



Charlotte's Future  
**TECHNOLOGIES**

# CHARLOTTE:

## WHERE INNOVATION PATHS MEET

by Scott Carlberg

IN THE DEPTH OF THE 2009 DOWNTURN, ONE BUSINESS GURU ADVISED TO LOOK FOR “A NEW INDUSTRIAL BASE THROUGH UPGRADES IN PRODUCTIVITY AND INNOVATION AS THE IMPORTANT DRIVERS.” THAT NEW INDUSTRIAL BASE IS IN CHARLOTTE, WHERE THE PATHS OF BUSINESS PRODUCTIVITY AND INNOVATION MEET.

INNOVATION, ON ITS OWN, IS ONLY INTERESTING. INNOVATION COMBINED WITH GOOD BUSINESS, SPELLS SUCCESS. “IT DOES NOT MATTER WHERE SCIENTIFIC DISCOVERIES AND BREAKTHROUGH TECHNOLOGIES ORIGINATE — FOR NATIONAL PROSPERITY, THE IMPORTANT THING IS WHO COMMERCIALIZES THEM.” ACCORDING TO CONSULTING FIRM MCKINSEY IN FEBRUARY 2009.

“There is a big advantage for new and fast-growing high tech firms in a city that has deep roots in financial expertise. I feel that Charlotte, as a national banking center, will have tremendous advantages in building excellence in high availability, mission critical processing technologies as well as new customer acquisition technologies.”

— Michael Elliott, General Partner, Noro-Moseley Partners (Venture capital)

The well-tested business strength of Charlotte, a city that has doubled its workforce in ten years, meets innovation to produce one of the nation’s most desirable and inventive cities.

Charlotte technologists produce products as small as a fraction of a human hair to larger than 500 tons. They manage data as little and fleeting as a message on a smart phone to multi-national financial systems. Charlotte is a welcoming place for inventive companies.

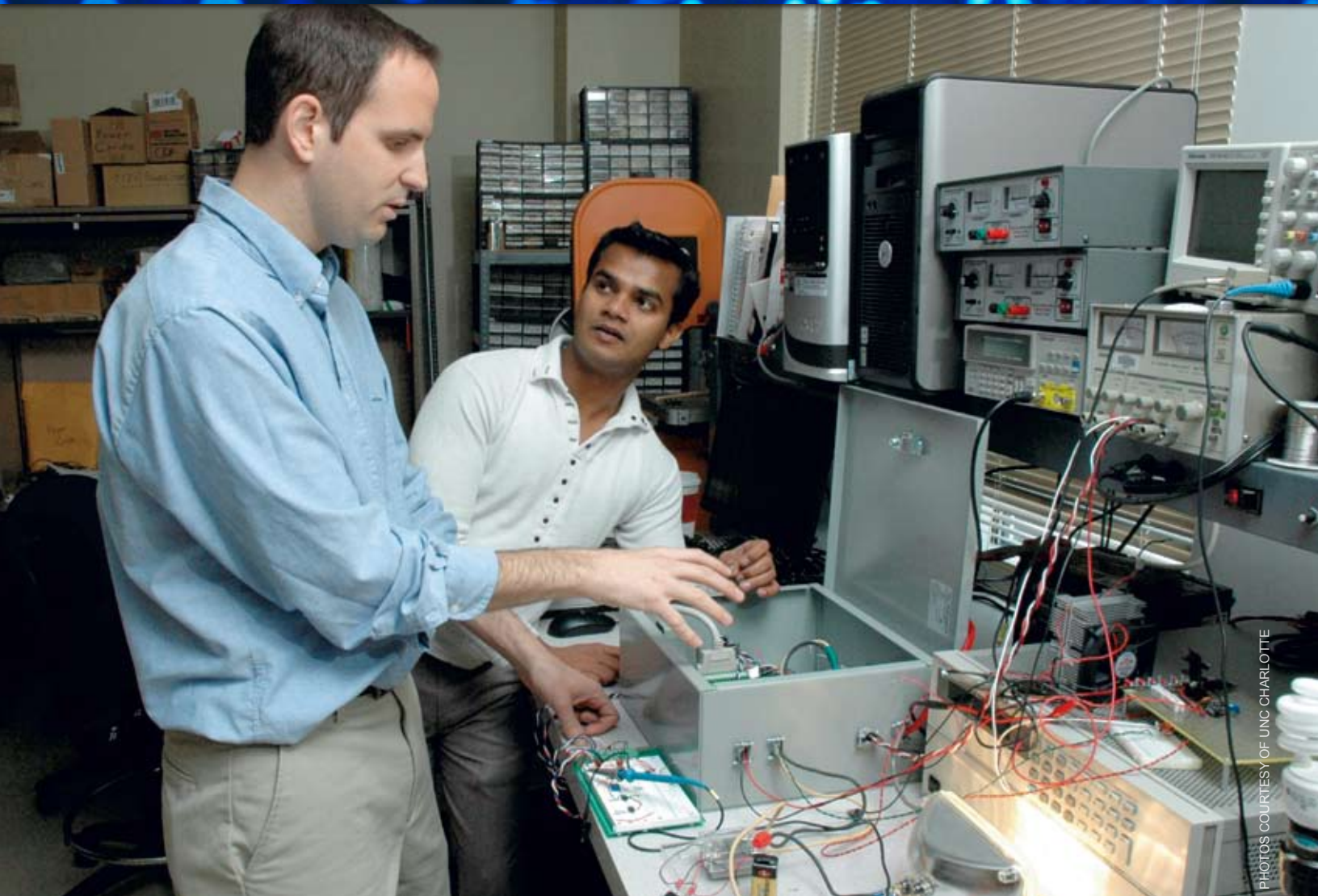
There are several paths of innovation according to the report “Blueprint for American Prosperity:”

