



VIRTUAL + HEALING

CENTRAL FLORIDA'S BUDDING BIOTECH INDUSTRY IS RECEIVING A HEALTHY BOOST FROM A POWERFUL LOCAL SOURCE: SIMULATION. AND THE SYNERGY IS VERY REAL.

by Kevin Fritz

Mannequins that bleed. Virtual-reality headgear that's used to treat post-traumatic stress due to motor vehicle accidents. A mixed-reality kitchen to rehabilitate a brain-injured patient in typical household tasks. Simulated ambulances and emergency rooms with computer-generated patients that talk.

Sounds a little like a science fiction movie, doesn't it? At best, it smacks of some futuristic world, where technology and medicine become intertwined to great proportions.

Well, that's exactly what it is. Except the future is now, and in 2009 on the University of Central Florida Health Sciences Campus at Lake Nona in southeast Orlando, this will all become a reality — virtual and otherwise.

Indeed, while the UCF College of Medicine and the prospects of a medical industry cluster continue to garner the lion's share of headlines locally, and rightfully so, given their enormous potential as economic drivers, there is another story unfolding: the way the mix of emerging medical technology and our well-rooted simulation industry is becoming very real, very quickly.

Call it virtual healing. It's in action today and will only become more prevalent in time.

"The new medical college plans to use simulation in its curriculum," says Dr. Randall Shumaker, director of the UCF Institute for Simulation & Training (IST), who views the potential medical cluster at Lake Nona as the next Research Triangle Park, the quintessential biotechnology complex in North Carolina. "We are now in discussion with possible partners," he says.

The medical school's plans are for a four-year curriculum that will capitalize on UCF's

existing strengths in modeling and simulation, among others, and eventually graduate 120 students a year. Under the direction of Dr. Deborah German, formerly associate medical school dean at Vanderbilt University, the UCF College of Medicine is scheduled to open in fall 2009 with a class of about 40 students.

Shumaker is on a curriculum committee specifically created to determine how simulation will be incorporated into student instruction.

So is Dr. Janis Cannon-Bowers, on loan for the year from IST and the Department of Digital Media at UCF to study models and simulation techniques for a variety of formats. They include simulators for surgery that are exact models of human physiology. Cannon-Bowers spent the summer helping design concepts for medical-simulation laboratories, essentially creating models of the human body for medical training.

"I have been asked to help craft a vision of what it [the body] should look like," Cannon-Bowers says.

That's where the bleeding mannequin comes into play. "In the case of bleeding," she explains, "a person with a severed limb is going to bleed out pretty quickly. So, if we are trying to train medics for the battlefield, we need to be sure that our simulators bleed out at a realistic rate.

"The point is that in order to provide effective training, we need to correctly model aspects of the system we are training on. That might be an aircraft or, in the case of medical personnel, human bodies — hence, the need for accurate physiological models."

Similarly, virtual reality can prove effective.

"If we are teaching critical thinking skills, we don't necessarily need a physical model [since]



The marriage of simulation and medicine in action: Mannequins in a simulated emergency room and ambulance are used at the Emergency Medicine Learning & Resource Center to teach first responders such as emergency medical technicians, paramedics, firefighters, emergency physicians and nurses.

AT A GLANCE

Central Florida's Biotechnology and Life Science Industry

- ▶ 155 biotechnology and life science companies
- ▶ 9,248 workers
- ▶ estimated \$2.6 billion in earnings

Central Florida's Simulation Industry

- ▶ 100-plus companies
- ▶ 16,847 workers
- ▶ \$2.5 billion in earnings

SOURCE: ECONOMIC DEVELOPMENT COMMISSION OF METRO ORLANDO

DEFINING TERMS

Biomedical: the application of the principles of the natural sciences to medicine

Life sciences: the study of living things

Biotechnology: technology based on biology, especially when used in agriculture, food science and medicine

a virtual one will do, so long as it accurately represents the symptoms and cues that the doctor typically uses in decision making," notes Cannon-Bowers.

