Georgia Science and Technology Strategic Plan Joint Study Commission Meeting

October 28, 2011
10:00 AM – 3:30 PM

Commissioner Binders

AGENDA: Science and Technology Study Commission

October 28, 2011 10:00AM – 3:30 PM
Mercer University, Macon, GA

Timing	Activity
9:30 – 10:00	**Check-In & Registration** – *Mercer University*
10:00 – 10:10	**Welcome Announcement** - Mercer University President - Commission Co-Chairs
10:10 – 10:55	**PANEL A –** *Topic* - Role of Higher Education and Technology Industry
10:55 – 11:00	**Panel Transition**
11:00 – 11:45	**PANEL B** – *Topic* - Traditional Industries in Technology Growth
11:45 – 12:45	**Break for Lunch** - Commissioners eat at Mercer & have discussion on topics - Public on own
12:45 – 1:30	**PANEL C –** *Topic* - Aerospace
1:30 – 1:35	**Panel Transition**
1:35 – 2:15	**PANEL D** – *Topic* - Military and Defense
2:15 – 2:35	**Public Input & Comment Session**
2:35	**End of Public Meeting**
2:35 – 3:30	**Commissioners Private Discussion Meeting**
3:30	**Adjourn & Depart**

AGENDA: Science and Technology Study Commission

October 28, 2011 10:00AM – 2:35 PM
Mercer University, Macon, GA

Timing	Activity
9:30 – 10:00	**Check-In & Registration** – *Mercer University*
10:00 – 10:10	**Welcome Announcement** - Dr. Jim Netherton, EVP, Finance & Administration, Mercer University - Sen. Barry Loudermilk & Rep. Barbara Sims, Commission Co-Chairs
10:10 – 10:55	**Role of Higher Education and Technology** - Dr. Scott Davis, Mercer University - Dr. Richard Mendola, Emory University - Dr. Hans Reichgelt, Southern Polytech - Jon Sizemore, University System of Georgia, Board of Regents
10:55 – 11:00	**Panel Transition**
11:00 – 11:45	**Traditional Industries in Technology Growth** - Dr. Norman Marsolan, Technical Assoc. of the Pulp & Paper Ind. - Randy McRae, International Paper - Dan Floyd, Renmatix - Dr. Phil Jones, Imerys Pigments
11:45 – 12:45	**Break for Lunch** - Commissioners eat at Mercer & have discussion on topics - Public on own
12:45 – 1:30	**Aerospace** - R. Steven Justice, Georgia Center of Innovation – Aerospace - David Garrison, Delta Air Lines - Joseph Marks, TIMCO Aviation Services - Alan Mathis, Warner Robins Air Logistics Center
1:30 – 1:35	**Panel Transition**
1:35 – 2:15	**Military and Defense** - COL Michael Brownfield, US Army - Thomas Sweeney, Trident Refit - Matt England, CyPhy Works
2:15 – 2:35	**Public Input & Comment Session**
2:35	**End of Public Meeting**

The Role of Higher Education in Technology Panel

- **Dr. Scott Davis, Mercer University**
- **Dr. Richard Mendola, Emory University**
- **Dr. Hans Reichgelt, Southern Polytechnic State University**
- **Jon Sizemore, Board of Regents, University System of Georgia**

SR 68 Strategic Plan for Science & Technology Joint Study Commission – Panelist Guidelines

Outline of Remarks:

Please type an outline of your remarks based on the prompts below and return to Richie Johnson at Richie@tagonline.org by October 28, 2011 These remarks will be given to the Commission in advance to help prepare for the meeting.

I. Background/Company Overview

D. Scott Davis, Ph.D. is the Senior Vice Provost for Research, Dean of Graduate Studies and Dean of the Stetson School of Business and Economics at Mercer University. Dr. Davis joined the Mercer faculty as assistant professor of chemistry in 1991. He was promoted to associate professor in 1996 and served as chair of the department from 2000-2002, when he was named associate dean of the College of Liberal Arts. He served as associate executive vice president from 2003-2006. Davis currently holds the rank of professor of chemistry.

A native of South Carolina, Davis holds a B.S. from Erskine College and a Ph.D. from Emory University. Davis completed a post-doctoral fellowship at the University of Illinois, Urbana-Champaign.

Mercer University is one of America's oldest and most distinctive institutions of higher learning, offering rigorous programs that span the undergraduate liberal arts to doctoral-level degrees. Founded by early 19th century Baptists, Mercer — while no longer formally affiliated with the Baptist denomination — remains committed to an educational environment that embraces intellectual and religious freedom while affirming values that arise from a Judeo-Christian understanding of the world.

With more than 8,200 students enrolled in 11 schools and colleges on campuses in Macon, Atlanta and Savannah, and at four Regional Academic Centers around the state, Mercer is consistently ranked among the nation's leading institutions by such publications as *U.S. News & World Report* and the *Princeton Review*. More than 65,000 alumni are making important contributions to their professions and communities throughout Georgia, the Southeast and the world.

While offering a breadth of programs found at much larger universities, Mercer maintains an intimate, student-focused culture more characteristic of smaller liberal arts colleges.

Mercer's uniqueness is found in the way the University integrates five defining components of its mission:

Liberal Learning
Professional Knowledge
Discovery
Service to Humankind
Community

II. Please address the following points:

a. What policies are currently in place that are barriers to your company/organization's success?

i. Lack of membership in the Georgia Research Alliance (GRA)

ii. Lack of state sponsorship for collaborative research between private and public universities

b. What policies have aided in your company/organization's success?

i. Georgia Cancer Coalition Distinguished Scholars/Clinicians Program

ii. Scholarship for Engineering Education

iii. HOPE

iv. Georgia Tuition Equalization Grant (GTEG)

c. Where do you want to see your company/organization in ten years?

Within the next 10 years, Mercer University will become widely recognized as one of the leading private universities in the Southeast, along with other outstanding institutions such as Vanderbilt, Emory, Duke, Wake Forest and Tulane.

d. How can the state of Georgia help your company/organization realize this goal?

i. Support of STEM education

ii. Continue to generate opportunities for STEM graduates

iii. State-enhanced opportunities for start-ups and young entrepreneurs

Recommendations for the Commission: Please use the template below to make any policy recommendations to the Commission on actions the State can take to improve Georgia's Science and Technology Industry. They may be specific or broad, but the more details the better. Feel free to provide any additional or supporting documents you deem appropriate.

SR 68 Strategic Plan for Science & Technology Joint Study Commission – Panelist Guidelines

Policy Recommendation(s)	Recommendation Details, Specifics & Reasoning
Recommendation #1 (insert summary statement/descriptor)	Expansion of GRA
Recommendation #2 (insert summary statement/descriptor)	Expansion of a quality STEM program at the elementary, middle, and secondary school level
Recommendation #3 (insert summary statement/descriptor)	Specifically target research with a strong potential of having a positive return on investment within five years in support of Georgia's economy, military installations, and private military industrial complex to ensure their long-term viability
Recommendation #4 (insert summary statement/descriptor)	Increased State funding for cooperative research among Georgia's public and private universities.

Dr. Richard "Rich" Medola
CIO
Emory University

Dr. Richard ("Rich") Mendola, became Emory's first vice president for information technology and chief information officer on September 1, 2005. Dr. Mendola and the Office of Information Technology provide leadership and direction for information technology (IT) services across Emory University and Emory Healthcare. Dr. Mendola's enterprise IT groups include: Emory Healthcare Information Systems (EHc-IS), IT Finance & Administration, Research & Health Sciences IT, and University Technology Services (UTS).

Emory Healthcare Information Services (EHc-IS) provides guidance, input and direction in the selection, installation and support of IT solutions that meet the goals of fiscal, operational and clinical improvement for Emory Healthcare. Key IT initiatives include electronic medical record (EeMR), enterprise medical imaging, and clinical data warehouse.

Research and Health Sciences (RHS) supports and advances the research IT environment for researchers across the University. In addition, the Division works with each Woodruff Health Sciences Center unit to optimize information technology support and services. Key initiatives and services include: high performance computing cluster, collaboration environments, server provisioning, and consultation.

University Technology Services (UTS) delivers IT services to Emory's academic and administrative communities. Key services include email and calendaring, administrative systems, academic systems, technology-enriched classrooms and computer labs, and information security. In addition, UTS delivers data center operations networking and telephony services to Emory University and Emory Healthcare.

Dr. Mendola's current focus is on implementing an IT governance and prioritization structure that will better align Emory's IT expenditures with its strategic objectives. He is also working in partnership with the IT organizations across the schools, colleges and institutes of Emory University to deliver a more seamless customer experience.

Dr. Mendola currently serves as a director on the board of the OpenEAI software foundation, which is focused on open source software and methodologies for enterprise application integration. Prior to coming to Emory, he was the associate vice president for Administrative Information Technology Services, across the three-campus University of Illinois system. From 1995–99, he was chief information officer of the University of Illinois Medical Center. Dr. Mendola received his M.A., Ph.D. and MBA degrees from the University of Connecticut and his B.S. degree from the University of Pittsburgh.

SR 68 Strategic Plan for Science and Technology Joint Study Commission

Background and Overview of Emory University

- Emory University is one of the state's leading centers for discovery and learning and empowers the active, passionate pursuit of learning for a better world. Emory enrolls 13,893 students in degree programs, including 7,441 undergraduates and 6,452 graduate and professional students. Emory offers a wide range of programs that prepare students for careers in some of the region's leading sectors, including biomedical research and biotechnology, health care and the management of global businesses.

- Emory is a leading – and fast-growing – center of biomedical research. In Emory's prior fiscal year, researchers earned $539.7 million in external research funding. In 1996 Emory ranked 31st among all U.S. universities in NIH funding; by 2011, Emory ranked 17th in NIH funding.

- Emory is home to Emory Healthcare, Georgia's largest and most comprehensive health care system. During FY 2010, more than 48,000 inpatients were discharged from institutions operated by Emory Healthcare, and approximately 2.5 million patient visits occurred at the Emory Clinic. Of the 318 doctors selected by their peers at the Atlanta area's "top doctors" in a survey conducted in 2011 by *Atlanta* magazine, 123 were Emory Healthcare doctors and Emory faculty members.

- Emory (including Emory Healthcare) employs 24,884 people (excluding students), making Emory the Atlanta area's third-largest private employer. Between fiscal years 2004 and 2011, employment at Emory grew by 38 percent. Emory has been named a "best place to work" by *The Scientist* and the *Chronicle of Higher Education* and an "elite learning organization" by Learning Elite Magazine.

- Since 1990, about 50 new businesses have been created to develop commercial applications of technologies first developed Emory. They include 30 companies that were started in Georgia, of which 20 are still doing business in the state. Among Emory's most notable successes in technology transfer has been the development of a series of drugs based on research conducted at the School of Medicine that are now widely used in treating HIV/AIDS. Emory was recently ranked *fourth in the nation* for the discovery and development of new drugs by a major study published in the New England Journal of Medicine.

Emory's Vision

A destination university internationally recognized as an inquiry-driven, ethically engaged, and diverse community, whose members work collaboratively for positive transformation in the world through courageous leadership in teaching, research, scholarship, health care, and social action.

Emory's Science and Technology Context and Recommendations

I would like to highlight three areas where I believe science and technology intersect with Emory's vision, and illustrate how, with the State's support, we can realize that vision.

1. **Access and connectivity**.

To become a destination University, Emory must enable both physical and virtual access to our

resources. Technically, we need to be connected, to our local and regional communities, as well as to the larger world. As a member of the Southern Crossroads (SoX) federation (http://www.sox.net), we have access to very high speed (10Gb+) global network connectivity utilizing both Internet2 (www.internet2.edu) and the National Lambda Rail (www.nlr.net) . The speed of these networks is roughly 1,000-2,000 times faster than the typical residential Internet service in Georgia. Communities such as Palo Alto, CA and Kansas City, KS have partnered with Google to offer very high speed, gigabit connectivity to their residents, shrinking the gap between what is available to individuals and top Universities such as Emory. Although "last mile" connectivity has improved for Georgia citizens, it is still a constraint for online learning, outreach and telemedicine activities. Fostering initiatives that improve last mile connectivity to Georgia's citizens would enable and enhance virtual activities such as these.

