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Decisions, decisions

Just how do we spend money? How might technology alter banking? With Bank of America's help, MIT is trying to find out

By Ross Kerber
GLOBE STAFF

Which would you rather have: a \$2 cup of coffee today, or \$8.64 more in retirement savings 30 years from now?

It's the sort of question Dan Ariely can ponder for hours. A professor at the Massachusetts Institute of Technology's Media Lab, Ariely is part of a newly formed group of faculty that will comprise the Center for Future Banking. Last month, the group received up to \$25 million in funding from Bank of America to explore how people make decisions about their money, and how technology can shape and assist in these choices.

Ariely uses the example of retirement savings to illustrate one goal of the program: to help people make rational decisions by understanding their own sometimes irrational impulses and how they make choices.

In the example above, compounding interest would more than quadruple a \$2 deposit in a retirement-savings account over three decades, assuming a 5 percent interest rate. But it's hard

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Dentistry goes digital, makes a better impression

High-tech scan lets patient avoid biting into a tray of goop

By Jennifer Batog
GLOBE CORRESPONDENT

It looks like something out of the opening credits of the "Six Million Dollar Man."

Three dimensional, real-time images of teeth rapidly appear one by one on a computer screen as a dentist waves a wand about the size of an electric toothbrush in a patient's mouth.

The whole process takes a minute or two, and the dentist has captured an image of the patient's teeth which can be sent to a lab to create a crown. It's a long way from the uncomfortable process of taking an impression using

liquid and an impression tray.

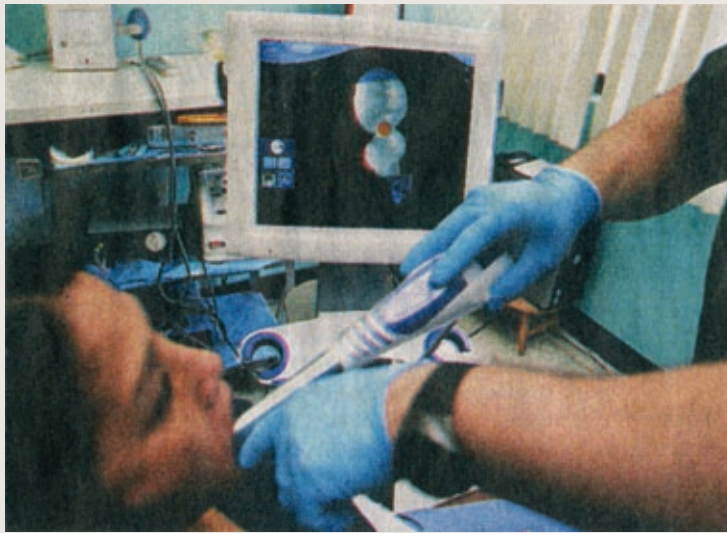
The device, called the Lava Chairside Oral Scanner, is a creation of Lexington-based Brontes Technologies. The firm, part of 3M Co., of St. Paul, Minn., began marketing it to Boston-area dentists at the end of 2007.

"Being able to do this digitally has many positive effects," said Dr. Steven Spitz, who began using a prototype of the scanner about 18 months ago and now uses it for most of the impressions he takes. "I love the instant feedback," he said. "It's cut out a lot of time."

Although the device currently is marketed only for making impressions for crowns, Spitz has also used it to gather data for creating bridges and entire arches, or one row of teeth.

For Spitz's patient Matthew Pukel, the system resulted in a much more

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SUZANNE KREITER/GLOBE STAFF

Dr. Steven Spitz demonstrates a digital wand used to create three-dimensional images so dental crowns can be precisely made.

Keep your friends at your fingertips, with a cellphone

By Carolyn Y. Johnson
GLOBE STAFF

When Tim Collins of Natick wants to know where his friends are and what they are doing, all he has to do is glance at his phone.

Collins and a handful of his friends use Buddy Beacon, a friend-finding service for mobile phones that allows them to keep tabs on one another throughout the day.

Collins said he joined for the entertainment value, but suspects the service may actually be useful.

"I have visions that I'll be stuck in an airport and pull it up, and notice a friend is also stuck" a few gates away, Collins said.

The service could also provide a simple way to keep tabs on his daughter, if she will update

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ONLINE

On the surface

Watch Adam Bogue demonstrate the DiamondTouch touch-sensitive table at boston.com/business



INSIDE

Nokia N-Gages social gamers

Nokia has launched its new mobile games service. Players can join in multiplayer games, chat live, and participate in tournaments. **E2**



Device glides participants through Second Life. **E2**

Hand crank helps keep hardware going. **E2**

Wachovia may announce infusion of up to \$7b. **E3**

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Services let phone users keep tabs on friends

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her location from time to time. "When I just want to talk to my daughter, she finds it embarrassing – but I find she actually will respond to text messages very quickly," he said.

