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JANUARY 2018

HOW HIGH WILL IT GO?

BITCOIN!

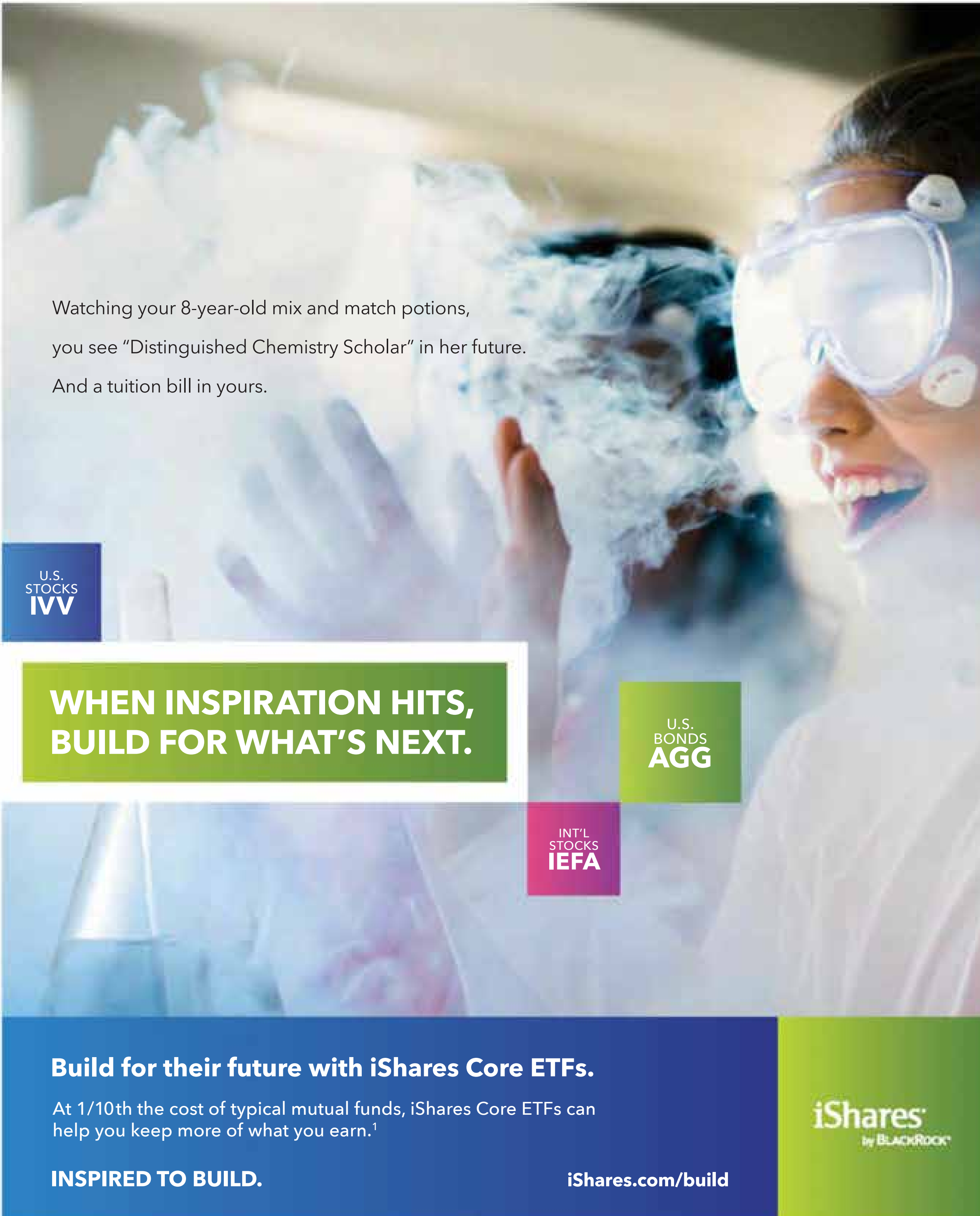
WHAT COULD BRING IT DOWN

WHO'S BETTING ON IT

ALL THE ANSWERS YOU'LL NEED FOR 2018

PLUS 25 COMPANIES THAT GET DESIGN RIGHT

...IS APPLE STILL LEADING THE WAY?



Watching your 8-year-old mix and match potions,
you see "Distinguished Chemistry Scholar" in her future.
And a tuition bill in yours.
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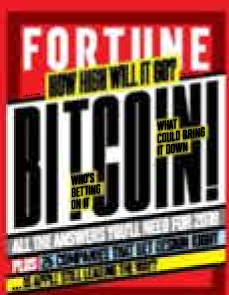

COVER DESIGN BY **PAUL MARTINEZ**

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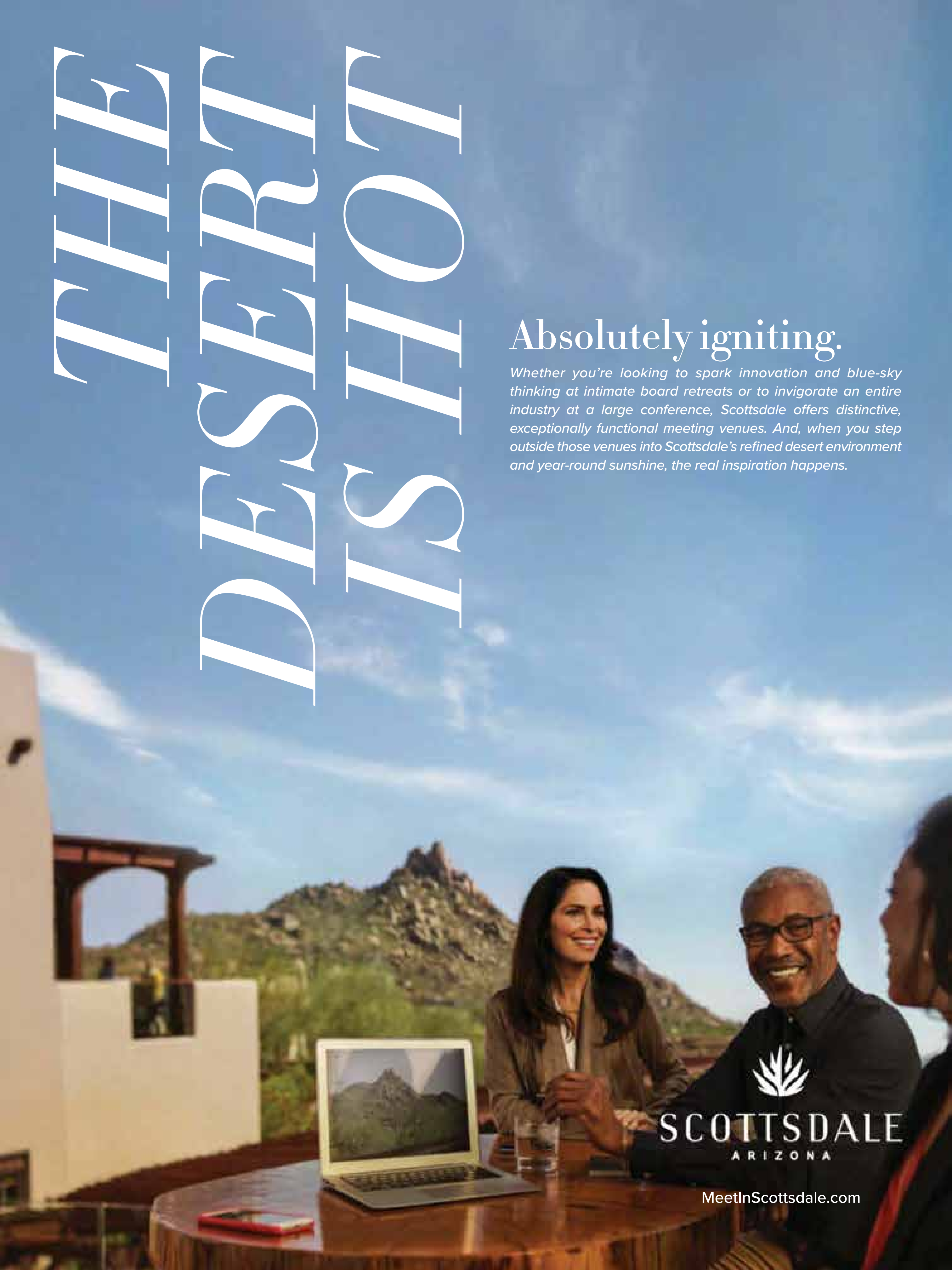
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THE QUEST FOR 'JUST RIGHT'

FOR MY LAST BIRTHDAY, my wife gave me a spectacular present: a product so ingeniously made that every time I use it, I marvel at how marvelous it is. The item? A sturdy plastic shoehorn.

Okay, I'll admit it sounds workaday. But what makes this shoehorn special is its length—30 inches—which allows its 6-foot 3-inch owner to put on the snuggest of loafers without sitting or bending down. There's even a curved edge to the handle that lets me hang the thing off the side of a bureau or closet door.

In a word, it's "intuitive"—which is about the highest compliment one can pay a product or service, whatever it may be. Yes, ever so rarely, a thingamajig or machine does what it's supposed to do so exquisitely—so in sync with what you want and expect it to do—that it delights you every time you use it. And though I can't tell you who manufactured my beloved shoehorn (there's no label on it), I would bet that it didn't get that way by accident. Rather, it was *designed* to be perfect.

If all that sounds hokey, you will be happily surprised to learn that there is an accelerating corporate movement to do the same—to design perfection—and it's being led by some of the most admired and fastest-growing companies around, from Alphabet to Uniqlo (please see our "Business by Design" package beginning on page 56). While the 25 companies we dig into in this issue aren't necessarily (or always) delivering on that goal, each is rethinking the way it develops what it makes or sells—often from the point of conception—with the aim of connecting with customers on a much deeper level.

Folks in Silicon Valley call the process "dog-fooding," making sure that they're eating their own cooking, so to speak—or, in Airbnb's case, hosting guests in their own homes and overnighting in strangers' apartments to make sure they're experiencing what their users are (page 66). Ikea is designing environmental sustainability into everything from construction to packaging to delivery. And to make sure it's being creative enough in its ideation and customer solutions, IBM has even dramatically changed the composition of its workforce, hiring so many in-house designers that it now has one for every eight engineers. Not long ago, the ratio was 1 to 72.

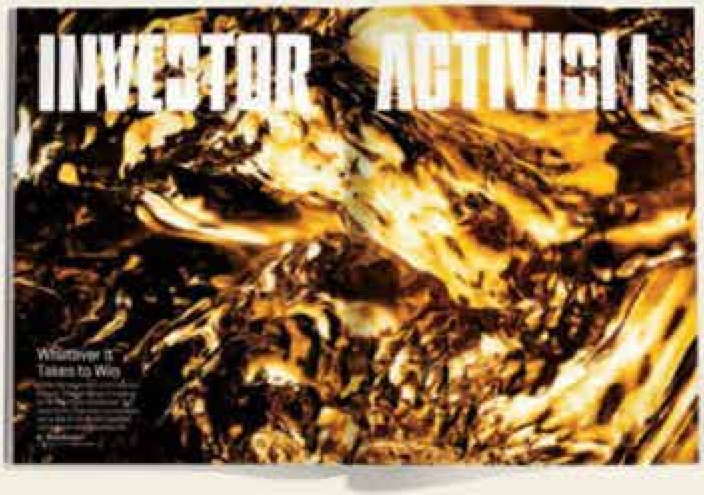
Then, of course, there's the company that has long inspired design-envy: Apple—and the raging debate about whether it has lost a step in the years since iconic CEO Steve Jobs passed away (see our feature on page 46). At the risk of playing spoiler, author Rick Tetzeli makes a convincing argument it hasn't.

The design movement is so integral to global corporate strategy these days that *Fortune* is launching, with partners *Time* and *Wallpaper**, our first international conference on the subject this March in Singapore. Brainstorm Design will gather the world's most creative thinkers and company leaders to explore how this new customer-centric approach is transforming everything from R&D to online sales.

Perhaps no design of the past decade has been as mind-bogglingly successful as the cryptocurrency created by a mysterious coder (or coders) in 2009: Bitcoin. As much as its jaw-dropping rise of some 1,800% in 2017 (at press time) speaks to its impact, so does the sudden influx of copycat coins, from Ethereum to Litecoin. Our cover story, beginning on page 36, will tell you everything you need to know about the phenomenon—and we couldn't have designed two better reporters to explain it than Robert Hackett and Jen Wieczner. Read on!

CLIFTON LEAF
Editor-in-Chief, *Fortune*
@CliftonLeaf

LETTERS



ELLIOTT OFFERS A NO-HEDGE RESPONSE

IN THE ARTICLE titled "Whatever It Takes to Win" [Dec. 15], *Fortune* relayed several instances in which unnamed people allege that the adult children of various executives were contacted by individuals that they assumed to be working for Elliott Management. This assumption and the implicit allegations that Elliott sent anyone to contact the children of these executives are completely false.

Elliott has always behaved ethically in its disputes with corporate managements and boards, and it is regrettable and disappointing that certain parties adverse to us would choose to promote false allegations about us rather than engage on the merits of our arguments in good faith.

Elliott Management Corp.
New York City

EDITOR'S NOTE: *During the reporting of this article,* Fortune*'s Jen Wieczner reached out to Elliott on at least seven occasions to ask for its perspective on the allegations referenced here; the firm repeatedly declined to comment on the record. After the article was published, Elliott responded with a letter, excerpted above.*

MORE ON ELLIOTT

MOST OF US (INVESTORS) spend our days ferreting through filings and statements, trying to find clever business models implemented by exceptional managers, understanding that the unexceptional and incompetent will simply wither away over time. Therefore, we pay no attention to these unexceptional pipe dreams; we assume they will struggle, inefficiently consume capital, and eventually evaporate. We get a good night's sleep and move on.

Elliott is a different animal. They recognize the unexceptional and bloated immediately. They dramatically accelerate and monetize the "withering," by any means necessary. They fix it (or dismantle it), often before management can even understand what's happening. Consequently, Elliott can generate a nice return where most fear to tread. The payoff? The value of the "accelerated wither."

I'd imagine the only downside for Paul [Singer] and Jesse [Cohn] might be an occasional bout of insomnia. As any boxer would tell you, starting fights is a tough way to make a living.

Bob Wittbrot
Cleveland

A CHAIN OFF THE OLD BLOCK

RE "THE MARK OF ZOOKO," *in the Dec. 15 issue, which discussed efforts by programmers to fix a major deficiency in cryptocurrencies like Bitcoin, using a privacy-enhancing technology known as zk-SNARKs:* Robert Hackett did an amazing job at communicating this complex, multifaceted topic in an accessible way, elucidating the social importance of the technology, vividly portraying its evolution, and bringing perspectives about promise.

The zk-SNARK technology, which I helped develop, has great potential, and we're indeed seeing keen interest in its applications by parties ranging from blockchain cypherpunks to the U.S. Department of Defense, national banks, and enterprises.

Eran Tromer
Professor, computer science
Tel Aviv University

CORRECTION

A graphic in "Whatever It Takes to Win" [Dec. 15] misstated the title of Jay Y. Lee; he is the vice chairman of Samsung Electronics.

© STEPHEN LEWIS

BRIEFING

THE WORLD IN 8 PAGES

PAGE 1

I.O.U.S.A.

Both the U.S. government and Americans on the whole are racking up more debt than ever—with no sign of slowing. When will it be time to panic?

By Erika Fry

DEBT

EARLY LAST SUMMER, the National Debt Clock—a New York City fixture that has been tracking the U.S. government's arrears since 1989—got sent, somewhat aptly, for a tune-up. By the time it had been returned to Midtown Manhattan, half a year later, the country had blown $687 billion further into the red and reached the historic $20 trillion mark.

Indeed, America's debt is mountainous and growing. What the federal government alone owes its creditors easily eclipses what the nation produced economically (our gross domestic product) in 2016. The nation's debt-to-GDP ratio is as high as it's been since World War II, and many independent

▷▷ experts say it's poised to grow further under GOP tax plans. Federal Reserve chair Janet Yellen recently told Congress that the debt's trajectory is "the kind of thing that should keep people awake at night."

But as badly skewed as the U.S. Treasury's ledgers are, they only hint at the true extent of America's indebtedness. As of September 2017, American household debt, for instance, stood at an all-time high, according to the Federal Bank of New York: $12.96 trillion.

Companies have also been leveraging up. Outstanding corporate debt in the U.S. has swelled to $6.1 trillion, a 39% increase in the past five years and an 85% hike over the decade.

But while such figures may paint a frightening picture—one of a nation living precariously beyond its means—it may not be quite time to panic (at least not yet).

"Increasing nominal debt is not necessarily a danger sign ... It's important to think about income and the ability to repay," says Randy Kroszner, a former Federal Reserve governor who teaches at Chicago's Booth School of Business. "If I have $10 million in debt outstanding, that's really risky. If Warren Buffett has $10 million in outstanding debt, that's some of the safest debt in the world."

While few Americans are in Buffett territory, the U.S. population overall is better off than it was during the Great Recession. The nominal, or absolute, level of household debt—the roughly $13 trillion citizens owe—may be at a record, but debt service payments as a share of disposable income are lower than they have been in decades.

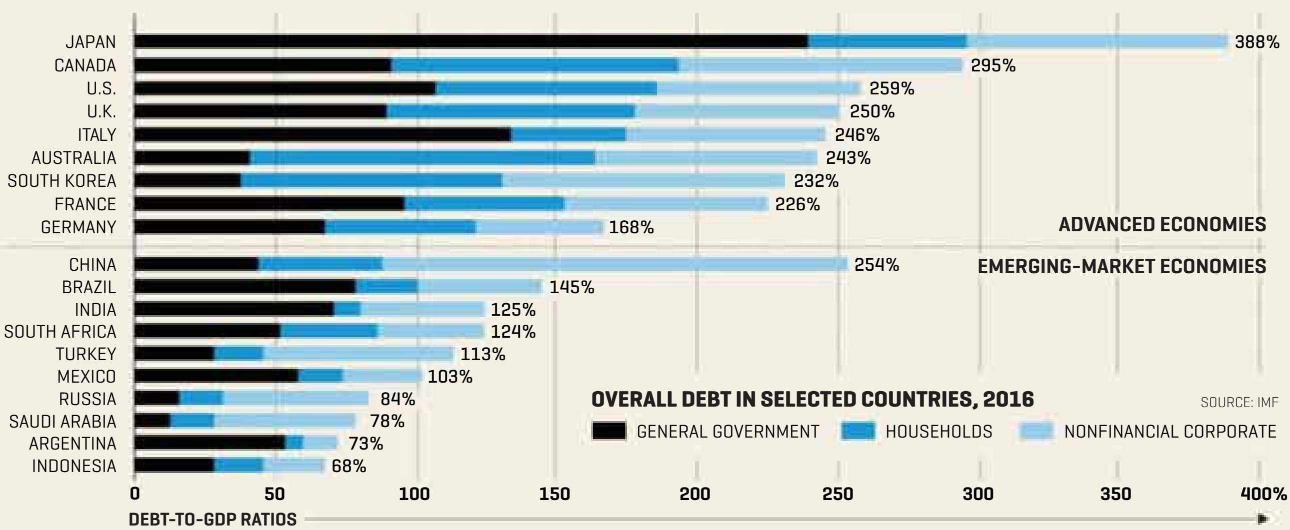
And while experts do see certain vulnerabilities in the system—automobile and student loans, in particular—Kroszner says the data suggest that Americans are recovering and reestablishing their ability to borrow responsibly.

The corporate story is also nuanced. After all, the stock market is at record highs, as is the amount of cash companies are keeping on their balance sheets. Still, the rise in corporate debt is striking: According to a *Fortune* analysis of the largest 1,000 U.S. companies by revenue, the average debt-to-capital ratio has risen steadily from 35% a decade ago to 54% today—its highest level in more than 20 years. Corporate debt is also growing at a much faster rate than sales—rising at an annualized rate of 8.5% over the past 10 years, vs. 4.6% for sales growth.

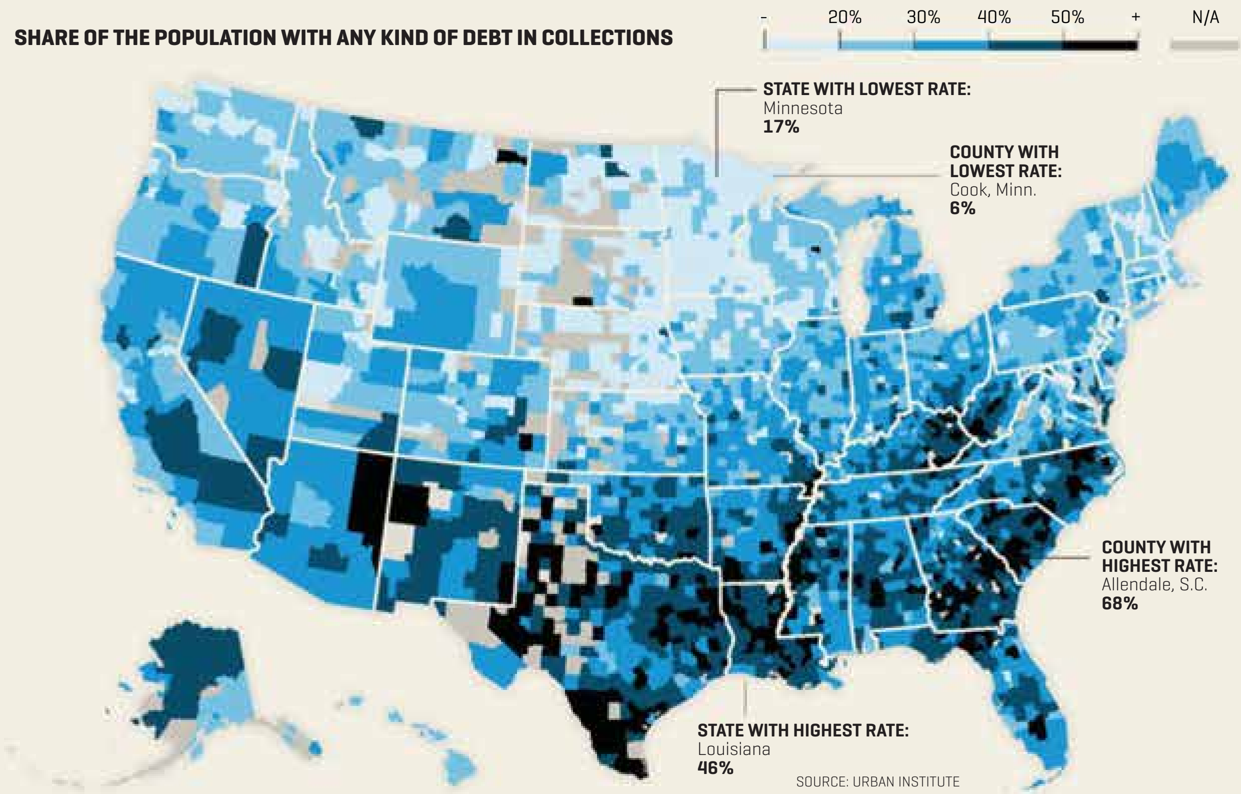
This shift has been driven largely by low interest rates, of course; it's darn cheap to borrow money, and tax-favorable as well, given that debt service payments are deductible

THE WORLD'S BIGGEST DEBTORS

Money owed by the U.S. government, households, and corporations exceeds 250% of economic output, according to IMF data. And it's not the only country with a sky-high ratio.



SHARE OF THE POPULATION WITH ANY KIND OF DEBT IN COLLECTIONS



THE UNITED STATES OF ARREARS

A startling number of Americans have debt that has gone into collections, according to a December report from the Urban Institute. An average of 33% of Americans have outstanding debt with collectors, and that number exceeds 50% in many Southern counties.

for corporations. That's why even cash-rich companies like Apple take on debt to buy back shares; it would cost far more to repatriate the cash they're hoarding overseas.

But then, there aren't many Apples out there, as a recent analysis by S&P Global drives home. It found that of the record $1.92 trillion in cash the U.S.'s largest 2,000 companies now hold, more than $1 trillion of it is held by a mere 1% of those companies.

While the rising level of corporate debt is worth monitoring, says Kathy Bostjancic of Oxford Economics, by itself it's not likely to lead to a recession.

It could, however, increase the pain if there is one. High debt loads make companies and consumers more vulnerable to shocks because servicing it gets tricky when the economy turns sour.

Debt loads could also become a problem somewhere else first—which could ultimately lead to tremors in the U.S. Both the IMF and the OECD have sounded the alarm over rising global borrowing. Households in advanced economies like Canada, Korea, and the U.K. are particularly burdened, while China has taken efforts to rein in fast-rising debt in its corporate sector. In terms of national debt meanwhile, Japan is 2.5 times more in the red than the U.S.

Given the deficit projections around the pending tax bill, many economists are asking, How much is too much? Kroszner says a lot of it comes down to the strength of institutions and the wisdom of the investments. If you're blowing the money on short-term fixes, it'll be harder to dig yourself out of that hole. ■

CRAZES

This App Could Be the Future of TV (No, Seriously)

What Vice TV is to *60 Minutes,* HQ Trivia is to *Jeopardy.* But it has competition.

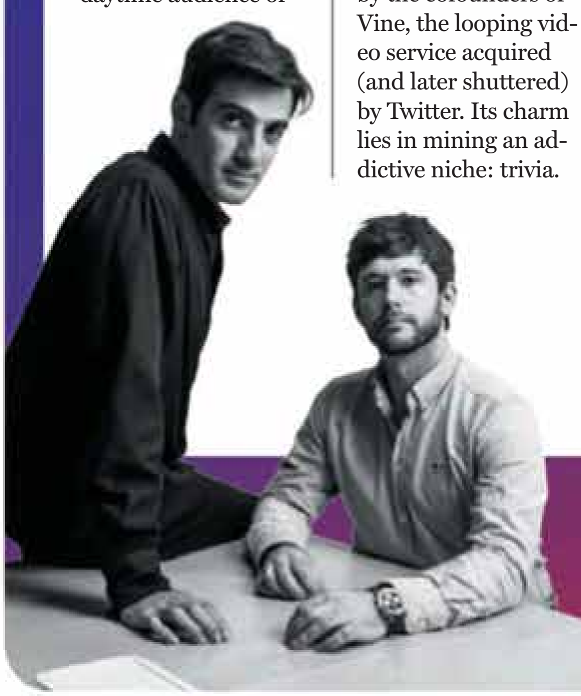
By Robert Hackett

MOST DAYS at 3 p.m. and 9 p.m. millennials across the country stop what they're doing—be it work, dinner parties, or drinks—and tune into the twice-daily broadcast of HQ Trivia. The mobile app, a live 12-question game show, regularly draws about 400,000 players—more than half the daytime audience of CNN. That's despite having virtually no social network, keeping user-generated content to a minimum, and being offline 98% of the day.

