

Alabama

Emerging Technologies and the State of Alabama: Creating World-Class
Technology Clusters--
A Assessment

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1. Alabama

Innovation and technology clusters have become one of the key success factors of world-class regions in their search for manufacturing and R&D foreign direct investment. This paper constitutes a preliminary effort to canvass the existing resource base and platform from which Alabama can leverage its relative competitive advantages in key technologies that are likely to drive the technological race at the dawn of the twenty first century. This paper therefore allows the reader to begin defining the rough outlines of a competitive profile, conceivably instrumental in crafting a state-level strategy for foreign direct investment targeting.

According to the University of Alabama's Center for Business and Economic Research, Alabama's economy will benefit from the nation's economic growth in 2004. Over 78 percent of Alabama business leaders expect technology needs in their industry to grow in 2004. Rising profits often linked to productivity gains that result from technology investment are helping to create new demand for technology, particularly in computers, software, and communication equipment. In the manufacturing sector the gains will be concentrated mainly in the automotive industry, as a result of new automobile manufacturer and supplier investments. However, the services sectors as a whole are expected to benefit from the overall economic recovery. The state's economy is expected to grow by 3.8 percent in 2004.

Alabama's main metropolitan areas include Birmingham, Mobile, Huntsville, Montgomery, Tuscaloosa, and Auburn-Opelika. Birmingham is the state's largest metro area, with over one million people, and it is considered the financial center of the state. Its major industries include Biosciences, Electronics and Communications. The University of Alabama is the top employer and R&D hub of the area. New and expanding auto suppliers are playing an important role for the metro economic development.

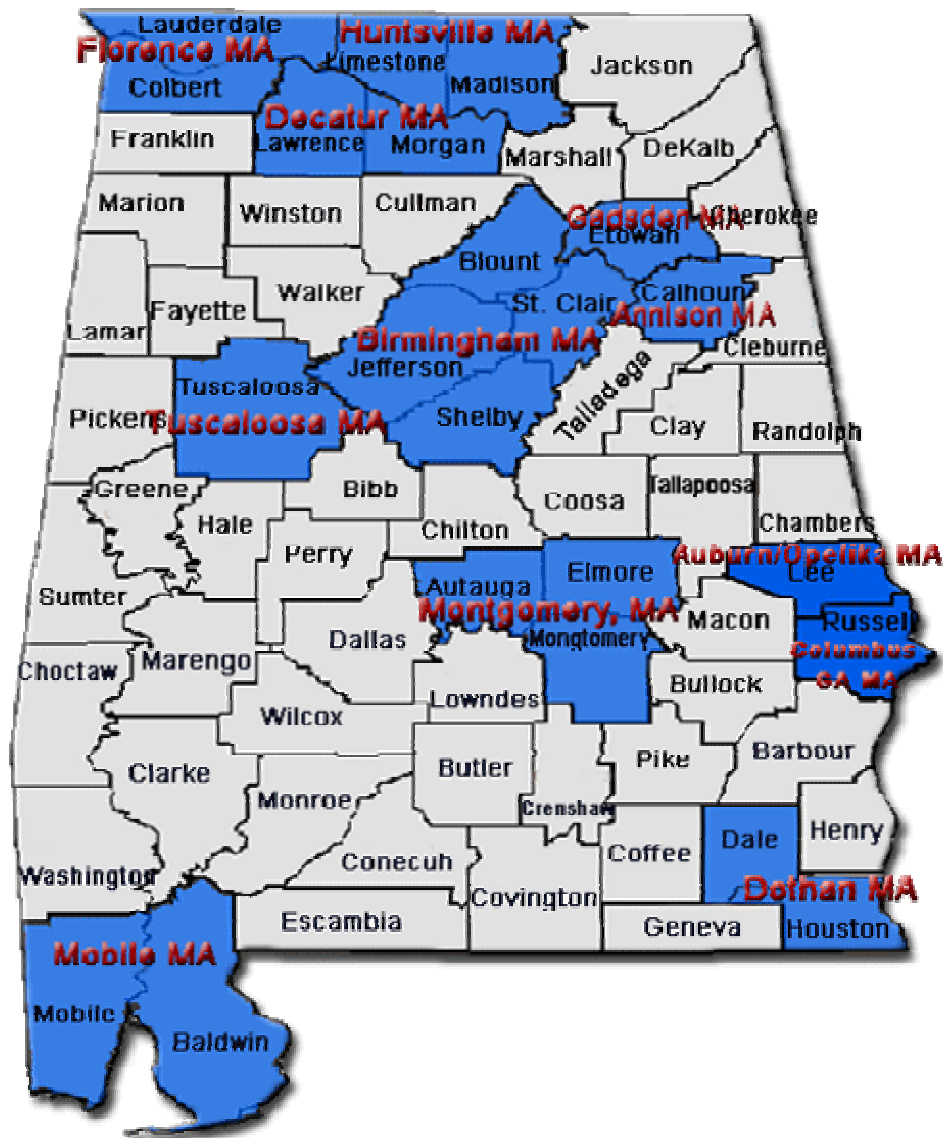
Mobile is the second largest MSA, and its economy is driven by the Port of Mobile, one of the busiest in the nation. Mobile's major industries are aerospace, shipbuilding and repair, chemicals, fabricated metals, and paper products. Healthcare is a major sector, benefiting from the University of South Alabama and Medical Facility.

