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Forbes

JULY 27, 2017

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BY LAURA SHIN

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INSIDE SCOOP

Following Us Into Our Next 100 Years

BY LEWIS D'VORKIN

AS WE NEAR OUR 100TH BIRTHDAY, there's one data point that I believe says more about the future of *Forbes* than all the others we collect and scrutinize. Sure, I love to point to the growth of our products. Each month, some 50 million people visit Forbes.com, up from about 15 million seven years ago, when we took bold steps to change our content and ad models. Our magazine's readership is up strongly, too, even as our competitors suffer declines and mobile devices eclipse desktops and print. But here's the number I find most intriguing. We now have 35 million followers across social media. That's up from a mere 100,000 total followers in August 2010.

Think about that. Consumers find us through search. They get links from friends. And websites point to us. Far more telling, 35 million people made a conscious decision to attach themselves to our brand. B.C. Forbes, our founder, set out to cover the "doers and doings" of capitalism. A century later, the generations of social media—the most entrepreneurial-minded of all—depend on our storied brand to track, filter and pass judgment on the newest doers and doings.

We're not taking this astonishing 350-fold rise in our social following for granted. We want to do more for them. So we're starting to publish content, not simply distribute links to our site, on the social networks where they often start their day. We now have a team of eight social media editors, up from only one seven summers ago. They're fast becoming social media content creators developing unique off-domain experiences—that's jargon for content that lives outside our traditional products.

These complete journalistic endeavors kicked off in January with an exclusive reveal of our 30 Under 30 List on Snapchat. Now we're running a kind of *Forbes* Webinar on LinkedIn, during which experts share actionable career and investment advice. On Twitter, *Forbes* Flash is a weekly show that highlights trending business news. On Instagram, Curtain Call goes behind the business of arts and entertainment productions. Up next: SheSuite and Seat of Power.

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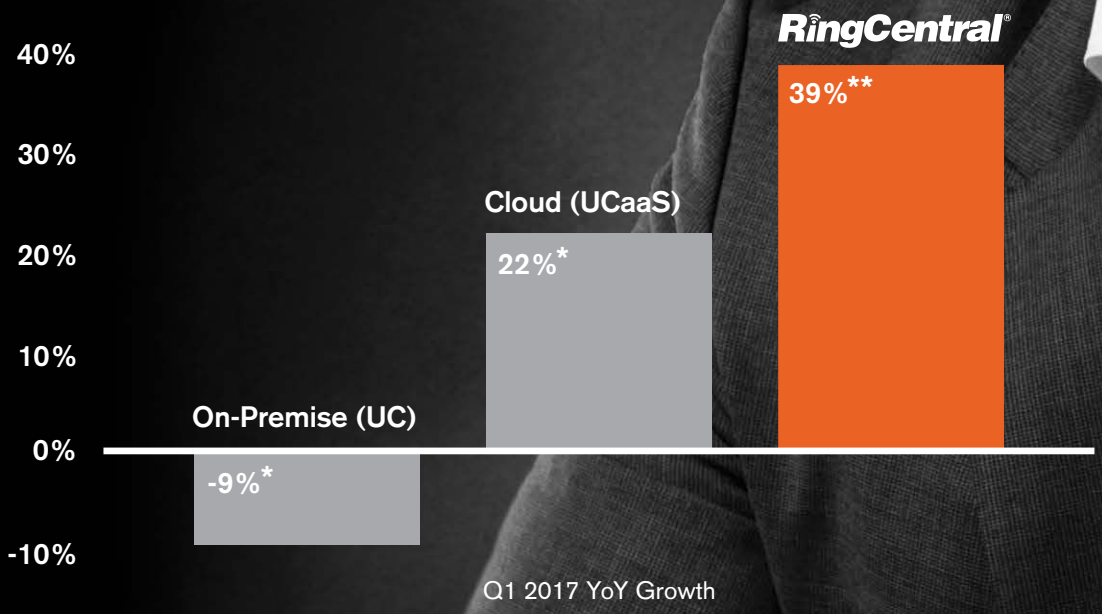

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Paul Chapman, Chief Information Officer

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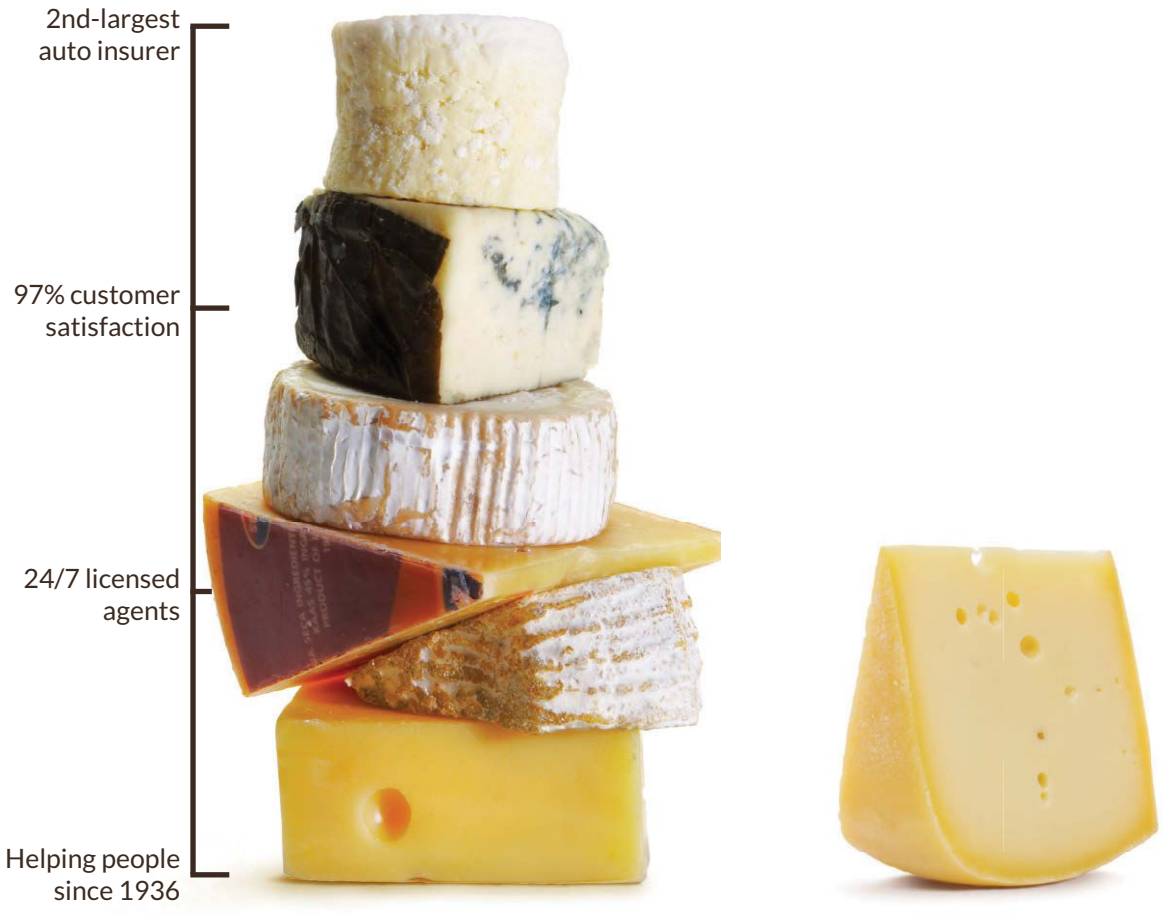

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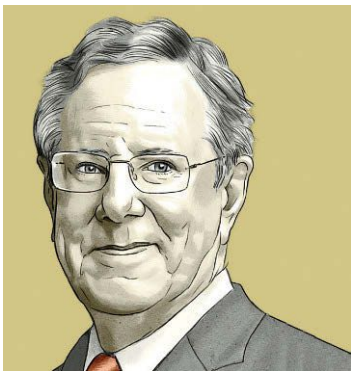
CRACKDOWN ON NORTH KOREA UNAVOIDABLE NOW

BY STEVE FORBES, EDITOR-IN-CHIEF



THE TERRIBLE DEATH of student Otto Warmbier at the hands of North Korea should be the catalyst for a genuine crackdown on this repugnant regime, for humanitarian and national security reasons. The Trump administration, thankfully, is taking the North Korea situation far more seriously than its predecessors.

When President Trump met with China's leader, Xi Jinping, in April, he pressed the Chinese president to take meaningful measures to curb North Korea's aggressiveness. So far, China hasn't followed through successfully.

That's why there are several steps the U.S. should take immediately, which would start to inflict serious economic pain on Pyongyang and put pressure on China to make good on its own pledges.

• **Bar any travel to North Korea by U.S. citizens that is not explicitly sanctioned by Washington.** While the State Department strongly warns U.S. citizens not to go to that odious country, that's not the same as an outright prohibition. Remember, every dollar spent in North Korea by an American goes directly into the hands of murderously psychotic dictator Kim Jong-un to finance his nuclear and terrorist activities.

• **Put North Korea back on the U.S. list of terrorist states.** In a misbegotten bout of appeasement President George W. Bush removed that designation in 2008, in the hopes that doing so would induce Pyongyang to keep its promises to throttle back its nuclear and missile programs. We've seen how successful that Neville Chamberlain-like move has been.

Pyongyang has routinely violated such agreements since Bill Clinton began this abject appeasement process in 1994. North Korea's nuclear program proceeds apace, and tests of its increasingly potent ballistic missiles—which will soon be able to reach our shores—are now routine.

• **Start applying serious sanctions on all banks and companies that do business with North Korea.** We began doing this in the early 2000s, and the sanctions were starting to be effective, which is why Pyongyang signaled the Bush administration that, if we let up, it was ready to make a deal. We backed off the sanctions, but the North didn't change its behavior.

Any financial or commercial entity found not to be in compliance would be barred from doing any business with the U.S. That ban would cover noncomplying companies everywhere—including those in Europe and in China. Banks in violation would be kicked out of the SWIFT (Society for Worldwide Interbank Financial Telecommunication) network, which is the world's largest payment-messaging system. This would effectively prevent such banks from conducting any international transactions. Three North Korean banks were recently ousted from SWIFT, but this measure would also apply to financial institutions that deal with companies doing business with the North.

• **Announce that the U.S. Navy would be free to interdict ships suspected of transporting North Korean military products, including nuclear parts, or of transporting military items or nuclear parts to Pyongyang.** This would forcefully let the world know that we are finally dead serious about decisively dealing with this rogue regime.

• **Step up our antiballistic missile efforts, with the stated goal of shooting down any future missiles fired by North Korea.** Such efforts would reassure South Korea, Japan and other Asian nations that we are not abandoning our post-WWII policy of protecting them and keeping the peace in the region.

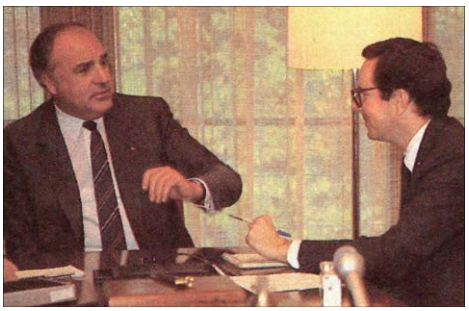
Powerful stuff, this. But kicking the North Korea can down the road, as we have done for more than 20 years, is no longer a viable option.

Cold War's Unheralded Hero

Historians often cite the trio of Ronald Reagan, Pope John Paul II and Margaret Thatcher as having played critical roles in bringing down the evil empire of the Soviet Union. A fourth name should be added: Helmut Kohl, who died recently at age 87.

When Kohl became chancellor in 1982 of what was

then West Germany, the Soviet Union was engaged in an ultra-high-stakes political offensive to shatter the Western alliance and win the Cold War. Moscow had developed and then positioned intermediate-range nuclear missiles that were aimed primarily at Germany. The goal: to blackmail West Germany into fatally weakening its ties to NATO, which would enable the Soviet Union to dominate Europe. The threat looked all too real. If Moscow fired its missiles at Germany, would the U.S. retaliate with a nuclear attack on the Soviet Union, risking its own nuclear annihilation? After all, even if we made such a response, the Soviets would still be capable of firing off enough of their missiles to obliterate us. Moscow was betting that its targeting of Germany with shorter-range rockets would, for all intents and purposes, emasculate our nuclear deterrent and force the West German government to cut a deal with Moscow, effectively becoming a neutral nation à la Finland.


SF with Helmut Kohl, 1984. It was clear the German leader wouldn't buckle under to pressure from Moscow or domestic demonstrators.

The obvious response was for the U.S. to station its own intermediate-range nuclear missiles in Germany that could then reach Russia. (We once had shorter-range missiles stationed in Turkey, but we had quietly pulled them out as part of the deal that settled the 1962 Cuban Missile Crisis.) But would Bonn (then the capital of West Germany) allow those weapons on German soil? Opposition—stoked with plentiful amounts of Soviet cash and fueled by an elaborate Soviet-orchestrated propaganda campaign—was fierce: "Don't let our country become a nuclear wasteland! Keep American missiles out!"

Chancellor Kohl was having none of it; there was no more equivocation like that of his predecessor. He was firm: Those U.S. missiles would be placed on German soil. Period. Despite intense pressure, domestically and from Moscow, Kohl wouldn't back down.

Moscow lost its great gamble, a setback that was even more damaging than its blinking during the Cuban missile showdown, because this was a crucial factor in setting the stage for the fall of the Berlin Wall several years later.

Kohl had two other major achievements during his time in office. One was the peaceful reunification of his country after the fall of the Berlin Wall. The U.S.S.R. wasn't keen on Germany's coming together again, nor was France or Britain. But Kohl's determination and skillful diplomacy won the backing of the U.S. and substantially softened French resistance (Kohl had worked hard for years to establish a close relationship with France's president, François Mitterrand). In the end Kohl not only merged East Germany with West Germany, but he also got Moscow to acquiesce in the new country's remaining in NATO.

The chancellor also pushed hard for the creation of the euro, even though Germans wanted to maintain their beloved deutsche mark. Kohl believed a unified currency would help further integrate Germany with the rest of Europe. He wanted to do everything possible to avoid a repeat of what had happened in the first half of the 20th century. He can't be blamed for the fact that most Europeans today (and almost all economists elsewhere) are embarrassingly clueless about what constitutes an effective monetary policy.

Kohl was Germany's longest-serving chancellor (1982–98) since Otto von Bismarck. Kohl reunited Germany by peaceful means in 1990. Bismarck achieved the original German unification through "blood and iron," that is, by cynically engineering a series of wars with his neighbors.

May Helmut Kohl's legacy be the one that triumphs in the future. F

Restaurants: Go, Consider, Stop

Edible enlightenment from our eatery experts and colleagues Richard Nalley, Monie Begley and Randall Lane, as well as brothers Bob, Kip and Tim.

Aureole
135 West 42nd St. (Tel.: 212-319-1660)

One could take days tasting all the delicious offerings at Charlie Palmer's Aureole, which is actually three different restaurants. The Dining Room is more formal and offers a three-course prix fixe menu. The yellowfin tuna tartare, loin of lamb, Scottish salmon and NY strip are all first-rate. Desserts are sinful. The casual Liberty Room serves small plates, pastas and regular-size dishes. Favorite: the Aureole burger with everything. Wander out to the Patio for the "Al Fresco All Day" and have a lobster roll, a plate of gougeres or BBQ beef sliders.

The Wright
1071 Fifth Avenue, in the Guggenheim Museum, between 88th & 89th streets (Tel.: 212-427-5690)

Go to the Guggenheim for the art, not the food. The space is located in the southwest corner of Frank Lloyd Wright's iconic building and is named in his honor, but neither the food nor the service does him justice. The tomato soup is tepid, the textured chopped salad tasteless and the char subpar.

Glass House Tavern
252 West 47th St. (Tel.: 212-730-4800)

This moderately priced, New American contemporary spot is a real find in the theater district. Whether you choose a prime ground beef burger on a brioche bun, roast chicken Cobb salad, warm hazelnut-crusted goat cheese salad with shaved apple and frisée dressed with a cider vinaigrette, fresh Atlantic salmon or monkfish piccata with baby spinach, lemon and capers, you'll be happily sated before or after a show. Killer homemade gelatos include cappuccino and butterscotch.

Hendriks
557 Third Ave., at 37th St. (Tel.: 212-686-8080)

A fun, affordable place to grab lunch or dinner before heading out to LaGuardia. Its decor is modern with lots of windows, but the paneled walls and brick keep it cozy. Deviled eggs are all the rage, and the ones here include prosciutto and other tasty toppings. The onion soup is as good as you'll get this side of France. The lobster and avocado salad and the crab cakes are both top-notch. If you have time, try the French vanilla cheesecake. Enjoy all of the above with a reasonably priced bottle of Pinot Grigio and you won't have to worry about the peanuts on the flight.

Le Veau d'Or
129 East 60th St. (Tel.: 212-838-8133)

A visit to this 80-year-old gem serving *vrai* French classics doesn't disappoint. A glass of white Burgundy and the creamy celeri remoulade begin the transport to France. The arrival is complete with a plate of bubbling garlicky escargot in melted butter. Poulet roti is golden, crispy and juicy; escalope de veau is tender in a bath of lemony sauce. Vegetables are straightforward. A must: the tarte aux pommes, filled with tart apples smothered in sugar and nestled into a butter crust.

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MEET THE NEIGHBORS

HOLLOWED GROUND

AT THE BEGINNING of the last century, Pio Crespi, a wealthy Italian count, arrived in America with the intention of expanding his cotton business. He headed west and eventually settled in Dallas, where he erected a mansion befitting an old-world noble in a northern enclave called Preston Hollow.

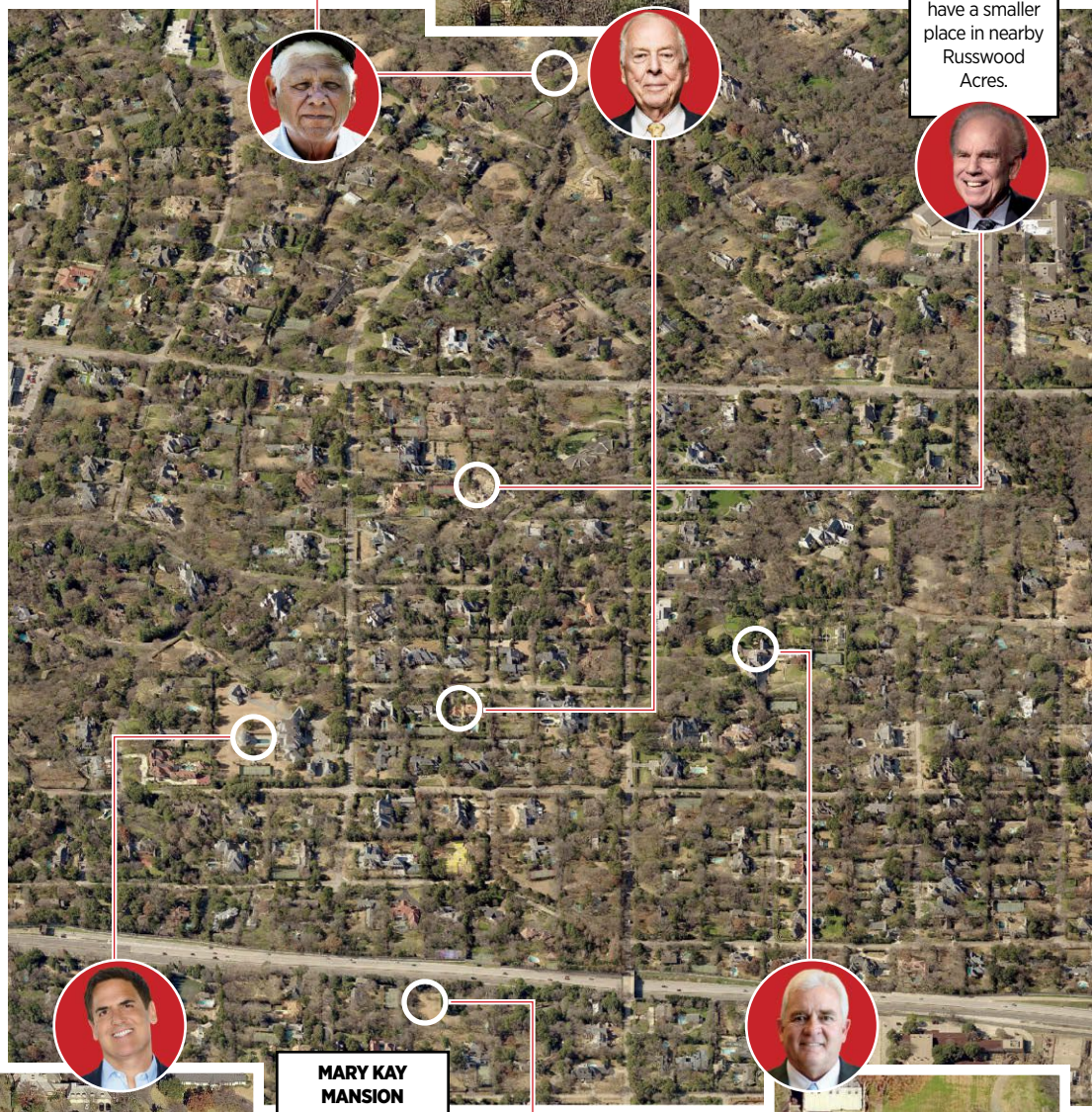
RYAN SHORT, RED WING AERIAL PHOTOGRAPHY FOR FORBES

MEET THE NEIGHBORS

There, Crespi and his family hosted guests, including legendary opera singer Maria Callas and the Duke and Duchess of Windsor, at their extravagant French-style estate.

The 29,000-square-foot, ten-bedroom manse still stands today as Preston Hollow's pièce de résistance. It's now owned by a corporate aristocrat: billionaire banker Andy Beal, who made headlines last year when, in a two-month span, he bought Crespi's old homestead for an estimated $40 million and then paid an estimated $25 million for another estate nearby.

Beal finds himself in very good company in the roughly 6-square-mile neighborhood, which lies about 10 miles north of downtown Dallas. Mark Cuban's palatial spread (pictured on previous page) is several blocks away. In all, Preston Hollow is home to at least five billionaires, a sprinkling of sports stars and the 43rd president.

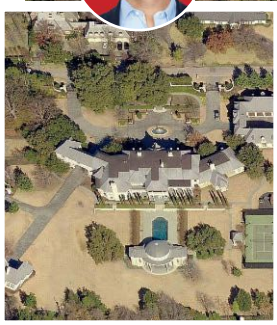


LEE & CLAUDIA TREVINO
$9.6 MILLION (ASSESSED VALUE)
The retired golfer—who won six major championships, including the 1968 U.S. Open and the 1984 PGA Championship—and his wife own two homes in Preston Hollow, one of which reportedly has two putting greens.

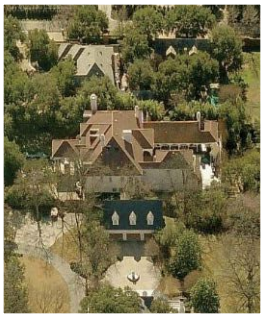
T. BOONE PICKENS
$4.6 MILLION (ASSESSED VALUE)
The oil tycoon and former billionaire owns an 8,200-square-foot, three-bedroom home.

ROGER & MARIANNE STAUBACH
$5.4 MILLION (ASSESSED VALUE)
Ex-Cowboys quarterback's retreat spans 12,800 square feet; he and his wife also have a smaller place in nearby Russwood Acres.

MARK CUBAN
NET WORTH: $3.4 BILLION
$18 MILLION (ASSESSED VALUE)
A few months after Cuban sold Broadcast.com to Yahoo for $5.7 billion in April 1999, he bought this 23,700-square-foot, ten-bedroom house, which features a spa, a sauna, a pool and five wet bars. He reportedly didn't furnish parts of the home for years, preferring to use the open space to Rollerblade and play Wiffle ball.



MARY KAY MANSION
$1.9 MILLION (ASSESSED VALUE)
Cosmetics queen Mary Kay Ash built this pink palace in 1984 and reportedly lived there until her death in 2001. The 11,900-square-foot house is now owned by an LLC with an address linked to a Dallas chiropractic office.



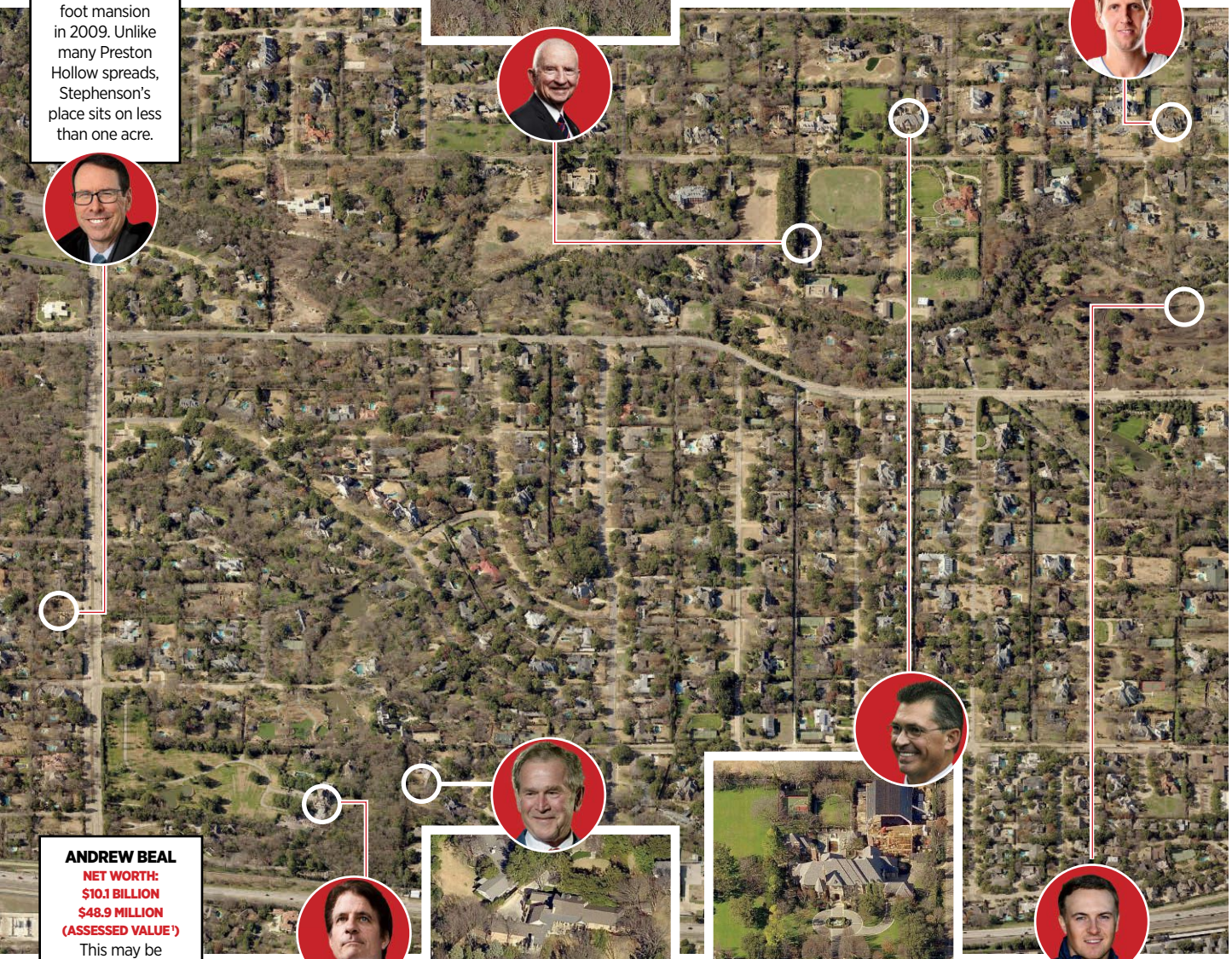
KELCY WARREN
NET WORTH: $3.7 BILLION
$25.4 MILLION (ASSESSED VALUE)
Energy Transfer Partners' cofounder snagged this 26,600-square-foot home in 2009. Pick your preferred sport: It has a baseball diamond, tennis court and bowling alley.

[1]Property value includes house and adjacent parcels of land.

RANDALL & LENISE STEPHENSON
$5.6 MILLION (ASSESSED VALUE)
AT&T's CEO picked up this 11,900-square-foot mansion in 2009. Unlike many Preston Hollow spreads, Stephenson's place sits on less than one acre.

H. ROSS PEROT SR.
NET WORTH: $3.9 BILLION
$22.1 MILLION (ASSESSED VALUE[1])
His presidential campaigns long behind him, the 87-year-old Perot can unwind (and fret about the deficit) on a property that includes a barn, a greenhouse and a pool.

DIRK NOWITZKI
$6.2 MILLION (ASSESSED VALUE)
In 2008, a year after he was named NBA MVP, the Mavericks forward rewarded himself with a 9,800-square-foot, five-bedroom home. It's just a six-minute drive from Mavs owner Mark Cuban's place.



ANDREW BEAL
NET WORTH: $10.1 BILLION
$48.9 MILLION (ASSESSED VALUE[1])
This may be hotter-than-hellfire Texas, but Beal's estate includes 11 fireplaces, a movie theater, a swimming pool, a tennis court and a wine cellar. This January, a year after he bought it, Beal put the place on the market.

GEORGE W. BUSH
$4.6 MILLION (ASSESSED VALUE[1])
When the Bushes left the White House in 2009, they settled on this 8,500-square-foot ranch built in 1959. If Bush 43 ever gets nostalgic for his previous residence, a replica of the White House owned by multilevel-marketing entrepreneur Ralph Oats is just down the road.

KENNY & LISA TROUTT
NET WORTH: $1.4 BILLION
$17.4 MILLION (ASSESSED VALUE)
Kenny founded long-distance carrier Excel Communications in the 1980s, and he and Lisa might have use for that service in their own home: The seven-bedroom mansion sprawls across 16,900 square feet.

JORDAN SPIETH
$8.9 MILLION (ASSESSED VALUE[1])
In December 2015, fresh off his Masters and U.S. Open wins, Spieth found a new pad in which to stash his green jacket. Purchased from fellow PGA golfer Hunter Mahan, the house came with a mural of the Augusta National clubhouse and an indoor golf simulator.

BY MICHELA TINDERA
MAP IMAGING: BING.COM; CRESPI: STEPHEN REED

WELL BEINGS

Healthier living with the Forbes 30 Under 30, in 30 words or less.

CHRISTINA BOGNET

PlateJoy | 29

The former health care consultant's company provides personalized meal plans based on 50 data points (gluten sensitivity, carbohydrate avoidance, etc.) to help the overweight and diet-restricted.

