

THE IDENTITY BUSINESS

Biometrics Cluster Sharpens West Virginia's Economic Image

BY BETTY JOYCE NASH

Tucked among the ridges and valleys of West Virginia, on land once stripped for mineral wealth, sits the biggest stash of fingerprint data in the world. The Federal Bureau of Investigation's Criminal Justice Information Services Division (CJIS) is 10 years old, employs more than 2,300 people, and forms the root of a new economic identity for West Virginia — biometrics.

The CJIS center has spawned a biometrics cluster. From certification labs to technology parks to technology transfer groups, the industry is taking hold, according to Tom Witt, director of the West Virginia University Bureau of Business and Economics. "The indication we have nationally is that this is a center for biometrics. We're on the map, the radar screen."

Biometrics uses physical traits to determine and verify identity, and as a result, speed transaction time. A quick fingerprint scan identifies you at a supermarket counter so there's no fumbling for credit cards. Or perhaps you enter the workplace by staring into a machine that scans the unique pattern of your retina.

The payoff could be big as the biometrics business grows along with national anxiety over security and identity fraud. An industry association, the International Biometric Group (IBG), predicts revenues will quadruple in the next four years, from \$1.2 billion in 2004 to \$4.6 billion in 2008.

Corporations such as defense giant Lockheed Martin maintain a mountain presence with about 250 employees in the region anchored by the FBI. West Virginia has built on this biometrics base with the goal of transforming the manufacturing and mining mentality into a technology focus. To capitalize on the CJIS center, the state is

pumping money into university research funds and the state's venture capital fund. West Virginia is also cultivating its most valued resource — people.

Alan Viars is the kind of knowledge worker West Virginia covets. He is a 1999 graduate of West Virginia University, with master's degrees in computer science and business administration. Viars works in Clarksburg as a contractor at the U.S. Department of Defense's Biometrics Fusion Center, the hub of defense biometrics research, testing, and evaluation. The center, located on Main Street among vacant storefronts and next door to the Ordinary Restaurant and Pub, is only three and a half hours from Viars' hometown of Comfort, near the Coal River in Boone County. But technologically, it's light years away.

"I was offered a job and it happened to be involved with biometrics, so I picked it up after college," he explains of his career path. Viars, who hails from a family of entrepreneurs, works on developing data-sharing software, among other tasks. "I do a lot of pilots to make sure things go well." He sees the industry, in particular the fusion center, as a permanent outcropping among the West Virginia hills. "I can tell you that I don't think this place will ever go away." In fact, a new home for the fusion center is planned on the FBI grounds with a projected 2006 construction start date. Currently, the fusion center employs about 100 people, many of them contractors. There are 150 to 175 jobs slated for the new location.

Viars heads Viametrica, a fledgling spin-off from West Virginia-bred TMC Technologies, started by native Wade Linger. Lockheed Martin, with help in biometric expertise from TMC, recently won a five-year, \$25 million contract to work on the Automated

TMC Technologies' Alan Viars assesses digital fingerprint collection systems at the Biometrics Fusion Center in Clarksburg, W.Va.



Biometric Identification System (ABIS) to store and search fingerprints collected worldwide by the Defense Department. The system will be able to search the database of arrestees maintained by CJIS, a big step forward.

CJIS, the fusion center, private technology firms, and a variety of state and federal institutions comprise a technology trail in the north central part of the state that runs along Interstate 79 from Clarksburg to Morgantown, home of West Virginia University (WVU). It also stretches west along Interstate 64 to include Marshall University and its forensics center.

Biometrics has become almost a household word around this region. Employees at the Biometrics Fusion Center, for example, spend 10 percent of their time fanning out into the community to offer programs. High schools encourage students to explore biometrics, and the fusion center offers internships for college students. The CJIS facility likewise reaches out. There are school children in West Virginia who have their fingers scanned to deduct lunch money from accounts, while some students at WVU gain access to dorms via hand readers.