- **Product innovation:** Creating new products or services
- **Process innovation:** Using new production technologies and techniques
- **Organizational innovation:** Implementing new ways to organize work and business processes

Charlotte’s innovative class follows each path across varied disciplines. Here are some examples:

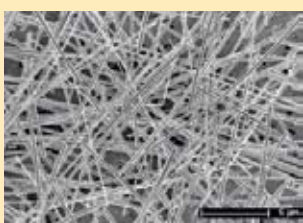
### Product Innovation: Energy Storage

Blue Nano is an advanced nano materials manufacturer that focuses on the energy sector, specifically batteries, fuel cells and solar. Blue Nano developed an extremely cost effective process to manufacture nano material and currently produces the highest quality nano material such as silver nanowires, nanotubes, particles and special material for fuel cells. Its “CNT-101,” a conductive additive, increases durability of lithium-ion batteries up to four times. The firm’s fuel cell catalyst far exceeds the Department of Energy’s performance standards well past the year 2015 and is considerably



PHOTOS COURTESY OF UNC CHARLOTTE

▲ ROBERT COX, UNIVERSITY ENERGY RESEARCHER: “Charlotte is the ideal location for my research. We are surrounded by forward-thinking industry partners forging the blueprint for America’s smart grid. When I speak to colleagues — even those in ‘tech savvy’ hot spots — they are instantly jealous.”



At 100,000th thinner than the width of a human hair, nanowires produced by Blue Nano are used for silver-enhanced solar panels that increase light trapping and conductivity to increase any solar panel’s efficiency by 38 percent. They can also be used for high-intensity LED’s, anti-microbial uses and thermal-conductive purposes like silver-zinc batteries.

more cost effective than other materials currently used.

“Our job is to push the boundaries of science,” says president David Himebaugh. “Blue Nano employs top scientists in their disciplines that have a unique sense of developing new products. We continually seek people who stand out from the crowd and Charlotte manages to attract that very type of person we need.”

### Product Innovation: Biotech

The rise of terrorist activities and the environmental awareness of our population drive a heightened sense of exposure to chemicals. Charlotte-based

Countervail Corporation focuses on developing and commercializing medical countermeasures against poisoning from nerve gas and pesticides.

Providing protection and treatment of military and civilian populations from exposure to chemical and biological weapons. More than 3.9 million US military, NATO and support personnel are considered at-risk for primary or secondary nerve gas occurrences, and high density cities can be targets for gas attacks.

Protection from and treatment of acute organophosphate pesticide exposure. Some estimates say that there are more than 39 million worldwide episodes of acute

pesticide poisoning each year. There are 1.8 billion agricultural workers worldwide at risk for toxic pesticide exposure.

The Countervail team has a biotech product to meet the challenge. Bill Basinger, CEO, Countervail Corporation, says, "Research data support that our drug, AverTox™, is anticipated to be effective both as a prophylactic and in post exposure to these toxins. Animal studies have shown that it not only protects the peripheral nervous system but, as a small uncharged molecule, it crosses the blood-brain barrier to also protect the central nervous system from longer term detrimental effects."

