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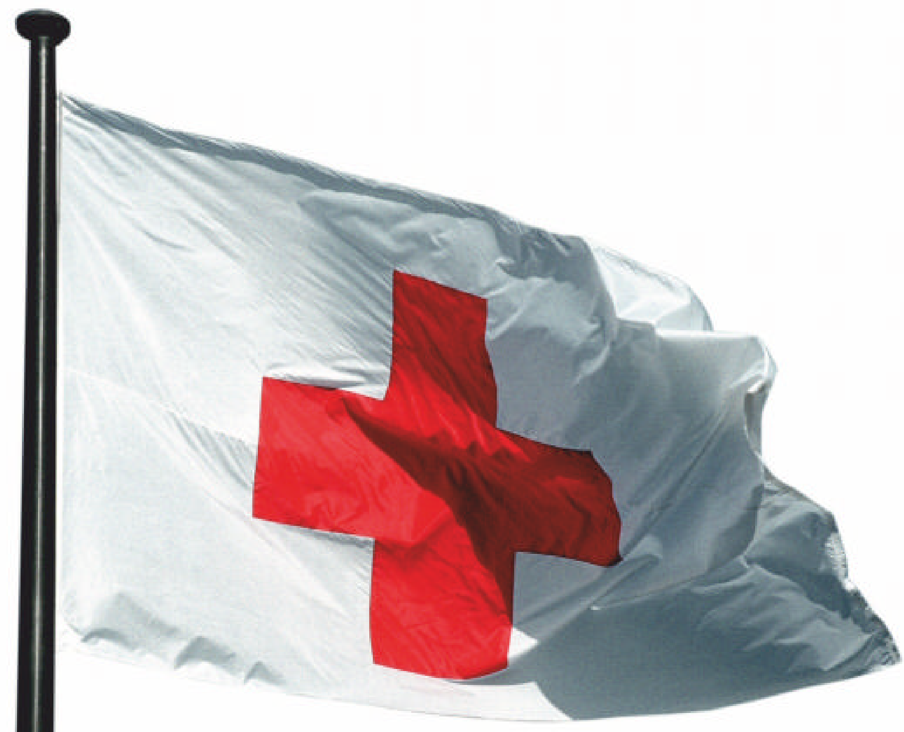
Bloomberg Businessweek

November 18, 2019

THE ULTIMATE BACKUP DRIVE

A CAVE IN THE ARCTIC HOLDS THE WORLD'S MOST IMPORTANT CODE 48

The American Red Cross Salutes Its Mission Leaders



Most of us know the American Red Cross does good work, but even an organization that has already launched nearly 50 significant disaster relief operations this year can't do it alone. Thankfully, it doesn't have to.

This year, four Red Cross partners reached a new level of support, committing $3 million or more annually, earning them recognition as "Mission Leaders." While each partner has unique strengths, they all believe in the Red Cross mission: To alleviate suffering in the face of emergencies, wherever people need it.

Latter-day Saint Charities, the first organization to qualify as a Mission Leader in 2018, continues to go above and beyond to support the Red Cross. Last year, Latter-day Saint Charities leveraged its network to collect more than 60,000 blood donations, in addition to mobilizing resources to provide baby food, clean-up kits or whatever was needed in the moment. "Our strength is in committed volunteers," says President Sharon Eubank. "The American Red Cross offers the coordination so they can address the critical issues of any mission."

Amazon leverages its operations and worldwide logistics network to provide relief during natural disasters. To aid efforts after Hurricane Dorian, Amazon provided cargo flights to the Bahamas with donated relief supplies, and the company also donated $1 million to help increase blood donations and launched a feature for customers to say, "Alexa, donate to the American Red Cross." Customers can also support the Red Cross when they shop at smile.amazon.com. "Our partnership allows us to strengthen communities to help those who need it in new, creative ways," says Bettina Stix, Senior Manager, Disaster Relief by Amazon.

Walmart and the Walmart Foundation have provided cash and in-kind donations, and raised more than $58 million through stores and clubs. The company provides critical help during disasters, with a focus on increasing efficiency through technology. By funding the Red Cross' disaster relief platform, RC View, Walmart ensures that those affected by disasters have the supplies necessary to begin to recover. "Since Hurricane Katrina, we have formalized our disaster response program to help those hit hardest," says Julie Gehrki, Vice President of Philanthropy, Walmart. "This is an essential part of our efforts to help communities recover."

Wells Fargo has donated more than $48 million to the Red Cross over the years, often in creative ways. In addition to direct funding, Wells Fargo allows customers to give directly from ATMs and to redeem GoFar® Rewards for a cash donation. "Collaboration is a powerful tool for mobilizing support," says Brandee McHale, President of the Wells Fargo Foundation. "When we work with the Red Cross, there's an ability to go directly to where help is needed very quickly."

It's difficult to overstate the impact these Mission Leaders have, according to Gail McGovern, President and CEO of the American Red Cross. "We're honored to recognize Latter-day Saint Charities, Amazon, Walmart and Wells Fargo, as well as their employees, customers and members, as leaders that go above and beyond to support us through volunteerism, generous financial gifts and critical supplies," she says. "We could not carry out our work without their ongoing generosity, and we are truly grateful for their partnership."

Thank you

The proactive contributions of our Annual Disaster Giving Program and Disaster Responder Program members ensure the Red Cross can provide help and hope to families after devastating disasters—from hurricanes and wildfires to home fires.

American Red Cross

Annual Disaster Giving Program Members

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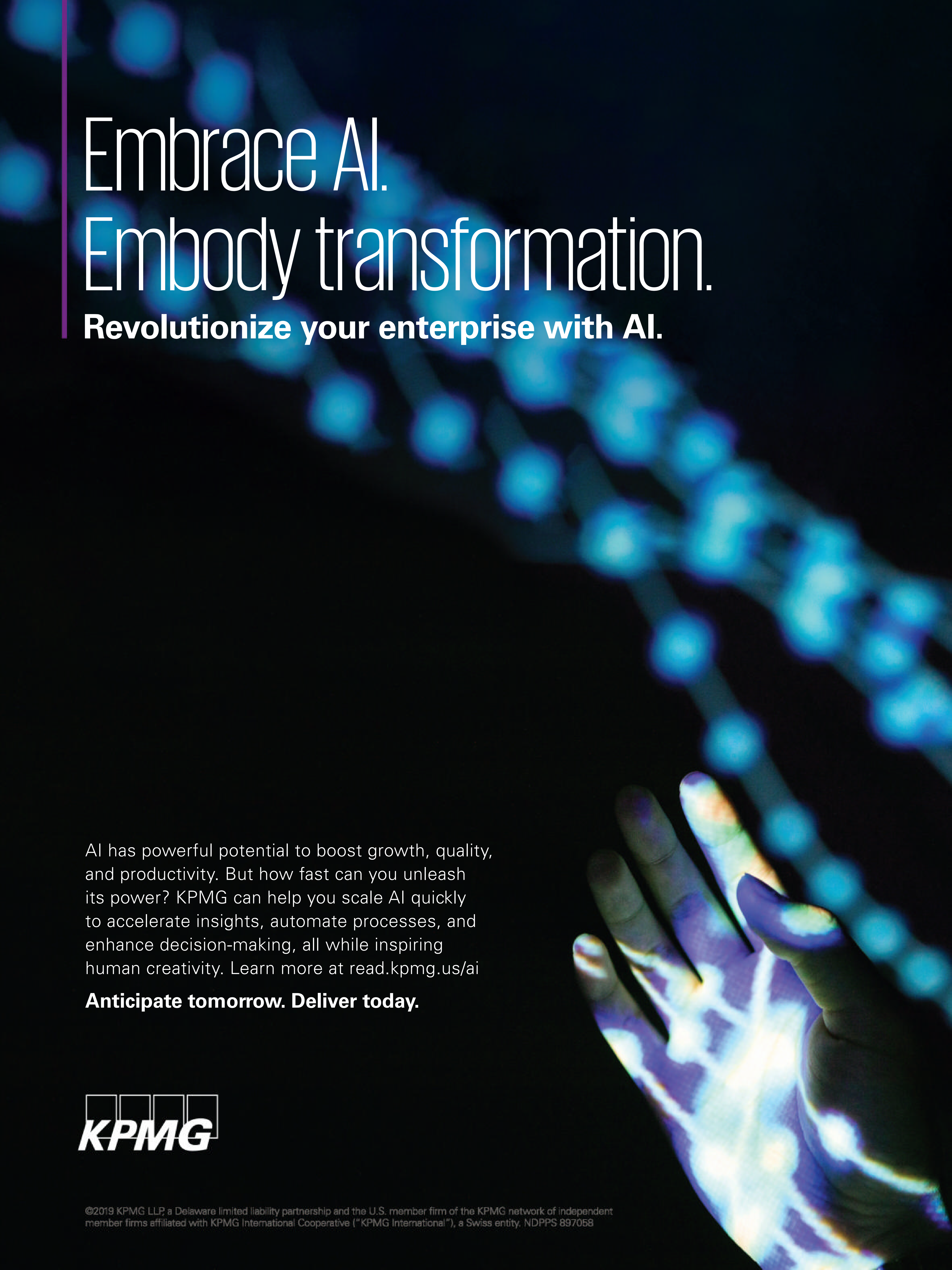

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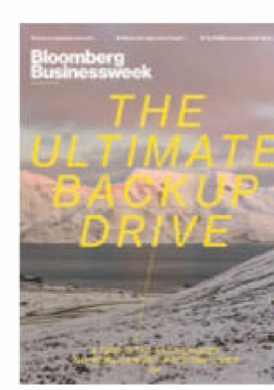

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BOTTLES: PHOTOGRAPH BY YAGAZIE EMEZI FOR BLOOMBERG BUSINESSWEEK


From employee to entrepreneur
Nisha learned how on YouTube. What will you learn?
"After I got laid off from my job, I didn't have enough money to buy a nice birthday gift for a friend's daughter. Then a light bulb went off. I had a sewing machine, and always had a knack for design—maybe I could make something? I didn't even know how to turn it on, so I pulled up YouTube to learn how to use it. I kept watching videos, over and over, until I finally made my first stitch. I taught myself to make these colorful bows that my friend's daughter could wear in her hair. And the parents went crazy for them. I left that birthday party with six customers.
That's when I started reimagining myself as an entrepreneur and started my company, Knotzland. We now make handmade bow ties from reclaimed fabrics. It's beyond what I dreamed—I'm not only a designer but also a business owner. I gave myself a whole new life. It's been a crazy journey."
Watch Nisha's story: youtube.com/NishaLearnedHow
YouTube

IN BRIEF

By Benedikt Kammel

● The chances that U.K. Prime Minister Boris Johnson's Conservatives will emerge victorious in the general elections next month have improved: Brexit Party leader Nigel Farage said he won't contest seats the Tories won in 2017, leaving Johnson free to concentrate on winning districts held by Labour.

● Bolivian President Evo Morales, who quit on Nov. 10 after election irregularities triggered weeks of violence, was granted political asylum by Mexico. An icon of the Left throughout Latin America, Morales first came to power in 2006. Jeanine Áñez, the second vice president of the Senate, declared herself interim president on Nov. 12.

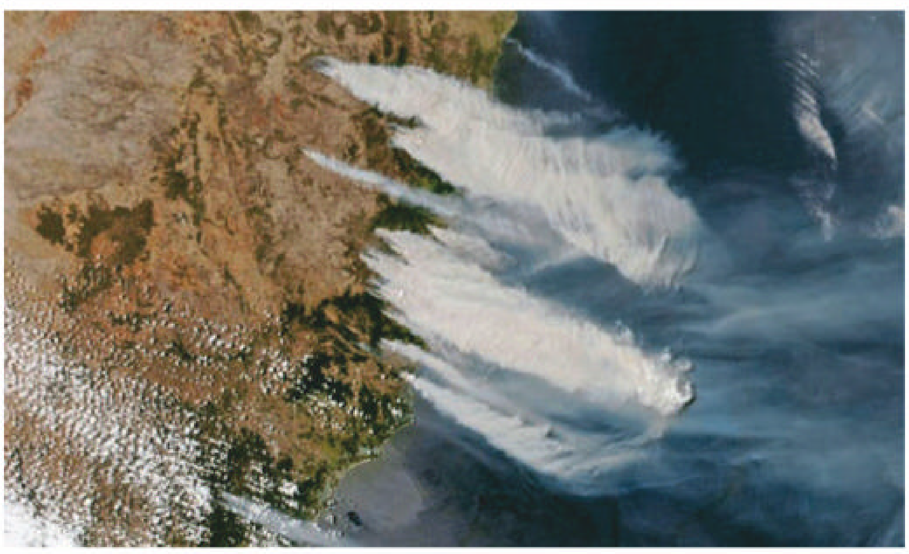
● **Alibaba logged more than 268 billion yuan ($38.3 billion) of purchases on Singles' Day.**

The proceeds of the 24-hour buying marathon, the world's largest shopping event, exceeded last year's record haul. An estimated half-billion people from China to Argentina swarmed the e-commerce giant's sites on Nov. 11.

● Travis Kalanick sold 20.3 million shares of Uber Technologies worth about

$547m

after a 180-day lockup period ended. Ousted as CEO in 2017, Kalanick still owns 78 million shares in the ride-hailing company, whose value has tumbled 40% since its May 10 IPO.



● Severe wildfires continue to burn across New South Wales. The two-year Australian drought has increased the risk of blazes in the state even before the start of summer, with isolated fires reaching Sydney, the country's biggest city.

● Boeing said U.S. aviation regulators are likely to sign off on the redesigned in-flight software for its grounded 737 Max model by mid-December. The stock jumped as investors saw renewed hope the company can emerge from the crisis early next year.

● **Zimbabwe plans to relocate as many as 600 elephants and other animals from its drought-stricken south.**

It's one of the biggest such rescue operations ever undertaken by wildlife authorities. The country, which has an estimated 80,000 elephants, has lost 105 of them in this year's drought.

● **"The violence has far exceeded the call for democracy, and the demonstrators are now the people's enemy."**

Hong Kong leader Carrie Lam deplored the increasingly violent protests shaking the city. Police continue to fire tear gas to disperse protesters; they've responded by setting cars on fire and dropping heavy objects from bridges.

● U.S. milk processor Dean Foods filed for Chapter 11 reorganization on Nov. 12. The company has suffered from intensifying competition in the conventional milk business and tighter supplies, which have increased costs and eroded its gross margin.

● A Patek Philippe with two dials and 20 functions became the most expensive watch ever, selling for

$31m

at a Geneva charity auction. The one-off model's buyer remained anonymous.

● Israel assassinated a senior commander of the Islamic Jihad group in Gaza, shattering a truce that had held for months.

● The U.S. Supreme Court refused to block a lawsuit against Remington by families of the Sandy Hook massacre victims.

● KKR has formally approached drugstore giant Walgreens Boots Alliance about a deal to take the company private.

● Maya Rockeymoore, widow of Maryland Representative Elijah Cummings, who died last month, will run for his seat.

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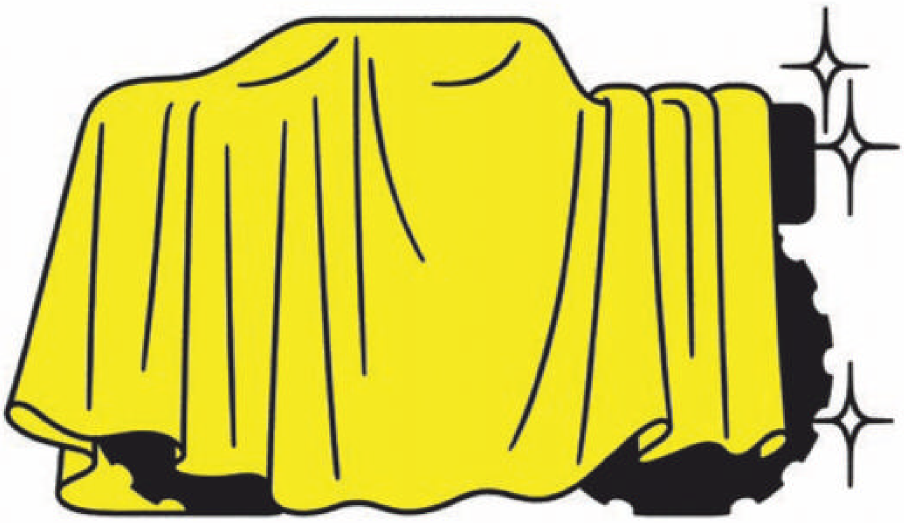

▶ A Pickup Truck for the Electric Age

On Nov. 21 in Los Angeles, Elon Musk unveils the latest addition to Tesla's growing fleet of models: the electric Cyber Truck, a pickup with a design like something out of the *Blade Runner* movies and more power than Ford's popular F-150.

▶ At the Nov. 22-23 CDU conference, Angela Merkel will shore up support for Annegret Kramp-Karrenbauer, her chosen successor as party leader.

▶ On Nov. 20 the European Central Bank releases its semiannual financial stability review, an assessment of potential risks facing the euro region.

▶ Bankers and government officials meet in Frankfurt starting Nov. 18 for Euro Finance Week. They'll discuss banking strategy, tax reform, and compliance.

▶ South Africa's Naspers reports earnings on Nov. 22. Its fortunes are closely linked to those of Chinese web giant Tencent, in which it holds a big stake.

▶ On Nov. 20 the Federal Open Market Committee releases the minutes from its Oct. 29-30 meeting, when the Fed cut its main rate a third time this year.

▶ Target reports earnings on Nov. 20, rounding out a quarter in which retailer results showed consumer demand is still holding up, despite a slowing economy.

■ BLOOMBERG OPINION

Make Vaping Expensive

● Taxing e-cigarettes is a good way to keep young people from starting the habit

The number of high school students who vape has risen 135% in just two years, and the government deserves more than a little blame. The U.S. Food and Drug Administration has dragged its feet on regulation, and lawmakers have resisted reforms to make e-cigarettes less appealing to children. Government inaction has jeopardized one of America's greatest public-health achievements of recent years: the drastic decline in teen smoking.

The House of Representatives can help put this right. It's about to consider a tax on e-cigarettes—a policy that's long overdue. E-cigarettes aren't safe, though it took a mysterious outbreak of a lung ailment linked to 37 deaths to grab the country's attention. On Nov. 8 the Centers for Disease Control and Prevention identified "one very strong culprit of concern" in its investigation into the fatalities: a vitamin E acetate, part of some THC vape products, that tends to accumulate in the lungs.

But even before that announcement, the dangers of vaping high levels of nicotine were well-known. It's addictive, it strains the cardiovascular system, and it's especially dangerous to young people. In other words, we should be doing everything we can to discourage young people from using these products, just as we discourage them from smoking cigarettes.

Which makes it shocking that they aren't taxed by the federal government. The World Health Organization has called tobacco taxes "the most cost-effective solution for reducing tobacco use." On average, every 10% increase in the price of tobacco cuts consumption by 4%—and by as much as 7% among teenagers, who are more sensitive to prices. The nationwide decline in smoking has a lot to do with taxation: As the federal cigarette tax rose sixfold from 1990 to 2014, per capita use fell by more than half.

The Protecting American Lungs Act cleared an important committee last month and will now face a full House vote. It would tax vape products at the same rate as cigarettes—adding $1.15 to the price of a Juul pod, a 20% increase over the manufacturer's retail price. That's a lower tax than most public-health experts would recommend, but it's high enough to make a dent in teen vaping rates.

The proposal has bipartisan backing. Some Republicans worry that tackling e-cigarettes is a political loser, but recent polling and Republican-led proposals in Arkansas and Kentucky suggest their fears are misplaced. Other states and cities have passed bills raising the tax on tobacco products with bipartisan support. The truth is that well-designed tobacco taxes aren't a partisan concern: They're a public-health necessity, supported by abundant research.

Finally, Washington seems to be taking the threat seriously. It's about time. Ⓑ

Written by the Bloomberg Opinion editorial board

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Is it OK to show your real face at work?

ILLUSTRATION BY 731

● Depression, anxiety, and other conditions are in a "don't ask, don't tell" limbo—at a huge cost for business

● By Cynthia Koons

Aaron Harvey is co-founder of Ready Set Rocket, a boutique advertising firm that's done campaigns for fashion brand Michael Kors, pop star Rihanna's fragrance, and upscale salad eatery Sweetgreen. He knows how to sell a lifestyle that people want to associate with. He's also spent decades secretly living with a rare form of obsessive-compulsive disorder. Fed up with a corporate world in which it's not OK to talk about that, he's applying his branding skills to a topic that people generally try to avoid: mental health.

Since the dawn of the corporate office park, mental health has been relegated to the "don't ask, don't tell" limbo of the American workplace. People who've been diagnosed with a condition such as depression or anxiety aren't inclined to open up to bosses and colleagues. Shame and stigma prevent some 80% of sufferers from seeking help, according to one report. These are expensive problems to keep hidden. Depression alone costs the U.S. economy $210 billion a year, half of which is shouldered by employers in the form of missed work and lost productivity.

As a business owner, Harvey thought he'd established a culture that was supple enough to deal with all employee challenges. His firm offers unlimited time off and the flexibility to work remotely as needed. It takes a shared, rather than top-down, approach to decision-making. Ready Set Rocket has been named *Crain's* and *AdAge*'s best place to work. So Harvey was humbled by what happened when the company experienced a mental health crisis in its ranks. An intern started acting erratically, going into meetings uninvited and shouting before someone was able to get an emergency responder to take him to a psychiatric ward. The office's confused handling of the incident exposed a weakness in its approach to mental health, a gap Harvey is convinced exists throughout the corporate world. "We are a small, pro-mental-health-culture company," Harvey says. "If we don't know how to do this, no one knows."

Seeing that the discussion around mental health was being informed, and shaped, by individuals sharing their experiences, Harvey started the site Made of Millions. It curates stories from people with a range of conditions. The site's three-person team published a guide in February, *Beautiful Brains*, to help employees push for better dialogue about mental health in the office. To get the message out through social media, Harvey and his team started the #DearManager campaign, encouraging workers to share the guide with their human resources departments. From the data he's seen so far, employees at companies including Goldman Sachs Group, Deloitte, Accenture, and Verizon Wireless have downloaded it.

The creation of "best practices" has thus far been left to the handful of business leaders like Harvey who care about the issue. Many companies don't even know how to start the conversation, and there's no playbook to follow. Benefits managers compare notes through initiatives led by organizations such as the Kennedy Forum, a mental-health-focused nonprofit, to guide one another through the darkness.

While there are laws to protect people with mental health issues from discrimination, the pervasive stigma around those conditions has limited their usefulness. Every avenue that exists has its shortcomings: The U.S. Equal Employment Opportunity Commission takes up cases on behalf of workers who feel they've been discriminated against as a result of their mental health. The agency tries to resolve cases via mediation, which doesn't create binding precedents. Even when it sues successfully, it rarely wins the kind of payouts that would force a broad change in corporate behavior. Individual companies rely on their HR departments to field complaints, but a worker's comfort level in broaching sensitive topics with HR is wrapped up in how much they trust their employer. When those avenues fail, a person can turn to the courts. That, however, can come at great expense and with public exposure.

The Americans With Disabilities Act (ADA), a 1990 law designed to protect employees with health conditions against discrimination (assuming they can perform the essential tasks of the job), requires companies to offer accommodations if needed. When the legislation was being hashed out in the late '80s, Republican Senator Jesse Helms of North Carolina fought to exclude people with certain mental health problems from its protections. His effort failed but highlighted the pervasive bias against people with mental health conditions that lingers to this day.

Three years after the law was passed, New York Law School professor Michael Perlin warned that it wouldn't be effective if people's attitudes toward mental health didn't change. "No matter how strongly a civil rights act is written nor how clearly its mandate is articulated, the aims of such a law cannot be met unless there is a concomitant change in public attitudes," he wrote in the *Journal of Law and Health*.

As the ADA wound its way through the courts in the '90s and early 2000s, it became clear that judges thought of disabilities as permanent conditions rather than ones that manifest in episodes, according to Tom Spiggle, an employment lawyer. That view largely excluded people with mental health conditions, which often flare up intermittently. In 2008, Congress voted to expand the ADA to include conditions that manifest periodically, which helped improve protections for people with conditions such as post-traumatic stress disorder, bipolar disorder, and depression.

That same year, Congress passed a law requiring insurers that provide mental health coverage to offer the same level as their medical benefits. While many insurers comply ▶

◀ on paper, their provider directories are often filled with therapists who aren't taking new patients or are no longer in the plan.

To deal with the problem, employers have been expanding employee assistance programs. Insurer Hartford's Chief Executive Officer Christopher Swift took a look at his company's mental health programs and noticed a 30% jump in the use of EAP counseling sessions in 2018 from the previous year. So the company decided to offer its 19,000 workers double—10 free sessions instead of five—and started reimbursing them for out-of-network mental health care at in-network rates. "What employees value today is a more holistic approach to an employer benefit," he says.

Chevron Corp. is trying to provide help where services might be otherwise scant. Some of the energy giant's workers are out on remote, 28-day rotations away from their families, doing jobs that "can be very stressful based on how sensitive the type of work is that they're doing," says Brian Walker, Chevron's manager of EAP Work Life Services. "This may trigger other mental health conditions." Chevron has also decided to be more forgiving toward people who fail alcohol or drug tests, as long as there isn't a safety issue. "If we can get them out of the work setting, get them education, and treatment, and support," says Walker, "the person can come back and contribute 10 to 15 more years."

Cisco Systems Inc. gives its employees emergency days off for the things in life that wouldn't classically fall into "sick" or "vacation" days. Microsoft Corp. offers workers 12 free counseling sessions and is building on-site counseling services. "I think the demand will always exceed our ability to add capacity," says Sonja Kellen, senior director of global health and wellness benefits at Microsoft.