Huntsville is home to the Marshall Space Flight Center and Cummings Research Park, the nation's second largest research and Technology Park. Aerospace, Defense, Computers, Electronics, and Telecommunications are the major industries.

Montgomery has been driven by the automotive industry. In 2000, Hyundai announced its \$1 billion manufacturing plant. The Maxwell Air Force Base is the largest employer in the region. Major Universities are Auburn University and Alabama State University.

Tuscaloosa's tech community is led by the University of Alabama, its largest employer and biosciences player. Other major employers are Mercedes-Benz contributing to the automotive sector and JVC in electronics. Decatur is home to Boeing's \$450 million manufacturing facility which produces common booster cores for the Delta IV family of rockets.

The Auburn-Opelika Metro Area is the hub of East Alabama due to its proximity to Atlanta, Montgomery and Birmingham. Auburn University, the Uniroyal Goodrich-Michelin plant and the Briggs & Stratton plant are major players in the region.



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1.1. Defense and Aerospace

High-technology and R&D

Research and Development in Alabama is mainly driven by the Aerospace and Defense sector. The *Marshall Space Flight Center in Huntsville* (www.msfc.nasa.gov) has long been a leader in space engineering and propulsion

technologies. Four nearby military bases — Redstone Arsenal (www.redstone.army.mil), Fort McClellan, Fort Rucker (www-rucker.army.mil), and Maxwell Air Force Base (www.au.af.mil) — also carry out advanced research, often working with a wide range of private-sector contractors that utilize the latest in high technology. Boeing, TRW, Lockheed Martin, and Northrop Grumman are prominent players in the area.

Smaller companies make important contributions, including *Envirofoam Technologies*, which makes an anthrax-killing compound, and *Time Domain*, which manufactures RubbleVision, a wireless hand-held scanner to help locate and recover victims in areas of debris. *Dynetics, Inc* tracks military and commercial aircraft. *Camber Corporation's* technology covers land, sea and air. They specialize in engineering, management analysis and information technology systems. Camber manufactures two "sniffing" detection devices that warn of airborne chemical agents "available for military and public safety departments."

Biometrics is a top technology development and research in the field is led by Dr. Reza Adhami, at the University of Alabama in Huntsville (UAH). Biometrics' research has broadened from the covert military and intelligence realm to personal credit cards, passports and driver's licenses. In Biometrics, startups *Photon-X* and *B2Secure* have developed cutting-edge optical sensing technologies and medical diagnostics that are used by the military for tracking and screening. The biophotonic medical diagnostics/industrial inspection markets are promising areas.

