VentureLab company wages compare to statewide averages, we used information obtained from DOL for VentureLab companies in 2011. Data was available for 63 companies.
- To determine the economic impact of VentureLab companies on Georgia's economy, we obtained a multiplier analysis from the Fiscal Research Center. To conduct the analysis, the Fiscal Research Center used wage and jobs data provided by DOL and revenues reported by companies in GRA's VentureLab surveys. Wage and jobs data was available for 59 companies and 18 companies reported revenue data. This analysis examined the economic impact, in calendar years 2010 and 2011, of the 59 companies for which data was available. The analysis used IMPLAN modeling software, which allows the estimation of the multiplier effects of changes in final demand for one industry on all other industries within Georgia.

To determine how the proceeds from successful GRA projects (patents, licensing fees, publication royalties, etc.) are distributed and if this is consistent with similar organizations in other states, we interviewed staff at GRA about proceeds from successful projects. We also reviewed the BOR's intellectual property policy and the revenue sharing policies at Emory, GSU, GaTech, UGA, GHSU, and Clark-Atlanta University. We obtained a list of Eminent Scholars and Key Scientists for each university from GRA and used those lists to survey staff at the technology offices of Emory, GSU, GaTech, UGA, and GHSU to obtain information related to the revenue associated with intellectual property developed by eminent scholars and other key scientists funded by GRA. In conducting this review, we selected six other states for comparison, including four states identified by GRA as peers (Maryland, North Carolina, Ohio, Pennsylvania) and two states (Kentucky and Utah) viewed by the State Science and Technology Institute as having a structure similar to Georgia.

This special examination was not conducted in accordance with generally accepted government auditing standards (GAGAS) given the timeframe in which the report was needed. However, it was conducted in accordance with Performance Audit Division policies and procedures for non-GAGAS engagements. These policies and procedures require that we plan and perform the engagement to obtain sufficient, appropriate evidence to provide a reasonable basis for the information reported and that data limitations be identified for the reader.

## Appendix B: Eminent Scholars

Univ	Chair Discipline	Fiscal Year Funded	Separations	Fund Source of Chair	Current Scholar	Year Hired
1	GSU Environmental Economics	1993	1	Public/Private	James C. Cox	2005
2	GT Technology Transfer	1993		Public/Private	John A. Copeland	1993
3	UGA Water Quality & Environmental Systems	1993		Public/Private	M. Bruce Beck	1993
4	EU Biomedical Imaging	1994	1	Public/Private	Xiaoping Hu	2002
5	EU Neuropharmacology	1994		Public/Private	Michael Kuhar	1995
6	GHSU Cognitive and Systems Neuroscience	1994	2	Public/Private	Joe Tsien	2007
7	GHSU Telemedicine	1994	1	Public/Private	Max Stachura	1998
8	GT Sustainable Systems	1994	1	Public/Private	John Crittenden	2009
9	GT Telecommunications	1994	1	Public/Private	Jim Foley	2000
10	GT Energy	1994	3	Public/Private	VACANT	
11	UGA Technology Enhanced Learning	1994		Public/Private	Michael J. Hannafin	1995
12	UGA Structural Biology	1994		Public/Private	B.C. Wang	1995
13	CAU Cellular Biology of Cancer	1995	1	Public/Private	Shafiq Khan	2004
14	EU Structural Biology	1995		Public/Private	Xiaodong Cheng	1997
15	GHSU Molecular Immunogenetics	1995		Public/Private	Andrew Mellor	1995
16	GT Electronic & Bio-electronic Systems	1995		Public/Private	Rao R. Tummala	1995
17	GT Sensors and Instrumentation	1995		Public/Private	Jiri Janata	1997
18	EU Vaccine Development	1996		Public/Private	Rafi Ahmed	1995
19	GSU Molecular Biotechnology	1996		Public/Private	Julia Hilliard	1997
20	UGA Microbial Physiology	1996		Public/Private	Robert Maier	1998
21	GHSU Molecular Biology - Cancer	1997	1	Public/Private	VACANT	
22	GHSU Molecular and Cellular Neurobiology	1997		Public/Private	Robert Yu	2000
23	GSU Business Process Innovation	1998	1	Public/Private	Lars Mathiasen	2002
24	UGA Animal Health Vaccine	1998		Public/Private	Ralph Tripp	2004
25	GT Wireless Systems	1999		Public/Private	Nikil Jayant	1998
26	GT Tissue Engineering	1999		Public/Private	Barbara Boyan	2002
27	UGA NMR Spectroscopy	1999		Public/Private	James Prestegard	1998
28	EU Molecular Pathogenesis	2000		Public/Private	Samuel Speck	2001
29	GT Ultrafast Optical Physics	2000		Public/Private	Rick Trebino	1999
30	GT Electro Optical Systems	2000		Public/Private	Russell Dupuis	2003
31	UGA Animal Reproductive Physiology	2000		Public/Private	Steven Stice	1999
32	GSU Drug Discovery	2001		Public/Private	Binghe Wang	2003
33	GT Bioengineering	2001	1	Public/Private	Ross Ethier	2012
34	GT Membrane Science & Technology	2001		Public/Private	William J. Koros	2001
35	GT Innovative Engineering Education	2001	1	Public/Private	Ed Coyle	2007
36	UGA Molecular Cell Biology	2001		Public/Private	Steve Dalton	2002
37	EU Retrovirology	2002		Public/Private	Eric Hunter	2004
38	GHSU Genomic Medicine	2002		Public/Private	Jin-Xiong She	2002
39	GT Embedded Systems	2002	1	Public/Private	Marilyn Wolf	2007
40	GT Analytical Genomics	2002		Public/Private	Steve Harvey	2003