Lyft Inc., the ride-hailing company, has made mental health care entirely free. Through a service called Lyra Health Inc., corporate employees can see counselors for any mental health issue or even marriage counseling. "There is a war for talent," says Nilka Thomas, vice president for talent and inclusion at Lyft. "Supporting your workforce supports your bottom lines. It's not only the smart and human empathetic thing to do—it's the smart business tactic as well."

Yet only a small fraction of eligible employees use EAP programs, according to one study. And they don't solve the glaring gaps in care that exist. Without offering better insurance coverage, "you're just sending more people out into an inadequate system," says Henry Harbin, a psychiatrist and adviser to the Bowman Family Foundation, which works on mental health issues. "You the employer are basically not helping your employees get access to effective treatment, much less affordable treatment."

Improving mental health benefits has been a priority for Michael Thompson, CEO of the National Alliance of Healthcare Purchaser Coalitions, which represents 12,000 employers that spend $300 billion a year on health care for 45 million people. Inadequate networks, in particular, are a problem, he says: "When you compound that with the fact that often people who are experiencing issues with mental illness are in denial, and then you put these barriers in front of them, it's no wonder suicide rates are rising."

The recognition that mental health is a pressing workplace issue extends beyond the corporate world. In August the New Jersey attorney general signed a directive to promote resiliency in its ranks saying "protecting an officer's mental health is just as important as guarding their physical safety." There were 37 law enforcement suicides in the state from January 2016 through mid-2019, according to one study.

The suicide rate among doctors is more than twice the national average. The American Medical Association has acknowledged that doctors are less likely to seek therapy for fear of jeopardizing their medical licenses. The group has urged state medical boards to change the language in mental health questions so as not to dwell on the past but focus on conditions affecting a doctor's ability to do her job.

The NBA, in response to players such as Kevin Love and DeMar DeRozan opening up about their struggles with anxiety and depression, bolstered its mental health offerings, requiring teams to have a licensed mental health worker available for players in the 2019-20 season. NBA Commissioner Adam Silver said Love's and DeRozan's outspokenness helped inspire others. "Because there's been more talk around mental health in the league," Silver said at a *Time* magazine health-care conference in October, players "in a one-on-one setting will say, 'Yeah, I have issues, I feel very isolated.' "

For ordinary workers, the best hope is that business leaders will force insurers to improve coverage. After his son was diagnosed with schizophrenia in 1990, Garen Staglin, a venture capitalist, and his wife began a fundraising effort that's now amassed more than $450 million for mental health charities and research. Staglin has also started a nonprofit, One Mind, that among other things allows employers to compare their mental health benefits with those of other companies. He meets with CEOs and tries to persuade them to sign a pledge promising to reduce the stigma associated with mental health issues in the workplace and improve suicide prevention efforts. So far, companies representing 3.5 million U.S. workers have signed. That's out of a workforce of 164 million. "We've got a long way to go here," Staglin says. "We're determined. I think the momentum is building." Ⓑ

Mental Health in the Workplace

Harris Poll of U.S. workers in 2018

76%
Share of employees who say they have struggled with at least one issue that affected their mental health

42%
Share of employees who have been diagnosed with a mental health disorder

63%
Share of employees who have been diagnosed but say they have not disclosed it to their employer

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[2]Expense ratio data as of 3/29/2019. Based on a comparison of total expense ratios for U.S. communication services sector-level ETFs with similar holdings and investment objectives, within the universe of 12 U.S. ETFs in the Morningstar Communications category.

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As of 11/30/2018, this fund changed its name from Fidelity Select Telecommunication Services Portfolio.

[3]Source: Standard & Poor's, FactSet, as of June 30, 2018.

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How Nike Started a Sneaker Arms Race

Its high-tech running shoe, used to break two marathon records, raises concerns that technology may have trumped ability

Last month, elite marathoner Eliud Kipchoge ran 26.2 miles in less than two hours, breaking a barrier some thought impossible. The following day, fellow Kenyan Brigid Kosgei shattered the women's marathon record. The common thread for both performances: the shoes on their feet. Kipchoge was running in a prototype featuring Nike Inc.'s latest Vaporfly technology. Kosgei was wearing an earlier version of the same shoe, which retails for $250.

Their runs reignited a debate that's simmered since Nike unveiled this class of shoes in 2017. The sneakers have a carbon fiber plate, lightweight foam, and a stiff forefoot that rocks you forward. Nike says they're proven to decrease effort by at least 4%, helping you run faster on the road and recover quicker afterward. "Out of the box, you are 4% better," says Matt Nurse, vice president of the Nike Explore Team Sport Research Lab. "No question. We tested that across ranges of speed and ability."

Now, as other sneaker companies race to produce high-end shoes with similar benefits, critics worry that Nike has tipped distance running's competitive balance on the eve of the Summer Olympics in Tokyo. The sport's governing body is exploring whether to rein in athletic goods companies or let them run wild, a decision that could usher in an

Edited by James E. Ellis

PHOTOGRAPH BY ERIC HELGAS FOR BLOOMBERG BUSINESSWEEK. PROP STYLIST: CHELSEA MARUSKIN. DATA: INTERNATIONAL ASSOCIATION OF ATHLETICS FEDERATIONS, BLOOMBERG REPORTING arms race for high-tech sneakers. "This is not a little advancement in technology, this is a completely different animal," says Ryan Hall, a retired U.S. distance runner. "Physically speaking, it's so hard for elite runners to take one minute off their marathon time. To just put on a pair of shoes and be able to run two minutes quicker, that's mind-blowing."

No sneaker generates more energy than a runner puts into it. But serious runners have long shown interest in recovering more of the force exerted in each stride. For decades, shoe companies have worked to reach maximum efficiency, producing many small innovations and a few big ones.

This new class of shoes is a once-in-a-generation leap, according to engineers and athletes. And there's evidence in the results. The five fastest marathons have been run in the Nike shoes, a list that doesn't include Kipchoge's closed-course run. They're also quickly becoming popular for weekend runners who can afford the $250 price tag. "It's fair, at a high level, to earmark this moment in time as a transformation in the definition of a marathon racing shoe," says Carson Caprara, senior director of global footwear product at Brooks Sports Inc. "Being able to see firsthand the impact on athletes, everyone is going to move quickly for their runners."

There's a lot of misinformation circulating about the shoes. Internet sleuths dug up a recent Nike patent and speculated that Kipchoge's pair had three carbon fiber plates. (There's just one.) Others latched on to the physics of the plate, saying it acts as a spring. In truth, the foam in all running shoes acts as a spring. Companies could put metal coils in sneakers, but they're heavier than foam and much less stable.

Although Nike has been the face of this class of running shoes, it's not alone in making them. Hoka released its own $180 carbon-fiber-plated shoes in May. Brooks's version, the Hyperion Elite, will sell for $250 when it's introduced next year. Saucony has been working on its latest, the Endorphin Pro, for more than two years. There are many others, including some prototypes worn by elite runners. "We all know each other, to an extent," says Spencer White, head of the Saucony Human Performance Lab. "It's rare that anyone does anything that another company hasn't already worked on or thought of."

But Nike's deep pockets have helped it stay ahead of the competition. "Is that really fair?" asks Hall, who still holds the U.S. half-marathon record he won wearing Asics shoes. "Kara [Goucher] missed out on the 2016 Olympic team by one spot; she was 65 seconds back. And they say these shoes make at least 90 seconds' to two minutes' difference in a marathon. Should she not have made the Olympic team because she wasn't with Nike?"

The International Association of Athletics Federations, track's international governing body, provides only a loose guideline on sneaker tech: Shoes "must not be constructed so as to give athletes any unfair assistance or advantage." In the wake of the controversy over Nike's shoes, the IAAF Technical Committee formed a working group of athletes, scientists, and ethics experts to help clarify the rules. The group is expected to provide its findings by the end of the year. "It is clear that some forms of technology would provide an athlete with assistance that runs contrary to the values of the sport," the IAAF said in a statement. "The challenge for the IAAF is to find the right balance in the technical rules between encouraging the development and use of new technologies in athletics and the preservation of the fundamental characteristics of the sport: accessibility, universality, and fairness."

Nike recently shut down a program for long-distance runners after a coach was suspended by the U.S. Anti-Doping Agency. Also, a female runner in the program alleged that an excessive training regimen destroyed her health. Nike has stood behind the coach and says no runners were implicated in the case. It's investigating the female runner's claim.

Running may be having a moment like one experienced a decade ago in swimming, when Speedo International Ltd. unveiled a full-body swimsuit. Imitations quickly popped up, and more than 100 world records were broken, leading some to compare wearing the suit to doping. Fédération Internationale de Natation, swimming's governing body, voted overwhelmingly in 2009 to ban the high-tech suits, imposing restrictions on the materials and the amount of the body they could cover.

Shoemakers hope the IAAF doesn't impose strict limits. That goes for Nike, which did $40 billion in sales last year, and much smaller companies such as Brooks, which reported a record $644 million in global revenue in 2018. They're largely unencumbered by IAAF restrictions and want to be able to keep improving shoes with the newest technology.

As its smaller rivals rush to match what's already on the market, Nike is pushing to find the next major innovation. "We're not in the business of changing rules, we're in the business of helping athletes find their greatness," says Chief Design Officer John Hoke. "If the athletes that we work with are able to do feats that are unique to them and pushes their own personal best, then we've done our job."
—Eben Novy-Williams

THE BOTTOM LINE The five fastest marathon times were set by runners wearing shoes containing Nike's Vaporfly technology. The sport's ruling body is studying the fairness of the souped-up kicks.

● Shoes worn during the fastest official marathons of all time

● Nike Vaporfly

● Other Nike

○ Adidas

Men's

E. Kipchoge 2018	2:01:39	Nike Vaporfly
K. Bekele 2019	2:01:41	Nike Vaporfly
E. Kipchoge 2019	2:02:37	Nike Vaporfly
B. Legese 2019	2:02:48	Nike Vaporfly
M. Geremew 2019	2:02:55	Nike Vaporfly

Women's

B. Kosgei 2019	2:14:04	Nike Vaporfly
P. Radcliffe 2003	2:15:25	Other Nike
M. Keitany 2017	2:17:01	Adidas
R. Chepngetich 2019	2:17:08	Nike Vaporfly
P. Radcliffe 2002	2:17:18	Other Nike

Lagos Is Facing Its Bottle Problem

● With plastic beverage container use doubling in three years, pressure to recycle is building

With 21 million residents whose growing needs have far outpaced the supply of basic services such as electricity, water, and roads, Lagos, Africa's most populous city, has plenty of unique challenges. But there's one it shares with megacities around the world: a worsening plastic waste problem. The amount of plastic bottles used in Nigeria has doubled in just the past three years, to an estimated 150,000 metric tons annually, with half of them consumed in Lagos, according to the Food and Beverage Recycling Alliance (FBRA), a trade group. Four-fifths of the containers are never reused or recycled, and during even a modest rain, the city's streets can flood because litter—much of it plastic trash—blocks drainage lines.

That's why informal collectors such as Mary Alex could be key to the city's sustainability future. The gregarious 44-year-old with a gap-toothed smile owns a food and drink kiosk in the historic center of Lagos known as the Brazilian Quarters. Her proximity to the area, where an exceptionally large number of plastic bottles are consumed because of the population density, many businesses, and frequent street parties, has given Alex an unlikely but lucrative side gig collecting PET (polyethylene terephthalate) bottles to be recycled.

In the four months that ended in August, Alex, better known as Mama Daniel, made 215,000 naira—about $600, or twice what the lowest-paid Nigerian government worker would have earned in the same period—retrieving plastic trash. She's collected about 14.3 tons of it, a performance so good that her income from bottle collection now dwarfs that from her kiosk. "I attend parties, and when they're done I pull out my bag and start to pack bottles without shame," she says. "Even now I can leave my stall at any time and ask my neighbor to watch over it if there are bottles to pick."

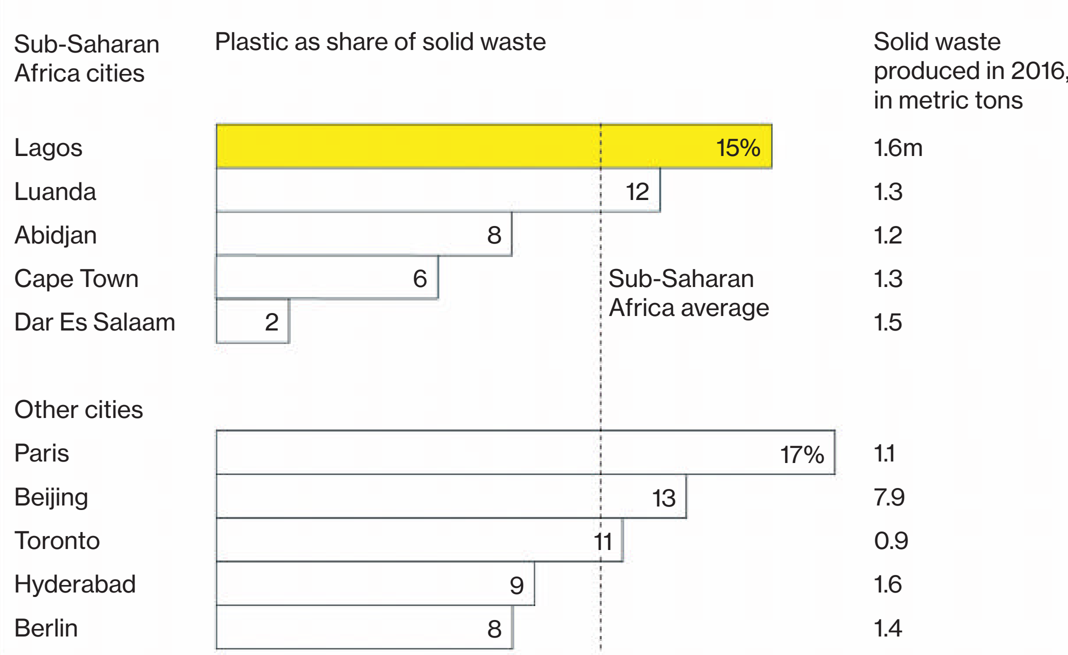
Notwithstanding Alex's remarkable prowess, Lagos officials know the area will require a more formal recycling infrastructure. So regulators, sustainability groups, and representatives of beverage makers, including the local units and distributors of Coca-Cola, Nestlé, and PepsiCo—the world's top three producers of plastic waste according to the group Break Free From Plastics—met in Lagos in October to hash out a standard allowing drinks companies to package products in recycled PET, or rPET. Boosting demand for rPET, which is more expensive than virgin plastic, would encourage investment in recycling operations. "All this points to show that this is a stakeholder and market-driven standard," says Chinyere Egwuonu, director of standards development at the Standards Organisation of Nigeria.

The concept of formal recycling isn't widespread in Lagos. Until now the government hasn't moved to allow drinks to be packaged in recycled material because of health concerns. Even bottles that don't end up burned or blocking sewer grates—particularly bad environmental outcomes—are thrown in unsorted trash and eventually make their way to one of two landfills to be buried in a gooey mishmash of solid waste. Thousands of scavengers live and work on the landfills, hunting for specific materials including PET, which only a handful of manufacturers there are willing to buy.

While Nigeria consumed less than 1% of all PET bottles in 2018 globally, less than 10% of that waste gets collected and recycled, making it an environmental nuisance worldwide. In a study published

Plastic Trash Goes Global

Although Lagos generates less plastic waste per ton of trash than some other major cities, poor waste infrastructure means most of it ends up in dumps and waterways.



PHOTOGRAPH BY YAGAZIE EMEZI FOR BLOOMBERG BUSINESSWEEK. DATA: WORLD BANK

▲ Women collect and sort bottles at Wecyclers' recycling hub in Lagos

in *Science* magazine by a team of researchers led by Jenna Jambeck of the University of Georgia, Nigeria was the ninth-largest source of ocean plastics—based on 2010 data, when the country consumed far less than it does now. The study found that 83% of Nigeria's PET waste is unmanaged. Consumption is expected to hit 300,000 metric tons by 2021, according to a report by FBRA, an organization of the country's top beverage companies.

Globally more than 200 businesses, representing about 20% of all packaging used worldwide, have made commitments to reduce plastic waste, according to the Ellen MacArthur Foundation. Unilever NV on Oct. 7 doubled down on an earlier commitment by announcing it would halve its use of virgin plastic by 2025 by various means, including using more recycled plastic. Coca-Cola Co. was among the first big beverage sellers to share its goals publicly in January 2018, when it announced that its bottles will contain an average of 50% recycled content by 2030.

Local companies considering investing the $12 million to $20 million needed to get rPET plants off the ground in Lagos are asking for guarantees that the top beverage makers will buy materials from them. "No guarantees have yet been signed, but individual companies have global commitments for recycling," says Sade Morgan, director of corporate affairs at the Nigerian unit of brewer Heineken NV and FBRA's chairman. "To that end, there is certainly a commitment by their local subsidiaries toward using rPET once locally available." Coca-Cola is committed to using rPET in line with its global goal and is in talks with an investor, said Clem Ugorji, public affairs director for its West Africa unit.

Companies that are interested, but uncertain, about investing in recycling plants in Nigeria include a unit of Mohinani Group, one of the country's biggest producers of virgin plastic bottles, and Alkem, a sister company of Johannesburg-based Extrupet SA, sub-Saharan Africa's largest recycler of PET bottles.

But with no local regulation mandating rPET content, beverage makers could choose to shun it. "Virgin plastic is still cheaper than recycled plastic," says Pieterjan Van Uytvanck, a Singapore-based principal analyst at Wood Mackenzie who expects rPET to be more expensive until at least 2025. Yet regulation and company commitments could still spur bottle-to-bottle recycling plants, he says.

Global pressure is growing. More than 30 African nations have bans or restrictions on the use of plastic bags. And in Europe, where a European Union directive mandates that PET bottles must have 25% recycled content by 2025, beverage makers are effectively forced to buy from rPET producers, and some may eventually buy some of Lagos's waste.

But even if a market for recycled bottles is guaranteed in Nigeria, collection remains a challenge. Wecyclers, a business founded by Bilikiss Adebiyi-Abiola and run by her brother, Olawale Adebiyi, is a pioneer in door-to-door waste collection in Lagos. It's the company that recruited Alex, who's recruited others by sharing the story of how much money she makes. Others in Lagos are trying to change local behavior around the disposal of bottles. The Africa Cleanup Initiative allows parents to pay school fees with used bottles they've collected.

While the 15 naira that Wecyclers pays per kilo of PET bottles has been enough to motivate Alex, Adebiyi says he's keen to see more buyers for them, which would increase the price and boost ▶

◀ earnings for collectors and dumpsite scavengers. "It's the chicken or the egg–which ones comes first?" he says. "You have to create the demands for the collection volumes to show up. If investors wait for the volume to increase, where is it going to go?" he asks. "You can't invest in collection without a major driver for the offtake." —*Yinka Ibukun*

THE BOTTOM LINE Nigeria accounts for more than 150,000 metric tons of plastic bottles annually, half of it from the megacity of Lagos. The government is moving to allow recycled bottle use.

Why 007 May Need An SUV

● Aston Martin, once James Bond's favored ride, has skidded since going public last year

A year ago it looked like investors and supercar fans who'd missed out on Ferrari NV's blockbuster initial public offering in 2015 might get a second chance with Aston Martin Lagonda Global Holdings Plc. There was the rich British motoring heritage, aggressive performance, and Aston's movie star allure as James Bond's vehicle of choice. So what could possibly go wrong? Turns out, pretty much everything.

Once-coveted Vantage, DBS, and DB11 Volante cars are piling up at dealerships. Aston shares have lost more than three-fourths of their value since the IPO–the worst performance among the U.K.'s 350 biggest companies this year–and management has been forced to raise more funds to stabilize the business. "We're not happy with the way the year has gone," says Chief Executive Officer Andy Palmer.

Now all hopes to pull Aston out of its rut rest on a new model: the DBX, a sport utility vehicle that will go on sale in December. With a starting price of $189,900, it joins a crowded field of high-end SUVs that includes the pricier Lamborghini Urus, cheaper Bentley Bentayga, and the $325,000-plus Rolls-Royce Cullinan. With the DBX, Aston Martin aims to lift annual production to 14,000 vehicles by 2023, more than double last year's output.

Even before the first DBX rolls off the line at a new factory in St. Athan, Wales, there's immense pressure to hit specific sales targets. Aston signed a $100 million loan in September that's conditional on it winning orders for 1,400 DBXs by mid-2020.

For the luxury car industry, SUVs have become big money-spinners. Porsche AG started the trend with the Cayenne more than a decade ago, and today established players such as BMW AG rely on them for almost half of sales. Even racing-bred Ferrari will join the club with its Purosangue in 2022. SUVs are especially popular in markets such as China and Russia, where two-seat sports cars aren't as attractive for well-heeled buyers who are chauffeured around congested streets. Women are also a big target group for SUVs, and Aston, which says only 4% of the 85,000 cars sold in its 106-year history went to females, could use help attracting them.

This month, Aston said its delivery goals for the year will fall below its previous guidance of as many as 6,500 cars, already lower than the 7,300 it had predicted at the start of the year. It also said the average selling price for its core models had fallen to £136,000 ($175,000) from about £140,000. Says Jefferies analyst Philippe Houchois: "Aston Martin sold the story of performance and growth and a kind of appeal, which they haven't delivered."

Palmer, who spent more than two decades with Nissan Motor Co., joined Aston Martin in 2014. Besides rejuvenating the model lineup and bringing back James Bond as an ambassador (007 had briefly wandered off to BMW), he sought to branch out into a lifestyle offering that ranges from leather key rings to a minisubmarine called *Project Neptune*.

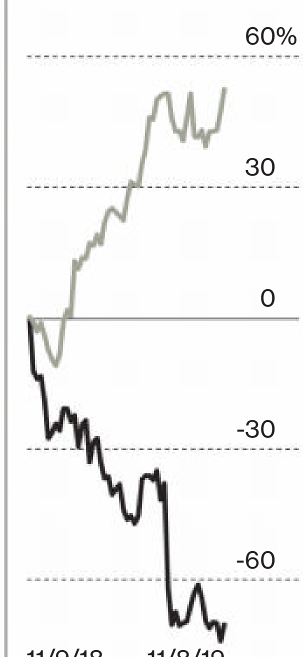
In the pantheon of supercars, Aston occupies a difficult-to-define spot. It doesn't have the name recognition of Ferrari. It's a quirkier choice than Porsche, but it's more mass-market than ultraniche players such as Zonda or Sweden's Koenigsegg. And, unlike Volkswagen AG's Bentley and Lamborghini and BMW's Rolls-Royce, Aston doesn't have the benefit of a deep-pocketed parent company, instead relying on Mercedes-Benz AG to supply its engines. "Aston is being managed as a premium/mass-market rather than a luxury carmaker," says Giulio Pescatore, an analyst at HSBC. Still, he says, the new SUV may hold enough promise that, "after months of underperformance and the future of the company at stake, we believe the launch of the DBX is potentially game-changing."

Palmer also hopes to get a boost from the next movie in the Bond franchise, where Aston Martin has been the mainstay ride since 1964, when the fictional British superspy got his first DB5 in *Goldfinger*. An Aston starred in 11 Bond films after that, with the latest scheduled to feature the DB5 as well as the Valhalla. The title of the next movie, due out in April, no doubt captures Palmer's hope for the venerable car brand: *No Time to Die*. —*Siddharth Philip*

THE BOTTOM LINE Aston Martin has lost three-fourths of its market value in the past year. It's betting that a pricey SUV will get its business back on track.