Emory currently has online degree programs in our Schools of Public Health and Business and we expect the number of these programs will grow in the coming years. Higher speed residential connections would allow for a more immersive experience, including real time videoconferencing, media-rich content, and enhanced collaboration with fellow students and instructors. In addition to formalized degree programs with online components, we are also an active contributor to iTunesU, Apple's higher education component of iTunes. Emory's iTunesU educational content has been downloaded over 10 million times and is available to anyone in the world, for free, using Apple's global infrastructure.

2. **Partnership and collaboration**.

Emory has a long history of partnering with other Universities, both private and public, as well as with the private sector. We believe these partnerships are likely to increase, since many forms of contemporary research and instruction can be enhanced by tapping into regional partners.

A recent example drawn from our research mission is the Atlanta Clinical and Translational Science Institute, (www.actsi.org), which includes Emory, Georgia Institute of Technology, Morehouse School of Medicine, Grady, Children's Healthcare of Atlanta, the Atlanta VA Medical Center, Kaiser Permanente of Georgia, and the Atlanta Community Physicians Network. The ACTSI is an inter-institutional magnet that concentrates basic, translational, and clinical investigators, community clinicians, professional societies, and industry collaborators in dynamic clinical and translational research projects. The consortium, funded in 2007 through the National Center for Research Resources, part of the National Institutes of Health's Clinical and Translational Science Awards (CTSA), shares a common vision to translate laboratory discoveries into treatments for patients, engage communities in clinical research efforts, and train the next generation of clinical investigators.

In more general terms, many types of biomedical research require resources that are expensive, and are not utilized 100% of the time. Whether these resources are located at individual institutions, or at commercial providers "in the cloud," there is much to be gained by aggregating demand to garner the greatest possible economy of scale. Anything the State of Georgia can do to encourage these types of collaborations between private Universities and public Universities or private sector businesses is likely to result in benefits for all parties.

In addition, encouraging state affiliated institutions of higher education to invest in technology infrastructure that allows logon credentials to be utilized across institutions through Internet2's InCommon initiative is another important component for cross-institutional collaborations. InCommon's mission is to "Create and support a common trust framework for U.S. education and research. This includes trustworthy shared management of access to on-line resources in support of education and research in the United States." There are currently 235 participants in InCommon. A specific, recent example of the benefits of such arrangements is the Internet2 brokered contract for access to reduced-cost "cloud-based storage" which is facilitated by InCommon-based access.

3. Developing and recruiting top technology talent

At Emory, we are fortunate to have an incredibly talented workforce. We have been investing considerable resources in furthering the technical literacy of our educators, investigators and staff. However, to remain among the top ranks of the world's universities, we will need to continue to recruit and retain the best individuals in their respective fields.

There are several dimensions to bringing in top talent. At the recruitment stage, programs like the GRA and GCC have helped research universities in Georgia recruit premier scholars in past years. Continuing to invest resources in these programs would be very helpful to Emory, and ultimately, to the patients and the citizens of Georgia. With our success in technology transfer, it would also be beneficial to create the conditions for successful entrepreneurship in the state, since we expect that many of our scientists will continue to seek out commercialization opportunities for their inventions.

In closing, I want to thank the commission for the opportunity to provide feedback on the importance of science and technology in the future of higher education.

Jon Sizemore Interim Head of University System Distance Education Efforts

ATLANTA — October 13, 2011

Jon Sizemore has been named interim assistant vice chancellor for Distance Education for the Board of Regents of the University System of Georgia. He will be responsible for directing the System's strategic planning and implementation of distance education initiatives.

"Jon has both the knowledge of the University System and its history with distance learning, as well as the expertise in the field of online education and technology to move this critical function forward and in the right way for students throughout the University System," said Dr. David Morgan, the USG's interim chief academic officer.

The University System's distance education efforts have grown significantly in recent years. Currently, 3,525 course sections through the System's 35 institutions are taught online, in more than 210 online degree programs. The System's online Learning Management System which supports classroom instruction and hybrid courses, as well as fully online courses, is utilized by more than 320,000 students.

Sizemore is currently director of eLearning at Valdosta State University, a post he has held since 2005. In this position, he provided leadership and oversight for all online courses and classroom instructional technology in use at the 13,000-student campus.

Prior to his work at Valdosta State, Sizemore served from 1999 through 2005 as the assistant director of Instructional Technology and Distance Learning at Darton College, Albany Ga.

"There is more demand for distance education than ever before," said Sizemore. "There are great opportunities ahead for those institutions that can innovate on program delivery and collaborate to take advantage of these resources. We will look at how hybrid and online delivery can enhance our on-campus programs and make the most of existing and new facilities."

Sizemore has worked on a number of grant projects in the field of distance learning, particularly in relation to bringing technology to rural areas. He has served on various USG committees and taskforces and conducted workshops in Georgia and nationally related to distance education.

On two occasions while at Darton College, Sizemore's leadership resulted in the College's selection by the American Association of Community Colleges as a "Top 10 Digital Community College," in 2003 and 2004.

Sizemore earned bachelor's degrees in mathematics and secondary education-mathematics, as well as a master's of education in instructional technology, all from Valdosta State.

Han Reichgelt
Dean, School of Computing and Software Engineering
Southern Polytechnic State University

Han Reichgelt holds degrees in Philosophy and Psychology from the University of Nijmegen in the Netherlands, and a PhD in Cognitive Science from the University of Edinburgh in Scotland. He has held positions at the University of Edinburgh and the University of Nottingham in the United Kingdom, at the University of the West Indies, Mona, Jamaica, and Georgia Southern University in the United States. He currently is dean of the School of Computing and Software Engineering at Southern Polytechnic State University in Marietta, GA.

Han is the (co-) author of over one hundred journals and refereed conference papers and a textbook on Knowledge Representation in Artificial Intelligence, and has been co-editor of two research oriented books. His research interests include IT delivery quality, computing education and the role of Information and Communication Technology in economic development.

Han and his wife Debi live in Acworth Georgia and have three boys.

Hans Reichgelt
Dean, School of Computing and Software Engineering
Southern Polytechnic State University
Remarks

Southern Polytechnic State University (SPSU) is a member of the University System of Georgia (USG) and has a unique statewide mission to serve both traditional and non-traditional students in science, technology, engineering, computing, and mathematics, as well as the applied liberal arts and business. SPSU has around 5,800 students, about half of who are non-traditional students, typically working adults who often have to juggle family, work and study responsibilities.

Science and technology permeates SPSU. Most of the institution's academic programs are in science and technology, and even when it offers programs that may appear not to be, they have a science or technology slant to them. For example, the recently approved education program is aimed at producing secondary school teachers in physics, biology and math, rather than for example primary school teachers.

Engagement with the technology community is central to how SPSU designs academic programs. The first goal in our strategic plan is to "increase the number of graduates who are well prepared for work and for life" and we obviously cannot determine whether a student is well prepared for work unless we engage with those organizations that might hire our graduates. Moreover, our program accreditation agencies, including for example ABET, are increasingly demanding that we show how our programs meet the needs of our constituents, and, as a public institution, we obviously consider potential employers an important constituency.

To illustrate, the School of Computing and Software Engineering recently started a degree program in Computer Game Design and Development and a series of certificate programs in Health Information Technology. In both cases, it used environmental scanning techniques to identify the potential needs for these programs (the promulgation of the Digital Entertainment Act for the gaming program, and the promulgation of the HITECH act for the health information technology programs). However, the decision to move forward and the shape of the eventual programs was to a large extent based on interactions with representatives from organizations that were already active in these areas, or that might be interested in hiring graduates from the programs under consideration.

The ability to meet the workforce needs of organizations in the state constitutes one of the most important contributions higher education in general and SPSU in particular makes to the economic development of Georgia. Well-educated graduates, who have the knowledge and skills to become valuable members of the organizations they join, preferably from the moment they start ("hit the ground running" as many of the employers of SPSU graduates put it), means that organizations can increase their competitive position. A second contribution to the economic development is through the development of new technologies by faculty and students, and the commercialization of these technologies. An exciting example of this at SPSU is the development of an oil well capping mechanism to minimize the environmental impact of blowouts.

SPSU's commitment to non-traditional students and its statewide mission have made SPSU a front-runner in the use of technology in all our programs, and in particular in high quality distance education. Reflecting our commitment to non-traditional students, we offer a growing number of programs fully online, including the MS in Quality Assurance, or make sure that there is a fully online path through the program, for example in the MS in Information Technology.

To reflect our statewide mission, we developed an articulation agreement with the Technical College System of Georgia (TCSG) under which students who earn an Associate's in Applied Science in certain disciplines from a TCSG institution can transfer to SPSU and earn a bachelor's degree with no loss of credit. We deliver the courses required for the program either fully online or in a low residency format to ensure that students who cannot or do not want to move to the Atlanta area can nevertheless earn a bachelor's degree.

We have learned three lessons from these efforts.

First, it is possible to deliver high quality online education, even in science and technology. The biggest challenge was ensuring that distance students get the same hands-on experience as our on-campus students but we have found a way to do so through the use of simulation and remote online labs, and through leveraging our relationship with the TCSG to use their facilities to give SPSU students the necessary hands-on experience.

Second, quality distance education has allowed us to reach a wider student population. Many of the TCSG students would not be able to complete a bachelor's degree if they had to move out of their home region. Given the shortage of STEM and computing personnel in the state and nation-wide, broadening the pool of potential S&T students is crucial to the economic competitiveness of Georgia.

Finally, distance education is not a cheaper way to deliver high quality education; it does not create an infinitely expandable classroom. Distance education, especially if done asynchronously, results in more one-on-one interaction between professor and student, rather than the one-to-many communication that is possible in lectures. It is this more time-consuming one-on-one communication mode that makes distance education at least as expensive as face-to-face delivery, if not more so.

This final points in these remarks concern the way in which the state can best enable SPSU and USG to help the state meets its S&T workforce development needs.

First, the most important way to do so is to restore full formula funding. As indicated, although distance education has the potential to significantly growth the S&T workforce in Georgia, high quality distance education is not cheap, and a restoration of formula funding would allow the USG institutions to (a) acquire the technology that our students demand and deserve, and (b) attract and retain the faculty required to deliver high quality distance courses.

Second, the State is considering changing the formula used for formula funding so that it is no longer based solely on student numbers but also considers graduation. This is right: Universities do not exist to have students; they exist to have graduates. However, I would urge us not to rely exclusively on the traditional definition of graduation rate as the percentage of full-time first-time freshmen who graduate from the same institution within four or six years.

While this may be appropriate for universities that cater primarily to traditional students, it is inappropriate for institutions such as SPSU that cater more heavily to non-traditional students. Indeed, our TCSG articulation programs, which I would argue are good for the State, are designed to produce graduates who would not show up in the traditional graduation rate. I would therefore urge the consideration of more creative ways of measuring graduation.

Third, the State should consider making more needs-based financial aid available. For many at SPSU, one of the highlights in the last budget cycle was the inclusion of some needs-based aid. Even relatively small amounts of aid often make the difference between the student being successful and the student failing. As one recipient at a recent SPSU scholarship banquet put it, "It is not just the money that is important; it is the fact that you know you do not have to worry about your rent and your other bills so that you can concentrate on your studies." Again, I applaud the legislature for making a first move in this direction last year, and I would urge it to do more.

