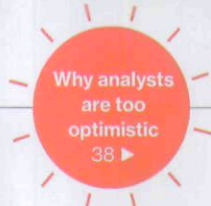


Technology



60

MILLION

U.S. households with 3D-capable TV sets by 2014. By the end of this year the number will be about 2.5 million.

DATA: FUTURESOURCE CONSULTING

of the revenue. The local merchants can set a cap on how much they want to sell. The trouble is, those businesses don't always make the cap low enough and get overwhelmed by bargain-seeking hordes. A nail salon in Boston sold 4,000 manicures and pedicures before Groupon discovered the shop had just two stations to serve customers, says Andrew Mason, Groupon's founder and chief executive officer.

Privately held Groupon, which declined to comment on its financials, says it aims to double its U.S. coverage to 100 cities this year. In April the startup got

\$135 million in funding from **Digital Sky Technologies**, the Russian investment firm that also owns as much as 10 percent of Facebook. The risk from disgruntled customers is lawsuits, says Jeremiah Owyang, an analyst at research firm Altimeter Group. "Imagine you're a consumer and you didn't get the manicure or pedicure you paid for," he says. "Who do you sue, the small business owner or someone who just got \$135 million?" Mason says Groupon hasn't been sued for unfulfilled deals, and adds that the company offers customers full refunds if they're dissatisfied. In the coming months, he plans to add online marketing seminars to better prepare small business owners for spikes in demand. "We say to businesses, the first day is going to be crazy," Mason explains.

Mission Minis, a San Francisco bakery that opened in January, was bombarded with 72,000 cupcake orders after a Groupon offer in March. Owner Brandon Arnovick says his frazzled bakers couldn't keep up, making some customers angry. Despite the chaos, he says the experience did have an upside: The shop has been baking as many as 1,700 cupcakes a day, vs. about 800 before the offer. Plus, the ordeal taught employees how to deal with disgruntled customers and work under pressure. "It was fun," he says. "Kind of." —*Joseph Galante*

The bottom line Groupon's popularity could backfire if it doesn't help small business clients deal with customer surges from its promotions.

Biotechnology

Can Cloning Save The White Rhino?



▶ San Diego's Frozen Zoo stores cells of endangered species

▶ "It gives me hope we can help save species from extinction"

For a northern white rhinoceros, Angalifu has a pretty sweet life. The two-ton rhino can roam freely through a 213-acre habitat that resembles the African savannah. Still, Angalifu and his pal Nola, an elderly female at the zoo, are two of eight northern white rhinos believed to be left on the planet. "These beautiful animals are on the brink," says Oliver Ryder, the chief geneticist at the San Diego Zoo's Institute for Conservation Research. "There are a few left, but it's not clear they're capable of reproducing."

Ryder oversees the Frozen Zoo, a lab where skin cells and DNA from 12 white rhinos and 8,400 other animals—a total of some 800 species—are stored at -280F. The hope is that scientists can use the cells to create cloned animals and replenish endangered species.

The lab was founded in 1972, but technology needed to make use of the cells is just now being developed. This winter researchers at the Scripps Research Institute used tissue from the Frozen Zoo to create stem cells from the silver-maned drill, Africa's most endangered monkey. On June 1 the stem cells morphed into brain cells. "I thought, 'We've done it!'" says Jeanne Loring, who led the research. "It gives me hope we can help save species from extinction."

The next step will be to use the stem cells in some variation of the method used to clone Dolly the sheep. In 1996, Scottish scientists made Dolly by transferring the nucleus from an adult sheep cell into a developing egg cell that had its nucleus removed. They used

Drawing Board



Technology

embryonic stem cells in that process; Loring would use the stem cells she developed from the drill's skin since embryos from endangered animals are hard to come by. Loring and her team may also try mixing the drill cells with a three- to four-day-old embryo for a similar animal that's in plentiful supply, like a baboon. Offspring from this mix could be selectively mated to breed out the nondrill genes, in theory leaving a pure drill.