## Appendix B: Eminent Scholars (continued)

Univ	Chair Discipline	Fiscal Year Funded	Separations	Fund Source of Chair	Current Scholar	Year Hired
41	GT Biological Systems	2002		Public/Private	Eberhard Voit	2004
42	UGA Emerging Global Diseases	2002		Public/Private	Roberto DoCampo	2005
43	UGA Molecular Biology & Functional Genomics	2002		Public/Private	Jeff Bennetzen	2003
44	GHSU Neurosciences	2003		Public/Private	Lin Mei	2004
45	UGA Drug Discovery	2003		Public/Private	Vasu Nair	2002
46	UGA Crop Genomics	2003	1	Public/Private	Scott Jackson	2011
47	GT Advanced Telecommunications	2004		Public/Private	Fred Juang	2002
48	GHSU Cancer Research	2005	1	Public/Private	VACANT	
49	UGA Forest Biotechnology	2005		Public/Private	CJ Tsai	2008
50	GHSU Cancer Research	2006	1	Public/Private	VACANT	
51	UGA Poultry Medicine	2006	1	Public/Private	VACANT	
52	EU Transplant Immunology	2007		Public/Private	Allan Kirk	2007
53	GT Computational Systems Biology	2007		Public/Private	Jeffrey Skolnick	2006
54	GT Energy Sustainability	2007		Public/Private	David Sholl	2008
55	UGA Biomass Conversion	2007	1	Public/Private	VACANT	
56	EU Cancer	2008	1	Public/Private	VACANT	
57	EU Pediatric Research	2008		Public/Private	VACANT	
58	EU Comparative Pathology	2008		Public/Private	Guido Silvestri	2010
59	EU Bioinformatics	2008		Public/Private	Joel Saltz	2008
60	EU Autism Spectrum Disorders	2008		Public/Private	Ami Klin	2011
61	GT Nanomedicine	2009		Public/Private	Yunan Xia	2011
62	EU Immunology	2010		Public/Private	Max Cooper	2008
63	EU Immunology	2010		Public/Private	Ignacio Sanz	2012
64	GSU Immunology	2010		Public/Private	Jian-Dong Li	2011
65	GSU Chemical Glycobiology	2011		Public/Private	George Wang	2011
66	UGA Agricultural Biotechnology	1995		Private	Clifton A. Baile	1995
67	GT Optical Networking	2002		Private	Gee-Kung Chang	2002
68	GT Molecular Design	2003		Private	Jean-Luc Bredas	2003
69	UGA Bioinformatics	2003		Private	Ying Xu	2003
70	EU Cancer	Split		Interest on Initial Endowment	Wally Curran	N/A
71	GT Photovoltaics	Split		Interest on Initial Endowment	Ajeet Rohatgi	N/A
	EU Molecular Biology	N/A		Not a chair position	Bill Dynan <sup>1</sup>	2012

Notes: Some chair positions are initially filled prior to the finalization of an endowment and recruitment package, while others remain vacant for years until a suitable candidate is found.  
<sup>1</sup>Separated from chair position #21 to take a position at Emory. Retains funding ties to GRA based on prior chair position  
Source: GRA

**Key**  
EU = Emory University  
GHSU = Georgia Health Sciences University  
GSU = Georgia State University  
GT = Georgia Tech  
UGA = University of Georgia

## Appendix C: Funded Centers

**University of Georgia** – In fiscal year 2002, the federal government granted funds to make the UGA Complex Carbohydrate Research Center (CCRC) home to the Southeast's only 900 MHz spectrometer. A significant factor in winning the grant award was the over \$4 million that GRA had already invested in the 6 less powerful spectrometers already housed at the CCRC's Nuclear Magnetic Resonance (NMR) facility. Used to map out unknown molecular structures, the NMR spectrometers are used primarily for medical and energy related research. As an integral part of the CCRC, the NMR facility has helped the CCRC to leverage an average of \$17.8 million per year in outside funding and to train 98 Ph.D. students. The CCRC is also credited with the creation of 5 start-up companies and the relocation of biotech company Galectin to Georgia.