Traditional Industries in Technology Growth

- **Dr. Norman Marsolan, Technical Association of the Pulp & Paper Industry**
- **Randy McRae, International Paper**
- **Dan Floyd, Renmatix**
- **Dr. Phil Jones, Imerys Pigments**

Norman Marsolan, Ph.D.

Dr. Norman Marsolan was appointed director of the Institute of Paper Science & Technology (IPST) at the Georgia Institute of Technology in November 2009. IPST is a key interdisciplinary research center at Georgia Tech and a central component of the Institute's efforts in industry engagement in forest products, energy, and sustainability. As director, Dr. Marsolan is responsible for engaging the research capacity of Georgia Tech in the service of the IPST industrial consortium.

Dr. Marsolan holds a B.S. Chemical Engineering, Louisiana State University and earned his Ph.D. Chemical Engineering in 1976 from Louisiana State University. His research interests include smart manufacturing technologies, operational excellence processes, and pulp & paper process optimization.

After twenty years of service, Dr. Marsolan retired from International Paper Company (IP) in 2008, where he last served as director of research & development. Over the years, he held various leadership assignments at IP, including management positions in process control technology and operations assignments as Mobile mill technical manager and mill manager of the IP Woronoco/Westfield mills in Massachusetts. Dr. Marsolan transferred to IP Technology in 1998, where he initially served as pulp manager. He then held the assignment of director of technology manufacturing solutions, where he was responsible for worldwide support of pulp and paper manufacturing. He later became director of R&D.

Prior to joining IP, Dr. Marsolan held positions at Louisiana Tech University (1976-1988) where he advanced to the position of professor and director of engineering research and graduate studies. His awards include the Dow Outstanding Young Faculty Award from the American Society for Engineering Education and an Outstanding Achievement Award in Research from the Engineering Foundation.

Dr. Marsolan currently serves as vice chair of the Technical Association of the Pulp and Paper Industry (TAPPI) and is a member of its board of directors and executive committee. Additionally, he previously served on the Georgia Tech IPST Board of Executives.

Good morning, Ladies and Gentlemen.

My name is Norman Marsolan. I am director of the Institute for Paper Science and Technology at Georgia Tech, here today in my capacity as elected chair of the Technical Association of the Pulp and Paper Industry. TAPPI is the leading technical association for the worldwide pulp, paper, packaging, and converting industries, a 7,000-member association fostering technical knowledge, networking, and professional growth in the forest products and associated industries.

Our panel on Traditional Industries in Technology Growth will emphasize that the existing economic and employment engines of Georgia offer emerging, dynamic opportunities for growth. They can and must be nurtured, even as the state is creating incentives and encouragement for new development. I will lead by discussing the forest products industry's efforts to re-create its future and develop breakthroughs that will enable its renewal and success. Next, Randy McRae of International Paper will discuss potential policy options and impacts on the existing industry. Dan Floyd of Renmatix will discuss how Georgia can encourage startup industries based on renewable biomass, and Phil Jones of Imerys, representing the Georgia Mining Association, will talk about how traditional commodities are opening whole new opportunities and markets to Georgia as a result of modern analytical and processing innovations. Dr. Jones will also summarize the panel's recommendations.

The forest products industry accounts for approximately 6% of the US (manufacturing) gross domestic product, on a par with automotive and plastics industries, employing nine hundred thousand people and generating $200 billion in sales and $50 billion in payroll annually. Its widespread employment base is concentrated in rural communities, and it is among the top ten manufacturing employers in 42 states.

The forest products industry has experienced challenges and contractions in recent years, and has relied on science and technology to maintain a competitive position in its traditional markets while reaching into new product and market opportunities through advances in materials science.

Therefore, the forest products industry is currently undergoing an urgent transformation, and its success is vital to the US economy and to Georgia in particular. This transformation will be accomplished through R&D (including product and process innovation), manufacturing performance goals, and development of a technologically advanced workforce. Understanding of the vast potential of wood to produce innovative 21st-century products is rapidly expanding—in fact, exploding—through modern analytical tools and advanced manufacturing processes.

First, research. To tap its full potential and create rural jobs, the forest products industry's Agenda 2020 Technology Alliance has published a research roadmap to identify the breakthrough technologies needed to accomplish the transformation. TAPPI and Georgia Tech collaborated in conducting the technical workshops that led to this roadmap. I have provided copies for each of you and ask that the Roadmap be included in the record for this hearing.

The Alliance and its roadmap aim to position the industry for sustainable long-term growth as a producer of goods made from a renewable carbon-neutral source while increasing the industry's leadership position in bioenergy and recycling of waste products. The industry aims to increase biomass supply, increase the value of biomass, and enable new products and new product features. An exciting part of this agenda is to evolve existing pulp mills into integrated forest biorefineries that produce new biomaterials, biochemical, and renewable energy, in addition to existing products.

Second, the Roadmap research agenda is also aimed at achieving the industry's publicly announced sustainability performance goals, developed through the American Forest and Paper Association. By 2020, the industry intends to increase its rate of paper recovery for recycling to 70%, from its present impressive 63.4% (for 2009 per AF&PA); to increase energy efficiency by 10%; to reduce greenhouse gas emissions by 15%; to expand forest certification; to move closer toward zero injuries through a reduction of 25% in the injury incidence rate; and to increase opportunities to reduce fresh water consumption.

Third, the industry is working to advance the capability of its employment pool and its own employees. TAPPI is a sponsor of the National Network for Pulp & Paper Technology Training (NPT2), created to provide a technologically advanced workforce. The National Network is an alliance of community colleges, universities, industry partners and the U.S. National Science Foundation. For example, the management of a mill in Georgia came to NPT2 to create a program to allow its incumbent employees gain technical skills and earn a two-year degree. NPT2 partnered with Alabama Southern Community College and Bainbridge College in Georgia to develop a 27 credit-hour certificate plan. Bainbridge will provide the core academic and technical classes in classrooms or through its eLearning platform. Students will then take NPT2's Pulping Technology, Paper Technology, and Chemical Recovery & Environmental Control classes through Alabama Southern (via eLearning). As soon as Bainbridge receives accreditation for its pulp and paper program, the entire certificate program will be issued through Bainbridge College. Bainbridge will then serve as a host institution for providing NPT2-certified programs in partnership with other technical colleges across Georgia.

Despite recent difficulties faced in the industry—mill closures, job losses, overseas competition, burdensome regulations, declines in housing, communications, print advertising and

publications, the industry has moved aggressively to seize the opportunities offered by 21st-century developments in its raw material, establish ambitious performance goals, and develop its present and future workforce.

How can Georgia help?

First, Georgia should be mindful of the value of the industry, and of its critical role in maintaining a healthy economy in Georgia. Georgia should establish a high-level exchange with the forest products industry and develop a technology research roadmap of its own, drawing from the national roadmap. This would ensure that Georgia not only revitalizes and protects its existing rural employment engine but also positions itself to capitalize on the growing worldwide demand for its advanced forest-based chemical, packaging, and biofuel materials. Georgia should back this up with strategic investments in technology innovation research.

Second, Georgia should support the industry's efforts to create the technologically advanced workforce through programs like NPT2, which provide STEM skills for existing employees as well as new entrants, and develop the capabilities of its technical colleges across the state.

On behalf of TAPPI and the industry, I thank you for this opportunity to participate in this important hearing, and will be pleased to respond further to any questions.

Sources:

2010 Forest Products Industry Technology Roadmap, Agenda 2020 and partners

Georgia Forestry Commission, The Economic Impacts of Forest Products Manufacturing in Georgia, 2009

Georgia Fact Sheet, Forest and Paper Industry At A Glance, American Forest and Paper Association, 2011

Norman Marsolan, Ph.D.

Chair, Technical Association of the Pulp & Paper Industry

Director, Institute of Paper Science and Technology, Georgia Tech

- Forestry is a valuable national and Georgia resource, providing sustainable, renewable raw materials and products accountable for 6% of the US manufacturing GDP, generating $200 billion in sales annually, and employing nine hundred thousand people — largely in rural areas.
- The industry's Agenda 2020 Technology Alliance, with support from TAPPI and Georgia Tech, has developed a technology research roadmap in support of its goals to transform the industry.
- The industry is advancing the capability of its employees and employment pool through the National Network for Pulp and Paper Technology Training (NPT2) to provide the technologically advanced workforce.
- Georgia's investment priorities should reflect the value of the forest industry, and other established manufacturing industries, and their critical role in maintaining a healthy economy in Georgia. The manufacturing base must be maintained and nurtured to protect and expand rural employment.
- Georgia should prepare and execute a technology research roadmap to revitalize its rural employment engine and position itself for growth in advanced forest-based chemical, packaging and biofuel materials.
- Policies should encourage highest and best use of raw materials and consider potential impacts on availability, sustainability and price of raw materials when establishing policies.
- Georgia should support initiatives like NPT2 to create the technologically advanced workforce to expand and enhance rural employment opportunities.

Edgar Randall "Randy" McRae, Jr.

Randy McRae serves as Senior Regional Government Relations Manager for International Paper, the world's largest paper and packaging company. With International Paper since 1987, his responsibilities include all Company public affairs activities in Alabama, Florida, Georgia, and Mississippi, encompassing legislative, regulatory, administrative, and local governmental affairs, as well as various internal and external communications functions. He represents the Company before state legislatures on a daily basis during regular and special sessions, is deeply involved in coalition work on a variety of technical issues, and has worked in elective politics since 1982.

McRae has been involved in legislative affairs since 1982 and previously held the positions of Regional Public Affairs Manager, International Paper, Manager, Governmental and Public Affairs with Hammermill Paper Company, and Director of Research/ Assistant to the President, Alabama Chamber of Commerce/ Business Council of Alabama. He also served as a District Executive for the Boy Scouts of America from 1978 to 1982.

He served for two years as Chairman of the Georgia Paper and Forest Products Association, and currently serves on the boards of the Georgia Chamber of Commerce, the Florida Pulp and Paper Association, and the Alabama Civil Justice Reform Committee. McRae was founding Chairman of the Alabama Industry and Manufacturers Association, and served on the steering committee that formed Manufacture Alabama, a larger, successor organization formed in 2002. He has also been active in leadership positions in a number of state trade associations and issue coalitions. These include Chairman, Governmental Affairs committee, Business Council of Alabama; Chairman, Federal Affairs committee, Business Council of Alabama; Chairman, Alabama Electricity Consumers Coalition; and Chairman, Legislative committee, Alabama Pulp and Paper Council. He received the first Business Council of Alabama "Partners For Progress" award in 1995 for his work in helping the organization realize its legislative goals.

McRae is a 2002 graduate of the Public Affairs Institute, a three-year continuing education program of the Washington based Public Affairs Council.

McRae is a 1977 graduate of Troy State (now Troy) University. He resides in Montgomery and is married to the former Sandra Strickland, a talented interior designer and home maker. They have one beautiful daughter, Caitlin Amelia, who followed her father’s footsteps and is a student at Troy University. The family is active in Frazer Memorial United Methodist Church. In his spare time he has played guitar in local musical groups and enjoys fishing, golf (sometimes), reading, and his family.

Remarks by Randy McRae, Jr.

Senior Regional Government Relations Manager

International Paper

Joint Study Commission for a Strategic Plan for Science and Technology in Georgia

October 28, 2011

Thank you all for the opportunity to speak here today and to represent not only my company, International Paper, but the Georgia pulp and paper industry as a whole. I come here today with 25 years of experience representing International Paper in four southeastern states in the state government relations arena. This includes serving two years as Chairman of the Georgia Paper and Forest Products Association. During my career, I have watched and participated in radical changes in my company and the pulp, paper, and forest products industry. I would like to discuss how the industry has changed and why that change makes it important that as we move forward, no well intended steps

are taken that ultimately hurt the existing paper and forest products industry in Georgia.