BUILDING AN INDUSTRY INFRASTRUCTURE

John Fremstad describes the marriage of simulation and medicine as a natural. The director of technology business development for the Metro Orlando Economic Development Commission (EDC), Fremstad cites the prowess of the local simulation industry, along with its related training and optics work, and points to the substantial medical infrastructure that already exists across the region. The combination, he contends, represents synergy simply waiting to happen.

According to the EDC, the simulation and training industry in Central Florida boasts more than 100 companies, employing more than 16,000 people. Notably, Central Florida Research Park is home to the National Center for Simulation. As a result, rival locales are few and far between, perhaps limited only to Tidewater, Va., and Huntsville, Ala.

"The [Central Florida] Research Park, which is the sixth-largest in the world, is basically all about simulation and training," Fremstad says.

"We are the nation's epicenter."

Drawing strength from that pillar, the intent is to have biotechnology — technology based on biology, especially when used in agriculture, food science and medicine — follow suit. "We hope the bio industry will be what simulation and training is today," he adds.

To help make that happen, this spring the EDC formed *bioOrlando*, a council that is charged with developing Central Florida's life sciences and biotechnology industry. At present, efforts by a who's who of medical industry players — everyone from UCF to juggernaut healthcare systems Orlando Regional and Florida Hospital, which are among the largest nationwide — are centered on paving the path for a medical cluster to take root. They are setting a legislative agenda and visiting successful clusters nationwide, such as the one in San Diego.

Through *bioOrlando*, the EDC seeks to recruit companies to the area. "We really position all of this effort behind *bioOrlando*," says Fremstad, realistically estimating that the maturation of a local medical cluster could take up to 30 years.

He adds the EDC is also intent on working with any and all local biotechnology or life



sciences companies, offering such help as workforce training and second rounds of funding. “Most of our work as an organization is with local companies. It just doesn’t get a lot of press,” he says.

CREATION OF A MEDICAL CITY

The *bioOrlando* concept, just an idea not so long ago, became more concrete, literally, when the foundation was poured in May for the UCF Burnett College of Biomedical Sciences, the first of several structures that will rise from the undeveloped land at Lake Nona. After much hoopla, wooing and wrangling, that initial construction activity was welcome confirmation that a new industry really is taking shape.

To recap: While a biotech industry was quietly exhibiting signs of life in Central Florida, thanks to existing top-notch hospitals, research facilities and business incubators, other events created needed buzz.

Orange County Mayor Richard Crotty announced plans for Innovation Way, a proposed road that would connect the airport to the Central Florida Research Park. The Tavistock Group donated land in Lake Nona for a 50-acre medical campus. The subsequent announce-

ment about the new Burnett College at UCF plus the approval of a \$200 million UCF College of Medicine not only raised eyebrows, but also heightened the industry’s decibel level. Then, last August, the Burnham Institute for Medical Research chose Orlando as the site for its East Coast operations. Most recently, a University of Florida medical research lab was added to the mix, along with a new VA hospital and the Nemours Children’s Hospital.

A medical city appears in the making.

LOOKING TO PLAY A ROLE

And there’s a population of area companies poised to ensure that the medical city grows.

While a biotech industry was quietly exhibiting signs of life, other events created needed buzz.

According to the EDC, approximately 155 biotechnology and life sciences companies are scattered throughout the region. Those com-

panies employ more than 9,200 people and generate annual revenues of \$2.6 billion. That’s pre-Burnham and pre-UCF College of Medicine.

Clearly, while the aforementioned made the biggest splashes, companies already here have been making news, too.

Do you have a fear of flying, of driving, of heights, of public speaking, of thunderstorms? Or, are you claustrophobic, agoraphobic or arachnophobic? Perhaps your cure awaits in the form of virtual reality.