YUNHA KIM

Simple Habit | 28

Want a less harried commute, more patience and better sex? Try this former Jefferies analyst's meditation app. Offering *om* sessions designed by Harvard psychologists, it has more than 500,000 users.

LIANA ROSEMAN, KRISTINA SAFFRAN

Project HEAL | 26, 25

With 40 chapters globally, the duo's nonprofit awards up to $80,000 to people seeking eating-disorder treatment, and it teams with care centers to provide peer support and mentoring.

ALEXANDRA ZATARAIN

Eight | 27

Her high-tech mattress (she has raised $13 million from backers) tracks your sleep patterns and connects to other smart devices—it can set an alarm and brew your morning coffee.

MEIKA HOLLENDER

Sustain | 29

NYU Stern M.B.A. has raised $7.5 million to make sexual-health products such as condoms and organic tampons; 10% of profits will go to women's-health organizations, with over $40,000 given already.

MOLLY HAYWARD

Cora | 29

San Francisco-based Cora, having raised $1.6 million, sends organic tampons to thousands of customers monthly; its one-for-one donation plan will deliver millions of pads to women in developing countries.

NICOLE CARDOZA

Yoga Foster | 27

Her nonprofit trains schoolteachers to integrate yoga into classes. The goal? To increase fitness and reduce disruptive behavior. The program has reached 20,000 kids in 500 schools nationwide.

BY NATALIE SPORTELLI
ILLUSTRATIONS BY MICHAEL FRITH FOR FORBES

Forbes Under 30
Listen to young innovators, disruptors and entrepreneurs
PODCASTONE

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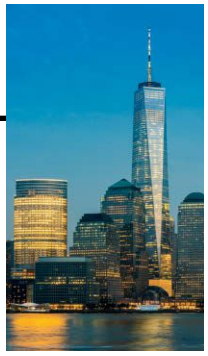
RETIREMENT CHECKUP

WHERE SHOULD YOU RETIRE?

Follow your passions to find a perfect golden-years home. (Our full list of 25 great places to retire based on your interests is at forbes.com/retirement-passions.)



- **Do you want to retire?**
  - **No.** → **Get back to work!**
  - **Maybe.** → **New York City**
  - **Yes.** → Where are you happiest?
    - Outdoors. → How active are you?
    - Indoors. → Like to eat out?
      - Michelin is my bible. → **New York City**
      - I prefer to cook. → Are the arts important to you?
        - Not really. → How active are you?
        - I'm studying the Masters. → The old ones?
        - I have a budding interest in Georgia O'Keeffe. → **Santa Fe, New Mexico**
        - Yes. → **New York City**
        - The old ones? → The ones with a green jacket. → **Pinehurst, North Carolina**
        - Yes, for I am nothing if not critical. → **Ashland, Oregon**
    - How active are you?
      - Pretty active. → Do you like animals?
      - I'm reading this while competing in a triathlon. → **Seattle**
      - I'm good for 18. → **Pinehurst, North Carolina**
      - Meh. I prefer patio drinks. → What kind?
        - Pour-over coffee. → **Seattle**
        - Vanilla-bean stout. → **Boulder, Colorado**
        - Manhattans. → **New York City**
        - No caffeine, no alcohol. → **Salt Lake City**
    - Do you like animals?
      - Yep, even rats. → **Palm Bay, Florida**
      - Save the manatees! → **Palm Bay, Florida**
      - That seems like a fishy question. → I'm an amateur Audubon. → **Bend, Oregon**
      - I'm an animal on the slopes. → **Seattle**

BY WILLIAM P. BARRETT AND ABRAM BROWN

CLOCKWISE FROM TOP LEFT: STOCKTREK/GETTY IMAGES; MICHAEL PRINCE; STEFANO POLITI MARKOVINA/GETTY IMAGES; ROB STOTHARD/GETTY IMAGES; LEE FOSTER/ALAMY; STRICKKIE/GETTY IMAGES; GETTY IMAGES; TED LEVINE/CORBIS/GETTY IMAGES; RYANJLANE/GETTY IMAGES

Needs Attention
<65% of Goal
Fair
65–80%
of Goal
Good
On Track
>95% of Goal
EIGHTY SEVEN
The Fidelity Retirement Score.℠
Another way we're making retirement planning clearer.
We introduced the Fidelity Retirement Score to make it easy to know where you stand. But getting your score is just the beginning. If you move your old 401(k) to a Fidelity Rollover IRA, you'll get:
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It's your retirement. Know where you stand.
Fidelity INVESTMENTS
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Be sure to consider all your available options, including staying in plan, and the applicable fees and features of each before moving your retirement assets.
There is no opening cost or annual fee for Fidelity's traditional, Roth, SEP, and rollover IRAs. A $50 account closeout fee may apply. Fund investments held in your account may be subject to management, low-balance, and short-term trading fees, as described in the offering materials. For all securities, see Fidelity.com/commissions for trading commission and transaction fee details.
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The Fidelity Retirement Score is a hypothetical illustration and does not represent your individual situation or the investment results of any particular investment or investment strategy, and is not a guarantee of future results. Your score does not consider the composition of current savings and other factors.
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THE 10-Q

FLIGHT'S NEXT ACE

Cirrus CEO Dale Klapmeier on creating a one-engine jet, drone taxis and brotherly rivalry at 20,000 feet.

Cirrus airplanes come with a parachute built into the craft's body, which makes flying considerably safer. How'd you think of that?
My brother Alan was in a midair collision back in 1985. He lost four feet of the wing but was able to land the airplane, barely. He got out of the airplane and said, "We can do better." This started the search for the parachute.

How many parachute saves have there been in Cirruses?
Since 1999, 146. That's a lot of lives. I won't say all of them wouldn't be here without it, but the parachute is a good solution when there's a problem.

Early on, Cirrus had to fight the image that only wimps would pull the parachute handle if they got in trouble.
We're a lifestyle company, not an aviation company. That means we make our planes safe and teach customers how to safely fly them. Happy customers come back.

How did Cirrus survive the Great Recession, when its business fell by almost two-thirds?
September 2008 was our best delivery month outside of a December. But by October 2008, we couldn't give an airplane away. It stopped that fast. It was several years of pure hell.

During all that, you're trying to complete the Vision Jet, the world's first single-engine personal jet.
We knew the Vision Jet was the future of Cirrus. We could not let that die, but we were forced to slow the project down to what I call "the speed of cash." Development got pretty slow.

And then you ended up selling Cirrus to China's CAIGA in 2011. What's that been like?
It's been both frustrating and exciting. A business issue that seems very simple can come off the rails quickly. Then again, it's been fantastic for the company and the customer to have that influx of cash. It let us finish the Vision Jet.

The Vision Jet sure is strange-looking.
It looks different because we designed from the inside out, not for the professional pilot but for the amateur owner flying the airplane with his or her family. It's simple to fly. Every seat is comfortable and has a spectacular view.

Your cofounder brother Alan left Cirrus in 2009. Now he runs One Aviation. Are you two competitors?
Oh, sure we are. But at the same time, One Aviation's six-seat Eclipse 550 costs $3.5 million, and we cost $2 million. We have a very big base of customers we're trying to move up, and they don't.

Do you and Alan get along?
We are competitors. Let's leave it at that.

Uber and others talk about drones as air taxis. Seriously?
Traditional aviation and drones will converge. There is no question about that. They'll be expensive at first. Battery technology has a long way to go. But it will happen. We will see drones flying people across cities.

CIRRUS CEO DALE KLAPMEIER SPOKE WITH RICH KARLGAARD, OUR EDITOR-AT-LARGE AND GLOBAL FUTURIST. THIS INTERVIEW HAS BEEN EDITED AND CONDENSED. FOR THE EXTENDED CONVERSATION, VISIT FORBES.COM/SITES/RICHKARLGAARD.

RICHEST BY STATE

IDAHO

POPULATION:
1.68 MILLION
2016 GROSS STATE PRODUCT:
$67 BILLION (1.8% GROWTH)
GSP PER CAPITA:
$39,970 (RANKS NO. 49 NATIONWIDE)
NUMBER OF BILLIONAIRES: **1**
RICHEST:
FRANK VANDERSLOOT
$1.9 BILLION

FRANK VANDERSLOOT has a treatment for every ailment. From Idaho Falls, Idaho, his company, Melaleuca, retails antifungal creams, vitamins, insect repellent, tooth whiteners and much else among 450 "wellness" products he manufactures and sells online. Most customers only buy things, but about a third take Melaleuca up on its offer to pay commissions for new-customer referrals. The privately held company hit $1.75 billion in sales last year.

VanderSloot, 68, grew up poor, running the family farm in northern Idaho while his father worked a railroad job. He paid his way through college by cleaning a laundromat (where he also lived) and launched Melaleuca in 1985. He now owns 44% of it, and thanks to its success he has acquired land (117,500 acres across the West), GOP political pull (he was a finance cochair for both of Mitt Romney's presidential runs) and the enmity of the left (after a 2012 tussle he sued *Mother Jones* magazine for defamation; a judge dismissed his claims).

RICHEST BY STATE BY CHASE PETERSON-WITHORN
EVAN KAFKA FOR FORBES; ILLUSTRATION BY CHRIS LYONS

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Z160117BR1 3/16

GONZO GOLD RUSH

Shane Smith's wild, unconventional Vice Media has become a Millennial favorite and a hot investment.

GOOD NEWS ARRIVED last month for Shane Smith, the CEO and cofounder of Vice Media. Another monster funding round—some $450 million—at the hands of private equity giant TPG put a lofty $5.7 billion valuation on the company. It was just enough to turn Smith into a billionaire thanks to his roughly 20% stake, *Forbes* estimates.

Vice began life as a community magazine in Montreal but started to evolve in the 2000s once Smith saw "everyone was spending all their money on platforms"—such as Hulu—"but none of it on what you put in the pipe," he recalled in a 2012 *Forbes* interview. "So we said, okay, eventually the market's going to catch up, and everyone's going to need content."

Vice today has a news website beloved by younger readers, a 24-hour cable television channel and an ongoing HBO docu-series covering its reporters' exploits in hot spots including Iraq, North Korea and Russia. Those journalists produce raw, rollicking stories unapologetically laced with an ultraliberal point of view. Put another way: If this were a Vice story, its headline would probably read something like "How to Make a Billion Dollars Hawking Sex, Drugs and War to Millennials."

BY NATALIE ROBEHMED
JESSE DITTMAR/REDUX

LAUREN CONRAD
WANTS TO SAVE THE SEA TURTLES
Fishing nets used to catch some of our favorite seafood catch, injure and kill thousands of sea turtles every year. For species like the Kemp's Ridley, extinction is too close for the government to ignore the problem. Stand with Lauren and Oceana. Help save sea turtles at www.oceana.org/saveseaturtles
OCEANA Protecting the World's Oceans
© Oceana/Melissa Forsyth

THE APPLE CORPS

Partnering with the Cupertino colossus has done wonders for Taiwanese suppliers—and plenty of others, too.

IN MID-JUNE, Apple CEO Tim Cook tweeted a photo of the company's soon-to-open store in Taipei. The shop is the first of its kind in Taiwan, but Apple has already made a substantial impact on the island nation. Long open to foreign investment, Taiwan has years of experience working with tech giants even as Johnny-come-lately China attempts to woo them away.

Eleven of Taiwan's richest tycoons owe significant portions of their wealth to Apple, but they're not the only ones who benefit from a partnership with the world's most valuable public company. Shown at right are the key entrepreneurs whose fates are most closely tied to Apple's. Such symbiosis is propitious in a year like the 12 months just past, in which Apple shares jumped by more than 50% to their all-time high. For the most part, its partners' shares followed suit.

Listed at far right are Taiwan's ten wealthiest people across all industries—proof positive that despite its small population (just 23 million) and its 800-pound foe just across the Taiwan Strait, the country ranks among the globe's economic giants. Per capita, Taiwan's GDP is north of $22,000 a year—two and a half times that of China. For more, please see forbes.com/taiwan.

All net worths are as of June 16, 2017. Changes in net worths have been calculated from June 24, 2016, to June 16, 2017.

JASON AND RICHARD CHANG
COFOUNDERS, ADVANCED SEMICONDUCTOR ENGINEERING
NET WORTH: $4 BILLION
STOCK: +7%
Cofounded by the brothers 33 years ago, Advanced Semiconductor, through its subsidiary Universal Scientific Industrial, supplies chips for various iPhone parts, including the touch-ID fingerprint sensor. Apple is responsible for a quarter of its sales.

BARRY LAM
FOUNDER, QUANTA COMPUTER
NET WORTH: $4.2 BILLION
STOCK: +18%
A top manufacturer of PC laptops, Quanta reportedly made the first-generation Apple Watches, released in 2015. It remains a top timepiece partner of Tim Cook & Co.

SCOTT LIN, TONY CHEN
COFOUNDERS, LARGAN PRECISION
LIN'S NET WORTH: $2.7 BILLION
CHEN'S NET WORTH: $2.2 BILLION
STOCK: +63%
Largan, founded in 1987, manufactures the iPhone's rear-camera lens. The company, which also makes lenses for Chinese smartphone makers Xiaomi and Huawei, sold some 6.6 billion optical components in 2016, a year in which Apple made up about 40% of its revenue.

BEARING FRUIT

AAPL'S LAST 12 MONTHS
JUNE 24, 2016: $93.40
JUNE 16, 2017: $142.27
CHANGE: +52%

BRUCE CHENG
FOUNDER, DELTA ELECTRONICS
NET WORTH: $1.4 BILLION
STOCK: +7%
Delta got its start in 1971 making TV parts; it's now a global leader in power electronics, including iPhone parts and MacBook chargers. Apple is its largest customer, accounting for 8% of its 2016 revenue.

ALLEN HORNG
CHAIRMAN, CATCHER TECHNOLOGY
NET WORTH: $3 BILLION
STOCK: +51%
Began supplying metal iPhone casings in 2014. Analysts expect Catcher to adapt to new iPhones' all-glass displays by providing glass assembly as well.

HENRY NICHOLAS III
COFOUNDER, BROADCOM
NET WORTH: $3.3 BILLION
STOCK: +59%
Broadcom reportedly won the contract to manufacture wireless charging chips and sockets for iPhones, expected to debut later this year.

TERRY GOU
FOUNDER, HON HAI PRECISION / FOXCONN TECHNOLOGY GROUP
NET WORTH: $9.5 BILLION
STOCK: +29%
The world's largest electronics contract manufacturer, Hon Hai Precision—better known by its trade name, Foxconn—makes iPhones and iPads. Gou, who founded it in 1974 with $7,500, began assembling products for Apple in 1999.

PIERRE CHEN
FOUNDER, YAGEO
NET WORTH: $2.1 BILLION
STOCK: +91%
Chen founded Yageo in 1977 and took it public 16 years later. It makes a range of components that help power the iPhone, including chip resistors and ceramic capacitors.

T.H. TUNG
CHAIRMAN, PEGATRON
NET WORTH: $280 MILLION
STOCK: +38%
Pegatron was one of four Taiwanese iPhone manufacturers that Qualcomm sued in May for not paying royalties. Exports to the U.S. accounted for 34% of 2016 sales for Tung's company.

MORRIS CHANG
FOUNDER, TAIWAN SEMICONDUCTOR MANUFACTURING CO.
NET WORTH: $930 MILLION
STOCK: +33%
Taiwan Semiconductor relied on Apple for 21% of its 2016 sales; it's making a crucial chip for the newest iPhone that will be the device's most expensive component.

ZHOU QUNFEI
FOUNDER, LENS TECHNOLOGY
NET WORTH: $9.5 BILLION
STOCK: +17%
Last August, Apple announced that Lens Technology would be its first major supplier to run its Apple-specific operations entirely on renewable energy. The company makes touchscreen glass; Apple accounted for 40% of its 2016 sales.

IRWIN M. JACOBS
COFOUNDER, QUALCOMM
NET WORTH: $1.3 BILLION
STOCK: +9%
Apple made up a fifth of Qualcomm's revenue last year, but their legal battle muddies waters: Apple blasts Qualcomm for its "illegal business model"; Qualcomm says Apple misrepresents its chip performance.

SHIGENOBU NAGAMORI
COFOUNDER, NIDEC
NET WORTH: $3.9 BILLION
STOCK: +38%
Nidec, founded in 1973, makes vibration motor technology used in iPhones, Apple Watches and MacBooks. The company relied on Apple for 5% of its 2016 sales.

LEE KUN-HEE AND JAY Y. LEE
SAMSUNG ELECTRONICS
LEE KUN-HEE'S NET WORTH: $17.9 BILLION
JAY Y. LEE'S NET WORTH: $6.8 BILLION
STOCK: +62%
Jay Y. Lee, vice-chair of Samsung, was arrested in February on bribery charges (which he has denied). Samsung is nonetheless expected to be the sole supplier for next-gen iPhones' advanced OLED displays. It already supplies memory and battery components to Apple, sales of which make up 10% of its annual revenue.

GORDON MOORE
COFOUNDER, INTEL
NET WORTH: $7.1 BILLION
STOCK: +12%
Analysts posit Apple and Qualcomm's legal tussle will increasingly lead Apple to Intel for baseband modem chips, which are in the iPhone 7 and enable devices' Web access when out of Wi-Fi range.

BILLIONAIRES

TAIWAN'S TEN RICHEST

1. DANIEL AND RICHARD TSAI
$10 BILLION
FUBON FINANCIAL
FINANCE
AGES: 61, 60

2. TERRY GOU
$9.5 BILLION
HON HAI PRECISION
ELECTRONICS
AGE: 66

3. TSAI HONG-TU AND FAMILY
$7.2 BILLION
CATHAY FINANCIAL
FINANCE

4. TSAI ENG-MENG
$6 BILLION
WANT WANT CHINA
FOOD & BEVERAGES
AGE: 60

5. LIN YU-LING
$5.6 BILLION
HONG TAI GROUP
REAL ESTATE
AGE: 80

6. WANG FAMILY
$5.4 BILLION
FORMOSA PLASTICS GROUP
PLASTICS

7. WEI ING-CHOU AND FAMILY
$5.3 BILLION
TINGYI
FOOD
AGES: 60, 58, 62

8. BARRY LAM
$4.2 BILLION
QUANTA COMPUTER
ELECTRONICS
AGE: 68

9. JASON AND RICHARD CHANG
JASON'S NET WORTH: $2.9 BILLION
RICHARD'S NET WORTH: $1.1 BILLION
ASE
SEMICONDUCTORS
AGES: 73, 70

10. LUO JYE
$3.8 BILLION
CST
TIRES
AGE: 91

Richard *(left)* and Daniel Tsai

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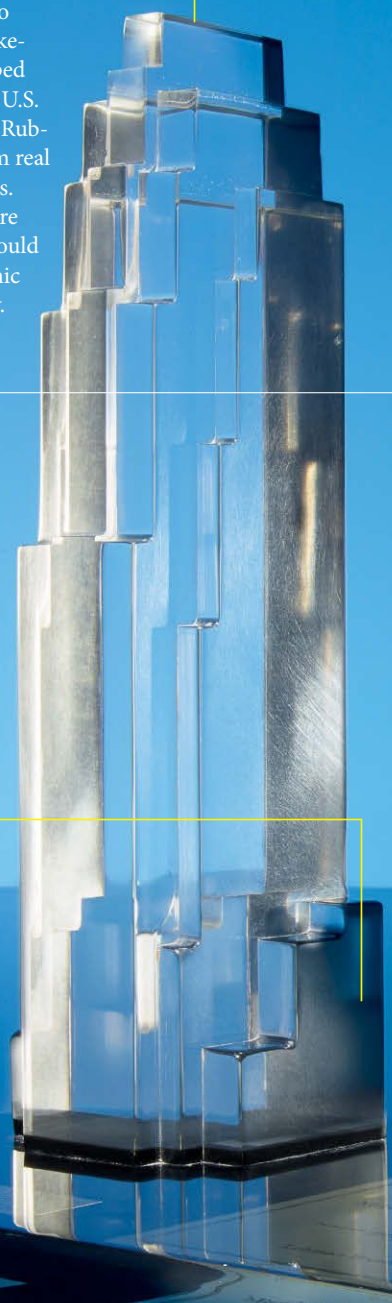
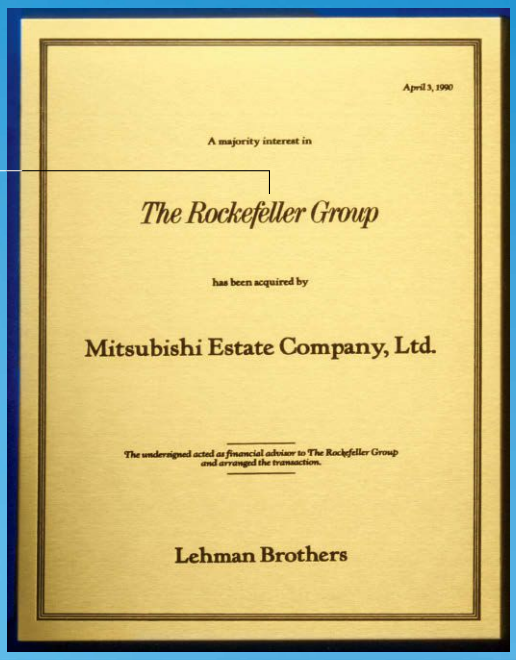
A PIECE OF THE ROCK

WHEN THE CONGLOMERATE Mitsubishi Estate struck a deal to take control of Manhattan's Rockefeller Center in late 1989, it capped a decade of go-go acquisition of U.S. trophy assets—Firestone Tire & Rubber, Columbia Pictures and plum real estate—by Japanese corporations. This deal, struck just weeks before Japan's stock market cratered, would prove hubristic, landing the iconic building complex in bankruptcy.



1. CHILD OF THE DEPRESSION
Built on derelict Midtown Manhattan land leased in late 1929 from Columbia University, Rockefeller Center was planned as the home of the Metropolitan Opera. As the Depression began to bite, though, John D. Rockefeller Jr. (son of the original oil titan) boldly shifted focus.

Selling Standard Oil shares at heavy losses, Rockefeller personally covered three-quarters of the $125 million construction cost ($2.1 billion today) to erect a 12-building Art Deco masterpiece that employed 40,000 construction workers through the tumult of the early 1930s.



April 3, 1990

A majority interest in

The Rockefeller Group

has been acquired by

Mitsubishi Estate Company, Ltd.

The undersigned acted as financial advisor to The Rockefeller Group and arranged the transaction.

Lehman Brothers

2. CASHING OUT, CASHING IN
Owned by the Rockefeller family for decades, the buildings became a liquidity spigot in 1985, when dozens of heirs extracted $1.3 billion from them via a mortgage held in a publicly traded real estate investment trust. In 1989, the family opted to cede control, selling an 80% share of holding company Rockefeller Group to Mitsubishi for $1.4 billion.

3. BUYER'S REMORSE
Bullish on America, Mitsubishi envisioned eventual Rock Center rents of $100 per square foot (they were about $33 when the deal closed), but a sharp early-'90s U.S. real estate recession dictated otherwise. In 1995, Mitsubishi defaulted on the complex's mortgage, sparking a bidding war for control among billionaires David Rockefeller (John Jr.'s son), Jerry Speyer and Sam Zell (as well as 28-year-old agitator Bill Ackman).

A year later, the victor was a consortium led by Rockefeller, commercial-property giant Tishman Speyer and Goldman Sachs. In 2000, Tishman Speyer and Chicago's Crown family bought Rockefeller Center outright for $1.85 billion.

4. SECOND TIME AS FARCE?
Today foreign buyers are once again looking to park their cash in prestige Manhattan properties. Three years ago, the unheralded Chinese conglomerate Anbang Insurance Group inked a startling $1.95 billion deal for the Waldorf-Astoria hotel. The deal is part of a new wave of Asian money. Since 2014, according to Dealogic, companies from China have plowed $100 billion into U.S. assets.

BY ANTOINE GARA
DAVID ARKY FOR FORBES

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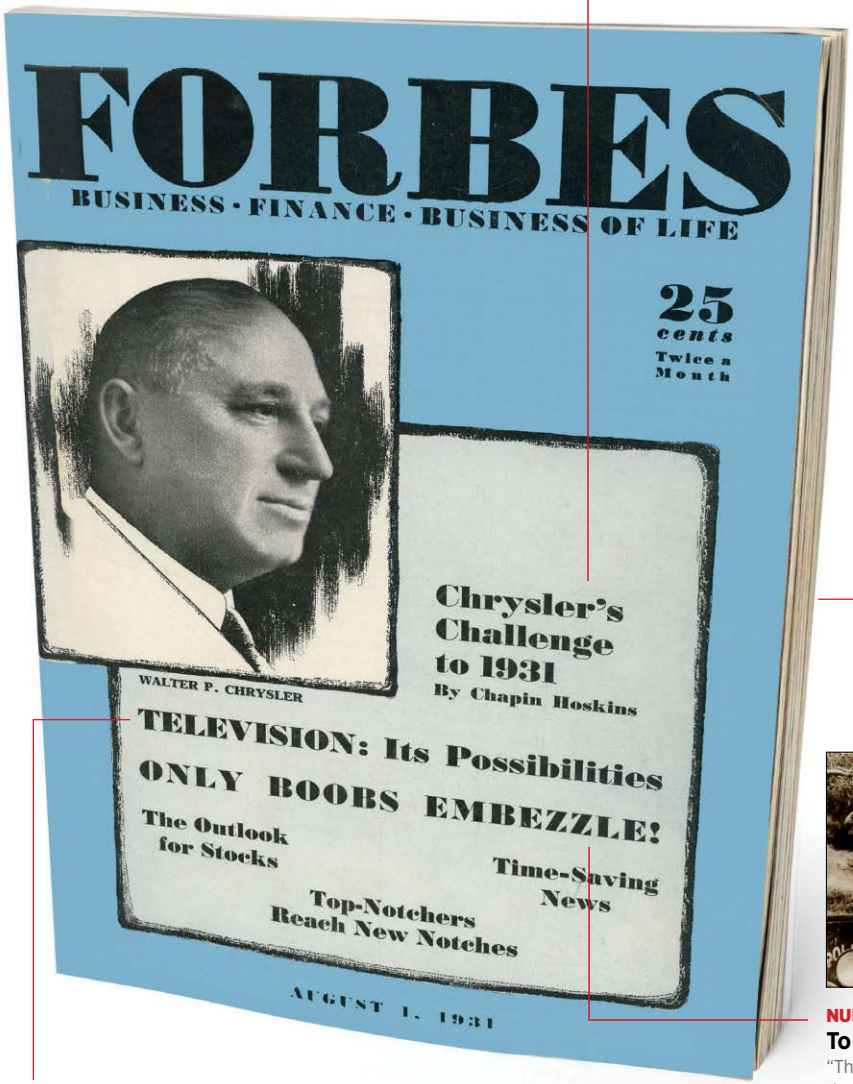
FORBES @ 100

As Forbes' *September 2017 centennial approaches, we're unearthing our favorite covers.*

JULY 15, 1931: DRIVING FORCE



WALTER P. CHRYSLER faced a crisis: Nineteen thirty-one was the worst year for business since the invention of the automobile.

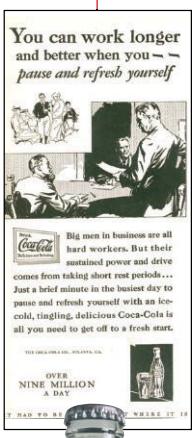
Chrysler responded by doubling down on a burgeoning area of his empire: the lower-priced Plymouth line he had introduced three years earlier. Chrysler advertisements of the time heralded the new 1931 Plymouth as "floating power" with "the smoothness of an eight [cylinder] . . . the economy of a four." A four-door, three-window sedan started at $635, or roughly $10,300 in today's dollars.

Chrysler instructed his company to embark on a new training program for dealers to ensure they understood the vehicle—and could sell it well. The regimen included an educational film that showed the Plymouth traversing the "worst roads in the United States," in Death Valley, where the temperature regularly tops 130 degrees.

NUMBERS GAME

To Catch a Thief

"There seems to be a blind spot in the intelligence of every embezzler, no matter how expert he may be," accountant George H. Kingsley told *Forbes.* He recounted stories of apprehended embezzlers, such as the $30-a-week clerk for an automobile company who had tried to buy a $3,500 roadster. (That's akin to earning $490 a week today while eyeing a $57,000 car.) Kingsley advised businesses to modernize their accounting systems, implement surprise audits—and carefully examine the motives of any employees who seem overly eager to "help" the auditors.



AMAZING AD

Cola Power

Advances in refrigeration had enabled Coca-Cola to increase distribution. The company had introduced its iconic six-pack of bottles eight years earlier.

SIGN OF THE TIMES

Tuned Into the Future

Television might still have been in a "crude, elementary stage," but *Forbes'* crystal ball sagely predicted business videoconferencing, televised sermons, QVC-like shopping channels and the continued success of CBS and NBC.

BY ABRAM BROWN

TODD BANNOR/ALAMY; MOVIESTORE COLLECTION/ALAMY; EVERETT COLLECTION/NEWSCOM; MOVIESTORE COLLECTION/ALAMY; EVERETT COLLECTION/NEWSCOM

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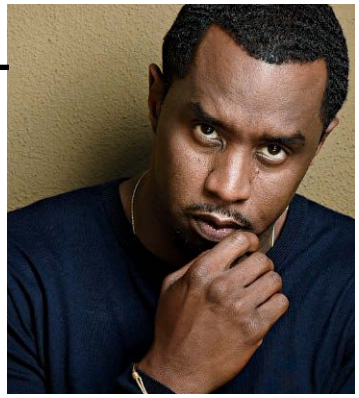
LeaderBoard

CONVERSATION

OUR ANNUAL RANKING of America's richest self-made women *(June 13)* was a barn burner, highlighting an unprecedented $61.5 billion aggregate net worth among the 60 on the list. Reader response included much surprising you-didn't-build-that snark ("None of these women are self-made. They got there with armies of support") but even more heady huzzahs. "The strength of women has never been brighter than in 2017," wrote AK Ahmed via LinkedIn. "It gives me great hope to find more and more women stepping out of the shadows." At *Forbes'* Women's Summit in Manhattan, meanwhile, *Wonder Woman* director Patty Jenkins appealed to the heart—and the pocketbook. "The world is changing, and if you want to get rich, pay attention," she said. "If women are the biggest audience in the world right now, it would be wise to go after them."



RAPPERS' DELIGHT

Readers cited *Forbes'* annual rundown of hip-hop's wealthiest superstars chapter and verse.

NED EHRBAR, CBS NEWS: "It's getting crowded at the top."

ARTISTDIRECT.COM: "It's reassuring that someone's keeping track of all the money so you don't have to. We get to reset the clock and know that we now have 12 full months to get into that top-five list ourselves."