**Georgia Health Sciences University** – Over the last six years GRA has invested over \$7.5 million in equipping and expanding the two buildings that make up the GHSU Cancer Center. The Outpatient Center has provided both inpatient and outpatient services to over 20,000 patients a year since opening in 2010 and has allowed researchers to hold 25 Phase I/II clinical trials within the buildings' specialty labs. It has also provided staff at the Cancer Research building with data in cross-disciplinary fields such as biostatistics, genomics, and pathology. At maximum capacity, GHSU projects the Cancer Research building will house 35 faculty members and approximately 175 research staff in 167,000 square feet of research space. Together the buildings provide GHSU with an integrated approach to cancer research and prevention that crosses multiple disciplines such as molecular oncology, developmental therapeutics, and cancer immunotherapy.

**Georgia Tech** – Along with other state and industry funds, Georgia Tech was able to use \$3 million from GRA to upgrade its Microelectronics Research Center into a Nanotechnology Research Center (NRC) in 2004 through the purchase of an Electron Beam Nano-Scale Lithography System (EBL). This purchase not only elevated Georgia Tech to regional prominence as a leader in nanotechnology research, but also made it one of 13 universities in the National Science Foundation's National Nanotechnology Infrastructure Network (NNIN), which provided Georgia Tech with \$14.7 million in grants for a ten-year period beginning in 2004. As part of the NNIN, the NRC is open to researchers from across the country and in the last five years has been used by 47 Ph.Ds. from 18 universities and research institutes. The EBL is in high demand because it carves the building supplies needed for nanotechnology development out of raw materials such as silicon wafers. In fiscal year 2012, the EBL was used as part of 56 contracts totaling \$38.8 million. Research coming out of the NRC, including that done by four Georgia Tech eminent scholars, is used to improve semiconductors, create higher powered lasers and to develop new forms of media.

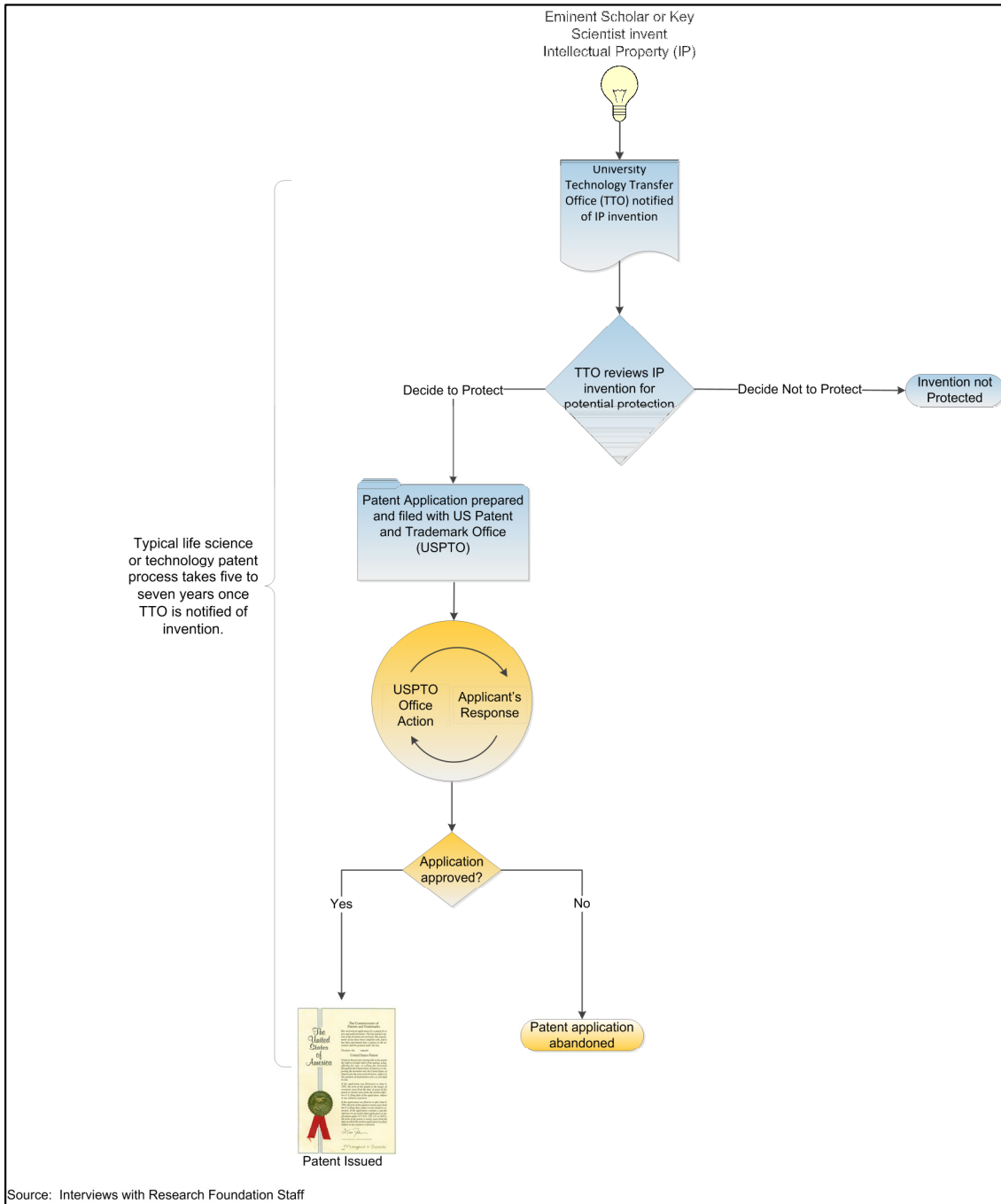
**Georgia State University** – In fiscal year 2010, GRA provided over \$900,000 to upgrade the Fermentation Facility in the Natural Science Center. The fermenters allow researchers to grow and alter bacteria, proteins and other organic products at a faster than normal rate by controlling the environment. Although the facility had been operational since 2001, GRA support allowed it to meet all safety requirements and improve the facility's exposure to outside contaminants. Eight principal investigators from both GSU and Emory use the facility to conduct a variety of