In the Technology Valley, *Cummings Research Park (CRP)* (www.hsvchamber.org/crp), established 40 years ago, is home to many research and development firms. CRP harbors multidisciplinary research centers such as:

- [Alabama Supercomputer Center](http://www.asc.edu) (www.asc.edu)
The Alabama Supercomputer Center provides supercomputing resources to academic, government, and corporate users throughout Alabama. The Center also hosts and manages the Alabama Research and Education Network (AREN), which provides Internet connectivity to government, industrial, and educational organizations within the State of Alabama.
- [IIT Research Institute](http://www.iitri.org) (www.iitri.org)
IIT Research Institute employs 1,500 technical professionals nationwide to solve an extensive range of technology problems. Activities conducted in Huntsville include the IITRI metallurgy research facilities.
- [MIT Lincoln Laboratory](http://www.ll.mit.edu) (www.ll.mit.edu)
A research center of the Massachusetts Institute of Technology, the Laboratory's fundamental mission is to apply science and advanced technology to critical problems of national security.

- **National Space Science and Technology Center** (www.nsstc.org)
The NSSTC is a collaborative research initiative involving NASA, the State of Alabama, and six research universities working in seven distinct fields of research. NSSTC scientists develop research teams from among corporate, government, and academic experts to pursue both basic and applied research projects.
- **Universities Space Research Association** (www.usra.edu)
Under the auspices of the National Academy of Sciences, the USRA works through member organizations to further space science and technology. Offices in Cummings Research Park include the USRA Astronomy Program in Huntsville (UAPH) and the Institute for Space Physics, Astrophysics and Education (ISPAE).

As with many of the diverse technologies that have been developed in *Cummings Research Park* over the years, the deepest roots of biomedical technologies are entwined with NASA, the Department of Defense, and the University of Alabama in Huntsville. CRP is home to biotechnology research and products including tissue engineering, bio-mineralization, bio-polymers, simulation software, and instrumentation development. Most recent developments include:

- **Bio-Mineralization and Tissue Engineering**
As stated by officials at UAH, research on bone structure and the human skeleton is of interest to NASA, and therefore to UAH scientists, because of the increasingly long-term presence of humans in space. Research has shown a loss of bone mass after long-term exposure to weightlessness, prompting a need to understand precisely why this happens. Collaborations between the UAH Laboratory for Structural Biology and scientists around the world are developing drugs used to treat these bone conditions; however, these drugs will also be effective against bone cancer and osteoporosis.
- **Bio-Polymers and Drug Delivery**
The Shearwater Corporation, a subsidiary of Inhale Therapeutic Systems, has developed solutions to drug-delivery problems and in the process has enhanced the performance of prescription drugs, such as those developed to combat Hepatitis C.
- **Simulation and Software Design**
CFD Research Corporation has developed multi-disciplinary engineering simulations for a wide range of markets, including the biomedical industry. CFDRC has been highly successful in adapting technology that it originally designed for aerospace and military use, and applying it to numerous other disciplines, such as microelectronics, environmental, and MEMS.

- **Instrumentation and Monitoring**
Titertek Instruments, Inc. and Photon-X have developed specialized instrumentation for the pharmaceutical and biomedical industries.
- Other companies at the Cummings Research Park include the ***Battelle Institute, Dynamic Concepts, Oceaneering International, and the Schafer Corporation.***

The ***University of Alabama in Huntsville (UAH)*** is developing and integrating a system of surface and on-board sensors, as well as remote sensors that will help tethered balloon operators keep track of changing weather conditions that might affect the blimp's performance. Smaller blimps tethered near the southern border of the U.S. are used as surveillance platforms to help federal agencies track and intercept illegal drug traffic. Connected to the ground by fiber optic cables, the balloons will carry aloft "look down" radar units that can detect objects that hug the ground in flight, including cruise missiles. The surveillance blimp project is based at the U.S. Army's Program Executive Office for Air and Missile Defense in Huntsville.

UAH is part of a five-university consortium that has an almost \$10 million contract to develop next-generation blimps. Led by Clemson University, the consortium also includes Alabama A&M University, Pennsylvania State and Mississippi State.