CORINNE HELLER, E NEWS: "Damn, Diddy. The rapper needs just $200 million to become a billionaire, and if he continues at the pace he's going, he'll probably get there in less than five years."

ALLISON SADLIER, HOLLYWOOD LIFE.COM: "Kanye West has reportedly been fuming because he didn't crack *Forbes'* top five. . . . 'He's happy for Jay Z, but it royally crushed his spirits when he learned Jay made it but he didn't,' an insider told us."

SESALI BOWEN, REFINERY 29: "[Diddy, Jay Z and Dr. Dre] are artists in their own right, but these days they're business titans first."

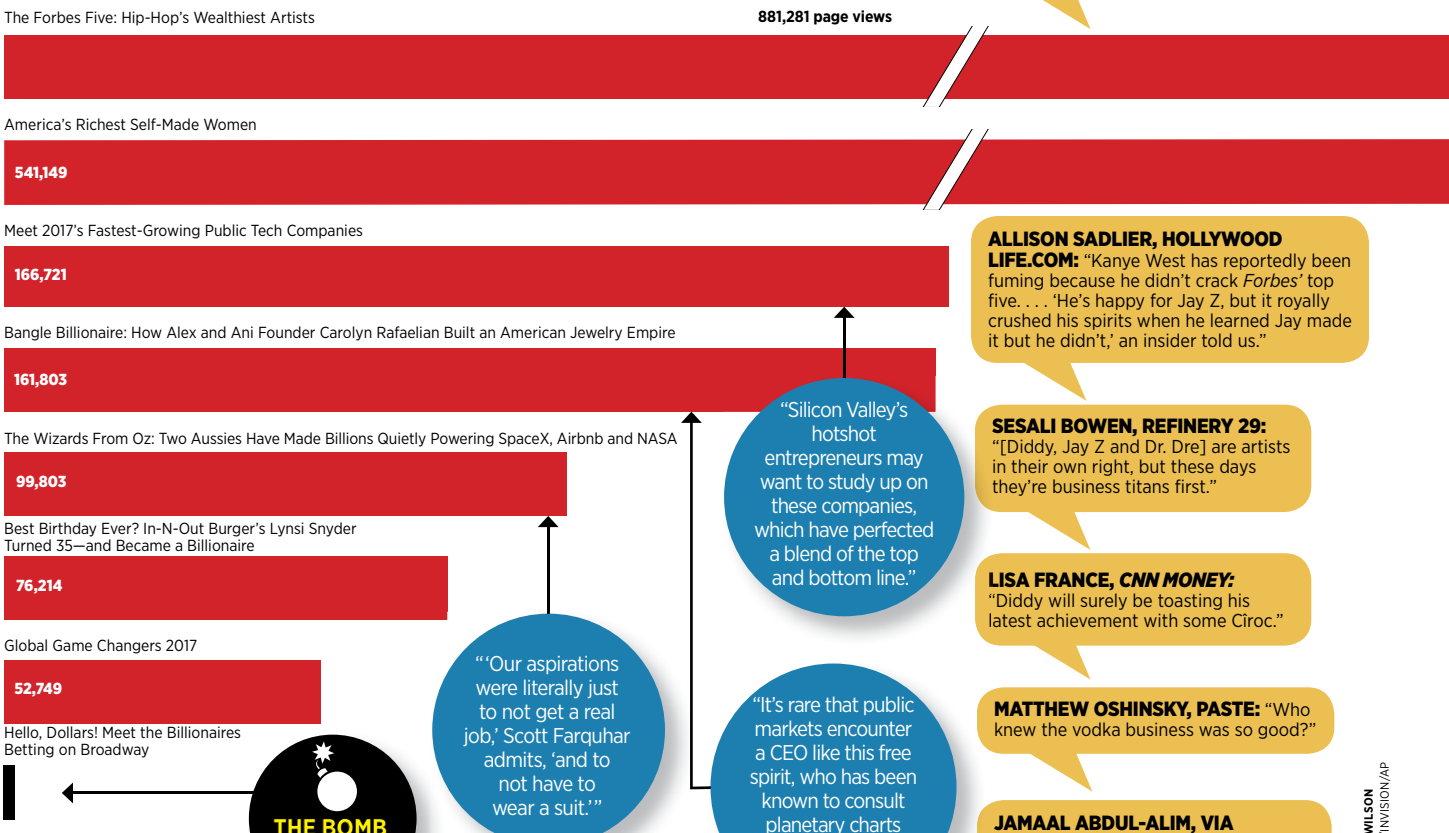
LISA FRANCE, *CNN MONEY*: "Diddy will surely be toasting his latest achievement with some Ciroc."

MATTHEW OSHINSKY, PASTE: "Who knew the vodka business was so good?"

JAMAAL ABDUL-ALIM, VIA FORBES.COM: "The deeper question is what are they doing philanthropically?"

THE INTEREST GRAPH

The rap game is money for the five big bosses / They have jet-black profits, not blood-red losses / We put 'em online and watch the page views pulse— / The five draw more eyeballs than Charles M. Schulz



"'Our aspirations were literally just to not get a real job,' Scott Farquhar admits, 'and to not have to wear a suit.'"

"Silicon Valley's hotshot entrepreneurs may want to study up on these companies, which have perfected a blend of the top and bottom line."

"It's rare that public markets encounter a CEO like this free spirit, who has been known to consult planetary charts during decision making."

BY ALEXANDRA WILSON
CHRIS PIZZELLO/INVISION/AP

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HIGH SCHOOL WILL NEVER BE THE SAME

SEPT 8

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Verticals

35 ENTREPRENEURS
38 STRATEGIES
46 TECHNOLOGY

A former social worker, Kim Jordan cofounded New Belgium, a company that both employees and beer drinkers considered special.

TIM PANNELL FOR FORBES

SMALL GIANTS

Growing Pains

Once a craft beer darling, New Belgium Brewing is discovering how tough it can be to transform from a niche player into a national brand.

BY SUSAN ADAMS

In January 2013, Kim Jordan, the cofounder and CEO of New Belgium Brewing, called an all-hands meeting and stunned employees by announcing that the company had been sold. Once the gasps subsided, she told staffers that the envelopes on their chairs contained the identity of the buyer. Inside they found a mirror, Jordan's way of informing them that they were the new owners of New Belgium through an employee stock-ownership plan.

Two years later, the more than 600 employee-owners of New Belgium awoke to a Reuters report that stunned them again: New Belgium was up for sale, its corporate leaders looking for a buyer willing to pay $1 billion for the Fort Collins, Colorado, craft brewer. A brewery tour guide, Dave Ponceby, remembers having trouble mustering enthusiasm that day as he walked visitors through the spotless, high-ceil-

inged brewhouse, past the four gleaming stainless-steel tanks where barley and hops are mashed and boiled. He gave his usual spiel but couldn't bring himself to talk about what it meant to be an employee-owner. "I was hurt," he says. "The rumor was that they were going to sell to Anheuser-Busch, which would have changed everything."

Anheuser-Busch InBev had in fact been buying up craft brewers. At the same time, New Belgium customers were defecting to microbreweries. In the past five years, according to the Brewers Association, the number of brewers in the United States has more than doubled to 5,300 and counting. Fort Collins alone has 21, with 4 more in the works. Increasingly, New Belgium has failed to match cachet with the smaller players and marketing dollars with the Goliaths. "New Belgium is too big to be small and too small to be big," says *Beer Business Daily* editor Harry Schumacher. Jordan's response: Get bigger.

The path has been rocky, however, for a company that once led the charge against bland American beer and that has prided itself on its progressive management. The decision to sell 100% of the company to her workers appealed to Jordan's ideals about employee empowerment but created debt and put pressure on the company to generate cash to service it. New Belgium took on even more debt to build a second brewery in Asheville, North Carolina, which cost $140 million and opened in 2016. The second plant increased production capacity by 50%, and New Belgium is now sold in all 50 states, but it must compete in places where beer drinkers have never heard of it.

Cheers! Inside New Belgium's spotless brewhouse and taproom.

In 2015, while waiting for the Asheville brewery to start producing, New Belgium had its first down year, with revenue slipping to $225 million from $226 million in 2014. That, along with the decision to put the company up for sale in late 2015, took a toll on the staff. Last October, Christine Perich, a 16-year New Belgium veteran Jordan had selected just a year earlier to succeed her as CEO, phoned in her resignation with no other job lined up and no public explanation, although there has been speculation about whether Jordan was ready to give up control. ("I'm still the chair of the board, and that's where the big-picture strategy is," responds Jordan.) This May, Peter Bouckaert, the company's longtime brewmaster, announced he was leaving to start his own microbrewery and coffee roaster. And Jennifer Briggs, head of human resources and a fervent brand evangelist, also resigned without public explanation. In the last year, as more people question whether New Belgium is still a special place to work, turnover has doubled to 10%.

The turnover spike is notable at a company where staffers have long told the company's story with pride: Electrical engineer Jeff Lebesch, a home brewer from Fort Collins, went on a mountain-bike tour through Belgium in 1988 and fell in love with the country's beer. Belgian brewers often add fruit, such as oranges and cherries, and spices like cardamom to the usual malted barley and hops. After Lebesch met Jordan, a social worker, at a party that year, the couple traveled to Belgium and decided to open a brewery, the first in the U.S. to make Belgian-style beer. After getting married, they took out a $60,000 second mortgage to buy equipment and nearly maxed out their credit cards. An artist who lived next door made their labels.

The marriage didn't last (Lebesch left the company in 2001), but the brewery thrived, and Jordan introduced perks like an on-site medical clinic with a full-time doctor who provides free care to staffers and their families. Employees get a free cruiser bike after a year of service and an all-expenses-paid beer tour of Belgium after five. In 2013, the company became a certified B Corp, submitting to rigorous monitoring of its commitments to transparent governance and environmental sustainability. "New Belgium was a company that didn't act like a company," says Greg Owsley, the brewery's chief branding officer from 1996 to 2011. "When New Belgium was at its strongest as a brand, it was

more a social movement than a brewery."

But as New Belgium grew, Jordan's ambition competed with her idealism. In 2005, she and her executive team, known internally as "missionaries," decided the company should plot a national strategy. The goal, says Jordan, was to offer new opportunities to employees and build a bigger platform for New Belgium's progressive environmental and management practices. Others sensed ego. "Kim wanted to be a force to be reckoned with," says a former member of the inner team.

Jordan says she has no regrets about selling the company to the employees even though an open-market sale would have brought a higher price. *Forbes* pegs her net worth at less than $200 million, a fraction of the $1 billion fortune of Ken Grossman, founder and 100% owner of Chico, California, craft brewer Sierra Nevada, whose revenues are not much higher than New Belgium's. "I have plenty of money," Jordan says. "We sold to the [employees] at a fair price."

After Jordan decided to explore a sale of New Belgium in 2015, she likened the process to a "death march." But she says she had a fiduciary responsibility to her employee-owners to assess the prospects. Heineken had just bought 50% of the California craft-brewer Lagunitas at a reported $800 million valuation, and Constellation Brands paid $1 billion for another California craft brand, Ballast Point. In the end, Jordan says, while there were offers on the table, none fit: "We didn't find the magical combination of cultural meshing and commitment to the craft of brewing, and the ability for us to be innovative and experimental." At least not yet.

Before the talks ended, Jordan hedged her bets with a new hire who didn't fit the typical New Belgium profile. Most staffers, including Jordan, dress in flannel, jeans and hoodies. Tattoos and piercings are common. In March 2016, Jordan hired Ruairi Twomey, a native of Ireland, as vice president of marketing. In 14 years at the beverage giant Diageo, he had marketed Guinness in Toronto, New York and Lagos, Nigeria.

Dressed in a crisp white shirt and black blazer, Twomey describes the new product lines he has helped bring to market, including Day Blazer, a light blond ale sold in 12- and 24-ounce cans. Twomey says he tested 39 names and 16 designs before finalizing the Incan-inspired graphic meant to appeal to Latino drinkers. Introduced in January, it already accounts for 6% of New Belgium's sales. "It's been really good to have someone who encourages us to take risks," Jordan says.

At Wilbur's Total Beverage in Fort Collins, six-packs of Day Blazer cost $7.99 and sit in a case a distant 27 refrigerator doors from the craft-beer display, where a six-pack of New Belgium's flagship Fat Tire amber ale fetches $9.99. "To a lot of beer geeks, New Belgium is considered the Budweiser of the craft beer world," says the bearded store clerk.

It's a dilemma other nationally distributed craft brewers have faced, including Jim Koch, the founder of Boston Beer, which makes Sam Adams and has annual sales of $879 million. "If you make great beer," Koch says, "and people love it and drink it, and more and more of them love it and drink it, the beer geeks will turn against you. You're talking about roughly 5%, but they're an influential 5%."

Craft geeks can object, but New Belgium recovered from 2015 to sell more beer than ever last year, booking $234 million, with a net profit *Forbes* estimates at $17 million. In the first four months of 2017, as sales of Sam Adams and Sierra Nevada slid 20% and 11.1%, respectively, according to Nielsen data, New Belgium's sales surged 8.5%.

Jordan, who says she is reviewing CEO candidates, makes no apologies for a down-market offering like Day Blazer or for leaving the door open should the right suitor come along, even if it's one of the Goliaths. Anheuser-Busch InBev and MillerCoors, she says, "make technically excellent beer, and you will never hear me disparage them. They're excellent brewers."

Smart business. But fans and employees who fear something special is being lost at New Belgium may find those words chilling. *

HOW TO PLAY IT

BY WILLIAM BALDWIN

Craft beer—how quaint, how cute! But don't fall in love with an investment because you love the product. Craft Brew Alliance is an assortment of artisanal beermakers from Oregon, Hawaii, New Hampshire and elsewhere. But a fair amount of its brewing and most of its distribution is handled by Anheuser-Busch InBev, the Budweiser outfit. In this crowded business, where freshness and economies of scale matter, smallness does not confer profits. Craft Brew's enterprise value runs to 29 times its plausible 2017 net before interest, tax and depreciation; the ratio for **AB InBev** is more like 18. Own the latter.

William Baldwin is Forbes' *Investment Strategies columnist.*

MARGIN PROPHET

THAT'S THE TICKET

Dishonest brokers can sell multiple printouts for the same seat at an event. That's why **Sandy Khaund** started Upgraded Inc.

How common is ticket fraud?

It happens a lot. Last year at game seven of the NBA Western Conference championship, dozens of people reportedly got rejected at the gate with tickets they'd bought from StubHub.

And you solve this how?

Ticket sellers don't have a singular digital asset. One way the tech world has overcome this is with Bitcoin, which works like a huge ledger. If I give you a Bitcoin and then try to give a duplicate to someone else, the ledger says I can't. I thought, we need that for tickets.

Why would a sports team pay for this?

Teams want to prevent fraud. More important, they want to know who's going to their games. Since the ticket is interactive, it's a way to do targeted marketing.

Are you trying to compete with Ticketmaster?

No. When you go to Ticketmaster, you get a drop-down that says PDF, Postal Service or will-call. In the short term, I want to be the fourth option. In the long term, I want to be the *only* option.

MARGIN PROPHET BY SUSAN ADAMS

FINAL THOUGHT

* *"Growth for the sake of growth is the ideology of the cancer cell."* —EDWARD ABBEY

ENERGY

Oil's Changing Face

As the first woman to run a big oil company, Vicki Hollub has quickly made Occidental Petroleum leaner, smarter, gentler—and poised to gusher cash for the next half-century.

BY CHRISTOPHER HELMAN

JIM PANNELL, FOR FORBES

The mini-major: CEO Vicki Hollub says Oxy will drill thousands of wells in West Texas.

South Curtis Ranch is an 11,000-acre "unit" that Occidental Petroleum operates in the Permian Basin, a 300-mile swath of West Texas and southeastern New Mexico that produces a quarter of America's oil. Here, cattle placidly masticate as hundreds of 20-foot-tall "nodding donkeys" suck up oil and gas from deposits 2 miles down. Oxy's pumps are gray with red tops—a well-gauger might describe his day as having been spent "chasing redheads." North winds whip up dust from truck tires crunching on the work roads. A storm-chasing group issues a flaming-tumbleweed warning. That's no joke to Vicki Hollub, the chief executive officer of Occidental. Just 5-foot-5, Hollub strides with authority to a lineup of nervous roughnecks, all men. She shakes hands and listens intently as the foreman recites the safety briefing. Everyone wears steel-toe shoes and flame-retardant coveralls. Hollub refuses a photographer's request to take off her hard hat and safety glasses for a few pictures. "Not going to happen," she says, tucking blond hair under the rim.

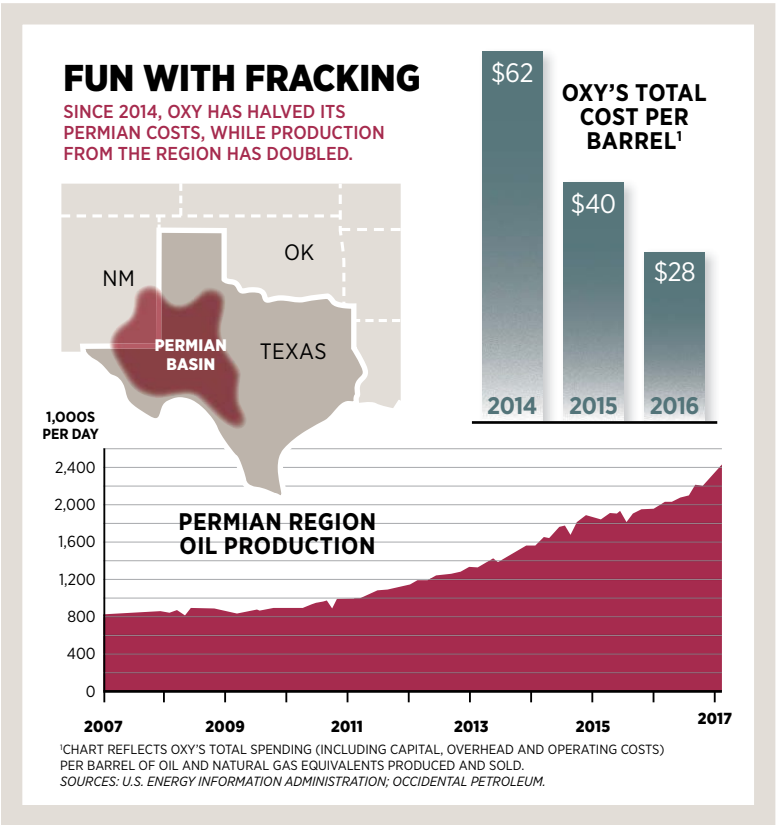
Hollub, 57, feels at home here. A decade ago, she was running Oxy's entire one-million-acre Permian position. The work consisted mostly of injecting carbon dioxide into 100-year-old shallow, conventional fields to coax out the more stubborn oil. Then came advances in directional drilling and hydraulic fracturing that enabled oil companies to unlock deeper, trickier oil-soaked rock. Output from the Permian has doubled in the past five years to 2.5 million barrels a day (bpd), with hundreds of new rigs deployed even in a world of $45 oil.

Oxy is the biggest producer in the region, at 270,000 bpd—half the company's worldwide total. Hollub says it will double that within a decade. "It's pretty hard to drill a dry hole there. We don't have to explore to find it. It's just a matter of engineering the right way to get it out." The geology is so stacked with oil layers that it's like having ten fields in one—a petroleum layer cake. "We know Oxy has more than 50 years of reserves left," she says.

Hollub presides over an all-new Oxy that has gone all-in on the Permian. In an unforgiving "portfolio optimization" that sought to undo the excesses of former CEO Ray Irani, Oxy shed 25% of its assets, including less cost-effective fields in North Dakota, Colorado, Kansas, Oklahoma, Iraq, Libya and Yemen. In 2014, Hollub orchestrated the spinoff

of California Resources Corp., which took all of Oxy's assets in that state, including Elk Hills, which produces half of the Golden State's natural gas. In the process she also loaded CRC with $6 billion of debt. She even sold off Oxy's lavish Los Angeles headquarters for $93 million and consolidated offices in Houston. (She lives with her husband on Tiki Island, near Galveston, Texas.) Half of Oxy's output now comes from Qatar, Oman, Abu Dhabi and Colombia. The other half is Permian. "Now every dollar we invest is in a quality asset," Hollub says.

Like supermajors Exxon Mobil and Chevron, Occidental has a vertically integrated operation at Hollub's disposal, at least in Texas. Oxy's pipeline network carries oil down to Corpus Christi, where the OxyChem division operates chemical plants and a new terminal for supertankers built on a former naval base. "We're integrated like a major, pay dividends like a major, but we're small enough that we can still generate solid growth," Hollub says. Oxy produced $117 million of net income in the first quarter on $3 billion in revenue, when oil prices averaged $51 a barrel. In 2016, with oil around $40, Oxy posted a net loss of nearly $600 million. But Hollub says at $45 Oxy can increase production. That's a far lower breakeven than you'd get from deepwater drilling in the Gulf of Mexico, and it also beats fracking in once-hot places like North Dakota, where the Bakken Shale is only a fraction as thick as the Permian layers. If oil prices return to their 20-year, inflation-adjusted average of $60, Oxy is poised to make $1.5 billion in net profits. Put another way, for every dollar in higher oil prices, about $100 million drops directly to Oxy's bottom line.



[1]CHART REFLECTS OXY'S TOTAL SPENDING (INCLUDING CAPITAL, OVERHEAD AND OPERATING COSTS) PER BARREL OF OIL AND NATURAL GAS EQUIVALENTS PRODUCED AND SOLD.
SOURCES: U.S. ENERGY INFORMATION ADMINISTRATION; OCCIDENTAL PETROLEUM.

It was no dumb luck that Oxy already had a giant position in the region before "Permania" took hold of the oil industry. Hollub is executing a strategy put into place nearly two decades ago by Stephen Chazen, her predecessor as CEO, who was convinced that the best place to find new oil was where it had been found before. In 1998, Oxy acquired the old Elk Hills oilfield near Bakersfield, California. It followed that up with the 2000 purchase of Permian-focused Altura Energy for $3.6 billion. When Oxy bought Altura, it paid only for the old, depleted conventional fields, which were being kept alive via injections of pressurized carbon. But there was more to it than that, says Chazen, who at 71 has spent three decades in the oil business.

"When you do a deal, the goal is to get free options. That is, things that might turn out but you don't have to pay for them." The Permian is the king of optionality. All those deeper layers of oil-soaked rock with names like Wolfcamp, Avalon and Bone Spring were seen as worthless, Chazen says. "We paid for the CO_2 business, but we got multiple prospective target zones for free." Oxy didn't even know how to drill those targets in 2000. But it does now.

Oxy's 25,000 wellbores in the Permian have lots of "jewelry" on them—sensors that measure, for instance, how flow rates respond to changes in atmospheric temperature and pressure. That big data feeds artificial-intelligence software that guides drill bits horizontally into the thickest zones of oil-soaked rock. Thanks to better technology and better fields, Oxy has reduced its total cost per barrel (including overhead, capital and operating costs) by more than half, to just $28.

It's been a bold transformation for one of America's most unusual companies. Oxy's founder, Armand Hammer, was the Bronx-born child of Soviet sympathizers. He made his first fortune trading medicine, grain and pencils to Lenin in the 1920s. Hammer founded Oxy in 1956 and during the Cold War became an infamous back channel between the Kremlin and the White House. He also used his diplomatic charms to win lucrative oil licenses around the world.

At Hammer's death in 1990, Oxy's fate fell to his handpicked successor, Ray Irani, an imperious

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INNOVATING SINCE 1917

Since 1917, Forbes has been committed to connecting the world's most creative, insightful and entrepreneurial minds to collaborate and improve the world. This year, we're celebrating our centennial anniversary and all of the people and stories throughout the years that have inspired us to stay true to our mission of championing entrepreneurship that builds a better future.

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chemical engineer who carried on Hammer's global gallivanting and landed megadeals with the likes of Qatar, Oman and Libya. Irani was the highest-paid CEO of his day, maxing out at $460 million in 2006. His lavish Beverly Hills lifestyle made Irani the living incarnation of corporate greed—but he made shareholders rich, with Oxy shares returning 2,000% over Irani's 20-year tenure, roughly four times better than the S&P 500. Running the show behind Irani was Chazen, a former investment banker who had disarmed mines in Vietnam. He also had a Ph.D. in geology. Low-key and subtle, Chazen found Irani embarrassing. In 2011, the Oxy board could no longer ignore the outrage over Irani's pay, so they made Chazen CEO but left Irani as chairman. Irani refused to relinquish his grip. In 2013, after dueling proxy votes, shareholders booted him. Irani's cumulative compensation: $1.2 billion. At last, Oxy could get on with selling assets. Chazen promoted Hollub to president and sent her to spearhead the California spinoff. She took over the CEO job in early 2016.

Hollub grew up loving Alabama football and idolized its legendary coach, Bear Bryant. At Tuscaloosa Hollub's freshman ambition was to play French horn in a symphony, but an instructor broke it to her that she was good enough only for the Crimson Tide marching band. "It was a real blessing he was so honest with me," Hollub says. Watching Bryant transformed her. "It wasn't about winning single games," she says. "The coaches were only comfortable winning national championships. It's a culture and an attitude of not settling." She considered mine engineering until she took a field trip down one of Alabama's mines. "It was claustrophobic, cold, wet. I never wanted to do it again." The next trip was to an oil rig. "I was 18 years old and thought that was so cool." After graduating, she worked on rigs in Mississippi and made the three-hour drive back for home games.

In 1982, Occidental bought the company she worked for, Cities Service. She never left. Hollub led teams in Venezuela and Ecuador. "I was surprised at the opportunities I got," she says. When she landed in Russia, "I found out I was there because a lot of other people didn't want to go." Football helped her endure tough jobs in a male-dominated industry. "It was the one thing we could always talk about. It broke down barriers." Now Hollub is one of just 28 women running S&P 500 companies. "I don't like the term 'role model.' What I do feel is, I've been fortunate. Without football and help along the way from some key men, I wouldn't be where I am today."

As the downturn took hold in 2015, Hollub made a big decision: Cut assets, not people. Oxy would ax contractors, sure, but not employees. Hollub saw it as a way to heal the Oxy culture in the wake of its post-Irani upheaval. Millennials got sent to the field instead of the chopping block. Jenny James, a 26-year-old petroleum engineer, worked 16 months on a rig in Pecos, Texas, living in a "man camp." Does she care that Oxy's CEO is female (as are the general counsel, midstream president, controller and head of external relations)? "It shouldn't make a difference," James says, "but it's still really exciting."

It'll be even more exciting when oil prices go up. At an average oil price of $50, Oxy figures, it can generate $5.6 billion in cash a year, enough to support $3.3 billion a year in capital investment plus $2.3 billion in dividends. Shares yield 5%. Hollub considers the payouts—raised for 12 years straight—to be sacred and good for fiscal discipline, which makes Oxy a solid choice for any timid oil bull. "Just as the Permian Basin will be the last basin standing, so Occidental will be the last company standing." ✱

HOW TO PLAY IT RICHARD LEHMANN

Black Stone Minerals Master LP is a great vehicle for benefiting from the rebound in energy prices. This master limited partnership is the nation's largest publicly traded mineral and royalty company. It is also one of the largest U.S. owners of oil and natural gas interests. The company maximizes value for investors both by marketing its existing properties for lease and by acquisitions. First-quarter net income increased by nearly five times from the previous year as higher energy prices drove an increase in oil and gas production. The MLP's conservative, well-managed operations make its 7% current yield a screaming buy for investors who can stomach some volatility risk.

Richard Lehmann is president of Income Securities Advisor and publisher of the Forbes/Lehmann Income Securities Investor.

FINAL THOUGHT

✱ *"It's not the will to win that matters. . . . Everyone has that. It's the will to prepare to win that matters."* **—PAUL "BEAR" BRYANT**

JUSTIN SULLIVAN/GETTY IMAGES

BY THE NUMBERS

FLY THE SKINNY SKIES

For all the attention Boeing's Dreamliner and Airbus' A380 get, smaller planes are increasingly the big boppers of the airline business. The share of "wide-bodies"—planes with two aisles and seven or more seats across—among the global fleet has fallen from 32% in 1996 to just 11% today. Further loss of altitude is ahead: Boeing projects that 72% of new aircraft delivered over the next 20 years will be single-aisle jets—a trend fueled by growth in low-cost, frills-free airlines, particularly in Asia.

PROJECTED DELIVERIES, 2017–36

	NUMBER	VALUE
REGIONAL JETS	2,370	$110 BILLION
SINGLE-AISLE	29,530	$3.2 TRILLION
SMALL WIDE-BODY	5,050	$1.3 TRILLION
MEDIUM/LARGE WIDE-BODY	3,160	$1.2 TRILLION
FREIGHTERS	920	$260 BILLION

SOURCE: BOEING.

BY THE NUMBERS BY JEREMY BOGAISKY

Ad Council
I am very sensitive to lights and sounds
Jacob Sanchez
Diagnosed with autism
Sensory sensitivity is a sign of autism.
Learn the others at autismspeaks.org/signs.
AUTISM SPEAKS

Forbes CIO SNAPSHOT SUMMIT

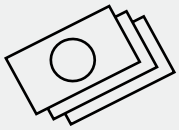
The world's most influential CIOs convened at San Francisco's Ritz-Carlton at Half Moon Bay for the annual **Forbes CIO Summit.** With an aim toward building better corporate ecosystems that find faster paths to seizing opportunity and mitigate risks, executives behind such leading companies as Box, Slack and Google gathered to exchange ideas in a mixture of engaging conversations, presentations and Q&A discussions. Here's your all-access executive summary featuring the tips and takeaways from the 2017 Forbes CIO Summit.

"The holy grail is an always-on chief of staff."

STEWART BUTTERFIELD, Slack co-founder and CEO, on Slack's evolution through artificial intelligence.

61%

Percentage of companies represented with 1,000+ employees



$24 BILLION

Total IT budget of CIO Summit attendees

"The future of software needs to be model driven."

ALAN TREFLER, CEO of Pegasystems, on how enlightened IT leaders enhance customer engagement during the "CIO as Customer Interaction Officer" session.

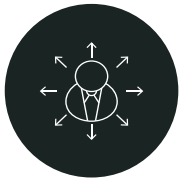
JEETU PATEL, BOX'S HEAD OF STRATEGY, SHARES THREE KEYS TO GOING DIGITAL:

DATA SCIENCE

Who's using what? How's it being used? How do we make sure that it continues to iterate?

DESIGN

More is not always better.



DISTRIBUTION

When it comes to distribution, have a business sense of how to get your product into the most hands.

"Our objective is to be our best and first customer on our product."