● A prerelease Aston Martin DBX covered in camouflage

● Change in share price since Nov. 9, 2018
Aston Martin
Ferrari



2 TECHNOLOGY

Elon's Solar Flare-Up

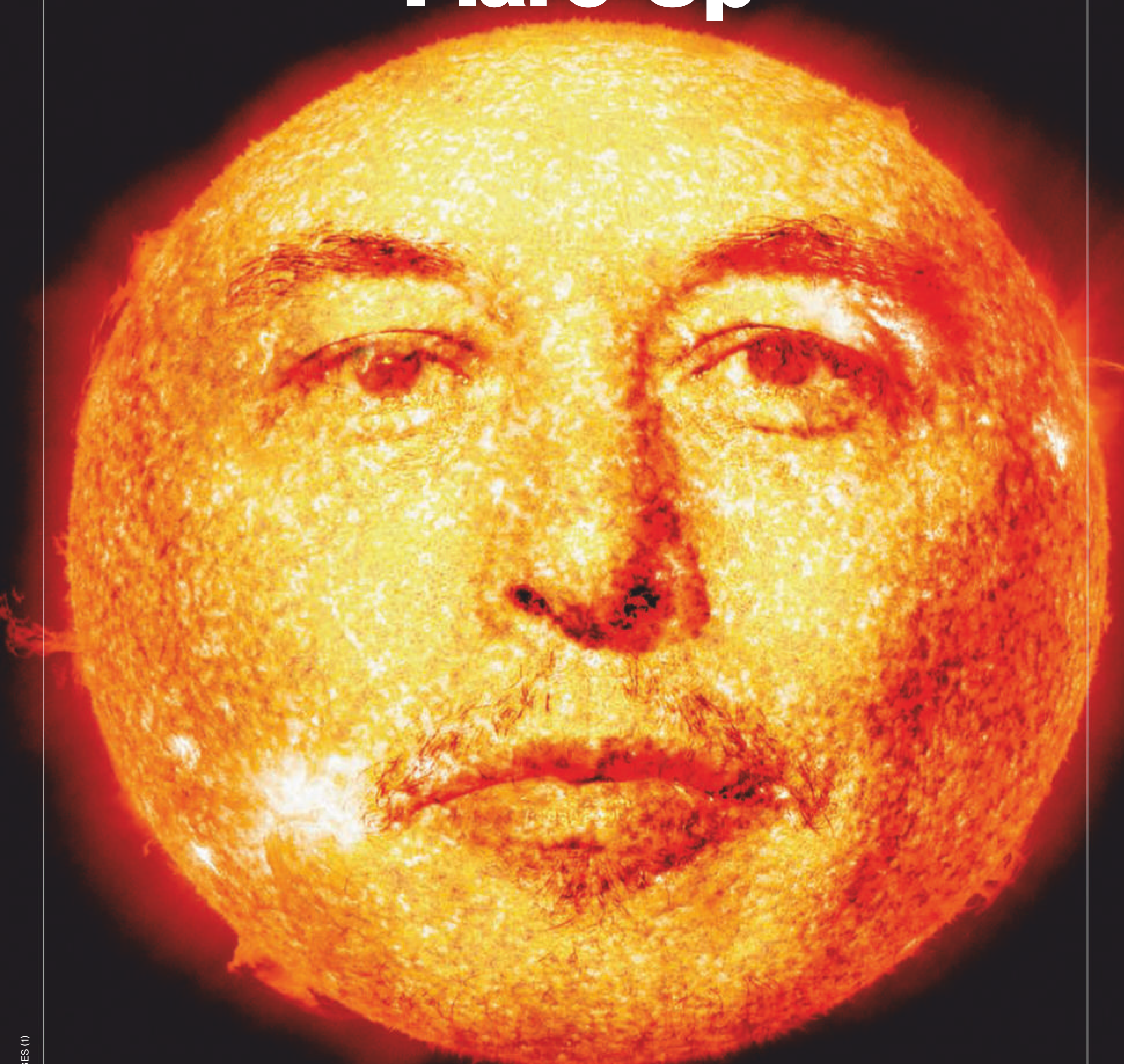


PHOTO ILLUSTRATION BY 731; PHOTOS: COURTESY NASA (1); GETTY IMAGES (1)

An acquisition Musk saw as the final piece of his energy empire has become the top threat to Tesla's future

During a heated deposition this past June, Elon Musk finally seemed to admit that his harshest critics were right. Since forcing through the controversial 2016 purchase of SolarCity Corp., the struggling solar sales-and-installation business he co-founded with his cousins, Tesla Inc.'s chief executive officer has faced almost-constant criticism: The move was called a catastrophe for Tesla, a $2 billion-plus bailout of a debt-saddled company of which Musk himself was chairman and the largest shareholder. Despite plummeting sales and substantial layoffs in the solar division under Tesla after the merger, Musk has fervently defended the SolarCity acquisition, once calling it "blindingly obvious" and a "no-brainer." ▶

Edited by Jeff Muskus

◀ But in a stunningly rare moment of contrition, Musk expressed regret over the decision at his deposition, part of a class-action shareholder suit that's gained momentum in recent months. "At the time I thought it made strategic sense for Tesla and SolarCity to combine. Hindsight is 20-20," Musk said. "If I could wind back the clock, you know, I would say [I] probably would have let SolarCity execute by itself."

The 85% of shareholders who approved the acquisition had only their devout faith in Musk to go on when they voted three years ago this month. The CEO said a combined Tesla-SolarCity was always part of his master plan and would create the world's first vertically integrated clean energy company. The hope was customers would drive a Tesla electric car, harvest energy from Tesla solar panels to charge it, and tie the ecosystem together with Tesla's Powerwall home battery.

In a trove of court filings unsealed this fall, thousands of pages of internal emails, board minutes and presentations, and executive testimony reveal how truly dire the situation was behind the scenes leading up to the acquisition, with almost every significant promise Musk pitched publicly either misleading or false. The documents in the lawsuit offer an unprecedented look at what happens when Musk's reality-distortion field comes up against the reality of testifying under oath. Tesla didn't respond to a request for comment on the suit.

From the outset, Musk's quest to buy SolarCity was riddled with question marks. He'd already bet Tesla on the Model 3, heralded as a $35,000 electric sedan for the masses; was it really the right time to engage in a distracting M&A gambit? Musk has said SolarCity was on solid financial footing, but internally he wrote that the company needed to solve its "liquidity crisis." SolarCity, it turned out, was hemorrhaging cash and in danger of defaulting on its debt.

Tesla's board initially balked at the proposal. So did Evercore Inc., one of the banks it brought in to evaluate the deal. (Not that they felt their guidance would be heeded: "It's Elon's world. We just live in it," an Evercore banker joked in an email.) Even Tesla's then-Chief Financial Officer Jason Wheeler raised concerns. "We have Model 3 happening. We have a lot of things going on. We ourselves have a large debt load," Wheeler said in his June 2019 deposition. "Why do we need to do this now, Elon?"

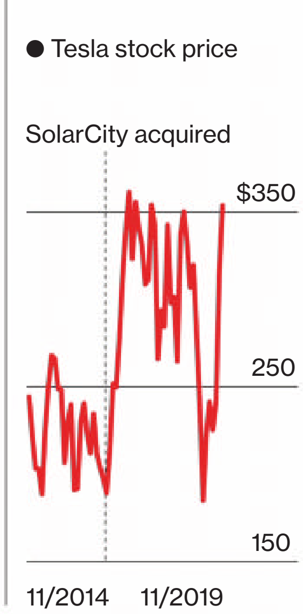
Then there were the jarring conflicts of interest. Besides his cousins Lyndon and Peter Rive running SolarCity, its board and Tesla's had complicated overlaps. Six of Tesla's seven directors were Musk associates (including his brother, Kimbal) with SolarCity ties. Antonio Gracias was on the board of both companies. What's more, Musk had used his other entities to raise capital for SolarCity: SpaceX, for example, had purchased $255 million of SolarCity bonds. Musk bought $65 million worth. Tesla's directors had to grapple with this apparent self-dealing as Musk pushed them to reconsider the acquisition in May 2016. Musk said he recused himself from these deliberations, but court filings indicate he remained actively involved, even advocating for the move directly with bankers and investors.

To win over shareholders, Musk came up with the concept of a "Solar Roof" that resembled a traditional rooftop shingle but could capture power from the sun. At a joint Tesla-SolarCity event in Los Angeles in October 2016, Musk showed off the product to an impressed audience. The demos he unveiled weren't functional, but the acquisition received approval a few weeks later.

Tesla's leadership was aware the acquisition risked damaging the company, particularly if the upside Musk promised never came. In a previously unreported internal memo from 2017, viewed by *Bloomberg Businessweek*, Tesla executives shared public talking points, including stressing that the merger "wasn't a bailout" and that family-run businesses can lead to long-term success ("the Kochs, for example"). They also discussed framing the Solar Roof's technology development as "going extremely well" and its manufacturing on schedule. "The collaboration has been great," they wrote of the Tesla-SolarCity merger.

In truth, SolarCity was by then falling apart. Tesla gutted its sales arm, and in the fourth quarter of 2017 solar deployments declined 56% from a year earlier. The SolarCity brand is now defunct. The Rive brothers left Tesla shortly after the merger. Although Musk had long argued the merger was all about corporate "synergies," he admitted in the shareholder lawsuit that he "took everyone from solar and said, 'Instead of working on solar, you need to work on the Model 3 program.' And as a result, solar suffered as you would expect.... That would include engineering, management, sales, service. Everything that could possibly be redirected towards the Model 3 program was so redirected." Tesla didn't respond to a request for comment on the memo.

Perhaps the biggest woe from the acquisition is the Solar Roof. The product was supposed to be central to the merger, but Tesla has failed to develop a mass-market version and delayed high-volume manufacturing multiple times in recent years. Gracias, the Tesla director who was also on the board of SolarCity, said in his April deposition that there are only "50 to 100 of these things operating today in tests on people's roofs." A year ago, in an interview with *Bloomberg Businessweek* at Tesla's solar



Gigafactory in Buffalo, Sanjay Shah, the company's head of energy, said he had "high confidence" his team was on track to ramp up production in 2019, promising that if any unforeseen delays again arise, "we will be more transparent than ever before to make sure you guys hear from us why." Musk said in his June deposition that Shah was mostly focused on Model 3 development during his tenure at Tesla. Shah is now chief operating officer at Beyond Meat, the plant-based food startup, and New York state officials wrote down the value of the Buffalo factory, built with more than $750 million in government subsidies. (Shah didn't respond to a request for comment, and Tesla didn't respond to requests for comment on the Solar Roof or the Buffalo write-down. Musk announced a new version of the roof the day depositions were unsealed last month.)

The contrast between the acquisition's internal reality and external perceptions will likely give fodder to the shareholder lawsuit, started by pension funds alleging that the board breached its fiduciary duties by going along with Musk's SolarCity plan and grossly overpaying for it, to boot. Tesla is also dealing with controversy stemming from legacy SolarCity solar panel installations. In August, Walmart Inc. sued Tesla over solar-related fires at its stores and warehouses, accusing it of "widespread negligence." (The companies settled out of court and issued a joint statement saying they were pleased the matter had been resolved.) Tesla has also initiated an internal program, called Project Titan, to inspect homes adorned with traditional solar panels that are paired with a potentially faulty connector, creating a risk of blazes. At least two homeowners in Maryland and Massachusetts have experienced rooftop fires from Tesla's flawed systems.

The shareholder lawsuit is set for trial before Delaware Court of Chancery Vice Chancellor Joseph Slights III in March 2020, according to Tesla's securities filings. So far, though, Musk has mostly adopted a defiant (if not irritated) tone at his two depositions. In a back-and-forth with the plaintiffs' lawyer, whom Musk called "dude," he said now that Tesla has a better grip on its vehicle business, "we're turning our attention to solar, and we're going to fix it." When pressed for details on the challenges with the acquisition, Musk called the lawyer "shameful" and a "very, very bad person" for scrutinizing a company that's trying to change the world for the better.

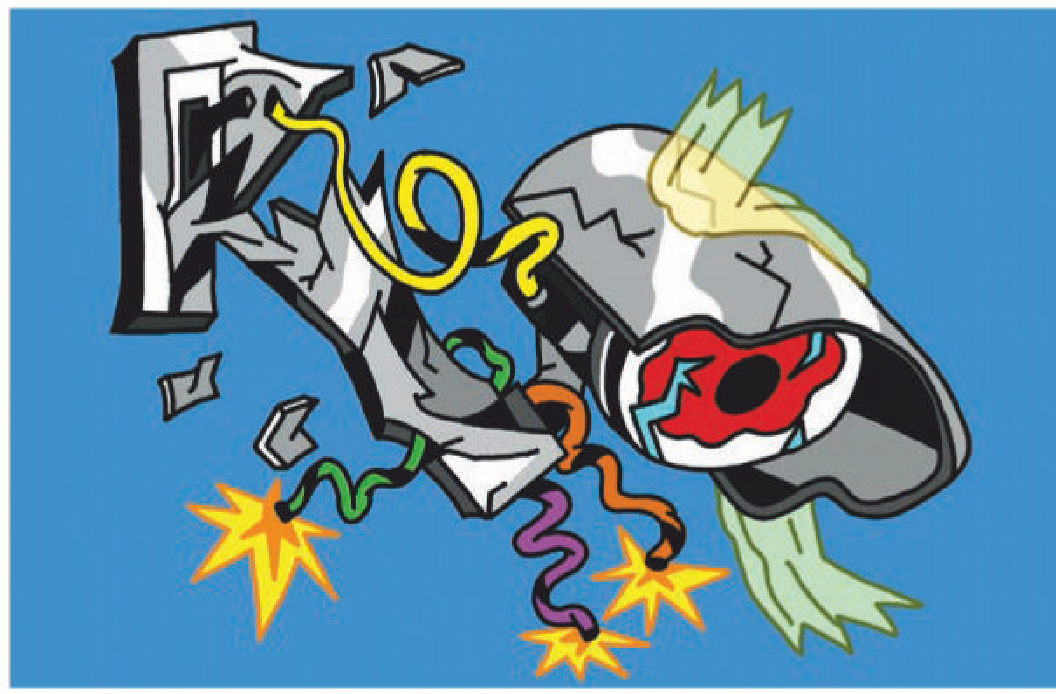
Musk sounded eager to make this case at trial. "I can't wait," he said. "It will be great. You're going to lose." —*Dana Hull and Austin Carr*

THE BOTTOM LINE A Tesla shareholder suit has revealed that the deal for SolarCity raised serious questions among Tesla's key stewards—except for Musk, who fought hard to override them.

ILLUSTRATION BY NICHOLE SHINN. DATA: COMPILED BY BLOOMBERG

Huawei Says It Makes Cities Safer. Not So Fast

● A report suggests the company's surveillance networks aren't as effective, or widespread, as it claims



Islamabad's Emergency Command Center, located in a blast-resistant building on a highway outside Pakistan's capital, has a video wall with 72 screens for 1,950 surveillance cameras. Completed in 2016 at a cost of about $100 million, it's the nexus for one of Huawei Technologies Co.'s global network of Safe City projects.

Yet murders, kidnappings, and burglaries in Islamabad all rose in 2018 from the previous year, and total crime was up 33%, according to data from Pakistan's National Police Bureau. That may have something to do with half the cameras being out of order, according to a legislative committee. But the same pattern of rising crime holds true in the rest of the country, where eight cities have contracted with the Chinese company for similar digital-policing technology. Crime is up 11% nationwide since 2015, when the first projects were announced. Islamabad police didn't respond to requests for comment.

A report on the Safe City initiative published earlier this month by the Center for Strategic and International Studies, a Washington, D.C., research organization, found a big gap between what Huawei says in its marketing and promotional materials and the reality on the ground. While Huawei's website says the technology is deployed in 230 cities in 90 countries, CSIS was able to verify only 73 locales in 52 countries. The company's statements about ▶

◀ improved public safety also appear overly rosy.

The report doesn't cite the Pakistan data, but in Kenya, it says, crime hasn't fallen as much as Huawei says on its website. The company boasts a decline of 46% in 2015 from the previous year in Kenyan areas that installed its Safe City systems. Yet police statistics in one of the cities, Mombasa, showed a slight increase during 2015, and the decrease in Nairobi was far less than the figure Huawei provided, according to the report. Nairobi also saw an increase in reported crimes in 2017 to rates higher than before the Safe City program began, CSIS says. Police in Nairobi didn't respond to inquiries, and a spokesman for the Ministry of Interior declined to comment.

Huawei's claims "are difficult to verify and appear grossly exaggerated in some cases," the CSIS report says. "When governments and citizens give up privacy and money for these systems, they should insist on public monitoring to track whether they are receiving the safety and security they're being promised," says Jonathan Hillman, a CSIS senior fellow and co-author of the study.

Huawei said in an emailed statement that comparing before-and-after crime statistics can be misleading because "the implementation of any of the data-processing capabilities from Huawei will exponentially increase the ability to analyze crime rates and law enforcement performance." The company also said that it relies on information provided by customers in its marketing materials and that any discrepancy in the number of places that have installed Huawei equipment is the result of counting equipment that's part of other "tactical projects, not full Safe City projects." (Each new phase of a project is also counted as an additional project.)

Almost 60% of the Safe City projects are located in developing countries in Asia and Africa, the CSIS report says, warning about the costs of installation and maintenance for countries that may not be able to afford them. "After adopting Huawei's equipment, countries may be 'locked-in' by high replacement costs," it says.

In Pakistan, while the total cost for all eight Safe City projects isn't known, the expenditures have come at a time when the country has been struggling under debt incurred in part because of China-financed infrastructure projects, including power plants, roads, and rail links under what's known as the "Belt and Road" initiative. Pakistan received a $6 billion bailout this year from the International Monetary Fund, its 13th since the late 1980s. A report last year by the Center for Global Development listed the country among eight nations that face potential debt-sustainability problems because of Belt and Road spending. Pakistan also owes China more than twice as much as it owes the IMF over the next three years.

In Lahore, the capital of Punjab province, 8,000 cameras were installed in 2016 as part of a Safe City project, but total crime in Punjab rose 6.5% that year, stayed roughly the same in 2017, and inched up 1.3% in 2018, according to police data. (The police didn't break out data for Lahore alone.) In Islamabad, a police official heading the Emergency Command Center told a visiting Chinese delegation in March that there was a sharp decline in thefts, terrorism, and robberies in the city soon after the center's inauguration in mid-2016. Official statistics show a decline in robberies, burglaries, and thefts of 6.7% in the city for all of 2016 followed by smaller declines, yet a 24% surge in 2018 from the 2015 levels. Murders and attempted murders were also up 11% in 2018 from 2015. Murders, burglaries, and robberies were all down in the first eight months of this year.

"It seems only natural to question Huawei's claims in the same way we'd question other products on the market," says Hillman of CSIS. "The burden of proof falls as much, or more, to governments, which are responsible for oversight and should be asking these questions and checking promises against actual performance." —*Sheridan Prasso*

THE BOTTOM LINE Huawei's surveillance networks appear to be failing to slow the rise of violent crime rates, in contrast to the company's rosy assessment.

Inside WeWork's Toxic Phone Booths

● The company's manufacturer, a former Starbucks contractor, used dangerous amounts of a cancer-causing chemical

WeWork first learned there might be something wrong with its phone booths this summer, when UBS Group AG complained about a smell. The investment bank was the biggest customer of WeWork's corporate interior design business, which outfitted UBS's spaces with trendy furniture, curtains of plants, and juice bars. The phone booths, which offered privacy in the open-plan design, were a point of pride, because they were fully designed by WeWork in-house.

To manufacture the tall, sound-insulated booths, which sport rectangular windows and folding doors, WeWork chose Premier XD, a commercial fixture company that builds kiosks for the likes of Starbucks, according to a document reviewed by *Bloomberg Businessweek* and three people familiar with the matter, who spoke on condition of anonymity because they weren't authorized to discuss it. After UBS employees at the offices of its wealth management unit in Weehawken, N.J., complained of a smell, the bank hired a company to test the Premier-made booths. The results showed potentially toxic levels of formaldehyde, say two people familiar with the matter who also spoke on condition of anonymity. Formaldehyde is often used in building materials, but in too-high concentrations in the short term, exposure can irritate people's respiratory systems. Long term, contact has been linked to cancer.

By August, after UBS had relayed the results and had its booths replaced, WeWork was holding discussions to try to find a new provider. On Sept. 11, Premier XD abruptly shut down; workers say they had to fight to retrieve personal belongings from its locked Virginia warehouses. Yet WeWork still hadn't warned its customers about the booths, so people were still using them. More than a month after Premier closed, WeWork emailed tens of thousands of customers to say it was pulling 2,300 booths because of possible formaldehyde risks. Those who arrived at WeWork offices that morning found the booths slapped with paper signs reading, "CAUTION: DO NOT USE." A WeWork spokeswoman wrote in an email: "We regret the impact this issue has had on members at some of our locations, and we are working to remedy this situation as quickly as possible." UBS declined to comment.

To keep costs down, Premier XD frequently outsourced manufacturing to China when it had enough lead time to do so, say two former Premier XD employees who spoke on condition of anonymity for fear of retaliation. A former WeWork employee says ousted Chief Executive Officer Adam Neumann likewise pushed hard to cut office furnishing costs.

If not for the serious health risks, this might seem like just another absurd turn for the hapless office space company, which in recent months has pushed out Neumann, abandoned its initial public offering plans, and required a $9.5 billion bailout from its chief backer, SoftBank Group Corp. As WeWork has begun replacing some of the tainted phone booths, it's swapping in units of the same design made by a different manufacturer, says a person familiar with the matter. Some remain off-limits. *—Ellen Huet, with Lananh Nguyen*

THE BOTTOM LINE People familiar with the matter say WeWork knew for at least a month that its custom phone booths might carry elevated levels of a carcinogen before it informed its customers.

BW Talks | Imran Khan

The co-founder of e-commerce startup Verishop Inc. says he's betting the online shopping market still has room for high-end but relatively affordable tastemakers that can survive the wrath of Jeff Bezos. *—Carol Massar and Jason Kelly*

CATE DINGLEY/BLOOMBERG

● Raised in Bangladesh; headed to the U.S. to pursue finance and economics degrees at the University of Denver ● Led the 2014 initial public offering for Alibaba Group Holding Ltd. while at Credit Suisse Group AG ● Served as Snap Inc.'s chief strategy officer during its IPO

Do you think about Amazon constantly?

One company cannot solve all problems. If you look at online retail, it's now 10% of overall retail sales, and I believe that in the next 10 to 15 years, online retail will be 30% of it.

How do you capture some of that slice? You've been live for just a few months now. What are you learning about the marketplace?

If you need a commodity, a disposable utility product, Amazon is phenomenal. What's really missing is a lifestyle e-commerce destination. We are creating a platform where you can find all the cool brands for your everyday luxury needs, and with the convenience of Amazon. Free one-day shipping, and we put our customer support number at the top of the page.

What's to prevent somebody from going to your site, saying, "OK, I like this XYZ cool brand," and then going to the home site of that brand in the future?

Some people will do that. The interesting thing is that consumers don't like putting their credit card number in 500 different websites. So if you have a relationship with one retailer who knows you and the product shows up, that's a great place to go.

What's it going to take to fix this chasm between private valuations and public valuations that we saw with WeWork?

A lot of great companies were built in a public market. Amazon went public very early. Netflix went public very early. But I think it's getting more and more challenging. The market is so volatile, and investors are so short-term-oriented. So I understand the excitement then with private markets.

What sorts of market lessons did you learn at Snap that you're applying now at Verishop?

If you can build an audience and work with a great team, you can build a business fast. By yearend we'll have a million unique shoppers a month. I still believe there is an opportunity to build big businesses.

● Interviews are edited for clarity and length. Listen to *Bloomberg Businessweek With Carol Massar and Jason Kelly*, weekdays from 2 p.m. to 5 p.m. ET on Bloomberg Radio.

Is the SEC Putting Shareholders In the Corner?

Proxy voting rules are the new battleground in a struggle over corporate control

The shareholder vote is fundamental to how publicly traded companies are run. But the question of who gets a real voice in a proxy fight is more complicated than one vote for every share.

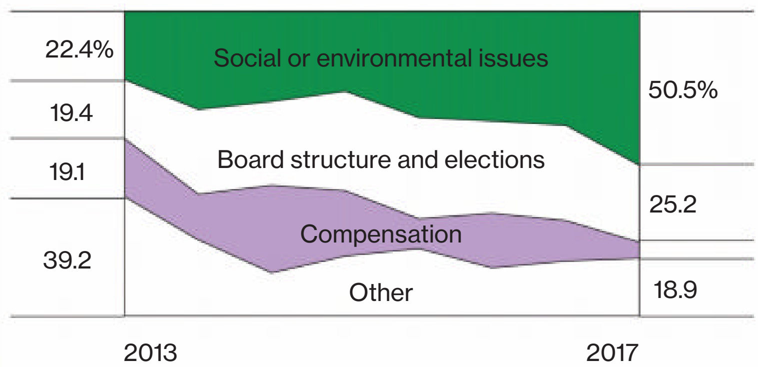
Many investors hop in and out of stocks and are happy to ignore votes. Others hold their stock at one remove, via a mutual fund or pension. Decisions on voting those shares are often farmed out to proxy advisers, specialized companies that provide recommendations to money managers. And while many investors—and corporate managers—think votes should focus solely on issues that affect profits and shareholder returns, others see owning a piece of a company as an opportunity to weigh in on how it behaves. About half of shareholder proposals these days focus on social and environmental issues.

On Nov. 5, the U.S. Securities and Exchange Commission stepped into this fray by proposing new rules affecting shareholder votes. One set of measures would put new regulations on the proxy advisers, effectively making them run recommendations past companies and give them a chance to respond before sending the advice to investors. Business groups backing the plan say the advisers aren't transparent enough and have acquired too much power to sway votes. In 2015, JPMorgan Chase & Co. Chief Executive Officer Jamie Dimon lashed out at "lazy" shareholders who just followed proxy

Edited by Pat Regnier

The Investor Class Gets Woke

Shareholder proxy proposals for the largest public companies*



*YEAR ENDED JUNE 30
DATA: INVESTMENT COMPANY INSTITUTE TABULATIONS OF ISS CORPORATE SERVICES FIGURES

advisers' recommendations. (Advisers had recently recommended voting against his pay package; it was approved.) Bloomberg News has reported that Dimon pushed the Business Roundtable, a Washington trade group he chairs, to lobby the SEC and lawmakers on proxy rules.

Proxy advisers and some investor advocates say these rules will tilt power toward management and muffle shareholder voices that are mobilized by the advisers. "They're trying to kill the messenger," says Nell Minow, vice chair of ValueEdge Advisors, which works with institutional investors on corporate governance issues. Earlier in her career, Minow was the fourth person hired at Institutional Shareholder Services Inc., the dominant shareholder-voting adviser.

ISS was formed in 1985, a time when institutional investors tended to vote in line with management or not at all. Voting has since gained significance—due partly to the rise of activist investors such as hedge funds, who seek changes they think can boost stock prices, but also to a shift toward passive, index-based investing. Because many investors have to hold every company in an index, they can't express their displeasure with a CEO or corporate board simply by selling shares. They speak with their votes.

All of this makes ISS and its main rival, Glass, Lewis & Co., important players, though many big asset managers, including BlackRock, Vanguard, and State Street, also have in-house teams dedicated to proxy voting. Most matters that go up for a shareholder vote are routine, such as approving firms that audit corporate accounting. Voting on executive pay and director elections can be contentious, especially during fights with activist funds, as can corporate mergers and acquisitions. These votes are where the proxy adviser firms are seen as having the most sway. Corporations complain about errors in the analyses the firms use—for example, comparisons of executive pay packages—when they come up with their voting advice.

