

technology

Metro Atlanta has emerged as a national center for bioscience and the high-tech industry. According to atlantatechnologyloop.com, a Web site published by the Metro Atlanta Chamber of Commerce, Atlanta is considered to be “1st in the world in Internet security” and “the most saturated wireless city in America.” The Atlanta region is home to many top technology companies, such as BellSouth, Hewlett-Packard, NuBridges and Scientific Atlanta. The region is also known for several renowned scientific entities that have made it their headquarters, such as the Center for Disease Control (CDC), the American Cancer Society and the Arthritis Foundation. Of course, Georgia Tech and Emory continue to graduate some of the brightest minds in the United States. With so many resources available, it is inevitable that the Atlanta region will be shaping the face of technology, while technology will be shaping the face of the region.

The Atlanta Regional Commission’s Fifty Forward initiative is an ambitious visioning effort to delve into the critical issues that will shape metro Atlanta 50 years into the future. This will be achieved through a series of public, open-house style forums held quarterly for the next two years, attracting the best national and international thinkers on a variety of key topics vital to the future success of metro Atlanta. Topics include sustainability, population and employment shifts, regional economic trends and future development patterns.



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The transformative power of technology. Think of some of the technologies that did not exist 50 years ago: the Internet, cell phones, PCs, laser technology, pacemakers, contact lenses, microwave ovens, Doppler radar, video conferencing and thousands of other inventions. Just the past eight years alone have brought us the segway, transformer fluid from vegetable oil, the artificial heart and liver, the iPod, Mars rovers, hybrid cars, the wii, thin film solar panels, the retail DNA test, Google Maps and brain radiators, to name but a few.

Technological progress spawns even more rapid technological progress. If we think that the past 50 years have changed the world we live in, imagine how much the next 50 years will change it! Imagine the impact that technological and scientific innovations will have on our region. What types of new jobs will technology bring, and what types of jobs will technology eliminate? How will technology and science improve our health and increase our life expectancy, and how will this shape the make-up of our population? How will new communication mechanisms decrease or even eliminate the need for travel and transportation? Will technology and science be able to save us from the damage that we have done to our environment? What will be our future sources of energy? How will innovations in technology change housing and architecture in the region? How will all this progress affect our economy?

In order to prepare our region for the future, we need to envision what the future will look like.

smaller, smarter, stronger, faster

If you asked scientists, technologists or other innovators about the things that will shape our future, you will most certainly hear the terms “information technology”, “biotechnology” and “nanotechnology”.

Your comfort level with “**Information Technology**” is probably greater than it is with regard to nano or biotech, mostly because you are used to working on the computer or on your Blackberry. Nevertheless, the IT world has much more in stock for us, such as virtual brains, quantum computing or chip implants to replace IDs and credit cards.

Biotechnology can be defined as the manipulation of biological makeup through technology, and it has primarily been applied in the fields of medicine and agriculture. Gene therapy, stem cell research and cloning are among the more controversial applications of biotechnology. There is no doubt that biotechnology will play a major role in the future of medicine and food production.

If you Google the term “**Nanotechnology**”, you get over 12 million hits. The number of publications and research interest related to Nanotechnology is skyrocketing, as is the market for its products. According to a report published in 2007 for BBC Research by Andrew McWilliams, the global market for nanotechnology products will have grown from \$9.1 billion in 2005 to \$25.2 billion by 2011.

So, what exactly is Nanotechnology? In basic terms, it is the ability to manipulate matter at molecular and atomic levels.

Does Nanotechnology have any real world use? You bet. From stain- and water-resistant clothes to gene therapy, from straighter-flying golf balls to diabetic insulin biocapsules, from thin film batteries to skin-graft applications – nanotechnology is everywhere, and it will become more prominent each day. The opportunities that nanotechnology bring to medicine, chemistry, energy, food production, aerospace and defense, textile production and transportation are endless.

“beam me up, Scotty”

Flying cars, zero-emission self-driving vehicles, self-repairing roads, smart-highways or even virtual technologies: when looking into the future, the sky is the limit when it comes to potential changes of transportation and infrastructure. How about cars with sensors that can warn you of potential accidents, or cars that can talk to each other to prevent collisions? With our population growing as a result of advances in medicine, with increased urbanization as a result of technology and with a mandate to reduce our carbon footprint, public transportation might have a whole new face in the not so distant future.