First, a few facts about the paper and forest products industry in Georgia. This data was compiled by the Enterprise Institute at Georgia Tech. Current economic conditions have no doubt affected these numbers:

- There are 12 pulp and paper mills operating in the state
- 11 veneer mills
- 94 sawmills
- 65 other miscellaneous wood products mills
- 1200 facilities providing secondary processing of wood products
- This represents employment of 57,812
- A payroll of $3.1 billion
- An output of $18.3 billion (pulp and paper is 59% of that)
- State taxes paid $539 million

These are impressive numbers. If multiplied out, however, to include suppliers, vendors, and jobs created to service the industry, those numbers are even more impressive:

- Output of $28.7 billion
- 128,387 jobs
- Payroll of $6.5 billion

International Paper is a big part of this. We employ 2,123 people at 12 manufacturing facilities, 3 distribution locations, and several fiber supply offices. We operate pulp and paper mills producing bleached board at Augusta and liner board at Savannah, and we will soon add employees and facilities when the acquisition of Temple-Inland is completed early next year. We had a 2010 payroll of $230 million and paid $15.6 million in state and local taxes.

I mentioned the changes the pulp and paper industry has seen over the last several years and I want to discuss that and

what it means as new markets and uses for wood fiber are being developed. When I began working in the industry, there were many more companies. A lot of familiar names have gone away through industry consolidation: Scott, James River, Hammermill, Union Camp, Federal Paperboard, St. Regis, Champion International, Jefferson Smurfit, just to name a few, have been merged or acquired since I joined the industry. I actually started working for Hammermill in 1986 and we were bought out by International Paper three months after I began work. This consolidation has been driven by pure economics and economy of scale, which ultimately has led to another important change.

Most companies in the industry used to look more or less the same. Some were bigger or smaller, but most all of them were vertically integrated. We all owned land, grew trees, had some wood products businesses, maybe some box business,

made some white paper, made some brown paper, maybe some consumer grades. The sawmills made lumber and fed chips to the pulp mills. That began to change in the 1990s with a rapid acceleration in the 2000s. Companies first began to run to certain market niches, deciding to concentrate on what they did best. Most sold off secondary businesses like chemicals and minerals. They concentrated instead on two or three businesses in which they felt they could best compete and generate the most profit. International Paper decided to concentrate on three platform businesses: Printing and Communications Papers, Packaging and Packaging Papers and Distribution. Most companies decided to concentrate on manufacturing. Along with this, most major pulp and paper companies made a very strategic change: *Almost all of them, eventually, made the decision to sell their land and timber assets.* One notable exception is Weyerhaeuser, which has decided to go the other direction, selling most of their

manufacturing businesses to concentrate on owning and managing land.

Why sell the land and the trees? There are varying reasons. Companies decided that they could best compete as manufacturers. Others sought to raise capital to redeploy in other businesses. Some needed the money to pay down debt. All of these decisions were made by the senior leadership of these companies, looking toward best positioning their companies for the future. International Paper sold approximately 6.9 million acres, going from the largest land owner in several states to owning almost no land at all.

This brings us to the present: The pulp and paper industry is now almost exclusively a traditional manufacturer. We are dependent on the open market for our fiber supply. As such, we realize that the free market price of fiber will fluctuate due to certain market conditions: Weather, natural disasters, fire,

and competitor competition in supply basins all affect wood prices. The industry has been very effective and successful competing in an open fiber market. International Paper, even with our land base, had always been dependent on the open market for approximately 70% of our fiber supply, so we didn't have to start from scratch, learning how to buy wood.

This is the most important point I will make today: *As we move forward, the existing paper and forest products industry must be allowed to compete on a level playing field in an open fiber market.* State government, legislators, local officials, and economic developers are all working hard in these tough economic times to bring jobs and industry to Georgia. In doing this, it is imperative that government at any level take no action that selects "winners and losers" in the fiber supply market. By this, I mean the granting of price incentives or subsidies to new industry which would use the same fiber that

existing industry must procure in an open market. I applaud the Georgia General Assembly for passing the 2010 “Forest Products Fairness Act” which prevents this from happening. Let me make it clear that we have no qualms at all with normal and traditional economic development incentives for new industry on the construction of any new industrial plant. The raw material price, must, however be left to the open market.

In conclusion: A previous Georgia Governor liked to say that Georgia was “The Saudi Arabia of biomass”. This sounded great, but those of us trying to manage wood costs and knowing our procurement areas best worried about that blanket statement. Yes, Georgia is blessed with vast timber resources, but the resource, while renewable, is not unlimited and must be carefully managed. We need to gather information on the inventory and *insure that it is sustainable* as we put increasing pressure on it with the additional of new

forest based industry and hopefully the expansion of existing industry. A couple of recommendations:

- Insure a stable ad valorem tax structure that makes it possible for the landowner to grow trees and replant them after they are harvested.
- A state funded, state of the art, timber inventory study that tells us where the trees are, what kind they are, and the age of the stand. A similar study in Alabama has been very useful and Florida is close to contracting for one. This will give us accurate information on the location and sustainability of the inventory. We don't want to harvest more than we grow, in affect "eating our seed corn".

Thank you for allowing me to speak with you today.

Summary of Remarks by Randy McRae, Jr.

Senior Regional Government Relations Manager

Joint Study Commission for a Strategic Plan for Science and Technology in Georgia

October 28, 2011

- Government should take no well intended action that ultimately hurts the existing paper and forest products industry.
- The paper and forest products industry represents employment of over 57,000 Georgians, with a payroll of over $3 billion, and output of $18.3 billion, and pays taxes in excess of $530 million.
- Including suppliers, vendors, and support jobs, these figures increase to and output of $28.7 billion, over 128,000 jobs, and a payroll of $6.5 billion.
- International Paper employs 2,123 people at 12 manufacturing facilities, 3 distribution locations, and several other support offices. A 2010 payroll of $230 million and paid $15.6 million in taxes.
- The pulp and paper industry has undergone radical change in the last few years. Consolidation, concentration on market segments, and the divestiture of timberland has changed the business model of the industry.
- The existing pulp, paper, and forest products industry is now dependent on the open market for its raw material and fiber.
- A level playing field on the price of fiber is essential for the existing pulp, paper, and forest products industry. Government should not select winners and losers on the price of fiber. No incentives should advantage one user of fiber over another.
- Georgia is blessed with vast, but not unlimited timber resources. These resources must be properly managed to insure that both existing and new fiber dependent industries have adequate raw material supply for the future.
- The state should fund a state of the art timber inventory study to obtain accurate and up to date information on the state's standing timber resources. We must know the sustainability of the timber inventory as decision are made concerning the expansion of the use of the resource.
- The state should insure a stable and affordable timberland ad valorem tax structure to foster the sustainability, retention, and expansion of our timber resources.

Policy Recommendation(s)	Recommendation Details, Specifics & Reasoning
Recommendation #1 A Stable Ad Valorem Tax Structure	Timberland owners must have a stable and affordable property tax structure. This will foster sustainability, good land use practices, encourage replanting of harvested tracts, and protect family timberlands.
Recommendation #2 Timber Inventory Study	The state should contract for and fund a state of the art timber inventory study. This is vital for the planning for and siting of new fiber using facilities and the protection of existing industry. Unlike traditional inventory methods, such a study can reveal down to the county level where the trees are, what type they are, and the age of the stand, in virtual real time. This information is critical in determining the sustainability of our timber resources.

Dan Floyd

Dan is Renmatix' Operations Director, responsible for the people and equipment in the Kennesaw site to move Renmatix' technology from demonstration phase to commercial validation. During 15 years at Dow and Union Carbide, Dan executed commercial-scale implementation of multiple technologies. He has driven results from leadership roles in both Manufacturing and R&D functions with teams in North America, Europe and India, as well as teams made up of multiple companies via JV and JDA. He has led teams in the Polyolefins, Polyurethanes and Diesel Particulate Filters businesses.

Dan, a licensed Professional Engineer, graduated with a Bachelors of Chemical Engineering with Honors from Georgia Institute of Technology. In 2007, Dan was named to Georgia Tech's Council of Outstanding Young Engineering Alumni.

Dan Floyd, P.E.

Operations Director, Renmatix

Fifteen years with Dow and Union Carbide, executing commercial-scale implementation of multiple technologies

Named to Georgia Tech's Council of Outstanding Young Engineering Alumni

Good morning and thank you for your time today. My name is Dan Floyd and I am the Operations Director of a biomass technology start-up based in Kennesaw Georgia—Renmatix. Renmatix was founded in 2007 in Kennesaw. We seek to produce the lowest cost sugars from biomass that can be converted to biochemical and biofuels. In our first generation process, we will focus on woody biomass as our feedstock. The sugars from our process feed the renewable materials markets as more chemicals and fuels are sought to be produced from renewable, home grown US based raw materials. To demonstrate that advanced manufacturing represents an important scientific and technology opportunity for Georgia, I would like to spend a few minutes describing the opportunity that Georgia's biomass raw materials, technical capabilities and positive business climate could mean for a company like ours as well as other technologies in our biorenewable space seeking to do the same thing: Create a growth industry by producing renewable materials here in the US with local employees, with homegrown biomass.

There has been much discussion recently about biorenewable materials, non food based or cellulosic materials or fuels. In the last 20 years, there has been significant growth in the biofuels market, primarily with the use of corn sugar as a fermentation feedstock for ethanol blended into gasoline feedstocks. This has created some concern about using corn as a feedstock for the fuels market as it may create competition between food and fuels markets. There is also concern about introducing the uncertainty of corn or ethanol subsidies into an already volatile

fuel market. Due to these considerations, there has been growing interest in exploring and finding ways to exploit the sugars or carbon available in biomass, including woody biomass, corn residues or cane bagasse, even municipal solid waste. There are several technologies under consideration including enzymatic hydrolysis, acid hydrolysis, pyrolysis, gasification or my favorite, supercritical water hydrolysis. Each of these processes seeks to break down the feedstock into sugars (glucose and xylose), pyrolysis oil, or synthetic natural gas (carbon monoxide and hydrogen). Each of these can be utilized in different ways to produce fuels, chemicals and materials. A popular example of a biobased material is biobased monoethylene glycol utilized in biobased PET for beverage containers. Woody biomass has a significant advantage over many of these biomass feedstocks because the supply chains already exist- this has caused companies like Renmatix to initially focus on woody biomass feedstocks and could provide a significant opportunity for Georgia to capitalize on the burgeoning industry due to its abundance of desirable feedstock. The companies that sustainably harvest, ship and chip these raw materials already exist in states like Georgia. This reduces a lot of startup risk for new technology based companies such as Renmatix and others in our space.

So what's the opportunity for a state like Georgia? As mentioned one of the drivers for a company like Renmatix is domestically grown, domestically harvested, and domestically converted biobased materials and fuels. A term often used is the concept of a biorefinery. Much like a paper mill or wet corn mill, a plant built by Renmatix would be located where the biomass is. With our initial focus on hardwood, we would be looking for an area that can sustainably produce 500 to 2,000 bone dry tons per day of wood chips throughout the year. These locations exist in Georgia, notably in rural areas in the north and especially the south of the state. This represents jobs in rural areas, many of which have been hit the hardest during the latest

recession, areas where this feedstock has historically been used by paper companies, many of which have ceased operations in recent decades. These jobs will be numerous throughout the value chain. Jobs to harvest the wood, jobs to produce the chips, jobs to build the plant, and jobs to convert the biomass into renewable fuels and products. All told, our partners and us expect north of 200 direct jobs in the value chain for each plant and many more indirect jobs derived in the local economy. These are jobs that cannot be outsourced- the logistics of moving biomass determine that one can never move the low cost material very far without significantly affecting its cost.