HQ has seemingly defied every rule for mobile hitmaking, and yet increasingly, reviewers gush it just might be "the future of TV."

The app was built by the cofounders of Vine, the looping video service acquired (and later shuttered) by Twitter. Its charm lies in mining an addictive niche: trivia. Add to that the program's gamification of live video, real money payouts (typically $1,000 to $10,000 split between however many winners), and a rotating cast of charismatic show hosts—including the beloved "Quiz Daddy" Scott Rogowsky—and you've got yourself a viral sensation. But we've seen what can happen to faddish playthings (see *Pokémon Go*). Can the good vibes last?

CEO Rus Yusupov has already run into trouble, threatening to fire Rogowsky in a much-read article. (The two laughed it off in a jovial Twitter photo soon after.) And even as the app's maker reportedly seeks a $100 million valuation, competition is mounting: A cofounder of Yik Yak whipped up a competitor, The Q, for iOS and Android, and it's easy to imagine Facebook making a knockoff too. HQ may be brilliant, but it's straightforward to imitate. On that, there's no question.



HQ cofounders Rus Yusupov (left) and Colin Kroll.

PAGE 4

JEDI NUMBERS

THE BUSINESS OF *STAR WARS*

Box office domination is only part of the galactic saga's moneymaking strategy.

$225M

OPENING WEEKEND

The Last Jedi blasted its way to the second-best domestic opening weekend in box-office history, behind only 2015's *The Force Awakens* from the same series.

$600M

TOY SALES

Estimated revenue between Dec. 2016 and Nov. 2017 from *Star Wars* toys, the hottest toy property during that period. (Expect sales to tick up while *The Last Jedi* is in theaters.)

735

DAYS*

Time between *The Last Jedi*'s release and Dec. 20, 2019, when Episode IX finally hits theaters.

—TOM HUDDLESTON JR.

* If you can't wait that long, *Solo: A Star Wars Story* opens after 161 days.

YUSUPOV AND KROLL: SASHA MASLOV—THE NEW YORK TIMES/REDUX; LEGO: SIMON DAWSON—BLOOMBERG VIA GETTY IMAGES

REGULATION

WHAT COMES AFTER NET NEUTRALITY

In December the FCC voted to dismantle net neutrality, a move that (assuming it survives legal challenges) could allow telecoms to charge companies different rates for different Internet speeds. Will that destroy the Internet, as many tech pioneers claim, or pave the way for making it better? Depends on whom you ask.

THE OPTIMIST

TYLER COWEN
ECONOMIST, AUTHOR

"Bandwidth is scarce. If we'd like to have a future where you can do surgery over the Internet … we're going to need more infrastructure. Charging for it is a good way to get it in place."

THE PESSIMIST

MIGNON CLYBURN
FCC COMMISSIONER

"I dissent from this fiercely spun, legally lightweight, consumer-harming, corporate-enabling *Destroying Internet Freedom Order*."

A small-format Target store in Brooklyn (hundreds more may be in the works).

The Incredible Shrinking Store

It's not just margins that are getting smaller at U.S. retailers. **By Phil Wahba**

SHOPPING **WHEN BARNES & NOBLE** CEO Demos Parneros sought recently to reassure anxious investors after the bookseller reported a seventh consecutive quarter of declining sales, he announced a new strategy: shrinking stores.

Parneros's idea is for the 620-location chain to reduce its assortment of nonbook items, like games and toys, and more cleanly present the books it does sell. The intention is to make book buying more inviting—not to mention more efficient, with cheaper rent. Right now, a typical Barnes & Noble is 26,000 square feet in size; in the future, many could be as small as 10,000 square feet.

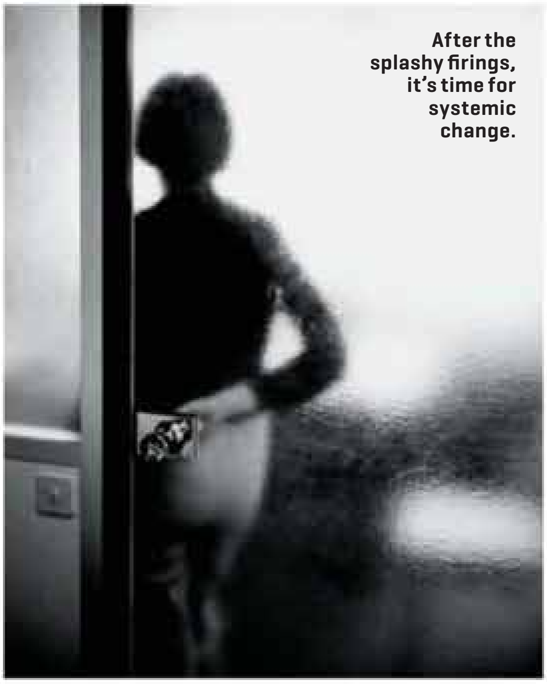
As it downsizes, the embattled bookseller is far from alone. In an e-commerce era where Amazon dominates, most brick-and-mortar shops can no longer afford to be glorified warehouses, and are dedicating more shelf space to unique items, harder to find online. This fall, Target announced it would accelerate the rollout of its urban-centric small stores, which garner more than twice the sales per square foot of its suburban emporia. (For more on Target's strategy, see page 24.) Kohl's said it would continue shrinking stores (leasing out extra space) on its way to having nearly half its locations be 35,000 to 55,000 square feet—down from 80,000. And Macy's is selling off real estate too, including several floors in its landmark downtown Seattle location. The building's new tenant, fittingly, will be Amazon.

IT'S NOT A "TAX," IT'S A "DONATION TO YOUR GOVERNMENT"

LOOPHOLES **THE GOP TAX BILL'S** scaling back of the state and local tax deduction isn't exactly an airtight deal. One possible workaround? Cities could cut income taxes for individuals but enact a (federally deductible) payroll tax on employers—theoretically resulting in a wash for workers. Or, explains Manoj Viswanathan of UC Hastings law school, states could let taxpayers "charitably contribute" their taxes, and deduct accordingly.

The Ball's in Your Court, HR

The concrete steps corporate America can take to help women at work. By Leigh Gallagher



After the splashy firings, it's time for systemic change.

EQUALITY

HARVEY WEINSTEIN. Louis C.K. VCs Steve Jurvetson and Justin Caldbeck. As more big names are torn down by the onslaught of harassment allegations, fervent conversations have been taking place in human resources departments across the land: How can we make sure our company doesn't end up as one of them?

Luckily, most experts say there's some relatively low-hanging fruit for companies that want to help women (and themselves) avoid uncomfortable situations. A few good places to start: Designate "lateral" employees to hear complaints, since people may feel more comfortable coming forward if they can go to peers first. Create anonymous tip lines—but make them truly anonymous. And don't include forced arbitration or nondisclosure clauses in employment agreements. In the tech world, NDAs were designed to protect trade secrets, says Niniane Wang, a founder who helped expose abuses in venture capital, but they can also have the effect of keeping women silent about harassment. At *Fortune*'s Most Powerful Women Next Gen Summit in November, Wang also called for tangible results that hurt perpetrators' bottom lines—resignations, for example, rather than "apologies and two weeks in rehab."

With the stakes so high, some may worry about a pendulum swing too far, where men begin to retreat reflexively from any kind of one-on-one engagement with women in the workplace, harming women's careers. But there's a solution to that problem too: Get more women in positions of power. No one abuses the boss, but beyond that, when a critical mass of women are in top positions the culture shifts. And finally, those female bosses should take up the cause. "There's a feeling as a woman that you have to 'play the game that's on the field,'" says OpenTable CEO Christa Quarles. "But in a leadership position, it's your duty to change the rules of the game."

SELF-IMPROVEMENT

FOUR EXECS SHARE THEIR NEW YEAR'S RESOLUTIONS

TORY BURCH
CEO & DESIGNER

"Less is more—in every sense. It's my new approach!"

GARY VAYNERCHUK
ENTREPRENEUR & AUTHOR

"I believe that if you are making a New Year's resolution you are not auditing yourself on a daily basis. You should be making a daily resolution."

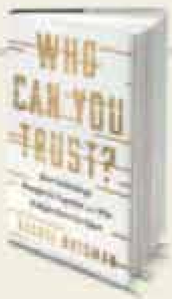
NELA RICHARDSON
CHIEF ECONOMIST, REDFIN

"I have two: Respond to emails more quickly, and listen more."

CHRIS ANDERSON
TED CURATOR

"To help turn the tide, just the teensiest little bit, in spreading reason and generosity in place of meanness."

HARASSMENT: ERICH HARTMANN—GETTY IMAGES; BURCH: TAYLOR HILL—WIREIMAGE; VAYNERCHUK: BRIAN GOVE—GETTY IMAGES; RICHARDSON: COURTESY OF REDFIN; ANDERSON: BRYAN BEDDER—GETTY IMAGES



BOOK VALUE

IN TECH WE TRUST

BACK IN 2010, when Uber and Airbnb were still in diapers, Rachel Botsman foretold the rise of the "sharing economy," in the book *What's Mine Is Yours.* Her latest title, *Who Can You Trust?,* is a deeply reported look at the key element that allowed the movement to blossom—along with so many other tech advancements. Botsman takes us deep inside what she calls the massive transfer of trust from institutions to individuals—enabled by technology, but with ramifications that go much further.

STREAKS

COMPANIES OF THE YEAR

WHICH CORPORATIONS led the pack in 2017? These four appeared on not one, not two, but *six* of Fortune's annual rankings. For our full list of 32 "Blue Ribbon" companies, go to *Fortune.com*.

AMAZON
Businessperson of the Year • Future 50 • Fastest-Growing Companies • Global 500 • *Fortune* 500 • World's Most Admired Companies

FACEBOOK
Businessperson of the Year • Future 50 • Fastest-Growing • Global 500 • *Fortune* 500 • Most Admired

NVIDIA
Businessperson of the Year • Future 50 • Fastest Growing • *Fortune* 500 • Best Companies to Work For • World's Most Admired

SALESFORCE
Businessperson of the Year • Future 50 • Change the World • *Fortune* 500 • Best Companies to Work For • World's Most Admired

Disney, Fox, and the CEO Who Can't Quit

The marriage of two media giants will supposedly be Disney CEO Bob Iger's last hurrah—but we've heard that before. By Michal Lev-Ram

MEDIA

IN MID-DECEMBER, Disney announced its much-anticipated, $52.4 billion bid to buy a sizable chunk of 21st Century Fox's media assets (an integral part of the Mouse House's master plan to wean itself off Netflix and start offering its own streaming services in 2018). In a press release confirming the deal, the company unveiled another well-leaked nugget of news: That it would renew chairman and CEO Bob Iger's contract through the end of 2021.

This wasn't the first or even second time that the board had extended Iger's tenure beyond its expected shelf life—it was the fifth. Indeed, in the 12 years since he became CEO of Disney, even as Iger has delivered outsize shareholder returns (15% vs. 9% for the S&P), he has frequently been primed to leave.

His original 2005 contract was set to last through 2010. But it was renewed in 2008, and again after the company made a series of big acquisitions, including Pixar and Marvel, in 2011. After Disney scooped up Lucasfilm in 2013 another extension followed (and yet another in March 2017).

Speaking at a conference in October 2017, the former weatherman forecast his departure in unequivocal terms. "This time I mean it," he had told the audience. "It's time."

Apparently not quite yet. According to this most recent contract extension, Iger will now have plenty of time to see the Fox deal through—and, hopefully, finally find a successor. ■

PAGE 8

The 10 Best Workplaces for Diversity

Plenty of companies pay lip service to inclusivity; we've found some that really deliver. For this list, *Fortune* partner Great Place to Work surveyed more than 400,000 employees who were either a racial or ethnic minority, female, LGBTQ, disabled, or were born before 1964. These are the 10 companies they loved working for the most. Find the full list of 100 on Fortune.com. **By Christina Austin**

01

COMCAST NBCUNIVERSAL

HQ .... Philadelphia
EMPLOYEES 159,000
MINORITIES ... Confidential

Employees "regardless of title" have access to senior leaders at the media giant and appreciate a culture that "promotes respect and diversity."

02

HYATT HOTELS

HQ .... Chicago
EMPLOYEES 97,828
MINORITIES 65%

The hotel chain makes staffers feel "respected and valued," with "amazing" coworkers and "great management that cares for the team."

03

ULTIMATE SOFTWARE

HQ .... Weston, Fla.
EMPLOYEES 4,305
MINORITIES 43%

"Everyone is treated equally," says one woman at this Florida-based IT firm, "regardless of age, gender, or sexual orientation."

04

SALESFORCE

HQ .... San Francisco
EMPLOYEES 29,700
MINORITIES 34%

The tech giant's employees rave about a culture "unmatched by anything I have experienced" and that lets them bring their "whole self" to work.

05

WEGMANS FOOD MARKETS

HQ .... Rochester, N.Y.
EMPLOYEES 47,084
MINORITIES 23%

"Empowering" managers "encourage career development" at the grocery chain, where everyone has "an opportunity to be successful."

06

PUBLIX SUPER MARKETS

HQ .... Lakeland, Fla.
EMPLOYEES 189,607
MINORITIES 42%

"There is always room to grow," say workers at this grocery chain, owned by its employees. "As soon as you get hired, you become a stock owner."

07

MARRIOTT INTERNATIONAL

HQ .... Bethesda, Md.
EMPLOYEES 408,500
MINORITIES 65%

"Fantastic women leaders" get high marks at this hotel chain, where "you can work your way up from dishwasher to general manager."

08

KIMPTON HOTELS & RESTAURANTS

HQ .... San Francisco
EMPLOYEES 8,265
MINORITIES 60%

Employees at the hotelier say it "truly celebrates individuality and welcomes diversity." Says one: "I've never been treated so well."

09

TEXAS HEALTH RESOURCES

HQ .... Arlington, Texas
EMPLOYEES 24,450
MINORITIES 42%

It's the "friendly and welcoming" teams that staffers love here, made up of "the highest integrity individuals I have ever worked with."

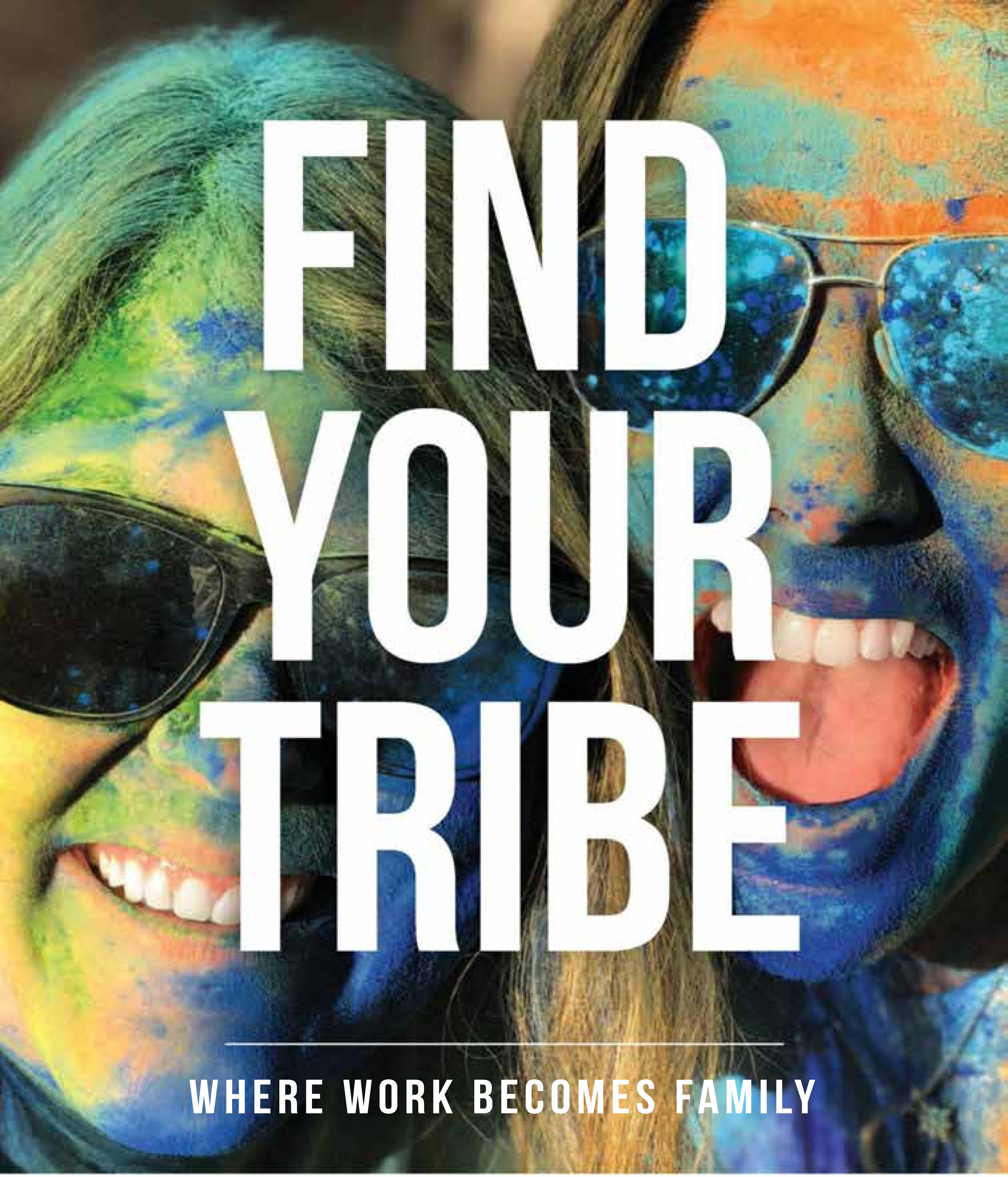
10

CAPITAL ONE FINANCIAL

HQ .... McLean, Va.
EMPLOYEES 47,300
MINORITIES 49%

Coworkers at the "passion-driven" finance giant help out "whenever needed." An added perk? "So many resources" for career advancement.

*EMPLOYEE COUNTS ARE GLOBAL TOTALS. PERCENTAGE OF RACIAL AND ETHNIC MINORITIES IS U.S.-ONLY. FIND THE FULL LIST AT FORTUNE.COM/BEST-WORKPLACES-FOR-DIVERSITY.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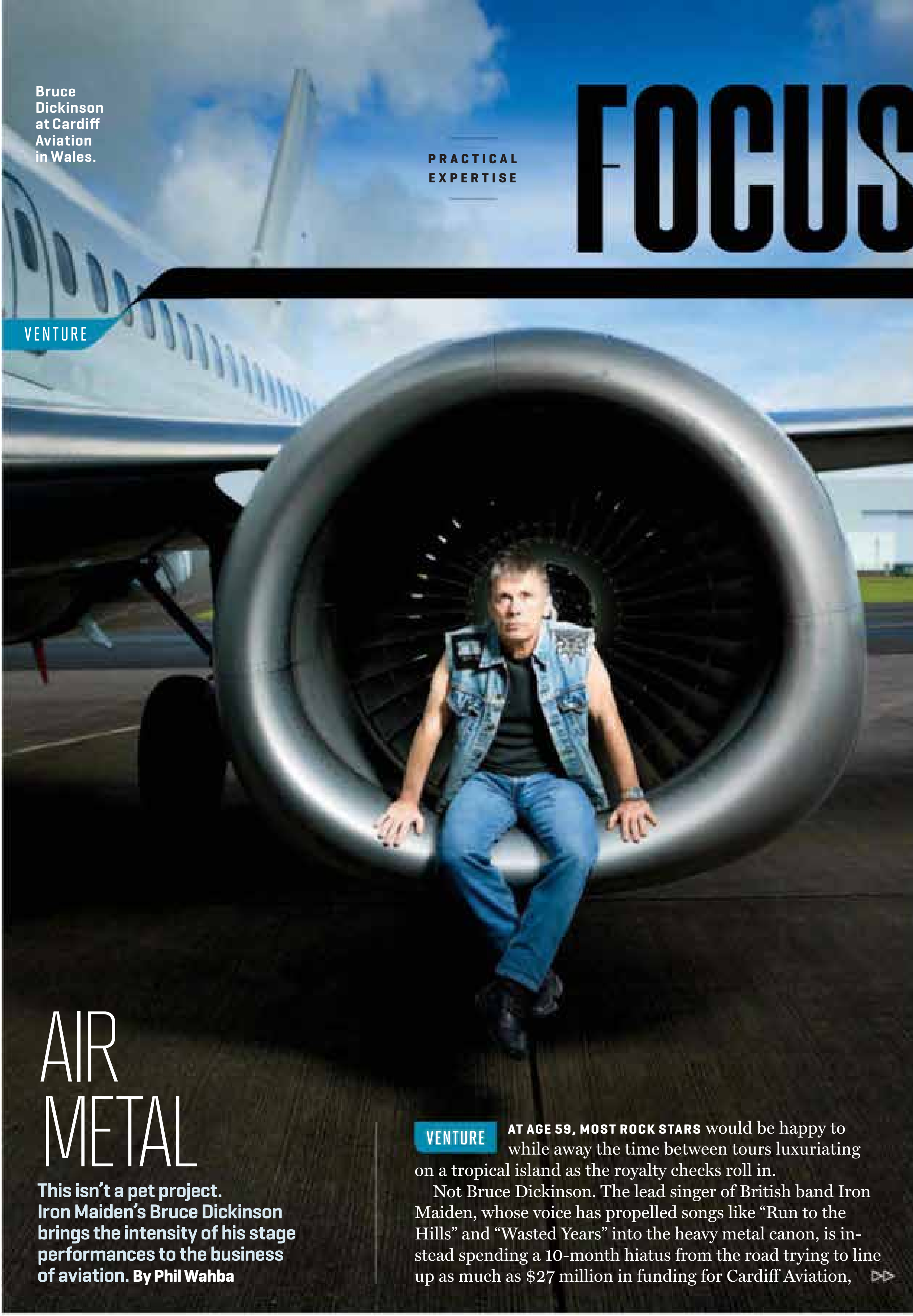


Bruce Dickinson at Cardiff Aviation in Wales.

AIR METAL

This isn't a pet project. Iron Maiden's Bruce Dickinson brings the intensity of his stage performances to the business of aviation. By Phil Wahba

VENTURE **AT AGE 59, MOST ROCK STARS** would be happy to while away the time between tours luxuriating on a tropical island as the royalty checks roll in.

Not Bruce Dickinson. The lead singer of British band Iron Maiden, whose voice has propelled songs like "Run to the Hills" and "Wasted Years" into the heavy metal canon, is instead spending a 10-month hiatus from the road trying to line up as much as $27 million in funding for Cardiff Aviation, ▷▷

PHOTOGRAPH BY **PAL HANSEN**

an airplane maintenance, repair, and pilot training company he cofounded five years ago and which he currently chairs.

"We want to get serious about the maintenance business, and that's going to require a proper level of investment. Otherwise, we'll always be just bouncing around underfinanced and undercapitalized," says Dickinson. (There were media reports in 2017, which Dickinson calls "malicious," saying that Cardiff fell into arrears on worker pay and that Dickinson had to fund the payroll out of his own pocket.)

The finance-speak couldn't contrast more starkly with his operatic exhortations for his legions of fans to "Scream for me!" at concerts.

Dickinson, who in the 1990s launched a second career as a commercial airline pilot and now flies Iron Maiden and crew when they are on tour, describes with pride how the company leases and maintains used airplanes and trains pilots. "There is an airline pilot shortage," he explains.

Another opportunity: smaller countries wanting to build their own airlines. Hence, Cardiff Aviation's so-called Airline in a Box, which relaunched Air Djibouti—providing aircraft, crews, and maintenance—before handing over the keys to a local CEO. Dickinson says two other African countries are looking at the service too.

His megastardom doesn't spare him from having to keep a 90-second elevator pitch at the ready in case he meets a venture capitalist. "Nothing's different because I'm Bruce Dickinson," he says. "It's exactly the same as for everyone else."

To be sure, Dickinson isn't the only music icon who doubles as an investor: U2's Bono, for example, is a managing director at private equity firm Elevation Partners. What makes Dickinson unusual is his deep involvement in the companies he invests in.

He is, for instance, very hands-on in the product development and marketing of Trooper craft ale, a joint venture between Iron Maiden and Robinsons Brewery named for one of the band's most popular songs. While working with a brewmaster to come up with flavors, Dickinson understood that for Trooper to have longevity, it couldn't just be a gimmicky beer.

"We would not have sold 19 million pints of beer or been one of the top brands in U.K. supermarkets if it was just an Iron Maiden beer," he says. The beer is now sold in 50 countries.

VENTURE

Dickinson in concert during the 1982 Beast on the Road tour, Merrillville, Ind.

© PAUL NATKIN—GETTY IMAGES

"THE KEY IS TO REINVENT YOURSELF, BUT WITHIN YOUR OWN TERMS OF REFERENCE."

And if he weren't busy enough, Dickinson has also put his own money (about $335,000) as a seed investor into Hybrid Air Vehicles, a British outfit that aims to bring enormous zeppelin-like airships back to the skies. (The company suffered a setback in November when its Airlander 10 broke free from its mooring and crashed into a field, injuring two people. Dickinson says he is keeping the faith and that "we will rebuild.")

Long before Dickinson accidentally discovered he had a rock star's voice, he had entrepreneurial ambitions, as detailed in his bestselling autobiography, *What Does This Button Do?* (Dey Street). At just 10 he started his first venture, Rent-A-Pencil, to take advantage of fellow students who had forgotten theirs. But he soon learned a brutal lesson about how hard capitalism can be: "When I'd ask for my pencils back and for the rent, nobody paid."

Dickinson relies on the same philosophy that has kept fans buying Iron Maiden records and concert tickets for over three decades: "The key is to reinvent yourself, but within your own terms of reference."

"We've created our own niche, and it's gotten bigger and bigger," he says of his band. He could well have been speaking about his business ventures too.