"Companies are dealing with this on a regular basis—cookie-cutter advice, flawed recommendations, the feeling that they need to kowtow to these firms operating as quasi-regulators," says Charles Crain, who directs tax and domestic economic policy at the National Association of Manufacturers. Supporters of the rules say they'll help weed out mistakes. ISS and Glass Lewis argue their error rates are low and say the complaints are really about recommendations companies don't like.

The proposed rules may sound like small tweaks. But Robert Jackson Jr., an SEC commissioner who voted against the rules, described them in his statement as a "tax" on anti-management advice. While proxy advisers are unlikely to face much blowback when they give advice that sides with the C-suite, they could "risk federal securities litigation over their methodology" when they disagree. In August, the SEC also put proxy firms on notice with guidance that their advice is subject to certain broader securities rules.

ISS is pushing back on that guidance with its own lawsuit against the SEC. While the commission's proposed rules are not yet final—the SEC is asking for public comment—the August guidance is already in effect.

A second set of proposed rules affects shareholders who offer their own measures to be put on a corporate ballot. These can include pension funds prodding the oil industry on climate-change-related risks or nuns pressing gunmakers about safety. Such efforts have at times gotten backing from big mutual fund companies, who've also used their voting heft to call for more women on boards. Small shareholders known as corporate gadflies also use proposals to seek governance changes in areas such as how directors are elected.

Those with as little as $2,000 in a company's stock for one year can offer a shareholder proposal today. The new rules would put the dollar figure on a sliding scale that goes up to $25,000, depending on how long an investor has held shares. Another potential rule change would raise the bar for letting a shareholder try again on a failed proposal. Gadfly James McRitchie estimates half the 150 stocks he and his wife hold wouldn't meet one of the new thresholds for activism under the SEC's plan.

Much of the pressure around shareholder advocacy is coming from the same business groups who want tougher rules on proxy advisers. They say a small stake shouldn't be used as a soapbox. In his remarks at the hearing, SEC Chairman Jay Clayton, who voted in favor, cited a study showing that the majority of shareholder proposals filed by individual shareholders—about a third of the total—came from just five people.

Groups such as the Council of Institutional Investors, which represents many pension funds, ▶


▲ Clayton


▲ Dimon

PHOTO ILLUSTRATION BY 731; PHOTO: ISTOCK/GETTY IMAGES. CLAYTON: VICTOR J. BLUE/BLOOMBERG. DIMON: GIULIA MARCHI/BLOOMBERG

◀ contend shareholder proposals are a mechanism for holding corporations accountable. While the SEC's new rules won't stop big pension funds from getting an issue on a ballot, the worry is that they could stop fresh issues and ideas about corporate governance from bubbling up. "Part of the value in keeping the dollar threshold relatively low is that it is a statement that even relatively small investors bring something to the table," says Jill Fisch, a law professor at the University of Pennsylvania who studies proxy issues. A seat at that table might be getting more exclusive. —*Andrea Vittorio, with Ben Bain*

THE BOTTOM LINE Companies that offer advice to investors on how to vote their shares are facing more regulation, which might make it less likely that they'll disagree with management.

Goldman, Apple Cards, And Algos

● A viral furor over the Apple Card is a reminder of how opaque credit decisions can be

Apple pitches its new credit card as a model of simplicity and transparency, upending everything consumers think about cards. But for Goldman Sachs, the bank that actually approves borrowers and lends the money, it's brought some of the same headaches that have long plagued the industry.

In early November, both companies got caught up in a social media firestorm. In Twitter posts, a tech entrepreneur named David Heinemeier Hansson and then Apple Inc. co-founder Steve Wozniak complained that their wives had been given lower credit limits on their Apple Cards than they had, despite sharing finances. Wozniak said he and his wife report the same income and have a joint bank account, which should mean lenders view them as equals. The New York Department of Financial Services soon announced it would conduct an investigation.

Goldman Sachs Group Inc. has said it's done nothing wrong, and there's no evidence the bank intentionally discriminated against women. But that may be part of the problem, according to critics. The complex models that guide Goldman's lending decisions could inadvertently produce results that disadvantage certain groups.

The increasing use of algorithms in lending decisions has sharpened a yearslong debate about what policymakers refer to as "disparate impact." Consumer advocates are pushing regulators and companies to rethink whether models are entrenching the discrimination that computer-driven lending is meant to stamp out. "Research is starting to reveal some troubling examples in which the reality of algorithmic decision-making falls short of our expectations or is simply wrong," Nicol Turner Lee, a fellow at the Center for Technology Innovation at the Brookings Institution, recently told Congress.

▲ The Apple Card

One reason Goldman has found itself in the hot seat is that the Apple Card, unlike many, doesn't let households share accounts. That could lead to family members getting significantly different credit limits. Goldman says it's considering offering the option. The bank said in a tweet it would also reevaluate credit decisions if the borrowing limit comes back lower than a customer expected. "We have not and never will make decisions based on factors like gender," the company tweeted. "In fact, we do not know your gender or marital status during the Apple Card application process."

A 2016 study by credit reporting agency Experian found that women had higher credit scores, less debt, and a lower rate of late mortgage payments than men. Still, the Federal Trade Commission has warned that women may continue to face difficulties getting credit.

Using complex algorithms that take into account hundreds of variables should lead to fairer outcomes than relying on error-prone loan officers who may harbor biases, proponents say. "It's hard for humans to manually identify these characteristics that would make someone more creditworthy," says Paul Gu, co-founder of Upstart Network Inc., a tech firm that uses artificial intelligence to help banks make loans.

But with the rise of machine learning, it's hard to keep track of whether decisions are really fair. "Algorithms are not only nonpublic, they are actually treated as proprietary trade secrets by many companies," Rohit Chopra, an FTC commissioner, said in October. "Victims of discriminatory algorithms seldom if ever know they have been victimized." —*Shahien Nasiripour, Jenny Surane, and Sridhar Natarajan*

THE BOTTOM LINE Goldman Sachs says it doesn't consider—or even know—the gender of applicants for the Apple Card. But computer models can unintentionally entrench discrimination.

Watching the Financial Detectives

● Activists worry that the U.K.'s Serious Fraud Office has lost its old ambition

About seven years ago, the U.K. agency set up to prosecute errant executives and publicly traded companies started taking on some meaty cases. The Serious Fraud Office investigated everything from derivative traders to top brass at blue-chip darlings Barclays Plc and engine maker Rolls-Royce Holdings Plc.

Now some academics, anticorruption activists, and lawyers are wondering whether the SFO's zeal for the biggest cases has waned over the past two years. "It's focusing on small cases, and you're left asking, 'Where is the ambition?'" says Susan Hawley, executive director of Spotlight on Corruption, a transparency group. "It feels a bit like it's lost its mojo."

The concern goes beyond the SFO to other investigative agencies and prosecutors. In one of the SFO's most sensitive cases—involving allegations of bribes to Saudi royals by employees of a military contractor—the attorney general has yet to approve charges or reject them after two years. White-collar crime enforcement in the U.K. is "a total disaster," says Bill Browder, a London-based hedge fund manager turned anticorruption campaigner. "This is the best city in the world to live in if you're a white-collar criminal, because you'll never be prosecuted."

A turning point for the SFO came in 2017, when then-Prime Minister Theresa May made an election pledge to fold the SFO into the broader National Crime Agency. She ultimately didn't do that, but with the office's future under review, the U.K.'s attorney general delayed replacing the outgoing director.

In the spring of 2018, senior staff approached the interim head of the SFO, proposing it investigate commodities trader Glencore Plc for alleged corruption in Congo. Glencore was the biggest-ever initial listing on London's stock exchange, so it would make sense for a U.K. agency to take it on. The SFO decided to leave the case to the U.S. Department of Justice. Glencore has said it's cooperating.

That was the environment Lisa Osofsky stepped into when she started as director of the SFO in late August 2018. Osofsky's résumé includes stints as a U.S. prosecutor, at the FBI, and with Goldman Sachs Group Inc.—and the confidence that goes with it. About a year into a five-year term, she has time to deliver. New cases range from a suspected property fraud in northern England to whether London Capital & Finance, a little-known marketer of unregulated mini-bonds, misled investors. Observers argue that while these cases are worthwhile, they lack the complexity or global reach that was once the SFO's hallmark.

Osofsky takes issue with this portrayal. "I have every interest in prosecuting big-ticket cases," she says. "We want to take bad guys off the street, whether they have a blue-chip name attached to them or not. I am 100% sure that London Capital & Finance is a top-tier case. If we've got thousands and thousands of people losing their life savings, what could be a more valid reason to investigate?" Administrators for LC&F, which collapsed this year, declined to comment.

The SFO has a budget of £54 million ($69.5 million), about the same amount the government is spending to prepare athletes for the next Summer Olympics. The SFO is also able to get ad hoc funding for big cases to support its staff of 450. But the task before any financial regulator in London is enormous: The U.K. believes about £150 billion of dirty money is cycling through its system annually.

▲ Osofsky

The U.K. has toughened its laws since the financial crisis. Companies are now accountable for bribes paid by their employees. Investigators can freeze the property and cash of wealthy individuals who can't account for their riches. And the three offshore British crown dependencies this summer promised to reveal the true ownership of firms registered there.

Osofsky has said that, where warranted, she's willing to use plea deals involving financial settlements with corporations. Since these agreements became a tool in 2014, the SFO has concluded six. It's working toward more. The test, for some, is whether the agency can settle with companies but also hold individuals responsible. —*Franz Wild*

THE BOTTOM LINE The U.K.'s top corporate crime watchdog got caught up in uncertainty about its place in the bureaucracy, and some wonder if it still has an appetite for the biggest cases.

START

‘Trade Wars Are Good, and Easy to Win’

● The behind-the-scenes story of how the fight with China went from method to madness

It started with a carefully calibrated trade weapon, an algorithm that spat out a list of targets for an assault on China ordered up by a U.S. president determined to rebalance the relationship between the world’s two biggest economies. The goal: building leverage for negotiations aimed at forcing wholesale changes in China’s economic architecture while limiting the pain to businesses and consumers at home. “We’ve given this an enormous amount of thought,” Robert Lighthizer, the U.S. trade representative, told senators in March 2018, highlighting the work of the computer model his team had constructed. “It’s a sensible, moderate, appropriate amount,” he went on, “and it is calculated and created in a very businesslike, sensible way.”

The algorithm produced a 28-page list of Chinese-made products, including aircraft tires, pacemakers, and printed circuit boards, whose total value—$34 billion—matched an estimate of the annual cost to U.S. businesses of Chinese intellectual-property theft and forced technology transfers. The more than 800 items on the list were selected for their potential to inflict pain on industries Beijing has designated as strategically important while taking into account the potential disruption to U.S. supply chains. Adding to the complexity, the task was to throttle back China’s imports without American consumers taking notice or endangering President Donald Trump’s promised economic boom.

The model, though, didn’t account for the unpredictability of Trump. Behind closed doors, the president took the modest number—equal to 7% of the $505 billion in goods the U.S. imported from China in 2017—almost as an affront. He didn’t want moderate or appropriate. He grumbled to aides the figure was too low and demanded it be rounded up to at least $50 billion. Trump also asked his staff, almost as an aside: “Do you think I should put tariffs on everything from China?”

Twenty months later, what began as method now looks more and more like madness. A tit-for-tat tariff war has ensnared more than 70% of bilateral trade in goods and raised the specter of a decoupling of two economies that once seemed destined to become progressively more intertwined. If the countries can’t resolve at least some of their differences in the coming weeks, the White House will on Dec. 15 add 15% punitive tariffs on a further $160 billion in Chinese imports, delivering on what were once just presidential ruminations. That tariff round could jeopardize America’s record-long expansion, according to some economists. As it stands, the existing duties will knock 0.8% off global growth in 2020, according to recent forecasts from the International Monetary Fund.

The disruptions of an all-out trade war may yet be averted: Trump and China’s president,

Edited by Cristina Lindblad

● END

Xi Jinping, appear intent on reaching at least a partial truce by mid-December. In a Nov. 12 speech, Trump again signaled he would refrain from a new tariff assault if Beijing agrees to a "phase one" deal that hinges largely on it stepping up U.S. agricultural purchases to as much as $50 billion within two years, more than twice the level before the conflict, and curtailing intellectual-property theft. Trump sees it as the start of a more comprehensive agreement. But Chinese officials quietly say they see any future successful phases as unlikely and that commodity purchases will at first simply be at the level they were before the Trump tariffs. Skeptics in the Trump administration also question whether Beijing is willing to close a larger transformative deal with a president running for reelection amid a slowing economy.

Politicians and businesses across the board agree Trump was right to take on China. At the same time, the issues being tackled in a first phase of the trade deal are much narrower than the ambitious goals the White House once set for itself. There's little doubt the fight will have a place in history, says Douglas Irwin, an economic historian at Dartmouth: No American president in the past century has waged an economic war on this scale. But while Trump created an opportunity, he risks squandering it as well.

"Are we going to look back and say, 'This was all a failure'? I don't think so," says Wendy Cutler, a former U.S. trade negotiator who leads the Asia Society Policy Institute. "But if we end up comparing what they're able to accomplish vs. their initial objectives, I think their accomplishments are going to fall way short. And they won't be the first administration to do that. But wow, they certainly raised the stakes and certainly allowed U.S. interests to suffer through the tariffs in this effort."

● OVAL OFFICE SCUFFLES

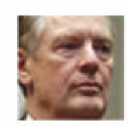
The picture that emerges from dozens of interviews over the past year with officials and other people close to negotiations is one in which one man's impetuousness has confounded attempts at strategy. It's the story of a president caught between his instincts as a dealmaker, his place in history, and a contentious band of aides, some of whom goad him into more radical action and others who tease him into restraint.

"That's very Nixonian!" intoned Larry Kudlow, the head of the National Economic Council, as the president and his aides huddled in the Oval Office in August to debate an intervention to weaken the dollar. The strong greenback is an obsession for Trump, who believes it undermines his tariffs. Three months on, the invocation has different connotations as Trump faces possible impeachment. But back then it was a code between two seventysomething men for avoiding an economic mistake—an allusion to Richard Nixon's August 1971 decision to end the dollar's convertibility to gold. That move led to years of turmoil in markets and the stagflation of the 1970s.

Well into September, Trump said he would never settle for a partial deal with China; it had to be the grand slam. Yet behind the scenes, his ▶

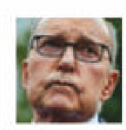
TRADE WAR CABINET

● ROBERT LIGHTHIZER



The Reagan administration alumnus is Trump's trade czar and leads negotiations with China.

● LARRY KUDLOW

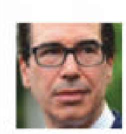


The former CNBC host Trump drafted to lead his National Economic Council is the administration's most prominent free trader.

● PETER NAVARRO

Trump's special adviser on trade is an avowed China hawk.

● STEVEN MNUCHIN



The ex-Goldman Sachs chief information officer heads Treasury and co-leads the China talks.

LIGHTHIZER, KUDLOW: EVAN VUCCI/AP PHOTO (2). NAVARRO: ALEX BRANDON/AP PHOTO. MNUCHIN: ERIN SCOTT/REUTERS.

◀ advisers were starting to discuss how to negotiate a stage-by-stage agreement and harvest elements that both sides had already largely concurred on, including a pact to avoid competitive currency devaluations hashed out in February when the Chinese team was in Washington.

To extract concessions from China, the self-proclaimed "Tariff Man" would have to roll back some duties put in place over the summer–a move some of his advisers, including Peter Navarro, the White House's most strident China hawk, oppose. In a Nov. 8 email to reporters, Navarro blamed "propagandists within the Chinese government" for inciting stories that a withdrawal of tariffs might be nigh. He and Kudlow, who says tariff "concessions" are needed to close the deal, have sparred openly.

The two men's battle echoes divides that have existed inside the administration since the beginning. On Oct. 11, shortly before Trump sat down with China's top negotiator, Vice Premier Liu He, in a televised Oval Office meeting to announce a "substantial phase one deal," Lighthizer and Treasury Secretary Steven Mnuchin met with the president so he could sign off on the step-by-step approach. This, they argued, was a way to pocket some wins, take the pressure off the U.S. economy, and have another crack at the tricky issues in a second stage. Only one member of the team disagreed.

Navarro, who was present, appeared intent on sabotaging the plan and, according to one person with knowledge of what transpired, interrupted the two cabinet members so forcefully that Trump eventually turned to him and said: "Peter, calm down!" Asked about the incident, Navarro said he is "always a passionate defender of the president's deep understanding of the situation with China and his practical solutions. But I don't comment on private meetings with the president. What happens in the Oval should stay in the Oval."

Within an hour of that exchange, Liu and his team arrived at the White House to finalize the truce. The discussion before the cameras arrived seemed inconclusive to some attending and left them confused, though Trump would minutes later praise a "lovefest" in U.S.-China relations to reporters. In the days that followed, Trump insisted that the teams were making progress and that he and Xi would likely sign the deal at a Nov. 16-17 gathering of the Asia-Pacific Economic Cooperation forum in Santiago. That summit was canceled after anti-government protests broke out in Chile, and a new venue and date haven't been decided. In the meantime, the two countries are still negotiating exactly what each side will concede in a phase one deal.

"We'll never out-China China. And if you spent 10 minutes in the country, you'd know that"

● ARE WE THERE YET?

The events of the past few weeks fit a pattern of false dawns in the trade war. At least three other times a pact seemed within reach, only to collapse in a back-and-forth of recriminations. One of the key moments came in May, when miscalculations by both sides blew up an expansive deal that had taken months to put together. Within days, Trump threatened new tariffs and

Deal or No Deal

Notable moments in the past year of the U.S.-China trade war, annotated with Trump's tweets

● 12/1

Trump and Xi negotiate a 90-day truce on the sidelines of a G-20 meeting in Buenos Aires. The U.S. says it will hit pause on new tariffs, while China commits to purchasing a "very substantial" amount of American goods.

"My meeting in Argentina with President Xi of China was an extraordinary one. Relations with China have taken a BIG leap forward!"

12/3

● 5/10

U.S. ratchets up duties on $200 billion worth of Chinese imports to 25%, after negotiations break down. China raises tariffs on $60 billion in U.S. goods in retaliation.

"I think that China felt they were being beaten so badly in the recent negotiation that they may as well wait around for the next election, 2020, to see if they could get lucky & have a Democrat win."

5/11

● 5/16

The U.S. Commerce Department blacklists Chinese telecom equipment maker Huawei and 68 affiliates from doing business with U.S. suppliers.

● 6/29

Trump and Xi meet, this time in Osaka, and agree to restart talks, though the mood quickly sours.

● 8/5

The U.S. Treasury labels China a currency manipulator after Beijing allows the yuan to breach the psychologically important threshold of seven to the dollar.

"China dropped the price of their currency to an almost a historic low. It's called 'currency manipulation.'"

8/5

placed Chinese telecommunications gear maker Huawei Technologies Co. on a U.S. Department of Commerce blacklist, restricting its ability to buy hardware, software, and services from American high-tech suppliers.

The Huawei decision cast a shadow on a late June encounter between Trump and Xi on the sidelines of the Group of 20 summit in Osaka, where the Chinese president asked his U.S. counterpart to ease pressure on the company and—according to Trump—promised to immediately buy "a tremendous amount" of American agricultural products. Trump agreed and returned from Osaka optimistic that a deal was in sight. But by the time U.S. negotiators returned from a round of follow-up talks in Shanghai in late July, the mood was souring. "That is the problem with China, they just don't come through," read one in a barrage of Trump tweets on July 30, in which he complained that Beijing hadn't lived up to its promise to restart agricultural purchases.

That set up one of the most volatile months of the trade war, feeding recession fears in the U.S. as signs of a slowdown in manufacturing continued to build, particularly in key presidential election battleground states. In early August, Trump announced a major escalation—tariffs covering the remaining $300 billion in China imports that would start to take effect Sept. 1. At his behest, the Treasury Department officially labeled China a currency manipulator. Then, on Aug. 23, the president directed U.S. businesses to explore ways of getting out of China. "Our great American companies are hereby ordered to immediately start looking for an alternative to China, including bringing your companies HOME," he tweeted.

Markets tumbled, and panicked chief executive officers and donors demanded to have a word with the president. Among them were Blackstone's Stephen Schwarzman and Las Vegas Sands CEO Sheldon Adelson, according to people close to the negotiations who asked not to be identified because the calls were private. They say the interventions succeeded. From that moment on, Trump was in deescalation and dealmaking mode.

Fears of an economic slowdown in the U.S. that coalesced in August also changed the equation. Publicly, Trump's advisers point to historic lows in unemployment and modest inflation to bat back concerns. They blame the Federal Reserve and a strong dollar for growth well below the 3% to 4% Trump once promised. (The U.S. grew at an annual rate of 1.9% in the third quarter.) But the angst that the trade war may be exacting a greater-than-anticipated economic toll is thinly veiled.

Worries about the economy burnished the attractiveness of a phase one deal that puts on hold new tariffs that would directly hit U.S. consumers. A partial pact would also reward American farmers for standing with Trump, despite being cut off from one of their most important markets. According to people familiar with the negotiations, missing from the partial deal are measures to address a key U.S. concern: how China often forces foreign companies to hand over technology. There's also nothing related to the vast web of subsidies China uses to help ▶

◀ its companies compete internationally—an issue Beijing is unlikely to budge on.

● FROM GRAND BARGAIN TO MINIDEAL

Despite the diminished expectations, Trump and his allies are quick to defend his handling of the trade war. American supply chains have started shifting away from China, they say, pointing to Apple Inc. and other companies' shifting of production to such places as India and Vietnam. And they are elated that Trump will also leave in place tariffs on a large portion of Chinese imports as an enforcement tool to ensure Beijing lives up to its side of the bargain.

Kudlow argues that a phase one deal will reduce the uncertainty hanging over the U.S. economy while starting to address important elements of the rivalry with China. "It's a big win for the president. Because his tough negotiating style and his use of tariffs—both of which have come under great criticism—are paying off."

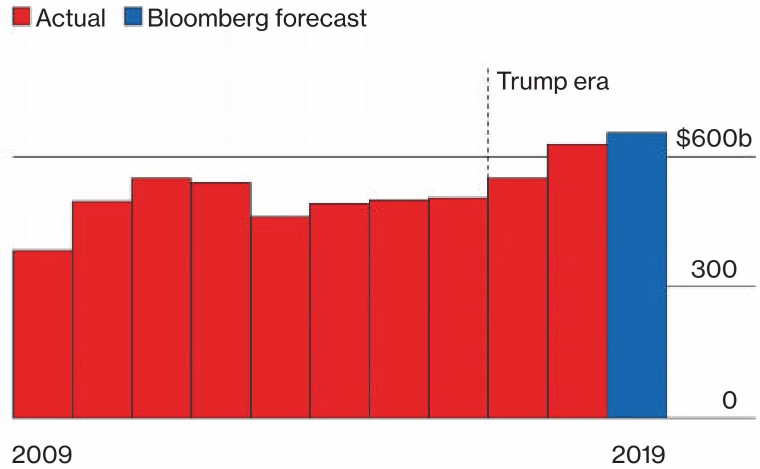
Even Navarro touts the strategy in public. "The great deal President Trump seeks for America, China, and the world is the deal Ambassador Lighthizer negotiated in May 2019 but China reneged on," he says. That agreement would have addressed what he calls China's seven "deadly structural sins," including its industrial subsidies and its dumping of low-cost products in the U.S. He also argues Trump, "as a master negotiator," will ensure further phases happen. "Of course I support the president in pursuing this strategy because it helps the American economy and American farmers, ranchers, and workers."

Critics, on the other hand, point to a U.S. trade deficit that's on track to end 2019 some $150 billion larger than at the end of 2016, on the eve of Trump taking office. And they argue that the tariffs and export restrictions his administration has put in place have, if anything, reinforced Beijing's determination to outpace the U.S. in critical areas such as artificial intelligence and biomedicine.

Trump's phase one deal, if it happens, "will not alter China's ambitions," says Charlene Barshefsky, who negotiated China's entry into the World Trade Organization under President Bill Clinton. Rather than using protectionism and industrial policy to give American businesses a leg up, the U.S. should be investing in education, research, and infrastructure to boost its own competitive position. "We'll never out-China China," she says. "And if you spent 10 minutes in the country, you'd know that."

Democrats looking to challenge Trump in 2020 will likely portray a phase one deal as caving. Yet, for better or worse, he has embedded the view of a malign China in Washington. Candidates from former Vice President Joe Biden to Senator

U.S. Goods and Services Deficit



DATA: U.S. CENSUS BUREAU

Elizabeth Warren agree the U.S. has to take on Beijing, though they find fault in Trump's tactics. Notably, none of the front-runners have committed to removing tariffs on China.

A U.S. business community that wants both a short-term end to the uncertainty and longer-term fundamental changes in China's economic governance is also wondering if it was all worth it. "What we all need now is a trade truce," says Myron Brilliant, who heads the international division at the U.S. Chamber of Commerce. Whether the fight will prove worth it "will depend on what comes next."

Many China experts argue Trump's approach was too improvised and forced allies into a "you're either with us or against us" equation that is divorced from the economic and business realities they face. "We're in a political era of simple solutions at a time when these really require complicated and coordinated actions," says Jude Blanchette, an expert on Chinese leadership politics at the Center for Strategic and International Studies, a Washington think tank.