We should also recognize that it's not just the biomass that a state like Georgia can bring to the table. We should recognize world class technology organizations such as Georgia Tech and the University of Georgia. At Georgia Tech, much work is being completed in the biorenewable space in places like the Schools of Chemistry, and Chemical and Biomolecular Engineering as well as the Strategic Energy Institute led by Dr. Roger Webb and the Institute of Paper Science and Technology led by Dr. Norman Marsolan. Along with the cutting edge technologies available in Atlanta, there are also extensive capabilities in Athens, including the Bioexpression and Fermentation Facility. Our company has worked with all of the above mentioned groups in collaborating to improve a part of our process, producing a vetted Life Cycle Analysis of our technology, or producing critical chemical analysis of our products.

How can the state of Georgia encourage this new industry to support job growth in Georgia and take advantage of the many resources already here? The commission should consider what the State is doing to maintain and grow its current resources in the space, be it support to the

biomass producers or support for the technical capabilities at Georgia Tech and the University of Georgia. The commission should also consider what other states are able to do in terms of incentive packages to convince companies to create new jobs in rural areas, i.e., locate commercial facilities. Our observation is that the most successful states are able to harness and coordinate resources at the federal, state and local level to combine very attractive economic incentives whether they are forgivable or low interest loans for brown and green field sites and their upgrades, tax breaks based on maintaining set employment levels or utilizing rural economic development programs to attract companies to where the feedstock is and where the jobs are needed most. Mississippi is an example of a state that has been very aggressive in attracting clean technology companies via combinations of low interest loans and other incentives. More than $2 billion in biorefinery projects have been announced by the state in the last 12-18 months. Georgia has 1.3x the amount of woody biomass on private lands as Mississippi and world class technology organizations in Georgia Tech and the University of Georgia- why shouldn't it be in contention for all of these large job-creating projects?

Thank you for the opportunity to be heard on this important subject.

Dan Floyd, Operations Director—Renmatix

- Advanced manufacturing represents an important scientific and technology opportunity for Georgia
- Woody biomass is an attractive source of sugars and carbons, which does not compete with food markets, to make biofuels and biochemicals
- The raw material supply chain and infrastructure already exist in rural Georgia.
- Georgia's world-class technology organizations such as Georgia Tech and the University of Georgia are supporting the research in chemical processes, life cycle analysis, and product analysis
- Georgia must create an attractive climate for venture capital, and become more competitive with other states; Georgia offers world-class technology and abundant raw material supply, and should be able to compete with other states for these major job-creation opportunities in rural areas

J. Philip E. Jones
Director, New Ventures & Disruptive Technologies.
IMERYS, Roswell, Georgia.

Phil Jones (BS Physics and PhD, Physics, University of London) joined English China Clays plc (Imerys) in 1975 and transferred to their laboratory in Sandersville, Georgia where he lived and progressed to become Vice President, Technology. In this role he built the Imerys Technology Center for studying minerals' applications in paper, polymers, paints and ceramics. His work has concentrated on developing and understanding the mechanisms for white mineral pigment performance where pigment characterization and ways of structuring mixed mineral systems have allowed micro and nano-engineering in a range of applications.

He has served as a member of the Board of Directors of Tappi.
In 2008 he was an expert panelist for the Canadian Government's Business-Led Centres of Excellence Program which reviewed the proposal by FP Innovations for a Nanotechnology program.
He is Co Chair of the Nanotechnology Committee of the Agenda 2020 Technology Alliance program and a member of the Consultative Board for Advancing Nanotechnology (CBAN) in the Forest Products Industry which interfaces with Government Agencies such as OSTP, DOE, NSF, USDA and DOD through the National Nanotechnology Initiative (NNI).

Kaolin a Material of the 21st Century

J. Philip E. Jones, Ph.D.
Director, New Ventures & Disruptive Technologies
Co-Chair-Nanotechnology Committee, Forest Products Industry's Agenda 2020 Technology Alliance
Dr. Jones has worked with Imerys/English China Clays for 36 years.
Member of Georgia Mining Association

Kaolin

The tools that have been developed from the massive US National investment in Nanotechnology have allowed us to see in more detail the true nature of kaolin minerals right down to the atomic level. This has allowed the industry to identify enormous deposits of very thin crystal kaolins that previously were believed to be useless but are now emerging as high value material building blocks with substantial potential. However many people regard kaolin and other minerals as traditional industries. In fact, kaolin and other minerals are complex materials for which the value depends greatly on formulating skills. The deeper insight as to the real nature of these mineral particles is opening up opportunities to use them in higher value applications where we can take advantage of techniques developed in the broader world of materials science.

Within Georgia the value of natural and mined resources has grown to $2.2 billion per year and the vision we have is that, with up to date R&D, this can be grown by a factor of 10. Part of this is underway with companies expanding with substantial capital investment in fracking products with associated new high paying jobs. Currently there are approximately 3,000 people directly employed by the kaolin industry with an additional 3,000 people in associated supported activities as well as the rural communities that they support. The kaolin industry has been a pioneer in the development of advanced mineral

processing technologies , such as minerals separation, dispersion of particles in water, filtration and dewatering etc, that have then been adopted by other large scale mining operations.

Modern scientific analytical tools have allowed us to understand the complexity on kaolin and are allowing us to explore new applications such as barrier coatings in paperboard food packaging. There is an opportunity to leverage the R&D infrastructure in the State of Georgia to re-invent the world class kaolin industry in Georgia and provide higher-paid jobs in rural Georgia and enhanced tax revenue.

Kaolin is comprised of tiny hexagonal platelets that are small enough to scatter light and appear white; the coatings of platelets are effective in producing smooth surfaces on paper and hold inks on the surface for maximal effect. With the more recent advent of extremely high-resolution electron microscopes and atomic force microscopes, we have been able to characterize these kaolins in increasing detail and identify more useful attributes. In addition, the kaolin operations are now operating more like oil refineries. Specific crude clay deposits are selected, the particles “cracked” or delaminated, and then different particle size and shape fractions are “distilled” off with a variety of centrifuges. These fractions are the building blocks for new composite materials, providing higher strength and consequently lighter-weight material applications such as automobile panels. New grades of kaolin products have emerged that are finding use in barrier coatings in food packaging grades and also providing higher mechanical properties in paper coatings. Applications are already in the marketplace that provide ways to make lighter-weight board and also paper and paperboard grades with enhanced barrier performances.

The kaolin deposits in Georgia are extensive and of a high purity. Historically, they have been used primarily in paper coatings and fillings. The Georgia deposits had a peak production rate of 10 million tons /year and remain, by far, the largest producing region in the world. In Georgia, we have both the extensive deposits of kaolins and, most importantly, the road, rail and pipeline infrastructure with a trained workforce in rural communities that give Georgia a unique competitive advantage over other parts of the world. Unfortunately, competition from kaolins in Brazil and from other materials such as ground marbles, coupled with the recent decline of printing and writing grades, has caused production to decline to 5 million tons per year.

In parallel with the advancements in analytical tools and refining capabilities, great strides have been made in the field of biomimetics, which is the understanding of how nature can make very high-strength materials such as sea shells, teeth, bone and antlers. These turn out to be mineral-based composites, very often comprising 98 % mineral with only 2 % adhesive holding the minerals together. We have seen that often the mineral building blocks in nature are of similar sizes and shapes of the selected kaolin fractions in Georgia. As a result, we are learning to take a commodity like Georgia kaolins and transform it into higher value grades for use in coatings and laminates of higher strength and lighter weights for use in a wide range of paper, construction and automotive applications.

Georgia has the strategic advantage of not only having extensive reserves, but also having the road, rail and services infrastructures to access them and ship them on to customers. Elsewhere in the world, large reserves occur in remote areas where access and

services are limited and which do not have an educated population available to manage and run extensive operations.

Georgia can build on this existing infrastructure to become the world center for light-weight mineral nanocomposites, leveraging the University system in Georgia and their expertise in materials science and characterization.

The Western world has 15 % of the globe's population but consumes 50+ % of the resources. As the rest of the world develops, it aspires to a similar life standard and to be able to consume at Western world levels. Our existing use of materials would become stretched to an unsustainable level resulting in rapid and dramatic price increases and potential political instability. It will become imperative to develop materials and products using abundant resources with lower energy inputs. As such, Georgia is well placed to become a world leader in developing high-strength, light-weight composites using its abundant kaolin resources. This will provide high-paying rural jobs mining and refining kaolins as well as "compounding" these products into a form that can be transformed or converted with micro and nanocelluloses to even higher-value products.

The State of Georgia must seize the initiative and ensure that adequate research dollars are made available to provide the fundamental work needed to expand our understandings of these unique materials. The likely areas of high growth will be in the areas of higher strength composites for packaging, construction and automotive applications. In addition we will see further growth in fracking volumes if we can enhance the strength of these ceramic beads through materials development in the University system. The resources exist in the Georgia University systems to allow this to happen and there is an opportunity to help coordinate academic and industrial resource by

supporting the development and scale up of manufacturing processes developed at Universities and scaled up at industry's pilot plants. We must be sure we focus on what is a major State resource in the kaolin deposits so that we deliver more jobs in the mining industry as well as in refining and production of composite compounds and applications. The State can help through investment in R&D, prototyping and scale up as well as providing a positive climate for capital investment and job creation. If we choose not to act, other countries, such as Brazil and China, will eventually do this work and accelerate the decline of the Georgia kaolin assets.

Above all is the need to recognize that kaolins are a 21st Century Material.

Ladies and gentlemen, with your permission I would now like to offer a brief summary on behalf of the panel.

Georgia has a strategic opportunity in its manufacturing assets. It should seize this opportunity.

Georgia today can leverage advanced science and technology capabilities to capitalize on its existing manufacturing assets, unique forest and mineral resources, rural workforce and infrastructure. It can develop its unique raw materials and convert them to 21st-century materials that will compete cost-effectively with petroleum, plastics and steel. To do this, Georgia should maintain and nurture its existing manufacturing assets; this will preserve existing rural communities and facilitate promising expansion of its economic base. Georgia should support efforts like NPT2 to develop the preparedness and capability of its workforce. Georgia should create a hospitable climate for venture capital and foster investments in new opportunities. Georgia should avoid policies that

exert unfair influences on raw material costs. It should seek policies to encourage development and processing of its raw materials to their highest value. Georgia incentives must become more competitive with those of other states.

Georgia should conduct a high-level discussion with the forest products, biochemical and mining industries to develop a shared agenda of opportunity, and support such a roadmap with strategic investments in research and development to foster innovation. Georgia's investment priorities should reflect the strategic value of its unique forest and mineral resources in rural areas. Georgia should conduct a forest inventory, as other states have done—a vital step in planning for new industry and advancing existing industry.

All of us on the Traditional Industries in Technology Growth Panel appreciate your allowing us this opportunity to share our views with the Commission.

Kaolin a Material of the 21st Century

J. Philip E. Jones, Ph.D.
Director, New Ventures & Disruptive Technologies
Co-Chair-Nanotechnology Committee, Forest Products Industry's Agenda 2020 Technology Alliance
Dr. Jones has worked with Imerys/English China Clays for 36 years.
Member of Georgia Mining Association

- Recent advances in analytical tools have allowed us to see kaolin and other traditional minerals for the complex materials they are, and open up new opportunities for higher-value applications of this abundant natural resource

- Through biomimetics—mimicking nature's construction of high-strength materials—we are learning to use materials like kaolin as nature does to create innovative high strength, light-weight materials, and to use them in barrier coatings in food packaging and laminates in paper, construction, and automotive uses

- Georgia's $2.2 billion in natural and mined resources—which are extensive, and high in purity—can be grown by a factor of 10, to create rural jobs—and the infrastructure is already in place

- Georgia's strategic advantages of abundant, high quality kaolin deposits, an existing infrastructure, and a capable rural workforce position it to become the world center for light-weight mineral nanocomposites

- Georgia must seize the initiative by supporting research in the fundamentals needed to expand understanding of these materials. Its research priorities should reflect the strategic promise of new applications from traditional materials. Otherwise, the existing economic strength of many rural communities will fall into decline.