FILLING RETAIL'S EMPTY SPACES

Fundamental changes in the way people shop have driven brick-and-mortar retail stocks down to clearance-sale lows. But the retail chains that survive today's shakeout could pay off big for investors. By Ryan Derousseau

A slow day at the Brass Mill Center, a shopping mall in Waterbury, Conn.

TO SEE HOW changing consumer habits are disrupting the retail world, drop by the Florida Mall, an upscale complex in Orlando owned by mall giant Simon Property Group. A few years back, with traffic declining at its "anchor" department stores, the shopping center converted a Lord & Taylor into three separate, smaller shops. Then, three years ago, a Nordstrom was repurposed as a Dick's Sporting Goods after its lease expired, while a former Saks Fifth Avenue became a food court.

Robb Paltz, a structured-finance analyst at Moody's Investors Service, sees the Orlando complex as a case study in the evolution of shopping. "Department stores do not create the same draw as anchors that they did 10 to 15 years ago," Paltz wrote in a recent note. And places like the Florida Mall are looking to other retailers to fill the vacuum.

It's no secret that brick-and-mortar retail has been struggling. The S&P Retail Select index has been anemic for three years, falling an average of 1% annually. Over 2017 through mid-December, even as total bankruptcies fell 37%, eight big retailers, including Toys "R" Us, filed for Chapter 11, according to BankruptcyData. And despite a holiday shopping season in which spending is expected to rise sharply, 2018 could be worse, says Garrick Brown, a retail and real estate analyst at Cushman & Wakefield—with department stores high on many pessimists' watch lists.

Conventional wisdom

depicts this slump as the result of a zero-sum contest between online and in-person shopping, where Amazon and its ilk unstoppably siphon money away from stores. The reality is more nuanced. In-store shopping is hardly disappearing—Forrester Research estimates that 87% of retail sales in 2017 took place in stores. But shoppers are shifting their loyalties, seeking out retailers who can compete for their time with low prices and online options in the era of Jeff Bezos's "everything store." Those trends are creating daunting challenges for retailers—but they offer opportunities for investors who take a chance on what are now some very inexpensive stocks.

Just because a retailer is profitable today doesn't mean it's poised for success. Department stores still produce a tremendous amount of cash, enabling them to endure for "decades as a zombie retailer," says Bill Dreher, an analyst at Susquehanna. Macy's, the nation's largest department store chain, runs that risk. This fall its stock jumped after the chain reported that it had boosted free cash flow 26% through the first nine months of the current fiscal year. But it obtained those results in part by arranging to close about 100 stores—15% of its total fleet—in the face of a long-term sales decline. And Macy's balance sheet could become the tinder that burns down its clearance racks. The chain has a 27% debt-to-sales ratio, high enough to pose problems if its revenue decline accelerates. Citi analyst Paul Lejuez says the company will likely need to cut its dividend—it currently yields 5.85%—in order to pare down that debt.

For investors bargain hunting in the beleaguered sector, industry analysts recommend a relatively simple formula: Seek out companies that have low debt, that are growing their omnichannel presence (the term that is used to describe retailers' ability to serve customers either in-person or online), and that didn't expand too fast during the mall boom of the 1990s and 2000s.

By these measures, Seattle-based **Nordstrom** **(JWN, $45)** looks competitive (despite its setback at the Florida Mall). It's one of the few retailers still growing store count, through its off-price brand Nordstrom Rack, which is helping it reach discount-conscious shoppers. The chain currently has 117 full-size stores and 216 Rack stores. Nordstrom has also aggressively invested in online shopping: E-commerce now accounts for more than 20% of sales companywide, giving Nordstrom an "opportunity for a future," says Dreher. The stock has fallen 21% in the past year, after a failed attempt by the founding family to take the chain private. But at 15 times its estimated earnings for next year, it's trading at an attractive discount.

The stumbles of department stores are creating openings for the giants that anchor strip malls. Five years ago, investors weren't sure electronics retailer **Best Buy** **(BBY, $64)** would survive. But after cutting prices, beefing up its omnichannel presence, and reducing expenses, it has become an investor darling. Although its growing reliance on e-commerce has eaten into margins, its stock is up 75% over the past three years. Best Buy offers a "good blueprint" for other struggling retailers, says Citi analyst Kate McShane. It recently laid out plans to increase revenues 9% over four years—which counts as a robust pace in bricks and mortar. And its price-to-2018-earnings ratio remains 29% below the S&P 500's.

Target **(TGT, $63)** has looked sluggish compared with Walmart, in part because of its slow growth in fresh groceries. But its online sales have risen nearly 30% annually over the past two years. Target has also been focusing on wooing the customers nearby malls lose. It's remodeling stores and building smaller, easily navigable shops in densely populated neighborhoods, and it has scored wins with in-house brands like kids' clothing line Cat & Jack. McShane says she's waiting to see store traffic grow at a steady, sustainable pace before buying in, but she sees Target making the right moves for the new retail era. "They're very focused on being the right omnichannel retailer for their customers," she says. ■

DEFENDING THEIR TURF

As shoppers increasingly choose strip malls over shopping malls, chains like Best Buy and Target could reap the benefits.

SOURCE: BLOOMBERG PRICES AS OF DEC. 12, 2017

INVESTORS LOOK TO ASIA

A rebound in Japan and fast-growing middle-class populations throughout the region are making Asian stocks look like great bets for 2018. Here's how to play the market in three promising countries. By Lucinda Shen

AT THIS TIME LAST YEAR, many investors feared that a trade-skeptical Trump administration would lead to globalization's demise and crashes in foreign markets. But no such nightmares came true in 2017. In fact, many international equity markets outpaced the U.S. Driven by stabilizing oil prices and low interest rates, the MSCI World ex USA—which tracks developed markets outside the States—rose 24% over the past 12 months, six percentage points better than the S&P 500 over the same period.

Many money managers expect the trend to continue in 2018. With U.S. stocks riding at high valuations after nearly nine years of a bull market, the world outside is looking less expensive, with the ex USA index trading at 14.5 times forward earnings, compared with the S&P 500's 18 times. "We still see more upside in emerging markets, Europe,

▲ ILLUSTRATION BY MELANIE LAMBRICK

and Japan than in the U.S.," J.P. Morgan Asset Management managing director Paul Quinsee recently told clients. And that upside looks particularly big in India and East Asia, where newly minted middle-class consumers are helping companies generate big gains for investors. Here are three markets stirring excitement.

SOUTH KOREA: Michael Oh, a portfolio manager at the Matthews Asia Innovators Fund, says South Korean companies are capitalizing on the country's own rising middle class while catering to the far bigger consumer market in China. At the same time, he adds, "South Korea is often overlooked [by investors] for China and India, so the valuations tend to look very attractive." Oh is upbeat on **Samsung Electronics,** which he says is three years ahead of its peers in making flash memory products for smartphones and data storage. He also favors beauty-products maker **Hugel.** That company is making headway in China, the world's largest beauty market, where consumers tend to be less trusting of domestic brands. The **iShares MSCI South Korea Capped ETF** gives American investors easy access to South Korea's stocks; Samsung is its largest holding.

JAPAN: A steady diet of stimulative economic policy has finally had an impact in Japan, where the economy is on track for two consecutive years of growth—a rare feat in recent decades. But many asset managers say investors have yet to take advantage. "Earnings have grown faster than stock prices," a sign that there's lots of upside left, says Richard Turnill, global chief investment strategist at BlackRock. Tadahiro Fujimura, CIO of Sparx Asset Management, says that smaller companies, which aren't chained down by legacy products and old, bureaucratic structures, are in the best position to take advantage of the growth. That category includes **DCM Holding,** a home-center store not unlike Home Depot. Fujimura expects its earnings to grow about 10% in 2018. Investors can make a broader bet on Japanese small-caps with the **WisdomTree Japan SmallCap Dividend ETF,** which is up 26% over the past year.

INDIA: India's middle class is expected to grow even larger than China's one day—and they'll likely want to borrow money. Matthew Benkendorf, CIO at Vontobel Asset Management, likes **HDFC Bank,** the largest private bank in India, whose earnings have compounded 20% a year over the past decade in U.S. dollar terms. It's a middle-class play, offering mortgages, small-business loans, and checking accounts to a population that is largely unbanked. Oh, of Matthews Asia, says **IndusInd Bank** is also poised to capitalize on India's fast-growing and fast-flowing stream of disposable income. ■

MARKETS FOR A NEW YEAR

Stock markets in India, South Korea, and Japan outperformed the S&P 500 in 2017 through mid-December, and many investors expect them to do it again in 2018.

	INDIA	S. KOREA	JAPAN
MAIN STOCK MARKET 2017 RETURN*	**33.1%**	**34.5%**	**24.9%**
MARKET CAP	$497 BILLION	$1,418 BILLION	$3,582 BILLION
PROJ. 2018 GDP GROWTH	7.4%	3.0%	0.7%
GROWTH DRIVER	India has been gradually privatizing its banking sector, creating opportunities for publicly traded banks like HDFC and IndusInd to serve a fast-growing middle class.	As China shifts its economic focus away from heavy industry and toward consumer goods, companies like Samsung and beauty-products maker Hugel are big beneficiaries.	Tax cuts and monetary easing under Prime Minister Shinzo Abe appear to be moving the needle for Japan's long-sluggish economy, and corporate earnings are on the rise.

* IN USD

TOTAL RETURN THROUGH DEC. 12

SOURCES: IMF; BLOOMBERG

WITH U.S. STOCKS RIDING AT HIGH VALUATIONS AFTER NEARLY NINE YEARS OF A BULL MARKET, THE WORLD OUTSIDE IS LOOKING LESS EXPENSIVE.

GRAPHIC BY **NICOLAS RAPP**

A REVOLUTION OF HAVES AND HAVE-NOTS

High-skill technology jobs are concentrating in few places, even as their impact sweeps across the nation.

By Vauhini Vara

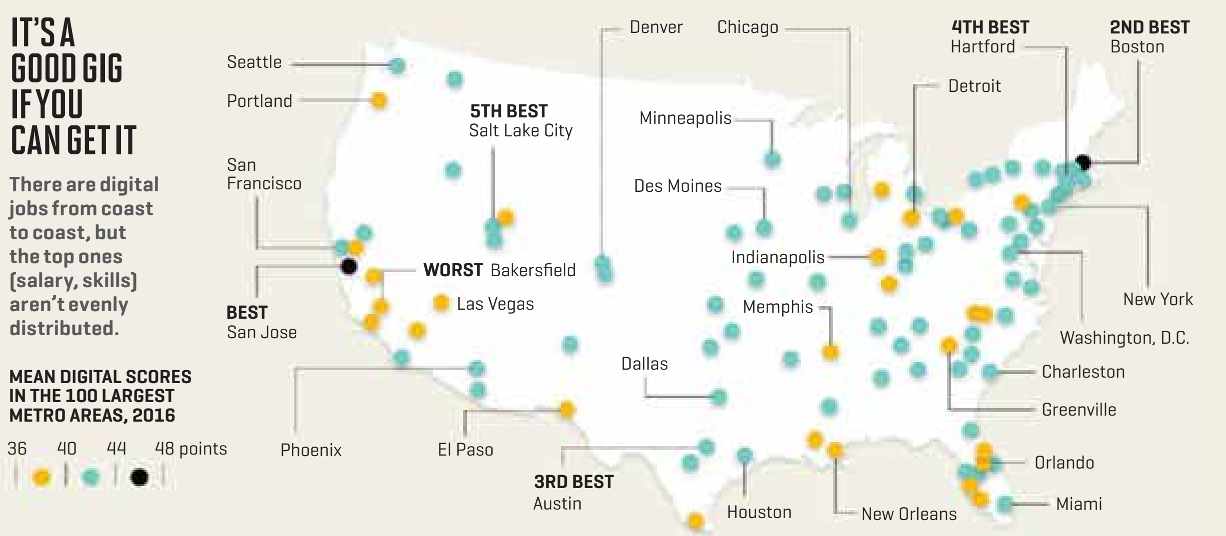
KEVIN MERSHON, A 32-YEAR-OLD entrepreneur in Bakersfield, Calif., has spent much of his adult life trying to persuade ambitious, technically oriented friends to stay in Bakersfield. He was raised there, went to college at San Jose State University to study computer science, then dropped out and—to the puzzlement of some friends—came home. Since then, he has become the acting director of Kern Innovation and Technology Community, an organization trying to build a tech community in Kern County, Bakersfield's home, and the managing partner of Start With Bakersfield, a venture capital firm that invests in local startups. Yet despite all his pro-Bakersfield arguments (cheaper housing! chances to network with local power brokers!), Mershon keeps watching people leave for techier cities. It's a chicken-and-egg problem of the highest order. Technical people won't stay in Bakersfield because not enough companies will hire them or invest in their startups, and companies and investors won't come to Bakersfield because they find the local tech talent unimpressive. Other cities have so much momentum that Mershon has concluded that Bakersfield and similar places are bound to fall further behind. "It's just insurmountable," he says.

Mershon's pessimism is borne out by evidence. The latest comes from the Brookings Institution, which studied a database of computer skills (from database entry to coding software) used in various occupations, then made a map of "digital scores" for U.S. metropolitan areas. Bakersfield tied with Las Vegas for the lowest average score among large cities, while San Jose scored the highest. What is most striking is that, though people like Mershon have been laboring for years to bridge the digital gap between cities like San Jose and those like Bakersfield, it

IT'S A GOOD GIG IF YOU CAN GET IT

There are digital jobs from coast to coast, but the top ones (salary, skills) aren't evenly distributed.

MEAN DIGITAL SCORES IN THE 100 LARGEST METRO AREAS, 2016



SOURCE: BROOKINGS

GRAPHIC BY NICOLAS RAPP

doesn't seem to be fully working. The Brookings researchers ranked cities' scores from 2002, then looked at how much each of those cities had improved as of 2016. They found that, in general, the cities whose scores used to be lowest have been closing the gap with the ones that used to be stronger, as technology infiltrates all kinds of occupations, from nursing to construction work. But when it comes to the highly digital employment that tends to be well-paid, like computer programming, San Jose and San Francisco are even further ahead now than they used to be.

Startups depend on venture capital funding, and that kind of investment is getting more concentrated in Silicon Valley—so that's where startups tend to put their roots and start hiring. Also, because both startups and more established tech companies hire a relatively small number of super-talented, creative employees—the kind who can come up with moneymaking innovations—they tend to hire in the places, like San Francisco and San Jose, where those would-be employees are known to gravitate. Both these effects are compounded by the fact that tech has become a winner-take-all market, with companies like Google and Apple consolidating their power—giving an advantage to the cities where they're based. People benefit from "living and working in the right place," says Mark Muro, a senior fellow at Brookings. "That's always been true, but digital technologies have really amplified that effect."

It's an unsettling conclusion. People understand that a lot of well-paid blue-collar laborers and office workers have found their jobs automated into extinction, but we have consoled ourselves with the thought that all this change will create new jobs for the people who have been displaced. The Brookings finding confirms that while some technical jobs are going to some of the cities that have been most hollowed out, the best ones aren't. Mershon, in Bakersfield, has started to feel that he should be encouraging the city's brightest residents to leave town after all, to give them a shot at doing well. He consoles himself with the thought that Start With Bakersfield could at least invest in some of them before sending them off to become successful entrepreneurs elsewhere. ∎

SCIENCE SOURCE/GETTY IMAGES

INVENTING THE INVENTORS

The United States is far from a meritocracy when it comes to creating the next generation of innovators. By Grace Donnelly

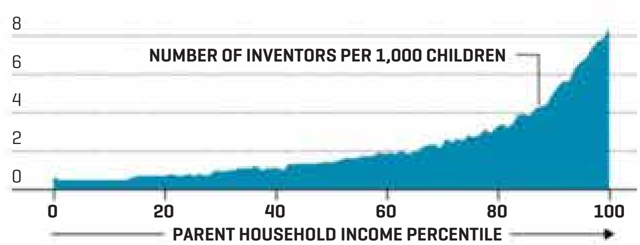
STUDENTS WITH THE POTENTIAL to be America's next Einstein can be identified in elementary school, yet most won't grow up to be innovators. So where's the disconnect? Researchers from the Equality of Opportunity Project examined patents, tax records, and test scores to determine which kids grow up to become inventors in the United States—and which ones do not. According to the findings, limitations that begin early in life help dictate whether a given American will contribute transformational ideas to society.

"I was a little shocked that you could know so much just by third grade about who's going to become an inventor based on science and math test scores," says Alex Bell, a doctoral student at Harvard and lead author of the study.

But even top-scoring students weren't much more likely to grow up to be innovators unless they were boys from white, upper-class backgrounds. Children from the top 1% of household incomes were 10 times as likely to become inventors when they grew up as their middle- and low-income peers. White children were three times as likely as black children, and girls go on to hold just 18% of patents in the U.S.

Decreasing these disparities hinges on changing a student's environment and correcting a lack of exposure to innovation. Proximity to inventors made children more likely to grow up to become patent holders, specifically in the same fields as their parents or other adults in their communities. "You can't be what you can't see," Bell says. "Having a mentor or a role model that's in some sense similar to you is important."

Imagine a world where, for example, girls saw women inventors as often as boys see men inventors. Recognizing the problem, then, is the first step to retaining these lost Einsteins. "This is not just the lives of the people who fall out of the pipeline that we're talking about," Bell says. "This is something very important to all of society."



SOURCE: HARVARD UNIVERSITY

THE GIFT OF GAB

Forget fingerprints and face identification. The future of secure authentication is your voice, thanks to artificial intelligence. **By Jennifer Alsever**

TECH **WHAT DOES YOUR VOICE** really say about you? More than the human brain can even conceive, it turns out. Your voice offers hints about your mood, social status, upbringing, age, ethnicity, weight, height, and facial features—plus information about the environment around you.

The human ear cannot detect these minute inputs. But artificial intelligence? Well, that's another story.

Software, often learning from those customer service calls "recorded for training purposes," can now pick up microsignatures in a voice that reveal telling details about the speaker. It's a concept called "voice profiling," and in December researchers at Carnegie Mellon University achieved a breakthrough by using artificial intelligence to generate a three-dimensional image of a speaker's face, simply by analyzing a voice recording. "Your voice is like your DNA or your fingerprint," says Rita Singh, who leads the research at Carnegie Mellon.

Research into voice analysis has been ongoing for decades, but it wasn't until this one that the field began to make its way toward the mainstream. Today a broad constellation of voice technologies is expanding, thanks to more robust computing power and more sophisticated algorithms.

The U.S. Coast Guard is using Carnegie Mellon's A.I. to build its own criminal cases against prank callers who send crews out on false search-and-rescue missions, which are costly and time-consuming. The agency receives about 150 hoax calls a year. The technology has contributed to a criminal case against one such caller—though it's unclear whether such voice fingerprinting will hold up in court.

A voiceprint makes it possible for your bank to have fewer security breaches because it knows that you're you and not your evil twin sister. It also enables your car to recognize you when you slip into the driver's seat and speak, unlocking secure apps and automatically adjusting the seat and temperature based on your preferences. (BMW, Audi, and Ford are among the many carmakers working the technology with Nuance Communications, a voice technology company in Burlington, Mass.)

And when you ask your TV for a good comedy, a voiceprint might prompt it to display R-rated movies rather than the G-rated ones it offers your nine-year-old daughter when she asks it the same question. Orange TV in France is working with Nuance on such an application.

"This is the very, very beginning," says Amy Webb, founder of the Future Today Institute, which researches technology and forecasts future tech trends. "We're going to see dramatic shifts [in biometric and voice technology] in the next 10 years."

Singh hopes that her tech could one day help doctors using telemedicine identify the early onset of conditions like Parkinson's disease. It's the tip of the iceberg of possibility. Says Singh: "Just like your DNA defines you, your voice captures your entire persona." ■

ILLUSTRATION BY SAM ISLAND

MEISTER SINGER

When money is no object, a classic Porsche 911 can become anything you want it to be.

By Jaclyn Trop

WHEN ROB DICKINSON, the lead singer for '90s British rock band Catherine Wheel, moved to Hollywood in the early aughts, he drove a 1969 Porsche 911 that he lovingly dubbed the "Brown Bomber"—a classic car he restored to serve as a lightweight daily driver. Before long he was approached all over town—not for his autograph—rather to field questions about and receive offers for his car. One especially appreciative motorist even handed him a glass of Champagne at a stoplight.

"Hollywood is a pretty tough audience to impress, and it just proved to me that the fascination that I had for the 911 went deeper than just nerds like me," Dickinson, 52, recalls from a glass-paneled conference room at his Sun Valley, Calif., office. "What I did appealed to other people—not just Porsche people but average laypeople who have a personal interest in cars."

Now his eight-year-old company, Singer Vehicle Design (a nod to his previous career, as well as an homage to famed Porsche engineer Norbert Singer), is charging up to seven figures to restore models from the nameplate's air-cooled golden period of the late 1980s to early 1990s and turn them into the "ultimate 911."

The final product, a Porsche 911 "reimagined" by Singer, leaves no detail unattended. A new engine, drivetrain, and suspension increase the driving performance, while painstakingly refurbished bodywork and Singer touches like handwoven door panels and quilted leather trunk liners let you know this is a very special car.

After contracting with Singer, customers turn over their "964"-model Porsche 911 (built between 1989 and 1994) and a sizable deposit before the company puts 4,000 hours into restoring, tuning, and customizing it.

Singer Vehicle Design's basic restoration services begin at $395,000 but average $600,000, "which is still way too cheap," says Dickinson, "for the assiduous labor and hand-built parts required." (He does, however, hold a "deep-seated English guilt" over the steep price tag.)

In 2009, Dickinson charged one of his first customers $300,000 and ended up spending $800,000 on the restoration. "I picked a number out of thin air and of course it was nowhere near, and we've spent the last eight years really understanding how astro-

ABOVE: COURTESY OF SINGER VEHICLE DESIGN

A 1990 Porsche 911 modified by Singer and Williams.

nomically expensive it is to do this," he says, reclining in his unofficial uniform of a black T-shirt, cuffed jeans, sneakers, and a jaunty green Goorin Bros. cap.

The former rock star restoring six-figure Porsches recalls a car-obsessed childhood underpinned by a curiosity about mechanical objects, heritage brands, and the trappings of the retro international man of mystery: sunglasses, cigarettes, and watches. (The company entered the watch market this summer, launching the $41,000 Singer Track 1 chronograph with Swiss designer Marco Borraccino.) Dickinson's earliest automotive memory: watching the friendly face and businesslike rear of a green Porsche 911 pass his family's VW Beetle on a summer vacation in France when he was 5. Ever since, Dickinson says, he's "had a fascination with the ultimate version of things."

The opportunity to cross that threshold arrived when a longtime customer asked him to take his 1990 Porsche 911 to the next level. The company began a "dynamics and lightweighting study" with Formula 1's Williams Advanced Engineering, eventually developing a new engine and full carbon fiber body panels, and making extensive use of lightweight materials with some help from famed Porsche engine-builder Hans Mezger and Norbert Singer himself.

This fall, Singer and Williams delivered on the dream and "reimagined" the pinnacle of air-cooled Porsches. The modifications, part of a limited run of 75 slated to begin deliveries at the end of 2018, will routinely fetch upwards of seven figures. The first commission, a modern, 500-horsepower sports car with retro flair, makes good on Dickinson's childhood dream "to restore an old 911 to be the best that there will ever, ever, ever be."

Even customers who don't opt for the F1 treatment, however, will continue to receive bespoke service, from 75 paint choices to "special wishes" such as the authentic-looking nickel-plated snowboard rack the company built for a customer in Moscow. "Nobody wrote the book on how to do what we've done with the Porsches," he says, "and no one has really written a book on developing a brand like ours." ■

Left: Singer founder Rob Dickinson; right: Porsche 911 modified with snowboard rack.

© FAR RIGHT: GF WILLIAMS; COURTESY OF SINGER VEHICLE DESIGN

THREE KEYS TO OUR CULTURE

By Corey Anthony

When I hear stories about AT&T employees who dedicate themselves to customer service, it fills me with pride. I'm talking about people like the technician who battled gale-force winds and frigid temperatures to connect his truck battery to a generator so customers wouldn't lose service—or the thousands of AT&T employees who worked so hard to reconnect people with loved ones after this year's hurricanes.

Every company hopes for a culture where employees consistently go above and beyond. For us, truly valuing diversity and inclusion has been key to creating that kind of workplace. At AT&T, every employee can reach his or her fullest potential. Things like race, national origin, gender, physical disabilities, age, or sexual orientation are never barriers.

Equally important is our focus on continuous learning. If employees want to move up, or even reinvent their careers, we give them the tools to do so. Our business, like most, is evolving quickly; the skills we need today are vastly different from those we needed just a few years ago. That's why any AT&T employee who wants to reskill to be ready for future job opportunities has a wide choice of learning options available.

The third thing we do to create the kind of culture that attracts great people is give back to our communities. Beyond our $350 million AT&T Aspire program, our Employee Resource Groups spent considerable hours making a difference in our communities. Every year, they teach young people the value of a STEM education, help the elderly understand technology, and give tens of thousands of dollars to students in need. The impact this has on individuals, families and our communities is immeasurable.

Taken together, we've found that valuing diversity, providing continuous learning opportunities, and giving back to our communities make AT&T a great place to work. Our employees are proud of their company, and are committed to making it even better.

Corey Anthony is Senior Vice President, Human Resources, & Chief Diversity Officer at AT&T

AT&T HAS...

...invested $140 billion in capital over the past five years (2012 – 2016), more than any other publicly held U.S. company

...the largest full-time union workforce in the U.S.

