- New trade war, new weapons 16
- Robert Mercer's side gig 62
- More Facebook shadiness 56

Bloomberg Businessweek

April 2, 2018 ● SPECIAL DOUBLE ISSUE

Volkswagen's Great Escape

How the world's largest automaker survived Dieselgate 50


79%
13:36

BEST SEAT IN THE HOUSE

NEC's facial recognition technology creates seamless customer experiences

Parking hassles, ticket problems, security bottlenecks, concession stand gridlock, merchandise store lines—it's hardly surprising that, for many fans, seeing their team lose is often not the biggest frustration of a night at the stadium.

The solution to these familiar stresses—creating a fan experience that balances efficiency with security—is staring right at us: facial recognition technology.

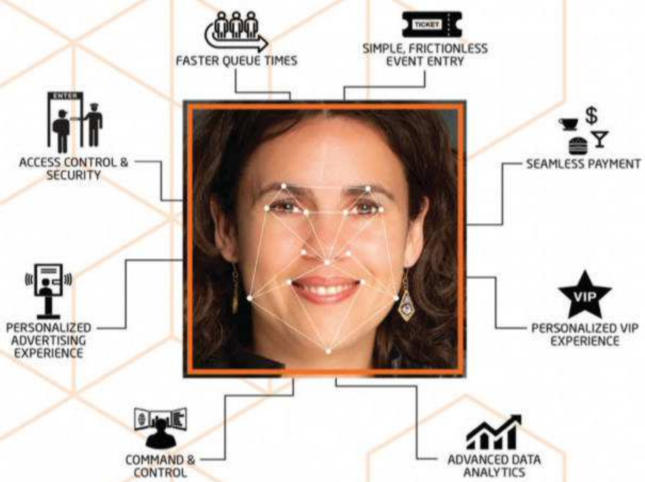
"Your face is a unified key as you move through the stadium environment, creating a frictionless, contactless experience," says Allen Ganz, Director of Advanced Recognition Solutions at NEC of America. "That can include everything from dropping off your car at the garage, entering the stadium, going to a concession to make a purchase, entering the suite—all using your face." From the venue side, facial recognition platforms can provide concierge alerts, enhance guest services protocols, provide crowd density estimates to allocate staff more effectively, and offer sales and service a way to put a "face to a name" when reaching out in-venue to guests.

This frictionless experience allows fans to leave behind parking permits, paper tickets, phone apps, passwords, credit cards, cash and queues. Those are reasons enough to smile for the scanner. Beyond consumer experience, facial recognition technology will have a revolutionary impact for both venues and sponsors.

"Facility managers don't really know who is in the building," says Lisa Johnson, who handles NEC's business development for sports and stadiums. "They know who owns the ticket and the ticketing system shows where the ticket was forwarded. But nobody knows enough about this new person coming to the game and how to convert them to a ticket buyer."

Having real-time demographic data about who is actually in a stadium can shape a host of resource decisions. Johnson offers one scenario: Just before a game, data reveals a much higher percentage of women in the audience than anticipated. "What do you change as a result of having that information in real time?" she asks. "You might change displays in the team store. You might change the music choice. You might put more wine in the cooler. You can react to actually meet the needs of the consumers that are in your building at that time."

Learn more: > www.bloomberg.com/ad/nec/fr



Facial recognition technology not only allows stadiums to better serve and target fans, it also significantly increases the number of transactions that can be processed within the finite duration of an event. And, as Ganz points out, more accurate audience data can drive a more deft marketing strategy as this technology can predict the age of each guest.

"Let's say they run a campaign targeting men in their mid-20s," he explains. "Are they seeing an uptick of men in their mid-20s coming into the stadium? It provides insight into the actual demographics that are coming in, but also into how effective campaigns have been in influencing that demographic."

For sponsors, this is a clear benefit as they can appropriately curate ads or streaming content to build a deeper connection with fans. "When you remove the need for a ticket or credit card to be held on a device, that screen is completely freed up as another platform to reach the audience."

Stadiums are not the only facilities being transformed into more efficient and secure worlds by NEC's facial recognition technology, which is the world's best in search speed and accuracy, according to the National Institute of Standards and Technology. At theme parks, it helps move season pass holders swiftly through the turnstiles. In the United States, it is being tested to permit passengers to board flights and access airline lounges.

"We've thought through how it could be deployed and integrated into existing systems that the stadium, airport or theme park are utilizing. We've built our systems with the capability to be integrated and deployed in a very scalable manner," Ganz says.

But will consumers readily embrace this new future? Ganz believes so.

"We've seen a paradigm shift largely driven by the use of biometric technologies on consumer devices," he says. "In the physical environment in which people operate, whether they're going to an airport, entering a theme park or going to a stadium, they're really looking for that same frictionless experience."

After experiencing the ease of using facial recognition and fingerprint biometrics on their smartphones, consumers are increasingly demanding the same convenience in every aspect of their lives.

"The more that you can eliminate passwords and the face becomes that universal key to replace username, passcodes and payment options—fans no longer have the pain point of remembering where their ticket is saved, what passcode they used for the team or venue app, or even memorizing their loyalty program number," Johnson says. "As long as the value proposition of biometrics is a superior fan experience for the guest regardless of ticket prices or team performance, then it will be worthwhile for fans to adopt that technology."

Whether at a stadium or a major transport hub, NEC's facial recognition is at the forefront of reinventing the customer journey, forging an optimal route between convenience and security. These industry-leading innovations ensure that you're more likely to remember the passion of the game than the pain of getting there.

Facial Recognition a Sure Bet for Casino Security

Merit Lefkoşa Casino strives to create a safe gaming environment for its customers, a commitment that requires staff to consistently refuse entry to blacklisted individuals and monitor the premises for suspicious activity.

Based out of Northern Cyprus, the casino integrated NEC's facial recognition solution into its surveillance system to enhance and speed security checks with the broader goal of improving the overall customer experience. The solution enabled security personnel to, for the first time, screen and track persons of interest in real time, no matter what quality of video.

In the process, Merit Lefkoşa Casino recorded significant improvements in productivity that ultimately led to a reduction in manpower and an increase in income.

\Orchestrating a brighter world NEC

Creating New Miracles in Asia

Ahead of the Boao Forum for Asia (BFA) Annual Conference, to be held on April 8–11, *Beijing Review* interviewed **Zhou Wenzhong**, Secretary General of the BFA, about his views on Asian development and the world's prosperity.

Founded in 2001, the BFA is a nongovernmental, nonprofit international organization committed to promoting regional economic integration. Its annual conferences take place in the resort town of Boao, in south China's Hainan Province.

***Beijing Review*: The theme of the 2018 BFA Annual Conference is An Open and Innovative Asia for a World of Greater Prosperity. How was this theme formulated? What is the BFA expecting to achieve at this year's conference?**

Zhou Wenzhong: In May 2017, the BFA started to solicit advice from its 29 founding countries, its board of directors, council of advisors, members, partners, think tanks and media on the theme of the annual conference and topics of discussion. We also held three seminars and a special meeting of the board of directors to discuss the theme.

During the process of consultation, we had a common understanding that—given the fact that anti-globalization sentiment and trade and investment protectionism are on the rise, and that globalization is partially facing setbacks—Asia, as well as the whole world, needs to be more open and connected than ever before, rather than being isolated and closed. The world needs to be more inclusive and balanced, rather than being divided between the rich and poor.

Currently, world economic growth is still fragile; there are many uncertainties and complicated situations in the world economy. Asia and the world need to change their ideas of development to economic growth driven by innovation instead of simply by factor input. Under the current situation, peace and development remain the call of our day. It should be the common mission of Asia and all the countries of the world to build a community with a shared future for mankind, and to advance the common development and prosperity of the world.

To push forward Asia's adaptation to the new situation, the BFA invited officials, industry and business professionals and academics from around the world, especially from the Asia-Pacific region, to gather at this year's annual conference to review the past and discuss prospects for openness and innovation in Asia. The discussions at sub-forums will focus on a variety of aspects, including sustainable development, macroeconomic policy, corporate responsibilities, social and cultural advancement, scientific and technological innovation, promotion of the Belt and Road Initiative and the strengthening of regional cooperation. We hope that the 2018 conference will become a multilateral event of exchanges that will build greater consensus within Asia, let its voice be better heard and boost internal cooperation in the region and collaboration between Asia and the rest of the world.

How would you evaluate the development of Asia?

In the past decades, Asia has played an increasingly important role in world economic development and has created "Asian miracles" one after another. It has not only transformed itself following a long period of poverty and underdevelopment, but has also injected energy into the world economy.

However, the 2008 global financial crisis gave a heavy blow to Asia's economy, posing an unprecedented challenge to the economic growth of the continent. On the one hand, the previous development mode could hardly continue, while on the other, a new way of development that fits the new situation has not yet been found. At the same time, a technological revolution led by mobile internet and artificial intelligence has been booming and gaining momentum, changing conventional ways of production, living, economic operation and even global governance.

Against such a backdrop, with so many changing factors overlapping, it is impossible for Asia to continue its success in the traditional way. To sustain prosperity in the post-financial crisis period, Asia needs a new round of opening up and innovation. Asian economies need to strengthen bilateral and multilateral cooperation and promote regional and sub-regional trade and investment liberalization. Asia needs to create an environment with a fully open market that is suitable for sustainable economic development.

With a new round of technological innovation, Asia needs to boost innovation in basic scientific research and applied technology. Meanwhile, Asian economies need to adjust development thinking and explore innovative ways of implementing institutional, business-model and structural reforms. In this way, they can deepen structural adjustment while maintaining stable growth; resolve the structural problems that restrict the sustainable development of the continent; and ultimately realize innovative, coordinated, green and open development for everyone.

How would you rate Asia's status in global economic development?

The growth of Asia has been higher than the average growth of the world economy in the past decades. Currently, Asia's economic aggregate accounts for more than 33 percent of the world's total, ex-

XINHUA

Zhou Wenzhong, Secretary General of the Boao Forum for Asia (BFA), speaks at a press briefing on the 2018 BFA Annual Conference in Beijing on Jan. 25.

ceeding North America's 28 percent and Europe's 22 percent. In particular, in the process of globalization, Asia has become the largest market of trade in goods and services and an important source and destination for foreign direct investment [FDI], thus making it the region with the most emerging economies since the start of the 21st century.

The rapid development of Asia's economy has benefited from two elements: the openness and innovation of Asia, and the lasting wave of globalization.

While following the trend of globalization and regional integration, Asian economies have become more and more mutually dependent, with trade volume between them far exceeding the total volume between Asia and external economies. The phenomenon is more prominent in East Asia, where before the 1980s, the trade volume between East Asia and North America was much higher than that within the region itself, which is no longer the case. Now, the trade volume within the region has exceeded the region's trade volume with North America and the euro-zone combined.

At the same time, Asian economies have not confined themselves to the region, but have been active in pursuing economic integration with other areas of the world. The increasingly close interdependence among economies in Asia and the closer connection between Asia and the rest of the world show that Asia cannot realize prosperity and development all by itself.

The wider and deeper openness and innovation in Asia are based on the foundation that interdependence within Asia has been unprecedentedly high, which means Asian economies must cooperate in order to realize their common goals. Because of the diversity in the history, culture, religions, politics and economic development levels of Asian economies, Asia does not have a continent-wide organization, which is different from other continents such as the Americas, Africa and Europe. But given the deepening regional economic integration, Asian economies have become close partners, creating a good environment for them to further strengthen regional cooperation through policy and mechanism connectivity.

Although the anti-globalization trend has been on the rise in recent years, globalization is irreversible. Asian economies must further embrace the global tide of opening up and innovation and try to lead the current. Technological advancement, which is the major driving force for the development of productivity, will result in innovation in a wide range of areas including institutions, policies and business models. Such innovation will go beyond the limits of national boundaries and will need to be carried out through coordination and cooperation among different countries and regions. We have reasons to believe that Asia, led by a new round of opening up and innovation, will become the most important source of dynamism for the world's economic prosperity.

This year is the fifth anniversary of the Belt and Road Initiative. What kind of role will it play in promoting regional cooperation in Asia?

The Belt and Road Initiative, proposed by Chinese President Xi Jinping, is based on the principle of achieving shared growth through discussion and collaboration. It provides a convenient and wide cooperation platform for opening up and innovation in the new era. It includes not only construction of "hardware" such as infrastructure and industrial parks, but also development of "software" such as institutional arrangements and mechanisms.

The Belt and Road Initiative is aimed at promoting policy coordination, infrastructure connectivity, unimpeded trade, financial integration and mutual understanding among people in countries along and beyond the ancient Silk Road routes. It could be a solution to realizing sustainable prosperity for the entire world economy.

Thus, themes such as the Belt and Road Initiative, openness, innovation and cooperation will become the keywords for many of the activities at the 2018 BFA Annual Conference. ■

Scan QR code to visit *Beijing Review*'s website
Comments to yanwei@bjreview.com

PHOTOGAPH: BEGO ANTON FOR BLOOMBERG BUINESSWEEK

▲ Madrid's Factum Arte provides the tools, technology, and staff for artists to realize their visions

■ IN BRIEF

■ REMARKS

■ VIEW

1 BUSINESS

2 TECHNOLOGY

3 FINANCE

4 ECONOMICS

5 POLITICS

FEATURES

PURSUITS

How to Contact *Bloomberg Businessweek*

Editorial
212 617-8120
Ad Sales
212 617-2900
731 Lexington Ave.,
New York, NY 10022
Email
bwreader
@bloomberg.net
Fax
212 617-9065
Subscription Customer Service URL
businessweekmag
.com/service
Reprints/Permissions
800 290-5460 x100
or email
businessweekreprints
@theygsgroup.com

Letters to the Editor can be sent by email, fax, or regular mail. They should include the sender's address, phone number(s), and email address if available. Connections with the subject of the letter should be disclosed. We reserve the right to edit for sense, style, and space.

Follow us on social media

Facebook
facebook.com/
bloomberg
businessweek/
Twitter
@BW
Instagram
@bloomberg
businessweek

Cover: Photo illustration by Justin Metz; photo: Alamy

PHOTOGRAPHS: FACEBOOK: ANGIE SMITH FOR BLOOMBERG BUSINESSWEEK. WATCH: DANNY KIM FOR BLOOMBERG BUSINESSWEEK. JINPING: LUONG THAI LINH/AFP/GETTY IMAGES. MAY: JACK TAYLOR/GETTY IMAGES. MUELLER: SEAN GALLUP/GETTY IMAGES. WOODS: STAN BADZ/PGA TOUR

Bloomberg Businessweek (USPS 080 900) April 2, 2018 (ISSN 0007-7135) H Issue no. 4564 Published weekly, except one week in January, February, April, June, July, September, and December, by Bloomberg L.P. Periodicals postage paid at New York, N.Y., and at additional mailing offices. Executive, Editorial, Circulation, and Advertising Offices: Bloomberg Businessweek, 731 Lexington Avenue, New York, NY 10022. POSTMASTER: Send address changes to Bloomberg Businessweek, P.O. Box 37528, Boone, IA 50037-0528. Canada Post Publication Mail Agreement Number 41989020. Return undeliverable Canadian addresses to DHL Global Mail, 355 Admiral Blvd., Unit4, Mississauga, ON L5T 2N1. E-mail: bwkcustserv@cdsfulfillment.com. QST#1008327064. Registered for GST as Bloomberg L.P. GST #12829 9898 RT0001.

Single Copy Sales: Call 800 298-9867 or e-mail: busweek@nrmsinc.com. Educational Permissions: Copyright Clearance Center at info@copyright.com. Printed in the U.S.A. CPPAP NUMBER 0414N68830

WORLD MEDIA
AWARDS 2018

MEET THE WINNERS OF THE WORLD MEDIA AWARDS 2018

The 2018 World Media Awards celebrate the most effective multi-platform, cross-border, content-driven advertising. To see more details of the winning campaigns, go to www.wm-awards.com/2018winners

WORLD MEDIA AWARD GRAND PRIX	Shell	SHELL BRAND GRAVITY LIGHT & BEDTIME STORIES Entered by MediaCom
WORLD MEDIA AWARD AUTOMOTIVE	PORSCHE	CAYMAN VS DRONES Entered by: PHD Germany Credits: Fuse/Omnicom Media Group, Google
WORLD MEDIA AWARD BRAND & MEDIA OWNER PARTNERSHIP	Barilla Center FOR FOOD & NUTRITION	FOOD SUSTAINABILITY INDEX Entered by: The Economist Group
WORLD MEDIA AWARD CORPORATE INFLUENCER	Shell	SHELL BRAND GRAVITY LIGHT & BEDTIME STORIES Entered by: MediaCom
WORLD MEDIA AWARD FINANCIAL SERVICES	UBS	IMPACT INVESTING & INNOVATIVE CHINA Entered by: Spark Foundry Credits: Wall Street Journal, CNBC, Mashable
WORLD MEDIA AWARD LUXURY, LIFESTYLE & FASHION	Hennessy	A NEW PERSPECTIVE OF THE SILK ROAD Entered by: KR Media France (GroupM) Credits: National Geographic
WORLD MEDIA AWARD MEDIA & ENTERTAINMENT	WARNER BROS. PICTURES	WONDER WOMAN PROJECT Entered by: MediaCom Credits: Discovery Networks, Latin America
WORLD MEDIA AWARD TECHNOLOGY & TELECOMS	e.on	TOMORROW IS .ON Entered by: Vizeum Credits: Engine
WORLD MEDIA AWARD TRAVEL& TOURISM	ATLANTIC AIRWAYS / the Faroe Islands	FAROE ISLANDS TRANSLATE Entered by: Sansir & Mensch Credits: Kovboyfilm, Travel PR

20th anniversary

World Media Group wmg

world-media-group.com

Bloomberg Media Group · The Economist · Forbes · FORTUNE · NATIONAL GEOGRAPHIC

The New York Times · TIME · THE WALL STREET JOURNAL. · The Washington Post

ASSOCIATE MEMBERS

REZONENCE

Smartology

Sounding the Alarm for Fire Safety

The Red Cross has installed 1.1 million free smoke alarms across the U.S.—and it's only getting started

The American Red Cross works with the Arlington County Fire Department to distribute free smoke alarms and fire education to area residents.

By the time she realized her apartment building was on fire, Fatrika Coleman says the flames had raced up two floors and spread to the roof. "I was in the kitchen, cooking," she recalls, "and I kept hearing a knocking sound. Then I saw smoke and the flicker of a flame." When she stepped into the bedroom, her balcony was engulfed.

Coleman grabbed her purse and ran. Once outside, she says, the scope of the damage became clear. "I realized the fire was a lot bigger than I thought it was."

Devastated while watching her home go up in smoke, Coleman stood there helpless, eager to leave the site of the fire. Then a police officer directed her to the building's rental office. There, she was greeted by a Red Cross volunteer. "She said, 'I need two things from you,'" Coleman recalls. "'I need your name. But first I need a hug.' In that moment, that's what I needed more than anything—a hug."

Coleman's story is shockingly common. "We respond to a home fire every eight minutes," says Gail McGovern, President and CEO of the American Red Cross.

Larger disasters dominate news cycles and social media, says McGovern, but for every massive hurricane or earthquake there are thousands of incidents like Coleman's that turn people's lives upside down—or, too often, end them altogether. "More people die in house fires than from all other disasters combined," says McGovern. "This is really a crisis."

To address this, in 2014 the Red Cross launched its Home Fire Campaign, with the goal of reducing death and injury from home fires by 25 percent. One big way the organization is doing that is through *Sound the Alarm*, its initiative to teach fire safety and install free smoke alarms in homes where they're needed most. "We target communities with lots of kids, lots of elderly, and low-income communities," says McGovern. "Volunteers show up with stepladders and drills, and install them on the spot."

The Home Fire Campaign and *Sound the Alarm* are succeeding, in a huge way. The Red Cross has installed 1.1 million smoke alarms since October 2014, in more than 12,000 communities with the help of thousands of partners. "Our next big move is an initiative that will take place April 28 through May 13," McGovern says. "During those 16 days we'll attempt to install 100,000 smoke alarms in over 100 major cities."

> **"We respond to a home fire every eight minutes."**
>
> – Gail McGovern, President and CEO, American Red Cross

It's crucial work, and it wouldn't be possible without an army of volunteers; the Red Cross will rely on 28,000 of them during its upcoming installation spree. "Volunteering is an incredible way to help," says McGovern—whether it's offering to assist with *Sound the Alarm*, or training to join a Disaster Action Team. "I've heard from so many people that it's transformational. We are so very grateful to the dedicated volunteers and generous donors who empower our lifesaving mission."

After experiencing what the Red Cross does for their disaster survivors, Fatrika Coleman, became a volunteer herself. Today, she is a captain on a Disaster Action Team for the Red Cross. And yes, that means that now she's the one offering hugs in times of crisis. "I know firsthand what that hug means," Coleman says. "It's compassion and understanding. At times, you need all those things." ■

The Red Cross thanks our *Sound the Alarm* Home Fire Campaign Donors

ALMOST family — We make lives better through Home Care

INTERNATIONAL PAPER

DELTA

Learn how you can get involved by visiting **SoundTheAlarm.org**

PHOTOGRAPH BY BY DENNIS DRENNER FOR THE AMERICAN RED CROSS

IN BRIEF

Asia

● India is attempting to sell a controlling stake in its state-run air carrier, along with two-thirds of the airline's

$7.8b

debt. Air India's buyer may be required to pursue a public stock offering, which would provide an opportunity for the government to sell off its interest entirely.

● "There's a lot of work that is still ongoing. The IPO is ongoing."

Saudi Aramco CEO Amin Nasser told Bloomberg the company should be ready for a public listing in the second half of this year. The next day, Saudi Crown Prince Mohammed bin Salman said the offering could be delayed until 2019.

● President Trump signed his first major trade deal, exempting South Korea from his 25 percent tariff on steel in exchange for an overall reduction in steel exports to the U.S., among other things.

● North Korean leader Kim Jong Un embarked on a surprise trip to visit President Xi Jinping in Beijing on March 25, ahead of planned talks with South Korea in April and an expected meeting with the U.S. sometime in May.

● Uber Technologies will swap its Southeast Asian ride-hailing business to rival Grab for a 27.5 percent stake in the combined business.

Americas

● The U.S. Federal Trade Commission confirmed it had opened an investigation into Facebook's privacy practices. At issue is whether the social network violated the terms of a 2011 consent decree in its funneling of user data to Cambridge Analytica without users' knowledge. ▷ 56

● As the gun control debate intensifies, America's oldest gunmaker, Remington Outdoor, filed for bankruptcy.

● Twitter erupted with calls from Brazil to #DeleteNetflix after the March 23 debut of *The Mechanism*, a fictional series based on the Car Wash anticorruption probe. Critics, including former President Dilma Rousseff, accused the story of "distorting reality."

BEIJING: KOREAN CENTRAL NEWS AGENCY/AP PHOTO. BEGOR: MIKE STEWART/AP PHOTO. PUIGDEMONT: FABRICE COFFRINI/AFP/GETTY IMAGES. MANDELA: COURTESY MARSTON WEBB INTERNATIONAL

● A federal appeals court ruled that Google's use of Oracle-owned code in its Android operating system infringed on the latter company's copyright. No award has been set, but Oracle is seeking

$8.8b

in damages.

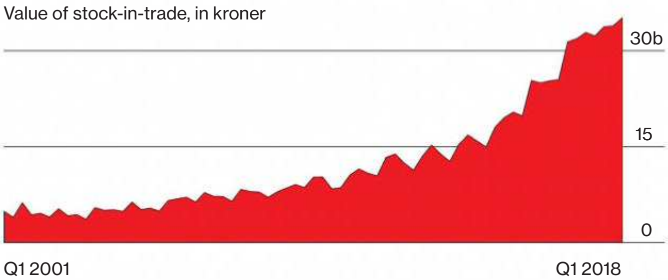
Europe

● Former Catalan leader Carles

Puigdemont was arrested on March 25 by German highway police.

Puigdemont has been in exile since declaring Catalonia's independence in October. The arrest came after Spain reinstated an international warrant against him and five others.

● H&M reported a record inventory backlog worth more than $4 billion. The clothing glut has forced the Swedish fashion retailer to increase markdowns this quarter, pushing operating profit to its lowest level in more than a decade.



● California and 11 other states sued to block the addition of a question about citizenship to the 2020 census.

The lawsuits say the question will deter some from responding, leading to undercounting in states with large immigrant populations.

● Support for Poland's ruling Law and Justice Party dropped to 28 percent in a poll released on March 28, from 40 percent a month earlier. The authoritarian party faces criticism for allegedly excessive bonuses paid to former cabinet members and protests over restrictive abortion laws.

● The chairman of Deutsche Bank has held talks with potential candidates to succeed CEO John Cryan.

Cryan issued a memo to staff on March 28 saying he's "absolutely committed to serving our bank."