Reclaim Land, Claim Opportunity

Once the CJIS facility cranked up, West Virginia closed in on its plan for a biometrics cluster. West Virginia's economy historically depended on natural resource extraction and heavy manufacturing, both now declining. That left West Virginia's per-capita income at 78 percent of the national average in 2003, 49th among the states, and its young people bound for opportunities elsewhere.

Efforts by U.S. Sen. Robert Byrd, D-W.Va., brought the FBI division to 986 acres of reclaimed strip mines near Clarksburg. It opened in 1995 and its effects were immediate. Between 1992 and 1998, the average annual employment growth rate in the three-county area that includes Clarksburg rose by 3.16 percent compared to the statewide change of 1.7 percent.

Today, CJIS employs about 2,350

people in jobs ranging from statisticians to mechanical engineers to fingerprint readers, among others. Lisa Stout, an arts and information specialist there, has worked for the division since 1999. She grew up here and is grateful for employment options that allow her to stay close to family as she raises four children.

In 1999, CJIS launched its automated fingerprint identification system. Response time for identifying criminal submissions dropped from weeks to less than two hours. CJIS stores 48 million sets of arrestee fingerprints, the oldest and most widely used biometric. This database is critical in identifying terrorist suspects; it is linked to the U.S. Department of Defense's Automated Biometric Identification System to check fingerprints of detainees, prisoners, or suspected terrorists.

The area's institutions have attracted contractors from international firms and mountain startups, many working on federally funded projects. For example, Computer Sciences Corp. (CSC) of El Segundo, Calif., obtained a four-year, \$52 million contract to support the Biometrics Fusion Center in Clarksburg. CSC will do it with the help of home-grown businesses such as TMC as well as WVU and the West Virginia High Tech Foundation.

"Obviously in light of what happened Sept. 11, many people across the world all of a sudden discovered biometrics," notes Jamie Gaucher of the West Virginia Development Office. "We were ahead of the curve. That gave us a boost and gained the state a great deal of recognition."

Michael Yura, senior vice president of the nonprofit National Biometric Security Project (NBSP), says WVU's biometrics and forensic identification majors were "simmering on the back burner until 9/11, and then moved onto the front burner on high." The NBSP's center in Morgantown develops standards, tests, and evaluates biometric technologies. WVU began its forensic identification and biometrics majors in 1997, and serves about 1,000 students today. The FBI approached Yura about

creating the majors because it needed trained employees.

"When I see an increase in enrollment at the state's largest educational institution within this field, I think of that as a resource," Gaucher says, adding that if a firm wants to find people with a set of skills within the biometrics industry, West Virginia can supply them.

Tom Witt, the director of the Bureau of Business and Economic Research at WVU, says the growth in federal agencies and associated contractors working with identification technologies is dramatic.

"We came up with lists in the Clarksburg-Morgantown area — CSC, Galaxy Global, Azimuth, Lockheed — as examples of firms we know have at least a portion of their work in biometrics. Match that with efforts at the university and other initiatives within the institution and you really see that it's a critical mass." Witt says that it's tricky to calculate numbers of biometrics employees because of the overlapping skills and duties in this rather hybrid business that is part computer science, part engineering, with some bio-sciences thrown in as well.

TMC founder Wade Linger returned to his native state in 1992 to open an office for his then-employer ManTech International Corp., which worked on U.S. Navy contracts. The company wanted a piece of the action bubbling up in the wake of plans to locate the FBI's CJIS division. In 1996, Linger formed his own firm. TMC's first biometrics work related to locating missing children through facial recognition. TMC, which expects 2005 revenues of between \$10 million and \$12 million over 2004's \$9 million, has endowed a biometrics scholarship at WVU. Biometrics has migrated into the mainstream, Linger says.

"It's gone from a fringe thing, with some real dedicated geeky types that play in it and come up with stuff that sometimes works and sometimes is hype — it's gone from that to something that's a very serious core technology that's going to be at the core of some important systems, like financial systems and criminal justice and a lot of

stuff that the military is doing, such as refugee identification,” he says.