...12 employee resource groups and 12 employee networks with nearly 140,000 memberships

Includes capital investments in our wireless and wireline networks and acquisitions of wireless spectrum and operations from 2012 to 2016


INCLUSION IS OUR PROUDEST INNOVATION.
At AT&T, we're excited about new ideas from every background. We believe that a diverse and inclusive workforce is the foundation of a successful and innovative work culture.
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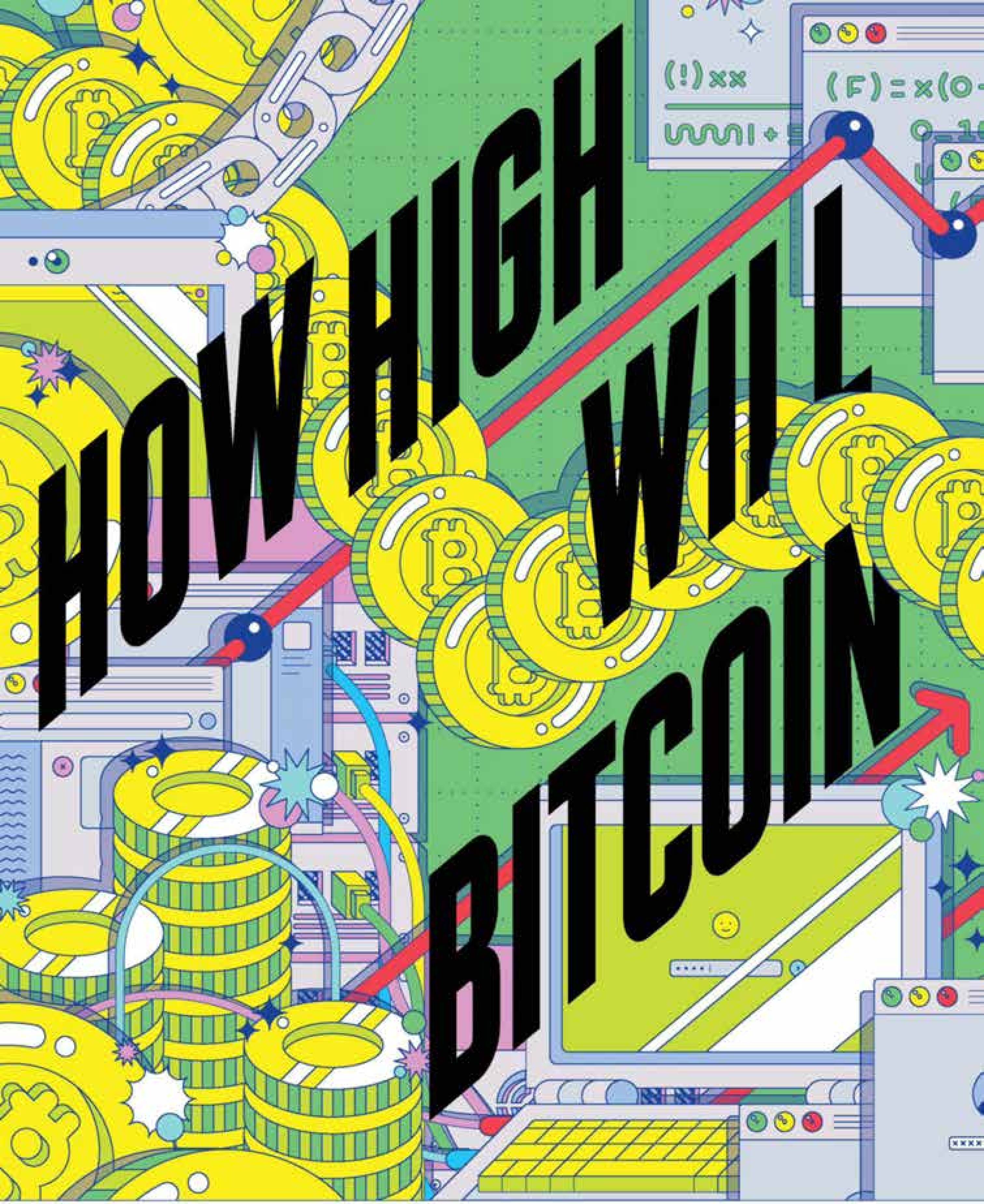
HOW HIGH WILL BITCOIN



GO?

From the tulip mania of the 17th century to the modern dotcom bubble, investors have followed irrational exuberance into despair more times than we can count. But we've NEVER seen anything like Bitcoin. What's driving the crypto craze—and how long can it last?

By ROBERT HACKETT and JEN WIECZNER

Had Jerry Brito's daughter waited longer to emerge, she might have been someone else entirely. In November, as Brito paced the hospital for 23 hours while his wife was in the delivery room, he floated an alternative name for the baby: "Ten Thousand."

The founding executive director of the nonprofit Coin Center, Brito had spent years advocating for Bitcoin, arguing that the cryptocurrency, and the technology underpinning it, would dramatically change our economy, reshaping the world into which we're all born. Now Brito was on the cusp of realizing two long-held dreams. Even as his wife went into labor a few days after Thanksgiving, Bitcoin was taking off as well. Worth $950 at the start of the year, its price breached $9,000 while Brito waited in the maternity ward. This explained why his daughter was taking her time, he began saying: "This baby does not want to be born in a world where Bitcoin is not $10,000."

Alas, the price was only $9,600 when Brito's daughter arrived early Nov. 27; the parents went with a different name. But Bitcoin broke $10,000 the following night. And in the newborn's first 10 days on earth, it more than doubled again, grazing $20,000. In all, Bitcoin has seen a roughly 20-fold rise since the beginning of 2017, outshining virtually every conventional investment.

For true believers, the soaring rise rewarded a deep-seated faith. "It's always been kind of obvious to me that this technology is as profoundly revolutionary as the Internet was and is," Brito says. But Bitcoin's spike also represented the revolution's next phase. Less prescient investors, fearing they'd miss the opportunity of a lifetime, had jumped into the currency, spurring a frenzy. "If Bitcoin is successful, the opportunity I have, my son will not have, and definitively, my son's son will not have," says Martin Garcia, managing director at Genesis Trading, the only licensed U.S. broker-dealer for Bitcoin. "Once it's successful, it's a boring investment—it's a way to move money around the world." And "boring" doesn't earn you 1,800% in a year.

GOING MAINSTREAM

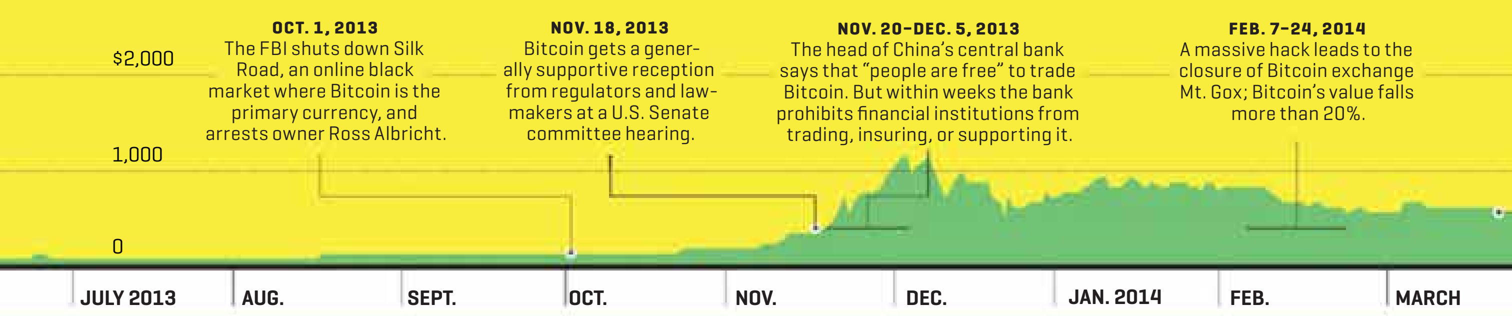
BITCOIN HAS PROVOKED hysteria before. Over one stretch of 2013, its price surged 85-fold; it crashed the following year after a hack of the exchange Mt. Gox shook the confidence of many early devotees. It wasn't until 2017, though, that Bitcoin hit a tipping point of mainstream popularity. By November, one of the biggest U.S. Bitcoin exchanges, Coinbase, had signed up some 12 million customers, surpassing the number of accounts at 46-year-old brokerage Charles Schwab. Within weeks, Coinbase's app became the iPhone's most downloaded. At press time, Bitcoin, once largely an insurgent's fantasy, was worth some $300 billion in real money.

"We are going through the biggest wealth generation opportunity of the century, and people want to participate," says Meltem Demirors, director of development at Digital Currency Group. DCG oversees a cryptocurrency portfolio including 1% of the total Bitcoin supply. It also invests in startups working on blockchains, accounting tools that use networks of computers to collectively sustain mutually trusted, shared ledgers of transactions, without relying on any outside institutions as middlemen.

The appeal of this tech is stoked by geopolitical unease. Since its inception in 2009, Bitcoin has fed off the festering distrust in institutions sown by the financial crisis. And as populist sentiment

SCENES FROM A MANIA

Highlights from the past five years of Bitcoin's history, from long slumps to sudden surges.



BIG FINANCE AND BITCOIN: IT'S COMPLICATED

Regulatory barriers and compliance issues have kept many big financial institutions from playing the Bitcoin boom. Some leaders are fine with that; others are impatient to pounce on the opportunity.

JAMIE DIMON
CEO, JPMORGAN CHASE

"IF WE HAVE A TRADER TRADING BITCOIN, I WOULD FIRE THEM IN A SECOND … IT'S WORSE THAN TULIP BULBS. IT WON'T END WELL. SOMEONE IS GOING TO GET KILLED … IT'S A FRAUD."

SEPT. 12, 2017
Barclays Global Financial Services conference

ABIGAIL JOHNSON
CEO, FIDELITY INV.

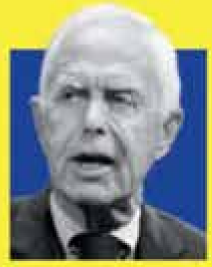
"I'M ONE OF THE FEW STANDING BEFORE YOU … FROM A LARGE FINANCIAL SERVICES COMPANY THAT HAS NOT GIVEN UP ON DIGITAL CURRENCIES. WE SET UP A SMALL BITCOIN AND ETHEREUM MINING OPERATION [THAT] NOW IS ACTUALLY MAKING A LOT OF MONEY."

MAY 23, 2017
at Consensus conference

LLOYD BLANKFEIN
CEO, GOLDMAN SACHS

"STILL THINKING ABOUT #BITCOIN. NO CONCLUSION—NOT ENDORSING/REJECTING. KNOW THAT FOLKS ALSO WERE SKEPTICAL WHEN PAPER MONEY DISPLACED GOLD."

OCT. 3, 2017
via Twitter



ARTHUR LEVITT
FORMER SEC COMMISSIONER

"I'M NOT SURE I WOULD INVEST IN BITCOIN ITSELF … BUT IT'S HERE TO STAY BECAUSE OF THE DISPARITY BETWEEN COUNTRIES WHERE A MONETARY SYSTEM IS ROBUST AND COUNTRIES WHERE THERE IS VIRTUALLY NO MONETARY SYSTEM."

SEPT. 14, 2017
Washington Post

has spread in the West, so has the allure of a decentralized currency outside the grasp of governments and banks. Bitcoin's price jumped after the U.K.'s Brexit vote in 2016—and again when Donald Trump won the White House. Combine such surges with ransomware attacks demanding payment in Bitcoin and buyers from countries like Venezuela seeking refuge from hyperinflation, and Bitcoin's significance has penetrated the public consciousness like never before.

"You do have people turning to it as that disaster hedge, much as they turn to gold," says Chris Burniske, cofounder of VC firm Placeholder and coauthor of *Cryptoassets,* a new investor's guide. "There's so much ammunition" feeding this movement, agrees Mike Novogratz, a billionaire former hedge fund manager who now has 30% of his net worth invested in Bitcoin and other cryptocurrencies. Every establishment failure reinforces the thesis; after debacles like the Wells Fargo fake-account scandal, he asks, "I'm supposed to trust those f--king banks?"

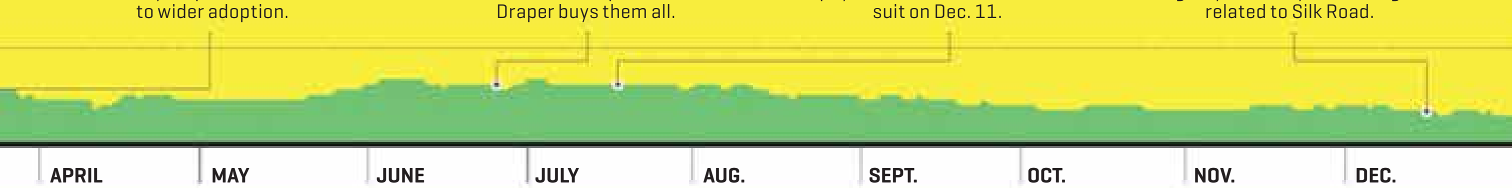
Trust them or not, banks and asset managers are poised to flock to Bitcoin too. "Wall Street has just started to dip their toes in," says Tyler Winklevoss, CEO and cofounder of Gemini, whose cryptocurrency exchange part-

MARCH 26, 2014
The IRS rules that Bitcoin should be taxed as an investment property rather than as currency—a potential barrier to wider adoption.

JUNE 27, 2014
The U.S. Marshals Service auctions nearly 30,000 Bitcoins seized from Silk Road. Venture capitalist Tim Draper buys them all.

JULY 18, 2014
Computer-maker Dell becomes the biggest company to date to accept Bitcoin as payment. Microsoft follows suit on Dec. 11.

DEC. 19, 2014
Charlie Shrem, Bitcoin's "first felon," is sentenced to two years in prison after pleading guilty to money laundering related to Silk Road.



BITCOIN AND BIG TECH: IT'S LOVE

Execs and investors in tech are accustomed to creating multibillion-dollar business categories where there was nothing before. So it's not surprising that they lean bullish (sometimes vulgarly so) on the potential of Bitcoin.

PETER THIEL
VENTURE CAPITALIST

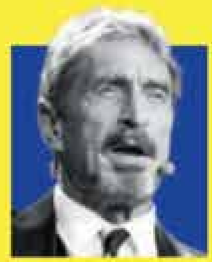
"PEOPLE ARE ... MAYBE UNDERESTIMATING BITCOIN SPECIFICALLY, BECAUSE IT IS LIKE A RESERVE FORM OF MONEY, IT'S LIKE GOLD, AND IT'S JUST A STORE OF VALUE—YOU DON'T ACTUALLY NEED TO USE IT TO MAKE PAYMENTS."

OCT. 26, 2017
Future Investment Initiative, Saudi Arabia

ELON MUSK
CEO, TESLA

"A FRIEND SENT ME PART OF A BTC [BITCOIN] A FEW YEARS [AGO], BUT I DON'T KNOW WHERE IT IS."

NOV. 28, 2017
on Twitter



JOHN MCAFEE
CYBERSECURITY ENTREPRENEUR

"BTC HAS ACCELERATED MUCH FASTER THAN MY MODEL ASSUMPTIONS. I NOW PREDICT [BITCOIN] AT $1 MILLION BY THE END OF 2020. I WILL STILL EAT MY DICK IF WRONG."

NOV. 29, 2017
on Twitter

NAVAL RAVIKANT
FOUNDER, ANGELLIST, AND COFOUNDER, META STABLE CAPITAL (A CRYPTOCURRENCY HEDGE FUND)

"BITCOIN IS A TOOL FOR FREEING HUMANITY FROM OLIGARCHS AND TYRANTS, DRESSED UP AS A GET-RICH-QUICK SCHEME."

JUNE 22, 2017
on Twitter

© FROM LEFT: NEILSON BARNARD—GETTY FOR NEW YORK TIMES; AARON P. BERNSTEIN—REUTERS; VCG VIA GETTY; REBECCA GREENFIELD

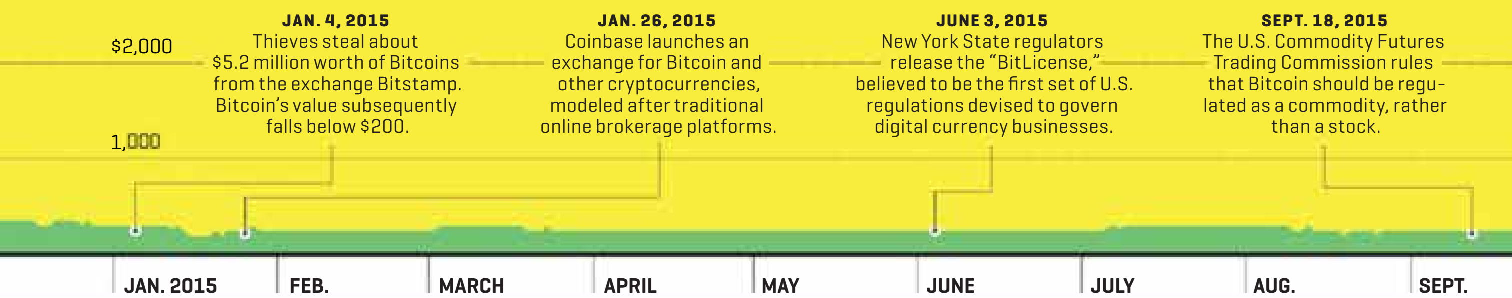
nered with a more traditional one, CBOE, on Bitcoin futures contracts in December, offering institutional giants a way to participate. "It's the bottom of the first inning."

Skeptics see a familiar mix of new-paradigm euphoria and get-rich-quick mania, with an unhappy ending looming. "It seems like the dotcom bubble all over again, or the housing bubble all over again," cautions Robert Shiller, the Nobel Prize–winning economist who literally wrote the book on the subject. (Shiller, who foresaw those crashes, tells *Fortune* he's contemplating a fourth edition of his *Irrational Exuberance*, updated to include the cryptocurrency craze.)

Still, for now the stampede of optimists continues, economists and possible calamity be damned. As investors pile in from Main Street to Wall Street, the question becomes, Is Bitcoin's rise more than an ephemeral rush?

WHY BITCOIN SOARED

IN AUGUST 2010, nearly two years after conceiving of Bitcoin in a landmark white paper, Satoshi Nakamoto, the project's pseudonymous, as yet unidentified creator (or creators), proposed a thought experiment. "Imagine there was a base metal as scarce as gold," the inventor wrote in a thread on an



online Bitcoin forum. The imaginary metal would not be "useful for any practical or ornamental purpose," Nakamoto wrote, but would have "one special, magical property: [It] can be transported over a communications channel."

Nakamoto was describing a physical analog to Bitcoin, and his point was to address a fundamental paradox of money: How does money get valued as a medium of exchange when its value lies solely in *being* a medium of exchange? The simple answer: It's mostly subjective. Perhaps limited supply and instantaneous portability would be enough to justify a market value for Nakamoto's magic substance. Maybe speculators, "foreseeing its potential usefulness for exchange," would bet on the stuff. "I would definitely want some," the philosopher teased.

Investors, it turns out, wanted some too—even though Bitcoin's usefulness remains largely theoretical. While some advocates dream of Bitcoin becoming the first universal currency, supplanting central banks and replacing Visa and Mastercard, so far its computerized bits are, at best, equivalent to "digital gold." They're good as a place to park money—what economists call a "store of value"—but impractical for payments, says Matt Huang, a partner at VC firm Sequoia. "The popular narrative around using Bitcoin to buy coffee or pizza is a pipe dream at this point."

Fred Ehrsam, ex-president of Coinbase, notes how unusual this "magical Internet money" is in practice. "The thing that gives it value is other people giving it value, which is a strange thing to wrap one's mind around." Strange, but hardly unprecedented: Like the green paper our economy is built on—and the gold and silver that predate it—Bitcoin is valuable because we collectively decide it is. "And if enough people agree," adds Huang, "then the bubble can just persist."

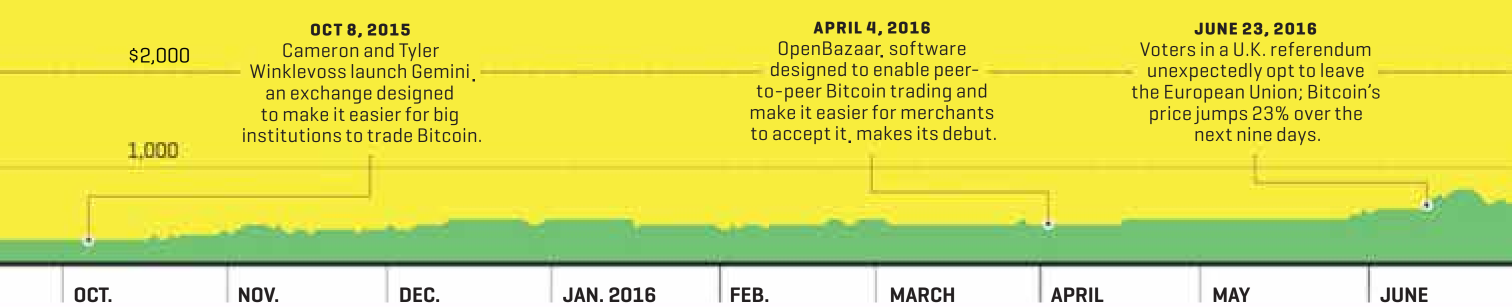
To justify Bitcoin's tremendous rise, bulls like the Winklevoss twins point to Metcalfe's Law, which states that a network's value increases exponentially with each additional participant. Tyler, along with his brother Cameron, entered the national spotlight after suing Facebook CEO Mark Zuckerberg, their Harvard schoolmate, for allegedly stealing their business plan. In Bitcoin they've found a lucrative second act. Having invested a portion of their $65 million Facebook settlement in the cryptocurrency some years ago, the twins are said to have recently become billionaires. "Money is in many ways the ultimate social network," Tyler says. "It's a medium of value that connects us all."

Bitcoin also enjoys the brand recognition shared by innovators that arrive early and dominate fast, like Google in search, Facebook in social networking, and Amazon in e-commerce. "Bitcoin is more contagious than all the other cryptocurrencies because it's the first mover," Yale economist Shiller says. "Just like Harvard is considered the most prestigious university because it was the first one" in the U.S.

Bitcoin's uniquely set payout rate—which rewards "miners" for supporting the network with their computers—also helps make it more valuable. Prices of commodities like corn, oil, or gold often plunge when producers pump out supply to meet demand, creating inadvertent gluts. Bitcoin's supply, in contrast, is forever fixed, by computer code, at a total of 21 million coins (of which about 80% have been produced). And nothing drives prices up like scarcity.

In the eyes of some supporters, these advantages add up to virtually unconstrained upside. Cybersecurity pioneer John McAfee recently set a $1 million price target for Bitcoin by 2020 (revised upward from $500,000). Others say the market value could match gold's, which clocks in at $9.7 trillion—roughly $460,000 per coin.

Still, even Bitcoin's greatest backers acknowledge the possibility that the cryptocurrency's value could plummet—if, say, regulators in China or the U.S. decided to effectively outlaw it, or if a better and more functional blockchain superseded it. It would hardly be the first craze that fizzled fast. "I think of these as high-tech Beanie Babies or 21st-century tulips," says Robert Hockett, a law professor at Cornell who gained notoriety after the financial crisis for proposing that cities use "eminent domain" to buy out underwater mortgages. Hockett sees echoes of that disaster



in Bitcoin-mania. After a securities regulator warned that people were taking out mortgage loans to speculate on Bitcoin, he noted the irony: "It's almost as though the cosmic joker out there is pulling our legs as maximally as possible."

Hockett believes blockchain tech will prove a game-changer. But he can't understand the fascination with Bitcoin, given its copious flaws. As the original cryptocurrency, Bitcoin suffers from drawbacks typical of first-generation technology. Transactions lack privacy, and fees commonly run as high as $20, even for transfers of small sums. Hackers run rampant. And the entire network can currently handle, at most, only seven transactions per second, compared to the thousands that Visa and Mastercard process in the same span. "It's a bit like betting only on Betamax when new video technology was coming online in the 1980s," Hockett says.

Jim Rickards, chief strategist at Meraglim, a financial analytics firm, views Bitcoin with equal fatalism. "I'm extremely bullish on the future" of blockchains, he says, "but I view Bitcoin as a Neanderthal, an evolutionary dead end."

AN ENDANGERED SPECIES?

WHEN BRITISH SCIENTISTS first encountered the platypus in the late 18th century, they suspected a hoax. The animal didn't fit in their conventional taxonomic categories. It looked like a mole, but it had a duck's bill, a beaver's tail, and an otter's feet. Plus, it was venomous and laid eggs. Still, "after really careful examination, they said, 'This is real!'" says Spencer Bogart, head of research at Blockchain Capital, a venture capital firm devoted to cryptocurrencies and related tech.

Bogart is deploying a favorite analogy: "Just like the platypus is not good at being a reptile, a beaver, a duck, or an otter, but it's great at being a platypus; Bitcoin is not good at being a currency, a commodity, or a fintech company, but it's great at being Bitcoin. It's creating its own category and asset class."

When skeptics dismiss Bitcoin, bulls like Bogart push back. Unlike gold, Bitcoin is not static. The software code is under constant development. Its features can be tweaked, improved, and "forked" into new iterations, with the potential to unlock value in as yet unimagined ways. Many Bitcoin fans, for example, have high hopes for the "Lightning Network," an improvement designed to facilitate quicker payments. If Bitcoin, in its evolution, acquires more compelling utility—making cross-border payments cheap and fast,

FOUR BURNING QUESTIONS ABOUT BITCOIN

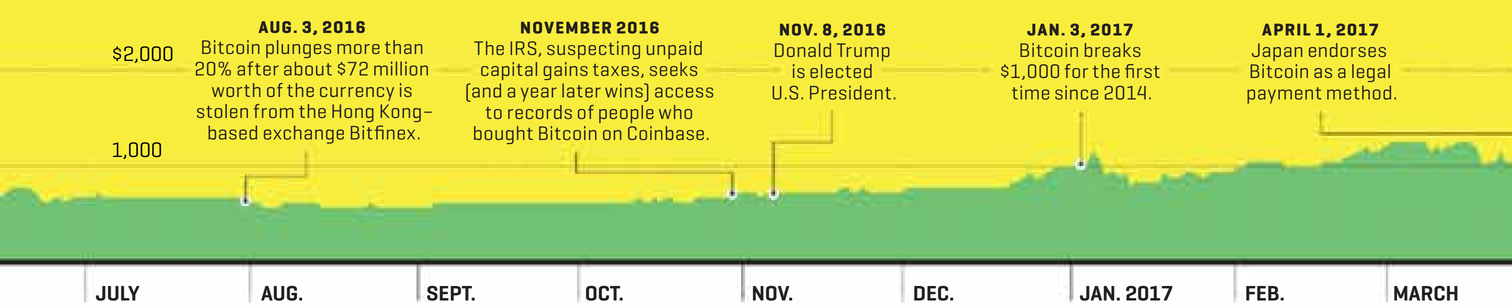
EVEN INVESTORS who wouldn't dare buy Bitcoin wonder how long its bull run will last. The answers to these questions could determine when the party ends.

1.
Will Wall Street Fall in Love?
The lack of a regulatory road map has kept big financial institutions and asset managers from investing in cryptocurrencies. But new products are removing those hurdles, and bulls believe Bitcoin's value could grow by many more multiples as Wall Street joins the fray.