research for the universities, the Georgia Department of Agriculture, and for private industry. Research through this facility has produced three U.S. patents, two published papers and one exclusive license used by VentureLab company VaxyGen. Outside funding for research conducted at this facility totaled \$5.8 million between fiscal years 2009-2012. The facility is additionally used to help instruct 5 current Ph.D. students.

**Emory University** – In 1996, GRA provided approximately \$2 million to assist with building the Emory Vaccine Center (EVC) which studies human response to vaccines, designs more effective vaccines and develops new ways to deliver vaccines. Since 1996, GRA has invested approximately \$25 million in the EVC primarily as the state's funding match to the over \$550 million in research grants that the EVC has received through non-state fund sources such as the National Institutes of Health and the Bill and Melinda Gates Foundation. Research at EVC has led to the development of three start-up companies (Geovax, Zetra Biologics, and Ketal Biosciences) with Geovax having the only university-based research team in the U.S. to have an AIDS vaccine candidate in clinical trials. EVC researchers have used federal grants to study both domestic and international vaccine markets for diseases such as malaria, hepatitis C, dengue, and HIV/AIDS. GRA's financial assistance has also led to the employment of five eminent scholars at the EVC who work with 81 other faculty members and professional researchers, 79 research staff, 78 postdoctoral students, and 44 graduate students.