DIANA MCKENZIE, Workday CIO, sharing her company's hands-on approach to making its products better during the "Managing IT as a Product" panel discussion.

CONTINUE THE CONVERSATION AT CIO NEXT IN NYC, OCTOBER 15-16 LEARN MORE FORBESLIVE.COM/CIO-NEXT

SOCIAL

Build, Race, Fight…and Chat

Discord's communications service for gamers has already outgrown messaging giant Slack. As it nears unicorn status, the two-year-old startup aims to cash in on its success.

BY KATHLEEN CHAYKOWSKI

Six days a week, a 26-year-old videogaming celebrity who goes by the name "Lirik" regales his 1.7 million followers on the streaming service Twitch as he broadcasts himself playing Destiny (a shoot-'em-up contest), Colony Survival (a city-building simulation) and other popular online titles. As he plays—from an undisclosed location in Massachusetts, lest he be mobbed by fans—another app called Discord floats on his screen. Lirik uses it to chat in real time via voice or text with teammates and to message with thousands of fans in channels dedicated to popular games like League of Legends and Mario Kart. Lirik, who refuses to publicly reveal his real name, became an avid user of Discord two years ago. He has since been chosen by the San Francisco-based startup as one of about 200 influencers it pays to promote the service. He says Discord fosters a sense of community among his fans, who chat, mingle and form friendships with each other. "I have Discord open 24-7," Lirik says.

Discord's embrace by famous Twitch and YouTube gamers like Lirik helped turn the free desktop and mobile chat service into one of the biggest app breakout hits in recent memory. Growing virally since its May 2015 launch, it has more than 45 million registered users, who send some 200 million messages daily. Every day 9 million people across the globe use Discord. By comparison, the corporate messaging phenom Slack had just 2.3 million daily users two years after its launch and has since grown to 5 million. Discord, which has been called "the Slack for gamers," is adding 1.1 million new users every week. "I haven't seen a product that has grown this quickly, with this daily usage, in a long time," says Josh Elman of Greylock Partners, an investor in Discord. "If you're a gamer, Discord speaks to you." Cofounder and CEO Jason Citron says, "Discord was just something that was missing from the world. It needed to exist."

Discord has quickly overtaken incumbents like TeamSpeak, Mumble, Ventrilo and, in some cases, Skype with a simple formula: an all-in-one service that combines text and voice communications—and, soon, video chat and screen sharing—and integrates easily with online games during playtime. The bulk of Discord users are 18-to-34-year-old

Stanislav Vishnevskiy (left) and Jason Citron turned a passion for gaming into a blockbuster communications app.

TIMOTHY ARCHIBALD FOR FORBES

gamers who connect with a core group of friends for hours on end to discuss strategies for slaying a dragon or chat about work or their romantic lives. Discord's mobile app shows users when friends are playing and makes it easy to set up future play sessions. Richard Hordijk, an analyst at the gaming-focused research firm Newzoo, says features like these "set Discord apart from long-running applications" and have turned it into the market leader.

The tantalizing prospect of becoming a leading pick-and-shovel vendor to the gaming gold rush has helped Citron, 32, and cofounder and CTO Stanislav Vishnevskiy, 28, raise nearly $100 million from a list of marquee venture investors that also includes Spark Capital and Index Ventures. The company won't disclose revenue, which comes mostly from $4.99 monthly subscriptions for extra features like animated avatars, custom emojis and larger file-upload limits. But a $50 million cash infusion in June valued Discord, which has just 65 employees, at about $770 million. Investors know gaming fans are a lucrative audience. Industry revenue, which includes PC and mobile games, will top $94 billion this year, according to Newzoo. The firm estimates that growth will continue as PC gamers, already at 1.2 billion globally, reach 1.4 billion in 2020.

Citron and Vishnevskiy began their gaming careers as 5-year-olds playing Nintendo on Long Island and in Los Angeles, respectively. They were programming for money by their teenage years and further honed their computer skills in college—Citron at Full Sail University in Florida and Vishnevskiy at Cal State Northridge. After graduating, Citron worked for gaming studios for a few years before launching his own Tetris-like game on the day Apple's App Store opened. When he couldn't monetize the game, he took the social features he had built and turned them into a service for game developers. He expanded the company, OpenFeint, to 100 employees and sold it to the Japanese media company GREE for $104 million in 2011. Citron left a few months later and, after unwinding through three straight weeks of playing Final Fantasy IV, decided his work wasn't done. "I had this itch, and still have the itch, to build something enduring and important," Citron says.

At the time, iPads were booming in popularity, and Citron thought Apple's tablet could become the next blockbuster device for gamers. He founded his next company, Hammer & Chisel, in 2012, to develop a multiplayer iPad game, recruiting Vishnevskiy, who had worked at GREE. The game won accolades for its design, but when it struggled to gain an audience, Vishnevskiy pushed Citron to consider an idea he had shelved: a text and voice chat service for gamers. Citron was intrigued and assigned half his 18-person staff to work on what would become Discord. Eventually, Citron made the wrenching

decision to stop development of his iPad game—and lay off about half the workers—to focus on Discord. "It wasn't even clear Discord was going to work, but I knew we couldn't do two things at once," he says.

(Interestingly, Slack, which is worth an estimated $9 billion, also emerged from a failed gaming experiment: It was developed as an incidental internal tool for a team of coders building a computer game that was later scrapped.)

Discord launched two years ago into a market dominated by a handful of rival services. But most had failed to innovate or adapt to rapidly changing gaming behavior, leaving them vulnerable to an upstart with a better mousetrap, says Lauren Foye, an analyst at Juniper Research. Discord seized the opportunity with a more seamless experience. While most rival apps have to be installed, Discord can run inside a Web browser, meaning users need only click an invite link and create a user name to get started. (Players who stick with Discord typically install the desktop version later for better performance.) Discord also caused fewer game-play delays than competitors, eliminated the typical monthly usage fee and removed the need for gamers to toggle between programs. "The social group moves from a fragmented messaging experience with TeamSpeak and maybe WhatsApp or Messenger, and then they just all use Discord," Citron says. "There's no waiting to call into chats. It's like an always-on conference call." Gamers also appreciate its security, which protects their IP addresses and prevents them from getting kicked offline. Meanwhile, Millennials are drawn to Discord's visual messaging, which supports GIFs and graphics tied to internet memes.

Discord's first spurt of users followed a fan's rave review on Reddit. Citron and Vishnevskiy shared links to invite users to the ensuing discussion thread, and usage took off. The founders still message with users every day, and Citron, who is more extroverted than Vishnevskiy, is known to spend hours at gaming events like TwitchCon handing out swag. Meanwhile, a customer-care team of 15 employees and 20 contractors works to prevent abuse and assist—and banter with—users. "It's a lot of little subtle things that make a big difference," Citron says.

For now, Discord's moneymaking potential is hemmed in by the founders' promises to users: The core service will remain free, and they won't run ads or sell user data. And as the company grows, the monthly subscriptions for extra services aren't likely to pay the bills. But Nabeel Hyatt, a partner at Spark Capital, says Discord's user base should lend itself to plenty of monetization opportunities over time. Selling games and merchandise could be an option, analysts say. The company may also sell tools and services to developers who create games with Discord's chat features and come up with bots for the service.

Discord is already being used by nongamers inside some businesses, and some analysts see another potential opportunity there. "Discord very much has its roots in gaming, but you could see it branch out more broadly," Juniper's Foye says.

Citron and Vishnevskiy say they prefer to remain firmly grounded in the fantasy world of games. They've built Discord's headquarters into a child's idea of what a workplace should be. There's a handful of arcade games lining the entrance and meeting rooms equipped with comfy recliners, antiquated televisions and gaming consoles, which could easily double as playrooms. Groups of couches offer seating for monthly game nights. Plushies, particularly Pokémon, decorate desks. "That's why Stan and I wake up every day and do this," Citron says. "Bringing people together around games is really the lightning rod we connect to." And who's to say fun and games can't turn into real profits? ✱

HOW TO PLAY IT BY JIM OBERWEIS

Tencent Holdings owns the largest online social media platform in China. WeChat and QQ, with 938 million and 861 million monthly active users, respectively, are the two most important platforms it operates there. And those users love games. Mobile and PC games contributed about 54% of Tencent's total revenue—it has about 45% market share in China's online game industry—in the first quarter of 2017. Tencent also provides online advertising to its users, which contributes about 15% of revenues. Growing revenues from gaming and online advertising are a great reason to own this Chinese juggernaut.

Jim Oberweis is president of Oberweis Asset Management.

ELEVATOR PITCH

BURJ KHALIFA
FLOORS: 163
SECONDS: 60
WORDS PER MINUTE: 130

Dubai's Burj Khalifa is the world's tallest building, but its elevators blitz you to the 124th-floor observatory in 60 seconds. So Israeli entrepreneur **Shimon Elkabetz** *must pitch ClimaCell—highly accurate weather software—in a hurry.*

"Forecasts affect people's safety and $3 trillion of the U.S. economy, yet there's been no major new way to observe the weather in 50 years. ClimaCell gives peace of mind by providing the highest degree of forecasting accuracy. ClimaCell's software can give details about the intensity and type of precipitation on one street versus another. It can also predict if it will rain on a specific plane, construction crane or baseball game with 90% accuracy. ClimaCell's core technology is based on using wireless communications networks as passive weather sensors, which outperform satellite and radar. ClimaCell's software is being used in the U.S. and will be deployed internationally this year to airlines, drone companies, logistics companies and pro sports leagues."

ELEVATOR PITCH BY SUSAN ADAMS. BUILDING ILLUSTRATION BY PETER HOEY FOR FORBES

FINAL THOUGHT

✱ *"On my business card, I am a corporate president. In my mind, I am a game developer. But in my heart, I am a gamer."* **—SATORU IWATA**

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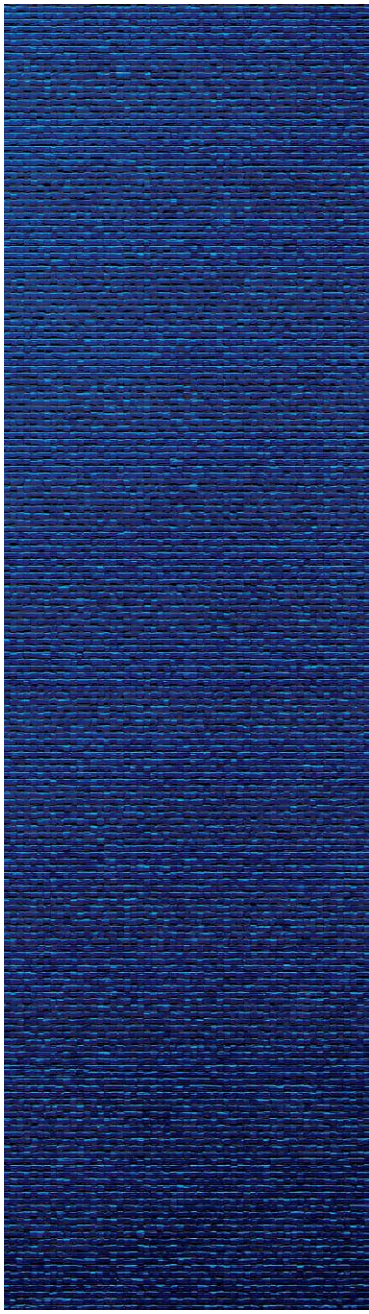


FRANCO VOGT FOR FORBES

ARTIFICIAL INTELLIGENCE

Battling Giants

Clarifai's image-recognition AI can go toe-to-toe with those of Google, IBM and Microsoft. Now the startup must fight to stay competitive.

BY AARON TILLEY

In the summer of 2013, as Matthew Zeiler was close to finishing a Ph.D. in artificial intelligence at New York University, he seemed to have every tech giant in the palm of his hand. Zeiler had left an internship with a Google AI group a few weeks earlier when he got a call from an unknown number while he was running along the Hudson River. It was Alan Eustace, then a senior vice president of engineering at Google, who had heard about Zeiler's AI chops. Eustace wanted Zeiler to join permanently. To entice him, Eustace told him he would make an offer that was among the highest Google had ever made to a new graduate, Zeiler recalls. Zeiler won't say how much he was offered, and Google declined to comment. But offers for top recruits with specific expertise can add up to several millions of dollars over four years, according to people with knowledge of the matter. Regardless, Google's offer kicked off a bidding war for Zeiler and his know-how in deep learning, the vaunted branch of AI that's driving major breakthroughs in computing.

Within days, Zeiler received a bigger offer from Microsoft, which Google promptly matched. Apple also wanted to chat, and when Zeiler flew out to Silicon Valley, Mark Zuckerberg personally sought to persuade him to join a new AI research group at Facebook. Zeiler respectfully turned them all down, deciding instead to start a company with an audacious goal: to compete with the giants that were courting him. "It was a crazy period," Zeiler remembers. "I had this low-risk opportunity of joining a tech giant versus doing my own startup." Zeiler says he knew that some of his algorithms worked better than Google's on certain AI problems. "I knew I had to follow my gut," he says.

Four years later, Zeiler's New York City-based startup, Clarifai, is widely seen as one of the most promising in the crowded, buzzy field of machine learning. Clarifai offers image- and video-recognition tools for developers that rival those from Google, Microsoft and others. Much as Stripe and Twilio make it easy for programmers to tap into payments and communications capabilities, Clarifai gives its customers access to cutting-edge AI techniques that would cost millions to replicate. Companies like Unilever, BuzzFeed, Ubisoft and Staples U.K., as well as makers of medical devices and drones, use Clarifai to automatically analyze millions of images and videos. One of the company's 100 or so customers, i-Nside, makes a smartphone accessory for imaging the inside of an eardrum and diagnosing ear diseases. Revenue, while still small, is expected to reach $10 million as early as next year, according to people close to the company.

That Clarifai has made it this far is, in and of itself, remarkable. In the past few years, AI—in particular a form of it called deep learning or deep neural networks—has emerged as the Next Big Thing in tech. Deep-learning techniques work loosely like the brain, with layers of "neurons" connected with "synapses." The techniques are leading to substantial breakthroughs in areas like image and speech recognition, which in turn are ushering in advances in everything from medicine to self-driving cars to robotics.

But there's a problem: Amid the scramble for talent, the richest companies in tech have consumed entire university departments and acquired just about every AI startup they could get their hands on. Google has been the hungriest, with at least 11 AI-related acquisitions, spend-

Small is beautiful: Clarifai is a guppy to whales like Google and Microsoft. CEO Matthew Zeiler insists that's a plus.

ing upwards of $1 billion for just two of those, DeepMind and api.ai. Nearly all the upstarts that competed with Clarifai have been bought: Amazon acquired Orbeus; Salesforce got MetaMind; IBM snapped up AlchemyAPI. When it comes to image recognition, Clarifai is perhaps the only one left that can compete with Amazon, Google, IBM and Microsoft, all of which offer AI image-recognition tools to their cloud-computing customers. Clarifai has already rebuffed several multimillion-dollar acquisition offers, according to an early employee. Zeiler says he is determined to keep the company independent.

Clarifai has none of the might or reach of its rivals, but Zeiler insists, convincingly, that playing Switzerland in a global AI war is a valuable asset. Many large companies that want to incorporate AI into their products are fearful of handing over their data to giants like Google and Amazon. Photobucket is a case in point. After assessing competing tools from Amazon, Google and IBM, the image- and video-hosting service became one of Clarifai's largest customers in terms of image volume. "Any time you're dealing with Google, you have to wonder if they're taking your data and training their own system,"

WHO CAN SEE BETTER?

Deep-learning systems typically identify an image by guessing the categories to which it might belong—and adding a measure of their confidence in the guesses. Here are some of what AI systems from Clarifai, Google, IBM and Microsoft saw in three images we selected. (Unlike the other three, Microsoft assigns a confidence percentage to the "caption" it writes for each image while also including a number of tags.)

	CLARIFAI	GOOGLE	IBM	MICROSOFT
Croissant	**BEST** CROISSANT 98% **SO-SO** BREAD 96% DOUGH 93% SUGAR 87% **SAY WHAT?** REFRESHMENT 83%	**BEST** CROISSANT 88% **SO-SO** BAKED GOODS 91% DANISH PASTRY 75% BREAD 60% **SAY WHAT?** PAIN AU CHOCOLAT 75%	**BEST** CRESCENT ROLL 99% **SO-SO** BUN 99% BREAD 99% FOOD PRODUCT 99% **SAY WHAT?** LIGHT-BROWN COLOR 100%	**BEST** PIECE OF BREAD 86% **SO-SO** DOUGHNUT BROWN EATING **SAY WHAT?** BANANA
Maine coon cat	**BEST** CAT 100% **SO-SO** CUTE 99% PUREBREED 96% FURRY 94% **SAY WHAT?** YOUNG 94%	**BEST** MAINE COON 86% **SO-SO** WHISKERS 88% FUR 79% TAIL 53% **SAY WHAT?** NORWEGIAN FOREST CAT 60%	**BEST** CAT 97% **SO-SO** FELINE 97% MAMMAL 97% DOMESTIC CAT 93% **SAY WHAT?** CARNIVORE 97%	**BEST** CAT LOOKING AT CAMERA 95% **SO-SO** MAMMAL SITTING GRAY **SAY WHAT?** LAYING
Bowling	**BEST** RECREATION 94% **SO-SO** FUN 97% GROUP TOGETHER 92% FRIENDSHIP 91% **SAY WHAT?** DANCING 94%	**BEST** TENPIN BOWLING 98% **SO-SO** LEISURE 83% FUN 82% BOWLER 72% **SAY WHAT?** PERFORMING ARTS 51%	**BEST** BOWLING TENPIN 75% **SO-SO** BOCCE BALL 59% BOWLING ALLEY 50% BOWLING BALL 54% **SAY WHAT?** SKATING 51%	**BEST** BALL **SO-SO** PERSON WOMAN STANDING **SAY WHAT?** GROUP OF PEOPLE RIDING ON BACK OF A WOMAN 20%

says Mike Knowles, senior infrastructure developer at Photobucket. With its Photos app, Google competes with Photobucket. Zeiler says many other potential customers are at risk of colliding with the ever-expanding ambitions of tech's biggest companies. "They open new divisions that compete with their customers," Zeiler says. "That's what we don't do."

At 30, Zeiler, who grew up in Beausejour, a small town in Canada some 40 miles northeast of Winnipeg, seems an unlikely challenger to tech's powerhouses. With slicked-back hair that he cuts only a couple of times a year, he retains the disheveled air of a college student.

But Zeiler's obsession with AI put him on a path to be mentored by some of the field's biggest luminaries. Oddly enough, his interest in the field started with a video of a flickering flame that he saw while an undergraduate at the University of Toronto. The video, shown to him by a grad student, looked startlingly real, yet it was generated by a computer using an AI technique. Zeiler had just learned the basics of computer programming but hadn't taken to it. The flame represented something different. No human had explicitly programmed it to move around in predetermined ways. Instead, a computer had been fed video data, deduced a pattern and generated the video on its own. "I was completely blown away," Zeiler says. "It was a whole new way to get computers to do what you wanted. I had to learn more."

Graham Taylor, the Ph.D. candidate who had shown him the video, brought Zeiler into a research lab that was run by Geoffrey Hinton, widely considered one of the godfathers of neural networks. Taylor liked the ambitious yet amiable Zeiler. "He was smart but wasn't a jerk," Taylor says. In Hinton's lab Zeiler worked on using AI techniques to track pigeons' mating rituals, resulting in his first paper, "Learning Pigeon Behaviour Using Binary Latent Variables." He graduated at the top of his class.

Zeiler then headed to NYU for a Ph.D., following Taylor, who was a postdoctoral student there. Taylor worked under Yann LeCun, another pioneer in deep learning, who now heads Facebook's AI efforts. Eventually, Zeiler did two internships at Google and worked for Jeff Dean, the head of

STUDIO BOX/GETTY IMAGES; MARTIN HARVEY/CORBIS/GETTY IMAGES; G-STOCKSTUDIO/GETTY IMAGES

LISTEN
TO INNOVATION,
ANSWER
THE EARTH
It can take up to 1,000 years for Mother Nature to make one inch of topsoil. Researchers are evolving digital tools that can help farmers measure, track and protect this vital resource 24/7. Learn how big ideas help us have a smaller impact at ModernAg.org
MODERN AGRICULTURE
Supported by MONSANTO

a then-new deep-learning research group called Google Brain. Hinton, who now works at Google and retains a position at the university, was part of that 20-person AI skunkworks. (Google Brain has since grown into one of the most high-profile and vital groups within Google.)

Zeiler founded Clarifai in November 2013 after his second internship, just as he was finishing his Ph.D. The company got off to an auspicious start. Zeiler tested his image-recognition algorithms in a highly regarded contest called ImageNet. The 2012 ImageNet had shaken the AI world when a team from Hinton's lab in Toronto, using deep-learning techniques, cracked a huge barrier in accuracy: Its error rate was 15%, far better than the 25% attained with earlier AI approaches. In 2013, Zeiler beat out the competition with an error rate of just 12%.

For the next few months, Zeiler worked alone, pushing the limits of his neural networks and rewriting the code to turn it into a commercially viable product. He installed four servers in his apartment to crawl the Web for images to train his algorithms. At one point, his apartment got so hot that he had to leave his windows open in the middle of winter. By April 2014, Zeiler hired a second employee, and the two moved the servers to a New Jersey data center, where Clarifai continues to expand. In October 2014, he made the service available to developers. His first customer was a wedding lifestyle website called Style Me Pretty, which uses Clarifai to identify and categorize thousands of user-uploaded pictures and serves ads based on what's in an image.

In 2015, Clarifai landed its first sizable investment: a $10 million round led by Union Square Ventures. The corporate coinvestors, who clearly understood the potential of what Zeiler was building, included Qualcomm, AI chip specialist Nvidia and, interestingly, Google's venture arm. The following year, in a round led by Menlo Ventures, Clarifai raised another $30 million, at a valuation of $120 million, according to PitchBook. "Tech giants are working on similar products, but they don't wake up every day living and dying on building the best image-recognition service," Menlo partner Matt Murphy says. Clarifai now has 55 employees, including 10 dedicated to digging through the latest AI research so the company can stay current. Last year, it hired a veteran sales executive from Google's enterprise unit as its chief customer officer.

A recent study by the consulting firm CapTech shows Clarifai remains competitive with, and in some cases outperforms, tech giants like Amazon, Google and Microsoft in image recognition. But finding and keeping AI talent to maintain that position—let alone expand into new areas like audio recognition and beyond—won't be easy. In February, Clarifai scored a longtime Google AI researcher, Andrea Frome, as its head of research, but she abruptly departed after only four months. Frome declined to speak about her departure, and Zeiler says it was the result of differing priorities. Access to data—lots of it—to "train" algorithms is also an area where Clarifai is likely to find itself at a permanent disadvantage compared to its much-larger rivals.

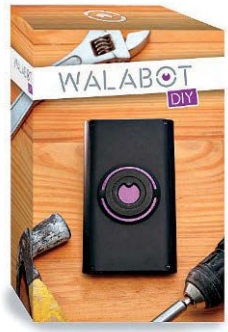
Clarifai's latest tool trains AI models on smartphones, not in the cloud, where most AI systems do the bulk of their computing. On a recent day, in a San Francisco hotel lobby, Zeiler pulls out his cracked iPhone 6. As he moves the camera, the phone identifies all the objects around it—chairs, a fireplace, people, cars, as well as a MacBook that Zeiler had just trained it to recognize. It's a tantalizing demonstration of the potential for deep learning as it moves into the most important device in people's lives. "We're only seeing the tip of the iceberg of what these systems will be able to do," Zeiler says. ✱

HOW TO PLAY IT BY JON MARKMAN

Artificial-intelligence investors would be foolish not to consider search giant **Alphabet.** The Silicon Valley stalwart is best known for advertising, but it's really a machine-learning company. Advertising just happens to be where it flexes its sensational AI muscle. When traditional Web advertising started to wane, it stepped up its algorithms and dominated mobile and programmatic media buying with AI software that automates and optimizes media placement. In the public cloud its open-source TensorFlow is the powerful AI platform behind the wizardry of Google Photos. AI is also central to its ambitions in self-driving cars and consumer electronics. It even has life-sciences businesses trying to control human aging and combat diseases. It is also buying small AI companies before they go public, building incubators and sucking up AI engineers from the elite schools. The stock is off its high and trading at just 32 times earnings.

Jon D. Markman is president of Markman Capital Insight.

PROTOTYPE



HEY, STUD

Brought home that coveted Basquiat but want to be sure it doesn't go crashing to the floor thanks to your all-thumbs home-project tomfoolery? **Walabot DIY ($199**; walabot.com/diy), a new Android-enabled pipe, stud and electrical-wire detector, is here to help. Your smartphone screen is the digital canvas on which it'll generate 3-D renderings of your wall interiors. Plug the slim device into your phone to harness its radio-frequency imaging sensor, which can "see" through cement and drywall and measure depth up to 4 inches. (An iPhone version is on the way.) The Walabot is so sensitive it can detect plastic pipes, leaks, termites and even the movement of rodents. Which is handy, as Sotheby's return policy probably doesn't cover mouse bites.

PROTOTYPE BY KATHLEEN CHAYKOWSKI

FINAL THOUGHT

✱ *"By far the greatest danger of artificial intelligence is that people conclude too early that they understand it."* —ELIEZER YUDKOWSKY

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The Unreformed Stock Picker

Bill Miller beat the market for 15 straight years before he was hammered by the financial crisis. Now the legendary investor is happily running money on his own terms—long on risk and big ideas.

BY ANTOINE GARA

DAVID YELLEN FOR FORBES

In the living room of his seven-room Park Avenue apartment, 67-year-old investing legend Bill Miller wears a slightly rumpled black golf shirt underneath a blue-and-gray checkered blazer from Dillard's. On walls painted burgundy and colonial blue hang oil paintings depicting 20th-century life, including Wall Street after the 1929 crash and drunks on the Bowery in the 1940s. Throughout the flat, heavy drapes, candles, plush couches and ornate chairs create a dark, frozen-in-time atmosphere.

It's all a bit surprising considering that Restoration Hardware, which peddles high-end modern furniture, is the largest holding in Miller's $1.5 billion Opportunity Trust—and a big reason the fund was up 20% for the first half of 2017, nearly twice the S&P 500's gain.

Truth is, Miller has never cared much about labels or current fashions. Beginning in 1991, his Legg Mason Capital Management Value Trust beat the S&P 500 for 15 years in a row partly because he defined "value" his own way. In addition to stocks with low price-to-earnings and price-to-book multiples, he bought those whose future cash flow he deemed undervalued based on his analysis of big technological and economic trends. After Amazon went public in 1997, Miller's fund eventually became the second-largest holder—second only to founder and CEO Jeff Bezos. When others fled tech stocks after the dot-com crash, he doubled down, scooping up a chunk of search upstart Google in its 2004 public offering.

As investors chased returns, Value Trust's assets grew to more than $70 billion, and Miller became the most famous active fund manager since Peter Lynch stepped away from the Fidelity Magellan fund in 1990. Yet heading into the 2007–08 financial crisis, Miller owned everything that would soon turn toxic: subprime mortgage lender Countrywide, now-defunct Lehman Brothers and Bear Stearns, bond insurers, home builders and even AIG. When conditions worsened, he once again doubled down, mistakenly believing (he now says) that the Federal Reserve could end the crisis quickly by injecting liquidity, when the real problem was asset values.

By the end of 2008, Value Trust had lost nearly two thirds of its value, wiping out most of Miller's outperformance over the previous two decades. It came roaring back in 2009 and 2010. But investors had already abandoned the fund, and Miller was by then the poster boy for the folly of paying active managers high fees to beat the market when hot hands inevitably cool and low-cost index funds allow you to capture the market's long-term gains.

Since then, the flight to index funds has accelerated, and Miller and Baltimore-based Legg

Old and bold: Bill Miller (*right*) remains an aggressive risk-taker. His son, Bill Miller IV, has a more cautious style.

Mason have parted ways. In 2012, he was replaced by understudy Sam Peters as manager of the Value Trust (now the Clearbridge Value Trust). This past February, Miller completed the buyout of a partnership he had formed with Legg Mason to manage the Opportunity Trust and a small income fund. His family-owned Miller Value Partners now runs the Opportunity Trust, a separate $120 million hedge fund and the $116 million Miller Income Fund, managed by his son, 36-year-old Bill Miller IV.

Miller is the biggest investor in all three funds and can do what he likes—thinking big thoughts and placing big and often contrarian bets—without worrying about marketing or bosses. "I was at Legg Mason for 35 years and ran the Value Trust for 30 years. This is better," he says. "Here it is much more about just growing the assets and not trying to get a constant inflow of new clients and doing pitches."

Still, outsiders ready to pay Miller's fees are welcome to come along for the possibly wild ride. Opportunity's most popular C class shares have a 1% load and annual expenses of 2.13%. The fund's 21% average return over the past five years ranks it in the top 2% of midcap equity funds, yet Morningstar gives it a neutral rating because of its extreme volatility.

While Miller makes his legal residence in state-income-tax-free Florida, his firm operates out of Baltimore with 15 employees. His 25th-floor office there overlooking Baltimore's Inner Harbor is a sort of stock-picking shrine. Against one wall is a replica

of the sound board used by CNBC's Jim Cramer on *Mad Money*, with 27 red levers that release sounds ranging from a crying baby to the "Ka-ching!" of a cash register. On another wall hangs a photograph of Silky Sullivan, a racehorse legendary for his come-from-behind wins—like the years during Miller's "streak" when his fund roared back from underperformance to close the year ahead of the market.

Miller's holdings reflect, as always, his intellectual breadth and appetite for both bargains and risk. Before joining Legg Mason in 1981, he spent three years as an Army intelligence officer. For a time, he pursued a Ph.D. in philosophy at Johns Hopkins. At Legg Mason he was the in-house professor, creating reading lists for analysts and leading weekend trips to New Mexico's Santa Fe Institute for sessions on everything from advances in computing to physics, biotechnology and economics. Longtime colleague Robert Hagstrom, now manager of the EquityCompass Global Leaders Portfolio, says Miller's curiosity served him well at the dawn of the PC and internet age, when traditional measures didn't capture the potential of companies like Dell, one of his best picks. "He was looking at the world differently than your traditional money manager."

Indeed, Miller still has a keen eye for change. In 2014, he put 1% of his net worth into Bitcoin, judging that the digital currency's potential for large-scale economic disruption *(see story, p. 62)* outweighed the risk of a total loss. He's up nearly tenfold, and Bitcoin is now a top holding of his hedge fund.