● U.S. diesel car drivers sued BMW, saying the carmaker, like Volkswagen, cheated on emissions tests and that its vehicles are actually polluting at up to 27 times the legal limit. BMW has said it installed the wrong software by mistake. ▷ 50

● Equifax named private equity and GE alum Mark Begor as its chief executive officer, seven months after the massive data breach that led to the resignation of then-CEO Richard Smith.

● Austria has so far opted out of the movement across Europe to expel Russian diplomats over the poisoning of a former Russian spy and his daughter in the U.K. Russia has denied responsibility, and Austria's government said it wants to "keep channels open" to Moscow. ▷ 46

Africa

● A collection of gold castings of Nelson Mandela's hands sold for $10 million—in Bitcoin.

● Ghanaian police arrested Koku Anyidoho, head of the country's largest opposition party, for suggesting President Nana Akufo-Addo would face a "civilian coup d'état" for approving a military cooperation deal with the U.S.

DATA: COMPILED BY BLOOMBERG

Weapons of the Trade War

● Tariffs and countertariffs may mark the start of an inevitable showdown between the world's two most important nations

● By Michael Schuman

Let's not sugarcoat it anymore. The U.S. and China are in a trade war. Two weeks after President Trump imposed broad tariffs on imports of steel and aluminum from China and other countries, he started the process of slapping punitive duties on tens of billions of dollars of Chinese imports and restrictions on Chinese investment in the U.S. In Beijing, President Xi Jinping was quick to retaliate, hitting U.S. exports of nuts, pork, and other products with tariffs and warning tougher measures could come. The Chinese Embassy in Washington, in a formal statement, pledged the country would "fight to the end."

Economists and Wall Street bankers are providing estimates of what a trade war would cost in economic growth, jobs, and corporate earnings. But the bigger, long-term consequences are harder to forecast. Perhaps this trade war will be resolved through negotiations, as U.S. Commerce Secretary Wilbur Ross, an architect of Trump's policy, has suggested. Talks between the two sides already appear to be under way, behind the scenes and without the hyperbole. The crisis might dissipate into a big nothing, with Xi tossing a few concessionary crumbs at an impatient and inconsistent Trump, who may prefer quick, tweetable wins to the hard work of changing the Chinese trade practices that really threaten U.S. business.

But a darker possibility cannot be ruled out: This trade war may be a critical turning point in history, the moment when the irreconcilable ideological and economic differences between the world's two most important countries burst into the open. In that case, the world may never be the same.

Some experts would argue that such a conflict was inevitable—that as a reigning superpower, the U.S. will at some point face a confrontation with an up-and-coming one, as has happened throughout history. Destiny or otherwise, today's trade war is a result of major policy changes in China and the U.S. Trump and Xi have both staked their political futures on making their nations "great again," resulting in a clash of nationalisms with potentially dire consequences for everybody. However the current trade spat works itself out, its fundamental causes aren't going away.

Trump is breaking with decades of U.S. foreign policy designed to avoid just such a conflict. Ever since Richard Nixon met Mao Zedong in 1972, Washington's strategy has been to coax China into the international order crafted by the U.S. and its allies after World War II. Trade and investment would bond the country to Western democracies. The U.S. opened its huge consumer market to Chinese exports and invited Beijing into the foundational institutions of the global economy—the International Monetary Fund, the World Bank, and the World Trade Organization—to give Red China a stake in the free world's economic system. The whole idea was to cooperate with Beijing's quest for economic development, to transform it from potential adversary to ally, and, possibly, from dictatorship to democracy.

To Trump, that strategy was an historic mistake that allowed the country to grow wealthy and powerful at the expense of the Western world. "I blame the incompetence of past Admins for allowing China to take advantage of the U.S.," he tweeted in November. Rather than encourage China to integrate further into the global economy, Trump is trying to limit its influence—and even reverse it.

Those opposed to his "America First" agenda may cringe. Advocates of the West's pro-integration approach can point to critical successes. China—now the world's largest exporter—did become an integral part of the global economy, and its momentous ascent has so far been remarkably peaceful. For much of the past 40 years, the country seemed to be moving in the "right" direction—toward a more market-oriented economy and a more open society.

That case has become harder to make. Part of the reason is purely political. Many politicians in the U.S. are fixating more on the perceived downside of China's rise—supposed losses of jobs, industry, and competitiveness—and less on the benefits of lower prices to consumers and expanding business opportunities to U.S. corporations. Also fueling Trump's change of course is real frustration at major U.S. companies over the slow pace of market-opening reform in China and their persistent ill treatment by Beijing's bureaucrats.

A much bigger factor is Xi. Newspaper headlines may blame Trump for setting off the current trade war. But that's not entirely fair. Xi is just as culpable, perhaps even more so. Like Trump, he's also broken with his predecessors. China was never really following the path the West anticipated. It borrowed the tools and trappings of capitalism while dispensing with the liberal political, economic, and social principles that have traditionally accompanied it. But earlier regimes were at least slowly allowing the market and private sector more influence in its still-state-led economy. Xi has turned toward more nationalistic policies. He's painted himself as a national hero, a defender of Chinese interests against a bullying West who's destined to return the country to its proper place on the world stage. Trump calls his program "Make America Great Again"; Xi labels his the "Chinese Dream."

Sure, Xi spouts the usual promises to continue "opening up" and to champion globalization. But in real life, he's dropped even the pretense that China is heading in the "right" direction. His regime is regressing into a one-man dictatorship. A national congress in March amended the constitution to allow him to serve for life. He shows little regard for the rules and norms of the global economic system, preferring to capitalize on the openness of Western economies while dragging his feet on reciprocating that ▶

ALAMY (4); GETTY IMAGES (2)

◀ openness. He's creating rival institutions to those of the West, such as the Asian Infrastructure Investment Bank, a multilateral lender akin to the World Bank. While blathering on about pro-market reform, Beijing is intensifying Communist Party influence over business and heavily subsidizing many high-tech companies to give them an advantage over Western competitors.

This dynamic—rising nationalism in China and defensiveness and grave doubts about globalization in the U.S.—will surely outlast today's trade tussle. No longer content to join the U.S.-led world economic order, China is striving to change it to suit its own interests. All Trump is doing is calling out what's become obvious: China is not a partner, but a competitor, and it has to finally be treated as such.

The big question is: Now what? There's a possibility that these two economies are so intertwined and interdependent that they simply must find ways of getting along. That implies that the old policies—of encouraging greater integration—will endure in some form and that disagreements between the U.S. and China will remain under negotiation and, thus, under control.

At the same time, China's trade practices are essential to its national agenda. Its leaders recognize that the country's economic future depends on their ability to upgrade its industries and foster technological innovation, and they're unlikely to significantly alter their industrial program under any circumstances. Trump may be able to pry open a market here or remove a regulatory hurdle there. Maybe he can even prod Beijing into treating U.S. companies more "fairly." But he's not likely to persuade Xi to give up his Chinese Dream.

Nor will his successors. Trump will eventually leave the White House, and the next president may take a softer approach. But the fundamental challenge from China isn't likely to vanish. The danger that the world could again degenerate into competing blocs—one democratic and free-market, the other authoritarian and statist—will remain a terrifying prospect. Washington invited China into its world order. Now China could destroy it. Ⓑ

■ VIEW

To read Scott Dorf on the bear market in bonds and Noah Feldman on the misguided call to repeal the Second Amendment, go to Bloombergview.com

Red Tape and U.S. Health Care

● Doctors, hospitals, and insurers need standardized electronic billing systems

The American health-care system has a unique problem with paperwork. The sheer number of participants—doctors, hospitals, clinics, insurance companies, patients—makes settling payments complicated, time-consuming, and expensive. The share of U.S. spending devoted to administrative costs, including billing, is roughly three times what it is in other affluent countries, and it's a major reason the U.S. spends twice as much on health care.

Some clinics employ more clerks than providers—not just to generate invoices but to send along the patient information insurers need to approve treatments, to dispute denied payments, to fix mistakes, to handle patient questions, and on and on. For every $1 billion in revenue, the health-care system employs the equivalent of 770 full-time people to settle the bills. That's almost eight times more than other industries. And doctors have to spend inordinate time dealing with red tape.

Of course, if the U.S. were to magically switch to a single-payer health-care system, these expenses would fall dramatically. The government would simply determine prices and write checks without dispute, as Medicare does for direct beneficiaries. But such a change is neither realistic nor desirable in a country where half the population has employer-sponsored insurance.

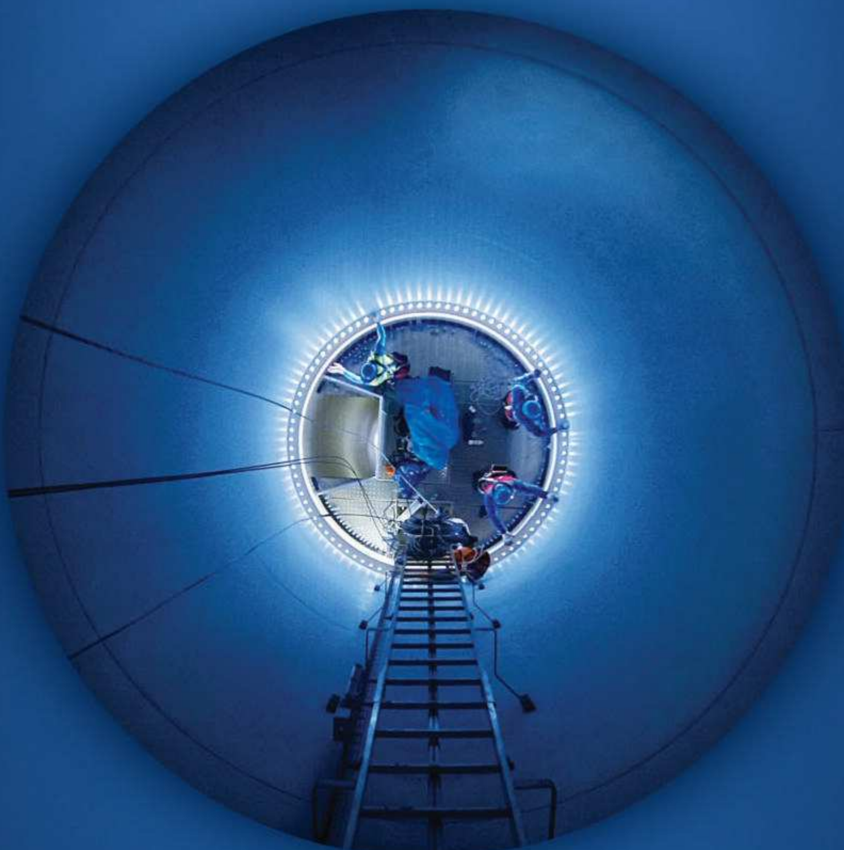
That said, it's possible to trim administrative costs within the system. The best way is for providers and insurers to standardize billing practices and modernize computer systems. The government has long pushed for such efficiency. A 1996 law set some preliminary standards for the electronic processing of claims. But they weren't nearly enough, and insurers could still complicate invoices by requesting additional patient data. More recent laws gave providers further incentives to adopt electronic records and make them more uniform.

Yet to a large extent, insurance companies continue to maintain distinct billing codes and forms, and providers still use separate computer systems for medical records and billing—making it impossible to automate claims processing. In this, health care stands apart from almost every other industry. Think of the way banks have standardized operations to allow all customers to use the same ATMs and credit card readers.

The government needs to keep pushing for standardized electronic health systems and to change how health-care prices are set. Bundled care and other alternatives to the fee-for-service model could greatly streamline billing.

Patients have increasing cause to demand such change. With premiums, copays, and deductibles rising, U.S. consumers now pay more for health care than their employers do. Administrative inefficiency adds another layer of needless expense. Billing shouldn't have to be so complicated, or costly. Ⓑ


Noisy attacks aren't hard to find...
But could you catch the silent attacker lurking beneath the surface?
Using artificial intelligence, Darktrace finds the quiet cyber-threats inside your organization, no matter how they got in.
From stealthy attackers and insider threats, to hacks of connected objects or industrial networks, Darktrace detects it and fights back in real time.
Find out how at darktrace.com
DARKTRACE
World-Leading Cyber AI



LOOK AHEAD

● Tesla is expected to report its first-quarter production and delivery numbers

● Nestlé releases a Milkybar in the U.K. and Ireland with 30 percent less sugar

● Mylan argues against Allergan's attempt to transfer its Restasis patent to the St. Regis Mohawk Tribe

Why Pay Equality Is Still Out of Reach

New numbers from the U.K. shed light on a global problem

April 2, 2018

Edited by Jillian Goodman

Businessweek.com

PHOTOGRAPHS BY CAROLINE THOMPKINS FOR BLOOMBERG BUSINESSWEEK.

There's an essential, frustrating truth about the gender pay gap: You can size it up or down depending on what you'd like to measure—and what you'd like to measure depends on what you think the pay gap is. Are you talking about all women across the economy? In a specific industry? A specific company? In certain jobs? "You can whittle the pay gap down when you control for more and more variables," says Henry Farber, an economics professor at Princeton University. "But you can never make it go away."

This year, Britain is forcing companies to report their pay gaps as they actually exist, no whittling allowed. By April 4, all businesses with at least 250 employees working in the U.K. will have to disclose any discrepancies in pay between their male and female workers. Ultimately about 9,000 companies representing 15 million employees will be forced to report, although only about two-thirds had done so by March 28. Those that don't will be subject to unspecified fines and sanctions by the government's Equalities and Human Rights Commission.

The law—enacted in 2017, after a 2010 measure encouraging voluntary reports failed—is very clear about just what numbers British companies must report: unadjusted mean and median hourly wage and bonus pay for all men and all women, as well as percentages of men and women in each pay quartile. The rigid approach leaves companies nowhere to hide, no statistical mechanism to cover up their failure to mentor women, no rhetorical way around the fact that their higher-paid divisions are largely male. While the requirement is confined to companies' U.K. workforces, the numbers provide an insight into the structure of companies around the world. "The picture in the U.K. isn't that much different from the U.S.," says Farber. "Women earn less than men."

A lot less, it turns out. Take HSBC Bank Plc. The average woman working there in the U.K. makes 59 percent less than the average man. More than half of the bank's U.K. workforce is female (54 percent), but most of the women are in lower-paying, junior roles: Women account for 71 percent of its lowest-tier employees and only 23 percent of its senior executives. About as many women as men earned bonuses at HSBC in the U.K. last year, but because women are in lower-paid positions those bonuses were 86 percent smaller than those earned by men.

At Goldman Sachs International, women in the U.K. collectively make 55 percent less than men; at Barclays Plc, it's 48 percent; at Deloitte, 43 percent. Outside the finance sector, based on companies reporting so far, the gap isn't quite so bad. Women at the oil and gas company BP Plc make 23 percent less than men; at 3M Co., it's 14 percent; at Amnesty International, 11 percent. The gap at the latter two is smaller than the U.K. average, according to the Office for National Statistics, which has identified a national mean pay gap of 17.4 percent, roughly on a par with the U.S.

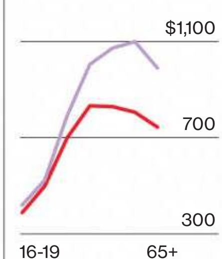
"For most companies, this is the first time they've analyzed numbers like this," says Charles Cotton, a compensation adviser with Chartered Institute of Personnel and Development (CIPD), an association for human resource professionals. These figures can't tell you whether women and men holding the same jobs at a particular company are compensated equally. But they do describe what working women have known for decades: that their careers move slower than men's, peak at a lower level, and ultimately pay a lot less. "If men are doing all the top jobs and the women are making the tea, then there's something wrong," says Vince Cable, leader of the U.K. Liberal Democrat party, which led the law's passage. "The gap is actually a lot worse than I think anybody anticipated."

That may be because most companies would prefer to analyze their salary data within very narrow parameters, if at all. In April 2016, Microsoft Corp. announced that it had run an internal

● Median weekly earnings by age in the U.S.

Women

Men



DATA: AAUW

The Many Gaps of Microsoft

Princeton economics professor Henry Farber analyzed six years of the company's salary data for technical jobs in the U.S. on behalf of the plaintiffs in a pay discrimination suit. He found that Microsoft's pay gap is...

8.6% considering gender alone

or **7.4%** factoring in age, pay grade, tenure, location, and performance

or **6.3%** considering all the previous factors within a single department (e.g., engineering or IT)

or **2.8%** applying all of that only to people with the same job title

or **0.2%** according to Microsoft

DATA: HENRY FARBER

analysis of its salary data and found that women at the company were paid 99.8 percent of what men working in the same roles at the same level received. That number becomes less impressive when you learn that each of Microsoft's dozens of pay grades at the time came with a set of salary ranges—it doesn't reflect whether women were assigned to the correct job levels in the first place or whether they were promoted as often as men. The company was essentially saying that men and women making roughly the same amount of money were, yes, making roughly the same amount of money. "If I'm doing the exact same job but am at a different level," one woman wrote in an email to Microsoft's head of HR, "that's not pay equality." Her email was released publicly in March as part of a pay disparity lawsuit filed in 2015 by three former Microsoft employees. Microsoft declined to comment, but it said in a 2016 blog post that it was "encouraged" by its pay findings.

No law in the U.S. compels companies to analyze their salary data in the British way—or any way. An Obama-era rule, which would have required government contractors to report their salary data broken down by race and gender, was scrapped by the Trump administration last year. Instead, companies such as Facebook, Amazon, Citigroup—and, yes, Microsoft—have come forward with pay gap figures largely in response to shareholder proposals put forward by Natasha Lamb, managing partner of the Boston investment firm Arjuna Capital. So far, Lamb has pushed only for job-for-job figures like the ones Microsoft reported, not the big aggregate gaps. "We see the equal-pay-for-equal-work number as a critical first step for companies," says Lamb. "The structural gap, like what you're seeing in the U.K., is the next step. So far we've had no takers on releasing that."

British companies haven't been thrilled about releasing their data. "We follow what we're asked to do, and we've done that," says Heidi Ashley, an HSBC spokeswoman. "We don't want to provide further information than is in the pay report." Several accounting and law firms have come under fire for excluding partners from the pay data, arguing that partners co-own the companies and therefore aren't employees. The accounting firm EY, for example, first reported a 20 percent gap, then later revised it to 38 percent when partners were included. ▶

"The gap is actually a lot worse than I think anybody anticipated"

White-collar employment in the U.S.

DATA: U.S. EQUAL EMPLOYMENT OPPORTUNITY COMMISSION

◀ The law's supporters hold that the pain is necessary to achieve the kind of sweeping social changes that will close the pay gap for good. "There's an element of realism" to the very public nature of the reporting process, says CIPD's Cotton. "Companies can do a lot about how they promote and pay people. But they can't change cultural norms." When Goldman Sachs announced its 55 percent gap in March, Chief Executive Officer Lloyd Blankfein and President David Solomon issued a joint statement claiming that "the real issue for our firm and many corporations is the underrepresentation of women." The company promised to have women account for half of its recruiting class by 2021 and 30 percent of its vice presidents (and above) by 2023. But it also called itself a "meritocracy" and said that gender wasn't a factor in how employees were paid. If that's true, then it follows that, until now, women haven't been rising through Goldman's ranks because they didn't deserve to.

"The pushback we hear is, 'We want a meritocracy, don't we?' " says Denise Wilson-White, CEO of the Hampton-Alexander Review, an organization that works with the U.K. government to lobby for more women on company boards. "We have to start questioning whether business is built on a foundation of meritocracy when consistently we're appointing senior white men into all of our leadership jobs. That doesn't feel like it is a meritocracy, does it? That feels like a highly biased selection process." In 2010 several former Goldman Sachs employees sued the company for what they alleged was widespread gender discrimination, claiming that women weren't given the same opportunities for promotions and advancement, were treated differently by their managers, and were sometimes paid less than male colleagues. Goldman denied the allegations and is still fighting the case in court. The company declined to comment.

The numbers coming out of Britain reflect a globalized society structured so that men hold certain types of jobs and women others. Even if you accept that as true, the problem remains of how to apply knowledge of how all women get paid to how a specific woman gets paid. "If you say, 'Oh, we've got a gender pay gap because we've got more men in higher-paid roles,' that's an explanation, not a justification," says Cotton. "Really, what we're seeing is that we have 750 years of history and progress in Britain, and we've still got a pay gap of 18 percent." —*Claire Suddath, with David Hellier, Lucy Meakin, Stephen Morris, Suzi Ring, and Janet Paskin*

THE BOTTOM LINE Companies can use statistical smoke and mirrors to hide their gender pay gaps. But at the societal level, the discrepancy is undeniable.

● The U.K. requires companies to report strict mean and median pay gap figures. In the U.S., companies face no such requirement. When they do publish pay gap figures, they can adjust them as they see fit.

Adobe Systems

Unadjusted in the U.K.

18.2%

Adjusted in the U.S.

0%

Expedia

Unadjusted in the U.K.

17.9%

Adjusted in the U.S.

0%

Mastercard

Unadjusted in the U.K.

19.8%

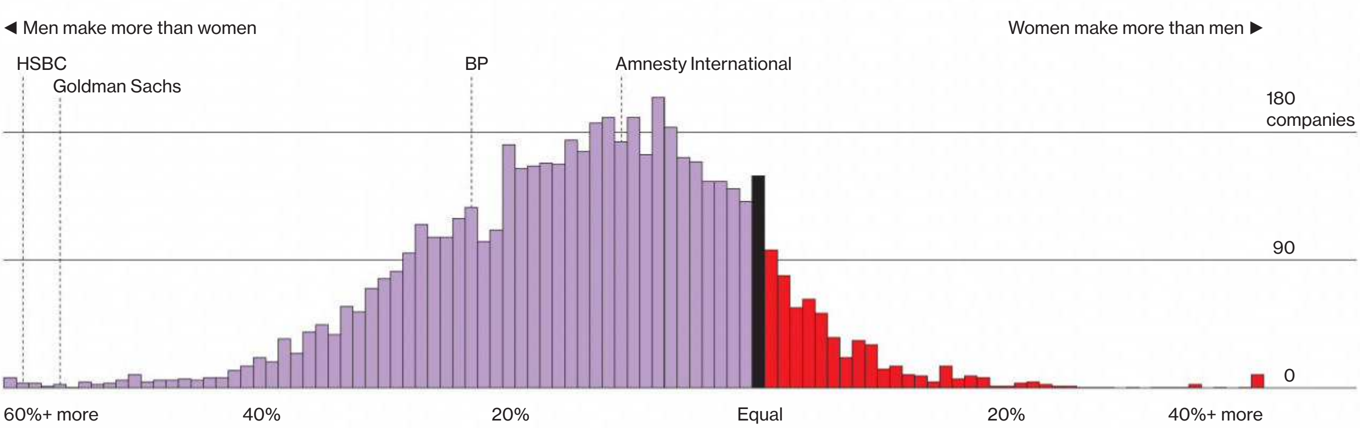
Adjusted in the U.S.

0.9%

DATA: U.K. GOVERNMENT REPORTS, COMPANY REPORTS

The Story in the U.K. So Far

Of the 5,638 companies that reported their data as of March 28, the overwhelming majority's average pay is less for women than for men



DATA: U.K. GOVERNMENT REPORTS

Setting the Pace in Africa's Phone Market

Chinese unknown Transsion sells 3 in 10 phones on the continent. The flip side: Threats of civil war

No matter how many phones you sell, Yu Weiguo has learned, it's tough to keep to a schedule when the government declares martial law. During his eight years in Ethiopia, Yu has helped turn little-known Transsion Holdings, owner of the sleepy Chinese brand Tecno Mobile, into Africa's leading mobile device maker. Having sold at least 200 million phones on the continent, he picked the outskirts of Addis Ababa, Ethiopia's capital, as the site for a 280,000-square-foot factory. It was supposed to be pumping out as many as 2 million phones a month by July, but things aren't working out as planned.

Ethiopia's ruling coalition declared a state of emergency in mid-February after the surprise resignation of Prime Minister Hailemariam Desalegn destabilized the rest of the autocratic regime. For Transsion, the fallout has been a lesson in risk. The company profits from China's checkbook diplomacy in Africa but now faces the downside: public outcry against worsening inequality and repression. "There are many things that can't be controlled in Africa," Yu says. "Sometimes your plans don't work."

To say Transsion and its phones are little-known outside Africa is an understatement. Tecno has never cracked the top-10 smartphone brands in China and doesn't sell in the U.S. or Europe. Yet its parent accounts for 30 percent of African phone sales, compared with 22 percent for second-place Samsung, according to researcher Canalys. Reclusive founder Zhu Zhaojiang controls the private company via a string of related backers and funds, as well as some government-backed investment. Zhu, 44, has said he plans to go public at some point through a reverse merger with Shimge Pump Industry Group, a Chinese manufacturer of stainless steel pumps.

Transsion's rise in Africa comes at a time when the continent is undergoing rapid transformation, owing significantly to the convergence of technology, trade, urbanization, and a huge swing in Chinese investment, including $60 billion since 2016. "What Transsion embodies is a kind of reading of the Chinese state, which beginning in the 1990s saw the opportunity that Africa represented," says Howard French, author of *China's Second Continent: How a Million Migrants Are Building a New Empire in Africa*. "Transsion had a discipline and stick-to-itiveness that allowed it to achieve results."