## Appendix D: Typical Intellectual Property Protection Process



Source: Interviews with Research Foundation Staff

## Appendix E: VentureLab Companies by Status Including Total VentureLab Funds Received (2003-2011)

Participant	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total	Status
Vivonetics	\$ 50,000	\$ 68,000	\$ -	\$ -	\$ 50,000	\$ 50,000	\$ -	\$ -	\$ -	\$ 218,000	Active
Orthonics Inc.	50,000	65,000	60,000	65,000	-	-	-	-	-	240,000	Not Active
Nuventix Inc.	50,000	57,000	-	-	-	-	-	-	-	107,000	Not Active
NeurOp Inc.	50,000	-	50,000	50,000	20,000	-	50,000	-	100,000	320,000	Active
JMD	50,000	-	-	-	-	-	-	-	-	50,000	No Evidence of Activity
GTronix, Inc.	50,000	-	-	-	-	-	-	-	-	50,000	Not Active
MemScan	35,000	-	-	-	-	-	-	-	-	35,000	No Evidence of Activity
Insectigen Inc.	25,000	50,000	50,000	50,000	100,000	196,431	150,000	-	-	621,431	Active
Pervasive Services Inc.	25,000	25,000	-	-	-	-	-	-	-	50,000	No Evidence of Activity
Angionics	25,000	-	-	-	50,000	75,000	-	-	-	150,000	Active
VAST Inc.	25,000	-	-	-	-	25,000	-	-	-	50,000	Active
CardioMems, Inc.	-	100,000	-	-	-	-	-	-	-	100,000	Active
Calorie & Pulse LLC	-	50,000	3,000	100,000	162,000	75,000	-	-	-	390,000	Not Active
Radatec Inc.	-	50,000	-	-	-	-	-	-	-	50,000	Not Active
4-D Imaging Inc.	-	38,000	50,000	50,000	-	-	-	-	-	138,000	No Evidence of Activity
Asankya Inc.	-	25,000	25,000	100,000	100,000	150,000	-	-	-	400,000	Active
Aruna	-	25,000	-	115,428	55,000	130,000	250,000	-	-	575,428	Active
AptoTec Inc.	-	-	100,000	125,000	125,000	-	-	-	-	350,000	Active
AxoTect	-	-	50,000	79,413	33,052	-	137,514	150,000	-	449,979	Active
Verco LLC	-	-	50,000	50,000	50,000	-	-	-	-	150,000	Active
LumoFlex, LLC	-	-	50,000	50,000	25,000	25,000	-	-	-	150,000	No Evidence of Activity
Molecular Therapeutics LC	-	-	50,000	-	-	-	-	-	-	50,000	Active
Reach Health	-	-	50,000	-	-	-	-	-	-	50,000	Active
Molecular Imaging	-	-	30,000	20,000	-	-	-	-	-	50,000	No Evidence of Activity
E-System Design	-	-	25,000	17,000	-	-	50,000	150,000	150,000	392,000	Active
Oncose Inc.	-	-	-	100,000	-	-	-	-	-	100,000	Not Active
Sentrinsic	-	-	-	50,000	200,000	150,000	-	-	-	400,000	Active
Qualtre Inc.	-	-	-	50,000	100,000	250,000	-	-	-	400,000	Active
Velocity Medical Inc.	-	-	-	50,000	100,000	100,000	150,000	-	-	400,000	Active
Altiris	-	-	-	50,000	50,000	100,000	-	100,000	150,000	450,000	Active
Zenda Technologies	-	-	-	50,000	50,000	50,000	250,000	-	100,000	500,000	Active
Innovolt	-	-	-	50,000	50,000	25,000	-	-	-	125,000	Active
DominInc LLC	-	-	-	50,000	50,000	-	-	-	-	100,000	No Evidence of Activity
NanoVici Inc.	-	-	-	50,000	50,000	-	-	-	-	100,000	Not Active
SynBioX, Inc.	-	-	-	50,000	-	10,000	-	-	-	60,000	Not Active
Damballa Inc.	-	-	-	50,000	-	-	-	-	-	50,000	Active
Abcell	-	-	-	50,000	-	-	-	-	-	50,000	No Evidence of Activity
EagleEye Networks	-	-	-	50,000	-	-	-	-	-	50,000	No Evidence of Activity
ImmuneRx	-	-	-	50,000	-	-	-	-	-	50,000	No Evidence of Activity
Synedria	-	-	-	50,000	-	-	-	-	-	50,000	Not Active
CorSynergy Inc.	-	-	-	42,000	100,000	-	-	-	-	142,000	No Evidence of Activity
Reperfusion Therapeutics LLC	-	-	-	30,000	20,000	-	-	-	-	50,000	Active
PSiSense	-	-	-	29,500	21,000	-	-	-	-	50,500	No Evidence of Activity
Plum Combustion Inc.	-	-	-	29,500	20,000	50,000	50,000	-	-	149,500	Active
WiSPi LLC	-	-	-	27,000	100,000	200,000	-	-	-	327,000	No Evidence of Activity
MedShape Inc.	-	-	-	25,000	110,000	231,950	100,000	150,000	-	616,950	Active
Radiation Therapy	-	-	-	25,000	25,000	-	25,000	-	-	75,000	No Evidence of Activity
Digital Media	-	-	-	25,000	-	-	-	-	-	25,000	No Evidence of Activity
MIMOSA LLC	-	-	-	25,000	-	-	-	-	-	25,000	No Evidence of Activity
Pathens Inc.	-	-	-	10,000	25,000	25,000	25,000	-	40,000	125,000	Active
Abeome	-	-	-	-	100,000	200,000	150,000	-	-	450,000	Active
CPD LLC	-	-	-	-	100,000	-	-	-	-	100,000	Active
Cartiza	-	-	-	-	100,000	-	-	-	-	100,000	Not Active
Adaptive Flight	-	-	-	-	50,000	100,000	250,000	-	-	400,000	Active
Qoil Inc.	-	-	-	-	50,000	50,000	-	-	-	100,000	Not Active