- World markets are rapidly expanding and, if Georgia chooses not to act, Brazil and China will eventually fill the need.

Policy Recommendation(s)	Panel: Traditional Industries in Technology Growth Macon, GA, October 28, 2011
Recommendation #1 Leverage existing resources as they advance to create 21st –century materials and create rural jobs.	Georgia should focus on leveraging its unique home-grown raw material assets where it can develop a strategic advantage over other states, and even the world, to create jobs in rural Georgia. Measures such as ad valorem tax structures to encourage reforestation are one example. Georgia's traditional industries are developing innovative products to compete successfully in world markets against plastics, petroleum and steel, and must be maintained and nurtured to protect the jobs and communities dependent on them and enable their transformation. Georgia should conduct a forest inventory, as other states have done—a vital step in planning for new industry and advancing existing industry.
Recommendation #2 Initiate a high-level forum with industry to develop R&D and investment priorities	Georgia should initiate a high-level forum with its key manufacturing industries to develop a shared agenda of opportunity, including specific research, development, and investment priorities. Georgia should back this up with strategic investments in R&D, prototyping and scale-up.
Recommendation #3 Support education and skill-building among the rural labor pool	Georgia should support initiatives for education and skill-building among current employees and the labor pool to promote preparedness for advanced manufacturing requirements. One such successful initiative is the pulp and paper industry's NPT2 program to promote the Technologically Advanced Workforce.
Recommendation #4 Encourage investment in rural Georgia	Georgia should create a hospitable climate for venture capital investment and job creation, while maintaining and nurturing its existing economic drivers in traditional industries. Georgia incentives must become more competitive with those of other states. Policies must be fair to both existing businesses and new entrants as regards raw materials and incentives. Emphasis should be on bringing raw materials to highest and best use.
Recommendation #5 Recognize the strategic potential of traditional materials such as kaolin and wood-based cellulose	Georgia's investment priorities should reflect the strategic value of its forests and natural mineral resources in rural communities. It should recognize kaolins and advanced wood-based cellulosic materials as the 21st-century materials that they are, and should provide a positive climate for capital investment and job creation to develop them.

Aerospace

- **R. Steven Justice, Center of Innovation for Aerospace**
- **David Garrison, Delta Air Lines**
- **Joseph Marks, TIMCO Aviation**
- **Alan Mathis, Warner Robins Air Logistics Center**

R. Steven Justice
Director
Georgia Center of Innovation – Aerospace

R. Steven Justice is the Director of the Georgia Center of Innovation for Aerospace responsible for a wide ranging program to accelerate Georgia aerospace companies' growth by helping them commercialize new products, services and business models, connecting them with university research and industry expertise as well as other Georgia resources for the aerospace industry. Mr. Justice brings to this role over 30 years diverse experience in the aerospace industry including technical leadership of intra-company and inter-company teams from major North American, European, and Asian aerospace organizations. Mr. Justice participated in the development, certification, and support of numerous aircraft including the Lockheed Martin F-22 Raptor and C-130J Hercules as well as the Northrop B-2 "Stealth Bomber" and the Gulfstream G-IV business jet. He is a former FAA Designated Engineering Representative (DER) and is currently a Licensed Professional Engineer (Aerospace).

Mr. Justice served on the national Board of Directors of the American Institute of Aeronautics and Astronautics (AIAA) and AIAA Technical Committees on Society and Aerospace Technology, Structural Dynamics, and General Aviation. Mr. Justice's honors include the Red Dot Design Award, Georgia Institute of Technology "Council of Outstanding Young Engineering Alumni", and the AIAA Distinguished Service Award.

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Aerospace

Georgia Aerospace Industry Facts

October 2011

Georgia Aerospace: Employment

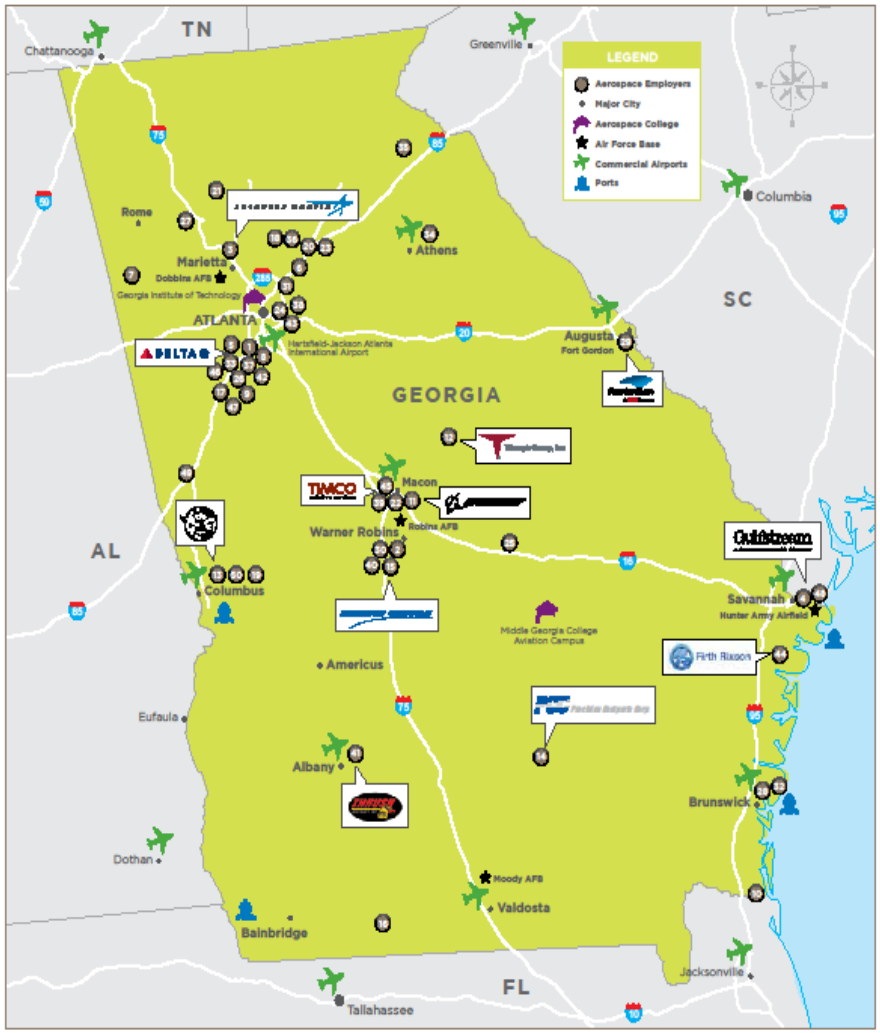
- Aerospace jobs in Georgia **up 4.5%** since 2006 – despite global economic downturn!
  - Ranked **#5** among US states
  - Aerospace payroll of $5.4 billion
  - 84,000 jobs in Georgia with average earnings of $64,600
    - **47% higher than average for the state**

Georgia Centers of Innovation

Aerospace | Agribusiness | Energy | Life Sciences | Logistics | Manufacturing

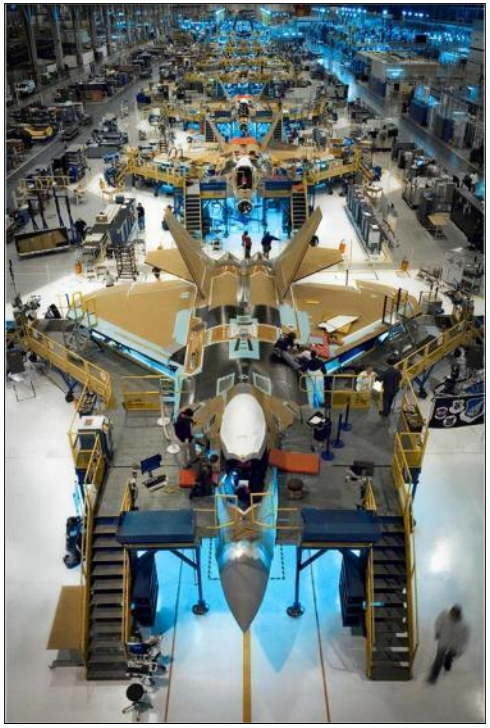
Georgia Aerospace: Sectors

- Over 500 Aerospace Companies
- Geographically Diverse
- Three main sectors
  - Aerospace Manufacturing
  - Maintenance, Repair & Overhaul (MRO)
  - Air Transportation



Georgia Aerospace: Manufacturing

- Aerospace exports of **$4.4 billion in 2010, up 100% since 2006**
  - Ranked **#4 in U.S**.
  - Exports exceed all but 6 countries globally!
- Aircraft & parts manufacturing for global aerospace programs
  - Military aircraft – fighters & transports
    - *Lockheed Martin, Boeing, Triumph, Northrop Grumman, Raytheon*
  - Commercial & general aviation aircraft
    - *Gulfstream, Maule, Thrush*
  - Aircraft engines- *Pratt & Whitney*



Georgia Aerospace: Maintenance Repair and Overhaul (MRO)

- Major civilian MRO operations
  - Ranked **#5** among US States
  - Over 13,700 employees
  - Direct economic impact of $1.3 billion
- Warner Robins Air Logistics Center
  - Largest industrial complex in Georgia
  - Over 13,000 civilian employees
  - Total economic impact of $4.1 billon

Source: Aeronautical Repair Station Association Report 2010

Georgia Aerospace: Air Transportation

- 104 public & 339 private airports
- 471,175 jobs, $17.7 B in payroll, and **$62.6 Billion** in statewide economic impact
- Hartsfield Jackson Atlanta International Airport is the **busiest passenger airport in the world**
- Home to major airline HQ & facilities
  - Delta Air Lines, Atlantic Southeast Airlines (ASA), World Airways, UPS, Airtran major hub

Georgia Aerospace: Defense In Georgia

164,000 Personnel in Georgia

- **Army**
  - Ft. Benning
  - Ft. Gordon
  - Ft. Stewart
  - Hunter Army Airfield
- **Air Force**
  - Moody AFB
  - Robins AFB
- **Navy**
  - Kings Bay
- **Marines**
  - Marine Logistics Base
- **Coast Guard**
  - Kings Bay
  - Savannah

Georgia Aerospace: Research

- Georgia Tech
  - $500M annual Engineering Research
  - #1 Aerospace Research University in U.S. (~$40M annually)
  - Georgia Tech Research Institute (GTRI)
- Mercer Engineering Research Center
- Middle Georgia College Applied Aerospace Research Institute
- Herty Foundation - Aerospace Fabrics & Biofuels

Georgia Aerospace: Education & Training

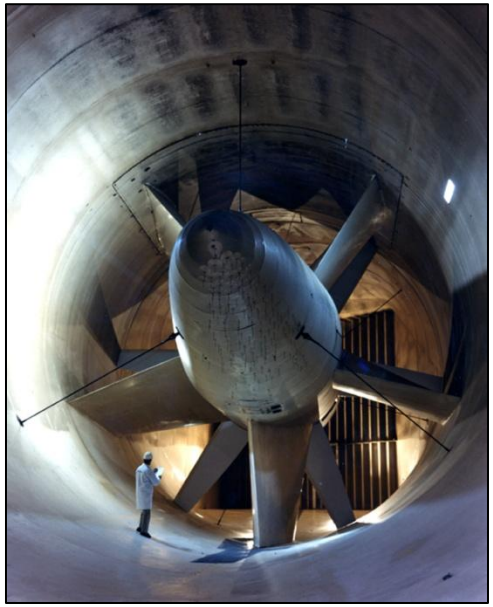
- Engineering
  - Georgia Tech (Atlanta)
  - Southern Polytechnic (Marietta)
  - University of Georgia (Athens)
  - Georgia Southern (Statesboro)
  - Mercer University (Macon)
- Aviation & Technical Training
  - Middle Georgia College Aviation (Eastman)
  - 7 Technical Colleges with FAA Approved Aviation Programs
- Quick Start & Work Ready Programs

Georgia Centers of Innovation

Aerospace | Agribusiness | Energy | Life Sciences | Logistics | Manufacturing

Center of Innovation for Aerospace

The Georgia Center of Innovation for Aerospace accelerates the growth of aerospace companies by providing industry expertise along with access to academic intellectual capital, industry knowledge, and business connections



Georgia Centers of Innovation

Aerospace | Agribusiness | Energy | Life Sciences | Logistics | Manufacturing

Center of Innovation for Aerospace

Aerospace.georgiainnovation.org

R. Steven Justice P.E.
Executive Director
sjustice@georgia.org
478.308.3097

Gary O'Neill
Deputy Director
gary.oneill@gatech.edu
404.433.8771

Georgia®
INNOVATION
AEROSPACE

Amy Hudnall
Associate Director
ahudnall@georgia.org
478.230.4300

Chad Dennis
UAS Program Coordinator
cdennis@mgc.edu
478.374.6712

David Background

David Garrison - Managing Director of Engine and Component Maintenance

Employed at Delta for over 20 years. Currently responsible for the production of over 600 turbine engines and over 150,000 aircraft components annually. His largest customer is Delta Air Lines; however, the engine shop produces over $400M in additional revenue from over 100 customers/airlines across the globe. David has held various positions within maintenance, including the head of Engineering and Quality. Other areas of responsibility have been Reliability, Training and Information Technology. David was born in Georgia and received his primary, secondary and college education in Georgia. He holds a Bachelor of Science in Physics from Emory University and a Bachelor's in Mechanical Engineering from the Georgia Institute of Technology.