Aerospace Industry

There are over 200 aerospace companies in Alabama today. These companies are clustered in space and defense, aviation, and maintenance, refurbishment and overhaul (MRO). Alabama is home to aerospace giants such as ***Boeing, GKN, Lockheed-Martin, Northrop-Grumman and Honeywell.*** The space/defense cluster is centered on Huntsville. Major companies include ***Aegis Technologies, Boeing, COLSA Corporation, Lockheed Martin, PPG Aerospace and Teledyne Brown Engineering.*** Boeing manufactures the Delta VI rockets in Decatur.

Aviation companies targeted for both the commercial and defense sectors are located throughout the state, with concentrations in central and southeast Alabama. Area companies include ***GKN Aerospace, and Kelly Aerospace*** in Montgomery, ***Williams International*** in Huntsville.

MRO industry is spread across the state. They provide maintenance, repair and overhaul for aircraft parts, and for both U.S. and foreign military. Major companies include ***Pemco World Air Services, ST Mobile Aerospace***

Engineering. Sikorsky Support Services, DynCorps, and Helipro Corporation International provide services to helicopters.

The ***Alabama Aerospace Industry Association (AAIA)*** was formed in 2003 to provide a unified voice for the industry on issues such as education, work-force development, and economic development. The AAIA is open to companies with direct involvement in the aerospace industry in Alabama. Eligible firms are those engaged in the manufacture of aerospace/aviation/defense hardware; those involved in aviation repair, maintenance, and overhaul; suppliers of parts, and providers of services and support to the industry.

Some other aerospace company names in Alabama include:

- ***Axsys Technologies***
- ***Dynetics***
- ***Northrup Grumman***
- ***Phase IV***
- ***Quantum Research Int'l***
- ***Raytheon***
- ***Sigmatech***
- ***SRS***
- ***Summa Technology***

1.2. Computer, Information, and Communication (CIT)

The information technology (IT) sector includes more than 1,500 companies and an employment base of more than 20,000 people. Research and Development is mostly driven by the aerospace/defense sector. In the northern part of the state,

Alabama's Technology Valley, Huntsville is already established as Alabama's IT industry hub, and Birmingham has increased its IT presence. Encompassing several Alabama counties and municipalities, including Morgan, Madison, and Limestone counties, this area has a high concentration of electronics manufacturers and software designers.

Government, aerospace, and the space program around Huntsville have spawned new IT companies. Alabama's IT industry advocate is the Alabama Information Technology Association (AITA), represented by developers, integrators, manufacturers, and consultants of hardware, software, Internet, networking, security, telecommunications, and biotechnology companies. Some names include:

Sword Microsystems has become the leader in e-commerce integration solutions for the printing industry, with significant expansion in the past six months, the most recent a strategic alliance with GA-based technology company ***Keylink***, IBM's largest distributor in the Southeastern region of the U.S.

Progressive Systems, LLC is in the surveillance business manufacturing video servers, and customizing computers to be used for security purposes. Employees assemble the hardware and produce the software to customize computers to accommodate standard video cameras. Other major players in the computer and communication sectors include:

- ***ADTRAN, Inc.***
- ***Avex Electronics***
- ***Cybox Computer Products***
- ***Daimler/Chrysler***
- ***Eaton Corporation***
- ***Intergraph Corporation***
- ***LG Electronics***
- ***MagneTek Corp.***
- ***Nichols Research Corp.***
- ***Nokia***
- ***Pressac***
- ***Sanmina***
- ***SCI Systems***
- ***Siemens-Westinghouse***
- ***Soldering Technology Intl***

1.3. Automotive

Alabama is home to almost 200 automotive-related manufacturers, giving the state a leading position in the Southeastern automotive corridor. Alabama is ranked fourth in the South in assembly employment with 4,100 jobs. By 2005, when Hyundai begins production and Mercedes and Honda have completed expansions, the state will become the third largest producer in the South, behind Tennessee and Kentucky.

This cluster includes the following vehicle assembly plants:

- ***Mercedes-Benz U.S. International*** (produces the M-Class and the Grand Sports Tourer)
- ***Honda Manufacturing of Alabama*** (produces the Odyssey and the Pilot, as well as engines)
- ***Hyundai Motor Manufacturing Alabama*** (produces the Sonata and the Santa Fe, as well as engines).