"We're in a political era of simple solutions at a time when these really require complicated and coordinated actions"

Irwin, the Dartmouth professor, says an historical reference point is the War of 1812—which the U.S. waged against an England that was by far its largest trading partner and a predatory one to boot. One slogan touted at the beginning of that conflict, he says, was "on to Canada!"—a promise to annex new territories. When the war ended with a return to preexisting boundaries, the parameters for victory changed: "You know what our slogan was after the war? 'Not one inch of territory ceded!'" Trump and his aides "launched the trade war against China and said, 'We are going to remake the economy and get the state out of industrial policy and mercantilism,'" Irwin says. "We are ending it by saying, 'They are buying just as much stuff as they did before.'" —*Shawn Donnan and Jenny Leonard*

THE BOTTOM LINE What began as a well-plotted strategy to force China to an even playing field for U.S. exporters and investors has devolved into an improvised approach with modest goals.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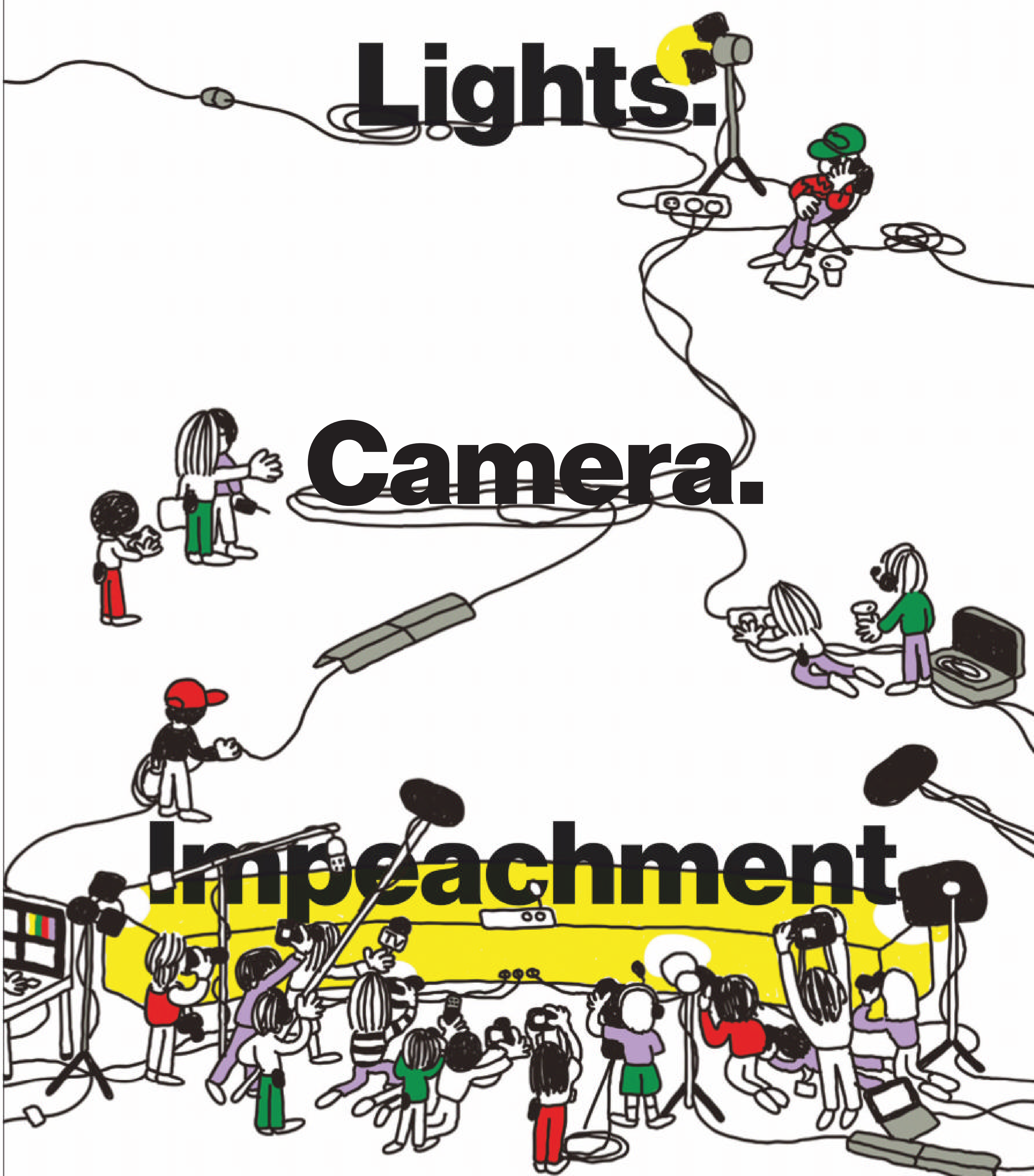


It's showtime for the Democrats' investigation of President Trump

Edited by
Jillian Goodman

House Democrats took their effort to impeach President Trump into a risky new phase on Nov. 13, counting on public hearings to bring to life testimony that's already been given behind closed doors.

The first witnesses to take the stand before the House Intelligence Committee, chaired by California Representative Adam Schiff, were top U.S. envoy to Ukraine William Taylor and Deputy Assistant Secretary of State George Kent. In his previous testimony, Taylor described growing increasingly concerned that Ukraine aid was being held hostage to White House demands for an investigation into Trump's potential 2020 rival, former Vice President Joe Biden, and into potential Ukrainian interference in the 2016 election. Kent, meanwhile, testified to committee members he was told that Trump "wanted nothing less than [Ukrainian] President [Volodymyr] Zelenskiy to go to the microphone and say 'investigations, Biden, and Clinton.' "

While Democrats used their questioning to try to establish the existence of a quid pro quo—in fact, if not in name—Republicans went after Biden's son, Hunter, and his position on the board of Ukrainian energy company Burisma. In his opening remarks, ranking member Devin Nunes, also of California, criticized Democrats for their "scorched-earth war against President Trump" and described the atmosphere during the closed-door committee hearings as "cultlike."

Nunes's language echoed that of Trump in his attempts to defend himself against the impeachment probe. He's used by-now familiar tactics such as leveling accusations of serious misconduct without providing evidence and attacking the credibility of House Democrats—including, especially, Schiff. "Schiff is giving Republicans NO WITNESSES, NO LAWYER & NO DUE PROCESS!" Trump tweeted days before the hearings started. "It is a totally one sided Witch Hunt. This can't be making the Democrats look good. Such a farce!"

In fact, the rules governing the process passed by the House on Oct. 31 allow Republicans to request testimony and question witnesses called by Democrats and gives the White House the opportunity to mount a formal defense once the proceedings move to the Judiciary Committee, which will consider articles of impeachment. They also, however, give Democrats the power to veto witnesses requested by minority lawmakers. On Nov. 9, Nunes sent Schiff a list of desired witnesses that included both Hunter and the anonymous whistleblower, both of whom Democrats have refused to call.

"It's an old adage that if you have the facts on your side, pound the facts. If you have the law on your side, pound the law. If you have neither on your side, pound the table," says Representative Mike Quigley, an Illinois Democrat on the Intelligence Committee. "They are pounding the table. And that means it's a safe assumption that they will go after Adam."

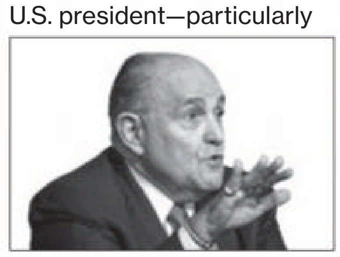
Schiff stumbled early during a public hearing in September, delivering an exaggerated parody of Trump's July 25 conversation with Zelenskiy, saying Trump sounded like a Mafia boss running "a classic organized crime shakedown." The president's allies pounced, and Trump repeatedly attacked Schiff on Twitter and in interviews, accusing him of lying and saying that he should be investigated for treason.

The House hearings come 20 years after Republicans brought charges against President ▶

What We Know and When We Knew It

A brief refresher on the events leading up to the impeachment investigation. ——*Nick Wadhams*

● April 21
Comedian **Volodymyr Zelenskiy** wins the presidency of Ukraine, taking U.S. officials by surprise. Advisers on both sides rush to ensure Trump's support for the country against Russia, while others close to the U.S. president—particularly



his personal lawyer, **Rudy Giuliani**—begin pressuring officials in Kyiv to investigate Joe and Hunter Biden and alleged Ukrainian interference in the 2016 U.S. election.

● May 6
Ambassador Marie Yovanovitch is recalled to the U.S. two months before the scheduled end of her posting to Ukraine. The Department of State gives no explanation for her firing. About a week later, Giuliani tells the Ukrainian press she "was part of efforts against the president."

● June 18
The U.S. Department of Defense announces $250 million in aid to Ukraine, which was appropriated by Congress the previous September. Three days later, the State Department notifies the White House Office of Management and Budget that it intends to send an additional $141 million in aid, which was authorized by lawmakers in February.

● July 18
The OMB notifies senior administration officials that Trump has ordered his acting chief of staff, Mick Mulvaney, to put a freeze on the full $391 million in aid.

● July 25
In a phone call with Zelenskiy, just after a discussion on U.S. aid, Trump asks him to "do us a favor" and look into both Bidens and the alleged election interference. While Zelenskiy has denied he felt pressured on the call, top U.S. envoy to Ukraine William Taylor testified to Congress that officials in Kyiv were later informed the aid was contingent on the investigations.

● Aug. 12
An unnamed individual files a whistleblower complaint to the Office of the Inspector General for the intelligence community, outlining concerns related to the July 25 phone call and the broader irregularities in the Trump administration's Ukraine diplomacy. The inspector general notifies House Intelligence Committee Chairman Adam Schiff, but the acting director of national intelligence, Joseph Maguire, refuses to share the full complaint.

● Sept. 11
The White House informs Congress that it has unfrozen all $391 million in aid to Ukraine. In fact, the State Department quietly released its portion of the funds at least two days earlier, after the agency's lawyers had determined the White House had no authority to block the aid.

● Sept. 13
Schiff subpoenas Maguire to produce the whistleblower complaint or else appear before Congress and explain his refusal publicly.

● Sept. 24
Trump authorizes the release of a reconstructed transcript of his July 25 call with Zelenskiy. Later that day, House Speaker **Nancy Pelosi** announces the opening of a formal impeachment inquiry into Trump and his dealings with Ukraine.

ILLUSTRATION BY OSCAR BOLTON GREEN. ZELENSKIY: EVGENIY MALOLETKA/BLOOMBERG. GUILIANI: WILLIAM B. PLOWMAN/NBC/GETTY IMAGES. PELOSI: BILL CLARK/CQ-ROLLCALL/GETTY IMAGES.

◀ Bill Clinton and more than 46 years after a special Senate committee held televised public hearings that helped lead to President Richard Nixon's resignation. Washington politics and media coverage have changed radically: TV and radio outlets that openly cater to the Right or the Left will attempt to spin viewers' opinions, even as others absorb the hearings via social media platforms, which are gearing up to stream the proceedings in real time.

There's another major difference this time around, says Joshua Huder, a senior fellow at the Government Affairs Institute at Georgetown University: time. The Watergate investigation unfolded over the course of a year, while the Clinton impeachment followed a long special-counsel investigation. "House Democrats and Chairman Adam Schiff are trying to do both between Sept. 25 and Christmas," Huder says. "It's a tall order."

Huder says he expects the House will impeach Trump, and the only question in both chambers will be whether there's any bipartisan backing. "While the president's support on Capitol Hill is not very good, he continues to garner consistent support from roughly 41% of the public," Huder says. "It's unclear Schiff can move the needle given strong partisan dynamics bolstering Trump's support and the short time frame he has to accomplish it."

If the House does vote to impeach, Senate Democrats will need to persuade at least 20 Republicans to vote for Trump's removal from office, which will be practically impossible without a broad base of public support. So far, Republican senators have been mostly tight-lipped, neither breaking with the president nor offering him their full-throated support. Lawmakers from both parties will be watching closely to see if the open hearings sway voters' opinions.

Public support for impeachment has grown since the House began its inquiry, but those numbers have largely stabilized, showing a plurality or bare majority of Americans in favor. An NBC/*Wall Street Journal* poll released on Nov. 3 found that 49% want to see Trump impeached and removed from office, while 46% don't. Other surveys with similar results show support for impeachment is mostly driven by Democrats, 85% of whom say they're pro-impeachment, according to an early November Monmouth University poll, compared with 42% of independents and just 8% of Republicans.

The hearings were scheduled to continue on Nov. 15, with former U.S. Ambassador to Ukraine Marie Yovanovitch, who's already testified in private about what she viewed as a pressure campaign led by Trump's personal attorney, Rudy Giuliani, which ended in her ouster in May. During the week of Nov. 18, the committee will hear from more than a half-dozen others who've already appeared behind closed doors.

In all these inquiries, Schiff, a former federal prosecutor, and his staff have an important advantage over Trump's Republican defenders on the committee. The rules give them the first 45 minutes of witness questioning, according to Kurt Bardella, a former spokesman and senior adviser for Republicans on the House Oversight and Government Reform Committee from 2009 to 2013, who's since switched parties. "For better or worse," Bardella says, "much like debates, these hearings are won or lost in the first hour." —*Billy House*

"It's a safe assumption that they will go after Adam"

THE BOTTOM LINE While House Democrats have amassed substantial evidence of improprieties in Trump's dealings with Ukraine, Republicans have plenty of ways to instill doubt in voters.

Spain's High-Stakes Gamble

● A snap election setback makes Prime Minister Sánchez more dependent on the rival Podemas party

It was April 28, election night, and Spain's acting Prime Minister Pedro Sánchez was on top of the world. His Socialist party had gone from 85 seats to 123 in the 350-seat chamber, and the 176 seats needed for an absolute majority seemed to be within the party's sights. He was tiring of Podemos, the anti-austerity party that had been propping up his leadership, and it was steadily losing ground anyway as the pain of the financial crisis faded from memory. Vox, Spain's insurgent far-right party, had won just 24 seats, underperforming most estimates.

The economy was doing well, and Sánchez sensed an opportunity: He'd take his chances with another vote rather than accept the compromises required to forge an alliance. Within days he was telling his team they'd need to repeat the election, according to two people familiar with the situation.

But instead of making Sánchez less beholden to Podemos, the outcome of Spain's Nov. 10 snap election has made him even more so. Together, the Socialists and Podemos lost 10 seats, leaving them 21 short of a majority. Meanwhile, Vox more than doubled its representation, winning 28 additional seats, and the conservative People's Party, the Socialists' traditional opponents, picked up 22.

"We have seen how irresponsible it was to call elections based on the calculus of party interests," says Alberto Garzón, a Podemos lawmaker. Ignacio Jurado, a political analyst with Quantio, puts the situation more simply: "His bet turned out badly."

And yet the Socialists remain the strongest party. "Spaniards have clearly said they want Pedro Sánchez and the Socialist party at the head of the government, but he will also need the support of all forces that support the constitution and want a stable government," said José Manuel Albares, his foreign affairs adviser, just after the results came in. "All of them will have to unblock the situation to move forward." On election night, Sánchez signaled he was ready to put aside his differences with Podemos. "One way or another there will be a progressive government led by the Socialist party," he told supporters in Madrid. That night, Pablo Iglesias, the ponytailed Podemos leader, offered to start talks, and on Nov. 12 the two signed a coalition agreement. They still need to attract support from smaller parties to solidify a governing majority, however.

For most of the post-Francisco Franco era, Spain had the classic two-party system common in Western democracies. The People's Party defended traditional values, while the Socialists pushed the envelope on social change. But as a result of the financial crisis that ravaged the country from 2008 to 2013, there are now five main parties. Last year, Sánchez managed to pull off an unlikely alliance that included both Podemos and the Catalan separatists to oust the People's Party administration with a no-confidence vote. Since then, the Catalans have joined blocking majorities against both the Left and the Right, and as recently as September, Sánchez claimed he wouldn't be able to sleep at night with Podemos ministers in his government. Of all the main party leaders, Sánchez has the best relationship with Pablo Casado of the People's Party, one of his advisers says. But the political climate is too polarized for a grand coalition to have been a possibility.

In all the turmoil, the figure of Franco, who used brutality to keep Spain intact and in line, looms large. The Catalan separatists, who caused a crisis in 2017 by declaring independence following a successful referendum that Spain's constitutional court refused to recognize, see the current chaos as fertile ground for their claims for statehood, which had been squelched for decades under the Franco dictatorship. Vox members, meanwhile, wrap themselves in the Spanish flag and wax nostalgic for the Franco years.

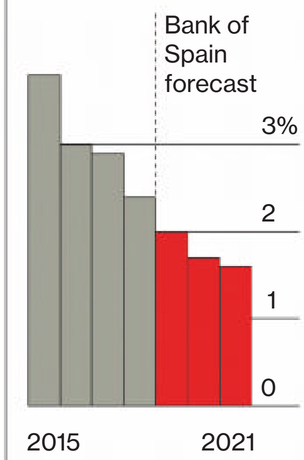
For Socialists, the recent exhumation of his remains from a mountainside mausoleum outside Madrid is Sánchez's signature achievement as acting prime minister. "Spain arose out of forgiveness, but it must not forget," he said in a statement. "This decision brings to an end a moral outrage in the form of the glorification of the figure of a dictator in a public space."

To Sebastian Balfour, who teaches Spanish studies at the London School of Economics, the empty rhetoric about Franco is pure diversion by a political class that doesn't know how to deal with such issues as chronic youth unemployment and job security. "You don't see a lot of effort to address the real concerns that people have," he says. "There are a lot of new grievances, especially among the younger generations."

Spain's central bank cut its annual growth forecast in September to 2%, from the 2.4% it had predicted in June, with further deceleration expected in 2020. Meanwhile, Catalonia continues to rattle Spain's constitutional framework. On his deathbed, the Generalissimo wanted God to forgive his sins and "keep the lands of Spain united." The latter, at least, is still a work in progress. —*Ben Sills, with Charles Penty, Jeannette Neumann, Charlie Devereux, Esteban Duarte, Thomas Gualtieri, and Katerina Petroff*

THE BOTTOM LINE A Nov. 10 snap election showed that Spain remains divided, just as economic headwinds threaten to destabilize the country even further.

● Spain's annual GDP growth



▲ Sánchez (left) and Iglesias sign a coalition agreement in Madrid on Nov. 12

BURAK AKBULUT/ANADOLU/GETTY IMAGES. DATA: INE, BANK OF SPAIN


Accountants

Small Business

OHB employees assemble a weather satellite in Bremen

A German Family Business Embraces Rocket Science

Satellite maker OHB says building a launcher is the key to growth

Since the 1980s, a small German company called OHB SE has built hundreds of satellites for clients ranging from the German army to scientific researchers. Within two years, OHB plans to send satellites into orbit with its own rockets—putting it into competition with giants such as NASA, Boeing, Lockheed Martin, Airbus, and Elon Musk's SpaceX. "Without rockets, satellites are useless," says Marco Fuchs, OHB's chief executive officer.

With satellites becoming ever smaller, Fuchs sees an opportunity for OHB to be a one-stop shop that builds spacecraft for customers and then places them in the sky. And the company has some experience manufacturing rocket parts as a subcontractor for the European Ariane carrier rocket. The potential is huge, with thousands of satellites planned for launch in the coming decade. Operators of small satellites often find themselves at the mercy of launch-services providers, which tend to place them on a sort of orbital standby list, frequently bumped by bigger—and more lucrative—cargo, and whose rockets often blast off from difficult-to-reach spaceports in places such as Kazakhstan or French Guiana.

With about €1 billion ($1.1 billion) in sales last year, the business has come a long way from its early days, when Fuchs's mother, Christa—looking for something to do after the kids ▶

WOLFRAM SCHROLL/BLOOMBERG

Edited by Dimitra Kessenides and Benedikt Kammel

◀ had left home—bought a small ship-maintenance business. Together with her late husband, Manfred, an experienced aerospace engineer working for a predecessor of Airbus SE, she transformed the company into a builder of satellites just as demand picked up for orbital data transmission.

Today, Marco, 57, steers the company from an unassuming office building on the outskirts of Bremen, located on a square named after his father. In hermetically sealed halls, dozens of workers assemble satellites for missions ranging from collecting weather data to military reconnaissance. Seven hours south of Bremen, at a company facility in the city of Augsburg, about 50 employees are working on a so-called minilauncher designed to bring payloads weighing as much as 200 kilograms (441 pounds) into orbit—enough for perhaps dozens of a newer generation of tiny satellites.

Since 1957, when the Soviets sent the first-ever satellite, *Sputnik*, into space, the orbit around Earth has become populated with thousands of artificial objects. About 450 were launched last year, four times as many as a decade earlier, according to the United Nations Office for Outer Space Affairs, and that number is poised to climb rapidly with a surge of broadband data transmission. SpaceX alone is planning to launch 12,000 satellites in the next seven years for its Starlink constellation.

At about $6.2 billion in annual revenue, the satellite launch industry is less than a third the size of the satellite manufacturing market, but it's growing faster, up 34% last year, according to the Satellite Industry Association. Satellites range in size from the International Space Station, which weighs as much as a jumbo jet, to weather satellites, more like an elevator's weight. Some recent models have included tiny satellites no larger than a milk carton that are typically used for Earth observation missions. Micro- and nanosatellites weighing less than 50kg will make up the bulk of future payloads.

With a maiden flight about two years away, OHB is exploring sites in Europe for launches, including the Azores islands in the Atlantic Ocean, as well as possible spaceports in Scotland, Sweden, and Norway. Fuchs says he's interested in a possible site in Germany to reduce transport costs. No matter where OHB's rockets will eventually lift off, Fuchs is optimistic that he'll play a role in the space race. "People used to think that only NASA can do this sort of stuff," he says, "but rocket science has been demystified." ——*David Verbeek*

THE BOTTOM LINE OHB's Fuchs sees a big market for space rockets that carry small payloads. The company is building a minilauncher to compete with those made by SpaceX, Boeing, and others.

Aerospace

1

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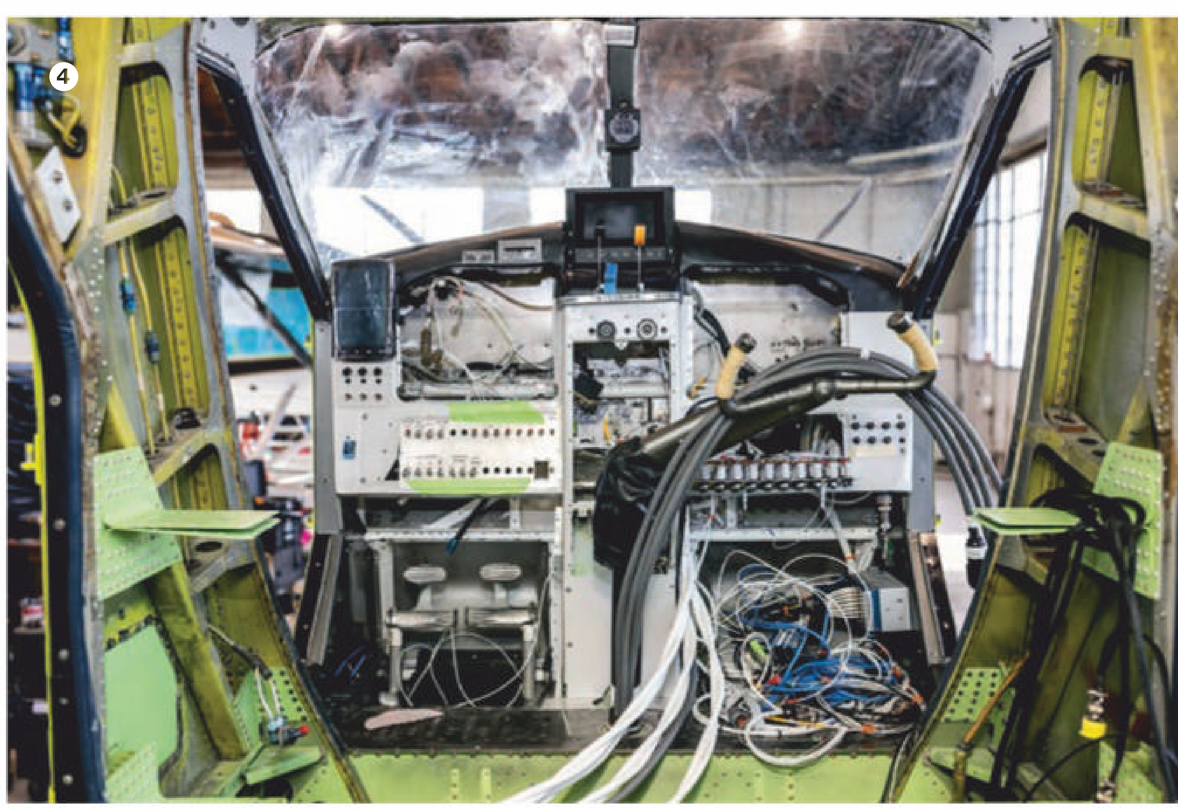
A Zero-Emission Aircraft

Harbour Air Ltd.'s seaplanes have been shuttling people between Vancouver and remote parts of British Columbia for some 40 years. In December, Harbour will test-fly a prototype e-plane, with a motor made by Redmond, Wash.-based MagniX. It hopes to become one of the first all-electric commercial airlines. —*Mike MacEacheran*



❶ Rush hour at Harbour Air's Fraser River runway, next to Vancouver International Airport's South Terminal ❷ The e-plane prototype and its specially designed propeller ❸ Aviation engineers at work on engine and cockpit components ❹ A pilot's view of the unfinished cockpit
❺ Nose cones sit inside a maintenance hangar in the South Terminal

PHOTOGRAPHS BY ROBERT ORMEROD FOR BLOOMBERG BUSINESSWEEK (5)

Cleaner, Safer Lithium-Ion Batteries

SimpliPhi's nontoxic power storage business is profitable and venture capital-free

Last year, when Jesse Gerstin was leading the Clinton Foundation's climate initiatives, one of his tasks was to bring reliable power to hospitals and other critical infrastructure in Puerto Rico. Hurricane Maria had devastated the island a year earlier, highlighting just how vulnerable its electrical grid was. It remains unreliable today.