2.
Will Bitcoin Survive Its Next Crash?
Price drops of 20% or more have been routine for Bitcoin, and some have hurt more than others. After then-dominant exchange Mt. Gox was shut down by a massive hack in 2014, investors' wariness about security kept prices in bear-market territory for two years. A comparably huge crisis could scare casual investors away.

3.
Will China Confiscate the Punch Bowl?
Chinese regulators have cracked down on Bitcoin before, and concerns about speculation and leverage could lead them to do so again—sidelining some of the asset's most avid traders.

4.
Will Another Coin Take the Crown?
Bitcoin is the oldest and most valuable cryptocurrency, but a crop of nimble competitors, including Ethereum and Bitcoin Cash, could lure investors away.



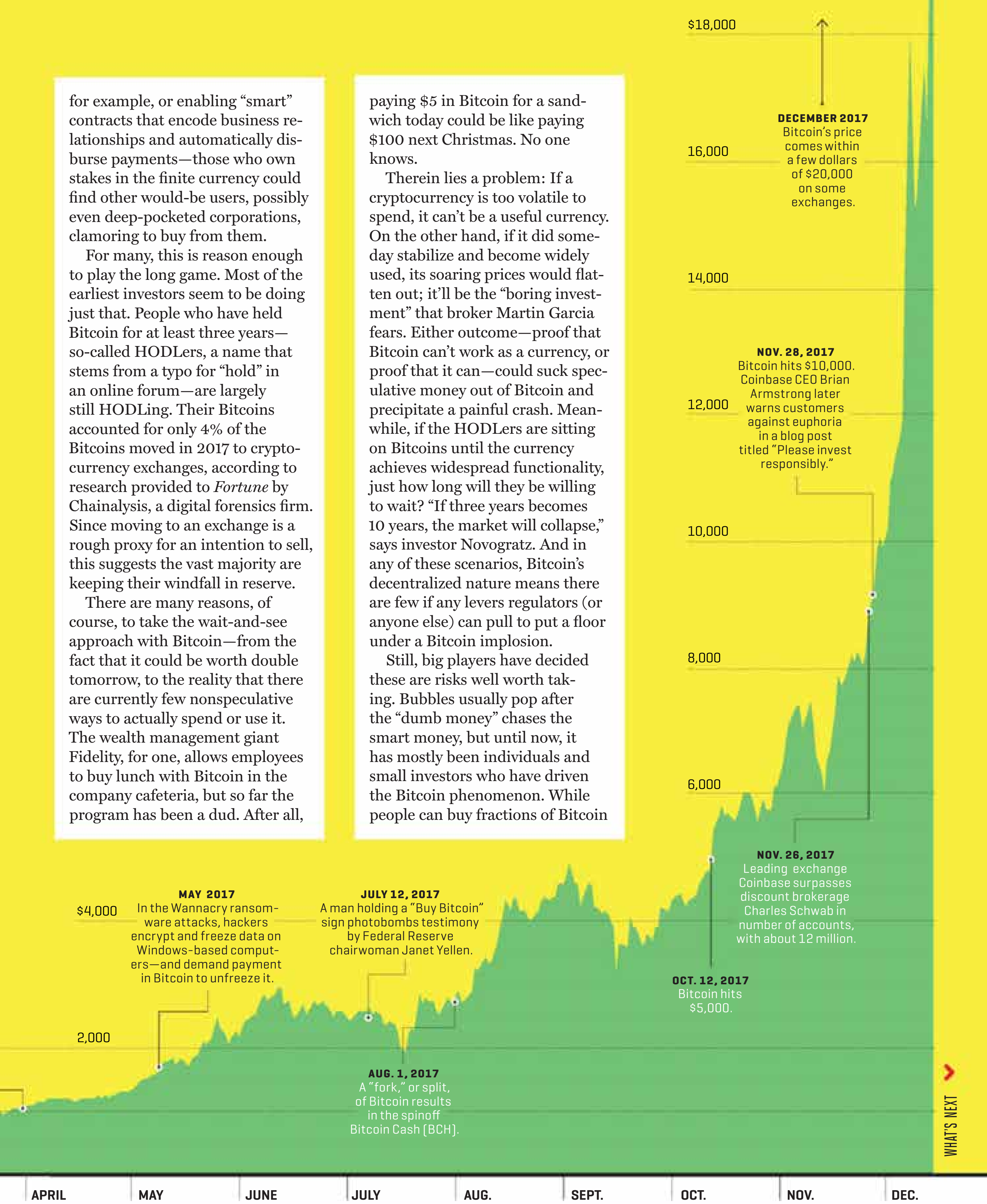
for example, or enabling "smart" contracts that encode business relationships and automatically disburse payments—those who own stakes in the finite currency could find other would-be users, possibly even deep-pocketed corporations, clamoring to buy from them.

For many, this is reason enough to play the long game. Most of the earliest investors seem to be doing just that. People who have held Bitcoin for at least three years—so-called HODLers, a name that stems from a typo for "hold" in an online forum—are largely still HODLing. Their Bitcoins accounted for only 4% of the Bitcoins moved in 2017 to cryptocurrency exchanges, according to research provided to *Fortune* by Chainalysis, a digital forensics firm. Since moving to an exchange is a rough proxy for an intention to sell, this suggests the vast majority are keeping their windfall in reserve.

There are many reasons, of course, to take the wait-and-see approach with Bitcoin—from the fact that it could be worth double tomorrow, to the reality that there are currently few nonspeculative ways to actually spend or use it. The wealth management giant Fidelity, for one, allows employees to buy lunch with Bitcoin in the company cafeteria, but so far the program has been a dud. After all, paying $5 in Bitcoin for a sandwich today could be like paying $100 next Christmas. No one knows.

Therein lies a problem: If a cryptocurrency is too volatile to spend, it can't be a useful currency. On the other hand, if it did someday stabilize and become widely used, its soaring prices would flatten out; it'll be the "boring investment" that broker Martin Garcia fears. Either outcome—proof that Bitcoin can't work as a currency, or proof that it can—could suck speculative money out of Bitcoin and precipitate a painful crash. Meanwhile, if the HODLers are sitting on Bitcoins until the currency achieves widespread functionality, just how long will they be willing to wait? "If three years becomes 10 years, the market will collapse," says investor Novogratz. And in any of these scenarios, Bitcoin's decentralized nature means there are few if any levers regulators (or anyone else) can pull to put a floor under a Bitcoin implosion.

Still, big players have decided these are risks well worth taking. Bubbles usually pop after the "dumb money" chases the smart money, but until now, it has mostly been individuals and small investors who have driven the Bitcoin phenomenon. While people can buy fractions of Bitcoin



WHAT'S NEXT

in increments of as little as $1 on cryptocurrency exchanges, institutional investors have largely been barred from those venues owing to fiduciary and compliance requirements around custody of assets.

Now that's starting to change. Companies like Coinbase and BitGo are rolling out products catering to heavyweight investors, as even the most staid hedge funds and sovereign wealth managers come knocking. Goldman Sachs is said to be considering launching a Bitcoin trading operation. (The bank's sole cryptocurrency-related investment to date, a startup called Circle, already operates a trading desk.) According to the bulls, the influx of smart money could eclipse all the wealth currently invested in Bitcoin—theoretically more than doubling the market value in one fell swoop.

And there's another reason to believe Bitcoin can go up a lot more before gravity drags its value back down to something stable. Historically, some of the frothiest bubbles have been relatively confined: the 17th-century Dutch tulip bubble left little collateral damage beyond the Netherlands; the dotcom boom blew up Silicon Valley, but international stock markets rebounded relatively quickly. Today, however, anyone in the world can buy Bitcoin—including unbanked peoples ranging from Afghanistan to Zimbabwe who have never had access to capital markets before. "The fact that this is our first global mania," adds Novogratz, "will make this the single most speculative bubble of our lifetimes."

WHAT'S NEXT

FOR THOSE REASONS and more, says Novogratz, "it wouldn't be crazy if the crypto bubble hit $10 trillion, and that's 20 times more than what it is today." By comparison, he adds, Nasdaq stocks hit a market value of more than $6 trillion before the dotcom bubble burst, not accounting for inflation.

Of course, the Nasdaq included Microsoft, Intel, and many other companies that were established business powerhouses, before and after the crash. Bitcoin, for now, remains a platypus of unproven worth. Even the CEO of Coinbase, one of the biggest beneficiaries of the mania, harbors concerns about it. "We probably are in a bubble," Brian Armstrong confides to *Fortune* following a recent all-hands meeting. With the total market valuation of all cryptocurrencies well above $500 billion, and few opportunities to put these coins to real use, Armstrong worries that "we haven't really earned the value of that half trillion." Nonetheless, in his experience, each time Bitcoin's price has surged, the valuation has leveled off at a higher plateau—even after crashes.

The more Bitcoin's price runs ahead of its capabilities, bulls say, the more likely that its technology may catch up to the hype. "The financial speculation that's going on ... is so important to developing infrastructure," says Demirors of the Digital Currency Group. The gusher incentivizes programmers and businesspeople to dedicate time and effort to Bitcoin-related projects. Already, farsighted zealots are pouring newfound riches into the cryptocurrency economy, creating blockchain-oriented businesses, like the Winklevoss twins' Gemini, or starting cryptocurrency-specific hedge funds, as AngelList founder Naval Ravikant is doing. It takes money to make money.

Then again, the more wealth that flows into Bitcoin, the more conservative an approach its maintainers may take in updating it. This could present an opportunity for other crypto coins to outmaneuver their forerunner. "I think Bitcoin's market share is a long-term downward trend because there are so many other interesting technologies being created," says Olaf Carlson-Wee, founder of crypto hedge fund Polychain Capital. He adds: "As a rule of thumb, I never bet against cryptocurrencies."

To Jerry Brito of Coin Center, the future of Bitcoin isn't about just the potential for limitless returns, but the promise that his daughter will grow up in a better world. "It's a world where you can keep your money safe ... where you can trade with anybody else in the world," he says. Bitcoin's allure, in this view, is not about the money, per se, but about technology. Maybe that's why Brito insists there's no fiscal significance in the name he and his wife eventually chose for the baby. They call her Penny—but it's short for Penelope.

BETTING ON BITCOIN, SAYS ONE SKEPTIC, IS "LIKE BETTING ONLY ON BETAMAX WHEN NEW VIDEO TECHNOLOGY WAS COMING ONLINE IN THE 1980S."

APPLE

The new iMac Pro, which retails for $4,999.

HAS APPLE LOST ITS DESIGN MOJO?

A GENERATION OF PEERLESS PRODUCTS MADE IT THE WORLD'S MOST VALUABLE COMPANY. NOW SOME IN THE I-UNIVERSE ARE QUESTIONING IF THE MAGIC—IN THE POST–STEVE JOBS ERA—IS STILL THERE. DON'T BELIEVE THE NAYSAYERS.

BY RICK TETZELI

THE TOUCH ID on Victoria's iPhone 6 doesn't work well in the winter cold. John is tired of kneeling or sitting on airport floors to plug in his 6s, whose battery seems incapable of lasting through the day. A few months ago, Henry noticed that when he'd type an "I" into his iPhone, "A?" would sometimes show up on his screen. Nancy, who's older, hates that Apple never provides instructions after upgrading her iPad to "new formatting." Adam, who's younger, has ditched Apple for Google's Pixel 2 XL, because he prefers the design and uses Google apps. Tony, who thinks iTunes has gone from being a well-organized music library to a disorganized marketing vehicle for Apple Music, has subscribed to Spotify and Pandora.

The five people in my home use two dozen cables to power and connect 18 Apple devices. Six are frayed and wrapped in duct tape—their thin, rubberized, and attractive-till-it-breaks covering doesn't seem designed for the heavy use these cables obviously get. Worse yet, hunting one down takes ages, because the USB, Lightning, Thunderbolt, and USB-C cables are incompatible in a variety of ways, and the little adapters I purchased after each "upgrade" have been lost long ago, probably behind some couch cushion that's also hiding Anya's too-tiny iPod Shuffle and the earbuds that came with the iPhone 6 that Tal shattered.

If your friends and family are anything like my friends and family, you've been hearing a lot of complaints about Apple design recently. In fact, enumerating the ways Apple design fails consumers seems to have become an international pastime. Google "Apple design sucks," and you'll find a never-ending litany of the seemingly infinite ways that this ostensible paragon of design excellence misses the mark: The Watch isn't out-of-the-box intuitive; the latest keyboards are annoying and fragile; Apple Pencils are easy to lose; the iPhone has been flawed ever since Apple introduced that camera lens that juts out on the back, and things have gotten worse with the "notch" on the screen of the iPhone X. Belittling headlines abound: "The Myth of Apple's Great Design" (*The Atlantic*), "What Happened to Apple's Faultless Design?" (*The Verge*), and "Apple Is Really Bad at Design" (*The Outline*), a recent screed that generated a lot of online chatter.

Highly respected developers and designers have weighed in with damning criticism. Tumblr cofounder Marco Arment admires most Apple design, but says, "Apple designs in the post-Steve era have been a little off-balance. The balance seems too much on the aesthetic, and too little on the functional." Don Norman, a former member of the Apple design team (1993–1996) who now heads the Design Lab at the University of California, San Diego, beats the drum that Apple has abandoned user-centered design principles. "They have sacrificed understandability for aesthetic beauty," he says.

Not everyone agrees, of course. Says Steve Troughton-Smith, an Irish developer of sleek iOS apps, "I have enough historical context to understand that these things have no relation to [Steve Jobs' departure], and are not a new aspect of being an Apple user. Things like USB cables and iTunes were bad for many years under Jobs too, and I have a collection of frayed Firewire-to-30-pin cables to remind me of that."

"I would argue that Apple design is as good as ever," says John Gruber, the dean of Apple bloggers. "Look at the most recent products. AirPods last year, and the iPhone X this year, are quintessential Apple products. There's a huge 'it just works' factor to them both."

Design is subjective, of course. It's entirely possible for two intelligent people to have diametrically

PREVIOUS PAGES: COURTESY OF APPLE

Apple CEO Tim Cook (right) and chief design officer Jony Ive look at the iPhone X at an event on the Apple Park campus in September.

© JUSTIN SULLIVAN—GETTY IMAGES

opposite views on the iPhone X ("ten" in Roman numeral form), and it's entirely possible for intelligent people to argue about whether Apple's product design is better or worse than when Steve Jobs was CEO. What's not subjective, however, is this simple business fact: Apple is a design company. Its future doesn't rest on being first in artificial intelligence, virtual reality, or any other technology. Its future rests on design.

For years now, Apple has done a better job than any other company of discerning what technologies will really matter to customers, and assembling those into remarkably intuitive products that appeal to millions and millions of people around the world. No tech company has ever had such a long and consistent run of mass-market success, even if there have been a few clunkers along the way. With perhaps a billion or more Apple products in active use, there are bound to be some that miss the mark.

But the volume of grumbling about Apple design has been loud of late. And the chatter can't simply be dismissed—because if Apple design is truly in trouble, then the world's most valuable company is in trouble.

A CENTRAL DESIGN TENSION at Apple has always been keeping its products clean, streamlined and easy-to-use while adding more, and more powerful, features. The best Apple designs—the best product designs, period—navigate this tension by making astute choices about when, what, and how to incorporate new technologies. Critics argue that Apple is making more poor choices than in the past.

Take the iPhone X, which was released in November. In its marketing of the X, Apple makes much of the beauty of a screen without bezels or buttons—in television ads, for instance, great swirls of red and purple color caress the rounded corners of the screen. When I interviewed Jony Ive in October for *Smithsonian* magazine (Apple declined to make Ive available for this story), he described the screen as an embodiment of a key Apple design principle. "As a design team, we're trying to get the object out of the way," he said. "We're not denying that it's material, but we want to get to that point where it is in no way an impediment to the technology that you care about." The spare and elegant screen on the X is as close as Apple has come to erasing the barrier between you and the world of digital data, entertainment, and services.

One reason the X has such a simple screen is that Apple chose to eliminate the Home button. The Home button is that small concave circle at the bottom of all prior iPhones that you press at any time to get back to your Home screen, where you can access all of your most important apps. Press the Home button, return to the Home screen. It was a simple concept, and, if you ask Don Norman, there was no good reason to abandon it. “They made it harder for people by their emphasis on the utter simplicity of the screen,” says Norman. “They took away the Home button, and they added even more mysterious gestures.”

In fact, to conjure the Home screen on my iPhone X, I swipe up from the bottom of the screen. On my old iPhone 7, that same gesture took me to the Control Center, with its icons for my flashlight, timer, camera, and other basic features. But to get to the Control Center on my X, I swipe down in a diagonal line from the top right. And if I want to see and close all those apps I’ve had open for some time, I swipe up from the bottom, but press down on the screen at the end of the swipe. In practice, this all comes quite naturally: My 11-year-old, Anya, who has spent more time than makes sense with an iPad, told me, “This is the way all phones should work!” But it’s not for everyone. I tried to explain multitouch gestures to my mother-in-law, Nancy, over Thanksgiving. “That’s it!” she snapped. “I’m done!”

The tension between complexity and aesthetic streamlining is especially evident in Apple’s oldest product lines—its desktop and laptop computers. After years of complaints from heavy users who rely on its most powerful computers, Apple released a new MacBook Pro laptop in late 2016, with a brightly lit digital touch screen strip that replaced the F keys at the top of the keyboard. The strip changes as you work, offering up shortcuts to features that might be relevant to whatever is up on your screen. Called the Touch Bar, because you manipulate it with your finger, the strip looks great and is a marvelous feat of engineering.

But adding functions isn’t really an addition if the process of using those functions is confusing. “To me,” says blogger Gruber, usually a reliable supporter of all things Apple, “the Touch Bar is the ultimate violation of that Steve Jobs axiom that design isn’t about how something looks, but about how it works.” In this first iteration, the Touch Bar seems like an unsuccessful, half-baked effort to bring some of the iPad’s touch control to Apple laptops. “Apple may have just gotten caught up in how cool the engineering is,” says Arment. “I know lots of people in the developer community who use these machines, and I have heard from zero people who are really taken with the Touch Bar.”

It seems unlikely that the design team, composed mostly of

iDesign: Some of Apple’s breakthrough products...

The Logo
The rainbow-colored Apple with a bite taken out was actually Apple’s second logo. The first was designed by original cofounder Ronald G. Wayne, who sold his 10% of the company to Steve Jobs and Steve Wozniak for $2,300.

The Macintosh
Jobs took the concept of a graphical user interface from Xerox, put it in a much friendlier package, and turned it into the first true mass-market “personal” computer. Susan Kare designed the memorable icons.

The iMac
When Jobs returned to Apple in 1997, computer manufacturers were still selling mostly personality-less gray boxes. Ive’s iMac made a statement that Apple was back as the consumer’s quirky, cool computer company.

The iPod
There were several other digital music players on the market before Apple’s. But the iPod organized your songs clearly, and the flywheel on the second version made it so easy to get to the ones you wanted.

LEFT TO RIGHT: SSPL—GETTY IMAGES; UNIVERSAL HISTORY ARCHIVE—GETTY IMAGES; APPLE COMPUTER—GETTY IMAGES; TONY AVELAR—AFP/GETTY IMAGES; RYAN ANSON—AFP/GETTY IMAGES; COURTESY OF APPLE (2)

Apple products are mostly "great—or at least fine," says one techie. "The reason people like me can nitpick is that we have been spoiled."

veterans who have been together for many years, got "caught up" in "cool" engineering. But we expect Apple to make perfect choices, every time, and when it doesn't we're dismayed. "I have friends who are driven to absolute anger when Siri tries to be funny," says Gruber, referring to Apple's digital voice assistant, which is widely seen as inferior to Amazon's Alexa or Google's eponymous version. "If you tell Siri to cancel the timer you asked her to start so that you could cook something, instead of just saying, 'I'll cancel the timer,' she usually says something like: 'Okay, I've cancelled this, but don't blame me if your egg overcooks!' It drives people nuts. I think it's the wrong way to go. They're trying to humanize her, but it falls so flat. It just feels like they're tone-deaf, especially when she does something like that and misinterprets your question."

Siri's attempt at humor is as much a design decision as whether to include a Home button on the iPhone X. It's an example of the complex new choices that designers at any company now face when developing a product with an Internet connection—toys, dishwashers, train engines, wine cellars, key chains, and more. So when Apple doesn't get Siri right, it makes people worry about Apple's future. The world of technology is growing increasingly complicated, and many people think that new product that most simplifies our life is the Amazon Echo. That can't be a good sign, right?

FOR MANY APPLE CRITICS, the story ends right here. Siri's not great, the Touch Bar's kind of a mess, the operating systems are pretty but somewhat confusing, and the reassuring Home button has been killed … the list goes on. Apple's far from perfect. Point made.

But here's the thing: Pick just about any time in Apple's history, and you'll find a similar set of worrying choices and seeming failures—even during those halcyon days of Steve Jobs' triumphant second tenure at the company. *1998:* that beautiful, bulbous, Bondi Blue iMac is actually an underpowered computer with an unreliable mouse and a CD slot that

The iPhone
Design isn't just for artists. It took design advances in microelectronics, software optimization, screen tech, low-power circuitry, manufacturability, and the touch screen interface to create Apple's most important product.

The iPad
In some ways, it's just a large iPhone. But the clean lines and simplicity of the iPad's big screen makes it the embodiment of Jobs' desire to create pure windows into the information and services consumers want to access.

Watch OS3
The third time's the charm with Apple's operating system for its smartwatch. After listening to consumers, who primarily use the watch for notifications and fitness, Apple's designers surfaced the important stuff.

AirPods
When people say that Apple's behind in A.I. or some other technology, they're missing the fact that it is way ahead in another important category—wearable computers. AirPods are the first solid-gold hit of the post-Jobs era.

few consumers could use productively. *2000:* The Power Mac G4 Cube, so gorgeous it becomes part of the collection of the Museum of Modern Art, doesn't deliver the power and features heavy users demand. *2001:* The first iPod is released, but it's not really ready for primetime, since the scroll wheel is clunky and the device works only with Macs, which account for just 2.6% of worldwide PC sales. *2005:* Apple's in the phone business! With something called the Rokr, a kludgy music player/cell phone that the company developed with Motorola. *2007:* The iPhone is introduced, with few applications and poor connectivity. *2011:* The iPad is introduced, and, as my brother-in-law Mark told me at the time, "I can't imagine anyone ever using this for anything interesting." (He's bought four since then.)

In fact, Apple rarely gets it perfect at first. But over the years, the company has developed a long-term design process that regularly turns design "mistakes" into successes.

The Apple Watch was introduced in 2015. Anticipation was high: Would this be Apple's first Next Big Thing since the death of Jobs? "Apple introduced products like the iPod that were so great and worked so well that we started to question the design of other things in our life," says Allan Chochinov, chair of the products of design program at New York City's School of Visual Arts. "Why isn't my thermostat like that?" Perhaps the time had come for a watch that was as great as an iPhone.

As you may remember, the press was disappointed. To say the least. The user interface was a jumbled, layered, and unintuitive mess. The watch itself was attractive, but those who wore it to the gym found it clunky compared to established fitness trackers like Fitbit. Since it served up notifications only if your iPhone was nearby, and since it showed you the time only if you flicked up your wrist just so, I found it less useful than a Swatch—and about $300 more expensive.

Cut to present-day. The new Watch, called Series 3, works independently from the iPhone. With cellular capability built in, I can now leave my iPhone behind and keep up to date with all the data and communications we've absorbed into our daily routines. The interface is simpler, and Apple has made it easier for me to access the things that a smartwatch is really good for, including timer, fitness tracker, texts, email, calendar, music, Apple Pay, mobile tickets, and even voice calling. It's great for responding quickly and simply

...And a few that missed the mark.

Hockey Puck Mouse
People believe Steve Jobs only delivered hits. In fact, even his most important products could be marred by design peculiarities. Case in point: the lovely but maddeningly ineffective mouse that came with Apple's breakthrough iMac.

Apple G4 Cube
Jobs loved "the Cube," which revived ideas he'd tried at Next. It earned a place in the Metropolitan Museum of Art, but consumers found it underperformed—and they didn't like that insects got stuck in cracks in its plastic case.

iPod Hi-Fi
Apple's been miniaturizing devices for consumers for years. Its designers decided to forget all those lessons when they produced this speaker, which couldn't decide if it wanted to be a boombox or a leaden piece of Swedish furniture.

Apple TV
The would-be killer TV device earned bad reviews, even from inside Apple. In 2007, *Fortune* writer Brent Schlender wrote that its only possible use was as a doorstop or a sushi dish. Jobs emailed to tell him that he couldn't disagree.

LEFT TO RIGHT: MIKE BOOTH—ALAMY STOCK; GETTY IMAGES/COURTESY OF APPLE; PETER DASILVA—GETTY IMAGES; MARC TIELEMANS—ALAMY STOCK; THE PHOTO DEPT to texts, even if it's not for deeply felt communication. Instead of trying to cram some sort of keyboard replacement into the watch, Apple has provided a set of canned responses ("Thanks," "BRB," "On my way," "In a meeting. Call you later?") that I can quickly tap, along with a scribble pad if I want to get more specific. Nothing about the Watch is confusing any more—its design perfectly suits its purpose.

That's probably why it's selling so briskly now. In a recent blog post, Asymco's Horace Dediu estimated that Apple is now selling 16 million a year. Dediu believes Watch sales will eventually grow bigger than sales of iPods at their peak, which would make the Watch Apple's second most popular product ever.

How did the Watch get so much better so quickly? What happened in the two years between the first and third editions of the Watch? I asked Ive this question during a November interview at the Hirshhorn Museum in Washington, D.C. "Mostly, we spend all our time looking at what we can do better," Ive responded. "Sometimes we are very aware that there are technologies that aren't ready. We're very aware of where the product is going. Then there are things that you don't truly know until you've made them in large volumes, and a really diverse group of people use them." In the case of the Watch, the loud and ample criticism from Apple customers clearly shaped the way Ive and his team improved the product. The iPhone X, on the other hand, seems more the creative brainchild of a team integrating new technologies to build something new on the foundation of an already successful product.

The flaws in the first iteration of the Touch Bar don't tell us anything about the state of Apple design. (MacBook Pro buyers may disagree—but they tend to be early adopters, who know that the cutting edge isn't always pretty.) What's more important is how Apple develops the technology in the years ahead.