Dedicated engine plants in the state include:

- ***International Diesel of Alabama*** (produces V-6 and V-8 diesel engines in Huntsville's Jetplex Industrial Park)
- ***Toyota Motor Manufacturing, Alabama, Inc.*** (produces V-8 engines for its full-size Tundra pickup truck in Huntsville).

Other automotive related companies based in Alabama include ***GM, Chrysler Electronics, Michelin, Dana Corporation and Dunlop***, who have operated in the state for years.

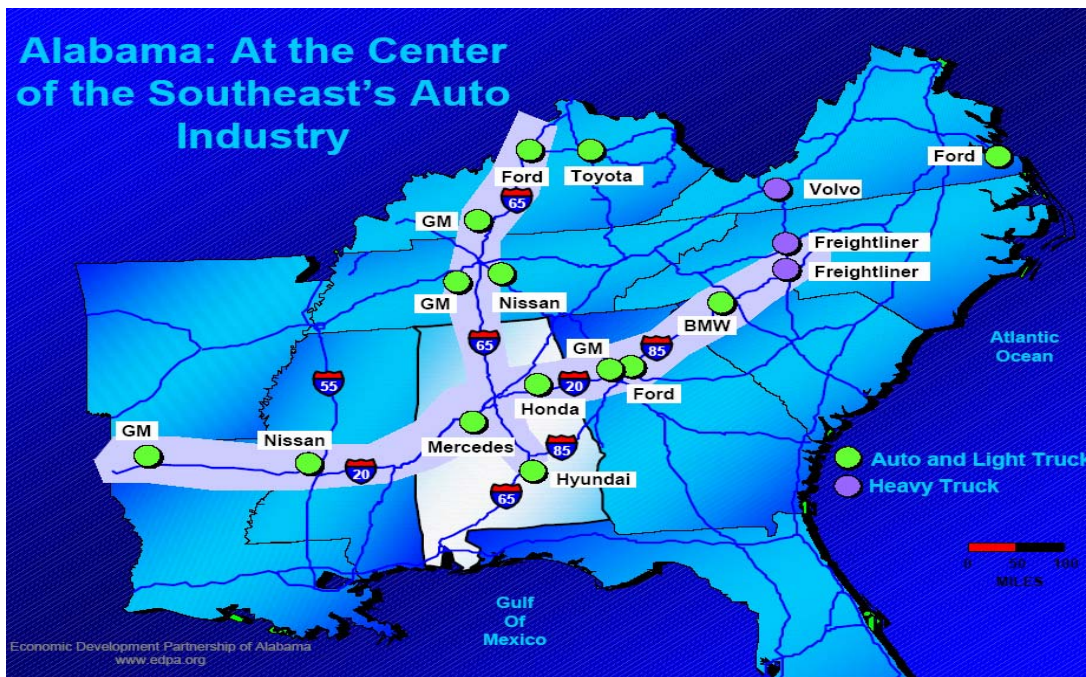
According to the Office of Economic Development at the University of Alabama in Huntsville, about 32% of 2002 automotive manufacturing jobs are in the vehicle parts industry sector, 25% in the tire sector, 17% in vehicle assembly, 11% in automotive electronics, 6% in extrusions and plastics, 5% in metal stamping, 2% in machinery manufacturers, tool and die makers and machine shops. Automotive parts manufactured in Alabama end up in cars made throughout North America. Some 52% of Alabama plants have major customers in Alabama. Others primarily supply the industry outside of the state.

The Alabama Automotive Manufacturers Association was created in 2001 to provide a forum for interaction among automotive companies in Alabama, share information among its members, and provide an awareness of manufacturing trends, techniques, and concerns.