Considering the growing need for public transportation as well as for personalization, the overall approach may have to be a hybrid solution that combines mass transport with on-demand individualized transport. Solutions may range from high-speed streetcars to solar-powered gondolas, citymobil cyber cars and dial-a bus services.

As you can see, all of these possibilities may drastically change the way we plan the infrastructure of our region.



This is an example of a Personal Rapid Transit (PRT) developed by Advanced Transportation Systems, Ltd. Plans are to have these PRTs in operation this year at Heathrow Airport in London.

As important as our transportation infrastructure is, there is a fairly good chance that our information and communication infrastructure will far surpass it. Even current technologies make it possible for us to perform a lot of our day-to-day activities online. We pay bills, go shopping, renew our driver's license and even work online. According to recent reports on ZDNet and Voip-News, 100 million employees world-wide telecommute on a regular basis. This number is expected to reach over 1 billion by 2011. An estimated 75 percent of U.S. employees will be mobile within the next three years, which means that they can perform work functions wherever they are.

What is becoming apparent is the fact that information and communication infrastructure will become just as much of a key player in regional and urban planning as traditional road infrastructure.

a walk in the (science) park?

In order to adequately support the nano-, bio- and information technologies, we have to be prepared to provide science centers that will attract talent. How will organizations, universities and business have to change in order to have a competitive advantage?

In other parts of the world, entire cities have been built around research and technology planning. For instance, Kansai Science City in Japan is an unincorporated city that was specifically designed to foster science, technology and culture. In 1996, 70 research institutions had established themselves in the city, along with 2,500 researchers and 20,000 students.



This is a conceptual drawing of Fusionopolis, a biotech center in Singapore that was slated to open in late 2008. It will boast the longest continuous vertical stretch of vegetation of any building in the world.

Recently, the concept of “science parks” has evolved to a more desirable description of the infrastructure that supports modern technology metropolises. The notion of science parks, in contrast to isolated science cities, emphasizes the fact that we are developing a more holistic view of science and technology as part of our daily lives. The primary idea is the same: to foster an environment to accommodate urban science, and, as a result, economic growth. Those science parks are often initiated and funded by national and local governments, developers, and planning agencies. To create science parks to support the growth of our region and to attract the talent we need, academic institutions, government, and industries will have to work together in new and creative ways.

How will the Atlanta region support the ever-growing demand for science and technology innovation and foster collaboration between educational facilities and industries? Will we see science parks in the near future? Will they become staples of our skyline, just like apartment complexes or malls?

Locally, more than a dozen local governments, public companies and research universities have joined together to focus on creating a world-class life-sciences hub in the heart of Georgia.

Called the Innovation Crescent, this unique collaboration supports the development and growth of life sciences companies through enhanced education and tailored economic development activities.

For more about the Innovation Crescent, go to www.innovationcrescent.com/about.htm.

life after oil

It's not a secret that the demand for renewable energy will increase each year and that our goal of sustainability will change our life styles, our infrastructure, our architecture, our economy and our industries.

Habitat 2020 illustrates the concept of architecture mimicking nature in order to maximize sustainability. The exterior of buildings are designed to act similar to skin, connecting the inside of a building with the outside environment. Not only would it create a surface that lets water, air and light into the building, but in fact it would position itself according to sun light. Wind and air would be filtered and used as air conditioning. Rain water and moisture would be purified and recycled, and even the resulting waste could be made into biogas.

For more information on Habitat 2020, go to www.design.philips.com/probes/projects/sustainable_habitat_2020/index.page.



This is a concept born out of the Habitat 2020 project that illustrates biomimetic architecture that creates “living” structures that operate like natural organisms. The idea is to look at cities as ecosystems where the buildings open, close, breathe and adapt according to their environment.