The company's origins were humble. Founded in 2006, it built its African business on cheap hardware and software tailored for customers who'd long gone underserved by companies from the U.S., Europe, and Japan. At Transsion's first assembly line in Ethiopia, Yu and five other Chinese expats slapped together phones on the ground floor of a three-story villa in the center of town. "The place was very small, but we had everything we needed to produce a cellphone," he recalls.

Yu sold his first couple thousand Tecno flip phones in bulk to local resellers. He charged at least 10 percent less than rivals in the $20 to $50 range, according to analysts' estimates, and promised to handle customer service, including repairs. Within a few months, as demand hit the tens of thousands, he moved production from the villa to a proper factory and began focusing on custom features.

Transsion added slots for multiple SIM cards and made it easier for customers to toggle between wireless networks, saving money. Chinese engineers developed camera software that could better register darker complexions. A lack of electricity infrastructure shifted the focus toward longer battery life. "These are what you call micro-innovations," says ▶

ILLUSTRATION BY JONATHAN DJOB NKONDO

◀ Arif Chowdhury, an early Transsion staffer who now oversees expansion in Latin America, India, and Southeast Asia. "What made us different was that, from early on, we made a product just for the Africa market." The company says it has about 5,000 staffers in Africa, and Chowdhury says more than 90 percent of them are locals.

The company expanded across Africa and into higher-end models. Today, it's no longer perceived as only a knockoff. In the Tanzanian city of Moshi, Tecno owner Nicodemas Gobre says he spent $160 for the Camon CX's strong camera, battery life, and air of trendiness. Now 1 in 6 people on the continent is a customer, and Transsion's success has helped draw in Huawei and Xiaomi, China's star domestic phone brands. "Tecno is changing the narrative that Africans can't afford smartphones," says Mbwana Alliy, a venture capitalist whose Savannah Fund focuses on local internet startups. "Facebook, WhatsApp, Instagram—all those apps owe a lot of their success to Tecno," he says.

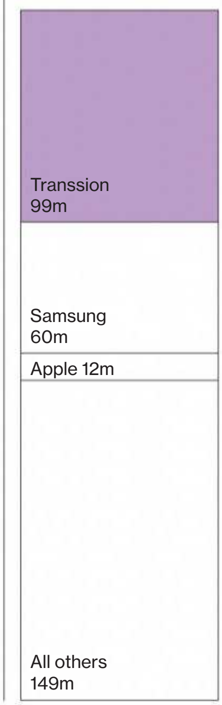
In Ethiopia it's less clear if Transsion will benefit from growing demand for representation among the country's largest ethnic groups, the Oromo and Amhara, or whether the company—having built its business under the oppressive regime—will suffer from perceptions of coziness. "I find it quite incredible how China agencies, investors, and governments continue to promote Ethiopia as an investment destination," says Gamechu Ibrahim, an activist in Oromia. "Think twice."

Yu doesn't see it that way. He argues that Transsion is bringing mobile and internet connection to the country and hiring and training locals, which all helps economic growth. "Political stability is a huge concern," he says, but he's optimistic. He says Transsion is investing for the long term, and the new Addis Ababa factory could be running by August, regardless of who's running the country.

Jean-Pierre Cabestan, co-author of *Tanzania-China All-Weather Friendship in the Era of Multipolarity*, says Tecno would be wise to pay closer attention to politics. "The Chinese government and companies in general only establish ties with the ruling government. They engage little with opposition parties," he says. "That could be a problem down the road." —*Lulu Chen, with Yuan Gao*

THE BOTTOM LINE Transsion has sold 200 million phones in Africa over the past decade by piggybacking on the infrastructure China's government paved. Now it faces the downside.

● Phones shipped to customers in Africa and the Middle East in 2017



DATA: IDC, BLOOMBERG INTELLIGENCE

This Robot Can Detect Lung Cancer

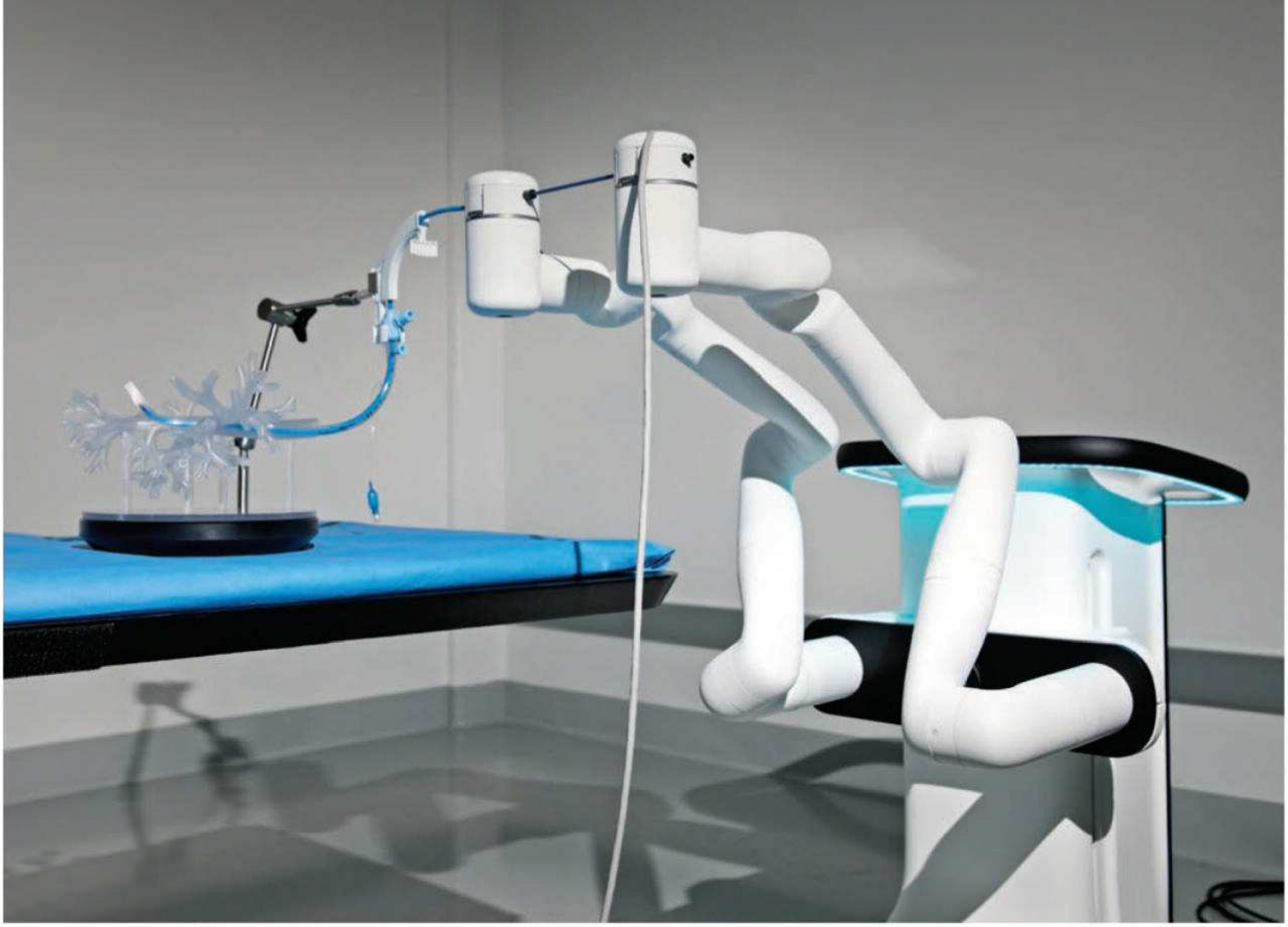
● The founder of a $50 billion robotics company says FDA approval is the first step toward AI surgeries

Fred Moll was a young surgical resident when he assisted on his first keyhole surgery in 1982. The technique, otherwise known as laparoscopic surgery, requires doctors to use unusually slender, extra-long tools to perform operations through tiny incisions. Today's laparoscopic surgeons use high-definition cameras to look inside patients' bodies, but even the primitive version Moll used blew his mind. "Wow," he recalls thinking. "This has to be a better way of doing things." He withdrew from his residency and began working on medical devices.

Moll, 66, is best known for the da Vinci Surgical System, a large industrial robot that surgeons operate using electronic hand controls and a video monitor. The top-selling surgical robot, it retails for about $2 million and is used in thousands of hospitals. Its success has propelled Intuitive Surgical Inc., the company Moll founded in 1995, to a market value of about $50 billion. Thanks to his work, robotic surgery is now commonplace, but he argues it can be improved because it still depends on the precision of a surgeon's hands. He believes robots, powered by machine learning algorithms and operating autonomously, are already capable of performing simple medical procedures. And after seven years of working in secret to prove it, he's ready to take the first big step.

Moll's Monarch Platform features a pair of arms with a long, blue tube attached, allowing a doctor to steer a camera and other surgical implements deep inside the body. This is a new kind of surgical scope, which he showed off to a *Bloomberg Businessweek* reporter in March at the headquarters of Auris Health Inc. in Redwood City, Calif. On March 22, the U.S. Food and Drug Administration told Auris it had cleared the device for use under a doctor's control in human lungs. The company says it will be


● Moll



used to diagnose and eventually treat lung cancer.

The robot can be operated manually with a controller modeled on the Microsoft Xbox video game console. That's what the FDA approved, though Moll says the Monarch will also be able to work without human aid. "It's not science fiction," he says. "It's sort of like self-driving cars. People used to wonder if it was going to be 5 or 10 years. No, no, no: It's going to be 18 months."

Although Auris was spun out of Columbia University research in 2007, much of the Monarch technology comes from an earlier Moll startup, Hansen Medical Inc. Hansen's ill-fated system aimed to use robotic catheters to eliminate the need for open-heart surgery, but it proved too expensive compared with the cardiac stent, a competing technology that became popular around the same time.

Moll left Hansen in 2010, and the following year became the chief executive officer of Auris, which at the time was working on a robotic approach to eye surgery. The company struggled to win FDA approvals. "They get touchy when you talk about inserting tools in the eye and controlling them with robots," he says. So he acquired the ailing Hansen and adapted its probe for lung cancer diagnoses. The company has raised about $500 million from investors such as Lux Capital and Mithril Capital Management, controlled by billionaire Peter Thiel.

Backers were impressed by Moll's willingness to bring Silicon Valley sensibilities to a field in which

▲ Auris's Monarch Platform allows a doctor to steer a camera and other surgical implements deep inside the body

◀ The lungs are a good proving ground for the Monarch, Moll says, because they require a lot of twists and turns

excellence largely remains a matter of fine motor skills. "The thing that everyone remembers is the control system," says Peter Hébert, a partner with Lux and an Auris director, referring to the Xbox-style console. "It's totally unique."

Moll says he focused on lung cancer for two reasons. It's the deadliest cancer, killing ▶

PHOTOGRAPHS BY JACK BOOL FOR BLOOMBERG BUSINESSWEEK

◀ 1.7 million people a year globally, according to the World Health Organization. (That's double the next-highest total, for liver cancer.) And it's the perfect proving ground for medical robots.

He blames lung cancer mortality rates partly on a current screening method's reliance on a manual bronchoscope, which has a limited range of motion and looks like something you might use to check your car's oil. The Monarch can navigate nimbly through the lung, which looks a bit like a network of tunnels, and the procedure doesn't require much decision-making beyond knowing where to turn.

No medical regulator in the world has approved fully robotic surgery, so for now surgeons who sign up for Auris's pilot program will drive the bot. Navigating on a video screen, the doctor guides the scope into the lung, starting in the trachea. A camera view is on the screen's left side, and a CT-scan-created map with turn-by-turn directions is on the right. Auris tracks the probe's precise location in part by comparing data from the camera view to the 3D map, and by using an electromagnetic sensor that works a bit like a miniature GPS. The idea is to collect data after every surgery and feed them back into the navigation software, improving it over time.

Once the doctor reaches a tumor, identified on the screen with a target, a needle can be run through the scope and used to take a tissue sample. Although the stakes were considerably lower, this reporter was able to drive the probe into a plastic lung after a two-minute training session, using the controller and a simulated version of the machine on an iPad.

Moll says amateurs won't be able to safely perform lung biopsies anytime soon, but he argues that the robot, operated under the watch of a surgeon, can do the driving for simple diagnostic procedures. There are plenty of reasons to be cautious about automating delicate medical treatments, but some surgeons are receptive. "I went in a skeptic," says Alexander Chen, a pulmonologist at Washington University in St. Louis who performs about 150 lung scope procedures each year. But in a test on a cadaver, the Monarch offered more control and reached deeper than a surgeon's wrists can, says Chen, now an Auris consultant.

Questions remain, he acknowledges, about how well the Monarch will perform. "There are a lot of moving parts," Chen says, and more research is needed to truly understand the robot's impact. But, he adds, "this is one of the most novel things in a while, and that gets me excited." —*Max Chafkin*

THE BOTTOM LINE Robot-driven surgery may sound iffy, but Moll has a strong track record and buy-in from the government and some surgeons for his first big step in that direction.

Goggles With a Work Crew Inside

● The oil industry is using augmented reality to oversee some repairs remotely

▲ Baker Hughes built its Smart Helmet with help from Italian developer VRMedia and wrote its own software

Replacing parts of an outdated Baker Hughes turbine at a petrochemical plant in Johor Bahru, Malaysia, is about as fun as it sounds. The chore was supposed to halt operations at the facility for at least 10 days and cost $50,000 to fly a specialized U.S. work crew about 9,000 miles. Instead, once the equipment upgrade began last year, it took only five days and zero air travel—just an on-site technician wearing a dorky helmet camera and a few American engineers supervising remotely. They watched and coached the local crew through the helmet from a Baker Hughes site in Pomona, Calif.

Augmented-reality headsets, which overlay digital images on a real-world field of vision, are driving advances in industrial technology a few steps beyond FaceTime. While the likes of Apple, Amazon.com, Google, and Microsoft race to develop mainstream AR consumer gadgets in the next couple of years, they've been outpaced by oil companies looking for ways to cut costs. Some are simply buying the goggles and building custom software; others are investing directly in AR startups; still others are making the hardware as well. Baker Hughes, a General Electric Co. subsidiary, calls its rig a Smart Helmet. "Traditionally I would have to pay for two people's travel, two people's accommodations, and so forth to visit the customer's site to do the mentoring," says John McMillan, a regional

FROM LEFT: PHOTOGRAPH BY MICHAEL STARGHILL FOR BLOOMBERG BUSINESSWEEK; GETTY IMAGES

repairs chief at the company whose team uses the helmet regularly. "It's saved me a lot."

Baker Hughes co-created its AR headset with Italian developer VRMedia S.r.l. and wrote its own software. BP Plc says it's using AR glasses to bring remote expertise to sites across the U.S. RealWear Inc., a startup, says it's signed two dozen other energy companies, including Royal Dutch Shell Plc and Exxon Mobil Corp., to test its $2,000 headset. On March 6, AR software maker Upskill announced a fresh $17 million in venture funding from Boeing, Cisco Systems, and other investors.

Remote gear can help experienced workers stay on the job even if they can no longer handle the travel or other physical demands of rig maintenance. "With these technologies, it's more about the people than the hardware," says Shell Executive Vice President Alisa Choong. Janette Marx, chief operating officer for industry recruiter Airswift, says remote work is also a good sales pitch to skilled technicians who might be lured by cushier gigs in Silicon Valley.

The bigger prize for oil companies is reduced downtime for equipment. Each day offline for a typical 200,000-barrel-a-day refinery can mean almost $12 million in lost revenue. Offshore oil and gas facilities often halt operations while waiting to fly specialists in by helicopter and, according to industry analyst Kimberlite International Oilfield Research, shut down 27 days a year on average. Little wonder, then, that analyst ABI Research estimates energy and utility companies' annual spending on AR glasses and related technology will reach $18 billion in 2022, among the most of any industry.

Remote AR work doesn't always go smoothly. Oil rigs often lack reliable wireless networks, and many headsets don't yet meet the strict standards for areas near hazardous materials or high-risk jobs. Under certain conditions, for example, the headsets might emit dangerous sparks. That's one reason many of the oil companies' pilot programs remain just that for now.

Baker Hughes hasn't had to worry about those issues yet, says John Westerheide, director of emerging technologies. In Malaysia, engineers were able to view equipment, send images to the headset screen, and talk directly to the on-site workers with few hiccups. "The way that we currently go to work," Westerheide says, "that's going to become much more virtual, interactive, and collaborative." —*Milana Vinn*

THE BOTTOM LINE Energy and utility companies' annual spending on AR and related technologies, which reduce travel and equipment downtime, is expected to hit $18 billion within five years.

Man vs. Machine — Recruiting

A Russian startup is using Robot Vera, artificial intelligence software designed for recruiting, to help its 300-odd clients—including PepsiCo, Ikea, and L'Oréal—fill vacant jobs. (Yes, with humans.)

The Benefit

Vera speeds the vetting of high-turnover service and blue-collar positions (clerks, waiters, construction workers), cutting the time and cost of recruitment by as much as a third, according to its creators. The software can interview hundreds of applicants simultaneously via video or voice calls, narrowing the field to the most suitable 10 percent of candidates.

Innovators

Vladimir Sveshnikov (28) and Alexander Uraksin (30), co-founders of Stafory, a 50-person startup in St. Petersburg

Origin

The co-founders, with a background in human resources, two years ago found themselves making hundreds of calls to candidates who'd lost interest in the given job or couldn't be located. "We felt like robots ourselves, so we figured it was better to automate the task," Uraksin says.

Development

Vera, named after Sveshnikov's mother, combines speech recognition technologies from Google, Amazon.com, Microsoft, and Russia's Yandex. Programmers fed 13 billion examples of syntax and speech from TV, Wikipedia, and job listings to expand the software's vocabulary and help it speak more naturally and understand responses.

Deployment

The robot started working in Russia in December 2016, and Stafory has since added clients in the Middle East and pilot projects in Europe and the U.S. The company says its revenue will top $1 million this year.

The Verdict

Human recruiters still vet the candidates cleared by Vera. Sveshnikov and Uraksin are working to teach the bot to recognize anger, pleasure, and disappointment, but even if it can gauge emotions, Vera shouldn't be viewed as a substitute for traditional HR departments, says Mikhail Chernomordikov, a Microsoft Corp. strategist in Dubai. "Final decisions on hiring," he says, "are reserved for humans." —*Ilya Khrennikov*

LOOK AHEAD

● Credit and debit card networks will allow stores to stop requiring signatures on sales using chip cards

● Mick Mulvaney, acting head of the Consumer Financial Protection Bureau, will testify to Congress

● Bank earnings season kicks off on April 13 with results from Citigroup, JPMorgan Chase, and Wells Fargo

ILLUSTRATION BY RAM HAN

Spring Is Coming For IPOs

● Some of the most valuable new companies are still private, but more may cash in soon

Don't be so afraid of a down round.

That may be the message Silicon Valley takes from the initial public offering of Dropbox Inc. on March 22. In the weeks before the cloud-storage company's stock market debut, it first targeted a price of $18 a share on the high end, giving the company a market valuation of $7.1 billion. That would have been about a third lower than the $10 billion it was valued at in its previous round of private fundraising—earning the IPO the "down round" stigma.

Things worked out better. Dropbox ultimately sold the stock for $21 a share, pulling its valuation past $8 billion. And by the end of its first trading day, it rose an additional 36 percent, to a total value of $11.1 billion. On the one hand, there's a chance Dropbox could have raised more money, since investors were willing to value the company a good bit higher than where the shares sold. But it was a sign that companies shouldn't see the risk of a valuation haircut as an absolute obstacle to going public. In recent years, concerns about not living up to lofty private valuations slowed the IPO pipeline.

Grumbles about the IPO market being broken have grown louder as tech giants such as Uber Technologies Inc. and Airbnb Inc. wait to go public. Jay Clayton, head of the U.S. Securities and Exchange Commission, and New York Stock Exchange President Tom Farley have both said the listing process dissuades companies from going public.

But IPOs have been making a quiet comeback. More than $12 billion in stock has been sold in new U.S. listings this year, up a third from the same period in 2017. January's $8 billion was the biggest month since Alibaba Group Holding Ltd. raised $25 billion in its September 2014 IPO. Maybe public equities aren't passé, after all.

A robust IPO market needs two things: favorable stock market conditions and companies that want to sell shares. Even with a record one-day volatility surge in early February and some more bumps in March, the stock market has been stable enough to get deals done. Meanwhile, investors are still hungry for investment opportunities, according to Michael Millman, JPMorgan Chase & Co.'s co-head of equity capital markets Americas and global head of technology banking.

That leaves the companies. The bread and butter of the IPO market still isn't the Dropboxes of the world. Since 2009 the average offering size is about $250 million, or a market value of about $1.7 billion. That's a fraction of the valuations for some of the biggest startups waiting in the wings. Uber sits at a $69 billion value, Airbnb at $31 billion, and WeWork Cos. at $20 billion.

All founded eight or more years ago, those companies have grown up in a funding world fundamentally different from their predecessors'—a world awash with cash for private companies. The startups have been able to go through their growing pains without the scrutiny of public investors, unlike Apple, Amazon, and Google (now Alphabet), whose IPOs all came within six years of their founding.

Last year saw $84 billion in venture capital investment, the most since the dot-com era, according to PitchBook-NVCA Venture Monitor. Masayoshi Son's conglomerate and investment vehicle SoftBank Group Corp., with its nearly $100 billion Vision Fund, has taken stakes in private companies at sizes that dwarf all but the biggest IPOs. It was the biggest buyer of a $9.3 billion sale of Uber stock; $4.4 billion went toward WeWork.

The private funding world has become crowded with some investors that usually play in the public markets. Mutual funds, hedge funds, sovereign wealth funds, and even private equity firms (which typically buy public companies and make them private again) have sought out these potentially high-growth investments because years of low interest rates and muted economic growth have limited returns elsewhere. "As more and more late-stage capital appears, the line of when companies go from private to public will keep shifting," says Neeraj Agrawal, general partner at tech-focused investment firm Battery Ventures.

While money has been plentiful, there have been unintended consequences to all this investment. Many private market valuations became inflated, especially in years such as 2014, when Dropbox last raised funds privately, through 2016, says Agrawal. Not all of these richly priced companies are ready for prime time. "Hypercompetition has made it so that the majority of venture capital's biggest fear is missing out on the next investment," Bill Gurley of Benchmark, which has invested privately in the likes of Uber, WeWork, and Snap, said in an interview with Bloomberg TV. "So they're afraid to have a reputation as someone who asks too many questions or pushes too hard," he said. "I think it's led to a situation where there's not a lot of stewardship for discipline and results."

Enter the down round. It's a bad look that can dampen employee morale and prompt a deluge of negative press coverage. Those immersed in the IPO industry point to payment-tech company Square Inc.'s 2015 offering as a deal that really stoked valuation concerns. The company, run by Twitter Inc. co-founder Jack Dorsey, listed at a $2.9 billion public market value, a far cry from the $6 billion valuation in its last private funding round.

Two of last year's buzziest deals have disappointed post-IPO. Disappearing-photo appmaker Snap Inc. listed with a 44 percent pop in its debut but went on to let down investors with slowing user growth and an app redesign, leaving it to flirt with its $20 billion IPO market value, just above its $18 billion valuation in its last private round. Meal-kit delivery company Blue Apron Holdings Inc. is trading at just $354 million, less than a fifth of its 2015 private value, after fears of increasing competition, the resignation of its founder and chief executive officer, and disappointing earnings have dragged on the stock.

Still, there are signs that more large startups are willing to face the scrutiny. Uber's new CEO, Dara Khosrowshahi, the ex-Expedia Inc. chief who took over after its founder and CEO was ousted, has said he wants to take Uber public as early as next year. Nine-year-old Pinterest Inc. added its first chief operating officer, aiming to scale its advertising business internationally—a move seen as a step toward taking the $12 billion private company public. There's also the mammoth in the room outside of the tech industry. The Saudi Arabian government is hoping to raise a record $100 billion selling shares in its oil company, Saudi Aramco, though the deal's timing has become unclear.

In April all eyes will be on music streaming service Spotify Technology SA. It's skipping the marketing roadshow and valuation-setting process typical of an IPO in favor of a direct listing. Its opening public value will be decided on listing day based on how many shares existing shareholders want to sell, who wants to buy stock, and the price they agree upon. Unlike most IPOs, the move won't raise capital for the company but will give existing shareholders a chance to cash out. While Spotify has ▶

● Venture capital investment in 2017

$84b

◀ tried to guide investors by disclosing its value based on the price of shares changing hands in private transactions, the range is very broad: From $6.3 billion to $23.4 billion since Jan. 1, 2017.