This creative process is Apple's secret sauce. Its goal—innovating and improving simultaneously, delivering both annual updates and the occasional brand-new product—is commonplace. But few companies have done it as well as Apple, at mass scale over a long period of dramatic technological change. Chochinov cites Nike and the *New York Times* as two that have, but many of the sources I interviewed for this story couldn't think of any comparable peers. "Apple design is so far ahead of everyone else," says Arment. "Apple has so many products and so many services and so much software out there, and most of it is great—or at least fine. The reason people like me can nitpick is that we have been spoiled."

IF YOU ARE ONE of those people who believes there's been a slump in Apple design, you might attribute some of that to the many distractions Apple has faced since the death of Steve Jobs in 2011. The six years since Jobs' death have been marked by outrageous growth and continual change. Under CEO Tim Cook, annual sales have more than doubled, and almost tripled in Asia. Besides introducing new products like the Watch and AirPods, Apple has opened 160 new stores (including 45 in China), acquired dozens of companies (including several focused on artificial intelligence and, most recently, the music recognition app, Shazam), and launched its own content creation arm.

Some outside observers sensed that the explosive expansion appeared to put a strain on resources for a while. "Apple seemed to struggle with its newfound scale," says Troughton-Smith," and appeared to not have the engineering practices in place to support the new status quo." That's improved in the past couple of years, he says.

It has been a period of big transitions for Ive personally too. During the last seven years of Jobs' life, Cook had performed many of the duties of a standard CEO, leaving Jobs free to develop products with Ive. As Ive told me at the Hirshhorn in November, "You know how sometimes something just clicks with someone? [Steve and I] had a bizarre way of looking at the world, but it was the same. When you feel odd and bizarre, it's nice to feel odd and bizarre with a friend." Now Ive is without his old friend and yet

Cables and adapters
The lightning-to-headphone cable above is one of many in Apple's confusing cord universe. (Anyone need a USB to USB-C adapter?) Apple's continual efforts to arm consumers with the fastest cables are continually annoying.

charged with greater responsibility than ever. An industrial designer all his life, Ive now oversees software design as well. He is Apple's product guy.

There's been one other serious distraction, something Jobs set in motion shortly before his death. Ive has been a central player in the creation of Apple Park, the company's new campus, fretting every detail. When I took a tour of the place in September, my guide took pains to point out many of them: the concave elevator buttons in the same brushed aluminum used on Apple laptops, the rounded edges of the rail on an Italian limestone staircase, the single-piece sneeze guard that will protect the food in the new café.

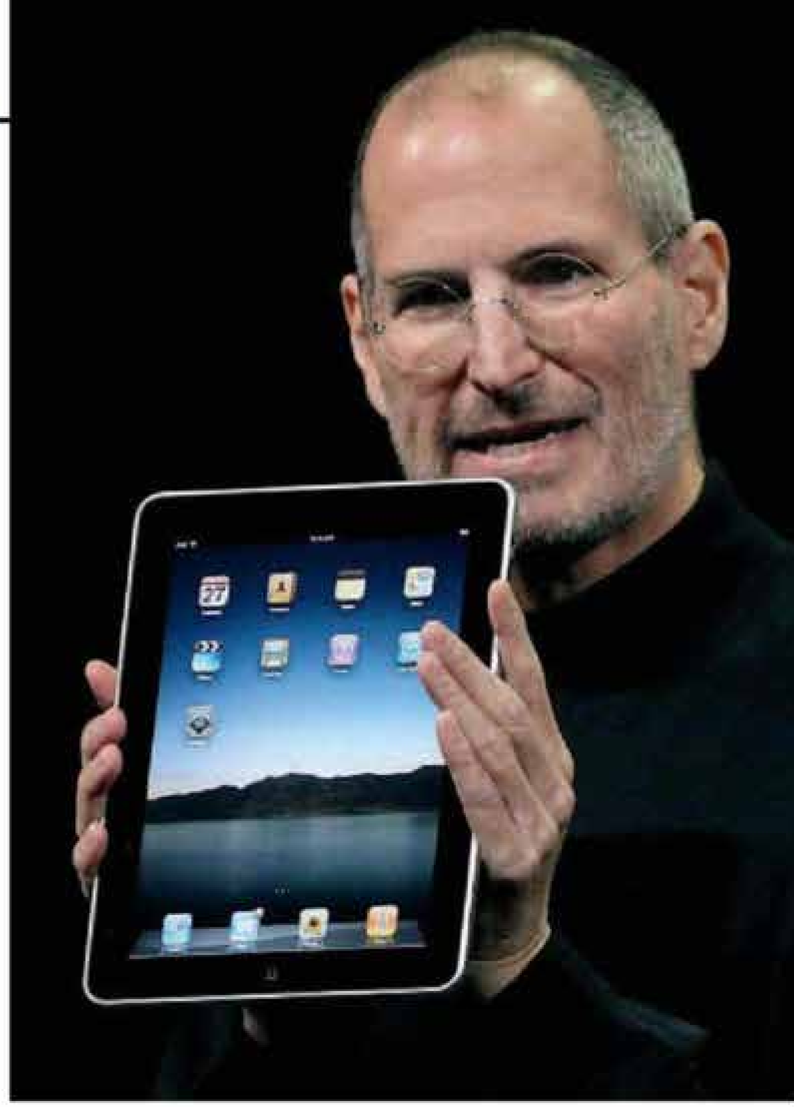
The idea that the project may have caused Ive to drop the ball on product quality was alluded to in a *Washington Post* column in late November, shortly after Apple had to issue a series of operating system updates to repair a security flaw. "While the company should have sufficient resources to obsess over both its headquarters and its software and hardware," wrote the paper's former personal-tech columnist, "the reality seen by Apple customers suggests otherwise."

There's simply not enough evidence to prove that Ive's focus on Apple Park distracted him from regular product development. However, there is this bit of context: When Ive was given the title of chief design officer in 2013, his two lieutenants overseeing industrial design and software design started reporting directly to Cook. Then in early December, Apple, which is usually very reluctant to discuss internal corporate machinations, surprised observers by issuing the following statement: "With the completion of Apple Park, Apple's design leaders and teams are again reporting directly to Jony Ive, who remains focused purely on design."

The message seemed clear: If there had been any distractions for Ive (something Apple would never admit), there won't be any going forward.

ONE THING HASN'T CHANGED since Steve Jobs died—the power structure of the technology industry. Facebook, Amazon, Google (now Alphabet), and Apple dominated tech in 2011, and they dominate it today.

Back then, conventional wisdom forecast a battle royale between the four, with each trying to grow by attacking the others' strongholds. Instead, each has grown outlandishly by becoming even more entrenched in the field it dominates. Google is still the behemoth in online search advertising. Facebook has dismissed all challengers in social media and become an even more-powerful revenue generator on mobile than it was on the desktop. Amazon's business model for efficiently attacking new business sectors is so potent that every large com-



Former Apple CEO Steve Jobs introducing the iPad. Since Jobs' death in 2011, the company has grown vastly more valuable and more dependent on iPhone sales.

LEFT: JUSTIN SULLIVAN—GETTY IMAGES

pany worth its salt now strategizes about how to avoid getting "Amazoned" by an unimaginable competitor from some unlikely industry.

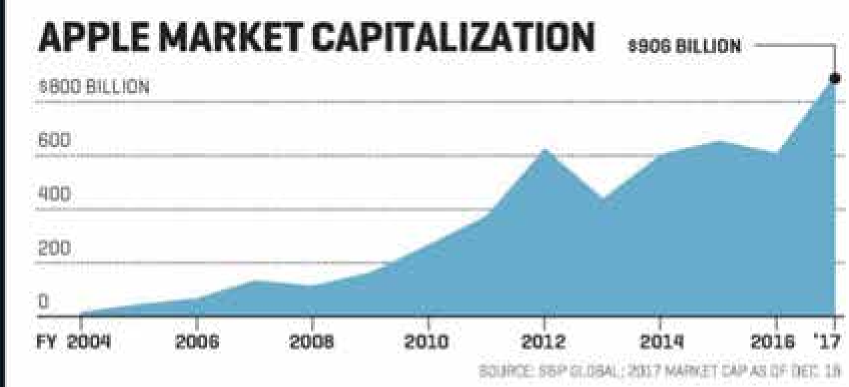
Apple was supposedly the most vulnerable of the four, doomed without the unique genius of Jobs. But over the past six years, Tim Cook has grown into a widely respected CEO, while Apple has become the world's most valuable company, and has introduced two hit products—AirPods and the Watch—that don't have even a wisp of a Steve Jobs fingerprint on them.

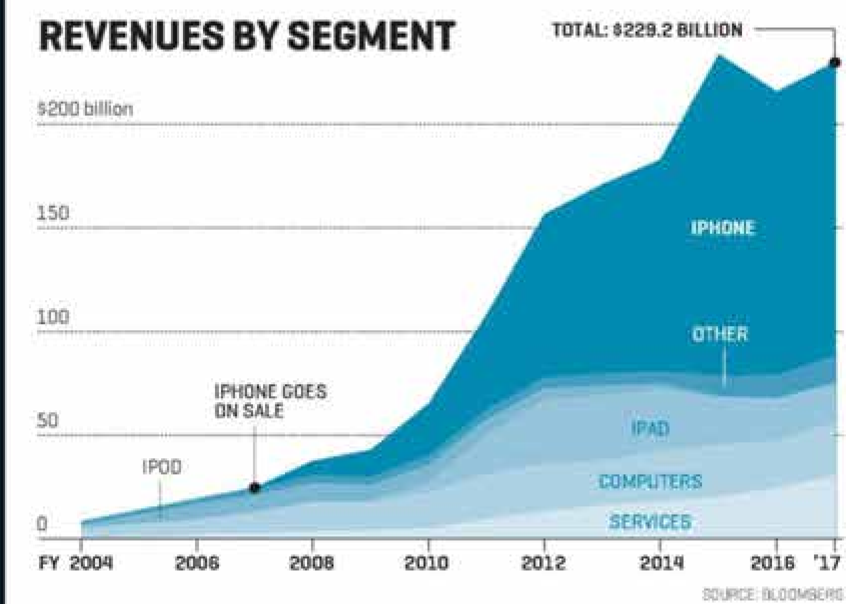
Like Alphabet, Amazon, and Facebook, Apple continues to rely on its unique strength—design. "If anything, Tim Cook and his team have doubled down on design," says Neil Cybart, a former research analyst who now pens his own astute Apple blog. "The companies that are saying that the world is changing and we're moving into a post-device era are the companies who haven't figured out that design is the missing ingredient. It's never just about the technologies, like machine learning, A.I., voice assistants—it's never just about those things. It's about how should we use those things. That's design. And no other company in Silicon Valley has a design focus and culture like Apple."

One way to understand the competitive power of Apple's design is to shift from thinking of the technologies of the future to the market opportunities of the future. Health care; the software and design of autonomous vehicles; wearable computers; the connected products in our homes. Each market will need different technologies. But every market will depend on design.

Apple will explore how it can make its mark on each of these markets. That process entails years of research—at the Hirshhorn, for example, Ive regaled the audience with a distilled history of the miniaturization of timepieces, from the single clock in big cities to grandfather clocks, pocket watches, and the tiny thing on your wrist. And it entails a catholic receptivity to new ideas and technologies. During the same interview, Ive described the design studio at the new campus. The new space is so large that, for the first time, everyone involved in product design will be gathered in one space. The user experience experts will be mixed in with the industrial designers, and the haptics specialists might find themselves sitting next to a graphic designer. It's a conscious, visible acknowledgement that Apple's future—its present, too—depends on so much more than just the industrial design that Ive, whose father was a silversmith, was raised on. Ive believes that the new space will expand and spark Apple's internal design conversation, leading the company once again to products we can't quite imagine now.

The prospect, he told the audience at the Hirshhorn, gets him "uppity uppity jumpy." How odd and bizarre. How promising.





BUSINESS BY

TECHNOLOGY AND GLOBALIZATION ARE LEADING TO MORE AND FASTER DISRUPTION THAN EVER. TO STAY AHEAD, SMART COMPANIES ARE TURNING TO DESIGN TO BETTER CONNECT WITH CUSTOMERS AND FIND THEIR COMPETITIVE ADVANTAGE. HERE, WE FEATURE 25 COMPANIES FROM A RANGE OF INDUSTRIES THAT ARE GETTING DESIGN RIGHT. (YES, WE'RE INCLUDING APPLE.)

DESIGN

W

WHEN AIRBNB'S FOUNDERS tell their origin story, they often hark back to the moment in 2009 when Paul Graham, head of startup incubator Y Combinator, gave them four crucial words of advice.

At the time, Airbnb had fewer than a thousand registered hosts. Founders Brian Chesky, Joe Gebbia, and Nate Blecharczyk were hunkered down in Silicon Valley, scrambling to scale the business by poring over data and revamping the website. After a promising start, revenue had flatlined at $200 per week. To figure out what wasn't working, Graham pressed the trio for information about Airbnb's users. Where were they, exactly?

In *The Airbnb Story*, *Fortune*'s

Leigh Gallagher recounts Graham's reaction upon learning that the largest concentration of them resided in New York City: "[He] paused and repeated back to them what they had just told him: 'So, you're in Mountain View, and your users are in New York?' he asked. They looked at each other, then back at him. 'Yeah,' they said. 'What are you still doing here?' Graham said to them. 'Go to your users.'"

That exhortation—to fly across the country and hang out with customers—defied a fundamental tenet of Silicon Valley wisdom: that data and technology are the solution to every problem. And yet, for Airbnb, heeding Graham's advice led to key breakthroughs. Among them: Helping hosts produce better photos of their properties would boost business. (For more on Airbnb and design, see Gallagher's Q&A with Gebbia on page 66.)

A decade on, "user experience" is among the tech industry's most overused buzz phrases. But the underlying idea—that there is power in empathy—has never been more profound.

That's true for at least two reasons: One is that the great forces of the modern age, globalization and digitization, are removing traditional barriers to entry. Large firms can no longer rely on great manufacturing capacity, a superior supply chain, and established distribution networks to defend their market position from challengers. The rise of China and other emerging economies, combined with newfangled technological developments like big data, the Internet of things, platform economies, A.I., and automation are combining to flatten and commodify traditional back-end defenses. A second reason is complexity. Design can help bring order and coherence to the chaos of our hyper-connected world.

Design can help bring coherence to the chaos of our hyper-connected world.

In this new landscape, smart corporate leaders are embracing the idea that design—channeling insight to delight and truly connect with customers and users—can be a crucial differentiator.

The result is a major design moment. *Fortune* 500 companies are hiring chief design officers and investing heavily in design centers and innovation centers. Professional services firms, too, have joined the fray. In 2013, Accenture acquired Fjord, a leading design firm, while PwC snapped up BGT, a digital creative consultancy. In 2015, McKinsey & Co. purchased Lunar, a Silicon Valley–based design firm. In October, Indian software giant Wipro acquired design agency Cooper, adding to its 2015 purchase of Designit. Meanwhile a host of top business and design schools have introduced interdisciplinary programs to help MBAs think more like designers and vice versa.

In the "Business by Design" package on the following pages, *Fortune* highlights some two dozen companies that have turned a commitment to design into a competitive advantage. To identify them, *Fortune* surveyed the design community, grilled executives, and searched for evidence of true corporate commitment. The result is not a completely scientific list. (Design, for the most part, is not quantitative.) And it's not a truly comprehensive list. (Too many companies are betting on design these days to include in one issue of the magazine.) But all of the companies that made the cut are at the forefront of the movement to create smarter, more thoughtful products and experiences.

No company tops Apple for demonstrating the strategic power of great design and learning to "think different." While there is a raging debate about whether or not Apple has lost some of its design mojo in recent years, as the story preceding this one explores, the world's most valuable company continues to push boundaries. Meanwhile, a host of other leading companies, including Alphabet, Amazon, and Nike, have achieved success by expanding design capabilities. The phrase "design thinking," coined back in 2003 by IDEO cofounder David Kelley, has become synonymous with taking a user-centric approach to creating products and services.

The sudden enthusiasm for design and design thinking has its detractors. Pentagram partner Natasha Jen sparked a lively debate at a New York design conference early in 2017 with a presentation titled "Design Thinking Is Bullshit." Her main complaint: that practitioners too often neglect to call out bad design. Gadi Amit, a technology designer who has worked on Fitbit trackers and the Lytro camera, frets that design thinking's obsession with empathy leads to wasted time and is out of step with the breakneck pace of modern product cycles.

It's a debate worth having. And one that *Fortune* will continue this March in Singapore, in collaboration with colleagues at *Time* and *Wallpaper**, at a new conference we're launching called Brainstorm Design.

One thing is clear, though: Business is almost always better by design. —*Clay Chandler*

DYSON

WHEN IS A HAIR DRYER COOL? WHEN IT'S THE PRODUCT OF POWERFUL R&D AND LASER-LIKE FOCUS.

● **BRITISH INDUSTRIAL DESIGNER James Dyson has spent his career marrying disruptive technology with an Apple-esque minimalism to transform drab everyday appliances such as vacuum cleaners, fans, and hair dryers into products with cult followings. Case in point: the Dyson Supersonic hair dryer pictured at right. Developed over four years and through 600 prototypes, it features a digital motor half the weight and eight times the speed of a traditional dryer.**

Such rigor is no anomaly. Dyson is the U.K.'s biggest investor in robotics and artificial intelligence research. In September, the company launched the Dyson Institute of Engineering and Technology, a university within its office grounds, to feed its growing headcount of engineers and scientists, which Dyson predicts will double to 6,000 by 2020. Dyson also plans to invest $2.6 billion into developing battery-operated vehicles in the same time frame. —*Debbie Yong*

GOOGLE

IN SEARCH OF CONSUMER ELECTRONICS AND SOFTWARE WITH SOUL

GOOGLE IS ALL GROWN UP. As with many tech companies—Apple, Yahoo, even Amazon—Google's design language has come a long way since its kaleidoscopic early days, when every color, typeface, and punctuation mark was used with abandon. (Seriously—just look at that 1998 homepage.) Over time, most of Google's peers matured by shedding their quirks and shades in favor of minimalist forms and a restrained palette, best embodied by the sleek, futuristic, Braun-influenced stylings of Apple. Not Google. In the wake of its 19th birthday, the company, now part of the conglomerate known as Alphabet, has retained the personality of its youth by wedding sophisticated industrial and software design (have you seen Google Home and Android 8.1?) with strange shapes, novel fabrics, and pops of bright color, such as the power button on its new Pixel 2 phone. In a world where today's angular machines are plastic and glass, black and white, and altogether expressionless, Google's products burst with the exuberance of, well, humans—a signal to its peers that they shouldn't take themselves too seriously. *—Andrew Nusca*

Google Pixel 2

SAMSUNG
HOLISTIC, STRATEGIC CONVICTION

IT WASN'T so long ago that Samsung found itself in a courtroom defending its creativity against Apple. But the company's decades-long bid to move beyond its reputation as a budget brand has paid off. Today Samsung is tech's largest spender on R&D. And its TVs, phones, appliances, services, and offices? Covetable. *—A.N.*

HUAWEI
BUILDING A BASE OF INNOVATION

WHEN CHINA'S tech giants looked to markets beyond their own shores, it was clear that many wouldn't be able to make the trip thanks to dubious intellectual-property portfolios. Not Huawei. The Shenzhen (but not *shanzhai*) gadget maker is a leader in international patents for software and hardware alike. *—A.N.*

AMAZON
HUMAN-CENTERED CAPITALISM

GOOD DESIGN isn't limited to aesthetics; it is equally about function. And what could be more functional than the store that sells everything? From its bulletproof website to its cashier-less stores to its family of speech-enabled devices, Amazon's customer focus cannot be ignored. *—A.N.*

MICROSOFT
DESIGN FOR THE 99%

THERE'S MUCH to be said about Microsoft's whiz-bang interfaces, modern Metro design language, and interactive Fluent Design System. But what sets this titan apart is its emphasis on inclusive design that makes products as accessible to people with disabilities as to those without. *—A.N.*

Amazon Echo Spot

COURTESY OF GOOGLE AND AMAZON

▲ Musical.ly

▲ Snap

▲ Meitu

MUSICAL.LY

THE SECRET TO THIS WILDLY POPULAR SOCIAL VIDEO APP? A DESIGN THAT'S ENGINEERED TO GO VIRAL.

● MTV IS *SOOOOO* LAST MILLENNIUM. Today's tweens produce their own music videos by accessing libraries of 15-second song clips—not to mention a plethora of ridiculous face "lenses"—on the hit app Musical.ly. The founders of the China-based, DIY lip-synching service, originally launched as a platform for educational tutorials, caught on to the fact that kids prefer copying Taylor Swift to watching calculus how-tos early on. Another lesson? Small but significant design tweaks—like moving the Musical.ly logo so that it wouldn't be cropped out when shared on other apps—helped the company grow its user base much faster. All of this has helped the booming music video maker generate 60 million monthly active users and get snapped up by the Chinese Internet firm Toutiao for as much as $1 billion. —*Michal Lev-Ram*

MEITU THE MOST INTUITIVE MAKEOVERS IMAGINED

● TOUCHED-UP PHOTOS never looked so good. Yet another China-based app maker, Meitu (the name means "beautiful picture" in Chinese), is enabling millions of young people to enhance their selfies—brighten eyes, smooth out skin, tweak and enhance features, or whatever their mobile-first heart desires. The company's series of apps (think BeautyCam, SelfieCity, and MakeupPlus) have been downloaded and installed on more than 1 billion phones worldwide, making complex technologies like augmented reality and machine learning accessible to regular people. Meitu's secret sauce? Tapping into the current demand for mobile apps that do one thing and do it well—plus catering to narcissistic tendencies. —*M.L.*

SNAP NEW ADVENTURES IN UX

● LET'S BE HONEST: You probably didn't know how to use Snapchat when you first downloaded it. Do I swipe? Where's the menu? Snap's convention-busting approach to user experience, which extends to its popular filters and unpopular Spectacles, reinvigorated a category known for its heavy reliance on feeds. —*A.N.*

INSTAGRAM PROTECTING THE EXPERIENCE

● SURE, WE JUST celebrated Snap for breaking the UX rules. But we commend rival Instagram for preserving its soothing social environment even as it adds live video and Stories (copied from Snap, naturally) to its core experience. It's a far cry from the busy buffet of options offered by parent Facebook's namesake app. —*A.N.*

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IBM

PUTTING A STICKY NOTE ON THE CUSTOMER. TO WIN IN THE AGE OF COGNITIVE COMPUTING AND CYBERSECURITY, THE VENERABLE TECH GIANT IS BETTING BIG ON DESIGN THINKING. HOW BIG? IT NOW BOASTS THE WORLD'S LARGEST DESIGN TEAM.

Cloud product designers work on an "empathy map" for an app developer at IBM's design headquarters in Austin.

PHOTOGRAPHS BY **SARAH LIM**

I

IF YOU WANT to track the fast-moving design transformation happening at IBM, try following the Post-it notes.

"I see it everywhere," says Diane Paulenich, a managing director at the technology giant who started her career at the company working in a call center 32 years ago. "Sounds silly. But when I go into the different offices I see teams of people getting together and collaborating with sticky notes."

The stickies are a hallmark of "design thinking" exercises, in which participants often jot down thoughts on the brightly colored pieces of paper and place them on a whiteboard as part of creating, for example, an "empathy map" to understand the perspective of the user or customer by imagining what she or he thinks, feels, says, and does.

Paulenich herself has become a convert to the design thinking process, even when she's just brainstorming with her team. Asking people to write down their ideas, she says, suppresses what she calls "meeting bullies," those who dominate conversation. And Paulenich regularly makes empathy maps to prepare for client meetings, complete with a picture at the center. "I actually do a little stick figure so that they're real," she says. "It's just to remind me, 'Don't think about you, Diane. Think about them.'"

Perhaps you perceive IBM as an engineering company, collecting patents and manufacturing mainframe computers. (Yes, it still makes them.) Or a venerable technology power trying to find its way in the era of Google and Amazon. Or, if you've seen the TV ads, the company behind the artificial intelligence platform Watson. But a design leader? Probably not.

Think again. Today IBM has some 1,600 formally trained designers operating out of 44 design studios in over 20 countries—the largest such team in the world. And those are just the official designers. IBM has offered basic training in design thinking to tens of thousands of employees like Paulenich.

What's even more remarkable is that IBM has built virtually all of this capacity in just the past six years, since Ginni Rometty took over as CEO in 2012 and the next year tasked executive Phil Gilbert with teaching the 380,000-person organization how to look at business through the prism of design—or, actually, to relearn that skill.

In fact, IBM has a storied history in design. After Thomas Watson Jr. became CEO of the company in 1956, he built a first-of-its-kind corporate design program at IBM, which elevated both its products and its reputation. In 1973, Watson Jr. famously declared in a speech, "Good design is good business." But over the years, the focus had faded.

Today, IBM's design operations are run from two floors—totaling 50,000 square feet of whiteboards and open office—on an IBM campus in Austin. Why there? Because Austin is where Gilbert, 61, was based when IBM bought his B-to-B software company in 2010. Gilbert isn't trained as a designer. But he got religion about the potential of design to help scale businesses at his first startup in the 1980s: "Ever since then I've been pursuing this notion that the magic in any product or service is how it's experienced by the end user."

▲ Members of IBM's design leadership team photographed at the offices in Austin, from left: Nigel Prentice, Joni Saylor, Jeff Neely, Liz Holz, and Phil Gilbert, the general manager of IBM Design.

Given a mandate by Rometty to move fast, Gilbert began recruiting aggressively in 2013. At the time, IBM had one designer for every 72 coders; today that ratio is 1 to 8. The company began holding design "boot camps" for new hires, then moving them into multidisciplinary product teams—for everything from A.I. to cybersecurity to Internet of things—where they served as evangelists.

In 2017 the company launched the IBM Design Thinking badge program. More than 90,000 IBMers, like Paulenich, have already earned their "practitioner" badges by completing an online course, and another 21,000 have done extra work to earn at least one of three advanced badges.

The ultimate aim of such programs, says Gilbert, is to help IBM to better serve customers—with a goal of winning. "Businesses don't care about design thinking, per se," he says. "Businesses care about outcomes." That's a Post-it worthy motto. —*Brian O'Keefe*

The recently opened Starbucks Reserve Roastery in Shanghai.

STARBUCKS

HOW THE SEATTLE COFFEE GIANT IS CREATING CUSTOM EXPERIENCES WORLDWIDE.