Recent Expansions and New Projects (Selected)

| Company | County | Product | Jobs Created | Investment (Millions) |
|---------------------------------|------------|---------------------------------------|--------------|-----------------------|
| 2003 | | | | |
| Ogihara America Corp. | Jefferson | Stamped auto body parts | 20 | \$180 (Expansion) |
| Bridgewater Interiors | Calhoun | Seating systems | 250 | \$13 (New) |
| HS R&A Co., Ltd. | Coffee | Weather stripping, hoses | 350 | \$20 (New) |
| Halla Climate Control | Macon | Bumpers, lights, radiators | 150 | \$28 (New) |
| Hwashin America Corp. | Butler | Chassis and drive trains | 400 | \$70 (New) |
| Plastech Romulus | Jefferson | Interior/exterior plastic parts | 400 | \$40 (New) |
| Shin Young Metal Industrial Co. | Crenshaw | Stamped metal parts | 400 | \$110 (New) |
| Johnson Controls, Inc. | Jefferson | Seat and door panels | 20 | \$38.7 (Expansion) |
| Teksid Aluminum Components | Talladega | Aluminum engine heads | 100 | \$18 (Expansion) |
| Daehan Solution Co. | Lowndes | Sun visors, interiors, sound proofing | 180 | \$25 (New) |
| Hyundai Hysco | Butler | Steel processing | 125 | \$30 (New) |
| Lear Corporation | Montgomery | Wire harness | 285 | \$16 (New) |

Economic Development Partnership of Alabama : www.edpa.org



1.4. Chemicals, Polymers, and Plastics

Alabama is home to chemical and plastics companies such as *Mitsubishi-Polycrystalline, 3-M, Kohler, Kerr-McGee, Olin, Benjamin-Moore, Ciba* and *Dupont*. Following are some fast facts about the state's chemical and plastics industry:

- Alabama exported \$1.3 billion in chemical products in 2002.
- While nationwide plastics output grew only 2.0%, Alabama's output grew by 3.4% in 2002.
- Alabama exported \$425 million in plastic products in 2002, making it the fifth largest exported product.
- *Plastipak Packaging, Inc.* in 2002, announced it would locate a new \$30 million facility in Alabama.
- *Elk Corporation of America* announced a \$77 million expansion in 2002.
- Employment within Alabama's chemical industry stands at over 15,000.
- Plastics employment in Alabama is 11,000.

Some major players include:

- *3M*
- *Atrion Medical Products*
- *Chinet Company*
- *Daikin America*
- *EFP South*
- *ES Robbins Corp.*
- *Federal Mogul*
- *Holm Industries*
- *Omnova*
- *Plasticraft Manufacturing*
- *Rainsville Technology (Honda supplier)*
- *Rehau*
- *Technology Molded Plastics*
- *Tulox Plastics*
- *Vulcan Plastics, Inc.*

Alabama is home to wood products companies such as: *Kimberly Clark, International Paper, Gulf States Paper, Weyerhaeuser Company and Boise Cascade*. The industry is one of the state's largest. Following are some fast facts about the industry in the state:

- Alabama exported over \$642 million in paper products in 2002.
- Seventy-one percent of forestland in Alabama is privately owned.
- Two-thirds of Alabama is forestland.
- Employment in lumber and wood products was 33,900 in 2002.
- *SCA North America* announced in 2002 that it would invest \$240 million in a new Alabama facility.

- *Wellborn Cabinets* announced in 2003 a \$4.5 million expansion adding 250 jobs.

1.5. Biosciences

Research and Development

The *University of Alabama in Birmingham* is the hub for biotech research and advancement in the state. The *Southern Research Institute* is a network of collaborative centers for scientific discovery and technology development in the pharmaceutical, health, biotechnology, defense, homeland security, automotive, energy, aerospace and engineering industries. SRI is a research affiliate of the University of Alabama at Birmingham.

Highlights of significant achievements and opportunities at the Southern Research Institute include:

- Two new, important cancer drugs now in clinical trials.
- Working closely with the Environmental Protection Agency in evaluating the effectiveness of technologies used to reduce greenhouse gases.
- Developing new composite materials for use in automotive applications and a wide array of commercial and military applications.
- Currently studying drugs to treat the opportunistic diseases that affect AIDS patients, including tuberculosis and pneumonia.
- Ten client compounds have passed the investigative new drug (IND) stage of drug development and are in – or are ready for – clinical trials.
- Worldwide leader in the evaluation of high temperature materials for re-entry systems, rocket motors, aeropropulsion and commercial applications.
- Training civilian emergency response teams and providing technical expertise in the development of U.S. policy on chemical and biological defense.
- Blending coal and a native Southeastern grass, call Switchgrass, to produce electric power with lower carbon dioxide emissions.
- Through the collaborative efforts of the Chemical & Biological Defense Division and the Homeland Security & Infectious Disease Research Division, the Southern Research Institute is contributing technology solutions to the national effort to improve the protection from the threat of chemical and biological terrorism.