Despite the recent market volatility, public equities are riding high. That should lure more companies to take the leap into public markets and make it easier for them to justify richer IPO valuations. "We're now entering the phase where these companies are starting to go public," says Nick Giovanni, co-head of global technology banking at Goldman Sachs Group Inc. "There will be larger deals for much larger market cap companies. I think the story will be: It was worth the wait." Whether public investors on the other side of the transactions will be as pleased with the results is another question. After all, sometimes getting in on a stock that IPO'd "too soon" means snagging a better deal. Consider, again, Square: The stock is up more than sixfold in two and a half years. —*Alex Barinka*

THE BOTTOM LINE The massive startups of Silicon Valley are becoming less fearful of the risk of going public at a lower valuation than private investors were willing to pay.

Noto's Big Job at SoFi

● The new CEO, a Twitter veteran, has choices to make about how the fintech company lends

▲ Noto

As chief operating officer of Twitter Inc., Anthony Noto did a lot to calm the company's perpetually anxious shareholders. He started as the head of finance but became second in command after management shakeups. On Feb. 26, however, Noto took over as chief executive officer of a financial technology startup, Social Finance Inc., or SoFi. Once again, he's stepping into a leadership gap at a company with big ambitions—and some big headaches.

With an online-only business model, SoFi has become the largest student-loan-refinancing business in the U.S. And it's aiming for more: to beat traditional banks by targeting millennials with products ranging from insurance and mortgages to wealth management and checking accounts. But in early September, CEO Mike Cagney left SoFi after allegations that some managers sexually harassed employees. Amid the turmoil, the company withdrew its application for an industrial loan charter, which would allow it to collect FDIC-insured deposits.

Noto hasn't signaled any big changes in direction. "We're going to focus now on continuing to execute on the strategic plan and build out our muscle and strength that would give us the option to be a public company at some point," he told Bloomberg News on his first day on the job.

He'll be facing increasingly tough competition. SoFi sees Marcus, the consumer-lending business started by Goldman Sachs Group Inc. in 2016, as the biggest threat, according to people familiar with SoFi's thinking. The Wall Street behemoth focuses on clients planning to refinance credit card debt, and CEO Lloyd Blankfein has pointed to advantages it has over a lot of fintech startups: As a bank, it can use deposits as an inexpensive source of funding.

One question Noto will have to navigate is how much SoFi should use its own balance sheet—that is, hold on to the loans it originates as opposed to selling them to other investors. It currently keeps a slice of loans but sells off most of them. Holding loans allows a company to earn a stream of interest income, but investors generally put a lower value on financial firms than tech platforms. SoFi eventually has to decide "who are we, what can we sustain?" says Henry Coffey, an analyst at Wedbush Securities. "They want a high market valuation, but they have to deal with the realities of being a finance company." SoFi spokesman Jim Prosser says the company is confident it can grow with its current model.

"We think we can deliver products in a more personalized way"

The startup tries to build a loyal following among young "HENRYs" (high earners not rich yet) and then get them to buy other products and refer their friends. Expanding fee-based products such as wealth management would give the company a buffer if rising interest rates hurt demand for loans. Because SoFi doesn't have retail branches, it connects with customers by holding events such as career advice nights and celebrations for those who've paid off student loans.

Some get extravagant treatment. At a dinner in ▶

PHOTOGRAPH: CHRISTOPHER GOODNEY/BLOOMBERG

◀ New York City, "there was a place mat, and when you turned it over, you see a letter that the special person you took with you wrote for you about your journey to paying off the loans," says Imran Chadry, 29. "I sobbed like a baby." SoFi says it plans to hold 500 events in 2018, up from 41 in 2015. "We found that the return on investment is really quite good," Joanne Bradford, the company's chief marketing officer, says of the gatherings. People who go "refer at a higher rate, take more products from us, and are great at giving us feedback."

The wealth management unit, fully launched in May 2017, had $42.3 million in assets under management as of Jan. 18, according to Prosser. SoFi is arguably late to this particular game: Betterment LLC and Wealthfront Inc., digital wealth management startups, each has more than $10 billion under management. But that may also suggest there's room for the business to grow.

Using a partner bank, SoFi is also starting a service that provides checking and debit accounts. "There's an opportunity to build relationships with our members," Noto said in February. "We think we can deliver products in a more personalized way with better selection, better information, and better value." If SoFi can show investors it's still a threat to traditional banks, the IPO that was first expected in 2015 is still in the cards. *—Julie Verhage and Selina Wang*

THE BOTTOM LINE SoFi has done well by marketing loans to young professionals, but to keep growing, it wants to sell them other products.

The Ancient History of Bitcoin

● Cryptocurrencies may appear frighteningly modern and disruptive. But they can still be regulated

In the 1920s a Florida citrus grower named William Howey hit on a way to raise money from investors. He would sell them strips of land in his groves and tend the trees on their behalf, giving them a share of the profit after the harvest. The transaction was presented as an ordinary sale of real estate, but for practical purposes the buyers had become shareholders in his farm. After Howey died in 1938, the then-new U.S. Securities and Exchange Commission sought an injunction against his company to stop the sales. In 1946 the Supreme Court ruled that Howey's contracts should have been registered with the SEC as securities–essentially, shares of stock.

The court said that what matters is the substance of a transaction, not its form. If it waddles like a duck and quacks like a duck, it's a duck. Keep that wisdom in mind the next time some bluffer tries to dazzle you with a complicated story about cryptocurrencies. When it comes to understanding new technologies, focus on what they do, not how they do it.

Governments and policymakers, like investors, have struggled to wrap their minds around cryptocurrencies. The gyrations of Bitcoin and the like can cause speculators to make and lose fortunes. "I don't really see what the actual true underlying value of some of these cryptocurrencies actually is in practice," Federal Reserve Bank of New York President William Dudley said on Feb. 22. Yves Mersch, a member of the European Central Bank's Executive Board, likened them in a Feb. 8 speech to "the will-o'-the-wisp, a malignant creature that dwelt in marshes" and lured travelers to "their untimely death and a watery grave."

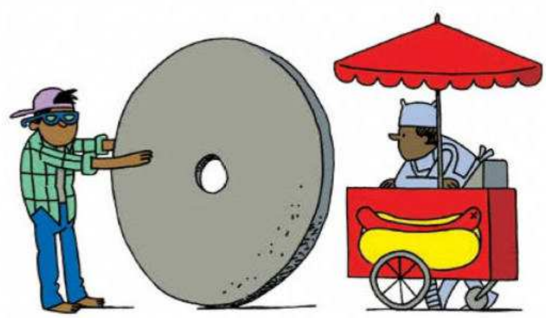


ILLUSTRATION BY DOROTHY GAMBRELL

This is when history can be a guide. Cryptographic money may be new, but money itself is as old as civilization. It's taken the form of beads, barley, tobacco, cowrie shells, and even giant stone discs, like the great rai of Yap in the South Pacific. Experience with other kinds of money hints that the volatility in the value of cryptocurrencies may be incurable, something that could be a fatal flaw for their use as a medium of exchange.

Jesús Fernández-Villaverde, an economist at the University of Pennsylvania, counts himself a cryptocurrency skeptic. He argues that today's ▶

◀ profusion of the exotically named tokens—more than 1,500 have been issued—resembles the 19th century heyday of "free banking," when commercial banks issued their own private-label monies in many countries, including Australia, Sweden, Switzerland, the U.K., and the U.S. In Scotland, the era of free banking lasted for more than a century until it was suppressed by the British Parliament in 1845. During that time Scotland went from poor to nearly as rich as England.

There's one crucial difference between then and now, though, Fernández-Villaverde says, and it has nothing to do with high-speed computing. The difference is that the supply of the currencies could be managed. Scottish banks had a strong incentive to build public confidence in the stability of their currencies, and they calibrated their supply to demand. In contrast, the libertarian appeal of cryptocurrencies is that they can't be controlled by anybody, even their issuers. There is nothing—and no one—to anchor their value. True, there's a cap on the number of Bitcoin that can ever be produced, which is supposed to protect it from hyperinflation, but the chaotic ups and downs in price show that it's vulnerable to speculative inflation and deflation.

Another illuminating precedent for cryptocurrencies is the famous (to economists) story of the Capitol Hill Babysitting Cooperative, which was founded in the late 1950s. Members pay other parents to take care of their kids using scrip—private money—that they earn by taking care of other people's kids. That's similar to the way "miners" create and earn Bitcoin by using computers. The co-op nearly fell apart in the 1970s because families were hoarding scrip to make sure they could afford a babysitter when they needed one. It was revived when the co-op printed more scrip to take away the incentive to hoard. Cryptocurrencies are equally vulnerable to market failure, but there's no scope for a beneficial intervention to match supply and demand, as there is with an ordinary currency managed by a competent central bank, says Fernández-Villaverde.

So far this has been about cryptocurrencies as money, but a lot of the tokens aren't intended to be used as alternatives to dollars, euros, or yen. They have narrower functions for special-purpose digital companies. People who buy them are betting that the issuing companies will succeed. In other words, as in the case of William Howey's orange groves, buyers are effectively acquiring a piece of a business. Since it's substance rather than form that matters, it would seem that these initial coin offerings should be registered as securities and regulated accordingly. SEC Chairman Jay Clayton argued just that last year, citing the Supreme Court case. "Simply calling something a 'currency' or a currency-based product does not mean that it is not a security," he wrote in a statement of his personal beliefs on Dec. 11.

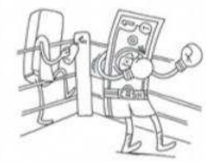
A romantic view persists in some circles that cryptocurrencies are the vanguard of a new era in which governments become less and less important. Legislatures? Unnecessary. Courts? Why bother with them when every contract can be indelibly recorded on the blockchain, the digital ledger that makes cryptocurrencies possible? Well, sure. Except people have been trying to create an unimpeachable record pretty much forever, with limited success. As early as 2340 B.C., the king of Ebla in modern-day Syria sent a diplomatic letter to the king of Hamazi that was like a blockchain, according to a 2017 article in *Ledger*, a journal devoted to cryptocurrency research, by Chris Berg, a postdoctoral fellow at RMIT University in Melbourne. Writes Berg: "Both blockchain protocols and diplomatic protocols raise the costs of opportunistic behaviour through a combination of a permanent record of past dealings, public and ritualistic verification of transactions, and game-theoretic mechanisms of reciprocity."

Maybe blockchain really is a foolproof record of transactions and promises, as its supporters contend. But experience has taught us that it's impossible to make anything foolproof because fools are so ingenious. As are crooks. And no matter how strong a contract you can write, people will find a way to renegotiate. There's even a term, "hard fork," for what crypto types do to fix a problem when the system that's supposedly on autopilot doesn't evolve the way they think it should because of a programming error, a hack, or someone's change of mind.

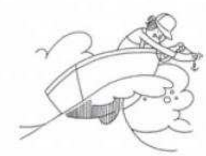
With apologies to the libertarians and anarchists, the best hope for cryptocurrencies is strong regulation that creates public confidence by weeding out crooks and poseurs. In 1970 the economist George Akerlof published a paper called *The Market for "Lemons"* that explained how the market for used cars breaks down if people can't tell which cars are clunkers. Afraid of being cheated, they won't pay very much, so sellers of good cars will withdraw them from the market, leaving only lemons on the lot. Regulation is thus in the interest of legit used-car dealers—and legit cryptocurrency issuers as well. To quote Ecclesiastes: "There is nothing new under the sun." *—Peter Coy, with Matthew Leising and Olga Kharif*

THE BOTTOM LINE From oranges to lemons, there are plenty of historical parallels to cryptocurrencies that both investors and policymakers can draw upon.

● Why cryptocurrencies are so volatile



❶ Cryptos, like dollars, aren't backed by gold.



❷ But dollars are anchored by central banks. Cryptos aren't.

❸ The result is that the price of cryptos is free to gyrate wildly.

ILLUSTRATIONS BY DOROTHY GAMBRELL


WITH THE RIGHT GUIDANCE,
THIS IS SAVING FOR RETIREMENT.
At Transamerica, we've discovered that wealth and health are inextricably connected. Something as simple as packing your lunch can save you $1,080 a year. Show your clients the power of combining wealth and health.
Be part of what's next at Transamerica.com
© 2017 Transamerica Corporation. All Rights Reserved. 21668-ADBRAD1017
Source: Visa Lunch Survey, 2015
TRANSAMERICA®

LOOK AHEAD

- Rate setters at the Reserve Bank of India meet on April 6. They're expected to stand pat.
- The U.S. jobs report arrives on April 6. The betting is unemployment dropped below 4 percent.
- China publishes trade figures on April 12, potentially adding more fuel to its dispute with the U.S.

PHOTO ILLUSTRATION BY HORSE & GOAT MEDIA; PHOTO: GETTY IMAGES

Orchestrating Trade

Tariffs are just one way to shrink a deficit. Here are some other ideas for restoring balance between imports and exports

Is there a better way to reduce the U.S. trade deficit than raising duties on imports? A lot of economists say yes. Some of their ideas are old, some new, and some a little strange. All have been given new life by the Trump administration's tariff offensive, which has sparked fears of a global trade war.

Economists who specialize in trade, coming from both the right and the left, mostly agree with President Trump that big and persistent U.S. trade deficits are a problem, particularly for American workers whose jobs have been displaced by imports. But trade experts say he's wrong to imply deficits are necessarily a sign that a trade partner is cheating. Mexico, for instance, has a surplus with the U.S., but it runs a deficit with the world as a whole in its current account, the broadest measure of trade in goods and services.

Alternatives to jacking up tariffs range from buying foreign currencies in huge volumes to push down the value of the dollar and make American products more competitive, to Warren Buffett's long-standing proposal to require importers to ▶

April 2, 2018

Edited by
Cristina Lindblad

Businessweek.com

◀ buy certificates to bring goods into the country.

The newest idea, and one of the most intriguing, is called the market access charge. It's a tax that would be applied to all foreign purchases of U.S. assets (possibly excluding currency trading to avoid a fight with Wall Street). The level would be set at perhaps half a percent—high enough to discourage inflows of speculative capital but low enough not to discourage foreign investments in long-term assets such as factories. The hope is that dollars diverted from hot-money investments would be spent on American goods and services. The Federal Reserve would administer the access charge, raising or lowering it as needed, and would keep it in place until the current account was in balance.

The idea was conceived by John Hansen, a retired World Bank adviser. The Coalition for a Prosperous America, an organization that represents import-threatened companies and unions, endorsed the market access charge last year. Hansen says the coalition's representatives talked it up in 130 meetings with congressional staffers in mid-March and got strong interest. The charge could succeed in shrinking trade deficits, says Joseph Gagnon, a senior fellow at the centrist Peterson Institute for International Economics. One advantage, he says, is that "it's completely legal under international law." Robert Scott of the labor-supported Economic Policy Institute has also come out in favor. Big banks, however, would likely oppose it, and the public might dislike it for making imports more costly and raising interest rates.

Other concepts directly target the strength of the dollar, which harms domestic producers by making U.S. goods and services more expensive. Gagnon and Peterson Institute co-founder Fred Bergsten propose that when the U.S. is running a big trade deficit, the Department of the Treasury should intervene decisively in currency markets to reduce the dollar's value. Gagnon says the strategy should eventually make money for the government, because the foreign currencies acquired in the process would be worth more in dollars when the dollar sinks to its trade-balancing level.

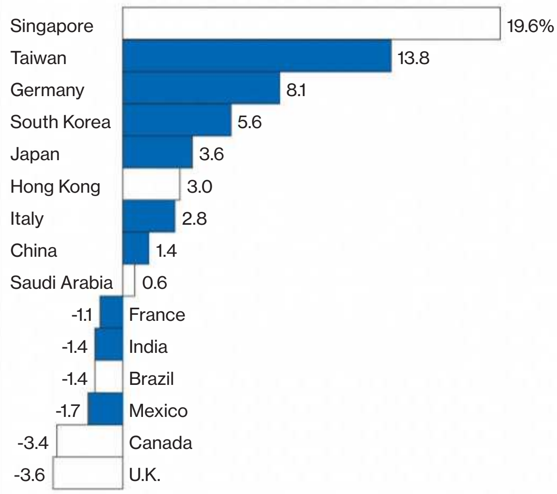
Buffett's import certificate idea has caught the fancy of many economists since he first pitched it in an essay in *Fortune* magazine in 2003. It's essentially the same concept as that which underpins carbon-emission trading. Companies would receive import certificates based on the value of their exports that they could then sell to other companies. The system would discourage imports by making them more costly.

Buffett's plan also resembles countertrade, which the Soviet Union used for decades to

Who Are You Calling a Cheater?

Current-account balance as a percentage of GDP, 2017 estimates

■ Nations with which the U.S. had a trade deficit



DATA: INTERNATIONAL MONETARY FUND, U.S. CENSUS BUREAU

eke out scarce hard currency, observes David Colander, a Middlebury College economist. In a barterlike arrangement, every import into the Soviet Union had to be balanced with an export. The system was clunky and bureaucratic, but it did ensure that the Soviets never ran short on dollars and other major currencies.

A variant of Buffett's plan, designed by Vladimir Masch, a Soviet planner who emigrated in 1972 and went on to work at Bell Laboratories, is called compensated free trade. Rather than putting the onus on companies, compensated free trade would require the governments of surplus nations to make payments to the U.S. for exceeding targeted surpluses. The U.S. could set the payment levels unilaterally.

The threat of a trade war is making once outré ideas seem relatively reasonable. Masch says he used to be told compensated free trade would never fly politically, but that was before Trump. "You can never say never in politics," he says. Levy Economics Institute President Dimitri Papadimitriou agrees that such ideas have greater relevance in these times: "I would suspect that a Buffett-type plan would have a much better hearing now. It would certainly be much more preferable and less dangerous than the one just signed by executive order."

"I would suspect that a Buffett-type plan would have a much better hearing now"

The trouble with many of these ideas is that government intervention is bound to have unintended consequences—a sharp increase in smuggling, for instance. And having to balance imports and exports at all times would deprive the U.S. government of options, says Brad Setser, a senior fellow at the Council on Foreign Relations. The dollars that foreigners use to buy American goods and services wouldn't be available to finance, say, a big American infrastructure program or other investment.

Fortunately, Setser says, there are proven ways to shrink trade deficits that are less extreme. He advocates changing tax laws to discourage offshoring and going after foreign trading practices that really are cheating, such as theft of intellectual property.

The quickest way to achieve more balanced trade, though, would be to shrink the U.S. budget deficit, say Setser and Dartmouth College economist Douglas Irwin, among others. Budget deficits force the U.S. to borrow more from abroad because domestic savings are insufficient to cover government spending and other needs. Trade deficits are the flip side of excess borrowing from abroad.

The $1.5 trillion tax cut that Trump signed at the end of 2017 will only make the U.S. trade deficit worse, experts say. It overstimulates an economy that's already running hot, with a jobless rate of just 4.1 percent, which is bound to suck in even more imports from abroad.

In fact, many economists say, now is not the best time to attempt a reduction in the U.S. trade deficit. An American widget factory that's already running flat-out wouldn't have the capacity to meet domestic demand if Washington curtailed imports of widgets. It's still important for U.S. negotiators to fight genuinely unfair foreign trade practices because they harm individual sectors, but a sharp drop in the overall trade gap now would probably stoke inflation. So while there are plenty of ideas for better orchestrating trade flows, the best thing for Trump to do right now might be...nothing. —*Peter Coy*

THE BOTTOM LINE Trump's brand of protectionism has economists reexamining proposals for how to shrink trade deficits without resorting to punitive tariffs.

We Can't Pay You Much More, But Here's a Sausage

● With unemployment in Germany falling and 1.2 million open jobs, companies are offering perks such as foreign travel and platters of local ham

Jakob Kratsch isn't a Harvard Business School grad, an elite engineer, or a software whiz. He's a 20-year-old manufacturing apprentice. And yet, a century-old factory near the old border between East and West Germany found him so desirable that the company included the possibility of a free trip to New York in his recruitment package.

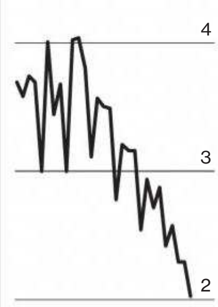
As a top performer in his first year, Kratsch spent three days visiting sites such as the Empire State Building and Times Square and met with management at Harry's Inc., a New York shaving-kit maker that four years ago bought the razor-blade plant where he works. "What kind of young person can go to New York and have their company pay for it?" Kratsch asks during a brief break from the din of the factory floor. "It builds a strong connection."

The scramble for qualified workers has become an existential concern for companies across Germany, which are offering enticements ranging from overseas sojourns to sausage platters. After years of robust growth, unemployment has dropped to just over 5 percent, and the country has 1.2 million unfilled jobs—almost equivalent to the population of Munich. Manufacturing, construction, and health care are particularly stretched, and 1 in 4 businesses may have to hold back production as a result of the crunch, the European Union reports.

Harry's employs about 550 people (and lists almost 40 open positions) in Eisfeld, three hours east of Frankfurt by car. To keep workers happy, it offers extras such as subsidized lunches, English classes, and a share-distribution program. "Talented professionals are hard to find," says Maren Kroll, head of human resources at the plant. "So we have to create conditions that are attractive."

Corporations haven't dramatically boosted salaries, at least so far. Compensation in Germany rose 13 percent in the last five years as unions moderated wage demands to help their companies maintain an edge in the face of global competition. And labor groups have chosen quality-of-life concessions over hefty raises; the country's biggest union this year accepted a lower increase in salaries in exchange for the right to work fewer hours. Even as ▶

● Unemployed people in Germany per open job



DATA: INSTITUTE FOR EMPLOYMENT RESEARCH

◀ Burger

◀ unemployment bottoms out, "I wouldn't expect pay to rocket," says Jamie Murray, chief Europe economist for Bloomberg Economics.

The danger for Germany is that growth could stall if the labor crunch worsens. After the economy expanded 2.2 percent in 2017, the highest rate in six years, the Bundesbank, Germany's central bank, warned that a surge in retirees and slower migration threaten to constrain the supply of labor in future years. "There is a risk that if there aren't enough workers, some things will no longer be produced in Germany," says Raimund Becker, an executive at the federal employment agency.

Many companies look beyond Germany's borders to fill vacancies. About 400 kilometers (250 miles) southwest of Eisfeld, among the steep hills of the Black Forest, an auto parts manufacturer called Burger Group makes a point of recruiting workers from abroad and helping them integrate into the community. The pitch to foreigners–they account for a third of the staff–includes help with Germany's daunting bureaucracy, a welcome platter with local ham and sausages, and frequent social activities such as group hikes, ski trips, and soccer matches. Obeid Allah Norzi, 18, joined a trainee program in September after an odyssey that took him from Afghanistan to Iran, Bulgaria, and finally Germany, where he received political asylum. "I am very happy to be here," Norzi, one of two refugees at the plant, says in near-flawless German.

He services machine tools at the company, which produces gears and other components for Porsche AG and BMW AG, motors for food processors and coffee grinders, and a few mechanisms for cuckoo clocks–which Burger has made since 1856. The business pays for Norzi's German classes, and he lives in one of 60 company-owned apartments around Schonach, a town of 4,000 whose main attraction is the world's largest cuckoo clock.

"Personnel is our bottleneck," says Silke Burger, one of four family members who own and run the company. "We're producing at the limit."

Immigrants have long been a cushion in times of tight labor in Germany, but that's changing. The Bundesbank warns it will get harder for businesses to lure workers from neighboring countries as wages in Eastern Europe catch up. Net migration from those places has eased since 2015, and when more Easterners decide to stay home, locals like Kratsch will be able to be even choosier. "You don't want any old traineeship," he says. "You want to find a company that can offer you something for the long term." —*Carolynn Look and Chris Reiter*

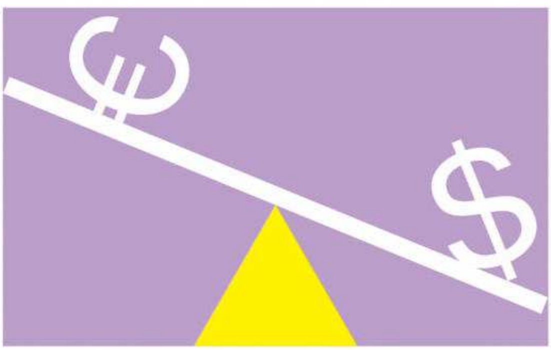
THE BOTTOM LINE German workers are getting lavish recruitment packages as companies scramble to fill jobs, but wage gains have been modest in the face of global competition.

The Euro Is Ready For Its Star Turn

● Central banks are poised to dial up their holdings in the single currency

The euro hasn't looked this good in at least a decade–in the eyes of central bank officials, anyway. European economies are resurgent, and the existential crises that threatened the single currency have receded, at least for the moment. And while President Trump seems intent on sparking a trade war with China, the European Union is pursuing free-trade deals across Asia and Latin America.