There is no shortage of possibilities for renewable energy sources. Some of the well-known and fairly well developed solutions are solar energy and biofuels. Others may sound obscure, but are nonetheless already in the works: energy from artificially created trees, cyanobacteria and hydrogen. It is not unlikely that we will see solar islands, giant *Polonia* tree fields, Green Towers or solar cells in asphalt. Regardless of the energy source of choice, grids will have to be optimized as well. Boulder, Colorado recently implemented the first steps towards becoming the first Smart Grid City in the United States. The smart grid can access energy from multiple sources and distribute it via multiple access points. Because of its decentralized structure, energy distribution between nodes can be monitored more closely. In addition, as technology progresses, our appliances are becoming smarter and will be able to communicate with the grid, so that certain functions can be powered down if the pressure on the grid reaches a specific threshold

For more information about smart grids, go to www.inhabitat.com.

Of course, technological and scientific innovations with regard to renewable energy will require billions of investments and possibly create millions of jobs, but at the same time, it might make us more vulnerable to a new type of security threat: energy terrorism. Keeping this in mind, we will not only be tasked with building a more sustainable region, but also safe one.

long live medical progress

In this century alone, we have seen medical breakthroughs that we would not have dreamed of just a few decades ago: from artificial hearts to double-arm transplants, from hormone replacement therapy to gene therapy for Parkinson's disease, from tests for metastatic breast cancer to a vaccine against bird flu. With innovations in biotechnology, information technology and nanotechnology, we are sure to see even more revolutionary developments in the field of medicine, and the Atlanta region has the potential of becoming even more of a key player in those advancements.

Did you know, for instance, that Atlanta is ranked #1 in Nanomedicine, funding, facilities and talent, according to Atlanta Technology Loop? In addition, one of the "world's foremost imminent scholars" in vaccine development is an Atlanta resident. Continued focus on biotechnology and nanotechnology in the medical field will have a major impact on the region. How many new jobs will be created? How will it affect our economy?

Let's look at some of the current and future medical applications of nanotechnology. According to Joseph Kennedy, who presented a study on Nanotechnology to the Joint Economic Committee, we are currently in the stage of "Active Nanostructures", during which we may be able to produce nanoparticles that could find cancer cells and "release an attached drug". In the next stage (2010-2015), we could have the technology in place to destroy the reproductive capacity of cancer cells altogether. Nanotechnology will even be able to fix the DNA of damaged cells.

Does this mean that we'll live longer, better lives? The answer depends largely on us. There are two competing trends – good science, but bad habits. Will medicine win over constant stress, lack of sleep and exercise and unhealthy diets? If so, we must provide for a regional infrastructure that can support what could be a dramatic growth in the size, age and diversity of our population.



The Marcus Nanotechnology Research Center at Georgia Tech will have 30,000 square feet of cleanroom space to conduct cutting edge research in nano- and bio-technology. Research will specifically focus on creating new approaches to drug delivery, cancer detection and treatment, DNA damage repair, and the detection and analysis of plaque formation for artery and cardiac disease prevention.

For more information about nanotechnology at Georgia Tech, go to www.development.gatech.edu/capital-projects/nano.php. Also, to learn about what other universities in the region are doing in the field of bio sciences, go to www.atlantahighered.org.

the future's so bright (i gotta wear shades)

From human cloning to eradicating cancer, from smart-highways to downloading your brain, from taking virtual vacations to self-repairing houses, from unlimited renewable energy to personal robots – innovations in science and technology have vast potential to dramatically change our lives, for better or worse. It will be our challenge to make sure that the future is as bright as it can be.

How many manual labor or service-industry jobs will technology eventually make obsolete? And what will this mean for our education system and our economy?

If our life expectancy will indeed significantly increase, how will senior citizens be able to afford medical care? What will their mode of transportation be? How will communication be designed to accommodate an aging population?

If virtual technology evolves to the point where we won't even have to leave the house for anything anymore, what will this mean for us as human beings? How would it affect our infrastructure?

How will we attract the talent we need in order to be competitive with other cities, other regions, and other countries? And how will we accommodate an even more drastic increase in urban population with regard to energy systems, waste disposal, water supply, transportation, and housing?

With such an increased dependence on technology, which measures do we have to put in place to make our region safe and address potential vulnerabilities?