IKEA SELLING MORE, BUT USING LESS

THERE'S AN irony in how Ikea—a company whose business is selling stuff, and lots of it—is turning the millions of customers who visit its stores every day into accidental environmentalists. By buying Ikea's products, consumers also are inadvertently buying into the Swedish furniture giant's mission to reduce the footprint of everything it sells.

Ikea views its environmental impact as a problem that can be solved with design. Take wood, which shows up in about two-thirds of the company's home furnishings. In its fiscal 2016, Ikea used 2% less of the material than it did the previous year, despite selling more wood products. One way was by using dual-density particleboard in its iconic Billy bookcases, which cut down on materials by 20%. Ikea's design work is also helping customers use fewer resources at home. All of its kitchen faucets now have an aerator. The feature mixes in air with the pressure flow to achieve the same feeling of wetness while using 40% less water.

The green design mindset has paid off too. Sales of sustainable products were around $2 billion in fiscal 2016, and Ikea is targeting about $3 billion by the middle of 2020. *—Beth Kowitt*

A selection of water-saving Ikea faucets.

THE WORLD'S BIGGEST coffee chain doesn't just sell java—it wants to serve up an experience. Starbucks has crafted each of its 27,000 outlets worldwide to feel like locally owned and designed cafés, says Starbucks' senior vice president of creative and global design, Liz Muller. Artists, and the occasional "starchitect"—such as Japan's Kengo Kuma—are tapped to customize details by country and community.

Muller's latest feat: a sprawling 30,000-square-foot Starbucks Reserve Roastery in Shanghai that opened in December. It's the second of Starbucks' ultra-luxurious innovation lab spinoffs and its largest store to date. A copper kettle roaster hand-carved by Chinese craftsmen takes pride of place in the outlet, which also features an on-site bakery and Teavana bar—both firsts for Starbucks—and virtual reality tours powered by Chinese e-commerce giant Alibaba. *—D.Y.*

PEPSICO INFUSING PRODUCTS WITH FIZZ

● **GOOD DESIGN** is about more than picking out the right shade of blue for a soda can. That's why PepsiCo CEO Indra Nooyi recruited chief design officer Mauro Porcini from 3M in 2013 and made design thinking a strategic priority for the food and beverage giant. The creation of a Design and Innovation Center in New York swiftly followed in 2014. And PepsiCo's new emphasis on design has led to a pipeline of creative products. Earlier this year, for instance, PepsiCo launched Lifewtr, a premium-priced bottled water featuring labels that are designed by artists and change several times per year. *—D.Y.*

CAPITAL ONE THINKING OUTSIDE THE BRANCH

● **BANKING AND** cutting-edge design don't automatically go together. But Capital One has adopted design thinking as a mantra to reinvent itself as a software company and innovation incubator, rather than a traditional bank. After acquiring design firms Adaptive Path and Monsoon, Capital One has recently rolled out fresh digital features, from an emoji-enabled SMS chatbot to GPS-tracked transaction histories. In early 2018 it will unveil its 1717 Innovation Center in Richmond, a 42,000-square-foot facility housing an experience design research lab and, through a partnership with an incubator program, some 50 startups. *—D.Y.*

MATT GLAC—COURTESY OF STARBUCKS; IKEA: COURTESY OF IKEA; COURTESY OF PEPSICO

AIRBNB

IN A Q&A, COFOUNDER JOE GEBBIA EXPLAINS HOW THE SHARING-ECONOMY POWERHOUSE 'DOG-FOODS' TO BETTER UNDERSTAND ITS CUSTOMERS AND WHY GREAT DESIGN CULTURES NEVER REALLY FAIL.

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FEW COMPANIES have emphasized the importance of design thinking as much as Airbnb. Two of the San Francisco startup's three cofounders, chief product officer Joe Gebbia and CEO Brian Chesky, are graduates of the Rhode Island School of Design (RISD)—a biographical detail that turned off some investors at first but turned out to be a big advantage for the sharing-economy giant, now valued at $31 billion by investors. We spoke with Gebbia, who also serves as head of Samara, the company's in-house design and innovation studio, about his approach to design.
—Leigh Gallagher

FORTUNE: What does "design thinking" mean to you?
Gebbia: To me, design thinking is another way of saying empathize with the customer. It's consideration for the person you're designing for. That's all it is. What it means is you're going to spend the time and the effort to understand the needs of the person you're designing for such that you can create something that's valuable to them. This is an old lesson from RISD when I was on a team working on a medical device. Through our research, we went out and talked to doctors and nurses and patients, but the big aha moment was when we actually had the existing solution applied to us, and we lay down on the hospital bed and got to experience what it was like to be the patient. It was this design principle, "Be the patient." Go as far as you possibly can to see the world through the eyes of the person you're designing for.

There's also a Part 2, which is applying your own point of view to the world. Design thinking does not mean design by committee. It does not mean that you write down every feature request or every complaint that a customer has and just transmit that into a one-to-one match. So Part 2 is, you come back to your studio or your place of creation and combine what you learned with your own point of view and your own creativity and your own imagination as a designer. The term I use for this is "enlightened empathy." And talking to somebody does not mean sending them a link to a survey. Digital communication is completely different from in-person, face-to-face conversations. One will give you surface insights and the other really gives you depth.

You also talk about "dog-fooding." What's that?
Dog-fooding is using your own products so that you understand from inside out what it is you're providing the customers. It's another way to gain insights and to gain intelligence. You use it yourself; you eat your own dog food. Every time we do that, we discover something that we can improve. It's one reason why we highly encourage our team members to be hosts, and why we give out travel stipends to every employee inside the company. Everybody comes back with, "Oh yeah, I tried to search, and I found this bug." Or "I really want to see this information as I'm driving to my Airbnb."

What goes into building a creative environment?
One thing in particular to Samara is that the word "failure" is not allowed. And the reason is that failure is not actually a thing. It's such a misconception. There is an action that takes place, and you get a result that you want or that you don't want. And then you label that with whatever you want. And if you get a result that you didn't want, some people label that as a failure. You can do that if you want to; or you can choose to label it as an incredible learning moment. The fact that you just figured out one

less path to go down in order for us to achieve the goal that we're after, well, thank you for that. Thank you for eliminating more paths. Cross it off the list, and we can now get to where we want to go quicker.

▲ Airbnb cofounder Joe Gebbia (right) poses for a selfie at a gathering of Airbnb hosts in Australia.

So many companies are now seeking to apply design thinking. What advice would you give to a big company seeking to do that if it doesn't naturally have design DNA?
I think they need to hire more designers. I think they need to hire design executives. And I think that the leadership or the founders or the CEO or whoever's running the company needs to go through some kind of crash course in the value of design. Because if the leader of the company doesn't get it, then nothing else you can do really matters. There needs to be an executive sponsorship of design philosophy. If design is unfamiliar to them, I would recommend a weeklong workshop at either the d. school at Stanford on the West Coast or RISD on the East Coast. They both have executive programs to help leaders grasp the nature of design, the value of design, so that they can be more informed and more conscious about design.

Can you name a company you admire designwise?
I think Pixar's done an amazing job integrating art and science. They really get this idea that art and engineering work side by side.

Has the thinking about design changed in the corporate world?
The good news is that there has been an incredible shift in investors' mindset on the value of design. And so even the people that leaders are sometimes beholden to, they are now getting it in a way that 10 years ago, trust me, they didn't. Because we met with them and they rejected us, because they didn't understand the value of design. But I feel like we, along with many of our contemporaries, have proven that design is a differentiator, that design can help you expand your business, that design is a critical component.

One last question: How would you design, say, an IPO differently?
We'll leave that one on the whiteboard. It's up to somebody else to rethink that whole process. ■

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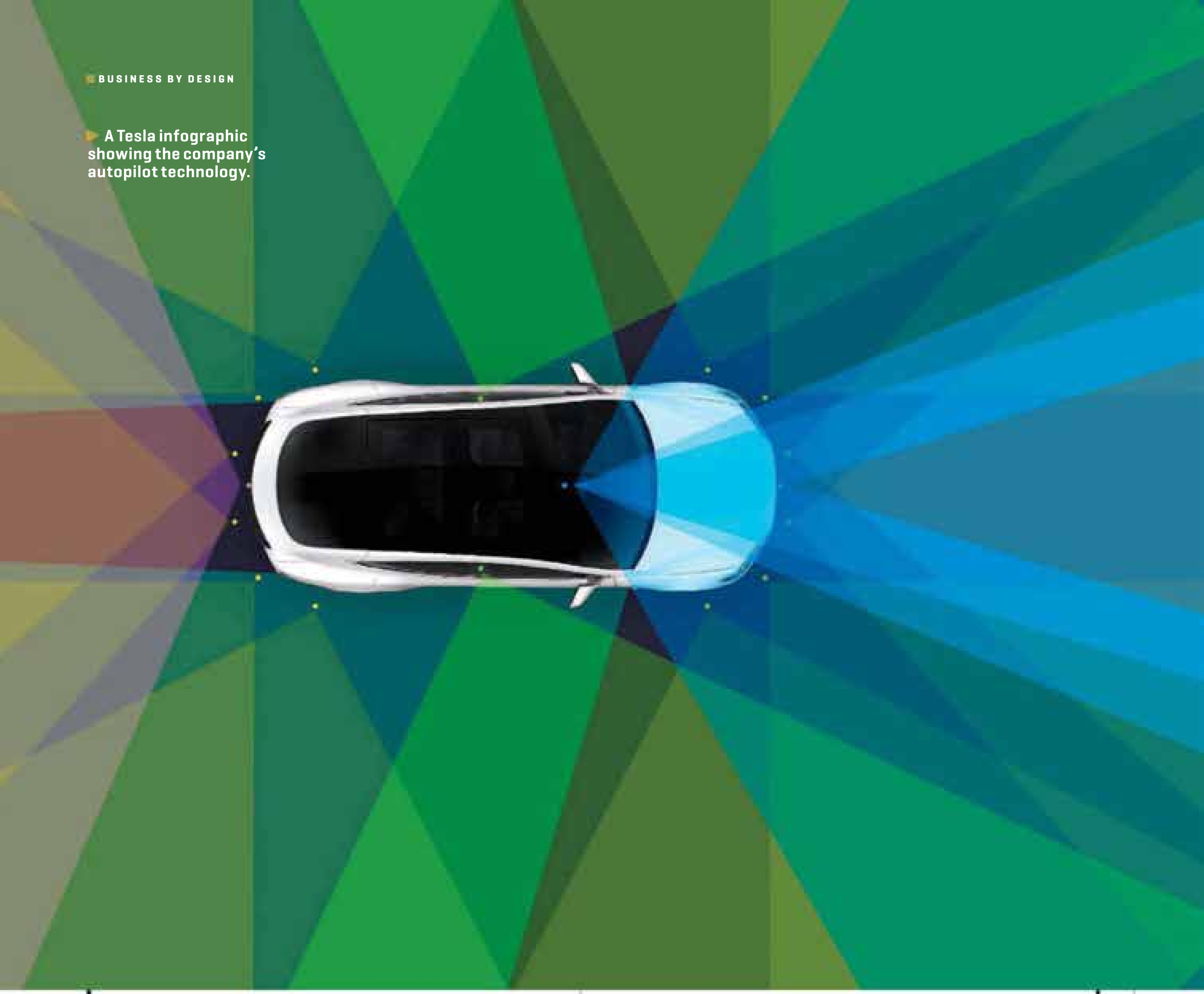

A Tesla infographic showing the company's autopilot technology.

TESLA

REDEFINING AN INDUSTRY. IT'S NOT JUST ABOUT MAKING ELECTRIC CARS SEXY. ELON MUSK'S ULTRA-AMBITIOUS COMPANY IS DESIGNING A NEW PARADIGM FOR ALL DRIVERS.

I

IN DECEMBER, at the Los Angeles Auto Show, most car companies used their display space to show off new models and concept cars. Tesla, the idiosyncratic electric-vehicle maker—which more often than not passes on these industry events—brought a house.

Dubbed the House of the Future, it was outfitted with Tesla-brand solar panels and one of Tesla's home battery storage units, the Powerwall. Tesla's fleet of highly sought-after vehicles—consisting of the Model X, Model S, and the recently released Model 3—was there too, of course. The cars and the homes of the future are each components of the state-of-the-art, cleaner-energy ecosystem that Tesla is defining and designing for us all.

There's an obvious metaphor in that. Few, if any, companies think as big as Tesla: To say the 15-year-old company is merely reinventing the automobile industry would be selling it short. And few, if any, have had as swift and profound an impact on the way we conceive of an object, as mythic and everyday, as the car. "They're bringing the Internet of things to the automobile, or vice versa—the automobile to the Internet of things," says Mark Baskinger, a professor at Carnegie Mellon's School of Design. "That's really interesting as they're positioning themselves as a different paradigm."

Wall Street has clearly bought into the vision. As of mid-December, Tesla's share price was up 61% in 2017, pushing its market value to $58 billion—on par with GM and above that of Ford.

Playing the role of visionary is Tesla cofounder and CEO Elon Musk. But while some snicker at his grand ideas—let's go colonize Mars!—the accomplishments of his car company are hard to deny.

From Tesla's push toward automation and self-driving capabilities to its treatment of car as software (with system updates beamed out over the air) to simply making electric vehicles cool, the traces of Tesla's new paradigm are increasingly visible in the way more traditional automakers are designing and engineering their cars.

Tim Huntzinger, an automotive designer who teaches in the renowned transportation program at the ArtCenter College of Design, says perhaps Tesla's biggest influence will be on the well-worn model of how cars are made and sold. "They managed to sell so many Model 3s, even before the Model 3 was in its final design stages," says Huntzinger, marveling at the feat. "It was almost like they were doing Kickstarter for cars. They were able to bring in hundreds of millions in revenue before actually creating final tooling for the vehicle."

It's been an almost unprecedented success. Says Huntzinger, "That's huge for the automotive industry. For the entire history of the automotive industry, you had to spend millions or hundreds of millions to even turn a cent. Many companies have gone out of business that way."

Huntzinger, who compares Tesla's ethos to Apple's, adds that the elevated role of the consumer in that process is also transformative. "To get feedback from customers early in the process—that's totally new and totally different."

There's also the radical approach Tesla has taken with the car-buying experience—to make it pleasurable, by placing its stores in malls and letting people order their cars online. "The purchasing experience is so different [from what] we've all been forced into with the dealership model," says Huntzinger. "It's super-refreshing to see the customer being put first." —*Erika Fry*

FORD REVVING UP THE FOCUS ON DESIGN

SINCE TAKING CHARGE of the Detroit auto giant in May, design-thinking acolyte (and, prior to joining Ford, the father of the open-office plan, as CEO of Steelcase) Jim Hackett has been shifting gears at the maker of the iconic F-150 pickup truck. Rapid prototyping and ideation are part of that process, as well as a focus on "mobility" as much as cars. —*E.F.*

The Ford GT, a high-performance showcase car featuring lightweight carbon fiber construction.

AUDI OFFERING DRIVERS A NEW VISION

THE HIGH-END German automaker, a division of Volkswagen, opened a spiffy new design center in 2017. But it's been building a reputation for high-quality, tech-forward designs for quite some time. That's especially true in the auto cabin, where passengers are treated to sleek, state-of the-art displays and obsessively engineered lighting and sound systems. —*E.F.*

The driver assistance system in the Audi Q7 has a night vision feature to help prevent hitting pedestrians.

HYUNDAI MOVING FAST INTO NEW TECHNOLOGY

WHEN IT COMES to selling cars, it's all about speed—or such is the rationale that led Hyundai to open an enormous, cutting-edge design studio south of Seoul in late 2017. The Korean automaker hopes to cut in half the time (three years) it takes to design a car—an effort, in part, to keep pace with new rivals such as autonomous vehicle startup Waymo. —*E.F.*

UNIQLO

COLLABORATIONS WITH EVERYONE FROM PHARRELL TO NINTENDO GIVE THE JAPANESE FAST-FASHION RETAILER A DISTINCT EDGE.

TO GAIN INSIGHT into how Japanese retail brand Uniqlo so quickly attained ubiquity around the world, consider parent company Fast Retailing's nine-month-old headquarters in Tokyo. Named Uniqlo City for its vast 188,000-square-foot sprawl, the painstakingly designed space—with its magazine library and fully stocked cafeteria—could easily pass for the office of a cutting-edge Silicon Valley firm, and is the first of its kind to challenge convention in corporate Japan.

Likewise, company founder Tadashi Yanai acknowledged early on that he had to adopt a global mindset when he took over his father's suit store in 2001 and renamed it the Unique Clothing Warehouse. By strategically planting global flagship stores in key cities, including New York, London, and Shanghai, and through design collaborations with prominent pop culture icons and brands such as Nintendo, Marvel, and Pharrell Williams, Yanai built his casual-wear chain from Hiroshima into what is now Asia's largest clothing maker by revenue, with over 1,900 stores worldwide.

Uniqlo has also opened design and R&D centers worldwide, and is exploring the use of A.I. in design in its quest to perfect the marriage of "fast fashion" design and utility. As Yuki Katsuta, Uniqlo's SVP of product design and global research, once said of the company's ethos: "People like to make their life easy, and their clothes should make their life easy for something. Easy for maintenance. Easy for action." —*D.Y.*

NIKE

LED BY CEO MARK PARKER, THE ATHLETIC-SHOE TITAN IS PICKING UP THE PACE ON CUSTOMIZATION.

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SPURRED ON by the Internet generation's demands for instant gratification, retailers are racing to shorten their production lead times. In September, Nike pulled ahead of the pack when it debuted the 90-minute Nike Makers' Experience, dubbed by many as the future of retail. The Nike By You Studio in New York utilizes augmented reality, object tracking, and projection systems to custom-design shoes, which shoppers can collect on-site in just over an hour.

As a former shoe designer, Nike CEO Mark Parker has emphasized innovation as key to transforming the 53-year-old company. (A positive sign: Nike's stock is up 27% over the past year.) Together with VP of design John Hoke, Parker manages a team of 1,000 designers overseeing everything from the development and production of Nike's sustainable, recycled Flyknit and Flyleather materials to incorporating inclusive designs such as Nike's Pro Hijab for Muslim athletes. —*D.Y.*

▲ Custom shoes on display at the Nike By You Studio in New York.

PHILIPS STAYING DESIGN-FORWARD IN MEDICAL TECH

● **WHILE MANY COMPANIES** are only just warming up to the potential for design to transform business, Philips recognized it as far back as 1925. That's when the now 126-year-old Dutch appliance manufacturer hired architect Louis Kalff as the company's first in-house designer. Kalff not only gave the company's ads a standardized look but also produced enduring designs such as the Philishave razor. Today, Philips Design functions as an independent unit with over 500 designers in 19 studios across nine countries.

Led by chief design officer Sean Carney, Philips Design regularly partners with hospitals and research labs to reconceive medical technology. Breakthroughs include the Azurion guided therapy platform, which allows clinicians to perform complex procedures with real-time imaging, and on-demand 3D printing of surgical tools. —*D.Y.*

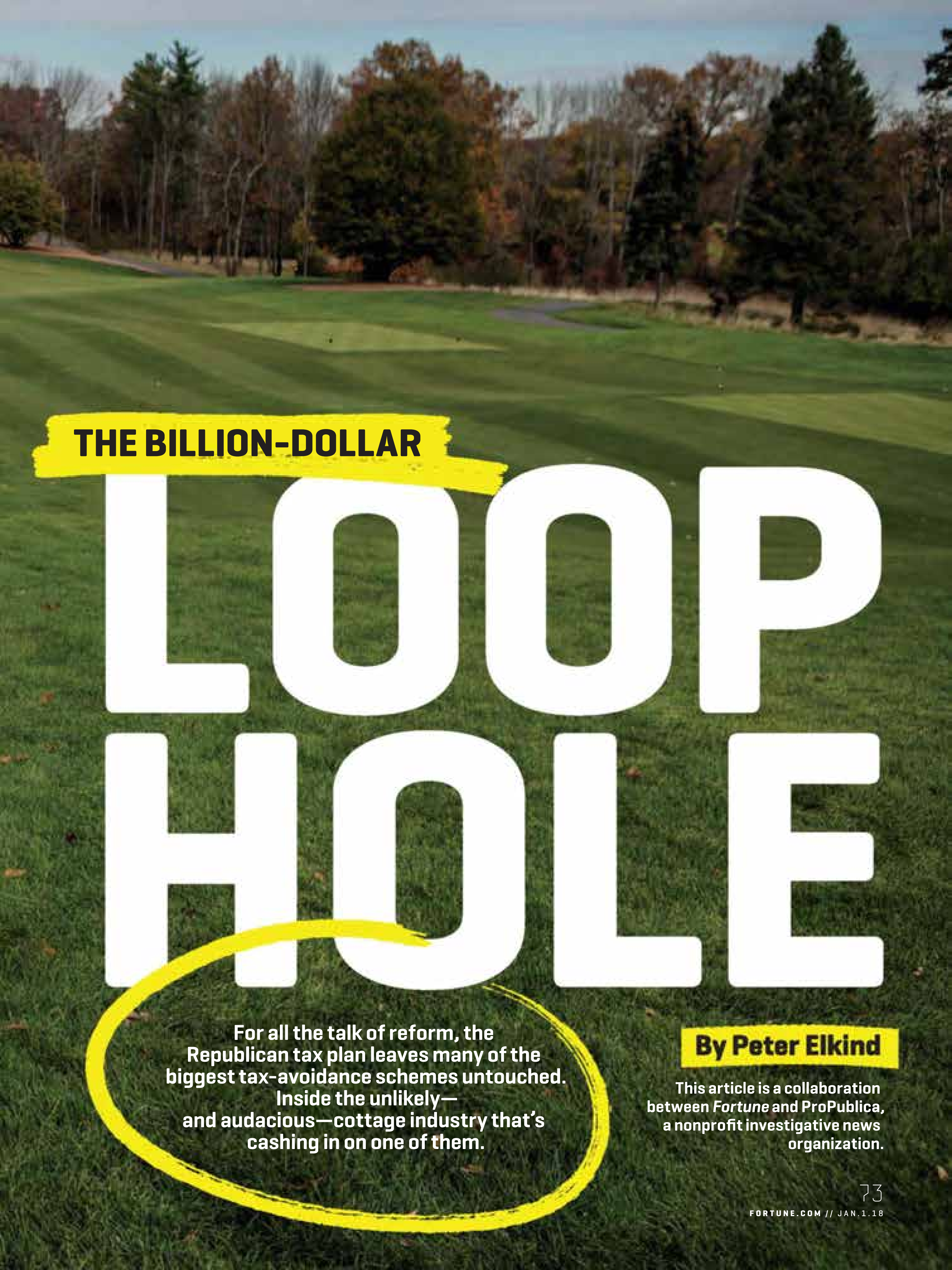
ZALANDO GIVING FASHIONISTAS EXACTLY WHAT THEY WANT

● **EUROPE'S BIGGEST** online fashion retailer fancies itself as the Spotify of fashion, says Anne Pascual, VP of product design for the Berlin company—helping consumers discover styles much as they find new songs. So Zalando, which sells over 2,000 brands in 15 countries, has developed user-friendly apps for browsing looks. If the fit isn't right, Zalando has a courier service to pick up your returns. —*E.F.*

▲ Zalando isn't just an app. It also runs outlet stores, like the one above in Berlin.

Donald Trump at his Bedminster, N.J., golf club in 2006. He took a $39 million tax deduction on the property under the conservation easement law.

PHOTOGRAPH BY **VINCENT LAFORET**



THE BILLION-DOLLAR LOOPHOLE

For all the talk of reform, the Republican tax plan leaves many of the biggest tax-avoidance schemes untouched. Inside the unlikely—and audacious—cottage industry that's cashing in on one of them.

By Peter Elkind

This article is a collaboration between *Fortune* and ProPublica, a nonprofit investigative news organization.

THE IDEA SEEMS LIKE THE PERFECT MARRIAGE OF ENVIRONMENTALISM AND CAPITALISM:

Landowners give up their right to develop a piece of property, and in exchange they receive a special tax deduction. Nature is preserved, and everybody benefits.

That's traditionally how what are known as "conservation easements" worked. In California's Napa Valley, for example, a former biology professor named Giles Mead agreed not to develop 1,318 hilltop acres in 1983 and got a deduction in return. The property, Mead Ranch, features vernal pools and rare and endangered plants. Two entirely new species were discovered there. Bears, bobcats, and mountain lions roam the grounds. Mead allowed groups of hikers, birders, and plant enthusiasts to visit. He sometimes greeted them with glasses of wine from the family's vineyard. Since Mead's death, his daughter has kept the property available to the public.

A growing number of recent easement donations, however, are driven by a more commercial reward—an outsize tax deduction for wealthy investors. Known as "syndications" (or "syndicated partnerships," since they're typically offered in that structure), they're deals orchestrated by middlemen with the goal of big payoffs for all of the participants, many of whom have never visited the land in question.

One example: the former Millstone golf course outside Greenville, S.C. Closed back in 2006, it sat vacant for a decade. Abandoned irrigation equipment sat on the driving range. Overgrowth shrouded rusting food and beverage kiosks. The land's proximity to a trailer park depressed its value. In 2015, the owner put the property up for sale, asking $5.8 million. When there were no takers, he cut the price to $5.4 million in 2016.

Later in 2016, however, a pair of promoters appeared. They gathered investors who purchased the same parcel at the market price and, with the help of a private appraiser, declared it to be worth $41 million, nearly eight times its purchase price. Why? Because with that new valuation and a bit of paperwork, the investors were suddenly able to claim a tax deduction of $4 for each $1 they invested. (One of the promoters says the $41 million valuation was legitimate.)

Such transactions are booming today, transforming an incentive for charitable gifts into a windfall for the wealthy looking to save big on their taxes. The provision they're exploiting is the single most generous charitable deduction in the tax code, according to experts.

The use of syndicated easement deductions has exploded in recent years, according to Brookings Institution economist Adam Looney, who began researching the subject while serving as a top tax official in the Obama Treasury Department. They cost the Treasury between $1.2 billion and $2.1 billion, he estimates, in lost tax revenue last year.

That's a negligible sum for the federal government—but it's a proxy for a bigger, more systemic problem. There are plenty of other flawed provisions in the tax code, creating opportunities for abuse, says Bill Hutton, an emeritus tax-law professor at the University of California Hastings College of the Law. They often take years to surface—and many more to shut down. "The tax shelter advisers' mentality just seems to live forever," he says. "Shelters keep coming back."