Make no mistake, the euro isn't about to dethrone the dollar as the world's reigning reserve currency: The greenback commands the lion's share of the $11.3 trillion of foreign exchange reserves—money or assets held in store by central banks or other monetary authorities. Still, after years of shunning Europe's common currency, reserve managers at some of the biggest central banks are looking to shift more of their holdings into euros, according to financial industry sources who've held regular discussions with them. "A lot of countries around the world are turning to Europe for increased partnership in trade," says Jens Nordvig, chief executive officer of Exante Data LLC and a former currency strategist at Nomura Securities Co. "It's not crazy to think that's also going to be happening in the area of capital markets and reserve allocations." Nordvig



estimates central bankers could add half a trillion dollars to their euro reserves in the next two years. "The bottom line is, this trade stance the U.S. has now is not helpful in terms of making the dollar attractive," he says.

Even a small shift—whether as a hedge against Trump's trade policies or in the name of diversification—could have big consequences. For more than a half-century, the dollar has been the currency of choice for most of the world's central banks, in large part because of its stability. That appetite for dollars feeds demand for Treasury bonds, which in turn helps keep a lid on the U.S. government's borrowing costs. The benefits extend to U.S. multinational companies, because the widespread use of dollars in global commerce often makes it cheaper for them to borrow compared with many of their overseas competitors.

There's been plenty of talk over the years about the need to loosen the dollar's grip on the global economy, with China and Russia among the most vocal proponents. But the euro has never come close to eclipsing the dollar. The euro's share of central banks' reserves peaked at almost 28 percent in 2009, a decade after it was introduced. Then followed a succession of humbling setbacks to the European experiment, including Greece's meltdown and the U.K.'s decision to exit the bloc. Start-stop growth and repeated bouts of deflation also dinged the credibility of the euro, which lost about 30 percent of its value against the dollar from 2010 to 2016.

Two big reasons suggest Europe's single currency is ready to have its moment. The one everyone wants to talk about is the euro zone economy and how it's back from the brink. Last year the 19-country area expanded 2.3 percent. While that may not sound like much, it was the most in a decade and almost four times the annual average over that span. And politically the union is more sound than it's been in years, especially after the May election of Emmanuel Macron in France beat back a populist surge of anti-EU sentiment.

Just as important, perhaps, is the Trump factor. While Wall Street strategists have been loath to point fingers at the Trump administration's "America First" trade policies, there's little doubt that U.S. protectionism could undermine the dollar's global standing over the long term. In early March, Trump tweeted that "trade wars are good, and easy to win" and made good on his promise to hit back at China by enacting as much as $60 billion of tariffs. The administration has also dropped more than a few hints that it prefers a weaker dollar to help U.S. manufacturers.

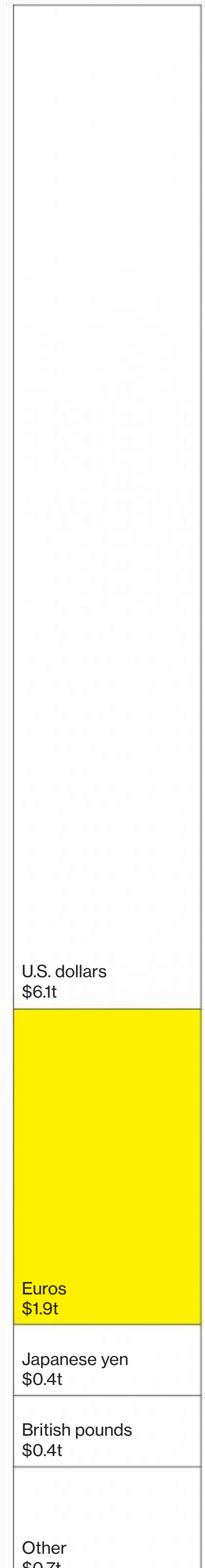
If the administration "not only abandoned the strong-dollar policy but were intent on pushing the dollar down aggressively to secure trade advantages, that would diminish the currency's luster as a reserve asset," says Barry Eichengreen, a professor at the University of California at Berkeley who's an expert on currencies. Like all investors, "reserve managers are trying to read the political tea leaves as well as the financial arithmetic to figure out what's next."

Trump's rhetoric contrasts with Europe's recent moves to forge closer trade ties with China, Japan, and much of Latin America, including Mexico and Brazil. The EU's total trade with China increased 75 percent in the decade to 2016, reaching $590 billion, which puts the bloc on pace to eclipse the U.S. as China's biggest trade partner.

"We think a pickup in reserve demand is right around the corner," says Zach Pandl, Goldman Sachs Group Inc.'s co-head of global foreign exchange strategy, who predicts central banks may funnel $300 billion into the euro over the next one to three years. "A lot of the preconditions that needed to be met are starting to come into view." —*Katherine Greifeld*

THE BOTTOM LINE Central banks are expected to shift more of their holdings into euros in the coming year, potentially to hedge against the effects a trade war could have on the dollar.

● Distribution of central bank foreign currency reserves*



ALEX KRAUS/BLOOMBERG; *AS OF THIRD QUARTER 2017; DATA: INTERNATIONAL MONETARY FUND

LOOK AHEAD

● The presidents of Turkey, Russia, and Iran will hold a summit in Ankara on April 4 to discuss Syria's civil war

● The next round of Nafta trade talks is tentatively scheduled to begin on April 8 in Washington

● On April 10, Mark Zuckerberg will testify before Congress about Facebook's data woes

Inside the Secret Plot To Reverse Brexit

● Chuka Umunna is trying to pull off the impossible—keep Britain in the EU

April 2, 2018

Edited by Matthew Philips and Dimitra Kessenides

Businessweek.com

Early each Wednesday morning, 15 people leave their homes and travel separately to a secret location in central London, where, over coffee and cookies, they plot to stop Brexit. The group includes a mix of women and men, old and young, politicians and activists, though their identities haven't been formally released. The one idea uniting them is opposition to Prime Minister Theresa May's plan for Britain to make a clean break from the European Union.

They're aiming to engineer a new referendum so the British people can reconsider Brexit before it's too late. "I do not want to see Brexit happen. I think it will destroy the futures of the next generation in this country," says Chuka Umunna, the charismatic, 39-year-old member of Parliament who chairs the weekly gathering. "But it's not about what I think—and shouting 'Stop Brexit' is not a political strategy. I want the people to get a vote."

Anti-Brexit campaigners in the U.K. are getting organized because, for the first time since the 2016 vote, they believe they can win. Ever since May made a catastrophic gamble on an early election last June—and lost her majority in Parliament—it's been clear she's in a weak position to lead the country through withdrawal from the EU. In the six months after that fiasco, she's managed to hold her ruling Conservative Party together and navigate the first phase of Brexit negotiations, albeit only after agreeing to pay the other 27 member states a £40 billion ($56.4 billion) divorce bill.

Then came her first legislative defeat at the hands of fellow Tories. On Dec. 13, 11 party members defied her orders in a key vote in the House of Commons on whether Parliament should have a veto over the Brexit deal. The Tory rebels ensured lawmakers will get a binding vote to reject or accept May's final Brexit deal when negotiations with the EU end later this year. This means the prime minister must get an agreement good enough to please her own lawmakers. She can't simply impose her policy on the country.

It's this make-or-break vote, expected sometime in October, that the Brexit resistance is targeting. By lobbying legislators, they hope to block May's deal and trigger a referendum or perhaps a national election. The pro-EU alliance Umunna chairs—which includes Tory rebels in Parliament and thousands of activists around the country—played a crucial role behind the scenes in inflicting the December defeat on May.

Speaking in his office, which overlooks the Palace of Westminster, Umunna says campaigners across the country targeted different members of Parliament in the runup to that vote to persuade them to back the rebellion. The MPs got "an avalanche of emails and hundreds of visits" to their offices, he says.

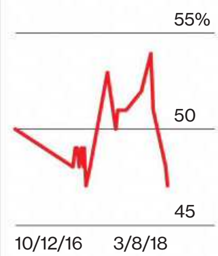
Umunna says the public and politicians increasingly see the dangers of Brexit and are changing their attitude as the risks become clear. A recent leak of a government analysis showed that Brexit could reduce growth by as much as 5 percentage points over 15 years if there's a free-trade deal, or by 8 percentage points if there's no deal at all. The most affected areas are likely to be some of those that voted heavily to leave the EU. "It terrified some people—what it was saying was going to happen in their communities," Umunna says. "If it does happen, and they are still the members of Parliament, they won't be forgiven."

Umunna is always immaculately dressed, a slick media performer who briefly stood for the leadership of his Labour Party in 2015, before what he calls "the added level of pressure" prompted him to pull out of the race. (It was ultimately won by socialist firebrand Jeremy Corbyn.) Until recently, he's been careful to keep quiet about the work of his Grassroots Coordinating Group, as the committee is known. He won't say where or exactly when they meet, since he doesn't want the gatherings to be mobbed by photographers and reporters.

Away from the cameras, Umunna and his allies have been seeking the help of European leaders. On Jan. 15 he joined senior members of the Conservatives, including Anna Soubry, a former business minister, and Dominic Grieve, who served as the U.K.'s Tory attorney general (before masterminding May's December defeat), to visit the EU's chief Brexit negotiator, Michel Barnier, in Brussels. They've met senior officials at other EU institutions, European foreign ministers, and ambassadors from the bloc's remaining member states—even heads of foreign governments. Some of those involved privately confide that the access to senior EU politicians has been "extraordinary."

While EU officials know they must tread lightly to avoid appearing to meddle in British affairs, they're privately feeding valuable intelligence on the unfolding negotiations to their British allies. On March 6, a day before the EU published its draft plan for the next phase of Brexit negotiations, Umunna was in his office, focusing on the bloc's future trade deal with the U.K. He told Bloomberg reporters something not even the British government officially knew at that point: The EU would make clear in its document that its offer of a limited trade deal, with poor access for services such as banks, could be improved—if May backs down on her own strict "red lines," which include leaving ▶

● Share of voting-age British citizens who say they'd prefer to remain in the EU



PHOTOGRAPH BY FELICITY MCCABE FOR BLOOMBERG BUSINESSWEEK; DATA: WHATUKTHINKS

◀ the EU's single market, its customs union, and the jurisdiction of the European Court of Justice.

Umunna's information proved accurate. When the bloc published its guidelines the next day, it said that if May's position "evolves," it would be willing to consider making a better offer. The EU's gambit, which became known as the "evolution clause," was seen as an attempt to divide U.K. strategists over May's hard-line stance. To some of the more paranoid anti-EU campaigners in the U.K., Umunna's prior knowledge of the clause will serve as evidence of an international conspiracy against Brexit.

May's defeat in December was a turning point for politicians in Europe, too. To many EU officials in Brussels and European capitals, Brexit seemed inevitable. Their only hope was to minimize the damage from the split and try to plug the €10 billion hole in the bloc's annual budget that the U.K.'s exit will leave. All that changed after May lost in Parliament. "They recognize that Theresa May does not necessarily have a mandate for her negotiating position," Umunna says. "They are very aware that actually she isn't in the driving seat of this. It is Parliament that will be in the driving seat."

Since January, European leaders have lined up to tell Britain it's free to change its mind. If May—or a different prime minister—were to write to European Council President Donald Tusk to say Brexit is off, the EU would welcome the country back without hesitation, they say. While the bloc continues to take the hardest line in the negotiations, officials have made clear privately that they'll agree to pause the Brexit process to allow for another referendum, and perhaps another election, according to Umunna.

Six of the 10 groups that attend Umunna's Wednesday meetings have moved into the same offices at Millbank Tower, a 10-minute walk from Parliament. Sharing space makes it easier for them to brainstorm and coordinate their campaign strategy. "We've got six months to change the game and get a people's vote on the Brexit deal," says Eloise Todd, chief executive officer of Best for Britain, one of the groups. Partly because it accepts large donations, including £400,000 from billionaire investor George Soros, Best for Britain has become a target of right-wing newspapers campaigning for the U.K. to leave the EU.

Todd reckons the press attacks backfired and fueled a surge of interest in—and donations to—her campaign. She puts the odds of engineering another referendum at "50-50." Her team has trained 2,000 activists in street campaigning techniques. They're gearing up for a massive Remain campaign to build support over the summer, believing only a new vote will have the legitimacy to halt Brexit.

The public is warming to the idea of having the final say, says James McGrory, executive director of Open Britain. With more than 500,000 supporters, his is the largest group attending Umunna's weekly meetings. "This is not a slam dunk, either with the public or Parliament," McGrory says. "People will holler and say, 'How dare you!' But what is absolutely critical is that the democratic argument is on our side."

"This is not a slam dunk, either with the public or Parliament"

But there's no clear evidence another referendum would deliver a different result. To bring about a new national vote, Umunna's alliance will need to persuade enough Conservative politicians to defy the prime minister on an issue that could topple her government. It must also persuade the Labour Party to back its cause. Corbyn doesn't support another referendum, though he hasn't ruled it out in the future.

The first task for the campaign is simply to make more noise so the public and politicians start to listen. Umunna is confident the Brexit resistance will be ready for the fight when it comes. "There is a role reversal now," he says. "We are not the Establishment anymore." —*Tim Ross and Kitty Donaldson*

THE BOTTOM LINE A coalition of anti-Brexit groups and politicians is gearing up for a campaign to force a second referendum by October on the final Brexit deal negotiated by Theresa May.

Finding Your Name On Russia's Hit List

● The nerve-gas poisoning of a former KGB agent in the U.K. has Moscow's foes spooked

It was just before 10 p.m. on Feb. 12, Boris Karpichkov's 59th birthday, when the former KGB agent got an unexpected call at his home in the U.K. It was a Russian secret service friend phoning covertly from mainland Europe to warn him of a hit list with eight names on it. Karpichkov, who'd defected to Britain in 1998, was on the list. So was Sergei Skripal, another ex-Russian double agent.

Karpichkov initially dismissed the warning—he'd faced death threats before. Three weeks later, he changed his mind. On March 4, Skripal and his daughter, Yulia, were rushed to a hospital after collapsing in a crowded shopping mall in the sleepy cathedral city of Salisbury in southwestern England. British officials determined the two—who remain in critical condition and may never recover—were poisoned with a military-grade nerve agent in what the U.K. says is the first offensive use of a chemical weapon in Europe since World War II. A local policeman was also hospitalized, and as many as 130 other people in Salisbury may have been exposed.

The attack, which London and its allies blamed on Vladimir Putin's government, led the U.K. to expel dozens of Russian diplomats. The U.S., along with NATO and 25 other allies of the U.K., followed on March 26 and 27, kicking out about 130 Russian diplomats. Britain is facing calls to crack down on illicit Russian money. Russia, which denies responsibility in the Skripal attack, has vowed to retaliate in kind for the expulsions.

The Skripal case disturbingly echoes the 2006 death of ex-Russian spy Alexander Litvinenko, who was killed with radioactive polonium slipped into his tea in London. A week after Skripal's poisoning, a second Russian exile and Putin critic was murdered at his London home. Police are reexamining 14 suspicious deaths in the U.K., dating to 2003, of opponents of Moscow and others with links to Russia.

Karpichkov arrives for a secret meeting with *Bloomberg Businessweek* in London in a black hat and dark glasses, clearly anxious. He says he's suffering from post-traumatic stress disorder because he's living in constant fear and gets only four hours of sleep a night. He's installed closed-circuit surveillance cameras around his home at his own expense. "How long is it going to go on? Who is going to be next?" Karpichkov demands to know from the British authorities. "I can ask to be removed to Mars or to the moon. What will it change? Nothing."

While Prime Minister Theresa May scored a diplomatic coup by persuading many other nations to expel Russian diplomats, the trail of corpses raises the question: Why have British authorities been so slow to act? Billions of dollars of Russian money have rushed into the U.K. since the 1990s, but billionaire oligarchs with ties to Putin have been allowed to remain. Britain said on March 28 that it would review visas for 700 wealthy Russians. When she was minister in charge of interior affairs, May "fought like a tiger" to stop a public inquiry into the Litvinenko murder for fear of causing a total rupture with Russia, says Jeff Rooker, an opposition Labour member in the Upper House of Parliament. "London is the capital of money laundering," he says. May at the time said "international relations" were a factor in the decision not to allow a public inquiry into Litvinenko's death.

▲ Karpichkov

CHRIS RATCLIFFE/BLOOMBERG

The 14 suspicious deaths have been attributed to suicides, natural causes, and accidents and not treated as murders. A British lawyer with links to Russia died in a mysterious helicopter crash in 2004. The badly decomposed body of another man, a British spy, was found in 2010 in a locked sports bag in the bathroom of his London apartment. In 2013, Boris Berezovsky, a Putin foe, was found hanged in his bathroom. In 2016 a U.K. scientist who helped detect the amount of polonium in Litvinenko's body was found dead in his kitchen from stab wounds.

Putin's spokesman, Dmitry Peskov, declined to comment on whether Russia was involved in the deaths, saying only that Moscow is ready to consider helping in the investigation if London asks. The Foreign Ministry on March 28 accused Britain of "systematically" failing to protect Russian citizens.

Mikhail Khodorkovsky, a former billionaire and Kremlin opponent who was freed after 10 years in prison and now lives in exile in London, believes there's worse to come. "A nuclear weapon has already been used, a chemical one, too, which leaves just a biological one in the arsenal, and this time no one will be able to do anything," he says.

Now living in an undisclosed U.K. location under an assumed name, Karpichkov already survived two attacks in New Zealand. After a beggar threw dust in his face in central Auckland in November 2006—a few weeks after Litvinenko was poisoned—Karpichkov lost 30 kilograms, one-third of his body weight, in two months. Four months later he fell ill again after finding mysterious amethyst-colored crystals on the carpet in his home.

In the 1980s, Karpichkov rose to the rank of major in the KGB; he kept working for Russian intelligence in his home country of Latvia after it gained independence in 1991. He later was a CIA informant and defected to the West with boxes of secret documents. He says the British should offer him better protection. Chris Phillips, who from 2005 to 2011 headed the U.K.'s National Counter Terrorism Security Office, wants the police to ▶

● Suspicious Demises

- Stephen Moss, 46, British lawyer, heart attack, 2003
- Stephen Curtis, 45, British lawyer, helicopter crash, 2004
- Igor Ponomarev, 41, Russian diplomat, heart attack, 2006
- Yury Golubev, 64, co-founder of Yukos Oil, heart attack, 2007
- Danny McGrory, 54, British journalist, brain hemorrhage, 2007
- Badri Patarkatsishvili, 52, Georgian businessman, heart attack, 2008
- Gareth Williams, 31, U.K. intelligence worker, found dead, 2010
- Paul Castle, 54, U.K. property tycoon, jumped under train, 2010
- Robert Curtis, 47, U.K. property tycoon, jumped under train, 2012
- Alexander Perepilichnyy, 44, Russian whistleblower, heart attack, 2012
- Boris Berezovsky, 67, ex-Russian oligarch, found hanged in his bathroom, 2013
- Johnny Elichaoff, 55, U.K. businessman, fell from shopping center car park roof, 2014
- Scot Young, 52, U.K. property tycoon, fell onto railings, 2014
- Matthew Puncher, 46, U.K. radiation expert, stabbed to death, 2016

◀ ensure Karpichkov's safety. He says of the hit list given to the ex-spy, "I would certainly be concerned if I were them."

On the list are several other Russian defectors, as well as Bill Browder, a U.S.-born British financier who's become public enemy No. 1 for Russia's government since he started campaigning for sanctions against Russian officials over the death of Sergei Magnitsky, the tax lawyer for Browder's Hermitage Capital Management Ltd. investment fund. Magnitsky died in a Moscow prison in 2009 after uncovering an alleged $230 million tax fraud. Three years later, a Russian whistleblower who provided information to Swiss authorities about the same fraud died near his U.K. home. In one of the 14 suspicious deaths, he collapsed while jogging after ingesting a rare toxic Chinese plant that triggers cardiac arrest.

"My life has been at risk for years," says Browder, whose London office is accessible only to people escorted by security. He called for action to rein in illegal Russian money flows from corrupt officials and oligarchs into the U.K. The Skripal attack should be a "wake-up call for Britain," Browder says.

Complicating the task of the British police are the close links between organized crime and the Russian intelligence agencies. Five Berezovsky business associates died in mysterious circumstances from 2008 to 2014, one suffering a heart attack, two jumping under subway trains, one falling off the roof of a department store, and the last plunging to his death from an apartment to be impaled on railings.

Russian secret services can use all kinds of drugs to stage murders that don't appear to be homicides, according to former counterterrorism chief Phillips. "Any trained assassin knows there is more than one way to kill someone," he says.

Marina Litvinenko, the widow of the dead spy, who succeeded only after a lengthy legal battle to get a public inquiry that pointed the finger at Putin for the assassination, also urges a crackdown on dirty Russian money. "Do you want another incident like this? Or do you want British citizens to decide that their government can't protect them?" she asks.

Karpichkov, who was trained as a KGB assassin though he says he never killed, echoes that sentiment. "If it was me tasked to take someone out in this country, it is doable—not only in the United Kingdom, basically anywhere in the world," he says, before pulling on his hat and sunglasses and vanishing. *—Kitty Donaldson, Henry Meyer, and Irina Reznik, with Stepan Kravchenko*

THE BOTTOM LINE A defector says Skripal, the ex-spy who's in critical condition in the U.K. after being poisoned, won't be the last victim of Russian foul play—and that he may be next.

Budget Smoke and Mirrors

There's less than meets the eye to some of the victories Republicans and Democrats have claimed after passing the $1.3 trillion omnibus spending bill. —*Sahil Kapur*

The Border Wall

What they say	What the bill says
Republicans: The measure makes a down payment on President Trump's promised southern border wall, to the tune of $1.6 billion in funding.	Reality: Some of the money in the bill may be used for planning the development of a wall. But the law limits any construction of a physical barrier to fencing and levees.

Gateway Tunnel Project

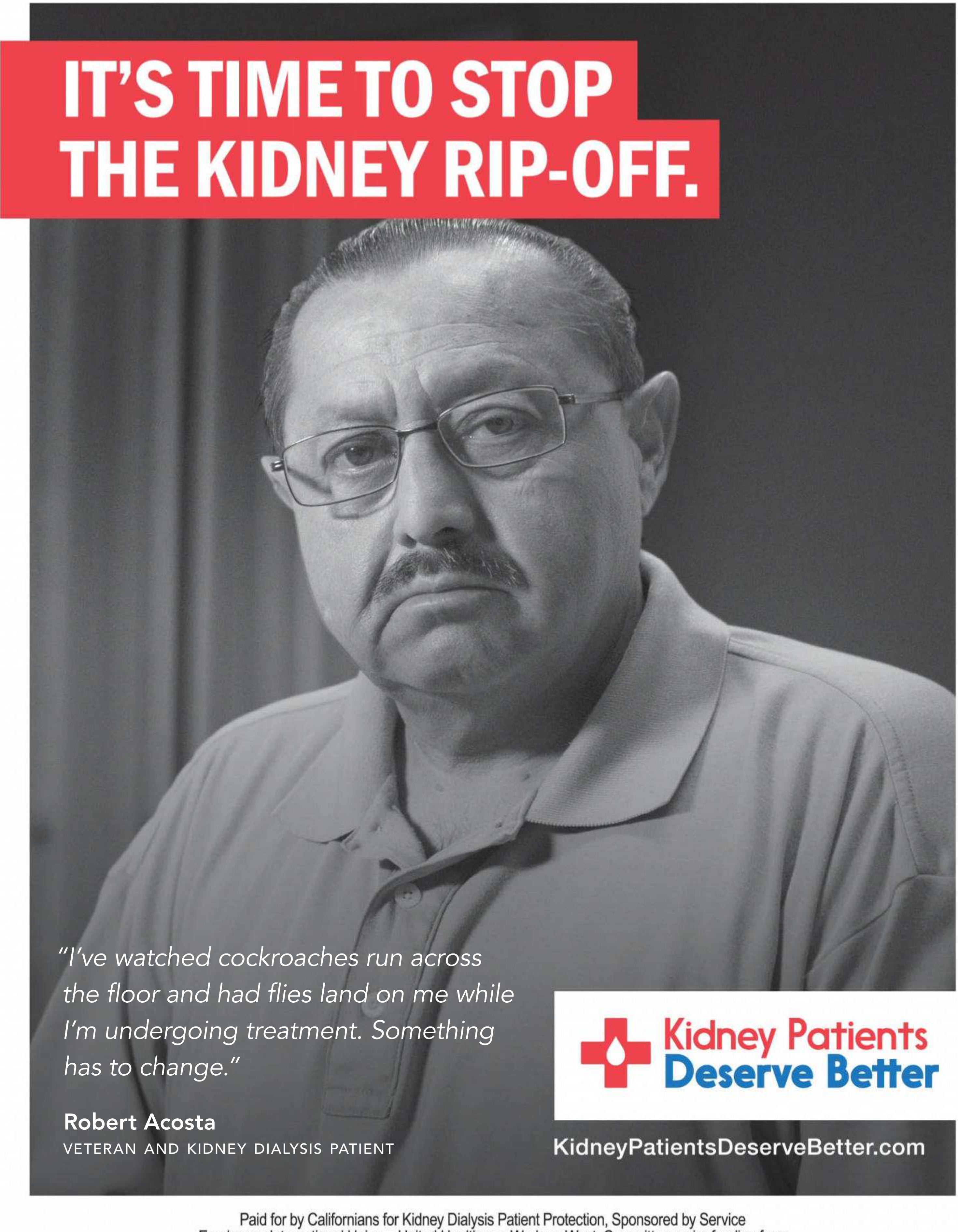
Northeastern lawmakers: Amtrak funding of $540 million could be used for the tunnel connecting New York and New Jersey, along with $2.9 billion in grant money the project could bid on.	Reality: No money is specifically earmarked for Gateway, which Trump opposes, and the $2.9 billion is subject to approval by the Department of Transportation.