As for his Opportunity fund, its second-largest position is in Apple call options, purchased before the stock started rising this year, and it has a large Amazon stake. "Warren Buffett has said Jeff Bezos is the best businessperson he ever met but he missed Amazon [as an investment]. Well, he *hasn't* missed it," Miller says. He expects Amazon's market cap to rise five- or sixfold within a decade.

Then there's Miller the bargain hunter. Last year, with Restoration Hardware's profits and stock reeling from heavy discounting, Miller bought in at an average of $32 a share. Within months, CEO Gary Friedman unveiled turnaround plans and $1 billion in stock buybacks. Restoration now trades around $65.

Miller prides himself on making such calls ahead of other investors. "The amount of information I need to come to a conclusion tends to be a lot less," he says. His long-term bet on the consolidating airline industry (he owns Delta, United Continental and American) recently got a boost when Buffett disclosed an $8 billion-plus investment in airline stocks after criticizing these carriers as dead money for years. (At Berkshire Hathaway's 2013 shareholder meeting, Miller quizzed Buffett on why he wasn't in airlines.) Miller concedes he bought Valeant Pharmaceuticals "way too soon," building up a position in the 30s; it's now around $17. He still likes the concept—rolling up specialty pharma products without spending much on R&D—but worries about Valeant's debt.

Still, Miller makes no apologies for bold bets. "What I'm trying to do with the Opportunity fund and especially the hedge fund is look for things that can go up many times. I am not trying to make 20%." He argues that investors shell-shocked by the financial crisis are still "risk and volatility phobic" and have created a "safety bubble."

Miller's passion beyond his funds? Collecting rare books. Here, too, he mixes intellectualism and bargain hunting—his collection, built over two decades, costs what one masterpiece painting might, he says. He owns Shakespeare's first folio and first editions of everything from Herman Melville's *Moby-Dick* to Darwin's *On the Origin of Species* to Adam Smith's *The Wealth of Nations*. A few years back, Miller shelled out more than $1 million for Bob Dylan's lyrics to his 1960s classic "Blowin' in the Wind," handwritten on stationery from the Taft Hotel. Last October, Dylan became the first songwriter to win the Nobel Prize in Literature. Once again, Miller was ahead of the trend. ✱

HOW TO PLAY IT BILL MILLER IV

What becomes a legend most on Wall Street? Track records. Bill Miller IV, son of Legg Mason's former star fund manager, has big shoes to fill, but over the last 12 months his $116 million Miller Income Fund has logged a total return, net of fees, of 25%. But rather than buy into his high-expense mutual fund, consider his top holdings, which are mostly concentrated around billionaire private equity barons such as Leon Black, William Conway and David Rubenstein. Private equity stocks earn money from management and performance fees and pass profits to investors via dividends, as with real estate investment trusts. Their current yields of 6% to 8% are hard to resist. Miller's top PE holding, **Apollo Group**, recently got a boost when hedge fund Tiger Global bought 8% of the company. Other buys with stellar year-to-date returns include **Carlyle**, **Oaktree**, **Blackstone**, **KKR** and **Brookfield.** —*A.G.*

THE CONTRARIAN PICK

MILKING THE MALLS

Matthew Werner, portfolio manager of the West Loop Realty Fund ($98 million in assets), is using the retail selloff to bet big on mall REITs. After fees, West Loop returns 12.8% annually. His play:

CULLING THE WEAK
S&P 500 retail REITs are down 21% in the past year, but Werner says a retailer washout may boost mall earnings. "It's a great opportunity for shopping-center REITs to upgrade to better tenants."

HIGH-END DISCOUNTS
A spillover of retail torment into real estate will be felt in lower-tier malls, meaning "Class-A" mall REITs such as Simon Properties and GGP are unfairly penalized. Their recent one-year lows, Werner says, are "crazy."

MIRACLE ON 34TH STREET?
Closures of anchor stores (Macy's, JCPenney, Sears) affect Simon and GGP, but Werner spies profit: Big-box redevelopment "is one of the best uses of capital" in REITs. Stores like Macy's pay a fraction of in-mall tenants' rent—as low as $4 a square foot versus $80 inside.

CONTRARIAN PICK BY ANTOINE GARA; ILLUSTRATION BY THOMAS KUHLENBECK

FINAL THOUGHT

✱ *"I'm always making a comeback, but nobody ever tells me where I've been."*
—BILLIE HOLIDAY

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When I grow up,
I want
to be a chef!

Last year Sarah was too sick to dream.
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25 years of helping children reach for their dreams

now I have a chance ♡

Sarah

THE EMPEROR NEW COINS

WE'RE IN THE MIDDLE OF THE GREATEST BUBBLE OF THE DECADE: $100 BILLION WORTH OF CRYPTOCURRENCY WITH LITTLE INTRINSIC VALUE. A LONG-TERM SYSTEM WILL EMERGE—BUT NOT BEFORE A HANDFUL OF VISIONARIES, AND HUCKSTERS, TAKE BILLIONS FROM THE GREATER FOOLS.

BY LAURA SHIN

ETHAN PINES FOR FORBES

Olaf Carlson-Wee, the world's first cryptocurrency native.

On April 24, Martin Köppelmann, 31, Stefan George, 29, and Matt Liston, 25, placed their laptops on a long wooden dining table ringed by high-backed wooden chairs and three-armed candelabra at their Airbnb in Gibraltar. It was an old-fashioned setting for a 21st-century moment. The three were about to launch a Kickstarter-style crowdsale, based on a concept they'd been developing for two years: a user-driven prediction market based on a coming "Cambrian explosion of machine intelligence" called Gnosis.

Their goal: raise $12.5 million. But instead of dollars, they would accept money only in the form of a new cryptocurrency, Ether, that didn't exist two years ago. It was a new form of crowdfunding called an "initial coin offering," or ICO. Supporters would not receive a finished product down the road, as in a typical Kickstarter project. Instead, for every Ether (or fraction thereof) sent to Gnosis' wallet, the "smart contract" would automatically send back a different type of money, a GNO coin, that would give people special access to the platform plus act as equity in the network.

Theoretically, as Gnosis became more popular, demand for GNO coins (also known as tokens) would rise, boosting the shares of existing GNO token holders. The founders had designed their crowdfunding as a Dutch auction, which starts with a price ceiling rather than a floor. Within 11 minutes, Gnosis had raised the $12.5 million, led mostly by programmatic pooled "bidding rings," and sold only 4.2% of its allotted 10 million tokens. The final price, $29.85, gave their project—which had little more underlying it than a 49-page white paper and a few thousand lines of open-source computer code—a valuation of $300 million. In two months, GNO coins were trading at $335 each, and Gnosis was suddenly worth $3 billion, more than the market cap of Revlon, Box or Time Inc. Köppelmann's stake alone is, in theory, now worth about $1 billion. "It's problematic," admits Köppelmann, who stammers and sighs repeatedly, in seeming embarrassment. His best defense for the valuation: There's a lot out there that's far worse.

That's pretty much all you need to know about the great cryptocurrency bubble of 2017. The market capitalization for these virtual issues has surged 870% over the last 12 months, from $12 billion to over $100 billion. (This number is a moving target, though, since a 30% daily market plunge or gain isn't out of the ordinary.) That's more than six times the rise in stock market capitalization during the dot-com boom from 1995 to 2000. A lot of this total gain comes from Bitcoin, the original digital asset—created out of an artful blend of cryptography, cloud computing and game theory—which is up 260% in 2017 alone. The total value of Bitcoin now exceeds $40 billion, despite years of shady characters, fraud, theft and incompetence (including the Mt. Gox meltdown, which took almost $500 million with it) and despite the fact it has no intrinsic value—not even the promise of a central government or a precious metal mined from the ground.

But the second movers are growing much faster and doing something more interesting. Rather than a mere cur-

PETER AND MARIA HOEY FOR FORBES

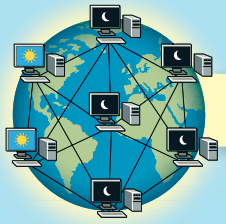
CASE STUDY: HOW COINS WORK

CGI ARTIST

A computer-graphics artist who bought Golem Network Tokens to rent computing power on Golem tells her computer to render an animation. Golem determines that the rendering can be completed by, say, five machines rendering for one hour each. (More likely, 100 for a minute each.) Each "idle" computer receives one GNT. All this happens automatically.

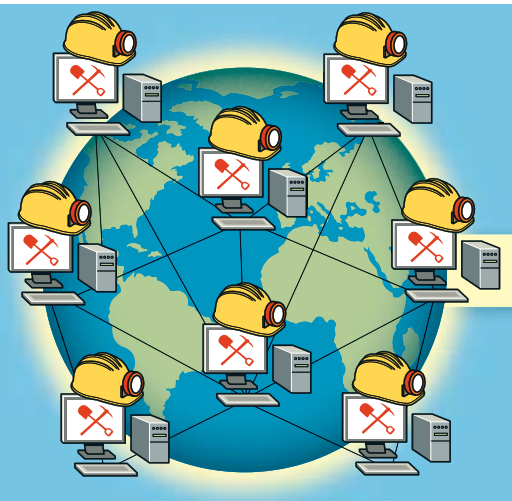
GOLEM WORLDWIDE SUPERCOMPUTER

The Golem Network, in its role as an Airbnb for computing-processing power, enables machines around the world to transact with each other. Computing power that would otherwise go to waste will soon be used by data scientists, companies training machine-learning algorithms and more. Golem had an ICO in November, and its tokens have already appreciated 4,425%.



ETHEREUM NETWORK

Computers supporting the Ethereum network, called miners, compete to solve a computationally intense math problem. The first to solve it wins the "block reward," which consists of newly minted coins (currently 5 ETH/block, or $1,350). The winning miner adds a new block of transactions to the ledger.



Why grovel to venture capitalists or deal with regulators of public markets when you can attach a token to your idea and have speculators throw money at it?

rency—which is largely used for speculation—these so-called "crypto-assets" intertwine businesses and tokens. The fuel here is something called Ethereum (whose currency is Ether). Like Bitcoin, it's based on blockchain technology, essentially a secure, decentralized, constantly updated ledger system. But while Bitcoin allows you to transact only in Bitcoin, the Ethereum network allows for software programs. In other words, Ethereum-based currencies can actually do things.

So suddenly anyone with a digital idea can launch a coin to go with it. There are now more than 900 different cryptocurrencies and crypto-assets on the market, with another launching pretty much every day. On June 12, Bancor, which plans to create a new reserve cryptocurrency, offered 50% of its total tokens and raised $153 million in under three hours, setting the record for an initial funding amount. The very next day, an entity called IOTA listed a token designed for Internet of Things micropayments and immediately fetched a value of $1.8 billion. A week after that, a messaging platform named Status launched its coin offering, raising $102 million.

In a gold rush, it's good to be selling the pans. Ethereum's value has skyrocketed more than 2,700% in the last 12 months, to $28 billion, or $300 per token. Of course, on the way there it has flash crashed to 10 cents and hit as high at $415. Bitcoin has been historically just as volatile, trading from $31 to $2 to $1,200 to $177 to its recent $2,500, as armies of day traders try to time something that has all the predictability of a roulette wheel.

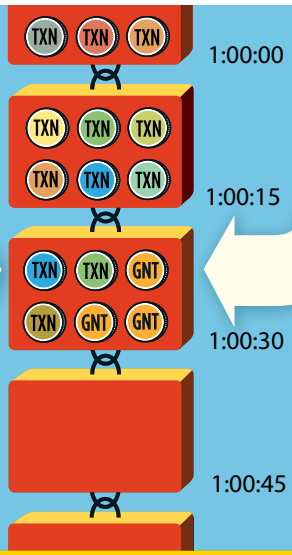
Of course, that hasn't stopped a slew of websites and Facebook groups from popping up, full of endless bragging of crypto-conquests, including token purchases financed with credit card debt. Or hucksters from trying to get people to put their retirement money in this stuff, via Ether and Bitcoin IRAs. Every new coin offering presents another chance to translate a flaky business into an absurd valuation.

GOLEM WORLDWIDE SUPERCOMPUTER NETWORK AIMS TO BECOME THE AIRBNB FOR COMPUTING, EMPLOYING IDLE PCS ALL OVER THE PLANET. HERE'S HOW CRYPTOCURRENCY PLAYS A ROLE.

Account	Balance
Computer 1 :	-5
Computer 2 :	+1
Computer 3:	+1
Computer 4:	+1
Computer 5:	+1
Computer 6:	+1

GOLEM NETWORK TOKEN'S SMART CONTRACT

GNTs aren't actually traded on the Golem Network itself. Ethereum makes it so easy to create tokens that the Golem Network (like many other networks) uses an Ethereum "smart contract" to trade GNT. The CGI artist's transactions are recorded onto the Ethereum blockchain, which updates the account balances of each computer that participated.



ETHEREUM BLOCKCHAIN

This time-stamped ledger contains the history of every Ethereum transaction since the network launched in late July 2015. New transactions are added in blocks roughly every 15 seconds. This single source of the truth is nearly impossible for anyone to tamper with, as the 32,000 computers around the world running the Ethereum software hold a copy of it. The CGI artist's GNT transactions are recorded here.

These pioneers have certainly unlocked a better way to raise money and create a network effect. Why grovel before Silicon Valley venture capitalists or deal with federal regulators in the public markets when you can attach a token to your idea and have speculators throw money at it and then bid it up? These initial coin offerings have raised more than $850 million, from Brave Software's lofty "Basic Attention Token" (which sucked in $36 million in 24 seconds, at a $180 million valuation, on the promise of using blockchain technology to fix digital advertising's deep problems) to the more basic Legends Room (a coin that gives users VIP privileges at a Las Vegas strip club).

If this all sounds familiar, it's because it is. The same dynamics—companies with more concept than concrete, day-trader speculators, wild volatility, Dutch auctions, instant fortunes created out of thin air—were ubiquitous in the first internet bubble. As was collapse: In 2000, $1.8 trillion in internet stock market value evaporated, and unless you think a prediction-market concept is instantly worth $3 billion, history will repeat. Ether is both a building block and the future description of what's going to happen to most of this "value."

Still, we're past the tulip stage. Yes, that first dot-com bubble was ridiculous, but it also gave us enduring companies like Amazon, Google and eBay. And, yes, scores of foolish day traders and IPO junkies got crushed, but lots of smart, early players got very, very rich. That history is repeating right now, too.

To best understand how cryptocurrency works, think about videogames. You have a virtual world, and within this realm, you can often earn virtual currency, which can then be redeemed for rewards within the game—extra armor, more lives, cooler clothes. It's the same here, except that it's rooted in blockchain technology and (theoretically) you can either convert the play money into the real thing or deploy it for actual goods and services inside the entity that spawned it.

Many ICO descriptions even read like byzantine videogame rule books. For example, owners of GNO tokens in the $3 billion prediction market Gnosis have the ability to earn a second kind of token, WIZ, valued at $1 each, to pay platform fees. Ingeniously, the coins are earned by voluntarily "locking in" tokens for periods up to a year, which conveniently props up Gnosis' overall price.

It's a common model. Since most of these platforms cap the number of tokens, increased usage jacks up the demand for them and should, in turn, boost the price. This network effect, in which a service becomes more valuable as more people use it, mirrors the incentives of Amway-style pyramid schemes. Imagine if Facebook had a token and by merely convincing a friend to join you would improve the network and your "token" net worth.

"We are crowdfunding a new decentralized digital economy," says Chris Burniske, who recently left New York City's ARK Investment Management, the first public fund manager to invest in Bit-

RETURN OF THE DAY TRADERS

At the end of the 20th century, there was no better indicator that the dot-com bubble was about to burst than the millions of everyday people—dentists, lawyers and bank tellers—armed with cheap PCs and internet connections who abandoned their day jobs to trade newly born internet stocks like Excite and Books-A-Million, based on the rantings in message-board posts.

Alan Aronoff: From $8,500 to $7.5 million in six months thanks to digital coins and a dose of OCD.

Token bubble traders have it even easier. Middlemen, regulators and tax reporting are easily avoided. Trading is 24 hours, including weekends. E-brokers have been replaced by "exchanges"—some 70 at last count—that offer "makers" and "takers" margin trading, pairs trading and derivatives, charging transaction fees that generally range from zero to 0.3%. One San Francisco exchange, Kraken, says it hired 100 customer-service people in May and June and has more hiring planned. "It's been really crazy," says founder Jesse Powell. "We've had about five times growth in terms of new signups this quarter versus last, and last quarter was already a pretty significant jump over the previous year."

No wonder. Newly minted coins are now being crowdfunded at a rate of about 20 per month, and never before has there been an initial-offering market that has risen so fast, with such volatility.

Ethereum, which has the status of Google or Apple in the crypto-world, trades on average 5% or more of its $30 billion float each day, compared to about 0.5% for Apple. Ethereum is up fortyfold year to date, and it's not unusual for it to move more than 10% in a day. There's good action even in the less popular coins. Rubycoin, for example, was hatched in 2014 and purports to be an untraceable savings-account coin that pays 5% interest. Like a Pink Sheet penny stock, it recently traded only $37,000 in a day, but gained 9%.

Virtually all of the exchanges offer leverage of up to 5-to-1. So if you bought $10,000 of an ICO like supercomputer-network coin Golem, which ran up 5,000% in its first seven months, you would have $2.5 million. Not enough? Leverage of up to 100-to-1 can be found.

Take the case of Alan Aronoff, a 47-year-old San Franciscan who has dabbled in the music business most of his life, playing in bands and, at one point, owning a private nightclub. In May 2016, Aronoff put $10,000 into Bitcoin—$8,000 of which came from a special 15-month zero-rate cash advance from

coin. Burniske classifies the emerging assets into three categories. First, cryptocurrencies like Bitcoin and untraceable digital cash like Monero and Zcash. Second, crypto-commodities, the putative building blocks of a decentralized digital infrastructure. Golem Network Tokens, for example, harness a network of computers that rent or lease computing power—so while you sleep, your computer could be used by an entrepreneur who needs to train her machine-learning algorithm, earning you coins in the process. An especially hot type of crypto-commodity: decentralized data-storage tokens, such as Filecoin, Sia or Storj, which compete with Amazon Simple Storage Service. The third category (and farthest off), crypto-tokens, promises to power consumer-facing, decentralized networks. Think Uber without Uber—a peer-to-peer network of riders and drivers (or driverless cars), earning and paying one another in the crypto-tokens needed to transact on that network.

The entities raising money in these coin offerings are not always startups. Sometimes they're merely developers collaborating on a project and don't form a legal entity. And even when the group is really a corporation, such as the messaging app Kik, which is launching the Kin token, the organizers will claim that the crowdsale is not actually offering a share in the company, conveniently sidestepping securities regulations.

And the people backing this technology aren't naïve idealists. Venture capital stalwart Tim Draper has backed two crypto-assets. Brendan Eich, of Basic Attention Token fame, previously created JavaScript and cofounded Mozilla. Tiger Management alum Dan Morehead founded Pantera Capital to specialize in these assets.

They're chasing firms like Blockchain Capital, founded by former child actor and video-game virtual-currency entrepreneur Brock Pierce. He went as far as to finance the firm's latest fund with its own crypto-coin offering, BCAP, ostensibly freeing its would-be limited partners from the usual regulations, including lock-ups. He raised $10 million in six hours in April. Pierce avoided regulatory scrutiny by limiting his coin crowdsale to 99 accredited investors in the U.S. and 901 investors overseas, where rules are more relaxed. Once it launched, though, anyone could buy in. And they did; the fund's valuation has spiked, to a recent $17.5 million.

"My phone has been ringing off the hook," Pierce says. "I have so many people coming to me saying, 'Can I do this in my industry?'"

Olaf Carlson-Wee is a 27-year-old son of Lutheran pastors. He can barely write computer code, has no formal training in financial analysis and has never managed money before. This, of course, qualifies him as the poster child for the cryptocurrency bubble of 2017. Carlson-Wee's Polychain Capital, based in San Francisco, has seen its assets swell from $4 million to $200 million in less than ten months, mostly because of a series of deft maneuvers based on his innate understanding of crypto-assets.

Ether is both a building block and the future description of what's going to happen to most of this "value."

For Carlson-Wee, it all started on a Minnesota lake during his summer vacation from Vassar College in 2011, as he stared at $20,000 in student-loan debt and $700 in savings in the bank. While his two older brothers have become poets, Carlson-Wee was obsessed with math, games and imaginary worlds from a young age. And after reading about the underground drug marketplace Silk Road and how it was enabled by Bitcoin, he conjured a world coursing with cryptocurrency and eventually sank in almost all of that $700 into Bitcoin, at prices as high as $16, only to see it drop to $2.

Undeterred, Carlson-Wee persuaded his sociology professors to accept a senior thesis on Bitcoin and graduated from Vassar with a degree in sociology. After a stint as a lumberjack living in a yurt on a commune in Washington State, he emailed his thesis to Coinbase, the cryptocurrency wallet and exchange, in 2012, and became its first employee,

his credit card. After the Bitcoin exchange he was using got hacked, Aronoff defected to Kraken with $8,500 in Bitcoin and began leveraging his positions. He bought Ether at $7 per coin in December 2016, as well as Golem and Gnosis in early 2017. He began watching the BTC/USD and ETH/USD markets 16 hours a day, sleeping as little as possible and barely leaving his house so that every time his gains hit certain thresholds, he could trade. "I'm kind of OCD," he says. Within six months, he turned his $8,500 into $7.5 million—a return of 88,000%.

Another new crypto-millionaire is Sean Ironstag, administrator of the Facebook group Advanced Crypto Asset Trading. The 37-year-old former forex trader likes to brag about his exploits: "I used to stand on rooftops and scream revolution-type shit and travel around the world," he says, mentioning his visits to Egypt and Syria during the Arab Spring. Ironstag trades more actively than Aronoff, having scored big wins in coins like Augur's REP, Game, Litecoin, Ripple and Dogecoin, an alternative currency based on a meme about a Shiba Inu dog. Ironstag netted 1,500% in Dogecoin and ultimately turned $15,000 into $3 million in less than two years. Thanks to a connection, he was recently invited to famed trader Michael Steinhardt's estate in Bedford, New York, where he took the opportunity to educate a group of Wall Street titans about the future of finance. "An entire, like, sector of, like, archaic finance knows now they're becoming irrelevant," Ironstag says. What's next for Ironstag? He's launching a hedge fund and a crypto boot camp that he says will be folded into a crypto holding company he plans, modeled after Berkshire Hathaway. *—L.S.*

charged with managing customer service. Carlson-Wee requested that his dollar-denominated salary of $50,000 be paid in Bitcoin, likely becoming the first person in the world to both earn and spend almost exclusively in cryptocurrency.

Customer service gave Carlson-Wee a front-row seat to the competencies of the fast-growing company. Eventually he helped automate many of Coinbase's routine customer-service responses and even created a sort of Bitcoin SAT, which he used to screen applicants for positions, eventually hiring eight, all of them paid in Bitcoin. He then got promoted to head of risk, lowering Coinbase's fraud rate by 75% via artificial-intelligence algorithms.

By last September, he had quit and launched his crypto-only Polychain Capital with $4 million in funding from investors like Jack Herrick, founder of Wikihow, and Garry Tan, a former Y Combinator partner. Since most venture capital and hedge funds are precluded from investing directly in highly speculative assets like cryptocurrencies, Carlson-Wee worked instead with the likes of Andreessen Horowitz, Union Square Ventures, Sequoia Capital, Founders Fund and Pantera Capital, as his three-plus years at Coinbase made him something of a sage in this space.

Accordingly, while the crypto-asset movement espouses a democratization of nearly every aspect of business, life and wealth accumulation, like the "friends-and-family" allocations of the dot-com bubble, most of Carlson-Wee's 13 investments to date have been made before the ICO, at a significant discount.

His investments include emerging industry-standard Ethereum and the decentralized supercomputer scheme Golem, as well as Augur, a prediction-market coin that Carlson-Wee prefers to Gnosis; 0x, a cryptocurrency exchange protocol that will allow for decentralized coin trading; and Tezos, an Ethereum competitor. "With Tezos, you can formally verify contracts whereby you essentially prove that the contract does what it's intended to do," says Carlson-Wee, looking out from more than 40 stories over the city, wearing a skull-emblazoned black T-shirt, track pants and a flat-brimmed rhinestone-adorned baseball cap.

He's taking a longer-term venture approach rather than wantonly trading coins, but in a market frenzy advanced knowledge and preferential treatment translate into extraordinary gains.

So where do we go from here? Carlson-Wee is one of the few who can articulate a vision. He believes that base-layer protocols and infrastructure such as data storage and computing-power services will be built first. "I could see a future where computers, instead of having their own internal memory, their own bandwidth, their own internet connection—and your own home computer, the CPU and GPU cycles on your device—all of that could be outsourced on a per-use payment basis using tokens," he says. "You could pay for every packet of internet you want, every cycle you want and every piece of storage you want in real time, instead of those things being on everyone's device

ARE CRYPTO RICHES TAX-FREE?

With billions being made in the crypto-bubble, Uncle Sam wants his cut. Getting his hands on it will be another matter.

In 2014, the IRS issued controversial guidance stating that U.S. taxpayers should treat digital currencies as capital assets, provided those currencies are convertible at some point into traditional cash. (In other words, play money in an online game doesn't count.) The upside of capital-asset treatment is that anyone who sells a digital position he's held for more than a year is taxed on his profit at the lower long-term capital gains rate—currently 0% to 20%. The downside is that traders who hold their positions for shorter periods are taxed on gains at ordinary federal income tax rates of up to 39.6%.

But an even bigger problem with the IRS' position is this: Anyone using digital coins to pay for some service online—say, buying data storage—would, it appears, have to treat each purchase as a capital sale. And if the value of the coin being spent has gone up since he acquired it, he'd have to report and pay tax on a gain. (By contrast, if you hold a conventional currency—say, euros or yen—and you happen to spend it after it has gained value against the dollar, the IRS doesn't consider that taxable income.)

Reporting on the taxpayer side isn't optional: Income is income, whether from trading stocks or Bitcoin or spending the latest token. The reality, however, is that there is no current requirement that cryptocurrency exchanges report transactions to the IRS the way brokers like Schwab must report stock sales on form 1099-B.

Is tax avoidance adding fuel to the current mania? Consider this: In 2016, only 802 individual tax returns out of the 132 million filed electronically with the IRS reported income related to cryptocurrencies.

The government wants more compliance. Last November, the Department of Justice filed suit in federal court seeking to issue a summons forcing Coinbase to turn over records on all U.S. customers who transferred convertible virtual currency between December 31, 2013, and December 31, 2015. The court sided with the IRS initially, but Coinbase—and Coinbase customers—have pushed back, delaying enforcement of the summons. Even if the IRS gets all those customers' names, however, it still has a big problem if it wants to tax all the crypto-gains: Much of the trading is done on overseas exchanges, and even more could migrate there. *—Kelly Phillips Erb*

CRYPTOS IN WONDERLAND

DOGECOIN (DOGE): In 2013, a Shiba Inu meme with broken-English captions went viral. Dogecoin, originally issued as a joke currency, has been a coin-market star. Today it has a $280 million market cap, and it has already sponsored Nasdaq race cars and water wells in Africa, plus sent the Jamaican bobsled team to the Winter Olympics.

MOONCOIN (MOON): Mooncoin sits on the new Mooncoin blockchain and aims to revolutionize investing. Forget researching companies and markets. You can "monetize your likes" by earning Mooncoins when others like them, too. Current market value: $21 million.

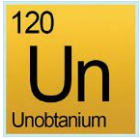
POTCOIN (POT): This cryptocurrency, built specifically for the cannabis community, is best known for sponsoring a trip by Dennis Rodham to North Korea. Current market value: $22 million.

LEGENDS ROOM (LGD): For 5,000 tokens, holders get a lifetime VIP membership to a Las Vegas strip club run by a team that includes mixed-martial-arts fighter Phil "New York Bad Ass" Baroni. All holders get a 20% discount (members get 50%) on drinks and services except gaming. Its fully diluted coin market cap exceeds $50 million.

TRUMPCOIN (TRUMP): This coin is meant to "support President Trump and his vision of making America great again." TrumpCoin Ambassadors are urged to post weekly articles on their Facebook page to earn coins. In January, before the inauguration, TrumpCoin peaked at 51 cents, or $3.38 million, in value but now trades for 6 cents, or $427,000.

INSANECOIN (INSN): Its website says, "Insane Coin is more than just a coin, it is a happening … a state of mind. You don't have to be insane to be part of our community, but it sure couldn't hurt." The coin's development road map includes establishing a voting system and opening an Insane Space storefront in England in 2018. Current market float of $2.5 million.

UNOBTANIUM (UNO): Only 250,000 coins will be mined over the next 300 years. So unobtanium coins are gunning to be the rarest crypto-token ever. "The platinum to Bitcoin's gold," says the website's video. Market value: $8.4 million.



PANDACOIN (PND): Who doesn't love panda bears? This cryptocurrency was marketed to crypto novices as easy to understand and use. It's basically an alternative bank account. If you hold Pandacoins in its PandaBank, you can earn 2.5% annual interest, but only when your computer is online and PandaBank is open. Market cap: $1.6 million.

SKINCOIN (SKIN): Want a rainbow-colored skin on the Glock-18 9-millimeter sidearm you use in Counter-Strike: Global Offensive? This cryptocurrency buys you more skins and allows you to trade and make bets with skins for videogame firearms. It began an ICO on June 21 and had raised $3.3 million in ether by June 30.

COINYE (COINYE): Originally called Coinye West, this cryptocurrency project was abandoned after a trademark-infringement lawsuit by Kanye West, whose image (in the form of a sunglasses-wearing fish) was its mascot.

and unused most of the time." In other words, cloud computing meets the sharing economy meets the Fed.

Maybe. But before that happens, a lot of folks get hurt. Technically speaking, at least in the U.S. these "equity" coins aren't securities so long as they are partly utilitarian and are not dependent on any particular party to succeed. It's sort of like taxi medallions or golf-club memberships. Some token developers have attempted to sidestep the issue of whether their coins are actually securities by basing operations in places that have low taxes and looser regulations, like Singapore, Gibraltar and Zug, Switzerland.

Unsurprisingly, insider trading and dirty deals are flagrant. One coin-offering creator told Metastable Capital's Naval Ravikant, the CEO and cofounder of AngelList: "If you agree to buy tokens at the ICO and support the price, then 30 days later, we'll secretly sell you any leftover tokens at a lower, pre-agreed price," recalls Ravikant. That's a felony on Wall Street. In the cryptocurrency Wild West? "These are the kinds of deals being cut left and right."

The SEC has said that it expects this industry to protect its investors, but given its Keystone Kop track record before and after the subprime meltdown, it's hard to see it effectively regulating a world of functional currency. "The scams are very subtle and very sophisticated unless you're willing to read the source code," Ravikant adds.