Delta Background

Delta TechOps - a division of Delta Air Lines, Inc., responsible for the maintenance of the entire fleet of aircraft, engines and components. Delta TechOps employs 10,000 people across the globe. Of the 10,000, 6300 are employed in the state of Georgia. Our employee base consists of Aviation Maintenance Technicians (AMTs), our largest group, at 5800 (3500 in GA). The division also employs 214 engineers (132 in GA). The remaining groups of employees in Georgia are technical support staff and administrative personnel. Our main hub for maintenance is in Atlanta. We also perform maintenance in Minneapolis, Detroit and several other cities in the US. Delta TechOps does not perform 100% of the airline maintenance - we currently utilize other repair stations to perform some aircraft, engine and component repairs. Delta TechOps also performs maintenance for other airlines and the US military. In 2010, we performed approximately $570M in maintenance for customers across the world. Today we are the largest North American airline maintenance provider. Over the next 10 years we plan to focus our efforts in continued quality service to Delta Air Lines through a globally competitive business and grow our revenue of additional maintenance business to over $1B. Our plan consists of a combination of internal growth based on current and future capacity models and growth through partnerships. The current global trend in aviation maintenance has been to establish partnerships with manufacturers and/or other airlines to build, train and operate maintenance facilities in locations that make the most economic sense. The industry forecasts show that aviation maintenance will be a $68B business in 10 years. This, combined with the continued insertion of new technology into aircraft and engines, creates a fruitful opportunity for Delta TechOps.

SR 68 Strategic Plan for Science & Technology
Joint Study Commission – Panelist Guidelines

Policy Recommendation(s)	Recommendation Details, Specifics & Reasoning
Recommendation #1 (insert summary statement/descriptor)	Enhance the Labor Pool - Due to the skilled labor force required to maintain a fleet of aircraft and its engines and components, Delta and its maintenance organization must continue to have a reliable pipeline of trained and certified aviation maintenance technicians. Nationally there are many schools that train and certify these technicians. We predict that the demand of these highly-trained technicians will outpace the supply over the next 8-10 years. Another significant part of our technical workforce is engineers. We must continue to attract and retain a strong engineering workforce. In order to retain and/or attract science and technology companies, Georgia must have a more robust and competitive labor pool of skilled technicians and engineers. Lastly, this workforce must possess the skill set of a 21st century worker.
Recommendation #2 (insert summary statement/descriptor)	Technology Development through Collaboration - Georgia has a very strong university system. Over the span of a year, this system develops "intellectual property" that can substantially enhance a company's competitive advantage. For example, the Delta maintenance organization spends over $700M annually in material used to repair and overhaul or engines and aircraft. As universities continue to develop new technologies and processes, can they help improve reliability of these materials or find alternative solutions? Collaboration of academia and industry to improve competitiveness should be leveraged and incentivized. Collaboration could exist through regional/state councils consisting of representatives from industry and academia.
Recommendation #3 (insert summary statement/descriptor)	Government Incentives - In order for Georgia to attract/maintain science and technology businesses the state must compete with the other governments that are offering large incentives and aggressive tax incentives. As Delta TechOps continues to grow its maintenance footprint and increase our sales of maintenance to other airlines we will form partnerships with similar providers internationally. These partnerships will increase our capacity and could potentially move business and technology outside the state. Georgia can assist in making sure that that is work transfer is not economically viable through such incentives and benefits.

TIMCO
aviation services

Overview

October 2011

1.0 Overview

The TIMCO Aviation Services group of companies provides a broad array of aircraft maintenance, repair and overhaul (MRO) services and aerospace manufactured products to commercial, private, government and military customers from around the globe. In fact, TIMCO is recognized as one of the largest independent providers of airframe MRO services in the world. Over the years, the company has grown beyond the core airframe, base maintenance business into engine MRO services, aircraft seat manufacturing and PMA parts, comprehensive engineering design and interiors manufacturing through its TIMCO Aerosystems division and line maintenance services at a large number of airports through its TIMCO LineCare network. Headquartered in Greensboro, North Carolina, TIMCO units operate at an expanding number of locations.

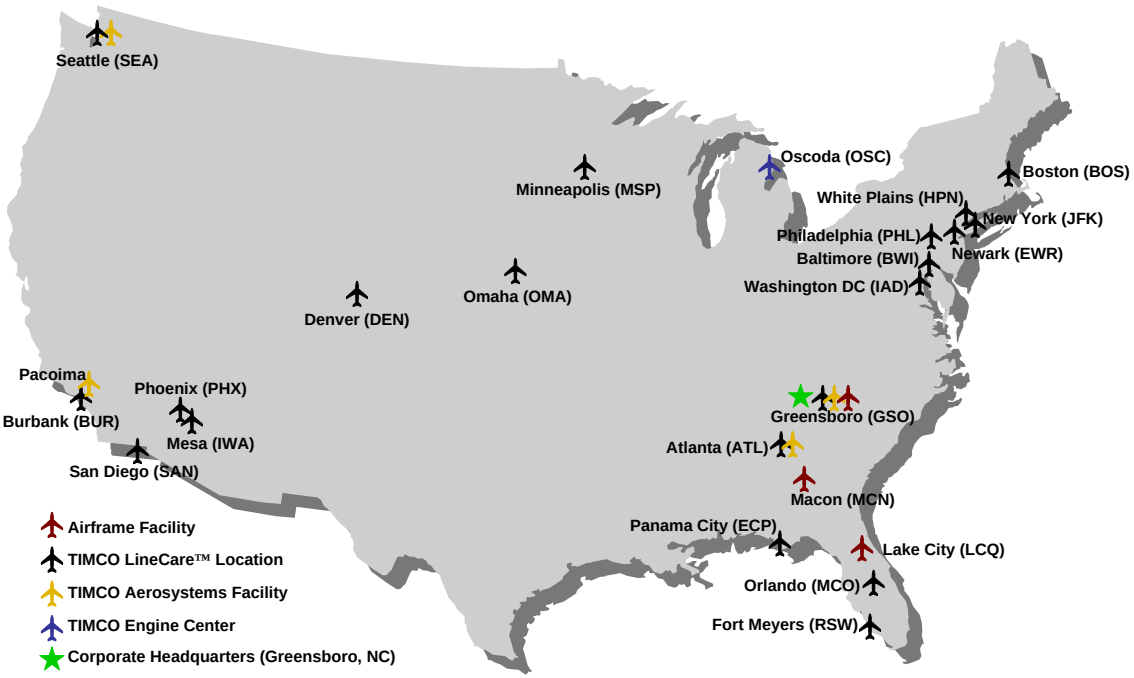


Figure 1: TIMCO locations across the United States

TIMCO's business units provide a full spectrum of aircraft technical services and interiors support for most fleet types made by leading aircraft manufacturers such as Boeing and Airbus. In 2009, TIMCO Aerosystems was certified by the FAA as an Organization Designation Authority (ODA) repair station, replacing the Designated Alteration Station certification it held since 1995 and authorizing it to provide design and engineering services, agency certification approvals and supplemental type certificate (STC) listings, and to manufacture and distribute modification installation kits.

TIMCO's customer base includes the largest global commercial operators, low cost carriers (LCCs), aircraft leasing companies, private charter operators, governmental agencies from around the world and private aircraft fleet owners. Altogether, TIMCO businesses include nearly 2,500 employees, many of whom are fully FAA-certified.

Employees

TIMCO businesses currently employ nearly 2,500 employees:

Employees by Business Unit		
Operation	**Location**	**Employees**
Greensboro MRO	Greensboro, NC	1,025
Lake City MRO	Lake City, FL	434
Macon MRO	Macon, GA	190
TIMCO Line Care	All locations (See section 7.6 for station locations)	150
TIMCO Engine Center	Oscoda, MI	40
TIMCO Aerosystems	Greensboro, NC; Atlanta, GA; Seattle, WA; Pacoima, CA	570
Corporate Offices	Greensboro, NC	60
	TOTAL	**2,469**

7.2.3 TIMCO Base Maintenance Operations at Macon

TIMCO aviation services **Airframe Base Maintenance at Macon, Georgia (MCN)**	
Area	115,500 square feet
Facilities	2 hangars; 3 bays
Employees	190
Capabilities	Macon holds a limited Airframe rating supporting work on the following: Boeing: B737; B757; B767; DC9/MD80; DC10/MD11 Airbus: A320 series On-site engineering
Certification	FAA M52R952N (1 March 1999) EASA 145.6108 (29 March 2011) Bermuda BDA/AMO/371 (29 July 2009) AS9100 (including ISO 9001:2000) (25 July 2003; reissued 13 October 2010)

TIMCO's Macon base maintenance operations (MCN), located south of Atlanta in Georgia, includes over 100,000 square feet of covered hangar space plus available ramp space for aircraft parking. This facility has two maintenance hangars, one with twin-bay capacity (3 bays in total). The operation at MCN includes on-site liaison engineering support for all customer work, and the engineering operation at LCQ provides additional DER support as needed. All hangars contain NFPA-approved, pre-activated fire suppression systems.

TIMCO has made a significant investment to expand its capability at Macon to handle B767 aircraft. While the facility was originally built and designed for widebody aircraft, TIMCO had previously focused on maintaining narrowbodies like the B737 and A320.