That makes the treatment of syndicated easements a telling prism through which to view the tax system at a moment in which Congress has been frantically redrafting the tax laws. It's also a case study in how difficult it can be to turn the rhetoric about draining Washington's swamps

PHOTOGRAPHS BY MELISSA GOLDEN

Robert Keller (center) with his technical team. He defends syndicated easements, calling them a "wonderful conservation ploy."

into reality. Even as Republicans scrambled to find revenue to underwrite their tax cut—legislation that they claimed would reform and simplify the system—they permitted syndicated easements to survive intact.

The 1,000-page bill is likely to open up costly new loopholes, according to experts. "It clearly is going to create artificial incentives to engage in transactions that have no economic purpose other than to reduce taxes," says Looney. "The abuses in the new tax bill are going to make the costs of conservation easements seem trivial in comparison."

Conservation easements have generated controversy in the past, particularly when it came to light that private golf course owners were taking the deduction. Indeed, the nation's current President has availed himself of such write-offs in large quantities. In 2005, Donald Trump took a $39 million deduction on his private golf course in Bedminster, N.J. In 2014, he donated an easement on an 11.5-acre driving range in Los Angeles. (In both cases, he pledged not to build houses on the property.) All told, Trump has made at least five easement gifts, generating more than $100 million in write-offs.

Above: Keller in his office in Jasper, Ga.

But Trump's deductions are relatively tame compared with the aggressive strategies employed by others in recent years. A change in tax laws allowed enterprising promoters to reap deductions many times the size of the investment, on behalf of investors who hadn't previously owned the properties in question. A preliminary IRS analysis of syndicated partnerships this summer showed investors claimed an average of $9 in tax deductions for every dollar they invest.

People have accomplished that by exploiting a giant loophole: The size of the tax deduction is based on a claim about how much the land's value is diminished by the promise not to develop it. By law, that estimate is delivered by an appraiser hired by the taxpayer. The appraiser is free to assert that the donated land is actually worth many times what investors paid for it, often just months before. That, in turn, inflates the deduction. The process is abetted by law firms, brokers, and accountants who pocket millions in fees.

"They're bogus," says tax expert Steve Small of syndicated easements. Small helped write the charitable-gift rules at the IRS and is now a tax attorney in Cambridge, Mass. "They're tax shelters masquerading as conservation easement transactions, based on highly inflated appraisals. Someone's using a charitable contribution provision of the tax code to make a profit. That's not what any charitable contribution is designed to do." Former Montana Sen. Max Baucus, a sponsor of the legislation that updated the easement write-off, agrees. "Unfortunately, people have taken advantage of the code in ways that were not intended," he says. "These things should not be legal."

One reason abuses have multiplied is that a surprising amount of the oversight consists of the honor system. The genteel guardians of the old-line conservation community pledged to try to keep practitioners in line. But they've been unable to rein in the syndicators, whose rise they have watched with growing horror.

The traditionalists are embodied by the Land Trust Alliance, a Washington, D.C., association whose dues-paying membership includes the vast majority of the nonprofit trusts that, by law, administer conservation easements. (See sidebar.) The Alliance has long been the most important advocate for the tax break.

The Alliance's leadership now fears that public outrage over profiteering will jeopardize the deduction altogether. "These need to be shut down," says the organization's president, Andrew Bowman. "These few bad actors are going to give us a bad name." Bowman's predecessor, Rand Wentworth, calls syndications "large-scale, multimillion-dollar tax fraud."

As views harden among the traditionalists, a schism has occurred. A splinter group of land trusts has sided with the syndicators, providing a home for their deals. Most prominent among the renegade land-trust leaders: Robert Keller, a brash conservation biologist in Georgia who has built an empire through syndicated easements.

Unable to stop syndicators through moral suasion, the Alliance has increasingly prodded the IRS to take action. The IRS has policing power, and it wields that clout chiefly by auditing the returns of those who take the deductions. But that's a torturously slow process and one that so far has yielded minimal results. The speed at which the syndications have increased has left the resource-starved agency looking like a befuddled mall cop lurching off his chair and trying to figure out which of the dozen teenagers simultaneously grabbing candy bars to chase down.

The IRS announced a broader crackdown in December 2016. It took the rare step of branding syndicated easement deals as "listed transactions," subject to special reporting and scrutiny. Such IRS moves usually scare off audit-wary investors. But this time, the action appears to have had little, if any, effect.

The syndicators, arguing that the profit motive produces big environmental benefits, have fought back with a million-dollar public relations and lobbying offensive. That campaign produced a move to eliminate the funding for the IRS crackdown—one of multiple fronts on which a legislative battle is being waged.

THE BASICS OF CONSERVATION EASEMENTS

To be eligible for a deduction, land needs to meet at least one of four broadly defined "conservation purposes." These include protecting "relatively natural" habitats; historic sites or buildings; land for public recreation or education; and open space (including farms, ranches, and forests).

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Based on the appraised value of the land, landowners can deduct up to 50% of their income in one year and any remaining write-off over the succeeding 15 years; farmers and ranchers can deduct 100% in any period from one to 16 years.

The landowner can continue to own and use the land as before, and even build on a portion of it, subject to agreed restrictions.

It might sound like an arcane matter. Yet there's a lot at stake for all Americans: billions in tax revenue and a system that protects 56 million acres of U.S. land from being turned into resorts and Walmarts. How has a widely derided abuse—almost universally criticized by tax experts—managed to survive repeated attempts to fix it?

NOT SO MANY YEARS AGO, conservation easements seemed to be approaching extinction. Starting in 2003, investigative reports in the *Washington Post* generated clouds of scandal over the write-off. The stories exposed self-dealing at the Nature Conservancy; sham deductions taken for protecting facades on urban buildings; and jaw-dropping write-offs for golf resorts, whose chemical-doused fairways and private membership seemed at odds with the goals of protecting natural habitat and providing "significant public benefit."

The deduction seemed destined to die, or at least be sharply limited. In January 2005, Congress's Joint Committee on Taxation proposed killing the tax break for some easements and slashing it for the rest.

But the Land Trust Alliance lobbied hard, promising it would do more to prevent misuse of the deduction. Prominent conservationists chimed in with support for easements. And another constituency with a mom-and-apple-pie appeal also weighed in: Farmers and ranchers, often rich in land but poor in cash, argued that the provision helped keep them in business, producing the nation's food.

As a result, rather than eliminating the easement deductions, in 2006 Congress expanded them. The updated law raised the maximum annual write-off from 30% to 50% of taxable income; farmers and ranchers were allowed to deduct 100% of what they make. All were given 16 years to use their full write-off.

As for enforcement, Congress adopted a stance that could mostly be called "trust but don't verify." It accepted the industry's promises to reform, which included a voluntary accreditation program that would set best practices for land trusts. Meanwhile, the law did mandate new training requirements for appraisers.

It was left to the IRS to police misconduct through case-by-case audits, with stiffer penalties for those found to have violated the rules. That method would prove woefully inadequate to combat the coming wave.

IT'S IMPOSSIBLE TO IDENTIFY the precise birthplace of the syndicated conservation easement. But it's safe to say it became an industry in Georgia. Between 2010 and 2012, taxpayers in the Peach State claimed about 36% of all federal tax deductions for easements—despite having only 2.5% of the nation's land under easement, according to a May 2017 report that Looney, the former Treasury official, published for the Brookings Institution, where he's now a senior fellow in economic studies. Eight of the 10 biggest syndicators are located in Georgia, according to his research.

The syndication technique wouldn't have spread without a confluence of people and events. They include a small-town conservation biologist and a couple of big-city ex-bankers who met after the easements law was changed—at a moment in the wake of the real estate crisis when investors began looking for ways to salvage value from land whose price had plummeted.

The small town was Jasper, Ga., pop. 3,684 (about 60 miles north of Atlanta), and the biologist was Robert Keller. In the world of land trusts, no one embraces and enables syndicated deals quite like he does. Keller, 60, is CEO of the Atlantic Coast Conservancy (ACC), where he has built a conservation empire. By his estimate, ACC oversees 80,000 acres of conserved land in 11 states.

Despite the IRS's recent crackdown, Keller expects to accept more than 80 easements in 2017. He did 79 in 2016. Like most land trusts, Atlantic Coast Conservancy doesn't report the total value of its donors' conservation deductions. But a sampling of deal documents suggests it took easements and land donations responsible for as much as $1 billion in write-offs in 2017.

Keller accepts more syndications than anyone, and he's utterly unapologetic. "They call me a rogue land trust," he says. "I'm sick of people pointing an accusatory finger. I'm putting aside to the tune of about 12,000 acres a year that will never be developed. *Ever.* If I can do that, then I feel like I'm doing what I was tasked to do. I'm supposed to conserve land. What am I doing wrong?"

During the day I spent with Keller in northwest Georgia, followed by many email exchanges and phone calls, he was charming, forthcoming, and blunt. Stocky, with a red face and white beard, he was dressed in a black T-shirt, blue shorts, and running shoes. His left leg bears a tattoo of a shark. On his right calf there's a tattoo of a leopard seal. "They eat penguins," he says.

Keller's story—and a close look at some of the deals he's embraced—explains a lot about the battle over syndicated conservation easements. For starters, in a world of nonprofit land trusts, Keller is a proud capitalist. His direct compensation from the nonprofit he heads totaled $156,750 in 2015, tax returns show. But that's dwarfed by the $602,432 he made from Environmental Research and Mapping Facility, a side business he operates that works exclusively for his land trust.

Keller served in the Navy for a decade before earning a doctorate in conservation biology at Wake Forest. He then worked as an assistant professor at the University of Tennessee at Chattanooga for seven years. He left in 2006 to become the executive director of the Mountain Conservation Trust, a tiny outfit in Jasper, where, says Keller, "land conservation moved at a glacial pace." Keller's stock in trade, he says, was the expertise he'd picked up in the Navy about satellite-based global information systems, which allows him to survey land sites virtually anywhere in the U.S. "I wanted to expand and do more things," he says. "They wanted to putter along."

Keller's ambitions didn't find the right vehicle until about 2009, when two former Wachovia bankers rolled into Jasper from Atlanta. They pitched Keller on the idea of exploiting the devastated real estate market by urging developers and lenders to recoup some of their losses through partnerships donating "monetized easements" (Keller's preferred term). Notes Keller: "Most of these people would never have talked to a conservation biologist if the economy hadn't turned down, because they were going to turn it all into a subdivision and make a bunch of money."

The ex-bankers needed a nonprofit to accept easement gifts, and they had struggled to get a land trust on board. Keller smelled opportunity and persuaded his board to take a look.

They didn't like what they saw. In December 2009, the board of the Mountain Conservation

By law, a government agency or, more often, a nonprofit land trust must accept and administer the easement. The trust negotiates the development limits with the landowner and enforces them in perpetuity.

Sixteen states sweeten the pot by offering state income tax credits too.

Trust asked Keller to resign. Cody Laird, then one of its directors, says Keller was proposing accepting easements with “excessive appraisals” that went “against the IRS guidelines.” He adds, “It’s something we didn’t want to do as a board.” (Keller denies the allegation and blames the move on “a personality conflict.”)

In 2010, Keller set up Atlantic Coast Conservancy and began to accept “monetized” easements. By then, the Georgia syndication industry had begun to flourish. It touted itself with the get-rich-quick appeal of an infomercial. “Thinking about tax deductions for this year?” began one marketing email from a promoter. “Contact us right now for more information on how you can facilitate a conservation easement and get incredible tax benefits for doing so.”

For the promoters, the deals were lucrative, often generating $1 million or more in fees per transaction. New entrants rushed in from careers in banking, real estate, law, and accounting. In Georgia, they included a former lieutenant governor and even a practicing dentist.

The new syndication businesses typically had earth-friendly names: ForEverGreen, EvrGreen, EcoVest, Webb Creek. They set up websites featuring images of forests, waterfowl, and mountain streams. Their text proclaimed their principals’ deep concern about the fate of the earth. For example, Frank Schuler, president of Ornstein-Schuler, among the most active promoters, describes a personal epiphany that he says spurred his move into the conservation-easement business after a decade in Atlanta commercial real estate. In an interview, Schuler recalls driving with his toddler son past a large residential development where the site had been bulldozed. “Every square foot was going to be paved. There were no trees. My son said, ‘Dad, that’s pollution!’ ” Says Schuler: “The importance of conserving land for him and future generations really pushed me to this point… That’s why today I’m so passionate about conservation.”

But returns were front and center in marketing pitches. Eco Terra’s website, for example, offered the motto “Be Green, Make Green.” The website for a law firm that handles easements displayed a chart listing its clients’ high-end demographics: It said 92.5% had a net worth over $10 million. A 2015 summary for one fund reported that it was on track to deliver a return of 89% for the year.

The Land Trust Alliance became alarmed about the growing syndication-easement movement, fearing it would generate a fresh wave of scandal and congressional outrage. But syndications also posed a ticklish internal situation for the Alliance. Some of its members were an essential part of the chain that made the deals possible.

In 2010, Russ Shay, the Alliance’s public policy director, privately urged IRS officials to crack down on the syndicators through more aggressive action than individual audits—perhaps by issuing a public advisory. But the IRS remained silent. (The agency declined to make officials available for on-the-record interviews for this article.)

To be sure, the agency was auditing dozens of easements; they were among the most litigated issues in federal tax court. But the case-by-case enforcement had limited impact. And given the time it took to pursue a case, says Shay, the result “is they were solving yesterday’s problem.” He adds, “They did not seem interested in solving the problem of the present—which we told them was much bigger.”

The former Millstone golf course near Greenville, S.C., whose value rose by a factor of eight when it was donated as a conservation easement.

Budget cuts left the IRS with limited resources for the costly task of disputing an appraisal, which often required hiring outside experts. “The IRS is outgunned,” says Small, the ex-IRS attorney. “They don’t have the budget or personnel to audit a fraction of these transactions.”

The IRS also lost some key battles. In one challenge to a $30.6 million golf-course deduction taken in 2002—but not resolved until 2009—a tax court judge allowed 94% of the write-off. Claud Clark III, a folksy Alabamian who had appraised the coastal property and defended the deduction in court, became the syndicators’ star expert. Marketing materials hailed him as the man who beat the IRS.

Promotional documents for syndicated deals always acknowledge the risk of an IRS audit, which can result in an assessment for back taxes, interest, and stiff penalties. Recent Ornstein-Schuler marketing materials, for example, say the firm assumes “all partnerships will be audited,” but that it trusts its “conservative, defensible valuations…” It noted: “As of 3/13/17, approximately 11% of the partnerships have been audited and none of the valuations have ever been reduced as a result of an IRS examination or review.”

COURTESY OF ETHOS

"A FARCE AND A TRAVESTY AND AN ABUSE OF THE SYSTEM."

—Commercial broker Dean Saunders on the valuation increase in one Florida deal

To many investors, the promise of a fat deduction seems worth the remote peril of an audit. "If there's a day of reckoning," noted Small, "it's way, way, way out in the future."

BY 2013, ATLANTIC COAST Conservancy's syndications business was booming. Keller accepted 49 easements that year. He began staging promotional seminars around the Southeast with such agenda topics as: "Turning an Easement into a Source of Liquidity" and "Defending the Tax Audit From Examination Through Litigation."

Keller sought accreditation from the Land Trust Alliance, but the organization expressed concern about the syndications he was doing. So Keller dropped his application and moved forward without the Alliance's imprimatur.

This didn't seem to hurt the Atlantic Coast Conservancy's business, as syndicators rejected by other land trusts brought even more deals to him. Their easements have protected "gorgeous land," says Keller. "It turned out to be this wonderful conservation ploy ... For me, as a conservation biologist, this is the best."

In a typical syndicated deal, the investor partnership has acquired the property within the past year or two, presumably from a seller determined to get what it's worth. How, then, can an appraiser conclude its value has suddenly multiplied eight or 10 times?

Under federal regulations, an appraisal must offer an opinion of the land's fair market value—the price a knowledgeable buyer would pay a knowledgeable seller when neither is desperate to make a deal. But when it comes to conservation easements, syndication appraisers typically claim there are no comparable area sales. So appraisers use a more subjective approach (albeit one that often includes reams of complex projections and reports): They try to estimate what the land would be worth if put to its most profitable legal use—as, say, a development of resort homes. Under court rulings, this transformation is supposed to be "reasonably probable" to occur in the "reasonably near future," and not rely on "mere speculation and conjecture."

Based on a skeletal development plan, studies commissioned by the promoter, and an array of optimistic assumptions, the appraiser then projects the development costs and income for the imagined business. On syndicated deals this invariably results in a sky-high valuation—a calculation of what the investors are giving up and can thus claim as a deduction—that makes everyone a hefty profit.

As time went on, syndicators became more audacious. They began basing their projections on the view that isolated tracts could be used as sites for resorts or shopping malls—or even that mining riches lay beneath them. And they became more confident and aggressive in other ways. Some began acquiring large tracts of land themselves, then selling it in pieces to investors they recruited, who then used it to extract easement deductions. The two-step process had the effect of inflating the values even higher (and letting the syndicators make money on the sale too).

In Central Florida's Polk County, for example, entities controlled by Ornstein-Schuler bought the County Line Ranch, a 3,475-acre tract once owned by a citrus baron. They then carved it into 20 parcels and began selling them to investor partnerships run by Ornstein-Schuler and three other syndicators. Nine separate partnerships, all of them listing their address as a dropbox at a Lakeland, Fla., UPS store, then donated easements to Keller's land trust in December 2015. Eleven new partnerships followed a similar pattern in 2016.

In a matter of weeks, the land's value jumped from $3,500 and $6,500 per acre (its listing prices before the syndicators bought the land in two pieces) to about $20,000 an acre (the price at which the syndicators resold it to their investors) to more than $200,000 an acre (the claimed easement deduction). Once all that was accomplished, most of the partnerships gave away the land, earning one final, much smaller, deduction on its residual value.

The valuations defy common sense, say mining experts, who rejected the stated claims that the parcels could each be developed into highly profitable limestone mines. Dean Saunders, a commercial broker who listed the County Line Ranch for years, says a previous owner tried to sell it in 2008 as a potential mining site for $10,000 an acre, but found no takers. He "realized the economics didn't justify trying to mine," says Saunders. He calls the $200,000 per acre appraisal "a farce and a travesty and an abuse of the system." (Schuler defends the transaction, saying his company relied on "qualified, independent experts" who concluded that "profitable limestone mining operations were feasible.")

For his part, Keller calls it a "heck of a project." He says the area's avian and amphibian diversity is "amazing" and that the land will also help protect the endangered Florida grasshopper sparrow. "If I can provide habitat for that… I think I'm doing a heck of a good job."

AS KELLER'S SYNDICATION BUSINESS MUSHROOMED, so did his conflict with the Land Trust Alliance. Keller blamed the group for growing aversion to the promoters within the conservation community. In 2015, he tried to persuade Chuck Roe, a former Land Trust Alliance executive whom he'd hired as a consultant, to launch a rival trade association. Roe declined. Roe says he recognized that it would be an advocate for syndications, which he calls "horrifying."

By the end of the year, Congress once again addressed easements. The 2006 law that expanded the deduction had actually been temporary and had been renewed periodically since then. But in December 2015, even as concern mounted about syndications, Congress decided to make the enhanced deduction permanent.

In August 2016, the Land Trust Alliance barred all accredited land trusts—and later, all of its members—from accepting syndicated easements. It urged avoidance of deals that are managed by a paid promoter, involve land acquired within the past 36 months, and claim deductions of more than 2.5 times the property's acquisition cost.

The Alliance's position forced land trusts to choose sides. In 2016, the Georgia-Alabama Land Trust, an accredited and influential group that had previously accepted syndicated deals, broke off discussions to accept another from a previous donor. Keller accepted the easement instead.

Keller dismisses concerns about "hyperinflated" easement values, declaring it "something the Land Trust Alliance made up" as part of a "smear campaign." He says he knows the promoters bringing him easements are "in this for the money," but he says his mission is to conserve land. "I don't care if they get their tax benefit or not."

Last December, the IRS finally took a more systematic step. It issued a formal notice branding virtually all profit-generating syndicated deals as abusive. Anyone who had served as a promoter or material adviser on any deal dating back to January 2010 was required to file special forms, allowing the IRS to red-flag and scrutinize the transactions. This was intended to deter such deals and to lay the groundwork for future punitive action. The IRS has "listed" just two such tax-avoidance transactions since 2009.

The syndicators have punched back. A few months before the IRS announcement, Frank Schuler had formed the rival advocacy group Keller had contemplated, calling it the Partnership for Conservation ("permanently conserving important lands in the U.S."). It has spent $650,000 on lobbyists since its inception. EcoVest Capital—the single most prolific syndicator—has invested another $1.13 million on lobbyists. Those riches bought the services of top-tier advocates, such as former deputy Treasury secretary Stuart Eizenstat.

In the months that followed, the industry persuaded Georgia Congressman Tom Graves, whose district includes the syndication hotbed of Rome, to slip a rider into the federal appropriations bill that would bar the IRS from spending money to enforce the listing notice. (A spokesperson for Graves said via email that constituents had expressed concerns that the IRS notice would have a "chilling effect" on conservation.) The provision passed in the House but has not been voted on yet in the Senate.

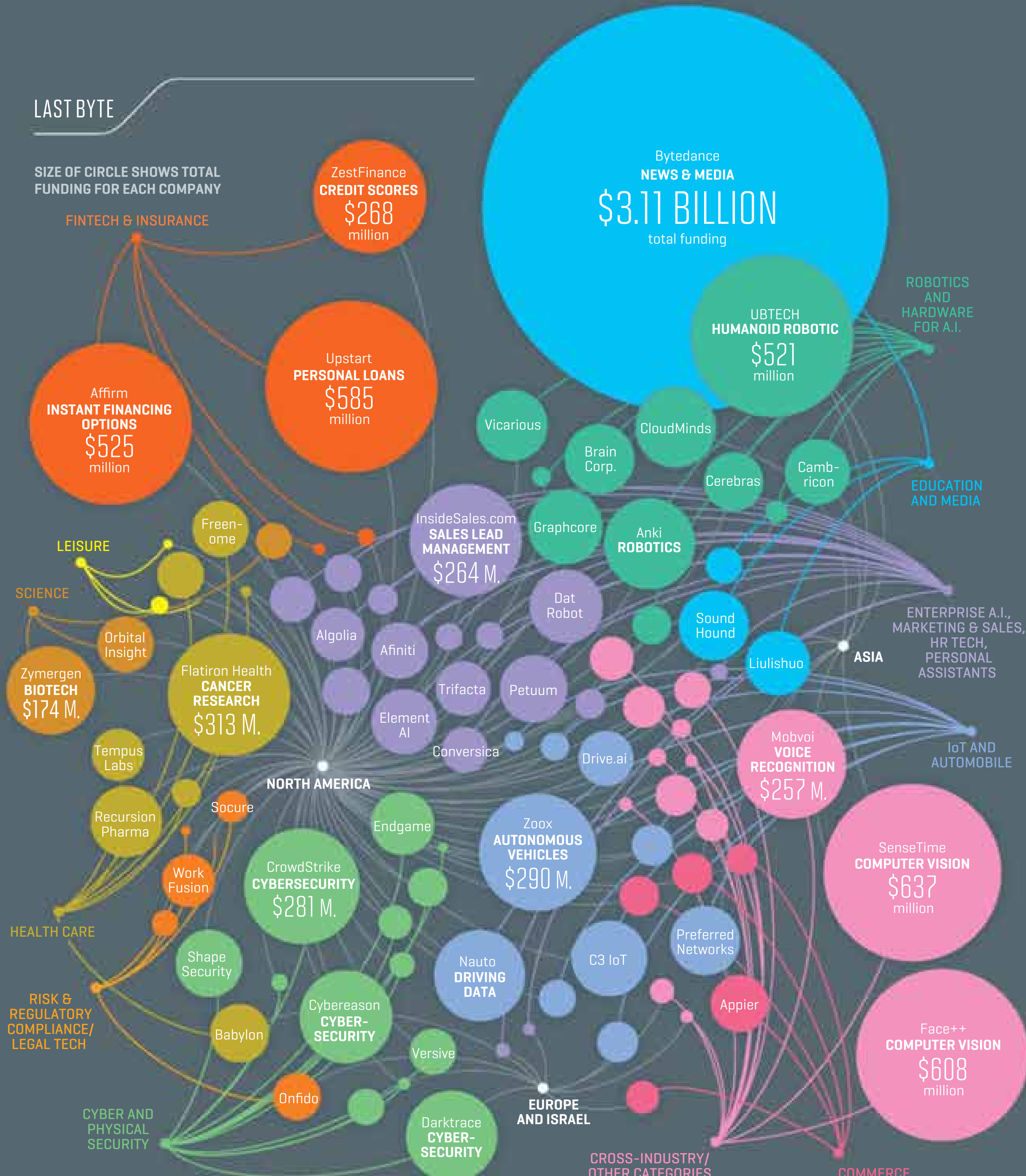
The next legislative volley, months later, came from the traditionalists: In November, two representatives introduced a separate bill to kill syndications.

In the final months of 2017, all attention turned to the tax bill. Again, the syndicators emerged unscathed—the easement rules were untouched—and it doesn't appear to have been a close call.

The anti-syndications contingent may still ultimately prevail. Yet every time the issue has reached Congress so far, the result has been to preserve or strengthen the deduction. It might not quite qualify as the cockroach of the tax code—the provision that survives every calamity—but it will take a lot to kill it. ■

"A SMEAR CAMPAIGN… SOMETHING THE LAND TRUST ALLIANCE MADE UP."

—Robert Keller on criticism of easement appraisals and the efforts to outlaw syndications



LEADING THE WAY IN A.I.

WHETHER YOU FEAR IT or embrace it, the A.I. revolution is coming—and it promises to have an enormous impact on the world economy. PwC estimates that artificial intelligence could add $15.7 trillion to global GDP by 2030. That's a gargantuan opportunity. To identify which private companies are set to make the most of it, research firm CB Insights recently released its 2018 "A.I. 100," a list of the most promising A.I. startups globally (grouped by sector in the graphic above). They were chosen, from a pool of over 1,000 candidates, by CB Insights' Mosaic algorithm, based on factors like investor quality and momentum. China's Bytedance leads in funding with $3.1 billion, but 76 of the 100 startups are U.S.-based. —BRIAN O'KEEFE

SOURCE: CB INSIGHTS; FOR THE COMPLETE LIST, GO TO CBINSIGHTS.COM/RESEARCH-AI-100.

GRAPHIC BY **NICOLAS RAPP**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