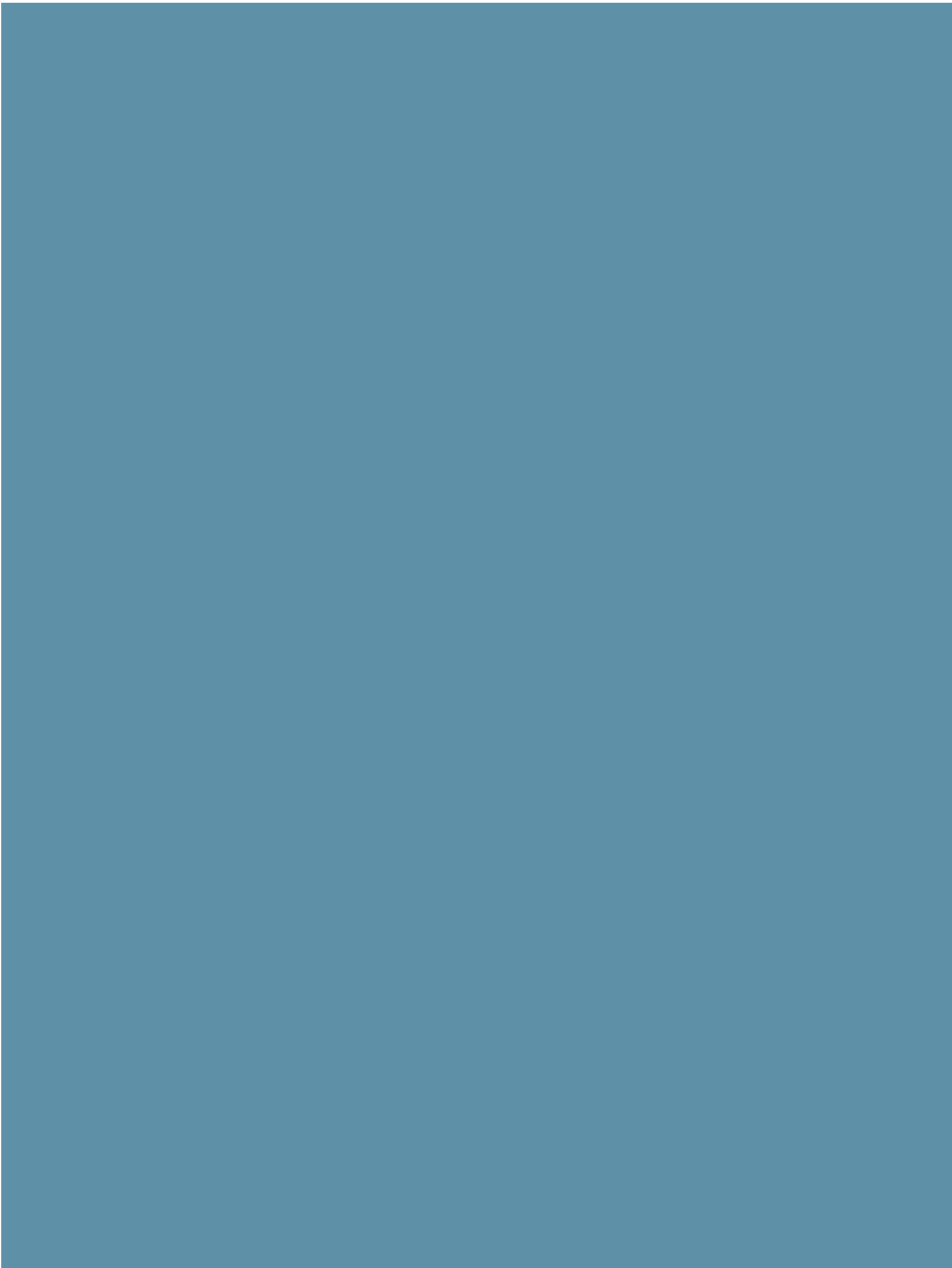
One thing is certain: technology planning and strategy will play an integral role in regional planning, alongside traditional infrastructure planning. To leverage the vast possibilities that technology and science will provide us, we have to prepare ourselves and our region on many levels. A French proverb noted – “The tools to him who has the ability to handle them.” It is clear that we will have an abundance of tools to do truly great things in the future; the key will be attracting the talent and developing the skills and discretion to handle them.

Of course, technological and scientific innovations with regard to renewable energy will require billions of investments and possibly create millions of jobs, but at the same time, it might make us more vulnerable to a new type of security threat: energy terrorism. Keeping this in mind, we will not only be tasked with building a more sustainable region, but also safe one.

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