And even if regulators did read the code? "If my bank account [in the U.S.] gets shut down, I can't just open up a Russian bank account and start using my bank credit card to go about my day buying Starbucks," Carlson-Wee says. "But if my Bitcoin wallet provider gets shut down, I can shoot that bitcoin overseas so fast—literally in one minute—it's like, 'Okay, now that Bitcoin is in Russia, and now I'm going to participate in this crowdsale from the Russian exchange and store these tokens on a

Russian wallet. . . . So on a global scale, trying to regulate these things is like Whac-a-Mole." Ditto trying to collect taxes *(see box, p. 68)*.

So buckle up for more blowups, more Mt. Gox-type fiascoes and tens of billions in losses for the people who are gambling in an area where there is precious little to protect them. The smart money, meanwhile, should do fine, vulnerable only to its own hubris. "Everyone's like, token sales are complete madness right now," Carlson-Wee says. "I don't think we've seen anything relative to how big this could be." F

NOT SO TINY BUBBLES

THESE ARE THE TOP 25 OF THE 900+ CRYPTOCURRENCIES AND CRYPTO-ASSETS RANKED BY MARKET CAP. MANY ARE WORTH EVEN MORE IF YOU INCLUDE THE TOTAL SUPPLY OF COINS THEY HAVE AUTHORIZED.

Coin/Token	Market Cap[1]	YTD Return	
Bitcoin	**$40,520**	**260%**	*Since only 21 million will ever be produced, the original cryptocurrency is the best store of value but still very volatile.*
Ethereum	**$26,720**	**3,825%**	*A blockchain for "smart contracts" (programs that will execute contractual terms automatically), Ethereum launched the token craze.*
Ripple	**$9,980**	**4,210%**	*Its XRP coin has soared. Wants to disrupt the slow, opaque and pricey world of international wire transfers. It already has 75 bank partners.*
Litecoin	**$2,080**	**980%**	*Litecoin has long marketed itself as digital silver to Bitcoin's gold, in part because it's less energy-intensive, with faster block times.*
Ethereum Classic	**$1,720**	**1,395%**	*This coin is from the original Ethereum blockchain, which was upgraded after a $50 million hack.*
NEM	**$1,430**	**4,320%**	*A cryptocurrency that is popular in Japan, where banks are testing an enterprise version. Many Western crypto enthusiasts have little idea what it is.*
Dash	**$1,330**	**1,690%**	*Originally called darkcoin, with an emphasis on privacy, Dash touts itself as digital cash, but its average transaction size is more than $10,000.*
IOTA	**$1,120**	**–35%**	*Bitcoin and Ethereum may be too expensive and slow for Internet of Things micropayments. IOTA could someday be in demand by Fitbits everywhere.*
Monero	**$640**	**340%**	*Privacy coin that aims to be a base layer for other privacy apps, such as messaging. Accepted on Dark Web marketplace AlphaBay.*
BitShares	**$630**	**6,190%**	*One-stop supermarket for crypto financial services, founded by controversial crypto serial entrepreneur Dan Larimer.*
Stratis	**$620**	**8,705%**	*A blockchain-as-a-service geared toward Microsoft platform users and targeted at enterprise customers.*
Zcash	**$470**	**2,825%**	*This privacy coin has beaucoup buzz: AngelList's Naval Ravikant is on its board, and JPMorgan Chase is using its tech in its private blockchain.*
AntShares	**$440**	**6,135%**	*Early blockchain ICO that wants to be China's version of Ethereum. Its fully diluted coin value is nearly $1 billion.*
Golem	**$400**	**6,030%**	*Global marketplace for idle computer power could be a boon for CGI artists, AI developers, DNA scientists and many more.*
Steem	**$390**	**990%**	*Crypto-Reddit of sorts. Rewards users who post and up-vote popular content. Has a dubious founding team and poor token distribution.*
Siacoin	**$390**	**7,295%**	*Taking on Amazon S3 with decentralized file storage that's a tenth of the cost, faster and more reliable.*
Gnosis	**$360**	**415%**	*Prediction marketplace that could have applications in areas as wide-ranging as art auctions and insurance.*
Waves	**$350**	**1,410%**	*Insiders call it a cross between Ripple and a decentralized exchange. Fuels bubble trading by making it easy for members to create their own tradable tokens.*
BitConnect	**$350**	**42,910%**	*Cryptocurrency portal that aggressively solicits investments and promises suckers eye-popping returns as high as 120%.*
Iconomi	**$330**	**1,245%**	*Investment platform for cryptocurrencies. Its Digital Asset Arrays are basically crypto-ETFs. Two have already been launched, one for ICOs.*
Bytecoin	**$330**	**3,695%**	*Marketed as a private, untraceable cryptocurrency designed for enterprise clients by an anonymous team. Crypto insiders say steer clear.*
Augur	**$310**	**740%**	*Prediction market, founded by Joey Krug, who is now also head of Pantera Capital's new ICO fund. Striving to become a decentralized financial system.*
Dogecoin	**$280**	**1,180%**	*Shiba Inu-meme-inspired community born out of a joke. It epitomizes the financial resources that can be marshaled by networks.*
Lisk	**$270**	**1,870%**	*Decentralized blockchain version of Apple and Google app ecosystems. In 2016, it was integrated into Microsoft Azure's blockchain-as-a-service platform.*
Stellar Lumens	**$270**	**1,595%**	*Sister to Ripple's XRP, which is targeting its services—remittance, mobile money—at the unbanked. Founder had been associated with troubled Mt. Gox.*

[1]CURRENT PRICE TIMES "CIRCULATING SUPPLY," IN MILLIONS. *SOURCE: COINMARKETCAP AS OF JUNE 30, 2017.*

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CHRISTIAN PEACOCK

CLOUD'S NEW CAPITAL

TIM PANNELL FOR FORBES

LED BY THREE UNICORNS EYEING AN IPO, UTAH IS BECOMING AS WELL-KNOWN FOR ITS CLOUD AS FOR ITS MOUNTAINS.

BY ALEX KONRAD

Ryan Smith, CEO and cofounder of analytics firm Qualtrics, is helping make the Beehive State cloud nine for tech startups.

In a particularly decadent McMansion, complete with personal theater, tennis court and replica hobbit hole, in the appropriately named Alpine, Utah, a few miles north of Provo, the clock ticks past 1 a.m. Wide awake on a couch, Josh James, founder of the $2.3 billion business-analytics software company Domo, sits in the enormous kitchen, flanked by two of his unicorn rivals: Ryan Smith, cofounder of Qualtrics, and Aaron Skonnard, founder of Pluralsight. At least once a quarter, the trio put down their swords and meet for an all-night jam session designed to forge consensus out of the earshot of their employees and without missing weekend time with their combined 16 kids. This one is fueled by chocolate chip cookies and Monster energy drinks, caffeine-fueled bombs you wouldn't expect of three coffee-shunning Mormons. Then again, the topic at hand is how to attract more diversity to Utah—around Provo, Mormons make up 97% of the population—America's eighth-whitest state and the third worst when it comes to gender pay disparity.

"I'm sick of words and statements on this," Smith says as the others nod. "Let's settle on three or four things we agree on that we can actually do at our companies." The head of a local nonprofit organization for entrepreneurs takes notes as his three board members speak. Utah's governor, Gary Herbert, stopped by earlier, pledging infrastructure improvements and student work programs that can add to the talent pool. And now the group is reviewing the roster of speakers at a tech summit they're backing at the Salt Palace in Salt Lake City, an event coinciding with the more famous Sundance Film Festival, trying to make sure more VIPs don't look like them. Smith tells the others how Qualtrics ripped up its maternity-leave policy and started over with female employees in charge of it. Skonnard proposes that local tech companies release joint diversity reports. James wants to impose mandatory interviews for diversity hires in certain roles, in a startup version of the NFL's Rooney Rule.

At 2:15 a.m., the group releases their scribe, Clint Betts, and Skonnard departs for the hour drive north to Farmington, where Pluralsight is based. Smith and James linger to speak privately until after 6 o'clock. "I don't think our own employees know how much we talk," Skonnard says. "They'll interview for jobs and think we won't tell each other."

Silicon Valley, of course, is famous for its cutthroat culture, with the real estate bidding wars and the talent scrambles to match. From Boston to Austin, Seattle to Santa Monica, North Carolina's Research Triangle to New York City's Silicon Alley and other places in between, American regions have long aspired to build an alternative tech capital.

Now Utah is making its play. The state has a legacy of modest tech success: Novell and WordPerfect rose here in the 1980s; Overstock.com pulled off an IPO in 2002; and Ancestry.com dominates online genealogy. Adobe bought James' first company, Omniture, for $1.8 billion in 2009. If Silicon Valley knows how to make great engineers, Utah breeds salespeople. Hawking security systems or enterprise software isn't so hard when you've spent two years on a mission trying to convert strangers to a new religion, which is why—in addition to aggressive state tax breaks—tech giants like Microsoft and Oracle locate sales offices and call centers in Utah.

But that was before the advent of the cloud. That sales prowess, mixed with business-friendly policies, an educated workforce, low energy prices and a culture of deliberate growth, dovetails with a new tech era that requires huge server capacity and even larger contracts. The Beehive State hosts six companies—led by Qualtrics (No. 6), Domo (15) and Pluralsight (20)—on the Forbes Cloud 100, a list of the leading private tech companies in cloud computing, which today spans everything from infrastructure to business software to cybersecurity. Dozens of cloud-focused startups are incubating behind them. "We all have a chance to do something great," Smith says. "We know the enormity of what we are doing."

For decades, Utah County and its tech cluster in Provo was known (sometimes with irony) as "the Happy Valley." More than ten years ago, James opportunistically trademarked a new catchphrase, dubbing the 60-mile stretch from Farmington down to Provo "Silicon Slopes." After years of precocious marketing, Silicon Slopes is now for real.

IN BASKETBALL-CRAZED UTAH, Smith has a court in his basement, and he takes it farther at work: a hardwood half-court right inside the front door at Qualtrics' new headquarters, where he shoots three-pointers with executives and random junior staff to alleviate stress. The company provides software that measures customer satisfaction and employee engagement for clients. More than 100 people started at Qualtrics in late June, swelling its numbers to almost 800 at the headquarters and 1,500 worldwide, and sales growth has it on pace to do $250 million in revenue in 2017, up about 50% from last year. But Qualtrics is far from an overnight success. Smith started it 15 years ago. Pluralsight and InsideSales (No. 92 on the Cloud 100) are both 13 years old; Workfront (58) is 16, and Health Catalyst (64) is approaching a decade. Even Domo, as James' second company and the one built the most on Silicon Valley tactics, is 7—the average age of a startup exit.

Slow and steady growth, with a focus on profits over nascent market share, may seem old-fashioned, but with flame-

outs proliferating in Silicon Valley, that Utah bootstrapping culture has been attracting investments from the likes of Benchmark, Insight Venture Partners and Sequoia Capital—albeit usually after the companies are profitable and thus can negotiate with the VCs from strength.

That's how Qualtrics did it. Smith dropped out of BYU to work on it out of a basement with his father (a former professor at the university), his brother Jared and a college roommate, Stuart Orgill. The idea: Put surveys and questionnaires on the internet, allowing anyone to conduct market research. Qualtrics raised its first outside capital only in 2012: $70 million for a company used in universities across the world and that had already been profitable for a decade.

A herd of unicorns and a wrangler: Domo CEO Josh James, Qualtrics' Ryan Smith, Pluralsight CEO Aaron Skonnard and Silicon Slopes executive director Clint Betts.

TIM PANNELL FOR FORBES

Pluralsight first got started in software as a way for Skonnard to put online the corporate training classes that had been dragging him to Europe on dozens of round-trip flights for three years. Profitable since its four cofounders each put in $5,000 to get under way in 2004, the company shifted gears again in 2010 to focus on providing its technical proficiency training to corporations. Pluralsight went nine years before raising outside capital: $27.5 million from Insight and then $135 million from Iconiq Capital, Utah-based Sorenson Capital and others so it could make eight startup acquisitions and absorb their offices.

James didn't take venture capital for years at Omniture. When the company went public, it was still something of an oddity to Wall Street—less so when Adobe acquired it for $1.8 billion three years later in 2009. With his second go, for Domo, James raised money the Silicon Valley way: $690 million in seven years for a company that connects all of a customer's sources of data, up to 300 billion rows per client, to track the health of the business in real time. But that conservative business culture remains. While James drives sports cars and jets to Idaho for summer weekends, employees must remain austere. "Just because I've made it before, doesn't mean we have at Domo," James says on the way to shoot skeet with his contractor on a Saturday afternoon. "Utah's culture generates extremely ambitious entrepreneurs who tend to be quite frugal," says Bryan Schreier, a partner at Sequoia Capital who led its investment in Qualtrics. "I think there are more great companies per capita in Utah than anywhere else."

With 100,000 students in the Provo area, many paying just $4,000 a semester in tuition, prospective employees emerge from universities debt-free and sales-driven. At BYU, 65% of students go on a mission as part of their Mormon faith, many of whom learn a second language. Research by BYU Marriott School professor Jeff Dyer, MIT's Hal Gregersen and Harvard Business School's Clayton Christensen has found that people who live six months abroad are twice as likely to start a new product or company. At Qualtrics, where Jared Smith helped instill Google-style hiring processes and interview questions upon his return from a six-year stint, completion of a Mormon mission counts as "sales adversity training," which boosts a candidate's résumé—bonus points if the candidate went "somewhere hard." Until it raised $70 million from Sequoia and Accel Partners in 2012, Qualtrics was light on engineers but heavy on young salespeople willing to work relatively cheap. "That's how you make 100,000 cold calls in a quarter and don't get fazed," Jared says.

Collaboration helps. You won't find turf wars or ego-driven battles among Utah cloud companies. In June, Domo sent a delegation to Health Catalyst for four hours, and that's quite typical. Each niche within the same field is respected by the others. While James is rare in sitting on InsideSales' board of directors, the whole group maintain endless text threads and

THE REWRITERS: Andrea Tinianow, director of the Delaware Blockchain Initiative; **Ragnar Lifthrasir,** CEO of velox.RE and founder of the International Blockchain Real Estate Association

THE GREAT REWRITE

E Pluribus Unum And The Blockchain

BY LEONARD BRODY

As consumers, we live much of our lives digitally. As citizens, that's not always the case. When we interact with government agencies — in person, by mail, on the phone — we brace ourselves and anticipate delays or mistakes. The conveniences that online retailers have built — websites that remember who we are, what we did before, our preferences — may be uncommon experiences when we try to access government services. Most old-fashioned paper checks that are still written today are payments to and from governments.

The blockchain has the potential to change that.

"Today as citizens we expect to deal with government the way we deal with every other part of our life. Governments can use blockchain technology to move the needle," said Lorna Stark, national advisory industry leader for state and local government at KPMG.

In the simplest terms, a blockchain is a shared database that's distributed across a network of multiple sites or institutions. More specifically it's a distributed ledger, a shared but secure way to record transactions and ownership of assets. That may not sound revolutionary, but consider how the World Wide Web standardized the way documents are linked and easily accessed on computers anywhere in the world. That wasn't possible before, and only a few visionaries imagined the vast transformations that linking files on disparate computers would bring. Blockchains could create a secure, universal record of who owns what, and the possibilities, similarly, are boundless.

Governments around the world have begun to experiment with blockchain technology projects to rewrite the way they manage information and serve constituents. The implications are big and small.

"Just think if you could put all of your required information into one government portal, into the blockchain," Stark said. "Your name, your address, all that pertinent information. And then you don't

have to re-enter it 10 times to get your driver's license, to get your CPA license, to record your title transaction, to pay your taxes. Imagine that world where you only have to give the government your information one time."

Ironically, blockchain technology was devised as a way to avoid central governments. The anonymous inventors of the digital cryptocurrency bitcoin created the methodology as a way for the community at large to maintain an agreed-upon, immutable record of who owns how much, without having to entrust record-keeping to a single authority such as a government central bank. All participants in a blockchain network can access identical copies of the ledger, and updates happen almost instantly. Digital "keys" and signatures cryptographically control who can update and view records. The assets tracked in the shared ledger can be physical or electronic, and they can be "smart" — containing computer code that can self-execute new transactions when set triggers are reached (for example, a bond that disperses its own coupon payments).

The State of Delaware embraced blockchain in 2016 when then-Governor Jack Markell launched the Delaware Blockchain Initiative. The state has unique record-keeping requirements, but its efforts merit attention. "The more we learned about it, the more we thought there's something here for the state," said Andrea Tinianow, director of the Delaware Blockchain Initiative.

Delaware's interest began as a way to bolster the business it does in company incorporations. Thousands of businesses, including about two-thirds of Fortune 500 firms and more than 80 percent of American IPOs, are incorporated in Delaware. A requirement is that companies tell Delaware how many shares they have has issued and then track who owns them. Some corporations have expressed interest in using blockchain for that, in part to avoid record-keeping errors. The number of shares a company has issued often doesn't match the number it has registered with the state, and when a material event such as an acquisition occurs, there can be disputes. Record-keeping using a blockchain — a single "golden record" — could eliminate inaccuracy. Delaware is amending its laws to make it crystal clear that it is legal for a company to issue and track its shares on the blockchain.

At the same time, Delaware is testing blockchain internally to organize the Delaware Public Archives, which contain everything from historic photos to mountains of public records. Older documents are being digitized. Databases and spreadsheets from disparate divisions are being migrated to a new distributed ledger. "Smart records" would automate compliance with state laws that dictate retention and destruction of documents. Ultimately the system will make it easier for agencies statewide to submit documents to the archive and residents to find information.

Records in the blockchain can be any asset, including physical property. California company velox.RE, along with the International Blockchain Real Estate Association, has been working with the government of Cook County, Illinois, to create a legal blockchain version of a property deed. That could someday replace paper deeds and create a universally acknowledged, "golden record" of who owns what property. It would eliminate the need for things like title insurance. For governments that register land transfers, blockchain property records could minimize fraud committed with counterfeit deeds. "With blockchain, you can't Photoshop a fake deed," notes Ragnar Lifthrasir, CEO of velox.RE and founder of the association.

Elsewhere in the world, the United Kingdom's national land registry said it will test a blockchain-based program that "would enable the ownership of property to be changed close to instantaneously." In Singapore, the central bank has completed a trial of distributed ledger technology for interbank payments, creating a digital representation of the Singapore dollar.

One model for where things may be headed is the little nation of Estonia, which became newly independent in 1991 and built its new government to leverage digital technologies. The Estonia ID card, a digital identity card pegged to a blockchain-like infrastructure, gives citizens access to a broad range of public services, acting as a driver's license, passport, credit card, transportation pass and more.

> *"Today as citizens we expect to deal with government the way we deal with every other part of our life. Governments can use blockchain technology to move the needle."*
>
> LORNA STARK, NATIONAL ADVISORY INDUSTRY LEADER—STATE AND LOCAL GOVERNMENT, KPMG

None of these government projects are without challenges. Culturally, agencies that aren't accustomed to sharing data easily may need to discover openness. Migrating legacy data to distributed ledger systems can be costly. Citizens will have privacy and security concerns.

But governments were early adopters of computer technology, and the potential is there.

"In the '50s we had the advent of the supercomputers and in the '90s the explosion of the internet," said KPMG's Stark. "And now, government could harness the potential of blockchain to leapfrog in the public's perceptions of efficiency, transparency and trust."

KPMG ***Voice:*** Read more of The Great Rewrite series at **forbes.com/TheGreatRewrite**

even vacation together. "I'm a businessman, but we trust each other," says Skonnard at Pluralsight. "There's a shared vision for Utah that unifies us."

UTAH'S CLOUD-BASED SURGE remains contingent on one thing: more outside talent. Which is why, ostensibly, Smith and James find themselves at Oakland's Oracle Arena, at the clinching Game 5 of the NBA Finals. Yes, they love hoops. But they love recruiting more, especially from the Bay Area, including shelling out $10,000 per seat for the hottest ticket of the year in a region smitten with the Golden State Warriors. After spending the day interviewing candidates in San Francisco, Smith works the crowd, all the way down to courtside, like a seasoned politician.

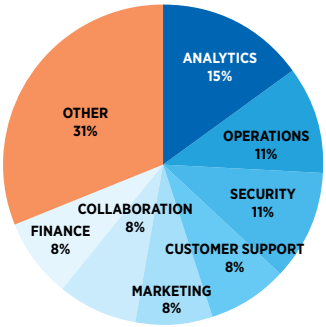
James is here to treat his new chief marketing officer and to woo the business-operations executive at a direct competitor he's spent weeks trying to recruit. "We've talked on the phone a few times, but this is the first time we're meeting face-to-face," says the veteran software executive. It's certainly a memorable one: The executive got to be a hero by bringing his son as well, and they sat one row behind LeBron James and the Cavaliers' bench. "It's an offer you can't refuse."

Like the companies themselves, the pitch often comes down to lower costs: a flat 5% state tax and a cost of living in Provo that's 30% less than Seattle's and 41% less than Boston's—and half that of the Bay Area, despite the fact that salaries are only 27% smaller, on average. The Utah cloud companies have opportunistically brought back BYU graduates who had left the state, such as new Qualtrics chief operating officer Zig Serafin, who had spent 17 years at Microsoft as head of what became Skype for Business and as president of its TellMe unit, and Pluralsight's new CFO, James Budge, who plans to move his family from California next year.

And these companies have shown the flexibility to attract others from out of state, as Qualtrics alone has relocated 160 people to Utah so far this year. Want upside? Pluralsight's Skon-

Pieces of the Cloud

TOP SPECIALTIES OF CLOUD 100 COMPANIES. OTHER IMPORTANT SEGMENTS INCLUDE HEALTH CARE, COMMUNICATIONS AND SOFTWARE DEVELOPMENT.



The Graduates

IN THE PAST 12 MONTHS, TEN COMPANIES FROM OUR 2016 CLOUD 100 LIST ARE NO LONGER ELIGIBLE FOR INCLUSION BECAUSE THEY WENT PUBLIC OR WERE SOLD.

COMPANY (2016 Rank)	TRANSACTION	MARKET CAP/ SALES PRICE ($ billion)
AppDynamics (9)	Sale (Jan. 2017[1])	$3.7
MuleSoft (20)	IPO (March 2017)	3.2
Okta (15)	IPO (April 2017)	2.2
Cloudera (5)	IPO (April 2017)	2.1
BlackLine (34)	IPO (Oct. 2016)	1.8
Coupa (17)	IPO (Oct. 2016)	1.5
Alteryx (24)	IPO (March 2017)	1.1
ServiceMax (44)	Sale (Nov. 2016[1])	0.9
Apptio (16)	IPO (Sept. 2016)	0.7
Veracode (64)	Sale (March 2017[1])	0.6

ALL VALUES AS OF CLOSE, 6/30/17. [1]DATE ANNOUNCED.
SOURCE: NASDAQ.

Trail Map

AN ENTREPRENEURIAL GUIDE TO UTAH'S SILICON SLOPES.

CLOUD 100 COMPANIES
1 Qualtrics, *Experience management*
2 Domo, *Business management*
3 Pluralsight, *Tech-learning platform*
4 Health Catalyst, *Health care analytics*
5 Workfront, *Work management*
6 InsideSales, *Sales acceleration*

BIG TECH COMPANIES
7 Overstock.com, *Internet retailer*
8 Ancestry.com, *Online genealogy*
9 Microsoft, *Business software*
10 Adobe, *Business software*
11 Oracle, *Databases and software*

STARTUPS
12 Teem, *Workplace analytics*
13 Bamboo HR, *HR software for SMBs*
14 Chatbooks, *Photo book subscriptions*
15 Lucid Software, *Visualizations and design tools*

NONPROFITS + EVENTS
16 Silicon Slopes, *Nonprofit for Utah's tech scene*
17 Silicon Slopes Tech Summit, *Annual event to promote Utah tech*

INVESTMENT FIRMS
18 Sorenson Capital, *Growth firm and VC fund*
19 Kickstart Seed Fund, *Seed-stage VC firm*
20 University Growth Fund, *Student-managed VC fund*

ANGEL INVESTORS
21 Jason Portnoy (Oakhouse Partners)
22 Mike Levinthal (Levinthal Capital)

UNIVERSITIES
23 Brigham Young University
24 University of Utah
25 Utah Valley University

THE CLOUD 100

The definitive ranking of the hottest private companies in tech's hottest sector. Compiled with the help of Bessemer Venture Partners and 25 public cloud-company CEOs, these standouts feature industry-beating metrics, including revenue growth, market share and valuation. For the complete methodology and expanded company profiles, go to www.forbes.com/cloud100.

1 Stripe
San Francisco, CA
Patrick Collison
EMPLOYEES: 750
FUNDING RAISED: $450 MIL
ONLINE PAYMENTS

2 Dropbox
San Francisco, CA
Drew Houston
EMPLOYEES: 1,500+
FUNDING RAISED: $600 MIL
COLLABORATION AND STORAGE

3 Slack
San Francisco, CA
Stewart Butterfield
EMPLOYEES: 800+
FUNDING RAISED: $540 MIL
MESSAGING PLATFORM

4 DocuSign
San Francisco, CA
Dan Springer
EMPLOYEES: 2,030
FUNDING RAISED: $525 MIL
DIGITAL TRANSACTIONS

5 Adyen
Amsterdam, The Netherlands
Pieter van der Does
EMPLOYEES: 600
FUNDING RAISED: $266 MIL
ONLINE PAYMENTS

6 Qualtrics
Provo, UT
Ryan Smith
EMPLOYEES: 1,443
FUNDING RAISED: $400 MIL
EXPERIENCE MANAGEMENT

7 Medallia
San Mateo, CA
Borge Hald
EMPLOYEES: 1,000+
FUNDING RAISED: $255 MIL
EXPERIENCE MANAGEMENT

8 Tanium
Emeryville, CA
Orion Hindawi
EMPLOYEES: 500+
FUNDING RAISED: $407 MIL
SECURITY AND IT OPS

9 MailChimp
Atlanta, GA
Ben Chestnut
EMPLOYEES: 600+
FUNDING RAISED: $0
MARKETING AUTOMATION

10 Squarespace
New York, NY
Anthony Casalena
EMPLOYEES: 660
FUNDING RAISED: $78.5 MIL
WEBSITE PUBLISHING

11 Cloudflare
San Francisco, CA
Matthew Prince
EMPLOYEES: 467
FUNDING RAISED: $182 MIL
INTERNET PERFORMANCE AND SECURITY

12 SurveyMonkey
San Mateo, CA
Zander Lurie
EMPLOYEES: 673
FUNDING RAISED: $1.5 BIL
ONLINE SURVEYS

ALL ESTIMATES COURTESY OF PITCHBOOK.

ADYEN

Paymeester

PIETER VAN DER DOES, COFOUNDER, CEO

At some point in the recent past, Pieter van der Does stopped caring that name recognition for Adyen, his 11-year-old Amsterdam-based company, is essentially zilch. "We [have taken] it on as a badge of honor: Adyen, the unknown unicorn," he says.

Unknown, perhaps, but quietly widespread nonetheless. Adyen acts as a middleman with its payment-processing platform, used by virtually all of the internet giants, including Facebook, Uber, Netflix and Spotify. It processed $90 billion in transactions last year and booked $727 million in revenue, almost doubling sales in a year.

While its clients in the past might've needed several different services to handle payments, Adyen completes the entire process itself, streamlining it and improving conversion rates. And unlike other startups that began with a small focus and then suffered growing pains as their scope widened, Van der Does envisioned Adyen as a global firm from the start and has partnered with virtually all the major credit companies, like Visa and MasterCard. "The Dutch market isn't very big, so we looked at other markets from day one and adapted to meet their needs." *—A.K.*

PORTRAIT ILLUSTRATIONS BY JAMES STEINBERG FOR FORBES

nard got Budge, the CFO of Anaplan, to jump by paying him entirely in stock (and $1 in salary). Internal chatter at Amazon Web Services about their hottest customers helped Domo hire its chief strategy officer, who became intrigued by the startup's prospects after noticing it spending more and more with AWS.

And Utah has developed an efficient commuter rail system that connects Provo to more cosmopolitan areas of the state. As recently as a year ago, Qualtrics operated one shuttle from its campus to the train station; the company has increased that to five as young relocated employees like Jesus Perez, an account executive and Penn graduate, opt to live in high-rises in Salt Lake City—which has a gay mayor and reportedly non-Mormon majority. Heather Zynczak, Pluralsight's CMO, says she loves the size of her house in Park City, the ski resort town where non-Mormon tech executives bump into each other getting coffee or dropping their kids off at the lifts. Milind Kopikare, a Qualtrics product manager, chose Draper, a suburban town with a burgeoning Indian-American population. "There's a big Indian temple there," he says. His neighbors work in nearby tech centers for American Express and Goldman Sachs.

Expanding offices in Europe, Seattle and cities such as Chicago allow the Utah companies to increasingly hire executives

13 Zscaler
San Jose, CA
Jay Chaudhry
EMPLOYEES: 800
FUNDING RAISED: $140 MIL
SECURITY AND COMPLIANCE

14 Sprinklr
New York, NY
Ragy Thomas
EMPLOYEES: 1,400
FUNDING RAISED: $228.5 MIL
SOCIAL MEDIA MANAGEMENT

15 Domo
American Fork, UT
Josh James
EMPLOYEES: 824
FUNDING RAISED: $690 MIL
BUSINESS MANAGEMENT

16 Procore
Carpinteria, CA
Tooey Courtemanche
EMPLOYEES: 949
FUNDING RAISED: $140 MIL
CONSTRUCTION MANAGEMENT

17 Cylance
Irvine, CA
Stuart McClure
EMPLOYEES: 803
FUNDING RAISED: $177 MIL
ENDPOINT SECURITY

18 Zoom
San Jose, CA
Eric S. Yuan
EMPLOYEES: 600
FUNDING RAISED: $145.5 MIL
VIDEO COMMUNICATIONS

19 C3 IoT
Redwood City, CA
Thomas M. Siebel
EMPLOYEES: 150
FUNDING RAISED: $200 MIL
INDUSTRIAL IOT AND AI

20 Pluralsight
Farmington, UT
Aaron Skonnard
EMPLOYEES: 640
FUNDING RAISED: $197 MIL
TECHNOLOGY-LEARNING PLATFORM

21 Avalara
Seattle, WA
Scott McFarlane
EMPLOYEES: 1,292
FUNDING RAISED: $300 MIL
TAX-COMPLIANCE AUTOMATION

22 Uptake
Chicago, IL
Brad Keywell
EMPLOYEES: 800
FUNDING RAISED: $146 MIL
DATA ANALYTICS

23 Intercom
San Francisco, CA
Eoghan McCabe
EMPLOYEES: 300
FUNDING RAISED: $116 MIL
CUSTOMER-MESSAGING PLATFORM

24 Anaplan
San Francisco, CA
Frank Calderoni
EMPLOYEES: 620
FUNDING RAISED: $239.9 MIL
PLANNING PLATFORM

25 AppNexus
New York, NY
Brian O'Kelley
EMPLOYEES: 1,000
FUNDING RAISED: $281 MIL
DIGITAL-ADVERTISING TECH

26 Yardi
Santa Barbara, CA
Anant Yardi
EMPLOYEES: 5,322
FUNDING RAISED: $0
REAL ESTATE SOFTWARE

27 Veeam
Baar, Switzerland
Andrei Baranov and Peter McKay
EMPLOYEES: 2,600
FUNDING RAISED: $0
ENTERPRISE-AVAILABILITY SOLUTIONS

UPTAKE

Big Industry's Brain

BRAD KEYWELL, COFOUNDER, CEO

With every industry becoming more digitally connected, how do they dig out from that data avalanche? That's where Uptake comes in. It creates software and algorithms to handle all that data for massive businesses like Caterpillar and Berkshire Hathaway. It's also widely used in the rail industry, where "customers are saving fuel and helping the environment" with Uptake's simplified data stream, says CEO Brad Keywell, who founded the Chicago-based firm with fellow Groupon cofounder Eric Lefkofsky. In three years, Uptake has attained a $2 billion valuation, while clients now deploy its software to produce 4 million predictions each week. *—S.M.*

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who work remotely or commute. Pluralsight's head of sales lives in New York. Domo's CFO and chief strategist and several other senior hires commute to headquarters two or three days a week from out of state. And InsideSales' chief revenue officer, Lindsey Armstrong, helps keep the company moving from London. "I travel all the time, but not necessarily to Provo," Armstrong says. "I like to maintain that at almost any given time someone is pissed off at me for being in the wrong location."