### Product Innovation: Power management

Buildings consume some 40 percent of our energy, a real concern as energy costs rise and availability is pinched. New technologies can reduce energy usage by managing the flow of energy into and throughout the built environment. Dr. Robert Cox at UNC Charlotte is researching a "non-intrusive load monitor tool" (NILM). This device uses line voltage and aggregate current to determine

"In recent years Charlotte has seen the development of a core of high-tech industries. Technology clusters have emerged in the new energy, biotech research and racing industries. The recent growth in these clusters has changed the face of the region and is stimulating additional related and unrelated technology expansion. The cumulative effect of this structural change is a more diverse and growth oriented economy."

— John Connaughton, TIAA-CREF professor of economics, UNC Charlotte's Belk College of Business.

the operational health of each of the major loads on an electrical service. This low-cost technology has been tested in buildings, automobiles, power plants and U.S. Navy vessels. NILM can track the consumption of each load, automatically detecting critical failures such as faulty compressors, poorly tuned controllers and leaky ducts. A technology such as the NILM — harnessing the power of computation — will be critical to the future of the smart grid initiative in the United States.

### Process Innovation: Biotech

BioCytics, Inc., founded by oncologist John Powderly, MD, is improving personalized medicine for cancer treatment. BioCytics isolates and analyzes circulating tumor cells that result when tumors metastasize. It is hoped that these cells can be cultured and then tested for their resistance to cancer drugs. BioCytics is also in the process of creating the first independent "bio-bank" and bio-informatics facility capable of dynamic clinical research trials embedded in Electronic Medical Records of network physician investigators. Additional cellular therapy and genomic research of these isolated cells will be performed in BioCytics' BioEngineering Laboratory.

### Process Innovation: Cancer research

Dr. Pinku Mukherjee is researching clinically-applicable immunotherapeutic strategies or vaccines against breast and pancreatic cancers to use in combination with conventional therapies. "Besides clinical efficacy, our interest is in generating a set of surrogate biomarkers that will correlate or predict short and long-term clinical efficacy of the cancer vaccines," says Mukherjee. The research in her UNC Charlotte lab is funded through the National Institutes of Health — National Cancer Institute, Department of Defense, American Association of Cancer Research and the Susan G. Komen Breast Cancer Foundation.

### Process Innovation: Automotive

The N.C. Motorsports and Automotive Research Center recently celebrated the grand opening of the area's first water tunnel. Since the days of Leonardo da Vinci, water tunnels have been in use for fluid flow research. Since water and air are both considered fluids, water tunnel research applications include not only the study of submarine and surface vessel efficiencies, swimwear efficiencies, and the environmental implications of



▲ Dr. John Powderly drives biotech innovation at BioCytics.

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schooling fish and soil erosion, but also aerodynamic applications such as race car aerodynamics, aerospace experiments, baseball bat design, golf club and cycling aerodynamics.

The Motorsports and Automotive Research Center does research and testing in vehicle components, fuel economy, fluid flow analysis and fuel injector algorithms which can impact operational issues in industry, such as environmental emissions, engine performance and mechanical dependability.

### Process Innovation: Communications

Charlotte-based “Yap” was founded by experienced scientists in the fields

of speech recognition and audio semiconductors, who previously worked on innovations such as Apple’s iPod, IBM’s ViaVoice and Nuance’s Dragon. They understood that voice will become the dominant user interface for mobile devices, and that blending it with visual web services creates an improved mobile application experience.

Yap’s telco grade speech-to-text platform provides the foundation enabling carrier and web portal applications such as voicemail-to-text, mobile messaging and voice search. Voice-driven apps allow their end users a more convenient and natural way of interacting with their mobile handsets, while at the same time augmenting

accessibility and safety as in the case of text messaging while driving.

### Organizational Innovation: IT

The Charlotte Visualization Center has strengthened its leadership in homeland

“Biotech in Charlotte is growing. Charlotte offers entrepreneurs a number of advantages. It is a major financial center and is within range of varied research capabilities. Local networking opportunities are also on the rise.”

— Bill Basinger, CEO,  
Countervail Corporation

▼ Pinku Mukherjee’s Charlotte research has national ties.