Solar power made the most sense. The question was how to store energy to use at night. One of the engineers working with Gerstin suggested pairing the solar equipment with batteries made by SimpliPhi Power. The company, based in Oxnard, Calif., manufactures what it describes as clean, safe lithium-ion batteries, free of cobalt, the toxic element that can lead batteries to overheat and catch fire. SimpliPhi's power systems instead use lithium iron phosphate (LFP), a compound that doesn't have those risks. Blue Planet Energy and Sonnen, makers of energy storage systems, also produce batteries using the safer compound.

The Clinton Foundation and other groups have since installed SimpliPhi systems—batteries, management software, and other tools—in multiple hospitals and clinics across the island. The model is proving useful for California homeowners and businesses dealing with the blackouts prompted by wildfires, says Gerstin, who joined SimpliPhi in May as head of sustainable business development.

SimpliPhi is competing with Sonnen, Tesla Inc., and other battery makers to play a bigger role in the shift away from fossil fuels to clean energy. "How can we talk about clean energy if we're using a chemistry that is fundamentally hazardous and toxic?" says Catherine Von Burg, SimpliPhi's co-founder, president, and chief executive officer.

Lithium-ion batteries are a decades-old technology that revolutionized consumer electronics in the 1990s and electric power vehicles more recently. (Three scientists who developed the batteries—John Goodenough, M. Stanley Whittingham, and Akira Yoshino—won this year's Nobel Prize in chemistry.) The technology is considered crucial to the widespread adoption of solar and wind energy because the electricity generated needs to be stored cheaply and safely when the sun isn't shining and the wind isn't blowing.

Energy storage installations around the world will "multiply exponentially" over the next two decades, requiring $662 billion in investment, according to a July forecast from BloombergNEF, Bloomberg LP's primary research service on energy transition. The market today relies more on cobalt chemistries, but the safer LFP compound used is increasing its market share in commercial and residential facilities and utilities, says Logan Goldie-Scot, head of energy storage analysis at BNEF.

Unlike other battery startups that have burned through hundreds of millions of dollars of venture capital, SimpliPhi hasn't taken any. The company, which gets most of its revenue from equipment sales, has been profitable since 2013, doubling or tripling revenue annually, says Von Burg. The company expects revenue to exceed $20 million for 2019. Tens of thousands of its systems, which range from bright yellow portable emergency power kits to units big enough to power entire hospitals, have been deployed in more than 40 countries. All its employees, including manufacturing line workers, are part-owners.

One type of SimpliPhi battery

Electrical engineer Josh Crosby, president of power-system consulting firm CatalystE in Huntsville, Ala., has been using SimpliPhi's batteries in projects for the U.S. military since 2014. Their safety track record, efficiency, and price—two to three times less than what military battery makers charge—led him to SimpliPhi, he says. Its batteries have been tested at the U.S. Army Aberdeen Proving Ground in Maryland and the Marine Corps Base Camp Lejeune in North Carolina and deployed in Afghanistan, Iraq, and elsewhere. "Cobalt is more energy-dense and lighter, but it's not going to last as long, and you have an inherent risk of fire," Crosby says.

In October 2018, SimpliPhi Power relocated from an 8,000-square-foot factory in Ojai, Calif., to a 25,000-square-foot factory in Oxnard, where all of its batteries are made on the same production line. Von Burg plans to break ground on a second factory next year, potentially in Africa or in India, she says. Improving energy access with nontoxic batteries "isn't a moralistic argument about what's right, what's wrong," she says. "Shifting to renewables is critical." —*Nick Leiber*

THE BOTTOM LINE SimpliPhi Power, a profitable private battery maker in California, says demand is increasing for its nontoxic systems that store renewable energy for individuals and organizations on and off the grid.

COURTESY SIMPLIPHI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CODE STORAGE

Some of the world's most important code is sitting on film deep beneath the surface of a Norwegian archipelago

BY ASHLEE VANCE
PHOTOGRAPHS BY GUY MARTIN

WHEN CIVILIZATION COLLAPSES, AT LEAST OUR SOFTWARE WILL BE BACKED UP

1

THE LAST STOP FOR CIVILIZATION BEFORE THE NORTH POLE IS SVALBARD, AN ARCHIPELAGO NORTH OF MAINLAND NORWAY ALONG THE 80TH PARALLEL.

Most of Svalbard's old Norwegian and Russian coal mines have shut down, so locals have rebranded their vast acres of permafrost as an attraction to scientists, doomsday preppers, and scientist doomsday preppers. Around Svalbard, things can be hidden from the stresses of the outside world. There's a treaty in place to keep it neutral in times of war. In other words, it's an ideal spot for a big global reset button or two.

Pride of place belongs to the Svalbard Global Seed Vault, where seeds for a wide range of plants, including the crops most valuable to humans, are preserved in case of some famine-inducing pandemic or nuclear apocalypse. The seed vault looks like something out of a movie, its entrance a triangular obelisk jutting high out of a blinding white expanse. It sparkles with glowing green lights.

Nat Friedman, however, hasn't come for the beat-the-apocalypse aesthetics. On Oct. 24, the tall, thin, 42-year-old chief executive officer of GitHub Inc., Microsoft's world-leading code bank, hops in a van and drives about 15 minutes from his hotel to an abandoned coal mine, where he puts on a miner's helmet and headlamp. Deep inside one of the mine's frigid, eerily quiet arteries, Friedman comes to what looks like a metal tool shed. "It's more mine-y and rustic and raw-hole-in-the-rock than I thought it would be," he says.

This is the Arctic World Archive, the seed vault's much less sexy cousin. Friedman unlocks the container door with a simple door key and, inside, deposits much of the world's open source software code. Servers and flash drives aren't durable enough for this purpose, so the data is encoded on what look like old-school movie reels, each weighing a few pounds and stored in a white plastic container about the size of a pizza box. It's basically microfilm. With the help of a magnifying glass, you—or, say, a band of End Times survivors—can see the data, be it pictures, text, or lines of code. A Norwegian company called Piql AS makes the specialized rolls of super-durable film, coated with iron oxide powder for added Armageddon-resistance. Piql says the material should hold up for 750 years in normal conditions, and perhaps 2,000 years in a cold, dry, low-oxygen cave.

Friedman places his reel on one of the archive's shelves, alongside a couple dozen that include Vatican archives, Brazilian land registry records, loads of Italian movies, and the recipe for a certain burger chain's special sauce. GitHub, which Microsoft bought last year for $7.5 billion, plans to become by far the biggest tenant. Eventually, Friedman says, GitHub will leave 200 platters, each carrying 120 gigabytes of open source software code, in the vault. The first reel included the Linux and Android operating systems, plus 6,000 other important open source applications.

Yes, this may seem like a stunt, headlamps and all. If the world is ravaged to the point where Svalbard is the last repository of usable wheat and corn seeds, the source code for YouTube will probably rank pretty low on humankind's hierarchy of needs. Yet to Friedman, it's a natural next step. Open source software, in his view, is one of the great achievements of our species, up there with the masterpieces of literature and fine art. It has become the foundation of the modern world—not just the internet and smartphones, but satellites, medical devices, scientific tools, robots.

The basic idea of open source is that you write code and share it, giving anyone else a chance to see what you've done, and, if they like, to take the code and change it and make their own thing. Over time this vast and expanding body of work is repurposed and improved upon and used to make innumerable software applications. GitHub is where much of the world's open source software gets developed. About 40 million people, many of them volunteers, refine the projects, log bugs that need fixing, scan for security holes, and track changes. Think of it as a gigantic, meticulously cataloged library of tools that anyone can use.

Other reels in the vault hold movies, land records, and the odd recipe

Open source is the dominant procedure for software development, though it took a revolution to get there. In the 1990s, at the height of the Microsoft Windows empire, Bill Gates's subordinates described the code-sharing model as "a cancer," a threat to everything that patent-loving capitalists should hold dear. "If you told someone 20 years ago that in 2020, all of human civilization will depend on and run on open source code written for free by volunteers in countries all around the world who don't know each other, and it'll just be downloaded and put into almost every product, I think people would say, 'That's crazy, that's never going to happen. Software is written by big, professional companies,'" Friedman says in the vault. "It's sort of a magical moment. Having a historical record of this will, I think, be valuable to future generations."

To many in the software trade, the craziest and most magical thing here is a Microsoft executive extolling the importance of open source. The rise of open source has indeed been huge, epochal even. And, like many significant inventions—nuclear power, antibiotics—open source carries risks. Some pretty weird ones, it turns out.

2

PROGRAMMERS FREELY SWAPPED CODE LONG BEFORE LINUS TORVALDS WROTE THE CORE OF THE LINUX OS AT THE UNIVERSITY OF HELSINKI IN THE EARLY 1990S, BUT HIS CREATION WAS A STANDARD-BEARER FOR WHAT BECAME KNOWN AS "THE FREE AND OPEN SOURCE SOFTWARE MOVEMENT."

Microsoft was making obscene amounts of money through Windows and Office, and closely guarded the source code of these products. As the U.S. Department of Justice began trying to reckon with Microsoft's influence over innovation and competition, DIY hacker types such as Torvalds argued that the very idea of patented proprietary software stood in opposition to free speech, free access to public goods and knowledge, and progress itself. (This was less radical than it might sound; U.S. law didn't recognize software as intellectual property until the late '70s.)

These idealists injected a dose of counterculture spirit into the debate over how much control a few large companies ought to have around technological advances. Linux became the most prominent alternative to Windows, and other coders created a free package of open source Office alternatives called, of course, OpenOffice. Both products struggled to find a mainstream audience, partly because the developers were sometimes more focused on the source code's purity than on its usability. Yet they gained valuable experience building development tools that made it easier to collaborate and widely distribute software. They could simply put their code online and let word of mouth and network effects do most of the rest. It took a long time—with lots of bitter fights and lawsuits along the way—but eventually, open source became the rule rather than the exception.

Google led the corporate charge in the early 2000s. Instead of buying expensive operating systems, Google ran Linux on the servers in its data centers. Then, it took open source databases and file systems and wrote its own open source applications to fill in the gaps. This reliance on free software made it easier for Google to afford to give away services such as search, email, maps, and others. Facebook, Uber, Netflix, and many others would do the same. Today, open source is the engine of most major computing advances. Amazon.com Inc.'s massive cloud networks rely on Linux and many other free apps to function, which means that the tens of thousands of businesses that buy computing power from Amazon's data centers are living the open source lifestyle, too. Google has placed Android, a variant of Linux, on more than 1 billion smartphones.

Thousands of people have contributed to Linux's position at the heart of everything from TVs to cars, but Torvalds, now 49 and living in Oregon, remains first among equals. In addition to writing the core Linux code that undergirds the internet and smartphones, Torvalds wrote a program called Git over a weekend in 2005 to help him manage the development of Linux. Some open source coders took Git and turned it into GitHub.

Torvalds draws a healthy salary from the Linux Foundation, a nonprofit funded by companies such as Google, IBM, Huawei Technologies, Tencent Holdings, and Intel to further develop the operating system. His total annual compensation of about $1.8 million is more than enough for him to buy a nice house in Portland and do as he pleases, which mostly means sitting at home coding. But if he'd been more interested in financial rewards and the daily grind, the guy might well have Bill Gates money. On paper, the company that's made the most money from Linux is Red Hat Inc., which has created a custom version of the operating system and charges client businesses to keep it updated and secure. IBM acquired Red Hat for $34 billion earlier this year in the biggest-ever software deal. GitHub ▶

◀ users can also opt to sponsor coders or projects that interest them, à la Kickstarter or other crowdfunding sites. Often, though, open source coders don't get paid what they're worth, and their status as hobbyists complicates the corporate world's reliance on their work.

About this time last year a 48-year-old software developer in Sweden named Daniel Stenberg received a panicked call one evening from a large German automaker. The car company, which Stenberg declines to name, asked that he fly to Germany immediately because an application Stenberg had written was causing the entertainment system software in 7 million cars to crash. "I had to inform them that, you know, this is a spare-time project for me and that I have a full-time job and can't just go to Germany for them," Stenberg says. "They started out pretty demanding, but then switched when they realized the situation they were in."

This is fairly typical for Stenberg, who since 1998 has been refining a widely used open source tool known as curl. Over the years, curl has found its way into the electronics of almost every new car, as well as software written by the likes of Apple, Instagram, YouTube, and Spotify Technology. On any given day, more than 1 billion people will unknowingly use curl, which helps transfer data between internet-based services. Developers from major companies and startups alike have grabbed curl off GitHub and elsewhere and inserted it into their products in ways that Stenberg could never have field-tested himself, and they're not shy to send him messages at all hours demanding that he fix bugs promptly.

"Most of the days ... I tear my hair when fixing bugs, or I try to rephrase my emails to [not] sound old and bitter (even though I can very well be that) when I once again try to explain things to users who can be extremely unfriendly and whining," Stenberg writes on his website. "I spend late evenings on curl when my wife and kids are asleep. I escape my family and rob them of my company to improve curl ... alone in the dark (mostly) with my text editor and debugger."

In similar fashion, thousands of labors of love have found their way into software running everything from cash registers to trains. Software tools like GitHub have made this process easier with each passing year. Rather than rewriting every piece of an app from scratch, a developer just searches the vast library of open source code to grab what already exists. The end result is a complex system of interdependencies on thousands of freely available tools and apps. If one of the volunteers responsible for maintaining and improving those tools and apps decides he's had enough, entire swaths of the internet and our infrastructure can cease to function until someone else steps in with a fix. "It's a bit crazy," Stenberg says. "Open source is a huge part of everything now, and I think it's still growing."

3

THIS ISN'T QUITE THE FUTURE THE HIPPIES WANTED. IN THE BEGINNING, FREE SOFTWARE ZEALOTS WERE TRYING TO DEMOCRATIZE TECHNOLOGY, NOT CREATE A WAY FOR POWERFUL CORPORATIONS TO GET MORE POWER.

They wanted to ensure the best computing tools and data wouldn't be centralized and metered out by corporations. They wanted people to have the freedom to explore technology and ideas away from the watchful eyes of an overlord.

Yeah, well, oops. Google, Facebook, Amazon, and many others have used open source code to create grand, global advertising networks that track and analyze billions of people's every move, online and off. By comparison, ideological wars about bundling Excel and Internet Explorer with Windows 95 seem downright quaint. "If you don't have control over the technology that runs your life, the devices and services that run your life, then your life will be run by other people using the computers," says Eben Moglen, a law professor at Columbia who's spent decades at the fore of the free software movement. "We made good stuff, and it was turned into ammunition against our dreams."

Moglen says he appreciates the leveling effect that GitHub can have—it's one of the best places for a talented 16-year-old programmer in Cambodia or Nigeria to show off her skills and alter the economic course of her life. Still, Moglen is counting on young people to form the core of a greater backlash against big tech companies' privacy grabs. He's pitching a hardware-software package called the FreedomBox, which costs about $90. It's a small computer that uses open source software to replicate many of the common internet services (search, messaging, file-sharing) away from the prying eyes of the tech giants.

Other open source veterans argue that the revolution was worth it. Small teams of scientists can now punch well above their weight thanks to GitHub shortcuts. Cancer researchers, to cite one of many, many examples, frequently borrow from Google's open source machine-learning work in their hunt for better ways to screen for tumors. "I don't know who is religious about open source anymore," says Dave Rosenberg, a veteran software executive and investor. "I don't think you can achieve the stuff we want without it."

Friedman, above in Svalbard, also plans to store parts of GitHub's code library elsewhere, including Oxford University

Friedman, who spent 20 years starting open source companies and working on similar projects at large software makers before Microsoft put him in charge of GitHub, has the future of open source very much on his mind a couple days before the Svalbard trip, in Oxford, England. No true prepper is content with only one backup plan: The Arctic cave is just the first of what GitHub plans to be many repositories of code scattered around the world, holding almost all the code in its data banks rather than just the favorites. At one stop, Friedman climbs a few flights of creaky stairs to visit the head of the Bodleian Library, which keeps 12 million items in its glorious medieval towers. Would Oxford also store some code for safekeeping? As it turns out, sure, they're game. Torvalds and Shakespeare, together forever.

In the spirit of the Svalbard cave, Friedman's immediate mission is to tame the existential risks facing open source software. During our time together, he recounts story after story of large companies that have no idea how much open source software they depend on, who wrote it, how old it is, or what security holes might exist in it. He's hoping that Semmle Ltd., a security research company GitHub recently acquired, can help close those gaps. GitHub is also refining the parts of its user interface that show a business what code it's using, where that code is from, and when it needs updating. Yet another important step will be the creation of a more formal system for uniting big companies to subsidize volunteer efforts like curl, he says. There should be an easy way that Apple, Spotify, and the unnamed large German automaker can split the cost of a meaningful full-time wage for Stenberg with a few clicks.

"We would be successful if we could create a new middle class of open source developers," Friedman says. "If you do this right, you create more innovation."

GitHub's most existential mission feels more urgent a few hours after we leave the Svalbard code cave. Fires have broken out around Friedman's family home in Sonoma, Calif., and his wife calls to say that she and their 3-year-old daughter are evacuating. Friedman tells his wife to turn on their Tesla's Bioweapon Defense Mode, which filters the outside air in extreme fashion. By the time dinner rolls around, he knows his house has been reduced to mostly ash. A photo of his front door archway—all that's left standing amid the smoking rubble—soon becomes the image most media outlets choose for their coverage. With much of California burning or blacked out, an Arctic reset button starts to make a lot more sense. As Friedman has said several times by now on our trip, "I think the world is fundamentally weirder than it was 20 years ago." B

To watch Ashlee venture into the Arctic World Archive and beyond, check out bloomberg.com/series/hello-world

Before there was recycling, there was the rag trade. By Adam Minter

RICHES FROM

Todd Wilson of Star Wipers with some of tomorrow's cleaning supplies

RAGS

The two-story cutting room at Star Wipers fills with a soft, mechanical hum. About 20 middle-aged women and a handful of men stand at workstations encircled by 6-foot-tall plastic bins full of used clothes and sheets. In the middle, Amity Bounds, one of the last professional American rag cutters, grabs a pink hoodie with a sparkly print across the front that reads JUSTICE LOVE JUSTICE. Like her co-workers, she stands 6 inches from a tea-saucer-size blade that spins at chest level inside a metal guard with three small gaps. With a butcher's precision, Bounds slips the hoodie into one of the gaps, cuts off the hood, then slices the garment twice so it lies flat. Next she cuts off the zipper and tosses it into a waste bin. Then she cuts off and tosses the sparkly print. ("It's abrasive and no good for wiping anything.") The remaining sweatshirt offers little resistance; she slices once, twice, three times, transforming it from a garment to rags.

"It took me a year to learn all of the products and learn to cut them," Bounds says as she tosses the sweatshirt fillets into a barrel filled with fresh-cut rags.

"How long have you worked here?" I ask.

"Ten years."

Few consumers, anywhere, have heard of the wiping-rag industry. But it bails out everyone. Approximately 30% of the textiles recovered for recycling in the U.S. are converted to wiping rags, according to Secondary Materials and Recycled Textiles (Smart), a trade association. And that's probably an undercount. The 45% of recycled textiles that are reused as apparel eventually wear out, too. When they do, they're also bound for the wiping-rag companies.

Nobody counts the number of wiping rags manufactured in the U.S. and elsewhere every year. But anyone who knows the industry acknowledges that the numbers are in the many billions—and growing. The oil and gas industry, with its network of pipes and valves, requires hundreds of millions of rags per year to wipe leaks, lubricants, and hands. Hotels, bars, and restaurants need billions of rags to clean glasses, tabletops, and railings. Painters need them for spills and drips. If these businesses can't reuse clothes and sheets, they'll opt for disposable paper towels, synthetic wipes, and new cloth rags, complete with all their environmental and financial costs. Decades before environmental organizations and governments encouraged reuse, recycling, and circular economies, the wiping-rag industry had mastered the art.

Todd Wilson, the wiry, 59-year-old vice president of Star Wipers, stands beside me, watching Bounds with rapt attention. "Did you see how many multiple cuts she did?" he asks with excitement. "Every time she runs it through the blade"—he stops to compose himself—"our competition doesn't do that!" Wilson is one of the industry's most passionate boosters. And Star Wipers, located in Newark, Ohio, 40 miles east of Columbus, is one of the last American companies that in his estimation does rags "the right way."

Like most people who don't make money from cutting rags, I long assumed that "the right way" was how it was done at home. My mother would take old T-shirts and tear them into rags for polishing furniture and wiping down sinks. What transformed this act of household thrift into an industrial process ▶

Photographs by Andrew Spear

◀ were the factories and machines that created the Industrial Revolution. Maintaining and repairing those machines required rags to apply or wipe up grease and oil.

In industrializing England, the most abundant source was the growing surplus of used, unwanted textiles made by those very machines. An industry emerged to collect them for Britain's ragmakers, which by the late 19th century were as industrialized as the textile mills, with buying networks as complex as those used to distribute clothing to the growing retail industry. By 1929 the U.S. was the world's largest rag producer, home to at least 26 industrial-scale ragmaking companies.

Star Wipers has 110,000 square feet of space in Newark, much of it devoted to warehousing the rags it packages and ships around the U.S. to distributors who know—intimately—what kind of user needs what kind of rag. It's a labor-intensive business, and as with textile manufacturing, much of the industry has migrated to Asia over the past three decades. Those that remain, such as Star Wipers, need good reasons to stay in the U.S. "It's about quality," Wilson tells me.

There are companies that distribute more rags than Star Wipers, but most of those are imported. With as many as 26 rag cutters working at one time in Newark and an additional 13 in the company's North Carolina plant, Star Wipers is likely the largest U.S. rag cutter left.

Wilson and I sit across from each other at a long table in a windowless conference room. Behind me is a door leading to an industrial laundry machine that looks a bit like a giant green metal caterpillar. It handles multiple different loads at once, without mixing them. And not all those loads are used clothes. "The washer exists to make a new T-shirt feel like an old one," Wilson says. This makes sense when I think about my own laundry. A new cotton tee, generally, doesn't feel as soft as one I've been washing for years. "Think about it," Wilson says. "That soft T-shirt is going to do a better job of absorbing liquid than one you've just pulled out of the pack."

As a result, buyers typically pay more for rags made from used shirts than ones made from new ones. And when they can't get used ones, they spend money to launder new ones so they feel used. For example, every three weeks, Star Wipers receives a load of castoffs from apparel makers in Bangladesh that must be run through the washer before cutting.

"That's upside down to me," I concede.

"You haven't spent much time around rags," Wilson says with a smile.

Rags have been in Wilson's family since the 1970s. His father, Robert Wilson, a manufacturer of components for card-filing systems, acquired a small rag company that became his dominant holding. In 1998, Todd and a partner formed their own rag company, Star Wipers; it and the assets of Todd's father's company were acquired in 2005 by Action Supply Products Inc., based in Coraopolis, Pa. Today, Star Wipers has 160 employees and additional operations in Pennsylvania and North Carolina, and a rag-sourcing network that extends from Brownsville, Texas, to Kandla, India. In 2017 it sold about 15 million pounds of rags, primarily in the U.S.

Privately held Action Supply doesn't disclose earnings or revenue for Star Wipers, but there's no question that business has been good. The Newark facility alone has expanded more than 350% since 2005, with much of its new square footage devoted to warehousing the washing-machine-size compressed bundles of textiles that arrive at the factory and the suitcase-size, shrink-wrapped bundles of cut-up fabric that go out to distributors around the U.S. Some of those shrink-wrapped bundles contain a rainbow of multicolored, cut-up T-shirts, 10 to a pound; some are filled with cut-up white sweatshirts. At retail outlets, a 5-pound box of cut-up tees can go for anywhere from $9 to $25, depending on color (all white is more expensive) and quality.

Wilson attributes the company's success to two factors. First, he cares. As he says repeatedly during our hourslong visit, "I love rags!" Second, he's a stickler for quality. "A rag is a tool," he says. "No different than a screwdriver. Different

Workers sort material at the Newark plant

tools for different applications. You have to make the tool and make it well." A car wash doesn't want a scratchy rag that'll mar a finish; an oil and gas company doesn't want a polyester rag that could discharge static electricity and set off an explosion; a maid service doesn't want a colored rag that's going to bleed dye onto a countertop.

Lately, Wilson finds that ensuring quality is getting harder. He pulls out a copy of the January 1963 issue of the *Bulletin of the National Association of Wiping Cloth Manufacturers*. Toward

"A RAG IS A TOOL. N

the end, a full page is devoted to "Specifications for Purchase of Rags for Conversion into Wiping Cloths." There are 18 specifications by grade, including ones for "white wipers," "colored wipers," "underwear wipers," "mixed wipers," and "blue overalls and pants (blue denim)," which it says "shall consist of 100% cotton material up to 12 oz. per sq. yd. Minimum area of pants leg when opened shall be 2 sq. ft. with a minimum width of 12 inches. Shall be free of coveralls and jackets. Shall be free of greasy, oily, painted, cement stock and skeletons."

The good news is that skeletons no longer threaten to turn up in clothes purchased for wiping rags. The bad news is that the days of recycled 100% cotton rags are pretty much over,

and so are the days when manufacturers could adhere to those industry specifications. Clothes and textiles simply aren't as well-made as they used to be. A shirt that falls apart after a few washes can't be transformed into a rag suitable for wiping down a freshly washed car or table. Cheap fast fashion doesn't just hurt thrift shops; it hastens the trip to the landfill or garbage incinerator.