THE COLLABORATION BETWEEN Utah's cloud founders extends past their regular all-nighters. When Goldman Sachs recently hosted Smith at a golf outing at the famed Shinnecock Hills course in the Hamptons with other tech executives, he noted how rare it was that he would do something like that without Skonnard, James or both. "The banks will ask for the 'Utah guys,'" Smith says, "because they know then we're more likely to go."

The "Utah guys" are all likely to go public soon, though "soon" is a relative word for companies whose life spans far exceed the typical startup story. Smith says he left money on the table when Qualtrics reached a $2.7 billion valuation in April (it was widely reported as $2.5 billion, which suited him just

28 GitHub
San Francisco, CA
Chris Wanstrath
EMPLOYEES: 650
FUNDING RAISED: $350 MIL
ONLINE CODE REPOSITORY

29 SendGrid
Denver, CO
Sameer Dholakia
EMPLOYEES: 400
FUNDING RAISED: $81 MIL
EMAIL MARKETING

30 CrowdStrike
Sunnyvale, CA
George Kurtz
EMPLOYEES: 651
FUNDING RAISED: $256 MIL
ENDPOINT SECURITY

31 ForeScout
San Jose, CA
Michael DeCesare
EMPLOYEES: 800+
FUNDING RAISED: $158.3 MIL
IOT SECURITY

32 AppDirect
San Francisco, CA
Nicolas Desmarais and Daniel Saks
EMPLOYEES: 700
FUNDING RAISED: $245 MIL
SERVICE COMMERCE

33 SMS Assist
Chicago, IL
Taylor Rhodes
EMPLOYEES: 873
FUNDING RAISED: $265 MIL
MULTISITE PROPERTY MANAGEMENT

34 Eventbrite
San Francisco, CA
Julia Hartz
EMPLOYEES: 600+
FUNDING RAISED: $200 MIL
EVENT-TECHNOLOGY PLATFORM

35 Zuora
San Mateo, CA
Tien Tzuo
EMPLOYEES: 800+
FUNDING RAISED: $242 MIL
SUBSCRIPTION MANAGEMENT

36 Rubrik
Palo Alto, CA
Bipul Sinha
EMPLOYEES: 424
FUNDING RAISED: $292 MIL
DATA MANAGEMENT

37 Datadog
New York, NY
Olivier Pomel
EMPLOYEES: 400
FUNDING RAISED: $147.9 MIL
CLOUD MONITORING

38 Apttus
San Mateo, CA
Kirk Krappe
EMPLOYEES: 1,200+
FUNDING RAISED: $274 MIL
QUOTE-TO-CASH SOFTWARE

39 Fuze
Boston, MA
Colin Doherty
EMPLOYEES: 700
FUNDING RAISED: $334 MIL
ENTERPRISE COMMUNICATIONS

CROWDSTRIKE

Hacker Beware

GEORGE KURTZ, COFOUNDER, CEO

When the Democratic National Committee suspected it had suffered a cyberattack last year, it turned to George Kurtz to figure out what went wrong. Kurtz and his firm, CrowdStrike, examined the DNC's networks and discovered that the organization had fallen victim to hackers affiliated with the Russian government.

"The mission we're really focused on is fighting the bad guys and protecting our customers," says Kurtz. "Being able to identify a foreign adversary in those systems using our technology is a testament to what we built."

Kurtz and cofounders Dmitri Alperovitch and Gregg Marston couldn't have hoped for better advertising than the public attention around CrowdStrike's role investigating the DNC hack. Based in Sunnyvale, California, CrowdStrike has seen subscriptions to its antihacker software shoot up 476% in a year while its number of million-dollar contracts quintupled. Its software uses AI to spot anomalies and determine the best plan of defense. It makes those decisions by drawing from a deep library: Its database records and analyzes over 40 billion events each day. *—S.M.*

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Accelerating next

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fine). Easy enough: With roughly 20% percent of the company, Smith is worth more than $500 million. Qualtrics' current focus is to build on top of its survey tools, helping businesses track the happiness of customers and employees through a range of channels it hangs under the umbrella term "experience management." Pluralsight's Skonnard says he could be the closest to an IPO. Skonnard owns roughly 20% of the company, a stake likely worth $200 million, while controlling the voting rights for 60%. A month ago, he loosened his grip somewhat, sharing equity with employees for the first time, based on their length of service. A new focus on enterprise customers in the past year has put Pluralsight inside 40% of the nation's 500 biggest companies, some of which now pay for thousands of seats, while the head count has doubled in two years to 640. "We're moving quickly in this phase," he says after an all-hands meeting in June.

The road to a public offering, of course, is never a sure thing. Domo's valuation stayed roughly flat at $2.3 billion during its last funding from BlackRock in April, as the market got tougher, its CFO says. While that would make James' stake worth around $575 million, he says he'll start looking closer at the public markets a year from now. The company may require

40 MongoDB
New York, NY
Dev Ittycheria
EMPLOYEES: 800
FUNDING RAISED: $311 MIL
DATABASE AND DEVELOPMENT PLATFORM

41 PagerDuty
San Francisco, CA
Jennifer Tejada
EMPLOYEES: 310
FUNDING RAISED: $83.6 MIL
INCIDENT RESPONSE AND DIGITAL OPS

42 Gusto
San Francisco, CA
Josh Reeves
EMPLOYEES: 450
FUNDING RAISED: $176.1 MIL
PAYROLL AND HR

43 Automattic
San Francisco, CA
Matt Mullenweg
EMPLOYEES: 560
FUNDING RAISED: $190 MIL
WEBSITE PUBLISHING

44 Looker
Santa Cruz, CA
Frank Bien
EMPLOYEES: 325
FUNDING RAISED: $177.5 MIL
DATA ANALYTICS

45 Duo Security
Ann Arbor, MI
Dug Song
EMPLOYEES: 400
FUNDING RAISED: $49 MIL
CYBERSECURITY

46 Sisense
New York, NY
Amir Orad
EMPLOYEES: 350
FUNDING RAISED: $94 MIL
BUSINESS INTELLIGENCE

47 MapR
San Jose, CA
Matt Mills
EMPLOYEES: 500+
FUNDING RAISED: $194 MIL
BIG DATA SOFTWARE

48 Carbon Black
Waltham, MA
Patrick Morley
EMPLOYEES: 825
FUNDING RAISED: $190 MIL
ENDPOINT SECURITY

49 Intacct
San Jose, CA
Robert Reid
EMPLOYEES: 475+
FUNDING RAISED: $140 MIL
ERP/ACCOUNTING SOFTWARE

50 Lookout
San Francisco, CA
Jim Dolce
EMPLOYEES: 350
FUNDING RAISED: $280 MIL
MOBILE SECURITY

51 Flatiron Health
New York, NY
Nat Turner
EMPLOYEES: 450
FUNDING RAISED: $328 MIL
HEALTH CARE TECH

FLATIRON HEALTH

Decoding Cancer

NAT TURNER, COFOUNDER, CEO

Nat Turner has a new weapon against cancer: better software for doctors.

His Flatiron Health, based in New York City, sells software made specifically for oncologists and designed after years of analyzing the type of data that doctors use. It will track costs, record medical information and provide a database for physicians to find possible candidates for new trials.

Over 2,500 clinicians use Flatiron today, and the startup has raised over $300 million from investors, including GV (formerly known as Google Ventures) and pharmaceutical giant Roche, which also agreed to use Flatiron software in clinical trials. *—A.K.*

significant additional funds to reposition itself as an operational tool that will allow its customers to make purchases and staffing decisions within the app. Domo leadership are seeking to distance themselves from the nifty visualizations and charts that are the mainstay of troubled competitor Tableau.

It's another story at InsideSales, which moved in the wrong direction on this year's Cloud 100 list. In a steampunk-influenced office of wood beams and wrought metal doors in Provo, CEO David Elkington sits in the dark near rows of empty desks. He recently hit the brakes on customer growth to focus on keeping the ones he already had, adding new predictive features to his sales-acceleration software. He says his billion-dollar-plus valuation (reported as $1.5 billion) was a distraction. "I started down that path of raising and hiring, and eventually I said I don't enjoy this," says Elkington, who has turned over much of his management team. "So I had to say, 'Screw them, I'll do it my way again.'"

When Utah's cloud companies eventually go public or get acquired, each founder says he'll be cheering his peers on, even if that means breaking up the Utah guys' collaboration. For better or worse, the adversity they faced is a thing of the past. Between Silicon Valley venture firms hunting in Utah and ascen-

52 Gainsight
Redwood City, CA
Nick Mehta
EMPLOYEES: 450
FUNDING RAISED: $156 MIL
CUSTOMER SUCCESS

53 Elastic
Amsterdam, The Netherlands
Shay Banon
EMPLOYEES: 550
FUNDING RAISED: $104 MIL
OPEN-SOURCE SOFTWARE

54 Smartsheet
Bellevue, WA
Mark Mader
EMPLOYEES: 592
FUNDING RAISED: $120 MIL
WORK MANAGEMENT

55 FinancialForce
San Francisco, CA
Tod Nielsen
EMPLOYEES: 700
FUNDING RAISED: $225 MIL
ENTERPRISE-RESOURCE PLANNING

56 Adaptive Insights
Palo Alto, CA
Tom Bogan
EMPLOYEES: 475
FUNDING RAISED: $176 MIL
FINANCIAL-SOFTWARE PLANNING

57 Turbonomic
Boston, MA
Ben Nye
EMPLOYEES: 450+
FUNDING RAISED: $125 MIL
HYBRID CLOUD MANAGEMENT

58 Workfront
Lehi, UT
Alex Shootman
EMPLOYEES: 786
FUNDING RAISED: $91.6 MIL
WORK-MANAGEMENT SOFTWARE

59 Optimizely
San Francisco, CA
Dan Siroker
EMPLOYEES: 400+
FUNDING RAISED: $146.2 MIL
EXPERIMENTATION PLATFORM

60 PointClickCare
Mississauga, Canada
Mike Wessinger
EMPLOYEES: 1,400
FUNDING RAISED: $94 MIL
HEALTH CARE PLATFORM

61 Hootsuite
Vancouver, Canada
Ryan Holmes
EMPLOYEES: 1,000+
FUNDING RAISED: $250 MIL
SOCIAL MEDIA MANAGEMENT

62 Acquia
Boston, MA
Tom Erickson
EMPLOYEES: 790
FUNDING RAISED: $188.6 MIL
DIGITAL-EXPERIENCE MANAGEMENT

63 iCIMS
Matawan, NJ
Colin Day
EMPLOYEES: 650
FUNDING RAISED: PRIVATE EQUITY
TALENT-ACQUISITION SOFTWARE

PAGERDUTY

Programmer's Best Friend

JENNIFER TEJADA, CEO

PagerDuty is a business that customers hope they seldom need to use. But as any developer can attest, when it's time to ship a new product, ten things will inevitably go wrong. PagerDuty's job is to spot them and get the right person on the job to fix them before the entire project implodes. "We serve to make sense out of all that chaos," says Tejada, who took over as CEO in July 2016. Crack open the hood at Airbnb or Instacart, and PagerDuty is there keeping an eye on the pipes—ensuring all the weekend getaways and deliveries happen. *—C.S.*

64 Health Catalyst
Salt Lake City, UT
Dan Burton
EMPLOYEES: 500
FUNDING RAISED: $265 MIL
HEALTH CARE ANALYTICS

65 DigitalOcean
New York, NY
Ben Uretsky
EMPLOYEES: 330+
FUNDING RAISED: $123 MIL
INFRASTRUCTURE

66 DataStax
Santa Clara, CA
Billy Bosworth
EMPLOYEES: 450
FUNDING RAISED: $190 MIL
DATA MANAGEMENT

67 Namely
New York, NY
Matt Straz
EMPLOYEES: 350
FUNDING RAISED: $157.8 MIL
HR TECH

dant local shops like Sorenson Capital, which just launched its first venture capital fund, access to cash is much easier now, and talent will continue to trickle in, regardless of outcome. A recent barbecue for local tech workers in Lehi, halfway between Provo and Salt Lake City, drew 5,000 people. The challenge will be to retain Utah's magic at scale. "I feel bad for companies that didn't have to go through what we did," Smith adds. "When Josh sits on a board, it's all about the scar tissue he can pass on."

And just as the boom in Silicon Valley eventually became a boom 45 minutes north in San Francisco, so is Silicon Slopes creating a startup scene in Salt Lake City, including the 80 employees of Teem, which offers cloud-based software that manages conference rooms. Airbnb was a key early adopter, though other Silicon Valley startups resisted a bit when they found out they were buying Utah tech. "So we just put a 415 number on our website," says CEO Shaun Ritchie, invoking the area code for San Francisco. "The question never came up again." F

68 Toast
Boston, MA
Chris Comparato
EMPLOYEES: 500+
FUNDING RAISED: $32.5 MIL
RESTAURANT TECH

69 Databricks
San Francisco, CA
Ali Ghodsi
EMPLOYEES: 200+
FUNDING RAISED: $107.5 MIL
UNIFIED ANALYTICS

70 BlueJeans
Mountain View, CA
Krish Ramakrishnan
EMPLOYEES: 450
FUNDING RAISED: $175 MIL
VIDEOCONFERENCING

71 NewVoiceMedia
Basingstoke, U.K.
Jonathan Gale
EMPLOYEES: 360
FUNDING RAISED: $141.3 MIL
CONTACT CENTER

72 Grand Rounds
San Francisco, CA
Owen Tripp
EMPLOYEES: 300+
FUNDING RAISED: $105 MIL
CLINICAL NAVIGATOR

73 AlienVault
San Mateo, CA
Barmak Meftah
EMPLOYEES: 318
FUNDING RAISED: $116 MIL
CYBERSECURITY

74 Segment
San Francisco, CA
Peter Reinhardt
EMPLOYEES: 150
FUNDING RAISED: $45 MIL
CUSTOMER DATA INFRASTRUCTURE

75 American Well
Boston, MA
Roy Schoenberg
EMPLOYEES: 300
FUNDING RAISED: $136 MIL (EST.)
TELEHEALTH TECH

76 Fastly
San Francisco, CA
Artur Bergman
EMPLOYEES: 327
FUNDING RAISED: $180 MIL
CLOUD SERVICES

77 Pindrop
Atlanta, GA
Vijay Balasubramaniyan
EMPLOYEES: 285
FUNDING RAISED: $122 MIL
PHONE-FRAUD DETECTION

78 Asana
San Francisco, CA
Dustin Moskovitz
EMPLOYEES: 260
FUNDING RAISED: $88 MIL
ENTERPRISE COLLABORATION

79 Talkdesk
San Francisco, CA
Tiago Paiva
EMPLOYEES: 300
FUNDING RAISED: $25 MIL
CALL-CENTER SOFTWARE

80 Evernote
Redwood City, CA
Chris O'Neill
EMPLOYEES: 330
FUNDING RAISED: $290 MIL (EST.)
COLLABORATION APP

81 Vlocity
San Francisco, CA
David Schmaier
EMPLOYEES: 300+
FUNDING RAISED: $103 MIL
INDUSTRY SOFTWARE

TOAST

Digitizing the Diner

CHRIS COMPARATO, COFOUNDER, CEO

With a baker grandfather and restaurateur sister, Chris Comparato was the natural choice when Toast cofounders Aman Narang, Steve Fredette and Jonathan Grimm needed a new CEO. Toast, which makes sales- and inventory-management software for restaurants, has raised $30 million to handle the back end for restaurants across all 50 states, from a Chinese chain in Los Angeles to a Nashville hot chicken joint. For many of those clients, Toast replaces pad and pen. "You've got to listen and really have empathy for what restaurants go through to run a successful operation," says Comparato. One thing busy owners want: simplicity. That's why Toast has announced deals with 20 other companies, including delivery leader GrubHub, to put their services in one central place. *—D.S.*

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SIEBEL'S SECOND ACT

A DECADE AFTER TOM SIEBEL SOLD HIS FIRST COMPANY TO ORACLE FOR $5.9 BILLION, HIS NEW COMPANY COULD BE TWICE AS VALUABLE.

BY ALEX KONRAD

Wincing with pain, Tom Siebel steps from behind his desk at C3 IoT headquarters in Redwood City, California, to sketch out the future of the Internet of Things on the back of a piece of office paper. It's been eight years and 19 surgeries since a near-fatal elephant attack in the Serengeti in 2009, but Siebel swears he's fully recovered and must have tweaked something while kiteboarding over the weekend. On the desk sit two Lucite cases, one containing the shards of his smashed iPhone from that day and the other the bullet that took down his assailant. A black-and-white photograph of a charging elephant looms on the wall. "It's not the same one," he says. "You get the idea."

Every day, Siebel gets up around 5 a.m., hits the gym and gets to work. At 64 and worth some $2.5 billion from the sale of his customer-manage-

ETHAN PINES FOR FORBES

How Three Top CIOs Turn IT Into "Empowerment Organizations"

BY JOE MULLICH

As companies forge ahead into the digital revolution, transformational CIOs are embracing new tools and techniques to encourage collaboration among their employees and with their customers. This collaboration isn't simply about working more efficiently but reimagining customer service and business outcomes. In the process, they're changing the role that IT can play.

For The Home Depot, this can mean coordinating all the different checkout options used by its customers from home DIYers to professional builders with special delivery needs. For Toyota, it might mean collecting data for specific drivers so they can get lower insurance rates based on their individual habits behind the wheel. For Schneider Electric, this means augmenting physical products with subscriptions that monitor the performance of those products to prevent issues.

Matt Carey, CIO, The Home Depot

"Our primary mission is to empower others — employees, partners and customers," says Herve Coureil, CIO, Schneider Electric, a global specialist in energy management and automation. "We want IT to be seen as an empowerment organization rather than having a monopoly over technology."

Reorganizing For Enhanced Efficiency

Transformational CIOs are reorganizing their departments around new ways of working to encourage more interaction. Coureil, who became head of IT after serving as CFO of a Schneider business unit, came into a situation where every country the company served had its own IT team. He immediately formed Schneider Electric's first centralized global IT function. "We created global discipline by shifting from a lot of local, small decisions into bigger global resource allocation decisions," he says.

Ensuring that the business side works in lockstep with IT is critical to transformational CIOs. Zack Hicks, who serves as both North American CIO for Toyota and CEO of Toyota Connected, a global company that uses big data coming out of vehicles to provide new products and services, builds cross-departmental teams at the beginning of projects. "Manufacturing and IT shouldn't be able to imagine working on something new for the company without being next to each other," Hicks says. "The level of engagement and collaboration should transform the relationship."

In a time when businesses are open 24 hours a day and response times to fulfill orders have shrunk from days to hours, CIOs need to find ways to compress and enhance interactions throughout the company. "The feedback loops are so much shorter," explains Matt Carey, CIO of The Home Depot. "You have to get people in a room a lot faster. It's less about having meetings than spending more time together."

Still, much of today's collaboration is done among people who are working from planes, hotels and conference rooms. Transformational CIOs believe that collaboration without impediment depends on having the right tools. These tools allow people to easily share

(THIS PAGE) PHOTO COURTESY OF MELISSA GOLDEN; (OPPOSITE PAGE) TOP PHOTO COURTESY OF BENJAMIN NORMAN AND BOTTOM PHOTO COURTESY OF TODD SPOTH

Herve Coureil, CIO, Schneider Electric

"We can make the lives of our employees better and make them more efficient. We can empower their ability to be agile and experimental."

HERVE COUREIL, SCHNEIDER ELECTRIC

and find the information they need no matter where they are.

At the same time, from a management perspective, transformational CIOs take the attitude that *how* you're working is as important as *what* you're working on. "Today, you can access documents from your mobile phone fairly easily, and communicate over video very easily," Coureil says. "We can make the lives of our employees better and make them more efficient. We can empower their ability to be agile and experimental."

Cloud Technology Driving Collaboration

Toyota, The Home Depot and Schneider Electric all use the cloud content management and file sharing service Box to enable secure collaboration and industry compliance among their various divisions.

Toyota has used Box's cloud technology to organize information after executives complained that too much was being pushed to them via email. And because the technology can be used seamlessly on tablets and smartphones, "you can really move toward a different level of collaboration," Hicks says. "Everyone is working off the same information, as the information is emerging."

Carey explains that using the cloud has solved difficult collaboration challenges, like allowing The Home Depot's marketing department to share large video files with an external advertising firm. "Box has become our way of choice to securely collaborate with people outside the company, as well as inside the company," he says. "The key is that people can collaborate in a natural way."

By promoting new attitudes and adopting new tools that make it easier to securely share information and collaborate, today's transformational CIOs are creating nimble IT departments that are keeping up with the rapid pace of business and anticipating where it will go next. "Our CEO challenged us to focus on fewer, bigger projects that make a big impact with customers," Carey says. "And you can only do that if collaboration is built into how you work, so everyone has the same information and the same focus of looking at things from the customer point of view."

Zack Hicks, CIO, Toyota Motors North America, and CEO, Toyota Connected

ment software company to Oracle in 2006, he still regularly works into the night. His newest project is C3 IoT, the awkward name referring to the Internet of Things—the billions of industrial sensors and other physical devices now connected to the internet. In March, investors (led by billionaire Jim Breyer) put more than $10 million into C3, valuing it at $1.4 billion. Siebel thinks it will eventually be twice as big as his last score.

Debuting at No. 19 on the Forbes Cloud 100 list, C3 IoT operates in a fast-growing sector of the cloud that provides software to the Internet of Things. Research firm Gartner predicts 2 billion new devices worldwide will be connected to the internet this year—everything from streetlights to oil pumps—bringing the grand total to some 8.4 billion. These devices can easily phone home when they are broken or performing poorly. But more valuable to their corporate owners, software provided by companies like C3 can read all those logs and do things like predict that a device is likely to break down in the near future, or warn that malicious hackers are probing the security on a power plant's reactors. "Customers are just figuring it out right now," says Alfonso Velosa, an analyst at Gartner. "It's a great place to be growing."

Founded eight months before the elephant nearly took off Siebel's foot, C3 was supposed to be an energy company. Flush from the sale of Siebel Systems, Siebel had been content to work on nonprofits and spend time with family until some symposia he hosted on the energy sector got him interested in building software to manage the flow of electricity from plant to home more efficiently. Patricia House, a longtime collaborator, signed on as CEO, and the company, then called C3 Energy, started working with Cisco, Dow Chemical and General Electric. To fund the company, Siebel emailed wealthy friends on a Friday, and he had $20 million in commitments, including $6 million of his own, by Sunday afternoon.

Siebel's contributions to C3 took a nosedive after his August 2009 run-in on safari left him fighting for his ability to walk. His weight down to 121 pounds, Siebel spent much of the next two years rolling into board meetings in an electric wheelchair. When he came back full-time, oil prices had stumbled, crushing spending for software at energy companies, and C3 was on course to go bankrupt.

No one was buying C3's energy software anymore, but Siebel saw a bright spot in the data flowing through the wind turbines and utility poles that made up the grid. By September

82 Dataminr
New York, NY
Ted Bailey
EMPLOYEES: 230+
FUNDING RAISED: $180 MIL
REAL-TIME ALERTS

83 InVision
New York, NY
Clark Valberg
EMPLOYEES: 340
FUNDING RAISED: $134.1 MIL
DIGITAL PRODUCT DESIGN

84 Sumo Logic
Redwood City, CA
Ramin Sayar
EMPLOYEES: 290
FUNDING RAISED: $235 MIL
MACHINE-DATA ANALYTICS

85 Greenhouse
New York, NY
Daniel Chait
EMPLOYEES: 191
FUNDING RAISED: $60.1 MIL
RECRUITING SOFTWARE

86 Welltok
Denver, CO
Jeff Margolis
EMPLOYEES: 400
FUNDING RAISED: $163 MIL
HEALTH TECH

87 ZipRecruiter
Santa Monica, CA
Ian Siegel
EMPLOYEES: 700
FUNDING RAISED: $63 MIL
ONLINE JOBS MARKETPLACE

88 Snowflake
San Mateo, CA
Bob Muglia
EMPLOYEES: 224
FUNDING RAISED: $205 MIL
DATA-WAREHOUSE SOFTWARE

89 AvidXchange
Charlotte, NC
Michael Praeger
EMPLOYEES: 850
FUNDING RAISED: $568 MIL
PAYMENT AUTOMATION

90 Grammarly
San Francisco, CA
Brad Hoover
EMPLOYEES: 110
FUNDING RAISED: $110 MIL
ONLINE WRITING ASSISTANT

91 Collibra
New York, NY
Felix Van de Maele
EMPLOYEES: 200+
FUNDING RAISED: $75 MIL
DATA GOVERNANCE

92 InsideSales
Provo, UT
David Elkington
EMPLOYEES: 425
FUNDING RAISED: $266 MIL
SALES ACCELERATION

GRAMMARLY

Error Police

BRAD HOOVER, CEO

Brad Hoover would despize this sentnce. For his Grammarly is, essentially, better spell-check software. Write in the wrong tense, or just repetitively, and Hoover's Grammarly lets you know. Its software scans for 400 error types the company says often sneak through Microsoft Word, while offering up synonyms to avoid repetitive—er, duplicative—structure or words. Its Chrome plug-in has 6.9 million daily users and follows them across Gmail to LinkedIn to Twitter. *—R.H.*

Morgan Freeman
SU2C Ambassador
Executive Producer
of the documentary,
The C Word

Tonya Peat
Cancer Survivor

Be the breakthrough.

Breakthroughs are the patients participating in clinical trials, the scientists and doctors working together to advance the fight against cancer, and the brave survivors like Tonya who never give up. Let's be the breakthrough. To learn about appropriate screenings and clinical trials or to help someone with cancer, go to **su2c.org/breakthrough**. #cancerbreakthrough

TheCWordMovie.com

Stand Up To Cancer is a program of the Entertainment Industry Foundation, a 501(c)(3) charitable organization. Please talk to your healthcare provider about appropriate screenings for your age, sex, family history and risk factors; and about clinical trials that may be right for you. Photo by Nigel Perry

2011, he'd decided to restructure C3. After the holidays he laid off 110 of its 150 employees—everyone except engineers—including some lifelong friends. Siebel says it was the hardest moment of his career. When he'd raised that money so quickly, "the understanding was the company would be successful or I would die trying," he says. "I couldn't just sit back and watch this thing diminish."

After hunkering down for two years to rebuild the company's core software, C3 returned to the market with a service that helps industrial customers ingest the data coming from their devices by putting it into custom applications. It's a market crowded with giants like GE and Microsoft. While it's impossible to verify from the outside, C3 claims it can build and deploy an app in as little as six weeks, ten times faster than and at a tenth of the cost of its competitors. One customer is Engie, a large French electric utility that has built 28 custom apps with C3's software. One of them analyzed more than a billion data points to figure out why one Middle Eastern power source was trailing another in performance by 2%. Using machine-learning techniques to study the data, C3's software discovered that specific maintenance events were causing gas turbines to degrade four times as fast. Fixing the problem saved the company more than $125 million a year.

Already cash-flow positive, C3 is on pace to about double its revenue this year to $100 million while tripling its bookings. Big new customers include Con Edison and Origin Energy. And Siebel's business isn't limited to the Internet of Things. C3 recently signed a deal with a large U.S. health care company to aggregate and analyze its health records. The resulting data could help pharmacologists and radiologists predict who is likely to contract specific medical conditions or diseases. In the race for customers, IoT companies typically choose a couple key sectors (C3 naturally started with energy) to focus on and differentiate themselves, says Michele Pelino, an analyst at Forrester. Health care and aerospace are among C3's next targets.

Analysts expect massive consolidation in the industry over the next decade, and Amazon (currently a partner) could prove to be more a rival than a friend. With staffing back up to 130 employees, C3 is competing more than anything for technical talent. "The competition is unlike anything I've ever seen," says investor Breyer, whose legendary venture capital career has spanned three decades.