The Human Equation

Identity can be verified through *possession* (a card, key, or token), *knowledge*, (personal identification number or password) or *existence* (physical traits such as fingerprints, iris patterns, hand geometry, or facial characteristics). Biometrics ratchets the identity business up a couple of notches. It transforms physical characteristics into codes that can be matched against a database to verify identity. The idea is to make sure you are who you say you are.

Fingerprints, the oldest and most common biometric, have been used in identifying criminals for at least 100 years. In England in 1902, fingerprints helped convict someone of murder for the first time. In the 1920s, the U.S. Federal Bureau of Investigation became the repository for fingerprint data.

Multiple, complicated passwords — a pet’s name or a great uncle’s cousin’s brother with the strange first name — are the norm these days in the workplace. But some firms are already getting more sophisticated with finger scans or iris recognition. At the Biometrics Fusion Center, for example, a very perfect female voice directs

employees to “Please, move forward a little” or “Please, move back a little” so that the eye lines up with a wall-mounted iris pattern reader. Iris pattern recognition devices comprised about 9 percent of the market in 2004.

Science-fiction fans know voice recognition from 2001: *A Space Odyssey*. Today, voice recognition accounts for some 6 percent of total biometrics sales, according to IBG’s Biometrics Market and Industry Report 2004-2008. *Star Trek II* used scanners to allow Captain Kirk access to the Genesis Project file. All that — and more — is reality today. Bank of America uses some palm scanners to admit customers to safety deposit boxes.

Security measures mandated by Congress have beefed up the government spending and propelled biometrics forward. For example, the U.S. Visitor and Immigrant Status Indicator Technology (US-VISIT) program starts abroad, where consular offices issue visas, collect biometrics (digital finger scans and photographs), and check them against a database of known criminals and suspected terrorists. When the visitor arrives at an entry check in the United States, their biometrics — digital finger scans — match the visitor to the same person who received the visa.

By the end of 2005, US-VISIT will operate at all ports. The U.S. government has set October 2005 as the deadline for requiring people from some 27 countries (Visa Waiver Program nations) to develop machine readable passports carrying biometric information on a chip.

The International Civil Aviation Organization established facial mapping as the global biometric standard for the e-passports. And electronic U.S. passports are in the testing phase. A voluntary identification tool for frequent travelers is under way at selected airports, using biometric identifiers.

Hand geometry readers already are used at some workplaces not only to verify identity but also to replace the time clock. Face recognition, estimated to be about 12 percent of sales, uses video cameras to photograph and digi-

tally map points across a face to search a database for a match to stored images.

Though the bugs in biometrics systems are still being worked out, along with standards, the industry is coming of age, especially as the U.S. Department of Defense and Homeland Security sink billions into security. The director of the U.S. Department of Defense’s Biometrics Management Office, the policy arm of the fusion center located in Clarksburg, is John Woodward. He studied biometrics for almost a decade. The way to leverage biometrics’ power as a tool for defense, Woodward says, is to be able to search the biometric information against as many databases as possible.

“People say finding a terrorist is like finding a needle in a haystack. You can do exactly that. You can search to find that needle in a haystack, but to do that, searching data has to be in an interoperable format,” Woodward says. And that’s where the ABIS project emerges. “We’re trying to take biometric data that the military collects from enemy combatants, detainees, etc., and collect that data, store it, and search it to see if we can link to the person’s previous identities or past criminal attacks,” he explains.

Cluster Effects

Woodward believes the fusion center’s presence in West Virginia will be healthy.

“The global war on terrorism is sadly not going away anytime soon,” he says. “I think you’ll see growth at our West Virginia office.”

North central West Virginia’s geographic concentration of interconnected industries, many of which do biometrics work, is based on the FBI CJIS division and a wide array of government entities. Some of those include the National Institute for Occupational Health and Safety, the Center of Biomedical Research Excellence, the NASA Independent Verification and Validation Facility, and the NASA West Virginia Space Grant Consortium.

Economists who study clusters say that even as the global economy and technology have erased some of the

A soldier enrolls her iris with an iris reader at the Biometrics Fusion Center.



needs for companies in a similar business to work in proximity, there are compelling reasons to do so.