Gun Control

Proponents such as Republican Senator John Cornyn of Texas: By adding the Fix NICS Act to the spending bill, Congress took a rare step to combat gun violence.	Reality: The act makes no changes to gun laws; it merely gives agencies an incentive to comply with existing rules and report information to the background-check system.

"You want to make these win-win situations where everybody can talk about what they got and not how they got screwed."
—*Tom Davis, former Republican congressman from Virginia*

ILLUSTRATION BY TOMI UM


IT'S TIME TO STOP
THE KIDNEY RIP-OFF.
"I've watched cockroaches run across the floor and had flies land on me while I'm undergoing treatment. Something has to change."
Robert Acosta
VETERAN AND KIDNEY DIALYSIS PATIENT
Kidney Patients Deserve Better
KidneyPatientsDeserveBetter.com

Volkswagen's Peace Offering

By Matthew Campbell, Christoph Rauwald, and Chris Reiter

Photograph by Travis Rathbone

Can the German giant atone for its diesel scam by becoming the electric car maker of the future?

As the world's largest automaker, Volkswagen in some ways better resembles an army or a country than a mere corporation. Its flagship factory in Wolfsburg, Germany—a city built from scratch by the Nazis for the express purpose of manufacturing vast numbers of automobiles—spreads over an expanse the size of Monaco and produces more than 3,000 vehicles every day. It is electrified by not one but two Volkswagen coal plants. It is fed by a 3,400-person Volkswagen catering brigade and a sausage-making operation so comprehensive it sells to supermarkets. Here and at more than 100 other factories worldwide, the company's 12 brands make 355 models in millions of color and trim combinations, employing more than 600,000 people who generate $284 billion in annual revenue.

It's hard to imagine that such a robust corporate edifice could ever be at risk of collapse, as it was less than three years ago, when Volkswagen AG was consumed by one of the largest scandals in automotive history. The revelation of a systematic effort to cheat on emissions tests—employees wrote software that made diesel cars appear cleaner than they were—brought the company to its knees, ended the career of its longstanding chief executive officer, and shattered a 70-year reputation for engineering-led competence. For a time it looked like Volkswagen might not survive, at least not recognizably, a prospect so alarming in Germany that Chancellor Angela Merkel stepped in to do damage control for what is arguably the country's most important industrial giant.

And yet today—$30 billion in compensation and repair costs and 11 million affected vehicles later—Volkswagen is, improbably, back on the offensive. Last year the Volkswagen portfolio of brands—including Audi, Porsche, and Bentley—comfortably defended its global sales crown from a challenge by archrival Toyota, in large part because revenue is soaring in China. Volkswagen's profits, and shares, have largely recovered to pre-catastrophe levels. It's even growing again in the U.S., a market its namesake brand considered abandoning. Consumers' willingness to forgive Volkswagen is remarkable, given the enormity of its wrongdoing: Scientists at the Massachusetts Institute of Technology estimated the extra pollution generated by its rigged cars will eventually contribute to more than 1,200 premature deaths.

Emboldened by this unexpectedly rapid rehabilitation, CEO Matthias Müller, 64—a Volkswagen lifer who received a battlefield promotion from running Porsche when the crisis claimed his predecessor—is attempting to reimagine the company for the electric vehicle age. Volkswagen late last year embarked on by far the largest program of electrification in the global car industry, pledging to spend €20 billion ($25 billion) to develop battery-powered or hybrid variants of every one of its models by 2030. Müller's goal is to make EVs, currently concentrated at the high end of the market, cheap and commonplace, inspired by Volkswagen's own 1960s Beetle, which was instrumental in bringing mass-market driving to postwar Europe.

Transformation won't come easily to Volkswagen. It's fighting thousands of investor and customer lawsuits that will keep it in court well into the 2020s, and criminal probes into some aspects of the diesel fiasco are still active. Its powerful unions have a de facto veto over any major strategic change and have long resisted efforts to reform a sprawling, costly corporate structure. And as the entire automotive world faces an unprecedented threat—the rapid shift of a car from something consumers buy to a service they order on demand, probably with no driver involved—Volkswagen's insular culture will make adapting to new ways of selling mobility a huge challenge.

The company is nonetheless in a much better position than was imaginable not long ago. Its leaders are even daring to suggest that the diesel crisis may ultimately prove to have been a good thing, at least from their perspective: a trauma that forced Volkswagen to ask hard questions about its operations and strategy and what a carmaker will need to look like to survive the 21st century.

The crisis was "an unmistakable wake-up call—a warning that things couldn't stay the way they were," Müller said in Berlin in March. "It told us there was a need for radical change," he continued, "change that would have previously been unthinkable or, at the very least, impossible to implement."

On Sept. 20, 2015—just after the U.S. Environmental Protection Agency accused Volkswagen of rigging software to make cars that generated 10 to 40 times the legal levels of smog-causing nitrogen oxide appear compliant with the rules—its top executives gathered for an emergency meeting in Wolfsburg. Virtually everyone present was male and German, most of them engineers or scientists by training—not an ideal team to handle a dramatic public-relations crisis playing out primarily across the Atlantic.

As one of its first decisions, the group dispatched then-CEO Martin Winterkorn to record a two-minute apology video. It was a disaster. Standing in front of a white background in a Wolfsburg studio and speaking in stiff, staccato German, an ashen Winterkorn said he still didn't know the full extent of what had happened, but described the cheating as a result of "terrible mistakes made by only a few." The strained tone and clunky production brought to mind a kidnapping victim's forced appearance in a ransom video, rather than a commanding corporate leader demonstrating control of the situation.

Things only got worse. The U.S. Department of Justice began laying the groundwork for criminal charges against some staff, and authorities in France, Canada, Germany, and South Korea began their own inquiries. Within a few days of the EPA going public, Volkswagen shares lost a third of their value. Winterkorn's attempts to blame the cheating on a few bad apples were widely ridiculed. A 30-year Volkswagen veteran with a doctorate in metallurgy, he was notorious for scrutinizing the tiniest production details—chastising underlings when he deemed chrome parts inconsistently shiny or gaps between metal panels too large. After Winterkorn bowed to investor pressure and resigned in late September, Volkswagen's board emerged from a seven-hour meeting to

"You would have wondered a year ago to what extent Volkswagen was going to follow through on their headlines, but it's really happening, and they're serious"

CEO Müller

Chairman Pötsch

name Müller as his successor. (It later appointed a new chairman, Hans Dieter Pötsch.)

For Müller, it was a move from perhaps the best job in autos to the worst. He'd spent the previous five years as CEO of Porsche, delivering considerable profits and cultivating a reputation for cheerful informality—at least by the standards of German automotive executives—with stunts such as joining the Porsche pit crew at Le Mans, ditching his usual suit for a mechanic's outfit. In his new job, he adopted a graver tone: "This crisis," he told a tense gathering of workers in a hangar-size Wolfsburg production hall shortly after taking charge, "is about the very core of our company and our identity." Volkswagen, he said later, was in for "a painful process."

The beginning of Müller's tenure easily lived up to that warning. He didn't seem prepared for scrutiny; the German press lambasted him for turning up at a black-tie ball in Leipzig and an auto race in Bahrain as the crisis deepened. Meanwhile, the list of models alleged to have used rigged software kept expanding, eventually including Porsches—undermining Müller's untainted image. In January 2016 he told an incredulous U.S. radio interviewer that the software spoofing was a "technical problem" and that Volkswagen hadn't lied about its cars—hardly indicative of a grasp of the gravity of the situation. Not long afterward, the company took the extraordinary step of delaying its scheduled earnings release, an ominous sign that it didn't have a handle on the damage. Industry analysts' estimates of the final bill to recall rigged cars, compensate buyers, and pay fines ranged as high as $80 billion, significantly more than Volkswagen's market capitalization. Some predicted that a breakup of the group, with units put on the block in a fire sale to pay that bill, was a probable outcome.

Volkswagen, however, caught some very lucky breaks. In the U.S. it had the good fortune to be in trouble after previous megascandals, including BP Plc's 2010 oil spill, had helped create an infrastructure for consolidating the claims of state and federal regulators, along with the bulk of customer lawsuits, into a single legal proceeding. That process, which was partly overseen by former FBI Director Robert Mueller—then working in private practice as a sort of unimpeachable referee for hire—allowed its U.S. outlay, while enormous, to become something of a fixed quantity relatively quickly. That meant executives could begin to plan for their ultimate exposure. (The main settlement cost Volkswagen $14.7 billion.) The company also benefited from a judge—Charles Breyer, of the U.S. District Court in Northern California—who guided the legal proceedings in an uncommonly efficient manner. Another advantage: the media spotlight rapidly shifted to a more sensational story than sneaky firmware, namely the presidential campaign of Donald Trump.

Volkswagen was also fortunate that the vast majority of the affected cars were sold in Europe, where rules on nitrogen oxide emissions, unlike those for carbon, are less stringent than in the U.S. European Union rules stipulate that the decisions of an automaker's home-country regulator typically prevail across the 28-nation bloc, and in Germany, Merkel's administration ruled that Volkswagen could simply modify the vehicles, instead of forcing it to offer the buybacks and compensation that were required in the U.S. As a result, Volkswagen is now coming to the end of a process to repair about 8 million European cars, mainly with inexpensive software upgrades that brought their emissions into compliance with the rules.

The scale of the crisis at Volkswagen nonetheless provided an opportunity for Müller and his team to eliminate some costly sacred cows. One of the first was the Phaeton, ▶

LINO MIRGELER/PICTURE-ALLIANCE/DPA/AP PHOTO

“It told us there was a need for radical change, change that would have previously been unthinkable or, at the very least, impossible to implement”

The SUV I.D. Crozz is one of three concept electric vehicles VW has slated for release in 2020. Planned features include:

◀ an ungainly luxury sedan beloved by former Chairman Ferdinand Piëch and seemingly no one else. Priced at almost €90,000 and assembled by hand in a factory with hardwood floors and glassed-in viewing stations for the public, the Phaeton represented a bizarre bet that high-end buyers would prefer an over-engineered Volkswagen to a BMW, Mercedes, or, for that matter, an Audi. Just 4,000 were made in the year before the model was killed off.

Müller handed over the Wolfsburg building that housed the Phaeton's engineering team to a new unit charged with rapidly developing EVs. He also began work on a new deal with Volkswagen's unions. Previously, they'd helped ensure that Volkswagen employed two-thirds more staff than Toyota Motor Corp. to produce roughly the same number of cars. Volkswagen's vehicles have far more components produced in-house than competitors' cars do: Items from seats to transmission parts are made internally, largely by well-paid German workers. The unions and Müller ultimately agreed to a 30,000-person reduction in Volkswagen's workforce. Out also went an events budget lavish even by the standards of the publicity-focused auto industry. Before the crisis, Volkswagen had routinely booked the likes of Justin Timberlake to appear at product launches; nowadays the music pumped in is recorded.

Moving Volkswagen into the future, rather than just past the immediate effects of the emissions scandal, would require more dramatic change. Diesel was at the core of Winterkorn's strategy, billed as sportier and better for the environment than gasoline. With “diesel” suddenly synonymous with “fraud” for many customers, Müller needed a different approach. He unveiled it at an event in Paris in September 2016: the I.D., a battery-powered hatchback with a range considerably longer than Tesla Inc.'s lowest-priced vehicle and intended to bring electric propulsion to the masses. The car, Müller said, was a symbol of “a new Volkswagen”—one that might still be apologizing, repeatedly, but was ready to move forward, too.

While every automaker is pushing into EVs, levels of ambition vary widely. The Asian giants—Toyota and Hyundai Motor Co.—are betting on exotic technologies such as fuel cells while also investing in hybrids. U.S. automakers, on the whole, are moving slowly because of their home market's reluctance to reckon with climate change. None is committing nearly as much capital as Müller's Volkswagen. The company's goal is for EVs to account for as much as 25 percent of global sales by 2025—when they will still represent just a small fraction of worldwide demand. The Paris event kicked off 18 months of increasingly ambitious pronouncements on Volkswagen's EV plans, from a €10 billion pledge to develop new models in China to a €20 billion deal announced in March to secure battery deliveries through the early 2020s, part of a total of €50 billion earmarked for battery purchases. Such big spending is made possible, in part, by Volkswagen's unusual shareholding structure. The state of Lower Saxony, where Wolfsburg is located, owns 20 percent of the voting rights, and can almost always be counted on to support job-preserving expansion.

Volkswagen is “absolutely more ambitious on EVs than the other global giants,” says Max Warburton, an automotive analyst at Bernstein Research in London. “You would have wondered a year ago to what extent Volkswagen was going to follow through on their headlines, but it's really happening, and they're serious.”

Early on a Tuesday morning in February, a team of investigators from the Munich prosecutor's office arrived unannounced at Audi's headquarters in Ingolstadt, just outside the Bavarian capital—a hulking, glassy office block inscribed with the luxury brand's slogan, "*Vorsprung durch Technik*," or "Progress through technology."

Employees stood aside as the investigators fanned out, boxing up documents and pulling hard drives. The Audi staffers knew the drill: The raid was the second at the HQ in less than a year and followed searches of a half-dozen executives' homes a week earlier, part of an ongoing German inquiry into the unit's role in the diesel scandal. The investigation is distinct from probes into Volkswagen as a whole and is focused on whether Audi had its own software-based diesel-rigging program and could lead to criminal fraud charges.

Audi, which contributes more to Volkswagen's profit than any other brand, has been roiled by the investigation. One senior manager, who asked not to be identified discussing the internal mood, said workers are exhausted by the one-thing-after-another drumbeat of bad news. A certain gallows humor prevails across the Volkswagen group; some employees have taken to joking, when praised for doing a good job, "Yeah, well, I just modified my software."

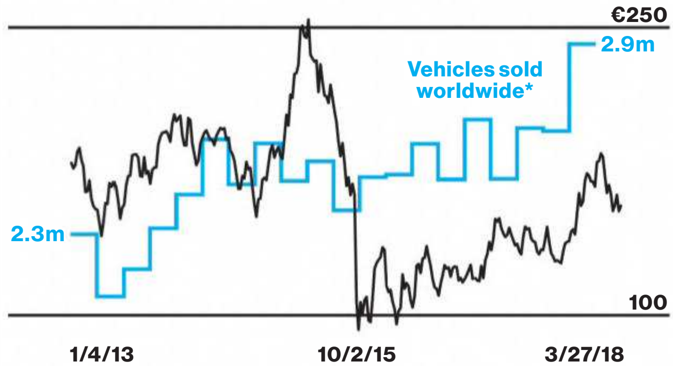
For Müller and his team, the Ingolstadt raid was an unpleasant reminder that the diesel scandal will have quite a long tail. BP provides a cautionary example. The oil producer is still paying for the Deepwater Horizon spill almost eight years on, and in January it announced a further $1.7 billion hit, bringing the total bill to about $65 billion. More than €9 billion in legal claims are outstanding against Volkswagen, including suits from investors who argue it disclosed the rigging program too late.

As it tries to limit the pain from those cases, Volkswagen must navigate another major challenge: persuading consumers to buy diesel cars again. Even with aggressive development, it will take another half-decade or more for EVs to be consistently profitable, especially at the lower end of the market—batteries are still simply too expensive. One example: An electric Volkswagen Golf starts at more than $30,000 in the U.S., compared with $21,000 for the conventional model.

Until prices come down, Volkswagen and other German carmakers need to keep selling diesels, which produce less carbon than comparable gasoline cars, to meet EU emissions requirements while still making money. With billions in capital investments sunk into diesel, "they don't want to have the transition happen too quickly and disruptively," says Stefano Aversa, a managing director at corporate advisory firm AlixPartners LLP.

For Volkswagen, this means trying to pull off a tricky two-step. It must sell consumers and investors on a shimmering electric future, while also restoring their faith in old-fashioned diesel—a technology that Müller, with exquisite Teutonic awkwardness, praises as "a very comfortable drive concept"—in the here and now. Current evidence suggests it's not working. Diesel cars currently account for about a third of sales in Germany, down from half before the cheating crisis. Many German cities have considered barring from their downtowns some older diesel engines, which can contribute far more to smog than gasoline counterparts. In Germany the issue has great political import;

VW's Share Price Plummeted. Sales Didn't



*QUARTERLY. DATA: COMPILED BY BLOOMBERG

Merkel convened two "diesel summits" last year with car-industry bosses and municipal leaders, at which she tried to come up with compromises to head off urban bans that would devastate German automakers.

Volkswagen in the meantime is trying to prepare for the future as best it can. At the Geneva International Motor Show in early March, Müller took the stage to unveil the I.D. Vizzion, an electric sedan that will be on sale from 2022. (It will follow the release of an SUV called the I.D. Crozz; apparently, nonstandard orthography will be another defining feature of 21st century cars.) From next year, the company plans to release a new EV or hybrid model every month. It's also investing in so-called mobility services through Moia, a new unit that will begin offering ride-sharing in Germany this year with a fleet of Volkswagen-built electric shuttles.

Yet as impressive as Volkswagen's recent performance may be, its ultimate success is uncertain and fragile. Until recently, access to natural light at its offices was determined by seniority; a company that hierarchical is an unlikely candidate to out-innovate Silicon Valley in data science and mobility services.

And its leaders still live in fear of the catastrophic damage that could result from another scandal, whether from fresh malfeasance or skeletons from its precision-machined closets. They had a taste in January, when reports surfaced of a series of tests, funded by Volkswagen and other German carmakers, measuring the effects of diesel exhaust on monkeys sealed in an airtight chamber. The experiments would have provoked outrage anywhere, but were especially horrifying in Germany, for obvious historical reasons. (Volkswagen condemned the testing and suspended an executive who had been aware of it.)

Müller, who's become noticeably less relaxed and approachable since leaving his job at Porsche, sometimes appears haunted by the responsibility of keeping Germany's industrial crown jewel clear of another disaster. At an all-hands meeting of managers in mid-March, he showed colleagues a bracelet he wears every day as a symbol of his stated priorities, a leather band engraved with the phrase "trust and honesty." Words to live by, certainly—and a reminder that despite its unexpected success, Volkswagen still has a long way to go to rebuild. B

—*With Elisabeth Behrmann and Dimitra Kessenides*

COURTESY VOLKSWAGEN

‘The
and *fi*
mor
for m

ey go out
nd the
ons
ne’

How Facebook helps shady advertisers pollute the internet

By Zeke Faux

It was a Davos for digital hucksters. One day last June, scammers from around the world gathered for a conference at a renovated 19th century train station in Berlin. All the most popular hustles were there: miracle diet pills, instant muscle builders, brain boosters, male enhancers. The "You Won an iPhone" companies had display booths, and the "Your Computer May Be Infected" folks sent salesmen. Russia was represented by the promoters of a black-mask face peel, and Canada made a showing with bot-infested dating sites.

They'd come to mingle with thousands of affiliate marketers—middlemen who buy online ad space in bulk, run their campaigns, and earn commissions for each sale they generate. Affiliates promote some legitimate businesses, such as Amazon.com Inc. and EBay, but they're also behind many of the shady and misleading ads that pollute Facebook, Instagram, Twitter, and the rest of the internet.

The top affiliates—virtually all of them young men—assemble a few times a year to learn the latest schemes and trade tips about gaming the rules set by social networks and search platforms. They think of themselves as kin to the surfers-slash-bank-robbers of the 1991 movie *Point Break*, just more materialistic, jetting from nightclub to Lamborghini race while staying a step ahead of the authorities. One San Diego crew took in $179 million before getting busted last year by the Federal Trade Commission for violating three laws governing online conduct.

The Berlin conference was hosted by an online forum called Stack That Money, but a newcomer could be forgiven for wondering if it was somehow sponsored by Facebook Inc. Saleswomen from the company held court onstage, introducing speakers and moderating panel discussions. After the show, Facebook representatives flew to Ibiza on a plane rented by Stack That Money to party with some of the top affiliates.

It was hard to believe that Facebook would cozy up to disreputable advertisers in mid-2017 as it was under intense scrutiny from lawmakers and the media over revelations that Russian trolls had used the platform to influence the 2016 presidential election. Officially, the Berlin conference was for aboveboard marketing, but the attendees I spoke to dropped that pretense after the mildest questioning. Some even walked around wearing hats that said "farmin'," promoting a service that sells fake Facebook accounts.

Granted anonymity, affiliates were happy to detail their tricks. They told me that Facebook had revolutionized scamming. The company built tools with its trove of user data that made it the go-to platform for big brands. Affiliates hijacked them. Facebook's targeting algorithm is so powerful, they said, they don't need to identify suckers themselves—Facebook does it automatically. And they boasted that Russia's *dezinformatsiya* agents were using tactics their community had pioneered.

When I asked who was at the heart of this game, someone who could explain how the pieces fit together, the affiliates kept nominating the same person. He was a Pole who'd started out as an affiliate himself, they said, before creating a software program called Voluum—an indispensable tool they all use to track their campaigns, defeat the ad networks' token defenses, and make their fortunes. His name was Robert Gryn.

Gryn strutted into Station Berlin like a celebrity, wearing a trim gray suit, a shiny gold watch, and gold-rimmed mirrored sunglasses. He was trailed by a personal videographer, and men he didn't recognize ran up to him for bro hugs.

Only a few years ago, Gryn was just another user posting on Stack That Money. Now, at 31, he's one of the wealthiest men in Poland, with a net worth estimated by *Forbes* at $180 million. On Instagram, he posts pictures of himself flying on private jets, spearfishing, flexing his abs, and thinking deep thoughts. Last year he posed for the cover of *Puls Biznesu*, a Polish financial newspaper, with his face, neck, and ears painted gold. Gryn's prominent cheekbones, toned biceps and forearms, perfectly gelled pompadour, and practiced smile lend him a resemblance to his favorite movie character: Patrick Bateman, the murderous investment banker played by Christian Bale in *American Psycho*.

"I'm Robert Gryn, and when I'm not playing games or trying to build billion-dollar startups, I like to live life to the fullest," he tells the camera in the trailer for his vlog, drinking from a mug that says "I'M A F---ING UNICORN."

When I introduced myself in Berlin, Gryn suggested we decamp to a nearby bar, saying he was tired of getting so much attention. His online bravado was just an act, he said; in person, he preferred to affect a humble naiveté, as if he couldn't believe where luck had taken him. He told me that having money taught him that materialism is unfulfilling. "Life is like the most beautiful game," he said, sipping a beer in the sun, speaking in unaccented English he'd learned in international schools. "Money is just the high score."

Gryn estimated that users of his tracking software place $400 million worth of ads a year on Facebook and an additional $1.3 billion elsewhere. (He later showed me reports that roughly support those figures.) It's not just affiliates who think Gryn is at the pinnacle of the industry. In June, just before the conference, Facebook's newly installed executive in charge of fighting shady ads, Rob Leathern, had invited him to the company's London office to explain the latest affiliate tricks.

The basic process isn't complicated. For example: A maker of bogus diet pills wants to sell them for $100 a month and doesn't care how it's done. The pill vendor approaches a broker, called an affiliate network, and offers to pay a $60 commission per sign-up. The network spreads the word to affiliates, who design ads and pay to place them on Facebook and other places in hopes of earning the commissions. The affiliate takes a risk, paying to run ads without knowing if they'll work, but if even a small percentage of the people who see them become buyers, the profits can be huge.

Affiliates once had to guess what kind of person might fall for their unsophisticated cons, targeting ads by age, geography, or interests. Now Facebook does that work for them. The social network tracks who clicks on the ad and who buys the pills, then starts targeting others whom its algorithm thinks are likely to buy. Affiliates describe watching their ad campaigns lose money for a few days as Facebook gathers data through trial and error, then seeing the sales take off exponentially. "They go out and find the morons for me," I was told by an affiliate who sells deceptively priced skin-care creams with fake endorsements from Chelsea Clinton.

Facebook has recently put more resources into weeding out scams. But for years, even as the company's total ad revenue reached into the billions, it assigned few engineers to the matter. Ben Dowling, one of only three such employees when he was hired in 2012, says Facebook was focused on checking whether ads followed policies about things such as the percentage of text and images, and not on catching people with bad intentions. "They definitely didn't want them, that was totally clear," Dowling says, but "they weren't particularly effective at stopping them." (He left Facebook in 2014.) The company hired a few dozen reviewers in Austin and Hyderabad, India, to look over ads that users or algorithms had flagged as questionable and ban accounts that broke the rules. But affiliates evaded them using a subterfuge they call "cloaking." It was easy, especially if you were running Voluum.