## Appendix E (continued)

Participant	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total	Status
DiagIS LLC	-	-	-	-	50,000	-	-	-	-	50,000	Not Active
Somerset Research LLC	-	-	-	-	50,000	-	-	-	-	50,000	Not Active
Genel Systems	-	-	-	-	30,000	20,000	-	-	-	50,000	No Evidence of Activity
Custom Vision	-	-	-	-	25,000	94,065	-	-	-	119,065	No Evidence of Activity
VQ Link	-	-	-	-	25,000	75,000	50,000	250,000	-	400,000	Active
Biolnquire	-	-	-	-	25,000	75,000	50,000	-	-	150,000	Active
CoreOpSys	-	-	-	-	25,000	75,000	-	-	-	100,000	No Evidence of Activity
Terabit Photonics	-	-	-	-	25,000	44,990	-	-	-	69,990	No Evidence of Activity
VersaQ, Inc.	-	-	-	-	25,000	25,846	-	-	60,000	110,846	Active
Prospect Photonics	-	-	-	-	25,000	25,000	50,000	-	-	100,000	Active
Piezodyne	-	-	-	-	25,000	25,000	25,000	-	-	75,000	No Evidence of Activity
Elastic Video	-	-	-	-	25,000	25,000	-	-	-	50,000	No Evidence of Activity
EmThrax LLC	-	-	-	-	25,000	25,000	-	-	-	50,000	No Evidence of Activity
SiLite-ChipSense Inc.	-	-	-	-	25,000	25,000	-	-	-	50,000	No Evidence of Activity
PISCES	-	-	-	-	25,000	25,000	-	-	-	50,000	No Evidence of Activity
Zetra Biologicals Inc.	-	-	-	-	25,000	1,000	-	-	-	26,000	Active
RxPlanner	-	-	-	-	25,000	-	-	-	-	25,000	No Evidence of Activity
BioSequent	-	-	-	-	15,000	35,000	-	-	-	50,000	Not Active
Antimicrobial Peptides	-	-	-	-	10,000	-	-	-	-	10,000	No Evidence of Activity
EZ Push Wheelchair	-	-	-	-	10,000	-	-	-	-	10,000	No Evidence of Activity
ECG Monitoring System	-	-	-	-	3,500	-	-	-	-	3,500	No Evidence of Activity
Suniva	-	-	-	-	-	250,000	-	-	-	250,000	Active
3Ti LLC	-	-	-	-	-	160,000	-	-	-	160,000	Active
Pramana	-	-	-	-	-	100,000	250,000	-	-	350,000	Not Active
SpherIngenics	-	-	-	-	-	75,000	25,000	-	-	100,000	Active
Axion Biosystems	-	-	-	-	-	50,000	200,000	150,000	-	400,000	Active
AeroVectRx	-	-	-	-	-	50,000	123,147	150,000	-	323,147	Not Active
Inquus	-	-	-	-	-	50,000	100,000	100,000	150,000	400,000	Active
InterCAX	-	-	-	-	-	50,000	50,000	50,000	-	150,000	Active
Regeneration Matrix	-	-	-	-	-	50,000	50,000	-	-	100,000	Active
Verificon	-	-	-	-	-	50,000	50,000	-	-	100,000	Active
Vehicle Monitoring Techs	-	-	-	-	-	50,000	50,000	-	-	100,000	Not Active
ZOOZ Mobile	-	-	-	-	-	50,000	-	188,000	62,000	300,000	Active
SeNa	-	-	-	-	-	50,000	-	-	-	50,000	Active
Tasser	-	-	-	-	-	50,000	-	-	-	50,000	No Evidence of Activity
Trivalve	-	-	-	-	-	50,000	-	-	-	50,000	No Evidence of Activity
Zeerive	-	-	-	-	-	50,000	-	-	-	50,000	No Evidence of Activity
Katharos	-	-	-	-	-	50,000	-	-	-	50,000	Not Active
TriptCor Inc.	-	-	-	-	-	50,000	-	-	-	50,000	Not Active
RadioMEMS	-	-	-	-	-	35,000	25,000	-	-	60,000	No Evidence of Activity
Argent Diagnostics	-	-	-	-	-	30,000	70,000	-	-	100,000	Active
Body Surface Translations	-	-	-	-	-	25,000	125,000	250,000	-	400,000	Active
Sayana	-	-	-	-	-	25,000	125,000	-	-	150,000	Active
uSenso Technologies	-	-	-	-	-	25,000	50,000	-	-	75,000	Not Active
SubMicro, Inc.	-	-	-	-	-	25,000	25,000	25,000	50,000	125,000	Active
Integris, LLC	-	-	-	-	-	25,000	25,000	-	-	50,000	Active
Ketal Biomedical	-	-	-	-	-	25,000	-	25,000	68,000	118,000	Active
Smart Router	-	-	-	-	-	25,000	-	-	-	25,000	No Evidence of Activity
Transmium	-	-	-	-	-	25,000	-	-	-	25,000	No Evidence of Activity
Braegen Pharmaceuticals	-	-	-	-	-	25,000	-	-	-	25,000	No Evidence of Activity
G2 EcoSolutions	-	-	-	-	-	25,000	-	-	-	25,000	Not Active
Apica Cardiovascular Technologies	-	-	-	-	-	20,000	30,000	100,000	152,000	302,000	Active
Nanoengineered Materials	-	-	-	-	-	16,000	50,000	-	-	66,000	Active
Glycosensors & Diagnostics	-	-	-	-	-	15,151	-	25,000	25,000	65,151	Active
Guided Tx/Gold Nanorods	-	-	-	-	-	15,000	-	-	-	15,000	No Evidence of Activity
Effigene Pharmaceuticals	-	-	-	-	-	10,000	50,000	25,000	-	85,000	Active
Inhibikase Therapeutics	-	-	-	-	-	-	105,550	100,000	150,000	355,550	Active
WiRider	-	-	-	-	-	-	60,000	-	-	60,000	No Evidence of Activity
Scintigra	-	-	-	-	-	-	50,000	62,962	-	112,962	Not Active
ImmunoMetrix	-	-	-	-	-	-	50,000	-	-	50,000	Active
Atomic Force Microscope	-	-	-	-	-	-	50,000	-	-	50,000	No Evidence of Activity
Elevar	-	-	-	-	-	-	50,000	-	-	50,000	No Evidence of Activity