Michael Porter of Harvard University writes: "Even as old reasons for clustering have diminished in importance with globalization, new influences of clusters on competition have taken on growing importance in an increasingly complex, knowledge-based, and dynamic economy."

In short, clusters foster innovation. And to promote the cluster, WVU has beefed up its research funding from \$60 million in 1998 to \$140 million in 2004, according to Russ Lorince, director of economic development for WVU. The goal is to reach \$200 million by 2010. And disclosures have ramped up as researchers move closer to patents.

The economy in the region is diverse — traditional mining and manufacturing jobs represent about 8 percent of the work force and health care is the major employer. The region's work force is educated — with 21 percent having bachelor's degrees compared to 14.8 percent statewide.

Jerry Paytas of Carnegie Mellon University has studied clusters extensively. The advantage of an institutional cluster, he notes, is stability. "The federal facilities aren't going to suffer from market shocks," he says. "You can still have shifts in political winds. In some ways, those are more predictable. With the federal government, you can negotiate a transition period."

But an institutional cluster is often focused on national needs and that can limit the benefit to the region. "In terms of making a decision, you might try to get some business for local firms, but they're beholden to different criteria. They might have to get the lowest supplier. Their mission is not to grow your economy."

Still, the industry is emerging and observers say that's why the best is yet to come.

Biometrics Buzz

Industry experts say the biometrics buzz will get louder, as worries about access mount and as businesses get on board and the technology gets cheaper and more accurate. Nearly all those interviewed for this article said the market, deployment of technology, research, funding, and acceptance had accelerated since 9/11. The International Biometric Group estimates sales of fingerprint identification systems alone at \$1.5 billion by 2008, largely because of projects such as border control, immigration, national identification cards, and drivers' licenses. And as public awareness expands, analysts expect commercial interests to blossom with particular emphasis on managing data in financial services and health care.

Consumer convenience will determine acceptance. Some grocers, including Piggly Wiggly Carolina Co. with stores in South Carolina and coastal Georgia, offer customers the option of using a finger scan to access a payment choice. Shoppers first register payment options along with the fingerprint. Fifty percent of store shoppers elected to use the scan. The company's senior vice president tested the system last summer when he was on a boat trip.

"I was wearing swim trunks and a T-shirt. I went into the store empty-handed. No wallet, no money," David Schools says. "I loaded a shopping cart with drinks and chips and snacks, went to the checkout, used my finger, paid for my groceries, and was on my way."

Biometrics technology is now living up to the claims of the vendors, accord-



A technician at the Biometrics Fusion Center tests a facial recognition system.

ing to IBG consultant David Ostlund. He observes that post-9/11, people have the notion in their head they need to maintain security. One of the first large-scale biometric deployments began in the 1980s, with hand geometry devices at Ben Gurion Airport in Tel Aviv, Israel. "They still use it."

Off-the-shelf technologies are available today, with fingerprint scan devices on keyboards, Panasonic iris recognizers, and a host of other technologies on the market. And that's got to be good news for the industry cluster in West Virginia.

The industry's intellectual resources are already on the ground in West Virginia because of the federal institutions, notes Jamie Gaucher, with the West Virginia Development office. "We're on the verge of a small- and medium-sized business explosion in biometrics."

And that will help keep the young people in the state. It may even draw educated people from other states, says Alan Viars. "I thought of leaving," Viars says. "But I found a job during graduate school that involved biometrics. It was pretty easy for someone with my background to fall into the biometrics industry." **RF**

READINGS

Paytas, Jerry, Robert Gradeck, and Lena Andrews. "Universities and the Development of Industry Clusters." Carnegie Mellon University, Center for Economic Development. Prepared for the Economic Development Administration, U.S. Department of Commerce, 2004.

Porter, Michael. "Location, Competition, and Economic Development: Local Clusters in a Global Economy." *Economic*

Development Quarterly, February 2000, vol.14, no.1, pp. 15-34.

Woodward, John, Nicholas Orlans, and Peter Higgins. *Biometrics*. New York: McGraw-Hill/Osborne, 2003.

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