There are 3 active hangar bays at MCN

SR 68 Strategic Plan for Science & Technology Joint Study Commission – Panelist Guidelines

Joseph Marks, TIMCO

Policy Recommendation(s)	Recommendation Details, Specifics & Reasoning
Recommendation #1 (insert summary statement/descriptor)	TIMCO MCN would encourage support from this commission to develop an aggressive proactive approach to engage high school age technical students to pursue a career in aviation. Within the Warner Robbins and Macon community there are over 25,000 aviation employees many of whom are approaching retirement age. If our industry doesn't act soon to develop skilled technicians to fill those openings, the aviation community in Georgia will be forced to relocate this work to where technicians are available. Remember that aircraft can fly anywhere to be maintained.
Recommendation #2 (insert summary statement/descriptor)	On the development of skills. Georgia House Bill 186 was created for the development of skills from elementary through high school. TIMCO encourages educators and business partners to continue to work together in creating career pathways and the development of soft skills. Currently TIMCO see's entry level students that are lacking the knowledge in completing an application for employment, and preparation for an interview. The requirement to read, interpret aircraft documents, and communicate is essential for working on complicated aircraft systems. Aviation is an industry where a well trained workforce delivers a quality product, essential to the greatest concern, public safety.
Recommendation #3 (insert summary statement/descriptor)	Currently the curriculum taught in Technical Schools does not meet all requirements for the commercial aviation industry. Only the FAA can approve a more advanced curriculum which when enacted will take time to implement. Aviation is one of the few industries still growing in a down U.S. economy, and in an international environment where competition thrives; some foreign countries provide funding and training for aviation technicians. Overcoming these obstacles is essential in keeping aviation jobs in Georgia and the USA. The MRO employer is limited in the amount of funding they can provide for training. Private and public funding sources will be required to bring new well trained aviation technicians into the industry. On the job training after Technical School for qualified applicants is an option. Funding could be provided by Georgia Work Ready in conjunction with matching funds by the employer.

Military & Defense

- **Col. Michael Brownfield, US Army**
- **Matt England, CyPhy Works**
- **Thomas Sweeny, Trident Refit Facility**

Colonel Michael Brownfield is the Director of the Fort Gordon Battle Lab, Fort Gordon, Georgia. Mike earned degrees in Electrical Engineering from the United States Military Academy, Stanford University, and Virginia Tech. Starting his career as an enlisted tactical radio repairman at Ft Sill, OK, Mike has served in a wide variety of leadership and staff positions throughout the Army. He has deployed from Germany for Operations Desert Shield and Storm with the 93rd Signal Brigade, VII Corps, commanded in the 101st Airborne Division (Air Assault!), and deployed with III Corps during Operations Enduring Freedom and New Dawn in Iraq. His most recent assignment included III Corps Chief Network Engineer and the Director of the Joint Network Operations Control Center (JNCC), US Forces – Iraq. Mike has also taught Electrical Engineering, Computer Science, and Military Science to the cadets at the United States Military Academy, West Point. He is a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE), a licensed Professional Engineer (PE) in the Commonwealth of Virginia, a Certified Information Systems Security Professional (CISSP), a Cisco Certified Network Associate (CCNA), and a PMI-certified Project Manager. He is married to Sally West Brownfield, and they have six wonderful children.

Tom Sweeney
Executive Director
Trident Refit Facility

Mr. Tom Sweeney currently serves as the Executive Director at TRIDENT Refit Facility, Kings Bay, GA. He has held this position since May 1989. As Executive Director, he is the senior civilian manager responsible for more than 1,400 civilian employees.

A Festus, Missouri native, Mr. Sweeney attended the University of Missouri School of Mines at Rolla, where he graduated in June 1969 with a bachelor of science in electrical engineering. After earning his degree, Mr. Sweeney accepted a job with the U.S. Navy at Mare Island Naval Shipyard, Vallejo, California, Electrical Design Section. In April 1973, he transferred to Superintendent of Ships at Pascagoula, Mississippi, to work as a project engineer on the Navy's newest class of destroyers (DD963). Mr. Sweeney accepted a job at Commander Fleet Activities, Okinawa, Japan, in February 1974, where he assumed the position of Chief Electrical Engineer. Later that year, he was promoted to Director of Engineering/Maintenance Control Department.

In November 1975, Mr. Sweeney transferred to Officer in Charge of Construction, TRIDENT, to work on the construction of the TRIDENT Submarine Base at Bangor, Washington. In January 1978, he became the first Facilities Manager for TRIDENT Refit Facility, Bangor, where he was detailed to the industrial superintendent position. In this position he assumed the task of completing the hull, mechanical, and electrical shops, in addition to taking charge of the training and apprentice programs. Mr. Sweeney was promoted to the newly established position of Deputy Weapons Repair Officer in November 1980. In February 1986, Mr. Sweeney made the move to Kings Bay, Georgia, when he accepted a position as the first Deputy Weapons Repair Officer for the TRIDENT Refit Facility.

Mr. Sweeney's other professional achievements include: registered as a Professional Engineer in the State of Washington; completed the Graduate School of Business, executive development program, at the University of Washington; attended the Navy's Post Graduate School at Monterey, California, in Defense Resource Management; and completed the American Management Association's Executive Development Program. He was also nominated by the Federal Mediation and Conciliatory Service (FMCS) to attend the certifications program for arbitrators. Mr. Sweeney also attended the Labor Law program at Harvard Law School.

Mr. Sweeney's personal awards include one Meritorious Civilian Service Award (February 1986) and two Navy Superior Civilian Service Medals (December 1990 and April 1999).

Kings Bay is the homeport for the Navy's East Coast fleet of Trident Ballistic Missile submarines and the forwarded deployed USS Florida and USS Georgia guided missile submarines. Trident Refit Facility is the largest tenant on Naval Submarine Base Kings Bay and employs over 1600 civilian and military personnel. Our mission is to provide quality maintenance, repair and modernization for sustaining a global submarine force. We currently have a large industrial complex with over a million and half square

feet under roof and over 300 pieces of state of the art industrial plant equipment. A large percentage of this equipment is computer controlled and we have just began operation of our first robotic work cell.

My remarks will be dealing with our experiences in the area of the necessary math and science skills that are needed to successfully complete our skilled trades apprentice program. We teach some 15-20 different trades with our biggest challenge in getting students successfully through the academic part of the four year program.

Tom Sweeney
Executive Director
Trident Refit
Recommendations for Commission

Recommendation #1

We continue to see weaknesses in students in the area of math and science. The education system must emphasize to young people the importance of these two areas of curriculum as the workplace becomes more challenged by rapidly developing technology even in the area of the skilled trades. It has become increasingly difficult to attract young people into a skilled trade as the education system emphasizes the need to obtain a college degree. Though a college degree is important the need for employees in the skilled trades continue to see substantial growth.

Recommendation #2

TRF has found the use of the Work Readiness test as a very effective means to screen applicants to achieve success in our apprentice program. The education system must stress the need for all students to obtain both math and science knowledge but also communication, both written and oral, skills. The system must begin the process of talking to parents and students, at a early age, about educational and career planning.

Recommendation #3

TRF sees itself in a position of constantly training the next generation of skilled tradesman with a emphasize on advancements in machine tool technology. There will be an increase emphasize on the use of Computer Numerically Controlled(CNC) machines and robotics which will not only require knowledge of the trades but computer programming. The future workforce must keep pace with the rapid improvement in technology as it becomes more and more integral with the workplace of the future.

Additional Information

- **Report Outline**
- **Commission Meetings & Timeline**
- **Commission Directory**

Executive Summary (1 page)

Introduction (half page)

Charge of the Commission (half page)

Background (1 page)

Commission Process (half page)

Summary of Hearings (3 pages)

Findings (2-3 pages)

Commission Recommendations (1 page)
- Short term (3-6 months)
- Mid-term (6-12 months)
- Long term (1-3 years)

Acknowledgements (half page)

Appendices (lots of pages)

A. SR68
B. List of Commission Members
C. Subcommittee reports
    - STEM Education
    - Workforce Development
    - Access to Capital
D. List of Hearing Dates and Panelists
E. List of all recommendations made to the Commission
F. List of states with strategic plans focused on science, technology and innovation
G. Key indicators of science, technology and innovation and how Georgia compares
H. References

Scorecard

FinTech
HealthIT
Communication Services
Internet Security
Logistics
Mission Critical Data Centers
Interactive Marketing
Agriculture

Training and mentoring

GDEcD Strategic Clusters

K-12

Tech Colleges

Broadband

CLUSTER
Driven by core competency, capabilities and potential. Where do we have and can retain a competitive advantage?

Education

Data centers

Strategic Public and Private Funding

Marketing

Ports, airports

International

Georgia's Science and Technology Strategic Initiative Joint Study Commission

Purpose: This study commission was created in 2011 through Senate Resolution 68 to explore the need for a strategic plan for science and technology in Georgia. The objectives of the Commission are:

Objective 1: Inventory Georgia's existing assets in the science and technology sectors to determine current strengths and capabilities.

Objective 2: Conduct review of state and national policies to discern best practices and lessons learned with regard to public policy that encourages advancement of the science and technology sectors.

Objective 3: Hold meetings around the state to solicit input from science and technology stakeholders, with a specific interest in identifying barriers to growth and progress.

Objective 4: Develop specific recommendations with regard to the scope and content of a strategic plan for science and technology in Georgia. Such recommendations shall stipulate what …should be excluded from such a plan.

Public meeting dates, locations, and topics

July 20
Gwinnett County
9:00 to 12:00

- Education
- Data centers
- Emerging growth companies

August 16
State Capitol
1:00 to 5:00

- Access to capital
- High growth potential companies
- Health information technology
- STEM education

September 26
Savannah
9:00 to 5:00

- Logistics
- Georgia and International Marketplaces
- Education & Workforce Development

October 12
Cartersville
8:00 to 11:00

- Infrastructure
- Statewide (Rural) Economic Development Through Technology
- Lt. Governor Topics

October 28
Macon
10:00 to 5:00

- Role of Higher Education and Technology Industry
- Role of Traditional Ind. In Technology
- Aerospace
- Military and Defense

November 15
Augusta
1:00 to 5:00

- Research & Development & Commercialization
- Communication Services
- Bio/Life Sciences

November 30
Columbus
1:00 to 5:00

- Financial Technology
- Information Security
- Economic Gardening (Entrepreneurs and 2nd Stage Companies)
- Emerging Technologies

December 15
Atlanta
8:00 to 12:30

- Subcommittee recommendations
- Public input via breakout sessions

Subcommittees:

- STEM Education: Chair, Dr. Gilda Lyon, GA Department of Education
- Access to Capital: Chair, Senator John Albers
- Workforce Development, Rep. Charlice Byrd

To follow the activities of the Commission online:

- Georgia Science & Technology Strategic Plan: www.scitechplan.ga.gov
- Twitter: GASciTechPlan
- Facebook: Georgia Science & Technology Strategic Plan
- Linked In: Georgia Science & Technology Strategic Plan

For more information contact Richie Johnson at 404-920-2028 or richie@tagonline.org

SR 68 Commission Committee Members Directory

John Albers State Senator Georgia State Senate **Office:** (404) 463-8055 **Email:** john@senatoralbers.com	**Dean Alford** Chairman Technical College System of Georgia **Office:** (404) 679-1612 **Email:** bwise@tcsg.edu
Charlice Byrd State Representative Georgia State House of Representatives **Office:** (404) 557-2218 **Email:** charlice.byrd@house.ga.gov	**Michael Cassidy** President & CEO Georgia Research Alliance **Office**: (404) 332-9770 **Email:** mcassidy@gra.org
Dr. Steve E. Cross Executive Vice President for Research Georgia Institute of Technology **Office:** (404) 894-8885 **Email:** steve.cross@gtri.gatech.edu	**Steve Dickinson** VP Global Corporate Communications Merial Limited **Office:** (678) 638-3682 **Email:** steve.dickinson@merial.com
Barry Loudermilk (Co-Chairman) State Senator Georgia State Senate **Office:** (770) 387-2424 ext. 105 **Email**: barry@barryloudermilk.com	**Dr. Gilda Lyon** STEM Coordinator Georgia Department of Education **Office:** (404) 657-8324 **Email:** glyon@doe.k12.ga.us
Tino Mantella CEO & President Technology Association of Georgia **Office:** (404) 920-2027 **Email:** tmantella@tagonline.org	**Calvin Rhodes** Chief Information Officer & Executive Director Georgia Technology Authority **Email:** crhodes@gta.ga.gov
Barbara Sims (Co-Chairman) State Representative Georgia State House of Representatives **Office:** (706) 373-5437 **Email:** beesims@aol.com	