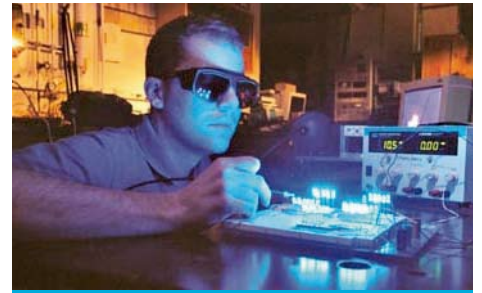
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security, emergency response, and natural disaster analysis. In addition to the DHS-funded Southeast Regional Visualization and Analytics Center, it is also part of the DHS Center of Excellence for Natural Disasters, Coastal Infrastructure, and Emergency Response and the new Center of Excellence in Command, Control, and Interoperability. The VisCenter is also a leader in other areas including financial visual analytics,

working with banks, government agencies, and financial services companies on new tools to understand their increasingly massive data.

### Organizational Innovation: Data

Peak 10, headquartered in Charlotte and with locations in nine cities, is the nation's leading independent data center operator and managed services provider. Peak 10 delivers scalable solutions for hosting



The University of North Carolina at Charlotte: A university that has been recognized by the National Science Foundation for its applied research, and industry's high-tech partner.

The Charlotte region has the highest number of IT professionals of all North Carolina metro areas (April 09, TEK Systems report). Says Brooks Raiford, President and CEO, North Carolina Technology Association: "Key elements needed for a healthy high-tech environment are plentiful in Charlotte: a history of a strong business community, concentration of higher education institutions and a highly educated citizenry."

▼ The Charlotte Visualization Center looks at data in entirely new ways.



The Charlotte Research Institute is the portal for industry partnerships at UNC Charlotte. The Institute has specialties in leading edge disciplines: Precision metrology, e-business technology, optoelectronics, bioinformatics, biomedical engineering systems and translational research.

The William States Lee College of Engineering is approaching 3,000 enrolled students, up more than 25 percent since 2004, making it one of the fastest growing engineering colleges in the nation. Since 2005 the college has grown research dollars more than 70 percent, signifying a well-rounded growth of students and research.

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David Jones, President and CEO of Peak 10, is also chair of the North Carolina Technology Association: "The Charlotte Chamber formed a partnership with NCTA to broaden each organization's reach and depth in the Charlotte-Mecklenburg region. The strategic partnership provides the leadership and venues for small, mid market and large, *Fortune* 100 companies to collaborate on key trends and technologies."

and managing complex information technology infrastructure. The company was an early entrant into the data center business and has grown by adopting and leveraging key technologies such as data virtualization. The company has more than 1,500 customers and though primarily concentrated in the Southeast and Midwest, touches customers globally. Peak 10 has its third expansion of its flagship Charlotte facility, a testament to the significance of the technology and SMB/mid market growth in this region of the state.

The merits of a desirable "high-tech" city go beyond intellectual capital. It is also the way the city embraces high-

tech thinkers. Carl Mahler, an engineer and patent attorney, came to Charlotte in the past few years to manage tech transfer at UNC Charlotte. He says: "A large percentage of the people who are 'movers and shakers' as entrepreneurs and innovators in the Charlotte area have been here for less than five years. One reason that this is such a fertile place for innovation is that the region genuinely welcomes new people with new ideas. Individuals who demonstrate talent and ability are recognized and valued whether they are seventh generation residents or newcomers. If you bring something worthwhile to the table, you'll find a seat in Mecklenburg County."

▼ Siemens Energy, Inc. has its steam turbine and generator repair and manufacturing center for the Americas in Charlotte. The facility features new generator production as well as service repair for the entire Americas-based Siemens steam turbine and generator fleet. The work below is being done on the stator of a 225-megawatt air-cooled electrical generator to be used in a combined cycle power plant. Randy Zwirn, President and CEO of Siemens Energy, Inc., says "We have had a presence in the Charlotte area and in other areas in North Carolina for decades, and it was our firsthand knowledge of the excellent business environment here that convinced us to expand our investment further."



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just like that, it hits you. You are responsible for choosing the right location for your company. You look at the stack of information on your desk from so many communities and realize there are many options. You need to find a location that offers all the right ingredients for your company's success. It has to be a place with superior air service, skilled labor, an exceptional but affordable quality of life for your employees, and most importantly — a reasonable cost of doing business. All of a sudden, one community stands out. Welcome to Charlotte.



330 South Tryon St., Charlotte, N.C. 28232 | 704.378.1300 | [www.BOOMcharlotte.com](http://www.BOOMcharlotte.com)