## Appendix E (continued)

Participant	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total	Status
DiagNano	-	-	-	-	-	-	50,000	-	-	50,000	Not Active
RideCell	-	-	-	-	-	-	48,100	100,000	-	148,100	Active
NanoGrip	-	-	-	-	-	-	43,000	-	-	43,000	Not Active
Tepyt	-	-	-	-	-	-	40,000	22,670	-	62,670	Not Active
Simatra Modeling Technologies	-	-	-	-	-	-	40,000	-	-	40,000	Active
HD Connect	-	-	-	-	-	-	35,000	25,000	-	60,000	No Evidence of Activity
Lumense, Inc.	-	-	-	-	-	-	35,000	25,000	-	60,000	Active
Garimella Cooling	-	-	-	-	-	-	35,000	21,400	-	56,400	Active
Aristotle Solutions	-	-	-	-	-	-	35,000	-	-	35,000	No Evidence of Activity
Evirx	-	-	-	-	-	-	25,000	71,100	49,000	145,100	Active
Szygy Memory Plastics Corp.	-	-	-	-	-	-	25,000	70,484	47,974	143,458	Active
Jinfinity	-	-	-	-	-	-	25,000	25,000	100,000	150,000	Active
GTC, Inc.	-	-	-	-	-	-	25,000	25,000	-	50,000	Active
Macular ReGeneration	-	-	-	-	-	-	25,000	25,000	-	50,000	Active
Acellular Matrices	-	-	-	-	-	-	25,000	25,000	-	50,000	No Evidence of Activity
Metaboscan Diagnostics	-	-	-	-	-	-	25,000	25,000	-	50,000	No Evidence of Activity
Microneedle Vaccine	-	-	-	-	-	-	25,000	25,000	-	50,000	No Evidence of Activity
Cardionic	-	-	-	-	-	-	25,000	25,000	-	50,000	No Evidence of Activity
Apeliotus Dermatology	-	-	-	-	-	-	25,000	25,000	-	50,000	Not Active
Cobot	-	-	-	-	-	-	25,000	25,000	-	50,000	Not Active
AKESOgen	-	-	-	-	-	-	25,000	-	100,000	125,000	Active
microPerfusion, Inc.	-	-	-	-	-	-	25,000	-	25,000	50,000	Active
Planteco	-	-	-	-	-	-	25,000	-	-	25,000	Active
Clear Free Defibrillator	-	-	-	-	-	-	25,000	-	-	25,000	No Evidence of Activity
HQ Video	-	-	-	-	-	-	25,000	-	-	25,000	No Evidence of Activity
InfoBay	-	-	-	-	-	-	25,000	-	-	25,000	No Evidence of Activity
Celltrast LLC	-	-	-	-	-	-	25,000	-	-	25,000	No Evidence of Activity
HeartSense	-	-	-	-	-	-	10,000	-	-	10,000	No Evidence of Activity
InVasc Therapeutics, Inc.	-	-	-	-	-	-	-	350,000	-	350,000	Active
Ionic Therapeutics, Inc.	-	-	-	-	-	-	-	348,067	-	348,067	Active
Urjanet	-	-	-	-	-	-	-	150,000	250,000	400,000	Active
Zirus Inc.	-	-	-	-	-	-	-	100,000	-	100,000	Active
CoolClouds, Inc.	-	-	-	-	-	-	-	50,000	50,000	100,000	Active
DigitalVision	-	-	-	-	-	-	-	50,000	50,000	100,000	Active
Medivity	-	-	-	-	-	-	-	50,000	-	50,000	Active
Ontogenesys Biotechnologies Inc.	-	-	-	-	-	-	-	50,000	-	50,000	Not Active
Khush, Inc.	-	-	-	-	-	-	-	49,980	50,000	99,980	Active
Audiallo	-	-	-	-	-	-	-	47,000	-	47,000	No Evidence of Activity
Array Sensors	-	-	-	-	-	-	-	42,000	50,000	92,000	No Evidence of Activity
OpenCell Technologies	-	-	-	-	-	-	-	30,000	20,000	50,000	Active
Somnolytics	-	-	-	-	-	-	-	30,000	-	30,000	Active
SPECTROPATH Medical	-	-	-	-	-	-	-	25,000	90,000	115,000	Active
Reactive Diagnostics	-	-	-	-	-	-	-	25,000	40,000	65,000	No Evidence of Activity
ARChem	-	-	-	-	-	-	-	25,000	25,000	50,000	Active
Intelligent Access	-	-	-	-	-	-	-	25,000	25,000	50,000	Active
Interactive Science in 3D	-	-	-	-	-	-	-	25,000	25,000	50,000	Active
Multispectral Imager	-	-	-	-	-	-	-	25,000	25,000	50,000	No Evidence of Activity
ImmunoReg	-	-	-	-	-	-	-	25,000	25,000	50,000	No Evidence of Activity
XFCT	-	-	-	-	-	-	-	25,000	10,000	35,000	No Evidence of Activity
Sustainable Solutions International	-	-	-	-	-	-	-	25,000	-	25,000	Active
ProvokeDD	-	-	-	-	-	-	-	25,000	-	25,000	Not Active
Neuromorfix	-	-	-	-	-	-	-	24,800	24,900	49,700	No Evidence of Activity
Down to Earth Energy, Inc.	-	-	-	-	-	-	-	22,500	-	22,500	Active
Whisper Communications	-	-	-	-	-	-	-	21,000	69,000	90,000	Active
Security Axioms	-	-	-	-	-	-	-	21,000	25,000	46,000	Active
LiquidText	-	-	-	-	-	-	-	21,000	22,000	43,000	Active
Useable Health	-	-	-	-	-	-	-	18,400	23,500	41,900	Active
Luminomics	-	-	-	-	-	-	-	15,000	-	15,000	Active
Trellis	-	-	-	-	-	-	-	-	118,875	118,875	No Evidence of Activity
Camellix	-	-	-	-	-	-	-	-	100,000	100,000	Active
AlpZhi	-	-	-	-	-	-	-	-	50,000	50,000	Active
Silanano	-	-	-	-	-	-	-	-	50,000	50,000	Active
VaxyGen Manufacturing Services	-	-	-	-	-	-	-	-	50,000	50,000	Active
Tissue Interrogation Device	-	-	-	-	-	-	-	-	50,000	50,000	No Evidence of Activity
NRG Biotechnology	-	-	-	-	-	-	-	-	40,000	40,000	No Evidence of Activity