So far, Siebel is living up to the promise he made to his powerful friends. Says Breyer: "Tom has a chance to be a worldwide leader." Again. F

CANVA

For the Photo Finish

MELANIE PERKINS, COFOUNDER, CEO

Australian startup Canva can turn you into a digital designer with a few finger swipes. Its mobile app has quickly amassed 10 million users in just three years with software that's easier to use and cheaper than Adobe's cumbersome industry standard. Canva will retouch a photo or provide templates for making a presentation or brochure. Now Canva wants to take on FedEx Office, too, with printing and delivery services for what's created on its app, which already has tutorials and users in 179 countries. "We have so much more to do. We feel like we've only done 1% of what is possible," says CEO Melanie Perkins. *—C.S.*

93 WalkMe
San Francisco, CA
Dan Adika
EMPLOYEES: 500
FUNDING RAISED: $90 MIL
DIGITAL ADOPTION PLATFORM

94 Onshape
Cambridge, MA
Jon Hirschtick
EMPLOYEES: 105
FUNDING RAISED: $169 MIL
3-D DESIGN SOFTWARE

95 Freshworks
San Bruno, CA
Girish Mathrubootham
EMPLOYEES: 1,040
FUNDING RAISED: $149 MIL
BUSINESS SOFTWARE

96 Code42
Minneapolis, MN
Joe Payne
EMPLOYEES: 524
FUNDING RAISED: $137.5 MIL
ENDPOINT SECURITY

97 Confluent
Palo Alto, CA
Jay Kreps
EMPLOYEES: 120
FUNDING RAISED: $81 MIL
DATA-STREAMING PLATFORM

98 Mesosphere
San Francisco, CA
Florian Leibert
EMPLOYEES: 200+
FUNDING RAISED: $126 MIL
DATA CENTER SOFTWARE

99 Campaign Monitor
San Francisco, CA
Adam Berger
EMPLOYEES: 250
FUNDING RAISED: $250 MIL
EMAIL MARKETING

100 Canva
Sydney, Australia
Melanie Perkins
EMPLOYEES: 200+
FUNDING RAISED: $42 MIL
GRAPHIC DESIGN SOFTWARE

EDITED BY ALEX KONRAD

REPORTED BY REBECCA HEILWEIL, SAMAR MARWAN, CAROLINE SIMON AND DAN SPINELLI

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TIM PANNELL FOR FORBES

POWERED

*YOUNG TEXAS REAL ESTATE MOGUL **NATE PAUL** HAS QUICKLY AMASSED A BILLION-DOLLAR PORTFOLIO AND AN $800 MILLION NET WORTH. IMAGINE WHAT HE'LL DO WHEN HE TURNS 31.*

BY NATHAN VARDI

Unlike other successful Millennial entrepreneurs, Nate Paul is not a T-shirt or hoodie kind of guy—his uniform is a suit. He has worn one to work, usually with a vest, every day since he dropped out of college nearly ten years ago. "I always wanted people to take me seriously," the Texas real estate prodigy says. "Part of it is you have to look older."

At 5'11", with a stocky build and a two o'clock shadow, Paul certainly looks as though his odometer has long since passed 30 years old. But that's not why the real estate brokers who clamor to meet him take him seriously. They try to get in the elevator that rises to the top floor of Austin's tallest commercial skyscraper, up past the offices of billionaire-run private equity firms, because Paul is the biggest buyer and owner of land for development in the city. And Texas isn't big enough for his ambition.

Paul's World Class Holding, which he started building in 2007, has $1.2 billion in assets, according to a document obtained by *Forbes*. That portfolio includes 120 properties in 17 states from California to New York, but most are in economically vibrant Texas. World Class Holding owns 10 million square feet of commercial real estate that ranges from office space to retail to self-storage. And although he once bid $800 million for Manhattan's Plaza and Dream hotels, Paul is no Texas Trump—he doesn't own a single trophy building and his name is not on any of his properties. "My assets are not sexy," the 30-year-old says proudly. "I mean, I own lots of storage. But I love my assets."

For good reason. Paul, who retains 100% of the company, is not overleveraged according to financial documents, and none of his debt is at the holding-company level. Based on his holdings inside and outside the company, *Forbes* estimates that Paul's net worth is $800 million. If commercial real estate prices stay strong, he could be a billionaire soon.

It's a particularly impressive trajectory when you consider that real estate is famously a dynastic business and Paul is the son of an ob-gyn. Complicating things further, he is the son of Indian immigrants in overwhelmingly white Austin.

From the beginning, Paul set out to build his portfolio as an operator and an investor. In order to buy, he hit up his obstetrician father's buddies, charmed high-net-worth individuals, and then landed pension and insurance money. He raised funds in dozens of partnerships to do deals and kept upwards of 50% of the profits. With the $25 million he started raising from the Austin Police Retirement System in 2009, he produced an annual (and now fully realized) internal rate of return of 24.8%, net of fees.

Now Paul is getting ready to double down on his early success. He has spent much of the past year recapitalizing his business, cashing out limited partners (such as the Austin Police Retirement System) and taking full ownership of many of World Class' partnerships, often using debt and his own accumulated capital. He then rolled up all the properties he could into his new holding company, which is attempting to raise $1 billion of preferred equity in the coming year. Paul thought about trying to raise a private equity fund, but what he really wants is permanent capital, which would allow him to get off the treadmill that requires him to sell assets to achieve exits for his investors every few years. "I am thinking with a 30-year time horizon," Paul says. "I actually have a 30-year amortization and will be around."

"From an investment perspective his returns have been spectacular, and he does a good job returning capital early," says Robert Smith, an Austin private equity billionaire who has invested tens of millions in five of Paul's deals. "I look at what Nate has accomplished; he has thought very strategically about areas like storage and the Austin marketplace."

Joseph Liemandt, founder and CEO of Austin's Trilogy Software, adds, "His general business acumen is unbelievable, and he is always talking about the long term." Liemandt, a close friend of Paul's who, at 27, appeared on a 1996 *Forbes* cover highlighting the wave of young tech entrepreneurs, says, "He is dramatically more mature than I ever was—nobody thought he was 23 when he was 23."

"From an investment perspective his returns have been spectacular, and he does a good job returning capital early," says Austin billionaire Robert Smith.

DRIVING AROUND HIS hometown in a Bentley, Paul proudly points out key development properties he owns in the heart of Austin. There is the parking lot and two-story

building being leased by Google Fiber sitting on 1.3 acres adjacent to the city's tallest building. The family who owned it for 70 years knew Paul and called him with four days left in 2012, saying they would sell it to him for a good price if he could close by the end of the year. A block away he owns another low-rise building, which he bought for $5 million in 2011, luring a Capital Grille restaurant to the site. Paul drives toward another two properties near the Austin Convention Center. Overall, he has accumulated entitlements to build 6 million square feet in downtown Austin.

Making his way southeast to the popular Rainey Street district, where historic bungalows have been converted into funky bars, Paul points out a property zoned for 730,000 square feet that he bought for $10 million two years ago and will soon be vacant. He purchased another property down the road last year that has only a small building with an IHOP as a tenant. "Imagine if you are a tech company that wants to be in downtown Austin—this is a supercool area to be in," says Paul, vowing to start building an office within a year.

Victoria, Texas, where Paul was born, is about a two-hour drive from most of these properties. As the youngest child of immigrants, Paul was raised to believe that school was a priority for him and

Dressing the part: The 30-year-old Paul started wearing suits as a teen so people would take him seriously. His sister even bought him a pair of suit pajamas—and she was only half-kidding.

TIM PANNELL FOR FORBES

his two older siblings. Born Natin, he shortened his name to Nate, but that didn't exactly help with assimilation. People in small-town Texas often thought he was Hispanic, and young Nate would not correct them. "People look at you and you are not white, you are not black, you are something in between," he recalls. As a kid he was "always selling something, trying to do some sort of business"—working as a DJ, selling rubber bracelets, hawking personalized water bottles.

Paul left home in 2002 at the age of 15 to attend a Catholic prep school in Austin. He played basketball, was good at math and started a business out of a local Barnes & Noble tutoring kids from the suburbs. At that point, everything was going according to his parents' plan, and Paul eventually attended the University of Texas at Austin, where he studied business. With his sister, Sheena, he even won a business case-study competition in Thailand. But Paul was restless and had already started channeling his energy toward real estate. He would spend hours studying foreclosed properties, building data sets that included appraised values and loan balances, then head down to the county courthouse on the first Tuesday of each month to see how the auctions turned out.

After his freshman year, Paul was ready to drop out but knew his mom would take it badly. "My mother would say, 'Doctor or lawyer,'" he recalls in his slight Texas twang. His older siblings were firmly on the track their parents desired—his brother eventually became a plastic surgeon, his sister an attorney—so Paul decided to take a year off with a promise that he would go back to school one day. Renting a basement office, he called his firm World Class Capital, a name for which he has sometimes gotten grief but reflects the idealism of a 20-year-old trying to make it. "I just wanted it to be great," he says.

While Paul may have good timing with the booming economy of Austin—the nation's fastest-growing big city since 2000, with a mounting number of high-tech companies and jobs—some initially discouraged Paul from getting into the real estate business. And after he started doing deals in his early 20s, one prominent local real estate owner told Paul straight up that he would not do business with him given his ethnicity. And one banker refused to lend to him because of a bad experience she claimed to have once had with an Indian.

"The adversity I faced in building my business pales in comparison to the challenges that my father faced as an Indian immigrant in the '70s and '80s living in Victoria, Texas," he says.

The first property Paul acquired, in 2007, was a 13-unit apartment building in south Austin that he bought for $1.1 million from a couple getting divorced. Backed by a local family that owned a mortgage company, Paul planned to sell the units individually, but he found a buyer who was ready to pay $1.6 million for the whole building 90 days later. With the profits from that sale, he bought five student housing apartment buildings in the West Campus neighborhood around UT together with money put up by the motivational speaker and marketer Paul J. Meyer.

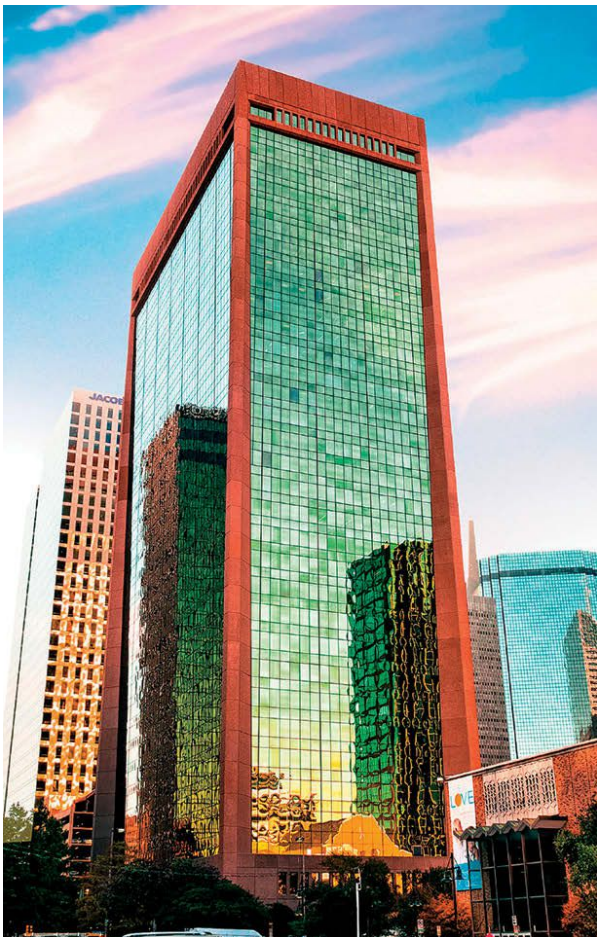
Paul returned to school in his sophomore year, trying to balance classes with World Class, but by the summer of 2008 he knew was done. He told Mom he was dropping out. "At that point, I went in with a mind-set that I had to make it work," he says. He had sold his refurbished student-housing assets in the first half of 2008, not because he saw the real estate crisis coming but in order to build a track record. To attract new investors, he wanted to show that he could perform.

When Lehman Brothers collapsed later that year, Paul had cash on hand and no debt, so he went to work building a portfolio. He started buying storage assets, land in Austin, a marina on nearby Lake Travis and a building being used by a call center in south Austin that he turned into a retail space for Dollar General and two other tenants. "I was buying at the pit of the crisis," he says. "In many of those deals, there was no other bidder." As a result, Paul has operated almost exclusively in a low-interest-rate environment with steadily rising prices.

In early 2009, Paul was ready to pitch the Austin Police Retirement System in an effort to land his first institutional investor. He was so nervous that he threw up before his first meeting with the board, regaining his composure to argue forcefully that the pension should invest in an area it knew. "I studied your portfolio—how do you not own any assets in Austin?" Paul asked them. "It's the fastest-growing city in America." He pointed out that the pension had invested in New England office buildings and JPMorgan's India Property fund, so why not its own backyard? "My biggest concern with him was the kid was 22 years old," says Art Alfaro, Austin's city treasurer, who has been a trustee of the police pension since 2000. "He had excellent presentation skills. We got comfortable. It was a plus that he was a local investor."

The rumors in Austin would trickle back to Paul—that he was backed by Chinese money, an Indian conglomerate or a billionaire in Dubai.

The pension fund agreed to go in with Paul on a deal-by-deal basis starting with a $2 million equity check he used to buy a distribution center in north Austin for $4.5 million. In a move that showed he was thinking bigger than Austin, Paul used some of the pension money to invest outside the state, starting with the distressed debt of an office property



The world of World Class Holding: Paul's properties include the 3M complex in Austin, the former KPMG Centre in Dallas and Great Value Storage facilities in ten states.

in Orlando, Florida, which he bought for $2.7 million and sold in 2012 for $6.4 million. Those kind of returns meant the pension plan kept investing more capital. Paul also raised money from the Texas Medical Liability Trust and a group led by Harvey Bookstein, a prominent Los Angeles accountant who suggests real estate investments to his high-net-worth clients. Bookstein says his group has invested $100 million in six deals with World Class that were structured in a way that let Paul keep 50% of the profits on development deals and 25% on existing buildings after Bookstein's group made an 8% to 10% return.

Paul specifically searched for distressed opportunities and rolled more of his own accumulated capital as the deals kept coming. In 2011, he bought a $19 million defaulted mortgage on a 180,000-square-foot shopping center outside of Minneapolis for $3 million. He foreclosed on it, took over operations and proceeded to lease the vacant retail space. "I ended up with the property since I was the only bidder willing to go tour a shopping center in Minneapolis in freezing temperatures in November and could close in ten days," he says.

Around the same time, Paul started putting a lot of the money he raised into self-storage. A deeply fragmented industry, storage has become popular with institutional investors that see it as recession-resistant and a cash-flow machine.

As in all his other deals, Paul became an owner-operator. He started in Austin, but one of his first storage deals was a $2.9 million investment in a defaulted mortgage on a facility in a Chicago suburb that Paul grabbed, leased up and later sold to publicly traded Sovran Self Storage for $7.2 million. He would buy from mom-and-pop owners in Colorado or Ohio who didn't even have a website, or build new storage sites in areas of Los Angeles where it was hard to get permits, making it tough for competitors to emerge.

Paul's storage playbook included slapping a fresh coat of green paint on a building and clearly branding each facility with the Great Value Storage name, boosting sales with an online reservation system and installing revenue management that would adjust prices based on demand. Eventually, Paul held 35,000 storage units at 69 sites across the nation. "It's a lot like multifamily housing," he explains. "Yet because a lot of people don't have the expertise in running it there is a disparity in value. We know how to run them better."

WHEN YOU ARE a twentysomething Indian-American man buying everything in sight in the capital of Texas, people start talking. The rumors in Austin would trickle back to

Paul—that he was backed by Chinese money, an Indian conglomerate or a billionaire in Dubai. In a town that is home to Michael Dell and his company, billionaire John Paul DeJoria, Whole Foods and the South by Southwest festival, "Nate Paul" was by far the most-searched phrase on the *Austin Business Journal*'s website in 2014. "Is this guy for real?" the publication asked the next year in a headline.

Paul's growing pains generated more gossip. In 2013, there was a *New York Post* item about Paul buying expensive bottles of champagne at Leonardo DiCaprio's 39th birthday party. Then former employees of the Austin rooftop bar and pool lounge that Paul owns sued him, claiming the bar cheated them out of tips. Paul says he did nothing wrong, and the case was privately settled in 2014. One of Paul's investors, Texas oilman Michael Macs, sued World Class after crude crashed in an effort to quickly retrieve some $15 million he had invested with the firm. A judge tossed the lawsuit to arbitration, and the duo settled.

There has also been some noisy employee turnover at World Class. In his highest-profile hiring, Paul lured five former Credit Suisse bankers to build a debt platform, but two left within months. "World Class is not for everyone," Paul says. "I reward those who do well. And the people who don't live up to what I expect, there is no place for them at my company."

And of course he has plenty of admirers. "The only reason I moved to Austin is to be closer to Nate," says Avery Bradley, a guard for the Boston Celtics who got to know Paul while at the University of Texas. "When I get ready for a game, I think of how hard Nate works—he works all the time—and it pushes me. I want to be around that."

What Paul is working on will keep shocking people in Austin. In June, he struck deals to buy 3M's 158-acre Austin campus, which has been appraised by the county at $80 million, and another 6 acres of land just south of downtown Austin. Last year, for $85 million he scooped up 13 office buildings in north Austin that house outposts of Allergan and Integra LifeSciences. In all these deals, Paul asserts, longstanding relationships and his ability to move fast secured him excellent prices. He says his negotiations are short and he doesn't bargain over price. Those 6 acres in downtown Austin come with a land lease that doesn't expire for more than two years, and Paul was willing to pay now and wait—but he made a take-it-or-leave-it offer.

Indeed, Paul has puzzled many in Austin for securing choice pieces of land and not developing them during a go-go real estate market. He announced plans for a $100 million, 39-story apartment tower on a prime lot he owns next to the Four Seasons Hotel but abandoned the project as other apartment condos went up around town. Paul has covered the plot's expenses by renting it during South by Southwest to Sony and Vice Media, which used it to put on concerts featuring Snoop Dogg and Lady Gaga. For now, Paul says he wants to focus on office space.

If Donald Trump can pass tax reform eliminating state tax deductions, Paul's long-term bet on Austin, where there is no state income tax, might look even better. "While everyone else was going vertical I went horizontal," he says. "We feel we kind of cornered the market on potential office space in downtown Austin."

Paul's highest-profile acquisition came outside of Austin in 2014, when he bought the downtown Dallas skyscraper known as the KPMG Centre. Lenders had taken control of the building through foreclosure, and KPMG was moving out. Paul bought it for $43 million, mostly with debt, knowing tenancy would go down to 14% once KPMG left in 2015. Paul spent another $35 million renovating the 1980s building so it would look like a place a tech company might want to call home. The lobby was remodeled with an open layout, and a community workspace was built on the second floor featuring Wi-Fi, modern boardrooms and private meeting areas. Paul then got three out-of-town software companies to move their headquarters there and recruited two other tenants, helping push occupancy to 70%.

At the ancient age of 30, Paul is ready to go even wider. He recently opened an office in Manhattan's GM Building, run by his sister, Sheena, who left her law career in 2013 to join her brother at World Class, where she is chief operating officer. Sitting in its boardroom, Paul talks about his decision to consolidate his real estate holdings in a holding-company structure. He says one of his inspirations for the move works just 31 floors above. Many years ago, Carl Icahn organized his diverse holdings in a single investment vehicle that he completely controls and raised permanent capital around it. A boardroom deal toy from September 2016 showing $260 million of loans from Ares Capital points to how Paul has put this plan together. Paul says the debt was partly used for his recapitalization but doesn't want to go into too many details. His company is private, and Nate Paul intends to keep it that way. F

"I reward those who do well," Paul says. "And the people who don't live up to what I expect, there is no place for them at my company."

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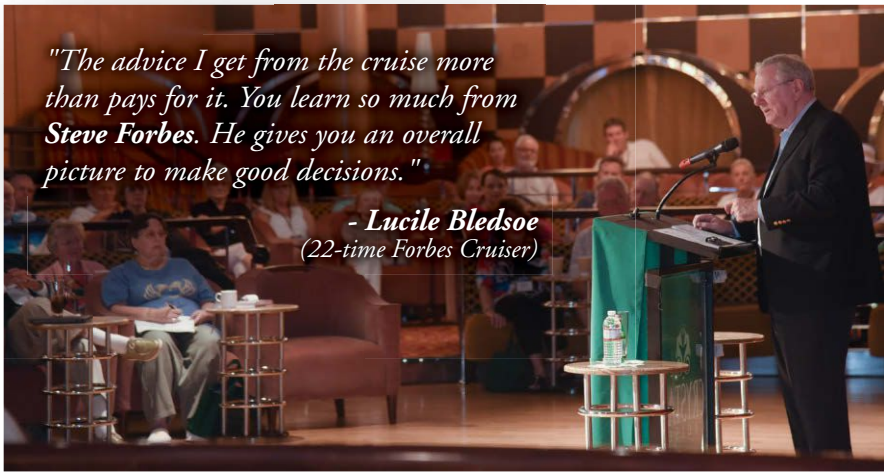

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The Long Game

An exclusive first look at Congaree, a new South Carolina golf club built by billionaires on a model of philanthropy.

BY ERIK MATUSZEWSKI

Jasper County, South Carolina, is only a 45-minute drive from the low-country resort town of Hilton Head, but it's a world removed. Aging churches and family homesteads whose better days have long passed are interspersed with dilapidated trailer homes and overgrown yards strewn with junk and broken-down cars. It's not where one would expect to find the most exclusive and inspirational new golf club in America, one where philanthropy drives a visionary membership model.

Congaree, which quietly opened this spring, was founded on a former 18th-century rice plantation by 2 of the 200 richest men in America—Texas billionaires Dan Friedkin and Robert McNair—and named after a Native American tribe that once called the area home. The club's calling is to use golf to bring together an international network of influential people passionate about changing lives, both locally and globally.

"We wanted to create a club that at the core of its mission makes meaningful differences in the lives of young people and attracts golfers who not only want to play a wonderful golf course but who also want to be actively involved in our philanthropic goals," says the 52-year-old Friedkin, who carries a tidy 6.9 handicap and is chairman of the Friedkin Group, a privately held consortium of businesses in the automotive, luxury hospitality, golf and entertainment industries.

Despite Congaree's forward-thinking mission, its membership process is old-fashioned: by invitation and referral only. There are technically only two members of the club: Friedkin and McNair, owner of the NFL's Houston Texans. Everyone else affiliated with Congaree—from an NFL Hall of Famer to a Grammy Award-winning country singer—is invited to become an "ambassador" on an annual basis. All share a love for golf and a passion for helping others.

Serious green: In addition to a golf club, Congaree features 26 guest rooms and a schoolhouse for the children its charity benefits.

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Ambassadors are encouraged to make a significant financial contribution to the charitable Congaree Foundation and also take an active role in interacting with youth at the club and sharing life experiences—good and bad. Congaree's aim is to offer educational, vocational and golf instruction to underprivileged youth, whether that's by helping area schools or through its Global Golf Initiative, which brings in high-school-age kids from around the world who aspire to play golf in college but don't have the support, financial or otherwise.

The person who would prefer to cut a check for several million dollars? That's not what Congaree is about. If you're hoping to join the club for yourself alone, you're probably not the right fit.

"It is very satisfying to hear our ambassadors express how proud they are to be a part of something like this that transcends a mere golf experience," says Friedkin, a trustee of the Wildlife Conservation Society and chairman of the Texas Parks & Wildlife Commission. "They aren't just looking to make a contribution to the Congaree Foundation and enjoy great golf. They're committed to helping the Congaree kids in any way they can."

Congaree's Global Golf Initiative started this June with teenagers from the United States and overseas. To identify prospective participants, the club turned to PGA pros around the world and invited them to be club ambassadors, with World Golf Hall of Famer Mark O'Meara, a two-time major champion, and other touring pros among them.

Playing through: Tom Fazio (with cofounder Dan Friedkin, right) designed the course among 300-year-old oak trees with no cart paths and no tee markers.

As for the club itself: The course at Congaree was built by the renowned architect Tom Fazio, who has 24 layouts ranked among *Golfweek*'s 100 best modern courses in the United States. Designed in the spirit of the Heathland courses found in Britain and the sandbelt courses of Australia, Congaree has a natural look, lends itself to the ground game and plays firm and fast, unlike many of the overly lush designs favored throughout the country today.

Friedkin's edict to Bruce Davidson and John McNeely, the codirectors of golf at Congaree, was to find a terrific piece of land accessible from the Eastern seaboard. After scouting a number of possible locations, they selected the inland property in Jasper County, with its sandy soil, perfect for a golf course, and its peaceful hunting grounds and historic feel. The lay and look of the land evokes the feel of some of the country's best courses, particularly Pine Valley in New Jersey and Pinehurst in North Carolina. When Fazio first visited the 3,200-acre property, dotted with longleaf pine, native wetlands and bottomland hardwood forests, he was blown away. "You guys hit the mother lode here," he said.

"We couldn't be more excited about the golf course Tom Fazio designed. However, we also recognize it is a process that is never finished, and it requires constant improvement," says Friedkin, who also owns the pristine Diamond Creek Golf Club in the mountains of North Carolina. "The opening has been a tremendous accomplishment, but it is a dynamic thing, and that is part of the fun of it."

There are no cart paths on the course, as Congaree is a walking property. It's a theme that extends beyond the fairways, with ambassadors and guests encouraged to walk the grounds, perhaps in step with the ghosts also said to call the historic land home. The club's main house sits at the end of a mile-long gravel driveway that goes through a gauntlet of ancient live oaks with Spanish moss waving gently in gnarled branches.

The house was rebuilt after the original burned down during Union General William T. Sherman's Civil War march across the South. There's also an inn and a newly constructed whitewashed lodge that has a restaurant, a bar and an inviting covered back porch that looks out on the remarkable new golf course behind it. Other historic buildings have been preserved and updated, from cozy guest cottages to a two-room schoolhouse complete with a working bell in the steeple.

And every time a "Congaree kid" is at the school, the ambassadors on the property will know. That bell will ring. ✱

FINAL THOUGHT

✱ *"Pressure is when you play for five dollars a hole with only two in your pocket."* **—LEE TREVINO**

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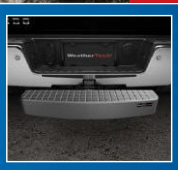
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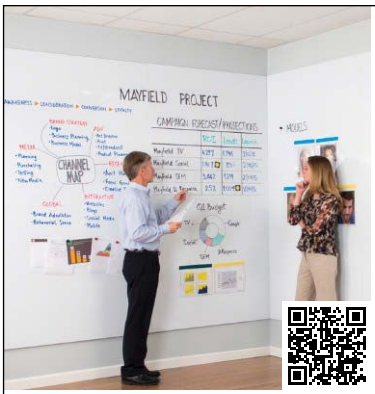

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THOUGHTS ON

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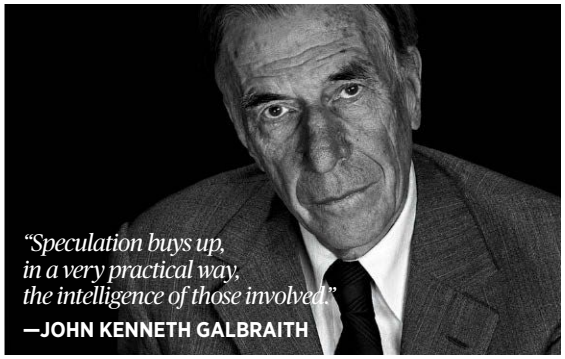
"It amazes me how people are often more willing to act based on little or no data than to use data that is a challenge to assemble."
—ROBERT J. SHILLER

"Men, it has been well said, think in herds; it will be seen that they go mad in herds, while they only recover their senses slowly, one by one."
—CHARLES MACKAY

"Crowds exhibit a docile respect for force, and are but slightly impressed by kindness–which for them is scarcely other than a form of weakness."
—GUSTAVE LE BON



"Speculation buys up, in a very practical way, the intelligence of those involved."
—JOHN KENNETH GALBRAITH

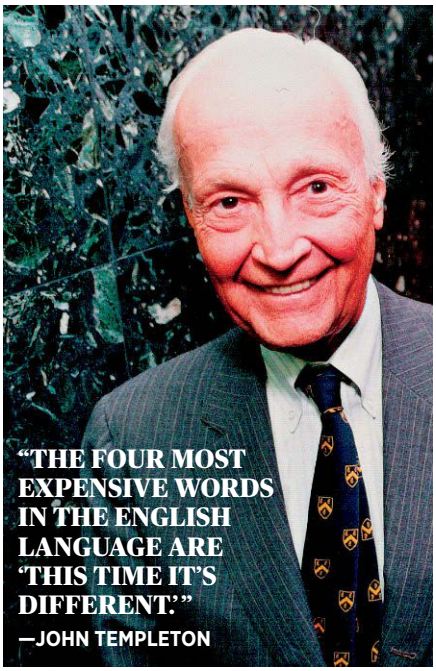
"You can get in way more trouble with a good idea than a bad idea, because you forget that the good idea has limits."
—BENJAMIN GRAHAM

"I CAN CALCULATE THE MOVEMENT OF STARS, BUT NOT THE MADNESS OF MEN."
—ISAAC NEWTON

"THE MAIN PURPOSE OF THE STOCK MARKET IS TO MAKE FOOLS OF AS MANY MEN AS POSSIBLE."
—BERNARD BARUCH

"BULL MARKETS ARE BORN ON PESSIMISM, GROW ON SKEPTICISM, MATURE ON OPTIMISM AND DIE ON EUPHORIA."
—DAVID SKARICA

"Over the short run, the fundamentals are often overwhelmed by the deafening noise of speculation."
—JOHN C. BOGLE



"THE FOUR MOST EXPENSIVE WORDS IN THE ENGLISH LANGUAGE ARE 'THIS TIME IT'S DIFFERENT.'"
—JOHN TEMPLETON

"IT'S A BASIC FACT OF LIFE THAT MANY THINGS 'EVERYBODY KNOWS' TURN OUT TO BE WRONG."
—JIM ROGERS

FINAL THOUGHT
"Refuse to be stampeded. Do your own thinking."
—B.C. FORBES

"THE DAYS OF PUNISHMENT ARE COMING; THE DAYS OF RECKONING ARE AT HAND. BECAUSE YOUR SINS ARE SO MANY AND YOUR HOSTILITY SO GREAT, THE PROPHET IS CONSIDERED A FOOL, THE INSPIRED PERSON A MANIAC."
—HOSEA 9:7

SOURCES: A SHORT HISTORY OF FINANCIAL EUPHORIA, BY JOHN KENNETH GALBRAITH; EXTRAORDINARY POPULAR DELUSIONS AND THE MADNESS OF CROWDS, BY CHARLES MACKAY; THE INTELLIGENT INVESTOR, BY BENJAMIN GRAHAM; THE CROWD: A STUDY OF THE POPULAR MIND, BY GUSTAVE LE BON; THE CLASH OF THE CULTURES: INVESTMENT VS. SPECULATION, BY JOHN C. BOGLE; IRRATIONAL EXUBERANCE, BY ROBERT J. SHILLER; COLLAPSE!, BY DAVID SKARICA.

CLOCKWISE FROM TOP LEFT: YALE UNIVERSITY/BLOOMBERG; MARY EVANS PICTURE LIBRARY/ALAMY; MICKEY ADAIR/GETTY IMAGES; AP; KEN CEDENO/BLOOMBERG; JONATHAN DRAKE/BLOOMBERG; ANNE MUNRO/TORONTO STAR/GETTY IMAGES; PACH BROTHERS/CORBIS/CORBIS/GETTY IMAGES; ULLSTEIN BILD/GETTY IMAGES

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