As people of all ages have become comfortable with keeping tabs on friends through online social networks that include minute-by-minute status updates, the major wireless carriers are beginning to take the types of interactions that have become common online into the real world, using the phone.

"A year ago, the business models were not in place, the technology was not mature. Now we're under

standing that location, that context, is king," said Shiv Bakhshi, an analyst at IDC.

Location "will be embedded in all kinds of services you are offered – space and time are two dimensions in which we all work."

This month, Verizon Wireless launched a social-mapping service called Loopt on its network. It charges \$3.99 a month, allowing people to share their locations, broadcast their status to friends, and share and tag photos.

Sprint began offering Loopt for \$2.99 a month last summer.

AT&T does not yet offer such a service, but plans to, a spokeswoman said.

T-Mobile is testing location-based search but it has not

announced any plans to offer friend-finding services.

"Location is the redefining element of mobile communication and the consumer experience," Sam Altman, chief executive and cofounder of Loopt, said in a prepared statement.

A Boston mobile applications firm, uLocate Communications, developed a competing friend-finding service, called Buddy Beacon, for the mobile operator Helio in late 2006. It has expanded the service aggressively to work on Sprint, Alltel, Metro PCS, and the iPhone.

"Carriers have gone through a process of determining what types of products, what types of services they want to bring to market.

Navigation was the first home run; family-finding was a follow-on to that," said Dan Gilmartin, vice president of marketing at uLocate. "I think the notion of your status, and where you are and what you're up to – and being able to easily share that with folks you specifically want to share it with – does become an important element of the mobile experience."

Location-finding technology seems like a natural fit for cellphones, and location-enabled handsets have proliferated in the United States because of the 911 system. Federal rules require that mobile phones make it possible for police, fire, ambulance, and other emergency services to locate

callers.

Using Global Positioning System technology is one way of adding location service to cellphones. The market for GPS-enabled phones is projected to grow rapidly; ABI Research estimates the number of such phones, at 140 million in 2007, will reach 600 million in 2012.

But privacy advocates worry that cellphones could become tracking devices. Location-based services attempt to overcome those concerns with controls that mean only approved friends can see a person's location, or that give people control over whether they want to update their location information.

The trade group CTIA-The

Wireless Association this month introduced guidelines for location-based services, including an example of the need to protect users' privacy when they use friend-finding applications.

But what has driven the industry most may be that people are finally ready for that sort of socializing.

"As more people play on social networks online, they get used to the idea of having contact and relationships in other spaces," said Adena Schutzberg, executive editor of Directions Magazine.

"In a sense this just adds another layer."

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PHOTOS BY SUZANNE KREITER/GLOBE STAFF

The Lava Chariside Oral Scanner, from Brontes Technologies of Lexington, has been marketed to Boston area dentists since late 2007. Dr. Steven Spitz uses it for most impressions he makes of teeth, though it's currently marketed only for making crowns.