## Appendix E (continued)

Participant	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total	Status
General Genomics	-	-	-	-	-	-	-	-	25,000	25,000	Active
Merlin Mobility	-	-	-	-	-	-	-	-	25,000	25,000	Active
Metacclipse Therapeutics Corp.	-	-	-	-	-	-	-	-	25,000	25,000	Active
Sinoora	-	-	-	-	-	-	-	-	25,000	25,000	Active
Sphingotex	-	-	-	-	-	-	-	-	25,000	25,000	Active
Gold Complexes	-	-	-	-	-	-	-	-	25,000	25,000	No Evidence of Activity
ME-Rosen-Infusion Pump	-	-	-	-	-	-	-	-	25,000	25,000	No Evidence of Activity
NECRM	-	-	-	-	-	-	-	-	25,000	25,000	No Evidence of Activity
SciTribes	-	-	-	-	-	-	-	-	25,000	25,000	No Evidence of Activity
Algix	-	-	-	-	-	-	-	-	25,000	25,000	No Evidence of Activity
CHP Patient Monitoring System	-	-	-	-	-	-	-	-	25,000	25,000	No Evidence of Activity
ChemoCore Therapeutics, Inc.	-	-	-	-	-	-	-	-	25,000	25,000	Not Active
Cybermetic Sense	-	-	-	-	-	-	-	-	24,997	24,997	No Evidence of Activity
Fuzayo	-	-	-	-	-	-	-	-	24,500	24,500	Active
Kudzu Wireless	-	-	-	-	-	-	-	-	22,000	22,000	Active
Soneter	-	-	-	-	-	-	-	-	21,500	21,500	Active
Voxel Engineers, LLC	-	-	-	-	-	-	-	-	17,500	17,500	Active
CYAN Bio	-	-	-	-	-	-	-	-	15,000	15,000	No Evidence of Activity
Biomarkers for Stroke	-	-	-	-	-	-	-	-	5,000	5,000	No Evidence of Activity

Source: GRA Records, Information from DOL, DOR, SOS, and GRA VentureLab Surveys



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The Performance Audit Division was established in 1971 to conduct in-depth reviews of state-funded programs. Our reviews determine if programs are meeting goals and objectives; measure program results and effectiveness; identify alternate methods to meet goals; evaluate efficiency of resource allocation; assess compliance with laws and regulations; and provide credible management information to decision-makers. For more information, contact us at (404)657-5220 or visit our website at [www.audits.ga.gov](http://www.audits.ga.gov).