Southern Research Institute plans to begin animal trials for three SARS vaccines developed in a high-priority program by Canadian scientists. The entry of Southern Research into Canada's high-powered vaccine program is the result of the institute's prominence in SARS research. It started last year when the nonprofit center converted its

high-capacity lab to quickly screen thousands of chemical compounds for possible development into drugs that could be used against SARS.

SRI and Memphis, TN based Genome Explorations, Inc. have recently entered into a collaborative agreement to pursue joint development programs in pharmaceutical target identification using gene expression profiling.

In Mobile, the *University of South Alabama* has opened a research park for collaboration with private enterprise, launched a *Cancer Research Institute*, and created a *Center for Lung Biology*. The university also is working on a 35-acre research park to house small and mid-sized technologically oriented firms.

Bioscience industries

The number of biotech firms in Alabama grew from about 20 in 1998 to more than 60 in 2001. Most of these new companies are homegrown startups spun off from academic research discoveries. This rapid growth has been facilitated almost entirely by homegrown startups, most resulting from research discoveries in academic research environments. One of them, *Cebert*, is developing towards the commercialization of a variety of psychiatric drugs, such as Methadone for the treatment of drug addiction. Atherotech is marketing a cholesterol and lipoprotein blood test. *TransMolecular* has been raising venture capital to fund early-stage clinical research for the development of its anti-cancer products. In addition to brain cancer, TMI's research and development efforts include other cancers with a higher incidence in the population and neuropathic pain.

Biotech companies are growing as a result of cooperation between higher education and business. Two Birmingham companies, TransMolecular Inc. and *MedMined Inc.*, spinoffs of *University of Alabama at Birmingham (UAB)* research with licensed technology from UAB Research Foundation, were named two of the hottest startup businesses in the February 2003 issue of Fortune Small Business magazine. MedMined's Data Mining Surveillance System is an infection control measure targeted to the hospital and long-term care facility market, allowing the reduction of hospital infections contracted in healthcare facilities.

The *Biotechnology Association of Alabama*, founded in 1997, was formed by biotech executives and community leaders to serve as a voice for the industry. The *Alabama Technology Network* provides hands-on business and technical assistance at seven centers of excellence and at the University of Alabama, Auburn University, and the University of Alabama at Huntsville.

It is worth mentioning some recent mergers & acquisitions (M & A) in the biotech sector. The four M & A deals included two in Birmingham, *Axcan - ScandiPharm* and *Direct - Southern Biosystems*, and two in Huntsville, *Invitrogen - Research Genetics* and *Inhale Therapeutics - Shearwater*.

The *Office for the Advancement of Developing Industry (OADI)* is the only biotech incubator in the state and it helps biotech entrepreneurs sustain, network and grow Birmingham-based technology oriented. The incubator seeks also to cluster a large number of biotech and advanced technology firms as part of the development of the *UAB Research Park* at Oxmoor. Since its inception at UAB in 1986, the incubator has graduated 36 companies from its 74 tenants and currently houses 24.

Alabama contacts on high tech agencies on economic development :

ADECA <http://www.adeca.alabama.gov>

Alabama Development Office (state industrial recruiters) <http://www.ado.state.al.us>

Alabama Economic Development Partnership <http://www.edpa.org>

UAB <http://www.uab.edu>

Space science <http://www.nsstc.org>

Info tech <http://www.alabama-infotech.org>

Cummings Research Park <http://www.hsvchamber.org/crp/>

Sector Organizations

Alabama Aerospace Industry Association

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<http://main.uab.edu/oadi/show.asp?durki=29458>

The only biotech incubation program in the state, and with more than \$360 million research dollars flowing through UAB (in addition to \$60 million to Southern Research Institute, which is owned by UAB), the opportunities for technology transfer are abundant

Southern Research Institute

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