"Go try to buy a 100% cotton shirt today," Wilson says with exasperation. "Even when it says '100% cotton,' you can't be sure." This isn't idle conspiracy mongering. Manufacturers have begun to incorporate more and more polyester into clothes to meet consumer demand for ever-cheaper clothing, and cotton-polyester blends often contain more polyester than the tag claims. (Mislabeling is a violation of the Textile, Wool, and Fur Acts, but it's rarely prosecuted.) Star Wipers first noticed the change in the millions of pounds of linens it purchased from laundries serving health-care facilities. Sheets and blankets that used to be cotton-polyester blends were turning up as 100% polyester. That's a problem. "A hundred-percent-polyester wiping rag is not going to do the same thing as a poly-cotton blend," Wilson says. "It won't absorb as well." That's the least of it. Polyester can melt in the presence of certain solvents or heat and—worse still—emit static electricity.

At Star Wipers, a sorting and grading operation pulls the all-polyester blankets before they're cut and packaged. But back in the 1960s, before poly-cotton blends were common and rag specs were adhered to more carefully, they'd have been rejected before they even got inside the factory. Today, just as clothing consumers are willing to accept lower quality in exchange for lower prices, so too are many wiper buyers. Wilson says many have accustomed themselves to poly-cotton blends. But not all of them: "Today if people can't find what they want in a reclaimed wiper, they'll look to a new one." Paper towels are always an option; so are synthetic towels that offer greater absorbency than reclaimed poly-cotton wipers. It's a quirk of the global economy that the most direct beneficiaries of the rise of fast fashion might be paper towel manufacturers.

Wilson loves rags made from reclaimed textiles. But he can't simply ignore that declining quality. So Star Wipers has started to manufacture a new, 100% cotton rag from yarn grown and manufactured in North Carolina. "We can follow it from field to here," he says. The environmental cost of a new rag is steep compared with that of a reclaimed one—growing cotton is highly water-intensive—but customers are willing to pay it.

Star Wipers' 100% cotton rag is known as the STB—short for "simply the best"—and across the industry, that's a widely acknowledged statement of fact. "It's not our biggest seller by any means," Wilson says. "But if a customer wants that consistency and is willing to pay the premium for it, we make it available." It's not good enough; it's as good as new.

O DIFFERENT THAN A SCREWDRIVER"

Toward the end of the Friday afternoon shift at Star Wipers, Wilson stops beside a cart piled with cut-up white sweatshirts. "Now here's what I'm gonna tell you about this product," he says. "This is a reclaimed white sweatshirt. For us to keep up with demand, we have to buy it offshore. There's not enough in the States." The problem, for those who view it that way, is that it's typically cheaper to cut sweatshirts into rags in India than in Ohio.

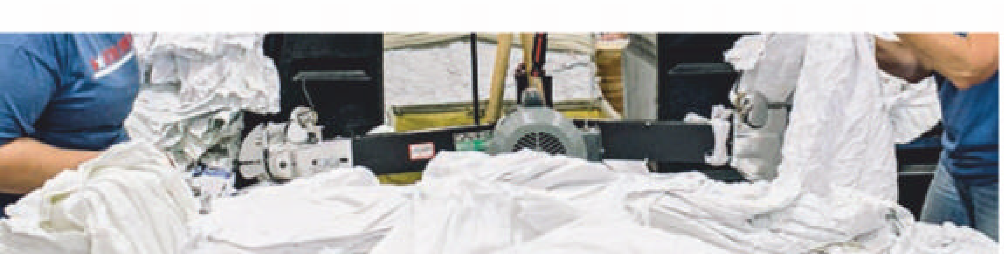
None of the cut-up sweatshirt fragments through which Wilson is rummaging were used in India. Rather, they were likely made in South Asia, exported to the U.S., and worn until they were donated to Goodwill, the Salvation Army, or some other thrift-based exporter. When they didn't sell there, they were exported again (to India, most likely), cut up, and exported again—this time to Star Wipers in Newark. Each step of that journey makes perfect business sense, even if the totality of it sounds ridiculous.

In fact, it's the future. Middle-class consumers in Asia already outnumber those in North America. For now, Wilson says more than 82% of Star Wipers' rags are sourced in the U.S. But soon, unwanted secondhand stuff from Asia will exceed what's generated in more affluent countries. If those clothes don't sell, they can always be cut into wipers, assuming the quality is sufficient. And those rags, sourced from clothes worn and cut in developing countries, will make their way to the U.S. A secondhand trade that once flowed in one direction—from rich to poor—now goes in every direction.

Wilson understood that dynamic years ago. In 2016 he traveled to India to teach a local rag company how to cut rags to Star Wipers' exacting standards. It wasn't hard to find a partner. Wilson just wants to be sure its rags are cut to a standard that he can import as his own.

That goal isn't easy. Workers in Newark are taught to cut shirts and other garments so they get about 10 wiping rags per pound. "But the industry standard is around five rags per pound," Wilson says, referring to big, sloppy cuts that make an old T-shirt look like a pair of oversize wings. "And that'll be the death of us as an industry. People will feel like they're getting a better deal buying new rags. So you have to find the people cutting the rags the way you want them." His cut, the Star Wipers cut, looks like what most people think of as a rag. That may seem trivial—maybe even comical—to someone outside the industry. But it's absolutely critical to anyone who wants to see the life of secondhand clothing extended for as long as possible.

Wilson is unswerving in his optimism about the future of reclaimed wiping rags. That doesn't stop him, though, from dropping an occasional joke at the expense of the industry. At one point, he says that during a recent convention, a fellow trade association member reported that he had good news and bad news about the business. "The good news," Wilson recounts, starting to laugh, "is that nobody wants to get into this business." Ⓑ *Copyright © Adam Minter 2019. Excerpted from* Secondhand, *published by Bloomsbury on Nov. 12.*



Better

Living

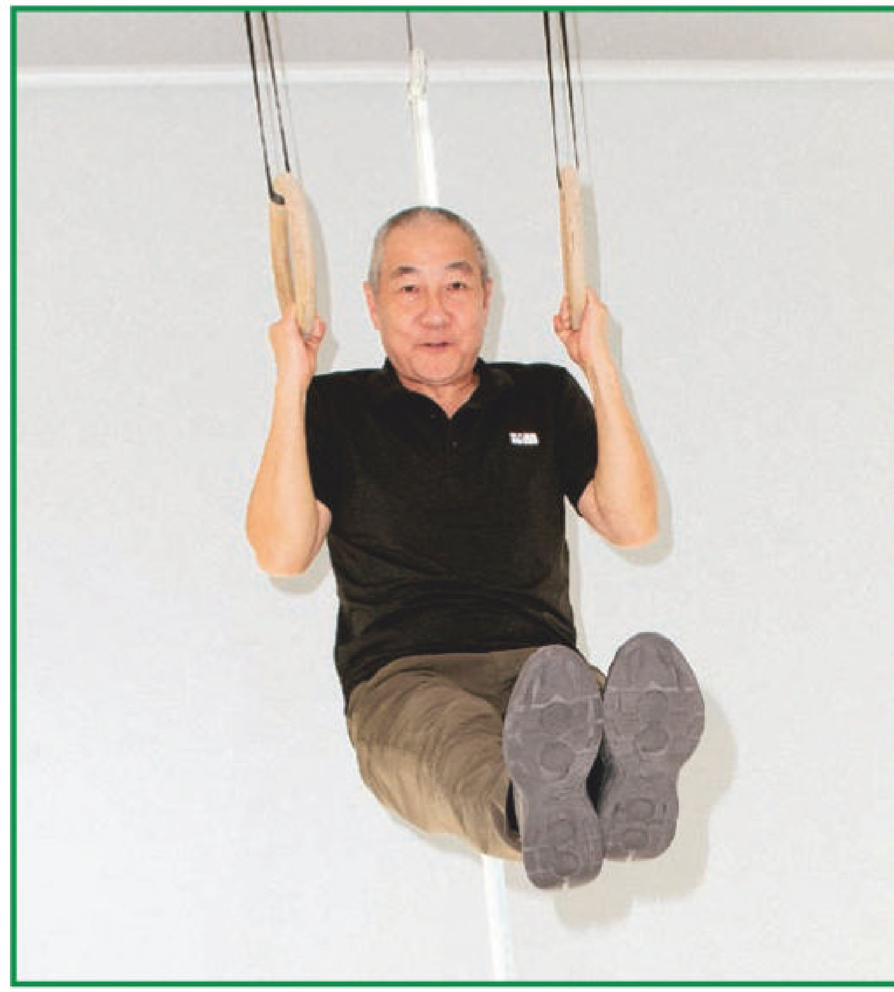
China's BGI wants your genes to guide your medical care, your diet, and maybe your choice of spouse. It could get weird

Through Genomics

By Matthew Campbell and Lyu Dong
Photographs by Ka Xiaoxi

At the Shenzhen headquarters of the Chinese genetics company BGI Group, there's no excuse for poor health. Employees are urged to punctuate their days with quick bursts of high-intensity exercise on the weight benches, pullup bars, and spin bikes placed in the open-plan offices' breakout areas. Riding elevators is officially discouraged. For those who insist, the company has placed a simple injunction on the doors, in English and Chinese: "DO SQUATS if taking the lift." For lunch, in-house coffee bars offer a selection of low-calorie "nutrition meals" as well as a curious "decreasing serum uric acid series." During their off hours, employees set out on arduous group hikes up and down the verdant mountains surrounding the city, often led by senior executives for whom physical fitness is a component of annual performance reviews. "If I get fat, no bonus," one jokes, a little anxiously.

BGI's co-founder, chairman, and animating force, 65-year-old geneticist Wang Jian, insists on all this exertion not just because he believes healthy workers are more productive. He also wants the more than 6,000 employees of his company, one of the world's largest producers of genetic research, to be walking advertisements for their products. To that end, employees and their families are encouraged to sample the wares, undergoing a regular battery of genetic and other tests to screen for such illnesses as cancer, heart disease, and dementia. Monitoring and prevention plans are put in place for those with worrisome results. With the right diagnostics and healthful lifestyles, Wang professes, everyone at BGI should live to 99 or older. It will take a while to test the claim: The average age of his employees is just over 30.



Wang takes to the exercise rings at the China National GeneBank, which BGI operates in Shenzhen

Whole-genome sequencing, the technology that drives BGI's business, is no longer particularly new. But Wang says genomics is about to become the core of modern medicine, for several reasons: Sequencing is becoming cheaper and more reliable; research is advancing to the point where genetic findings can underpin treatments; and governments—above all, China's—are encouraging their deployment at large scale. And he says BGI, which manufactures sequencing equipment, sells diagnostic tests, and performs research for drug companies, can be the company to take it there, becoming China's first global life-sciences giant in the process.

Someday soon, Wang predicts, getting your entire genome sequenced—a far more elaborate enterprise than commercial tests such as those from 23andMe Inc., which examine only small portions of a person's DNA—will be as unremarkable as getting a vaccination. Such testing will be repeated throughout your life, informing health decisions, eating habits, and perhaps even your choice of mate. And it could guide your medical treatments, eventually provided in BGI hospitals that specialize in acting on genomic insights. "Nowadays, medicine mostly comes from the industrial revolution. It's physical, it's chemical: Kill the tumor, poison the tumor, burn the tumor," Wang says. "We go back to real biology."

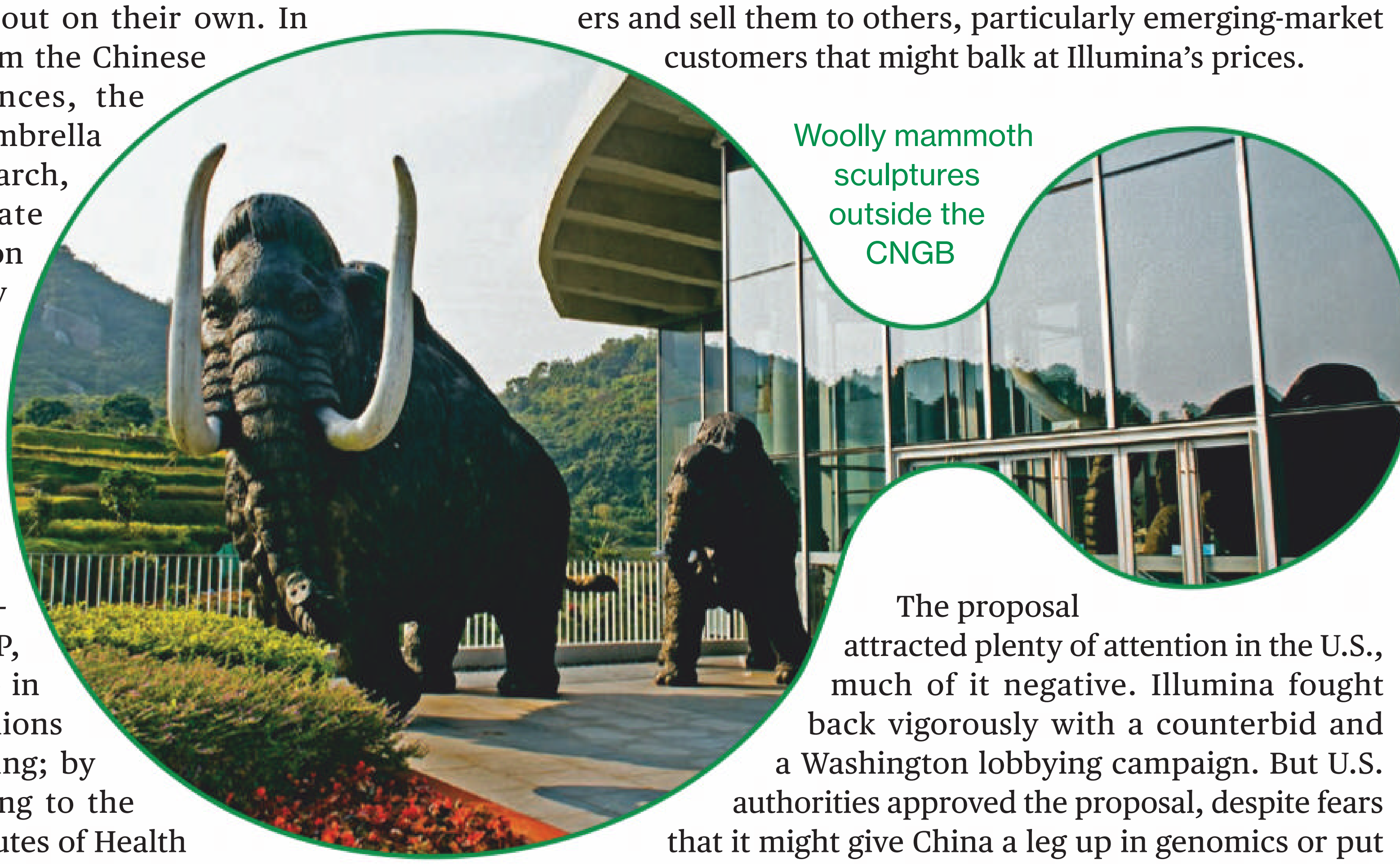
The field of genomics has come a long way since the first draft sequence of the human genome—the complete list of the billions of chemical "letters" that make up our DNA—was unveiled in 2001. The world Wang describes may finally be possible. And if the challenges of realizing it were purely technological, then BGI might be better poised than anyone else to make it happen. But genomics is an ethically and politically fraught proposition, and for Wang to win the world over to his vision, he'll have to answer a fundamental question: Why should anyone trust a Chinese company to do it? ▶

◀ Like many science-minded entrepreneurs of his generation in China, Wang got his start in publicly funded research. BGI began life in 1999 as the Beijing Genomics Institute, a state-backed lab dedicated to assisting the Human Genome Project (HGP)—the Clinton-era effort to assemble the first-ever comprehensive picture of human DNA. Compared with the participating Western institutions, BGI was tiny and its contribution modest. But the work gave Wang and his co-founders the confidence and international connections to strike out on their own. In 2007 they split from the Chinese Academy of Sciences, the state-controlled umbrella for high-level research, to create a private company focused on sequencing. They also decided to relocate to Shenzhen, China's entrepreneurial hothouse.

At the time, sequencing was shifting from revolutionary to commonplace. The HGP, which wrapped up in 2003, required billions of dollars in funding; by mid-2008, according to the U.S. National Institutes of Health (NIH), a human-size genome could be mapped for less than $1 million. The cost has been dropping even faster since. With researchers around the world hungry for genetic data on everything from viruses to elephants, BGI established itself as a sort of Foxconn of sequencing. It commissioned some assignments itself, eager to demonstrate its scientific chops by placing articles in prestigious journals. In 2008 its researchers published, in *Nature*, the first genome sequence of an Asian person; later, a BGI team revealed the genetic details of an E. coli outbreak in Germany through the *New England Journal of Medicine*.

At the same time, BGI gained a reputation for testing the field's limits. In 2011 it created the Cognitive Genomics Lab, assembling a multinational group of scientists to investigate the genetic basis of intelligence—a taboo question for many Western researchers. The study, which would have examined the DNA of high-IQ subjects and compared them with a control group of average intellects, was never finished. Later, an executive revealed at a conference that BGI was working toward offering gene-edited "micropigs" in a rainbow of colors. This, too, was eventually dropped. Both projects were emblematic of a certain tendency toward corporate entropy—an eagerness to pursue anything as long as it vaguely involved DNA.

As it further diversified its business model, BGI was contemplating a deal that would make it an important provider of the field's basic infrastructure. In 2012 it offered $118 million to acquire Complete Genomics, an unprofitable sequencing-machine manufacturer in Silicon Valley. At the time, BGI was believed to be the world's largest buyer of sequencing equipment, primarily purchased from Illumina Inc. in San Diego. Control of Complete would give the Chinese company the ability to build its own sequencers and sell them to others, particularly emerging-market customers that might balk at Illumina's prices.



Woolly mammoth sculptures outside the CNGB

The proposal attracted plenty of attention in the U.S., much of it negative. Illumina fought back vigorously with a counterbid and a Washington lobbying campaign. But U.S. authorities approved the proposal, despite fears that it might give China a leg up in genomics or put sensitive information in Beijing's hands. "It's hard to believe that any individual or any company that's directed by the state to engage in certain activities wouldn't do so," says Michael Wessel, a member of the U.S.-China Economic and Security Review Commission who raised concerns about the deal.

Discussions about the security implications of genomics tend to be extremely speculative, and BGI has attracted nothing like the scrutiny that Huawei Technologies Co., China's largest tech company, has faced over allegations that its equipment could be used for espionage. But the two companies are similar in at least one important respect: They have opaque structures that make it difficult for outsiders to understand the full extent of their operations, finances, and ownership.

BGI's official organization chart is depicted as a massive planet, BGI Group, orbited by eight moons of varying sizes. (It could also be read as a nucleus and its electrons.) Only one of these eight moons is publicly traded—BGI Genomics, which listed on the Shenzhen Stock Exchange in 2017 and has a market capitalization of about $3.5 billion. It derives most of its revenue from services such as prenatal tests. Another unit, MGI, incorporates the sequencing-machine business acquired from Complete. Much of the rest of BGI, which

“One of our dreams is that everyone has an ID card with their genome”

Pink flamingos roam the grounds

includes divisions dedicated to forensics and basic research as well as an open-access journal, is officially not for profit, subsidized by income from the commercial divisions and from grants.

The company has never disclosed how all this works or how its relatively modest earnings can sustain so much public-spirited research. Executives will say only that BGI is privately owned—Wang, with a net worth estimated by *Forbes* at $1.2 billion, is the largest shareholder—and has no special relationship with Beijing. It has received substantial loans from the government’s China Development Bank, however, and also operates a “biorepository” of frozen tissue samples and the China National GeneBank (CNGB), a Shenzhen facility that houses a vast trove of digitized genetic data, on behalf of the state.

BGI’s best insulation against suspicion is probably its roster of foreign partners. Over the years the company has collected a long list of scientific luminaries as advisers. One of its more enthusiastic collaborators has been George Church, a Harvard researcher who is arguably the most prominent geneticist in the U.S. He’s been involved with BGI since 2007, and one of its research institutes bears his name. Church describes BGI as “a bit more sophisticated” than Western competitors, particularly in applying genomic information to personal health. “It’s really unique in the whole world, what they’re trying to do and what they’ve done,” he says.

Wang’s eagerness to be seen as a sexagenarian superhuman is rarely subtle. Near his desk, a pair of gymnastic rings is suspended from the ceiling—useful training tools for one of his primary hobbies, mountaineering. The halls of BGI’s main campus, which occupies a converted shoe factory near the Shenzhen port, are decorated with photos from his climbing expeditions, including one shot from the summit of Mount Everest. For an interview in August he wore a T-shirt and cargo pants made of a stretchy technical fabric, as though he might bolt off up a mountain at any moment.

BGI recently celebrated its 20th anniversary, and Wang, who has spiky salt-and-pepper hair and a kindly manner, insists it’s only getting started. “For the last 20 years we just built up the infrastructure,” he says in lightly accented English. “Now we really think we can do something for the country, for the world, and also for ourselves.”

Staff are urged to use amenities such as climbing walls

He describes BGI as on its way to becoming the first full-stack genetics company: manufacturing sequencers, running them 24/7 with samples, and using research fueled by the resulting data to push the field forward, in turn creating even more demand for sequencing. Improving the basic technology is crucial to the strategy, and BGI is going after both ends of the market. Its entry-level sequencer, the printer-size DNBSEQ E, sells for about $12,000, making it ideal for small labs in developing countries. BGI says the machine can produce a full report on a sample in just eight hours, important when doctors need to rapidly identify a pathogen. The company’s top-of-the-line, $1 million T7—it looks a bit like an Imperial droid from *Star Wars*—is pitched to major research institutes and large drugmakers. It can churn through as many as 60 whole human genomes in a day.

The advances made by BGI and its competitors—above all Illumina, which still controls the majority of the sequencer market—have drastically lowered costs. As of August, according to the NIH, the cost of sequencing a human genome was $942, compared with about $4,000 in 2015, and BGI says its ultimate goal is to get to $100 or less.

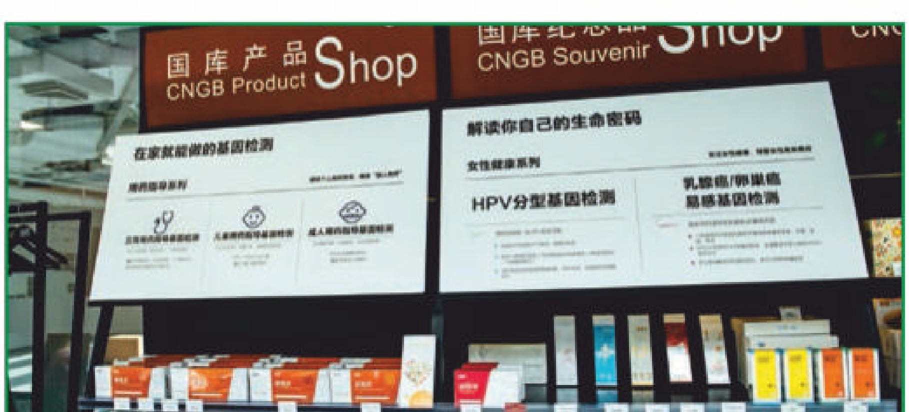
“Everybody needs it, especially newborns, who need a baseline,” Wang says of whole-genome sequencing. That initial assessment can then be followed by “monitoring and testing for the lifetime.” The inherited infant genome doesn’t change, but as people age genetic programming can manifest in unpredictable ways. Subsequent tests could monitor the immune system by examining blood cells to determine which genes are active, or could track whether mutations are occurring more frequently than expected, which might indicate increased cancer risk. In China especially, “most tumor patients come to the hospital in the middle or late stages,” Wang says. With sufficiently early detection, “cancer is going to become a manageable, controllable disease.”

Making genetic tests ubiquitous, starting in China, is a central plank of the strategy. At BGI’s in-house coffee stands, employees can pick up test kits for human papillomavirus, which can cause cervical cancer, as well as for BRCA mutations, which are associated with an elevated risk of breast and ovarian cancer. The company sells tests to the public on Genebook, an online “BGI mall” that offers diagnostics as well as complementary products such as probiotic candies. (BGI doesn’t disclose its sales through such retail channels.) ▶

◀ So far the only people starting to experience Wang's vision are BGI employees. One, Zhu Yanmei, describes having her genome sequenced after she joined the company as head of human resources in 2012. A generally healthy 47-year-old, Zhu was alarmed to learn she might be predisposed to develop Parkinson's disease. It was the kind of genomic knowledge that's at once significant and not especially useful: No drugs can head off Parkinson's, and there's only limited evidence that diet or exercise have a preventive effect. But Zhu figured she had to do something, so she began making small adjustments to her routines. In particular, she started using chopsticks with her left hand instead of her dominant right, a mental challenge that might in some small way help forestall dementia, which is common in Parkinson's patients. If one day a preventive treatment comes along, she'll know to take it and to monitor the scientific literature for relevant research.

Not everyone wants this kind of foreknowledge, but Zhu says she's confident that as sequencing becomes more accepted, most people will. "The next step," she says, "is from million scale to billion scale"—led by China, where things are "top to bottom" with "not so many discussions." She laughs. "One of our dreams is that everyone has an ID card with their genome," informing both medical and nonmedical choices throughout a lifetime.