Digital dentistry makes a better impression

► TEETH

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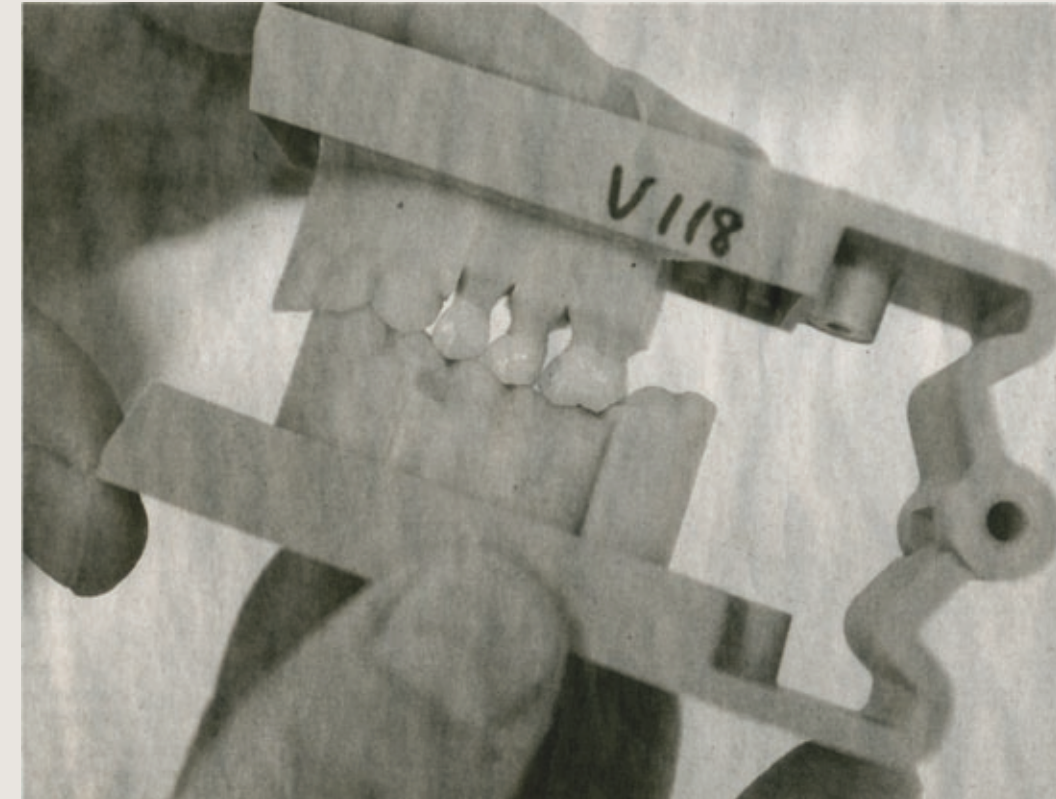
comfortable crown and a virtually touch-free procedure, versus having to hold his mouth shut over a tray filled with goop. "I really hate biting into that gummy paste," he said. "It was a much better experience overall than it was with the old-fashioned technique."

Digital scanning rather than actual impressions can cut down on turnaround time for crowns; create more accurate models of teeth, resulting in a better fit; improve patient education; and give patients and dentists a more comfortable, less invasive way to get the data necessary for crowns.

"It really makes a big impact in the quality of care," said Eric Paley, Brontes Technologies' general manager and cofounder. "It's a much better patient experience."

The scanner consists of high real-time modeling software, and an optical system containing multiple lenses and blue LED cells.

The technology is the first of its kind, according to its creators. Although there are products that create images of a patient's mouth, they use point and click methods – similar to taking pictures with a camera to create an image – while the Lava C.O.S. captures data in a video sequence in real time. It can capture 20 3D data sets per second. The device costs \$24,000 and there is a \$16 to \$20 charge for processing each case.



Digital technology means crowns fit more naturally and are produced in less time than with the old method of making a cast of the patient's mouth, say advocates of the new systems.

Once the scan is complete and the dentist is satisfied with the images, they are sent to Brontes Technologies, which in turn sends the images to a dental lab. All that can happen within an hour, compared with a lag time of several days to ship traditional impressions to a lab.

Turnaround time for crowns using digital impressions has been halved from two weeks to a week at Advance Dental Technologies in Stoneham. The LAVA device allows dentist and labs to connect the digital data directly from a patient's mouth to a digital program

and CAD software, eliminating steps in the crown-creation process and potential errors.

"Every once in a while in dentistry a revolutionary product comes out, and I really think this is one of them," said Advance Dental's president, Bob Cohen. "There really is a 'wow' factor."

MIT trying to see future of banking

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for many people to understand what that extra money would represent when all they want right now is a caffeine boost.

"It's clear what you're giving up now, but unclear what you're getting in the future," Ariely says.

To help consumers make those judgments, Ariely envisions budgeting tools such as credit card accounts that would allow users to set spending limits with serious consequences if they spend too much. Cross the line and the system might fire off an angry e-mail to your spouse or donate cash to a political party you oppose. He says he has suggested the idea to other banks for years but received little interest until now.

Executives at Bank of America in Charlotte, N.C., say it's too soon to know exactly what new products might come out of the center's work, which they will fund at between \$3 million and \$5 million a year.

But Anne Finucane, the bank's head of global marketing and corporate affairs, said staying ahead of technology trends is crucial for the institution, which is the largest retail bank, with 55 million households as customers.

"The role of technology is critical to us," she said. "Fifteen years ago it would have been hard to imagine people would pay their bills online or that we would sell 25 percent of our products online."

The challenge is figuring out what consumers want next. Forecasting the future of banking can be as amorphous as it sounds, and the field is littered with false starts. For instance, near the elevators at the Media Lab a map marks the location of the office of the MasterCard Future of Transactions Lab, a vestige of a \$5.6 million grant the institution received from the big payment network in 2000 to start a program that would study "the new social and economic order" emerging with new payment systems. That effort later was shut down in a round of MasterCard budget cutting, however, faculty say.