Gryn's software allows affiliates to tailor the content they deliver according to a number of factors, including the location or IP address associated with a user. The feature is useful for ad targeting—for example, showing Spanish speakers a message in their native language. But it's also a simple matter to identify the addresses of Facebook's ad reviewers and program campaigns to show them, and only them, harmless content.

Those who were caught and banned found that this was only a minor setback—they just opened new Facebook accounts under different names. Some affiliates would buy clean profiles from "farmers," spending as much as $1,000 per. Others would rent accounts from strangers or cut deals with underhanded advertising agencies to find other solutions.

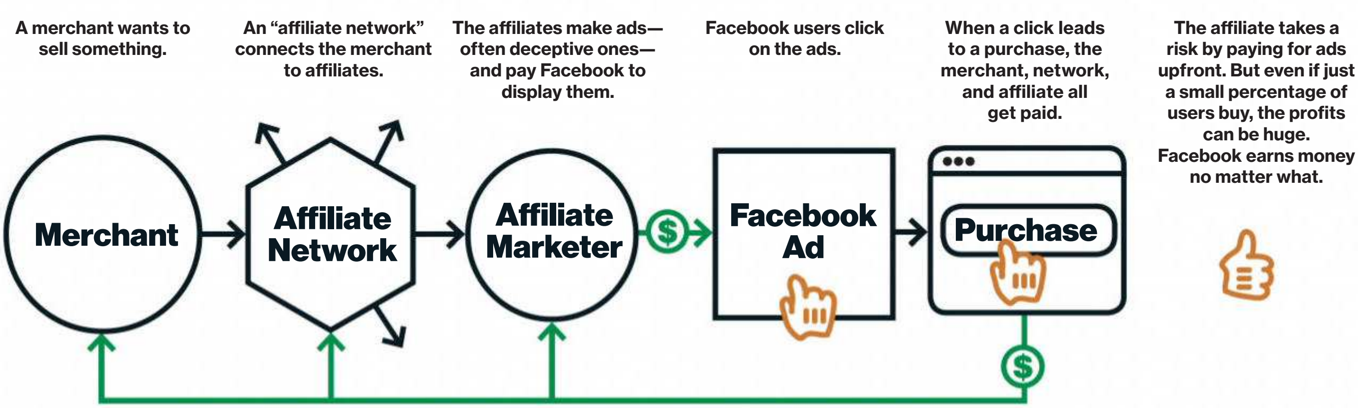
Affiliates say Facebook has sent mixed signals over the years. Their accounts would get banned, but company salespeople would also come to their meetups and parties and encourage them to buy more ads. Two former Facebook employees who worked in the Toronto sales office said it was common knowledge there that some of their best clients were affiliates who used deception. Still, the sources said, salespeople were instructed to push them to spend more, and the rep who handled the dirtiest accounts had a quota of tens of millions of dollars per quarter. (He left Facebook last year.)

"We are deeply committed to enforcement against malicious advertisers and protection of people's data," David Fischer, Facebook's vice president for business and marketing partnerships, said in a statement. "We require all employees to follow our code of conduct and act in the best interest of both people and advertisers on Facebook." In February 2017, the company hired Leathern, a 43-year-old South African ad startup founder, who'd drawn attention for writing a series of online posts about what he described as "subprime ads." His work for Facebook has progressed amid unceasing criticism that the social network is helping create a society in which little can be trusted—a fever that reached a new intensity with the disclosure that a Trump-connected consulting firm, Cambridge Analytica, acquired the data of 50 million users without their permission.

In a sense, affiliate scammers are much like Cambridge Analytica. Because Facebook is so effective at vacuuming up people and information about them, anyone who lacks scruples and knows how to access the system can begin to wreak havoc or earn money at astonishing scale.

Leathern's job is to police a $40 billion-a-year ad platform that malicious players are constantly trying to subvert. In August he announced Facebook would start using artificial ▶

How Affiliates Profit Off Facebook



◀ intelligence to disrupt cloaking. He declined to describe the process, saying he didn't want to give tips to bad actors, but he said the practice has been reduced by two-thirds. Facebook is adding 1,000 people to its ad review team, and it's banned ads for cryptocurrencies, which were popular with affiliates. Leathern has started engaging with journalists on Twitter—and occasionally he reaches out to individual users. "Thanks for letting us know about this," he wrote to William Shatner on March 21, after the actor complained about an ad that claimed he was dead. ("I'm not planning on dying," the actor replied to Leathern, "so please continue to block those kinds of ads.")

The majority of deceptive advertisers are caught in the review process, Leathern said, and Facebook has no interest in profiting from those who slip through. "We are working hard to get these people off the platform," he told me. "Winter is coming. They may get away with it for a while, but the party's not going to last."

I caught up with Gryn a second time in January in Santa Monica, Calif. He'd moved from Krakow to a $20,000-a-month beachfront apartment two months earlier and had already embraced the lifestyle, with a collection of flat-brimmed hats, a bike for riding on the boardwalk, and a ketogenic diet that forbade eating outside a single four-hour window.

Gryn employs 88 programmers nine time zones away in Poland, and when I visited, he'd fulfilled his management responsibilities by 9 a.m. as usual. He told me he'd decided to share his story because he felt a duty to show young Poles that they can succeed as entrepreneurs without relying on government graft. "This postcommunist mentality—I'm shattering that, unshackling part of our society from that trapped thinking," he said. "It's insane, really. It scares me sometimes."

He said he'd grown up among Poland's elite, the son of a mobile phone executive, with a beach home in Spain and a cabin outside Warsaw where his grandmother taught him to forage for mushrooms. But he was depressed as a child, and when he was older, he had to be taught how to smile. Nothing he learned in school excited him. He paid even less attention in college and graduate school, though he obtained a master's in marketing. His real education came on the internet.

Around 2009, Gryn moved to Prague to intern at a company called Elephant Orchestra, which specialized in selling ads on misspelled domain names such as facebok.com. Elephant Orchestra was so profitable that its founder, then about 26, produced a feature-length movie about typo domains and got Václav Havel, the former Czech president and anti-communist hero, to make a cameo. The company's customers were affiliates. Soon, Gryn discovered Stack That Money and other forums where they posted about their millions. The posters were people like Ryan Eagle, who'd made a fortune as a teenager in suburban Chicago and acquired a chrome-covered Bentley, iced-out watches, a diamond-encrusted chain-mail mask—and a nasty drug habit. ("When you're a real douche bag," says Eagle, now


Gryn

30 and sober, "the douchey things find you.") Other posters came from the world of professional pickup artists—people such as Mark van Stratum, who wrote a memoir called *Drug of Choice: The Inspiring True Story of the One-Armed Criminal Who Mastered Love and Made Millions*.

Once Gryn realized that what the affiliates were doing wasn't hard, the possibilities excited him so much that he sometimes couldn't sleep. "It's like striking gold," he said. "You almost panic."

Gryn found the affiliates at a moment when they were discovering social media. They'd begun applying tricks on Facebook that had been invented by email spammers, who'd in turn borrowed the tactics of fax spammers in the 1980s and '90s. New forms of media have always been hijacked by misleading advertising: 19th century American newspapers were funded in part by dishonest patent medicine ads. Within days of Abraham Lincoln's inauguration, the makers of Bellingham's Onguent were placing ads claiming the president had used their product to grow his trendy whiskers.

Fake personal endorsements and news reports are still the most effective tricks. Dr. Oz, the *Shark Tank* judges, and *Fixer Upper* co-host Joanna Gaines are among the most popular imprimaturs, though Eagle favored Kim Kardashian. After she complained to TMZ that her name was being used without permission to promote colon cleanses, he bragged on an affiliate forum in 2009 that the ads were his.

PHOTOGRAPH BY ANGIE SMITH FOR BLOOMBERG BUSINESSWEEK

The latest products include Enhance Mind IQ—or Elon's Smart Pills, as they were called in a recent Facebook ad falsely suggesting that the Tesla Inc. co-founder had talked them up on *60 Minutes*. The checkout page says the pills are free, though buyers must still submit a credit card number. Online reviews are full of victims complaining of the subsequent recurring $89-a-month charges. Other affiliates use deceptive pictures to sell junky watches, dresses, and flashlights from Chinese factories. *Shark Tank*'s Barbara Corcoran says she frequently fields complaints from people duped by skin-cream ads on Facebook featuring her face. Two of her own sisters fell for the scam, Corcoran told me. "I send out so many cease-and-desist letters," she said. "But it's very hard to track down the source."

Around 2011, Gryn started running a "Free iPhone" offer in Poland. It was his breakthrough. The lottery had real winners, but entrants had to agree to be billed a few zlotys ($1 or so) a week. It brought in more money than Gryn was earning at Elephant Orchestra, and he quit to do affiliate marketing full time. In 2012, when he was 24, his revenue hit $1 million. The next year his broker flew him to Las Vegas to celebrate with other affiliates. Photos show a nerdy-looking Gryn smiling next to an Oompa Loompa his hosts had hired for a candy-themed party. The group paid thousands of dollars at a club to chug vodka from light-up multiliter bottles as big as beagles. Gryn felt awkward and shy, but he knew he wanted more. "It was absolute decadence," he said. "I just wanted to ride that wave."

Also in 2013, Gryn bought out Codewise, a web development company in Krakow he'd hired to create a campaign-tracking tool. The software had modest but supremely useful features, such as tracking campaigns on multiple platforms—Facebook, Google, Twitter, etc.—in one place and altering content based on a user's country. Gryn branded it Voluum and began offering it to other affiliates. On the first day of sales, 1,000 customers signed up, at a minimum of $99 a month. (Gryn said some clients now pay thousands of dollars a year, based on usage.) He and his employees donned suits for the occasion, spraying Champagne around the office as the Twista song *Sunshine* played on repeat.

Voluum is intended for ad tracking and targeting, not trickery, Gryn said. Dishonest affiliates could apply other software to the same ends. "We're not in the business of policing the internet," he said. "If we ban people from Voluum, they'd be doing the same thing somewhere else the next day. At least we consolidate the bad apples in one place."

As affiliate marketing boomed, so did Codewise. Revenue reached $39 million in 2015, according to a statement Gryn provided me. Google banned Voluum over cloaking concerns, but that didn't derail the company—Facebook was where the action was. In January 2016, Gryn met with American investment bankers who told him they could get $200 million or more for Codewise, which he owns outright. He turned them down.

Gryn hired a public-relations agency and developed an online persona in keeping with his newfound wealth. For his 30th birthday, he rented a villa in Ibiza, hired 15 "pool girls" as entertainment, and flew in eight of his friends on a private jet for a weeklong party that cost $250,000. When he got back to Poland, he rented a giant billboard in Krakow and put up an ad with his face and the message "Don't Be a Corporate Slave. Join Poland's Fastest Growing Startup." In February 2017, *Forbes* put him on the cover of its Polish edition, naming him the country's 57th-richest man. He started getting recognized around Krakow and receiving fan mail from young people inspired by his story.

Inevitably, there was a backlash. One writer for a technology website called Spider's Web said Gryn's company facilitated fraud and scams. Others made fun of his Instagram account and its evident lack of self-awareness. Gryn fired his PR shop and called his critics "gypsies" in an online post. He posted a slogan on his office wall: "If nobody is criticizing you, you're not doing anything extraordinary."

Still, the disapproval hurt. He went to Phuket, Thailand, cleared his mind by training as a Muay Thai fighter for three weeks, and decided to move to California, where he'd fit in better. "In Poland, people can't stomach success," he said. "They associate it with stealing or thievery."

Sitting on a bench on the Santa Monica pier after a ride on the Ferris wheel, I asked Gryn about the ethics of affiliate marketing. He said he'd stopped doing it himself, because he started to get handwritten complaints from people who'd entered his iPhone sweepstakes and couldn't figure out how to cancel the recurring charges. "I had no idea that this is what it's doing to people," he said. "As an affiliate marketer, you just look at the numbers. You don't see the faces. You don't see the people that you're potentially financially hurting. It just sucks money out of the poorest people."

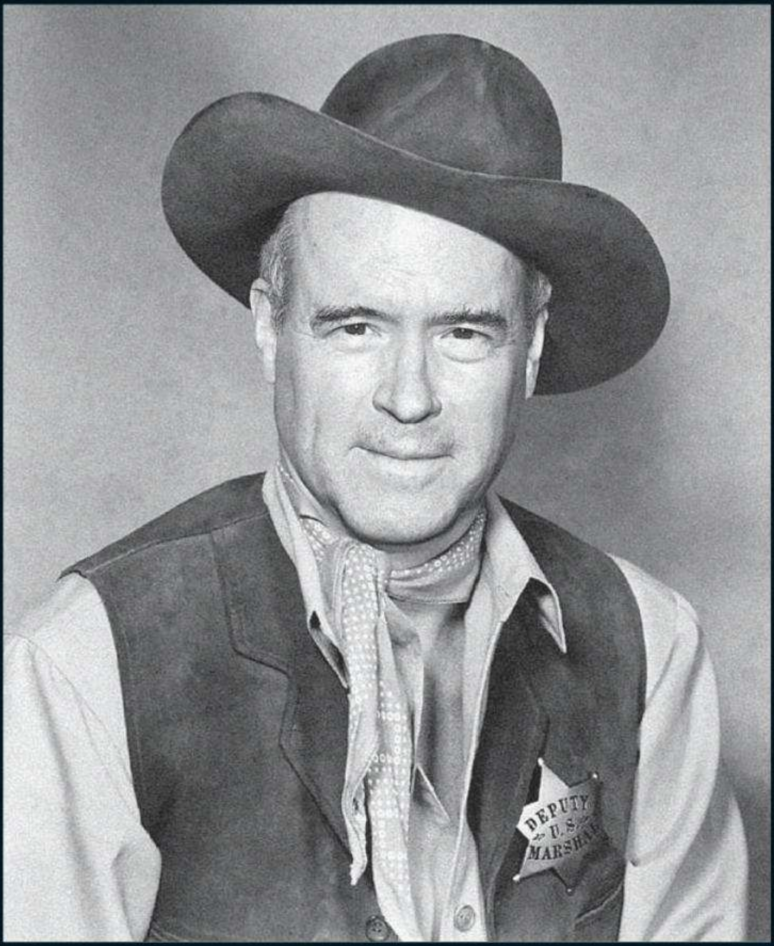
But affiliates, he continued, aren't really to blame. They're just taking advantage of opportunities created by large corporations in a capitalistic system built around persuading people to buy things they don't need. Gryn said he daydreams about changing directions and doing something positive for the world. He's considering investing in sustainable fish farming or going back to school to study mushrooms, like the ones he used to forage for with his grandmother. "Everything I do is futile," he said, staring out at the ocean, listening to seagulls caw. "No matter how successful a company I build in this space, I am facilitating what I deeply believe is a poorly designed system."

The moment passed quickly. "You can't abandon the skill set that makes you successful," he said. "You'd have to be some sort of hippie." As we walked back along the boardwalk to his apartment, he talked about his plan to raise tens of millions of dollars for Codewise by creating a cryptocurrency. Gryn said the token will enable him to revolutionize the affiliate-marketing business, cut out other middlemen, and build a billion-dollar company. Also, there was his 32nd birthday to plan. He was thinking of going back to Ibiza. Ⓑ

Robert Mercer

is

THE RICHEST GUN IN THE WEST



The enigmatic investor was secretly volunteering as a cop in a tiny desert town. Why? To obtain an item that's impossible to buy

By Zachary R. Mider

Photo Illustration by 731

Robert Mercer probably would have flown into Roswell. From there—1,800 miles from home—he would've traveled south through the high desert plains of southeast New Mexico, flat as a tortilla, past abandoned homesteads and irrigation machines moving in slow circles.

His phone reception would've gotten spotty when he turned left off Highway 285. He would've seen the bare limbs of a pecan orchard and a graveyard decked in plastic flowers. At the town hall in Lake Arthur, population 433, he would've met Police Chief William Norwood, the department's sole full-time employee, a barrel-chested man with two spare rifle magazines on his belt. There, Mercer, the fabulously wealthy computer scientist who helped bankroll the election of President Donald Trump, would've reported for duty as a volunteer policeman.

If Mercer's trips to Lake Arthur resembled my recent visit, he might've climbed into the passenger seat of Norwood's police truck, whose black-and-white paint job is fading in the wind-whipped sand. He and Norwood might've rolled past the house where someone reported spotting a stolen car—a false alarm, it turns out. While monitoring radio chatter, the plutocrat and the chief might have jawed about the latest news in a town so small it has no stores: the recent pursuit of a motorist across half the county; the record of the high school's six-man football team; reports of stolen pecans. Pulling up a chair at an Italian restaurant in nearby Hagerman, the chief might've urged Mercer to try the lasagna.

For most of the past six years, as Mercer became one of the country's political kingmakers, he was also periodically policing Lake Arthur, according to the department. If he followed Norwood's protocols—and Norwood insists no volunteers get special treatment—he would've patrolled at least six days a year. He would've paid for travel and room and board, and supplied his own body armor and weapon.

Until a few months ago, Mercer, 71, ran what is arguably the world's most successful hedge fund. He employs a phalanx of servants and bodyguards and owns a 203-foot yacht named *Sea Owl*. He was the money behind Breitbart News and Steve Bannon, whose fiery populism helped propel Trump to the White House, as well as the data firm Cambridge Analytica, which shaped the campaign's messages. Shortly after the election, Mercer donned a top hat and welcomed the president-elect to a costume party at his seaside mansion on Long Island. What was a guy like that doing in the desert, wearing a gun and a shiny badge?

I was surprised when I first heard about Mercer's sojourns in Lake Arthur, but then I'm used to his surprises. During the two and a half years I've covered Mercer, I've come to think of him as a hard-right version of that guy in the beer commercials, the Most Interesting Man in the World. There seems to be an inexhaustible supply of incredible-but-true Mercer stories, including his pioneering research that begat Google Translate, his funding of a stockpile of human urine in the Oregon mountains, his million-dollar model train set, and his habit of whistling constantly, even during work meetings. The common threads in these stories are a fierce intelligence, a wide-ranging curiosity, and an utter indifference to the judgment of others. The story of his adventures in Lake Arthur, which hasn't been previously reported, adds yet another strand. It shows just how far a man of means will go to get something he can't buy: the right to carry a concealed firearm anywhere in America.

The Mercers don't talk to the press, and Robert Mercer wouldn't tell me why he started volunteering for the Lake Arthur police. When I went there to see for myself, I found that it was unlike any police department I'd come across. Norwood and three part-timers are buttressed by 84 reserve officers, most of whom live hundreds or even thousands of miles away. There are Lake Arthur reservists in San Diego and Virginia Beach. Several are among the most elite soldiers on Earth—former U.S. Navy SEALs. Many are high-dollar bodyguards or firearms instructors, and almost all of them are serious gun enthusiasts. On that count, Mercer fits right in. He once built a personal pistol range in his basement. Through a company he co-owns, Centre Firearms Co., he has a vast collection of machine guns and other weapons of war, as well as a factory in South Carolina that makes assault-style rifles.

Over our own lunch at Piccolino, the Italian place, Chief Norwood passed me a copy of his department's newsletter, the *Blue Heeler*. One picture shows reservists training in a two-man sniper-spotter team. The sniper is kitted out in a mesh veil for camouflage and appears to be firing from inside a kitchen. Another shows a door with a hole blasted through it, the result of an exercise in "explosive breaching." The newsletter gave the impression that Norwood was running his department as a sort of high-octane club for guys who subscribe to *Guns & Ammo*. It was hard to imagine these skills being put to heavy use in Lake Arthur, where reservists' official duties include finding lost pets.

Even the coolest drills wouldn't explain why Mercer would go to the trouble of getting a Lake Arthur badge. With his connections in the gun world, he wouldn't need to travel all the way from Long Island to have some weekend fun on the range. And if he just wanted to serve the public and wear a uniform, he could choose from several police auxiliary programs without leaving his home county.

Then I learned that in 2012 several of Mercer's associates had set up a nonprofit in Georgia blandly named the Law Enforcement Education Organization. Among the founders were Mercer's son-in-law George Wells and Wells's longtime friend Peter Pukish—both of whom were also Lake Arthur volunteers. Chairing the group was former Georgia Representative Robert Barr, a Mercer lawyer and National Rifle Association board member who got pranked in the 2006 mockumentary *Borat*. (The movie captures his sour expression when he's told the cheese he just ate was made from a woman's breast milk.) Tax records suggest Mercer gave the group's sister foundation more than $400,000, and his gun company became a sponsor. The purpose: to educate local authorities across the ▶

PHOTOS: SYLVAIN GABOURY/PATRICK MCMULLAN; STR/AFP/GETTY IMAGES

◀ country about the rights of off-duty police officers to carry concealed weapons. The group showed up at police conferences and handed out brochures and moon pies.

States vary widely in their approaches to regulating concealed weapons. But in 2004, Congress passed the Law Enforcement Officers Safety Act, declaring that police officers can carry concealed guns in any state with no need of a local license. The law applies to officers who are off-duty and out of their jurisdiction—and includes volunteer reservists.

The law made a police badge an immeasurably valuable item in places such as Suffolk County, N.Y., where Mercer lives, and where concealed-carry permits are granted only rarely. Applicants must prove they face "extraordinary personal danger"; in 2016 the county rejected the request of a man who had helped the FBI take down an outlaw biker gang. Even if Mercer did get a local permit, it wouldn't be valid if he traveled to New York City or to most other states. For people in Suffolk who want to carry, the Law Enforcement Officers Safety Act is a tantalizing way to cut through all of that—if they can find a police force that will grant them its tin.

Since the law took effect, a few police and sheriff's departments around the country have been rumored to hand out badges to buddies or in exchange for cash. The gun community calls them "badge factories." Questions about whether Lake Arthur was such a place swirled last year on a popular gun chat room, after a noted firearms expert from North Carolina who was also a reservist got drunk and accidentally shot his brother-in-law in the leg. (Norwood quickly stripped him of his badge.) It's not clear exactly when or how Mercer became aware of Lake Arthur's reserve corps. But he became an officer on Dec. 10, 2011, and since then, Mercer and his son-in-law have supported the town generously. Their foundation underwrote a grant for some Lake Arthur officers to get SWAT training in Las Vegas. Separately, Wells helped start a reserve officers' association that apparently directed tens of thousands of dollars to the department.

At lunch, Norwood ordered a salad and insisted that his department was no badge factory. "It's a big help to me, I'll tell you that," he said of the reserve program. "It's better than going out to a domestic violence call way out in the county all by yourself." Norwood's head was closely shaved, and he had a hint of reddish stubble on his cheeks. He was dressed from head to toe in black tactical gear, and a patch on his chest gave his blood type as O+. Norwood refused to discuss Mercer or any other individual reservist but said that if a person simply wanted concealed-carry rights, volunteering for his squad wouldn't be worth the trouble: Department rules require 96 hours of patrol work and 20 hours of training a year. He added that while reservists are encouraged to carry their weapons off-duty for protection, they're not allowed to use their concealed-carry privileges for outside work. (Later, after I showed Norwood the LinkedIn accounts of two men who seemed to be doing just that—security contractors touting their ability to carry guns anywhere—the men faced "severe" disciplinary action, a department spokesman said.)

Norwood formed the reserve program in 2005, not long after he joined the department. With the nearest backup a half-hour or more away, he didn't like the idea of patrolling solo, so he turned to a couple of Army buddies for volunteer help. The program expanded by word of mouth. At one point a few years ago, there were almost 150 reserve officers—that'd be a ratio of one to every 2.9 residents—and Norwood, who prefers patrolling to paperwork, acknowledged he wasn't giving the program the oversight it needed. In 2016 a reserve captain took over administrative duties, tightened up policies, and cut the number of reservists almost in half. Last year, Norwood stopped accepting new members altogether. But even this smaller force is enough to provide him with a visiting reservist or two on any given day, free of charge.

"There may have been some abuses in the past," said the administrator, Oliver Brooks, who lives 200 miles away and joined us for lunch. "But whenever we find out about them, we take action."

After a formal request under New Mexico's open-records law, Norwood sent me documents showing that Mercer, Wells, and Pukish joined on the same day in 2011. Mercer and Wells left the department last September, and Pukish stayed on until February. Brooks said he didn't know why they left; Pukish declined to comment, and Wells didn't respond to inquiries.

Many of Mercer's links to the gun world flow through Wells, who's married to the youngest of Mercer's three daughters, Heather Sue. She deserves a beer commercial of her own. A talented placekicker, she made Duke University's football team in 1995 and then sued the coach for sex discrimination when he refused to let her suit up. She won. Later, after running a bakery in New York with her sisters, Heather Sue moved to Las Vegas and gambled for high stakes. She played $25,000 no-limit hold 'em six-handed at the 2010 World Series of Poker, placing 15th. She married Wells, one of the family's bodyguards, the next year.