Don headgear — the same type used for games — and a doctor can treat you via Virtual Reality Exposure Therapy. Basically, it is three-dimensional computer simulation, placing patients in a computer-generated world where they “experience” the various stimuli related to their phobia and receive visual and auditory cues. It can even be used for stress-related disorders.

That’s the handiwork of the Virtual Reality Medical Center, headquartered in San Diego, which recently opened an office in downtown Orlando. Although that office is currently focused on military training, leaving the medical care out West, it may not be long before that virtual-reality therapy comes to town. And, not



COVER STORY

coincidentally, the company is interested in opening an office at Lake Nona.

Already, the Virtual Reality Medical Center is engaged with UCF, also occupying space in the appropriately named Partnership II building at Central Florida Research Park and

working with IST on two projects separate from its downtown Orlando endeavors.

One project involves physical therapy, designed to find ways to improve arm- and shoulder-related activities of daily living in disabled patients, using a mixed-reality/haptics (sense of

touch) system. Mixed reality is the merging of real world and virtual worlds to produce new environments where physical and digital objects can coexist and interact in real time. The second project involves cognitive rehabilitation, used for developing a sense of touch. A virtual-reality tool enables troops in the field to gain immediate cognitive rehabilitation from bomb blast injuries.

“These pilots have taken off,” says Shumaker about the two projects. “The idea is to move from speculation to product.”

Additionally, IST has sponsored two of its own cognitive therapy projects, using mixed-reality technology. One was used to determine whether mixed reality could be used effectively to rehabilitate a brain-injured patient in typical household tasks, such as making coffee and finding the silverware drawer. The other was used to see whether the technology would be effective in helping a subject overcome a stuttering disability. The research is ongoing.

Meanwhile, simulated patients and simulated environments compose the backdrop of work at the Emergency Medicine Learning & Resource Center (EMLRC), a foundation created in 1990 by the Orlando-based Florida College of Emergency Physicians.

The foundation’s flagship is the Mobile Simulation Lab, complete with a simulated emergency room and ambulance featuring model patients — mannequins — for teaching first responders such as emergency medical technicians, paramedics, firefighters, emergency physicians and nurses.

“They are so lifelike,” comments Beth Brunner, EMLRC’s chief executive officer, about the mannequins. “They blink, breathe, talk, have airway movement and bleed.”

Planning for bigger things ahead, EMLRC is moving into a 33,000-square-foot facility in ▶





COVER STORY

south Orlando, near Lake Nona, in early 2009. The facility will provide interactive courses in a hands-on learning environment, including a simulated emergency room and ambulance and high-tech simulators for training. Collaborations with UCF are under way, too, through the university's Department of

Psychology and with IST on disaster preparedness. And future partnerships with the medical college seem likely. "Absolutely," Brunner says without hesitation.

CAPITALIZING ON SYNERGY

The work by the Virtual Reality Medical Center and EMLRC is

impressive. What's more, the companies are far from alone in the quest to cluster.

"This will be the area of the country where [biomedical companies] will be looking to relocate," asserts Carol Ann Dykes, associate director of the UCF Technology Incubator, which opened in 1999 and has served more than 80 emerging technology companies.

Dykes points to one of the incubator's most recent graduates, Cognoscenti Health Institute, a healthcare service and technology company using advanced information technology and emerging biotechnology to deliver medical laboratory services to patients, physicians, clinics and hospitals. Cognoscenti also uses and develops automated, emerging biomolecular technologies, and it's one of three companies in the country developing clinical diagnostic tests for a new "nanolab on a chip" platform. The company has settled at a location close to UCF, with an eye toward eventually moving to Lake Nona.

"When they graduated from the UCF incubator program, they wanted to be down there," says Dykes.

This is just the beginning.

There is synergy between two industries. And synergy among many companies. There are bright minds. And there is entrepreneurial spirit. There is progress. And there is optimism.

A brave new industry, beginning with the letters b-i-o, is on the way.

"Orlando has a positive brand," concludes Fremstad. "We're finally getting there." ■