To that end, BGI has proposed a plan to sequence the genome of every baby born in Shenzhen, a city of more than 10 million. Doing this could provide valuable data, both for individual health management and large-scale study. But it would also raise serious privacy concerns. Asked whether the state would have access to individuals' genomes, Wang demurs, arguing it's not obvious what Chinese officials would gain from them—after all, they have plenty of tools to track citizens already. "Right now the Chinese government is not seriously thinking about these kinds of things," he says. "It's a little too early." Current evidence suggests otherwise. Human Rights Watch and other groups have criticized China for systematically collecting genetic information from members of the Uighur minority without proper consent, and the national DNA database for law enforcement is the world's largest. (BGI says it has strict procedures to protect patients' privacy and adheres to international ethical standards.)



DNA tests available to employees

Wang is accustomed to controversy. Last year he attracted a flurry of attention for saying it would be a "disgrace" for any of his employees to have a child with a birth defect, which would indicate a failure to use BGI's prenatal tests to rule out problems—or to act accordingly.

In the interview, he argues for similar vigilance on a national scale. "China has 85 million disabled [people], and 70 to 80% of these disabilities are from birth defects," he says. "We can really prevent this. We can do premarriage testing"—to flag relationships in which partners carry a worrisome combination of genes—"and prepregnant, prenatal." He acknowledges that such ideas might sound alarming but predicts that, given the option, most potential parents will vote with their feet, so to speak: "People make their own choice." Wang argues that perceptions Chinese scientists are too aggressive stem in large part from envy and echo criticisms directed at rising powers throughout history. "When people grow up and get big muscles, the older brother's not happy with that," he says. "After World War II, European people looked at the Americans and said the same thing—'You cowboys.'"

There are limits to what Wang says he's prepared to contemplate. The company, he points out, is no longer studying the genetic origins of intelligence. But he suggests that, if researchers are able to truly identify genes that produce smarts, a *Gattaca*-esque push for designer babies is probably inevitable, especially in ultracompetitive China, where there's already a robust market for genetic tests that supposedly gauge innate talent for math or music. BGI has no plans to help parents customize their offspring, but "there's lots of people who want to do it," Wang says. "People never stop searching for interesting things." Unless, that is, someone stops them.

Last November, as thousands of scientists arrived in Hong Kong for a conference on gene editing, a Chinese doctor named He Jiankui made a stunning announcement. Weeks before, He said, the world's first genetically engineered babies had been born on the mainland. Working in secret, he'd used CRISPR, the powerful gene-editing tool, to alter the DNA of two twin girls, Lulu and Nana, to make them more resistant to HIV. Even more alarmingly, he'd done so via germline editing, a technique enabling the trait to be passed on to future generations, with unpredictable effects.

The reaction among Western scientists was predictably furious, and it soon became apparent that many Chinese scientists were just as angry. The country's main genetics and cell biology bodies issued swift denunciations, and 122 researchers signed a joint statement that called He's project "madness," complaining it had "delivered a blow to the reputation and development of Chinese biological research." BGI was among the organizations that condemned He's work, which had no connection to the company.

A meeting room at the CNGB

The episode nevertheless illustrated how far China has to go before Western doctors and regulators will be comfortable giving even its most sophisticated corporations a central role in patient care. No country has a solid sense of how to regulate genomics, but in China, "it's the wild, wild, wild West," says Robert Green, a geneticist at Harvard Medical School who researches consumer genetic testing. Even the kind of straightforward diagnostics that underpin much of BGI's current business present thorny questions. China has no equivalent to the 2008 Genetic Information Nondiscrimination Act, the U.S. law that bars insurers and employers from using DNA to make coverage or hiring decisions. And the scientific press is full of examples of eyebrow-raising research conducted at Chinese institutions, such as using CRISPR to breed ultramuscular beagles and giving macaques extra copies of a human gene that may promote intelligence. (No *Planet of the Apes*-style uprising has yet been reported, but it's early days.)

Green points out, too, that sequencing genomic data is one thing; drawing inferences about individuals from the results opens up another host of potential ethical issues. Companies might, for example, promote unproven claims about customers' genetic makeup so they can sell them products or treatments. "We're struggling with these issues in the U.S., and we haven't claimed to have got it right, but you get the feeling that in China many of the companies are just blowing past," Green says.

China's leaders appear concerned that their country not be regarded as a genetic free-for-all. Although the government was initially slow to react to the Lulu and Nana revelation, it came down hard once the depth of international fury was clear, shutting down He's lab and declaring that it wouldn't tolerate similar experiments. (Ominously, he hasn't been seen in public since.) Earlier this year the National Health Commission published draft regulations that would require researchers to receive central government approval to edit embryos or any cells that will be implanted in humans, with fines and criminal charges threatened for those who break the rules. Articles on gene editing in the heavily controlled media also frequently warn of its dangers, sometimes with reference to dystopian movies such as *Resident Evil*. With a vast architecture of surveillance and few checks on government power, Harvard's Church says, "I don't think the guardrails are less in China, I think they're more."

BGI's public commitments on editing are fairly anodyne; in the wake of the He controversy, it issued a proposal calling for researchers to "strictly obey the laws, regulations and policies governing life science" and "strengthen ethical awareness." Wang insists the company has no interest in experimentation that could bring it comparable opprobrium. "We can do pigs, we can do dogs, we can do monkeys," he says of BGI's gene-editing efforts. "There's no reason for us to do humans." He adds: "Do you want to use that technology to be the first one and make yourself the common enemy of society? We're not that dumb."

The genomics revolution Wang says is at hand will raise a series of difficult questions about ethics, privacy, regulation, and where the boundaries of science should fall. But in his telling, all that will really matter is outcomes—whatever the moral complexities, we'll be healthier with genomics than without it. And Wang intends for his outcomes to be excellent. In the meeting room where he receives visitors, he keeps a little Lucite block, encasing a 3D image of himself as a young man. Etched into the surface, right above the Chinese characters for his name, is a pair of numbers that capture his aspirations: "1954-2074." Ⓑ

Handmade For the Holidays

Because whether it's jewelry, gadgets, food, or a game, nothing says luxury like a gift that's been crafted with a master's touch

Photographs by Zhongjia Sun

500-piece marquetry poker set ↘

PROP STYLIST: ALEX BRANNIAN

November 18, 2019

Edited by James Gaddy

Businessweek.com

The Pick of the Critter

Jewelry designer Janie Kruse Garnett got an idea for a better lobster fork last summer at a wedding in (where else?) Maine. She works by hand in the “lost wax” method of casting, an ancient technique that allows for a high level of intricacy. “Also,” she says, “I’m overbearing and like to be in charge of the process from start to finish.” She designs these tiny sterling silver picks in her New York living room and includes carefully considered details such as the scalloped clamshell—perfect for resting your thumb—and the sharp barb at the end, which is crucial for pulling meat from a tight shell. Even the dimpled texture exists for a reason: so the fork doesn’t get slippery when doused in butter. *$225; 914 413-8867*

PREVIOUS PAGE
High rollers, look sharp: Alexandra Llewellyn, a London-based artist who makes tabletop games using the centuries-old method of marquetry, has created a poker set comprising more than 1,000 slivers of hand-cut sycamore, walnut, birch, and bog oak. She dips the pieces in a tray of hot sand, a process called “sand shading,” to give each a subtle tonal quality. The skull on the lid is a popular request, and it comes with one gold tooth, which is where she carves the edition number. Only 15 have been made. *£12,500 ($16,027); 212 226-7378*

Each lobster fork is approximately 3.5 inches long and comes with a tiny barbed hook at the tip

HOW (ELSE) TO USE IT

“The most straightforward uses of a pick are for lobsters, shrimp, oysters, and clams, but it can also make a cool accessory for holiday cocktails,” suggests chef and *Chopped* judge Alex Guarnaschelli. “Spear cherries for a Manhattan or lime wedges for a margarita. Try a few apple wedges dropped into a mug of warm, mulled cider. You could even serve a brownie or cake tidbit on the edge of an espresso cup or Irish coffee.”

Heavy Duty Hi-Fi

Other than in the motor and the needle cartridge, everything in this Recosonne record player is engineered from scratch and built by hand in the Philadelphia studio of BDDW's Tyler Hays. He first designed it, in an edition of 18, to use in the all-vinyl radio station that he runs out of his M. Crow shops in Milan and Lostine, Ore. Marble is used for the platter, and the housing is aircraft-grade wood that's brush-painted with a slow-drying oil, which gives it a slightly more imperfect finish than the typical spray-on paint. The tone arm can come in yew, holly, or yellow cedar, and the entire machine is damped with down feathers, tar, sand, and rubber. Hays is working on a second limited edition of the model.
From $22,000; 212 625-1230

72

pounds is what this turntable clocks on the scale, thanks to the marble disc

A Drop Of Perfume

On Dec. 1, Régime des Fleurs will re-release its original scent, Nymphaea Caerulea, after being sold out for three years. Founder Alia Raza sources ingredients from all over the world for her one-of-a-kind fragrances; for this one she blends 80 of them by hand. The main component comes from blue water lily, also known as blue lotus, a rare flower considered sacred by ancient Egyptians. "It's like wine," Raza says. "You don't get the best thing every year. All the conditions have to conspire to smell perfect." The bottles are hand-painted in her Los Angeles studio; the iridescent turquoise is meant to evoke mermaid skin. Use sparingly: The bottle, containing a mere 0.25 fluid ounces, or 8 milliliters, is no taller than a paper clip. *$715; regimedefleurs.com*

2

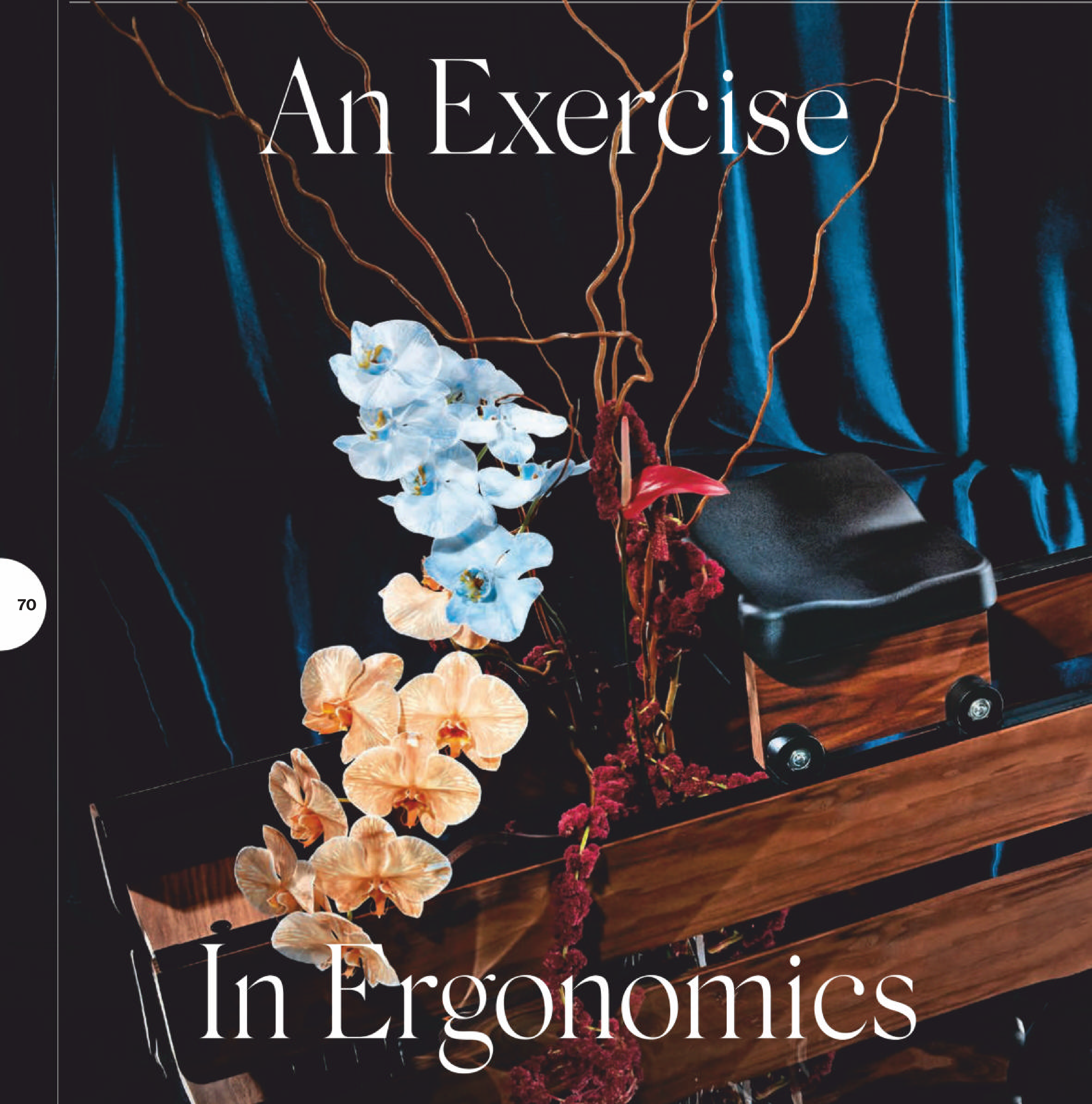
inches is the height of this diminutive perfume bottle

HOW TO MIX IT: AYUUK & GINGER

Pour two parts Ayuuk in a glass over ice cubes cut large (to delay dilution). Top up with three parts ginger ale, and stir to combine. Add a squeeze of lemon juice and a pinch of flaky sea salt. Finish with a cucumber ribbon.

A Glass of Something Spicy

Since 1586, Saint-Louis glass has been handmade in French workshops, where a team of 15 workers takes 10 days to shape just one Tommy cocktail glass (left). This year the brand introduced the St. Regis Midnight Supper set, which combines a few classic designs in a mismatched group including the Tommy, the Bubbles footed glass (center), and the Excess Champagne flute (right). Gift them alongside a handcrafted alcohol from Empirical Spirits, the distillery co-founded by Lars Williams, a former head of research and development for Noma. Its newest release, Ayuuk, is made from a purple wheat base with distilled *pasilla* chiles from Oaxaca that give it a smoky hit not unlike mezcal. *$2,300 (glasses); 212 752-8800. $85 (spirit); us.empiricalspirits.co*



An Exercise In Ergonomics

Blame CrossFit. Or *House of Cards*. But rowing, once largely reserved for crew teams at fusty northeastern colleges, has become a mainstay of fitness regimens, used by a half-million people for workouts every day. Whereas most exercise equipment has an industrial, plastic-and-metal aesthetic, WaterRower Inc. makes the frames of its machines from Appalachian hardwoods. All the smoothing, drilling, fitting, sanding, and staining is done by hand in Warren, R.I. The only machine-made parts are the polycarbonate water tank and the flywheel inside, which creates a soothing *whoosh* of resistance instead of the usual fan. Rowing has been proven as one of the best ways to burn a ton of calories, and like cycling, it's low-impact, so there's less wear and tear on the body. "It's one of the big three in terms of the best workouts," says David Jones, director of sales and marketing at WaterRower. "One is swimming, the other is cross-country skiing, and both are tough to do in your home." *$1,495; 800 852-2210*

> “You can do this exercise five times a week for the next decade and not destroy your body”
>
> —TOM AULET, CEO OF ERGATTA, A SCREEN INTERFACE LAUNCHING THIS MONTH THAT ALLOWS YOU TO COMPETE WITH OTHER ROWERS

HOW TO WORK IT

About 85% of the body’s muscles are activated on every stroke, according to Annie Mulgrew, vice president and founding instructor of Cityrow. Here are the three positions to know.

CATCH The starting position. Knees should be bent, arms fully extended, and torso at one o’clock.

DRIVE Where power comes from. Push out through the legs, lean back to 11 o’clock, and pull the handlebar to the chest.

RECOVERY Return to the starting position by reversing the order of the stroke—first arms, then back, then legs.

HOW TO GIFT IT

Rüdiger Alber of Wempe jewelers has been buying his wife baubles every year for 30 years. Here's how to find the perfect piece for someone else:

DO A DATE "There's nothing wrong with shopping together. Have some Champagne and get treated and forget about the world. The shopping itself can be an experience."

BE CURIOUS "Observe the lucky person. Is it something to wear on a daily basis or a special occasion? It's not about how much you spent but how much you thought about it."

30–LOVE "Tennis bracelets continue to be big. You never have to take it off, it fits instantly, you can wear it for years and years, and it goes with everything."

AND IF IT ALL GOES HORRIBLY WRONG ... "You want to go with a store that's reputable, so if you don't get it right, it shouldn't be a hassle to exchange it."

A Ring With Wings

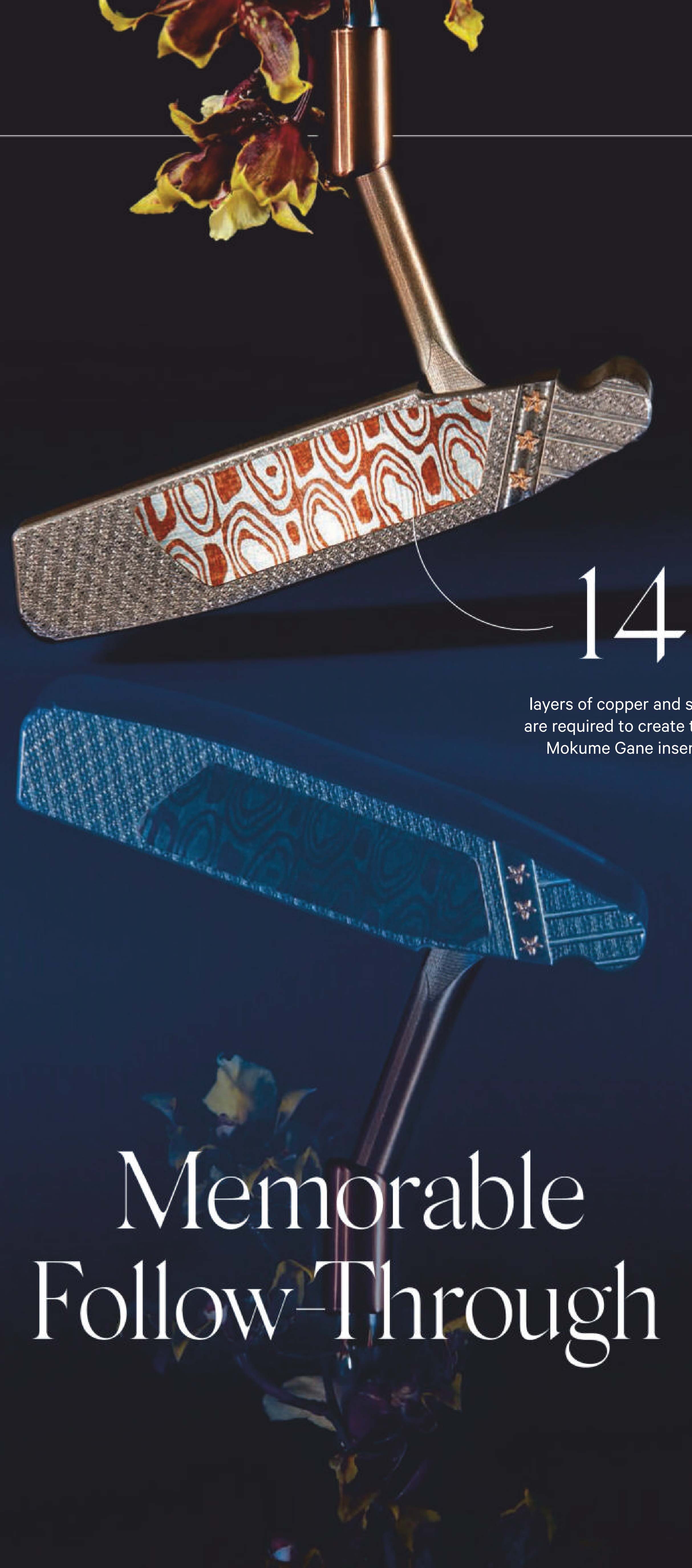
Sevan Bicakci makes every piece of jewelry by hand in his Istanbul studio, which is recognizable only by a drawing of a dagger above the door. (His last name means "swordsman"; his great-great-grandfather was a swordmaker in the Topkapi Palace.) Today he turns his blade on jewels, carving their undersides into designs that can be seen through the faceted front, a process called reverse intaglio carving. The resulting images—often birds or fantastical buildings—are painted within the cavity. In some rings he also adds diamonds to the face of the carved gem, and these are his hardest projects. Bicakci estimates he cracks about eight pieces for every one he finishes. In December he'll showcase his first such "solitaire" collection, including this ring, in which he's carved seagulls in flight out of an oval topaz painted blue. It features 2.49 carats of diamonds, including the 1.19-carat oval on top. *$49,770; 786 409-7156*

50

percent butter and sugar by weight

Sugar, Butter, Flour, and More Butter

Popping up in trendy bakeries around the world, the sugary butter bomb *kouign amann* is as hard to ignore as it is to pronounce. (For the record, it's "queen oh-MAHN"; in France's Brittany region, where the dessert was born, it translates as "butter cake.") The best way to describe it is as a croissant gone wild, with layers of caramelized sugar baked into a dough folded over and over. At first it crunches when you bite, then it melts in your mouth. They're usually about the size of a muffin, but at Manresa Bread in Los Gatos, Calif., head baker Avery Ruzicka specializes in plate-size versions that are 8 inches in diameter. She now mails her concoctions throughout the continental U.S., but you'll need to plan ahead: The pastries are baked every Tuesday morning for shipment that afternoon, so time your orders accordingly. *From $60; manresabread.com*



Memorable Follow-Through

In golf, drivers and irons tend to have set rules and principles of physics. A putter, on the other hand, is a more personal affair because less of a swing is involved. “It’s a category that leads to a higher preference ratio,” says Bruce Sizemore, the longtime club designer who founded More Golf in 2018. “It’s more of a love-hate relationship.” This winter he’s releasing a line of putters called the Detroit Collection. Their heads are all hand-forged in the Motor City, but the real showstopper is the insert fabricated using the Japanese method of Mokume Gane, in which sheets of copper and silver are heated to form a single layer of material. It’s not necessarily functional: The procedure was originally used to create showoffy hilts for samurai swords—the more ornamentation, the more gifted its owner. Each pattern is unique, creating a kind of “thumbprint.” After a consultation to choose among a darker bronze or gray or purple patina, the putters take about a week to arrive. Only 99 will be made. *$2,500; 800 618-1696*

14

layers of copper and silver are required to create these Mokume Gane inserts

Sole Support

An hour and 15 minutes from Guatemala City is Pastores, a semi-rural town where the formal employment (not unemployment) rate is 7%. Not for lack of know-how: The city is home to more than 1,000 trained shoemakers; they just don't have access to international markets. Boston-based Adelante Shoe Co., founded by Peter Sacco as a graduate student at Tufts University, employs more than 40 craftsmen in Pastores who make loafers, oxfords, and boots such as the Havana (here in denim blue). They are delivered within 10 business days of ordering and can be personalized with stylistic changes like different soles and lace colors. The workers, who are paid a living wage 75% above market for Pastores, are even introduced to their customers via a video that's sent with the purchase. A women's line also includes sandals and booties. *$255; adelanteshoes.com*

"We build relationships in a way that no standard off-the-rack shoe can really do"

—PETER SACCO, CEO OF ADELANTE

The Madoff Clawback Saga Is Almost Over

By Joe Nocera

ILLUSTRATION BY GEORGE WYLESOL

HSBC Holdings Plc, et al., Petitioners v. Irving H. Picard

Case #19-277

● This has already been a big year for Picard: In July he reached a settlement with a couple of funds based in the British Virgin Islands to return $860 million of the $926.4 million they'd invested with Madoff. One of the funds, Kingate Management Ltd., later filed for bankruptcy to protect its ability to pay.

● An excellent way to get rich is to become a bankruptcy lawyer. As of September, the lawyers, trustees, and consultants (but mostly the lawyers) working on behalf of the Madoff victims have brought in almost $1.8 billion in fees. That's almost $164 million per year since the clawback process began more than a decade ago.

❶ THE ORIGIN Remember when Bernard Madoff acknowledged operating the biggest Ponzi scheme ever, bilking investors out of $17.5 billion? That was 11 years ago. Since then, Irving Picard, the trustee in the Madoff bankruptcy, has filed hundreds of lawsuits to recover money for Madoff victims. He's clawed back $14.2 billion so far. But there's one bucket of money he hasn't been able to get at: about $3.2 billion held by foreign banks.

❷ THE HEARING In 2012 dozens of these offshore institutions argued before U.S. District Judge Jed Rakoff that Picard had no business going after their money. Yes, the money had been transferred from feeder funds—investment vehicles run by Madoff's friends and enablers that kept the money flowing into the scam. But that didn't matter, they argued, because the section of the U.S. Bankruptcy Code that dealt with voiding transfers didn't apply to transactions between foreign entities. In 2014, Rakoff ruled in their favor.

❸ THE APPEAL You know how they say the wheels of justice turn slowly? Has that ever been true in the Madoff bankruptcy! In February, seven years after that 2012 hearing, the U.S. Court of Appeals for the Second Circuit finally overturned Rakoff. The three-judge panel concluded that what mattered was that the original transfer, from Madoff to the feeder funds, originated in the U.S. If the subsequent transfer to the foreign banks couldn't be clawed back, they wrote in their decision, it would essentially make fraudulent transfers legal.

❹ THE FINALE No surprise here: The banks appealed to the Supreme Court. A few weeks ago, Picard asked the court to reject their appeal. The court is expected to decide whether to take the case in early December. Whatever it decides, this will be the last big case for Picard—at least as far as the Madoff victims are concerned. In most Ponzi schemes, the trustee recovers 5% to 30% of the lost funds. Picard has recovered more than 80% so far; if the courts let him claw back the $3.2 billion from the foreign banks, he'll be close to 100%. Ⓑ —*Nocera is a business columnist for Bloomberg Opinion*

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