Still, the Media Lab remains perhaps MIT's most famous gizmo originator, where a Segway-riding visitor draws no stares and faculty have wired up everything from wearable computers to cellphones embedded in talking toy squirrels.

The banking project came about after a Media Lab student had an internship last year in Bank of America's quantitative analysis group in Charlotte, getting executives there interested in the lab's work, such as a conference it hosted last year called "h2.0," for human 2.0. The conference focused on "neural-digital interfaces" such as those that would allow disabled people to move mechanical limbs through electrical impulses from their brains.

Speakers included several faculty now involved with the Center for Future Banking, including Deb Roy, who develops software for machines to communicate in human-like ways, and Rosalind Picard, who studies sensors and systems that respond to human emotions.

Another attendee was Bank of America executive Jeff Carter, who now plans to move from Charlotte to Boston to become the bank's lead executive for interacting with the center.

In an interview last week, Carter mentioned several "workstreams" the bank hopes the MIT researchers will examine. One issue is what he calls the "cloud of information" of financial advice surrounding consumers. A problem for banks, he said, is how to make sense of the problems and opportunities surrounding the growth of mobile devices that keep track of their location, raising many tricky privacy issues.

That's where the bank could benefit from work like that of Media Lab professor Alex "Sandy" Pentland, a specialist in mobile information systems. In his office in the center of MIT's campus, he speaks about the chance to create "a new deal on data" in which consumers would gain a much greater understanding of the privacy tradeoffs they make when their devices broadcast their location to computer networks – to get better prices at the supermarket, for example.

"Mobile systems in particular suffer from the danger of false expectations" among their users, Pentland said.

One unexpected study area is an online game created by a student and Roy, who's also the banking center's director. Known as the Restaurant Game, it invites users to control on-screen figures, called avatars, in a restaurant where they play the part either of a waitress or of a patron with \$50 to spend on a meal.

While the activity seems banal, the goal is to gather enough data from two-player games to design artificial intelligence software that could take orders from a single player – a remarkably complicated task, Roy says, given the unpredictability of human beings.

Work like this could feed into a much broader set of services both for customers and for banks, including Bank of America and any others he can sign up as sponsors. Anything that can improve their customer service would be a competitive advantage, he said, in an industry whose scale often makes institutions seem impersonal.

"The last time you needed to call your bank, did you look forward to it? Probably not," Roy said.

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Wachovia may announce infusion of up to \$7 billion, report says

ASSOCIATED PRESS

CHARLOTTE, N.C. – Wachovia Corp. said yesterday it will move up the release of its first-quarter financial results, an announcement that closely followed a report that the nation's fourth-largest bank is about to get a multibillion-dollar cash infusion.

The Charlotte-based bank, which is struggling to digest its admittedly ill-timed purchase of mortgage lender Golden West Financial Corp., will report before

the month opens today. The bank had been set to report its results Friday.

The change was announced shortly after The Wall Street Journal reported Wachovia was working on the final terms of a deal that would bring in between \$6 billion and \$7 billion of capital. In return, the investor group would get shares priced at roughly \$23 to \$24 apiece – about an 18 percent discount to Wachovia's closing share price Friday of \$27.81.

Wachovia's shares have sunk 48 percent in the past year, dropping from a 52-week high of nearly \$57 as the housing slump and credit crisis pounded the nation's leading banks and financial service companies.

The Journal cited people familiar with the matter and said officials at Wachovia could not be reached for comment. Wachovia officials did not immediately return calls from The Associated Press.

The cash infusion would be Wachovia's second of the year. In January and early February, Wachovia added \$8.3 billion in capital by issuing preferred stock and other securities to investors.

"These securities strengthened our regulatory capital position and provide greater certainty that we are well positioned in 2008," chief executive Ken Thompson wrote in a letter to shareholders in February.

Wachovia's troubles with the

housing slump have been compounded by its 2006 acquisition of California-based Golden West, a \$24 billion deal whose timing, Thompson has admitted, "was not the best."

"With the benefit of hindsight, it is clear that the timing was poor for this expansion in the mortgage business," Thompson wrote in February.

Golden West's loans were concentrated in California, one of the hardest-hit housing markets in

the U.S. Wachovia said this month that it was considering halting the making of loans, including its signature Pick-A-Payment mortgage loans, in 17 California counties heavily affected by falling home prices and rising foreclosures.

The Journal said Wachovia's cash infusion is similar in structure to the \$7 billion in new capital Washington Mutual Inc. obtained last week from an investment group led by private equity group TPG.