The cell-transformation technique, developed three years ago by Shinya Yamanaka of Japan's Kyoto University, uses a harmless virus to carry genes into skin cells—and change them into stem cells. Although the technique worked for the drill, it fell short when used with white rhino cells, so Loring is hoping to map the rhino's genome to get clues about which of its genes may reprogram cells.

Scientists have harvested stem cells from embryos for more than a decade, but Yamanaka's technology is important because embryos aren't always available for endangered species. Attempts to clone endangered animals, though, have led to aborted pregnancies and deformed offspring. In 2000, cells from the Frozen Zoo were used to clone two endangered types of cattle—a gaur and a banteng—using the Dolly method. Two of the three calves died shortly after birth. The surviving banteng lived at the San Diego Zoo for seven years, less than half its normal life span, and died in April.

Some scientists say those examples show the moral complexity of cloning. The benefit may be limited if only a handful of animals are created and live in zoos, says Autumn M. Fiester, a senior fellow at the Center for Bioethics at the University of Pennsylvania. "There has been a lot of suffering with these early deaths and malformations," Fiester says.

Ryder acknowledges the problems. "We would only engage in these efforts if there were no other way to prevent extinction," he says. For Ryder, the only rationale for cloning is to create new animals that could mate with existing ones, boosting their population and genetic diversity. With the white rhino, though, he and Loring are up against a deadline: Angalifu is pushing 40, and rhinos generally don't live past 50.

—Rob Waters

The bottom line Clones made from skin cells may help revive endangered species, but some experts say cloning is the wrong solution to the problem.

Innovator

Tod Dykstra



The Berkeley MBA is selling traffic-control technology that targets the most annoying drivers: those who clog streets in search of cheap parking

Tod Dykstra looks out from his downtown San Francisco office window every day and sees waste. While a parking garage next door sits empty, roads are clogged with cars in search of cheaper metered spots on the street. "Thirty percent of driving in cities is made up of people who have gotten where they want to go and are looking for parking," Dykstra says. "Think about all those carbon emissions. It just doesn't seem right."

Dykstra, founder of Streetline Networks, a San Francisco company that makes traffic-control technology, wants to make it tougher to park cheaply or get away with not feeding the meter. Streetline's system lets parking authorities identify crowded streets and jack up parking-meter rates block by block. The idea is to encourage drivers to stop circling and get off the streets—either paying for a municipal garage or heading to a less crowded neighborhood. San Francisco and Los Angeles are now installing Streetline technology.

Unlike anticongestion programs in London and Singapore, which rely on cameras and in-car devices called transponders to bill drivers as they enter crowded areas, Dykstra taps streets for data. Low-power magnetic sensors about the size of a palm are embedded in roads to detect cars in parking spots or driving. Those data are wirelessly transmitted to devices on top of streetlamps or traffic-signal boxes, which send the data to parking authorities. If a street has high traffic and no parking spots, San Francisco's SFpark agency plans to raise meter rates up to \$6 an hour. The prices will show up on meters and the city's website.

The system also sends expired-meter data to smartphones carried by officers who can issue tickets. Each Streetline sensor costs \$300 for installation plus a \$120-per-year software license fee. San Francisco, where drivers feed meters only 55 percent of the time, says it's planning to buy 8,000 sensors. According to the city, an early test nailed so many scofflaws, the system paid for itself within two months. "The ultimate hammer will be the parking ticket," says Dykstra.

Streetline's technology grew out of a Pentagon-funded project Dykstra worked on while serving on the boards of Bay Area nonprofits focusing on environmental sustainability efforts. The research looked into sprinkling "smart dust"—millions of tiny sensors that measure temperature, pressure, sound, and other factors—over hundreds of square miles. Then a computer would gather the data and analyze it in real time. That project ended in 2001, and Dykstra, 48, founded Streetline four years later.

A self-described environmentalist who grew up in the Bay Area, Dykstra says he plans to sell sensors that monitor city water pipes for leaks. "Once you get things instrumented," he says, "you find you can do all sorts of interesting things to help save the planet." **B**—Cliff Edwards

Battle cry ▶ "The ultimate hammer will be the parking ticket"

Background ▶ Worked on a Pentagon-funded "smart dust" project

Next up ▶ Systems to monitor lighting usage and water-pipe leakage