Wells had previously worked as a firearms trainer and a security contractor in Iraq, and he once had a sideline making concealed-carry holsters out of elephant and ostrich skin. Soon after the marriage, he got a new job: Wells and Mercer joined with other investors to acquire Centre Firearms, a longtime Manhattan dealer that specialized in outfitting movies and TV shows, and Wells became its president.

Mercer and Wells wanted to expand beyond props, and they soon entered talks with Daniel Shea, a Nevada arms dealer who had a world-class collection of machine guns. His wares included 19th century antiques, a Stinger antiaircraft missile launcher, and the fake grenade launcher that Al Pacino wielded in *Scarface*, according to documents filed in subsequent litigation. He also rented guns to video game makers. If you play certain *Call of Duty* titles, you hear their thunder. But Shea was far more than a mere collector: He had brokered arms deals in Jordan and Serbia and trained U.S. commandos on obscure weapons they might face in the field.

Centre agreed to buy the assets of Shea's company, Long Mountain Outfitters, for as much as $8 million, with Mercer providing the cash, court documents show. Shea stuck around to introduce the new owners to his contacts in the U.S. government and foreign militaries. In a November 2013 business plan, Centre executives described their aim to become "the leading international supplier of arms and training." As part of their strategy, they wrote, they would "use our relations with government contacts and politicians."

Wells put his friend Pukish in charge of the Nevada operations, located in an industrial park in a Las Vegas suburb. Pukish is a martial-arts master who once ran a dojo, as well as a training business called Chaos International. In online profiles he claims to be expert in jiujitsu, kuntao knife fighting, and the Japanese healing art of reiki. Meanwhile, in early 2014, Mercer and his partners acquired a warehouse in the Ridgewood neighborhood of Queens, N.Y., and moved much of Centre's East Coast inventory there. (Ed Leiter, a former owner of Centre who visited the site recently, said the stash includes an Mk 19 belt-fed grenade launcher, capable of hurling 60 explosives per minute. Leiter said he thinks it's used for training.)

But Centre's partnership with Shea quickly collapsed. In November 2014, Centre sued Long Mountain Outfitters in Nevada, accusing Shea of keeping guns he was supposed to hand over. Shea denied that and countersued, alleging Pukish was running the business into the ground and that sales trips the two of them had taken to Washington, D.C., Israel, and Jordan had been a disaster. The parties settled the lawsuit on undisclosed terms. Shea left the company, and Centre kept most of his armory. (Through his lawyer, Shea declined to comment.)

While Mercer's foray into international arms dealing struggled, he moved in another direction: manufacturing guns himself. In 2016, Centre acquired South Carolina's PTR Industries Inc., the maker of a civilian version of a Cold War-era German battle rifle called the G3. PTR hasn't disclosed its investors and declined to comment for this story. But according to a person with knowledge of the matter, Mercer appeared at the plant one day in early 2016 and went on an hourslong tour, flanked by Centre executives and a woman said to be Mercer's nurse. He asked a few questions about the production process but was otherwise silent, the person said. Around plant employees, PTR's chief executive took to calling the visitor "Mr. M."

Lake Arthur, N.M.

Population

433

Reserve officers

150*

*roughly, at peak

Trump's victory seemed to vault Mercer to the center of American political power. His two closest political advisers, Bannon and Kellyanne Conway, helped lead the campaign and then moved to the White House, and his daughter Rebekah, who oversees his political and charitable spending, won a leadership role on the transition team. But Bannon has since been cast out of the president's circle, and Rebekah tossed him from Breitbart News. Liberal activists hounded investors in Mercer's hedge fund, Renaissance Technologies, until he announced in November that he would step down as co-CEO. And Cambridge Analytica is at the center of a tech and political firestorm after revelations that it improperly harvested the personal data of 50 million Facebook users without their knowledge.

Trump's win appears to be, at best, a mixed blessing for Mercer's gun interests. The president supports a House measure requiring states to recognize concealed-carry permits regardless of where they were issued—essentially offering civilians the same workaround Mercer got from Lake Arthur—but after the school shooting in Parkland, Fla., the measure's chances in the Senate grew dimmer. On the corporate front, it's unclear if Mercer's gun company has won any government contracts. And with a gun-rights supporter in the White House, civilian purchases of assault-style rifles have plummeted from Obama-era highs. Remington Outdoor Co., among the nation's largest gunmakers, declared bankruptcy on March 25.

Mercer didn't get into the gun business to get rich; the Bloomberg Billionaires Index values his wealth at almost $1 billion. But his family seems to be having fun. They've shown off their guns to political allies, taking them to a vault deep under the streets of Manhattan or to the warehouse near Las Vegas and pointing out some of the more remarkable weapons. Visitors, speaking on condition of anonymity, say the spaces are laid out like high-end clubhouses, with fully stocked bars. And in January, Mercer's manufacturer rolled out a new product: a civilian version of the German submachine gun known as the MP5. It offers a 30-round magazine and an optional threaded barrel for attaching a silencer. It retails for $1,899.

Mercer would've used a more modest gun at the marksmanship tests he was required to pass annually to keep his Lake Arthur badge valid. To qualify, he might've headed to the local range, in a desolate part of Hagerman, where a bulldozer has piled up berms of earth on three sides. A fellow reservist would've planted a man-shaped paper target at a distance and called out instructions, timer and clipboard in hand: "Two rounds, kneeling position." Mercer would've dropped to a knee and fired. "Two rounds, center mass." Mercer would've taken aim, felt the trigger against his finger, and sent two more bullets out into the desert. Ⓑ —*With Joshua Green*

Lowe and Marina Abramovic in the Madrid studio of Factum Arte

INSIDE THE ART WORLD'S DREAM FACTORY

Adam Lowe gave up his own painting career almost 25 years ago. Today, his Madrid studio is the place where top artists build their greatest works

By James Tarmy

Photographs by Bego Antón

April 2, 2018

Edited by Chris Rovzar

Businessweek.com

On a sunny February afternoon in Madrid, the performance artist Marina Abramovic is going over a list of things she wants to create for her coming solo show at the Royal Academy of Arts in London. For starters, there's something she calls a "fountain."

"The fountain is me, made out of glass," she explains, speaking in a Slavic-accented English that's delivered in a soft near-monotone. "But out of everything–my nose, mouth, eyes, breasts, fingertips–comes blood."

Abramovic is most famous for her feats of endurance. In 2002 she lived in a gallery without food for 12 days. In 2010, for a piece titled *The Artist Is Present*, she sat in a chair in the atrium of New York's Museum of Modern Art for more than 700 hours, locking eyes with any stranger who sat across from her.

In Madrid, she's sitting in an apartment above Factum Arte, an art fabrication company, leveling her gaze at Adam Lowe, Factum's founder and the man who'll help her translate her art from performances to objects. For the next several months, she'll work with the company's 50 technicians and artisans to make dozens of artworks, including a table covered with 10,000 glass tears and a statue of the artist eating herself.

Another project will charge Abramovic with enough electricity that she can extinguish a candle by pointing at it. "It's generating a million volts of static," Lowe says. "If it goes wrong, it's a killing machine." In addition to the works that will be exhibited in London, some of what's produced at Factum will be sold through her various galleries.

Abramovic isn't known for her sense of humor, but she probably should be. When she notes, "I really hope not to put too much ego into anything that I do.... I like to keep it light," it's unclear at first if she's joking. But Lowe, who's been pecking away at a laptop while Abramovic talks, bursts into laughter. "You've just talked about making a sculpture of yourself with blood flowing out of every orifice," he says. "You can't then talk about 'keeping it light.'"

Since founding Factum in 2001, Lowe has established a similar repartee with a who's who of the contemporary art world: the sculptor Maya Lin, best known for designing the Vietnam Veterans Memorial in Washington; Anish Kapoor, who dreamed up Chicago's famous bean-shaped *Cloud Gate*; and Jenny Holzer, whose conceptual art includes the *Truisms*, one-line sentences splashed across building facades. Like a popular high school teacher, Lowe will bounce around possibilities with visiting artists, helping them to figure out how to make their ideas tangible.

What comes out of Factum's Madrid factory ranges from giant golf balls made out of marble by Paula Crown to a full-scale olive tree–including its root structure–cast in brass. When I visit, one room holds a towering fiberglass sculpture of interlocked circles by Mariko Mori. Steps away from it is a row of El Anatsui's *Benchmarks* print series, which captures the topography of his work tables.

The vast size of many of the artworks in Factum, combined

A three-dimensional rendering of Abramovic, carved in alabaster

with the high-tech carving and 3D-printing machinery, gives room after room the air of a Willy Wonka factory, but one where art, not candy, is the treat of choice. Lowe, who presides over all of it, is here to make sure that the artists who enter have the tools, technology, and support staff to make whatever they dream up.

"There's a kind of community that's been built there," says Anatsui, who won the Venice Biennale's Golden Lion for Lifetime Achievement in 2015. "You explore making art with the team there—it's a process of exploration."

There's a common perception that "real" artists are in a garret somewhere working in tortured solitude. That idea isn't true today, and it wasn't 500 years ago. Rembrandt had a workshop so robust (and effective) that there's still an ongoing debate about which paintings are by him and which are by his assistants. Tintoretto devoted the last two decades of his life to painting the walls of Venice's Scuola Grande di San Rocco building and the interiors of the Doge's Palace; art historians agree that he rarely touched many of "his" studio's canvases during this period. Even John Chamberlain, the 20th century artist known for his crushed metal sculptures, rarely made them himself—he notoriously hated to weld.

Artists today still have studio assistants, but in the increasingly ambitious and moneyed world of contemporary art, they frequently turn to outside fabricators when the scale, complexity, or cost of their visions exceeds the scope of their studios. There are fabricators around the world: Prototype New York in Long Island City, Queens; Mike Smith Studio and MDM Props, both in London; and Carlson & Co. in San Fernando, Calif., to name a few. Often artists will use a few fabricators based on the location of the project.

Lowe and Factum Arte occupy an unusual place in many artists' practices. But when they work with him, regardless of the final destination of their projects, artists almost always come to the factory in person. "Casting fabricators look very similar to [Factum], but in other facilities, you do it, pay the bill, and it's done," Abramovic says. At Factum, "it's really a process of cooperation and research, which is very different."

Lowe attributes Factum's success to its ability to help artists test the limits of what's possible, sometimes through new technologies and materials but also conceptually. "By pushing boundaries," he says, "there's nearly always a commercial advantage for the people you're working with."

Lowe, 59, is tall with dark hair and is perpetually in motion. "I think I can persist in pretending I'm young quite successfully," he says. "I genuinely feel about 30." He favors loose-collared shirts and khakis, and he speaks, often quite breathlessly, with an upper-class English accent.

He was born in Oxford, and after studying at the Ruskin School of Art at the University of Oxford, he got a master's from the Royal College of Art in 1985. About that time, his paintings began to appear in the British art scene with the work of the so-called Young British Artists, a group of stars that included Damien Hirst, Tracey Emin, and Rachel Whiteread.

Lowe's paintings were well-received, and they were acquired by a few British museums, but his career never skyrocketed in the same way that some of his peers' did. By the late 1990s he'd begun to explore different pursuits. "I was always too restless to just spend all of my time in the studio," he says.

He began to experiment with new printing techniques, "and I spent rather a long time doing that." Having found fulfillment in experimentation in artistic techniques, he says, "I didn't want to go on exhibiting in galleries. I'd lost interest in it completely." Instead, to make money, he began to do work for other artists, including Kapoor and the pop artist Richard Hamilton, helping them create prints and editions.

Lowe founded Factum Arte in 2001 with the artists Fernando Garcia-Guereta and Manuel Franquelo—a partnership that lasted "about two weeks," he says, at which point Lowe took over the company himself. Everyone parted amicably.

The initial aim of Factum was to "build bridges between specific new technologies and high levels of craftsmanship," he says. If the mission sounds vague, that's because it was. Lowe generally is open to doing anything, even if—especially if—he's never done it before. "If he can't do it, he'll figure ▶

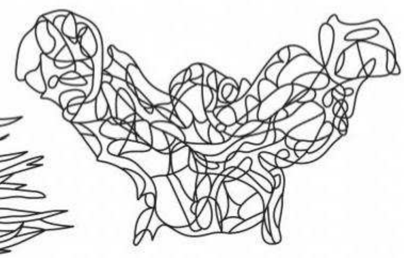
FACTUM'S FABULOUS FABRICATIONS

Three recent works highlight the studio's surreal skill

The primate sculptures can reach as high as 11.5 feet

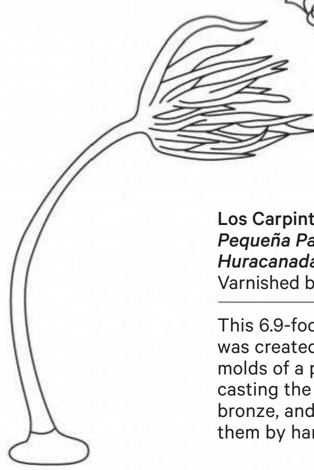
The Haas Brothers
Gorillas in the Mist
Copper, 2017

A fountain composed of three giant, playful gorillas and four trees was installed in the courtyard of the Aventura Mall in Miami



Mathias Bengtsson
Growth Lounge Chair
Tetrashell and bronze, 2016

First 3D-printed in Belgium, this 55-inch-long chair was designed as part of a "biomorphic furniture" collection and cast in bronze in Madrid



Los Carpinteros
Pequeña Palma Huracanada
Varnished bronze, 2017

This 6.9-foot-tall work was created by taking molds of a palm tree, casting the pieces in bronze, and assembling them by hand

◀ out and invent a tool for you to do it," Lin says. "He's a bit of a mad scientist."

Lowe brings a sophisticated understanding of what certain technologies can accomplish, but the connections he makes with artists come from a deeply esoteric knowledge base. He bonded with the artist Shezad Dawood, who's made work at Factum, around their shared interest in ancient Egyptian magic.

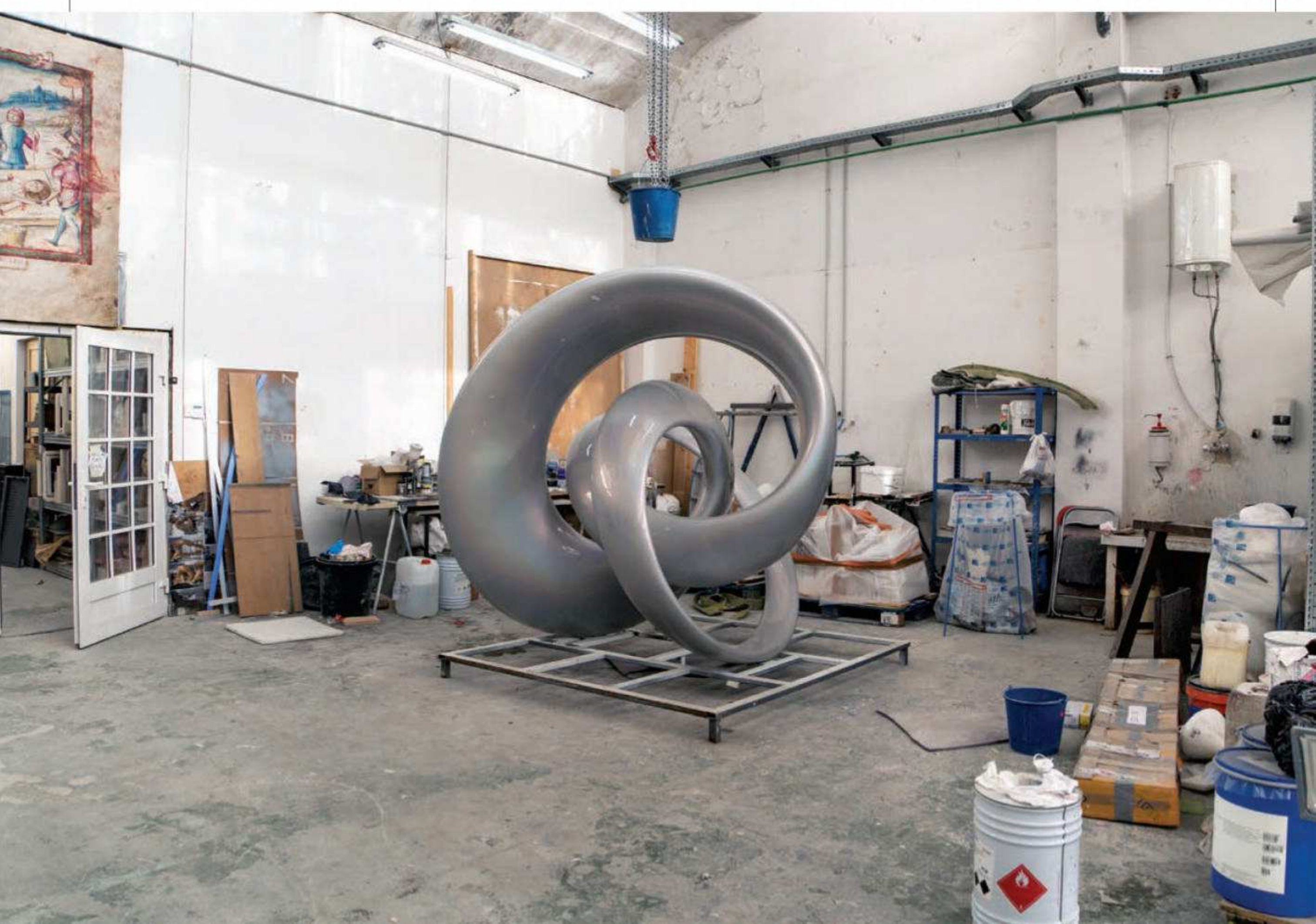
His first clients were drawn from his existing relationships—Kapoor, British sculptor Marc Quinn, Russian photographer Boris Savelev—and eventually through word-of-mouth he began to gain clientele beyond that first coterie of friends. His staff started at 4 people and now numbers 50 employees, along with about 60 contractors, including those who work at nearby foundries.

Such a substantial operation requires significant overhead, but Lowe doesn't talk about what it costs to produce work at Factum. "It's kind of like asking, 'How long is a piece of string?' " he says. "What I can tell you is that certain works' budget is not enough to cover their cost, while with other works, there's a profit margin in the job, because it's a repeat job—making an edition." When the factory makes editions, he says, "you can use the first [artwork] to work out a cost, and then you can say, 'Well, every other one will cost X.' "

But given that Factum is largely an extension of Lowe's own interests, he'll occasionally find himself paying for projects—or at least parts of projects—when they exceed their initial budget. Hrair Sarkissian, a Syrian-born, London-based artist, came to him with an idea for a work commissioned by a museum in Saudi Arabia, titled *Final Flight*. Sarkissian intended to chronicle the slow destruction of the northern bald ibis, a highly endangered bird whose nesting place was, to the horror of ornithologists, in the desert near war-torn Palmyra, Syria. His project entails a line of painted casts of the bird's skull in front of a laser-etched map of its former migratory route.

For most artists, the cost would be fairly manageable—€15,000 ($18,700) to make the casts of the birds' heads—but for Sarkissian, who isn't a well-known artist, that price tag "exceeded the budget by a lot," he says. The museum that commissioned the work said they'd have to scale it down. Rather than ask the artist to compromise on his vision, Lowe made the work at a steep discount.

A fiberglass sculpture by Mori



Workers in the Madrid foundry that Factum contracts with to create many of its artworks; from left: Charles Westgarth, Jenifer Vahos, and Carolina Ruiz

"I still get emotional about Adam's gesture," Sarkissian says. "He felt like there was something really important in the work and said, 'We'll do it. Don't worry about the money for the moment.' "

In 2009, in part to offset such costs, Lowe founded the Factum Foundation for Digital Technology in Conservation, which uses the company's resources to conserve and re-create some of the world's greatest cultural works. "We were doing more work on a bigger scale, and we needed the Factum Foundation to find its own identity and raise its own finances," Lowe says. It's grown to four full-time employees, who work on projects that can range from scanning the tomb of the Egyptian King Seti I to reconstructing a shattered plaster equestrian statue by the neoclassical master Antonio Canova. After scanning the pieces of the latter, the foundation used software to create a 3D model of the original in order to reproduce it.

Factum Arte and the Factum Foundation share floor space in the facility, and the endeavors benefit each other. If Lowe develops software or technology for one, he'll apply it to the other. The sheer variety of projects—and getting to feed off Lowe's enthusiasm for those projects—contributes to the appeal for artists. "I love all of the foundation's work," says Dawood. "That's part of what attracts me to Factum."

"BY PUSHING BOUNDARIES, THERE'S NEARLY ALWAYS A COMMERCIAL ADVANTAGE"

There's always a lot riding on each of Factum's projects, but even in this rarefied art world air, Lowe's current work with Abramovic will be an historic achievement when it's complete. Her exhibition at the Royal Academy will be the first time a woman has had a solo show in the institution's 250-year history.

Inside the factory, Abramovic steps into the Veronica Choreographic Scanner, a machine that does a 360-degree body scan, as Lowe stands off to the side, observing. The data gathered will be used to create a 3D cast of her face. The room is also filled with tapestries, computer equipment, plaster busts, and two different teams of technicians.

While assistants help Abramovic extricate herself from the machine after the process is complete, Lowe wanders to a group behind him working on a 3D map of J.R.R. Tolkien's Middle-earth. The project has been commissioned by the Bodleian Library at Oxford as part of the exhibition "Tolkien: Maker of Middle-earth," which opens on June 1.

The map, Lowe says, "is actually four dimensions." The topography of Middle-earth has been created out of translucent Perspex, a material similar to Plexiglas, and sits between two digital screens that project images and colors from above and below. The hills are green, the oceans are blue, and animations, including the path that Bilbo Baggins takes on his journeys in *The Hobbit*, appear to rise out of the ground.

Abramovic walks by and peers over Lowe's shoulder. "So if I wanted to make my own journeys through the world, with all the countries I've been to, I could do something like this?" she asks.

Lowe loves the idea. "We could do it large-scale," he says. "It could fill a whole room! And we've got the data to make the relief." As he figures out how he would make it, his voice keeps rising. "It could really be something special."

"See? This is how it works," Abramovic says. "We talk, then comes the work, then it goes back again. It's endless, and it's wonderful." B

Squaring the Circle

One of the earliest shapes in wristwatches is making a comeback

By Anthony DeMarco Photograph by Danny Kim

Shortly after the French-Brazilian aeronaut Alberto Santos-Dumont became the first European to achieve sustained flight in 1906, he complained to his friend Louis Cartier that he didn't want to be fumbling for his pocket watch to measure time in the air. In response, the legendary jeweler invented a small clock to be worn on a leather strap, one of the earliest wristwatches for men.

It was square.

Such pilot watches became popular in the early 20th century, but eventually they took on a round shape—like the dials and gauges in a plane's cockpit. The technology that makes clocks and pocket watches work had traditionally been round: The interlocking gears and springs in a watch movement are round by nature, and the rotating hands are best read against indexes arranged in a circle.

"About 80 percent of watches sold are round, so clearly the market prefers the round shape," says Paul Boutros, a watch historian and international strategy adviser for Phillips auction house. Pocket watches were so vital to navigation at the turn of the century, he says, watchmakers focused on developing technology to keep them precise through changes in temperature and humidity. They even accounted for body perspiration.

Again, a round shape was the better solution. "It was much easier to make a watch water-resistant in a round case than in a square or rectangular case," Boutros adds, because the case could easily screw tight to seal itself. "Material science has improved, but the industry still relies on the round shape."

Certain watches remained square over the decades: Cartier's Tank and Panthere collections, the Jaeger-LeCoultre Reverso, the Baume & Mercier Hampton, and several Bell & Ross timepieces.

Last year, Cartier revamped its Santos collection, named after the aviation pioneer, with a signature square case with rounded edges and visible screws (eight around the bezel, plus more in the bracelet). The idea was to capitalize on interest in heritage with modestly sized, angular timepieces that wear well with suits and dresses.

Hermès, like Cartier, is betting that customers want square watches, which offer lines that parallel the edges of the wrist and the cuff of a shirt. This year at the Salon International de la Horlogerie in Geneva, Hermès showcased its Carré H line, a chunky, simple timepiece that almost evokes the rounded-rectangular Apple Watch. The brand is also offering fresh colors and metallics in its Cape Cod collection, also squared-off.

Philippe Delhotal, artistic director of Hermès Horloger, acknowledges that the square watch isn't broadly popular. But the geometry appeals to those who value design.

"The square—even though strongly featured in other Hermès métiers, such as silk scarves—is not very widely used in watchmaking," Delhotal says. "Watches of this shape are less conventional for customers looking for singular objects. To compose these forms, you have to look for harmony and purity and perfection in details." Ⓑ

1. NOMOS GLASHUTTE TETRA NEOMATIK 39 SILVERCUT
German brand Nomos Glashutte is known for its minimalistic designs, and its high-quality, handmade movements are among the most affordable in the industry. This watch is powered by an ultrathin automatic movement—at only 7.2 millimeters. Its silver-gray rhodium-plated dial is topped with blued-steel minute and hour hands—but most noticeable is a small seconds subdial at 6 o'clock, finished with a red hand. *$3,980*

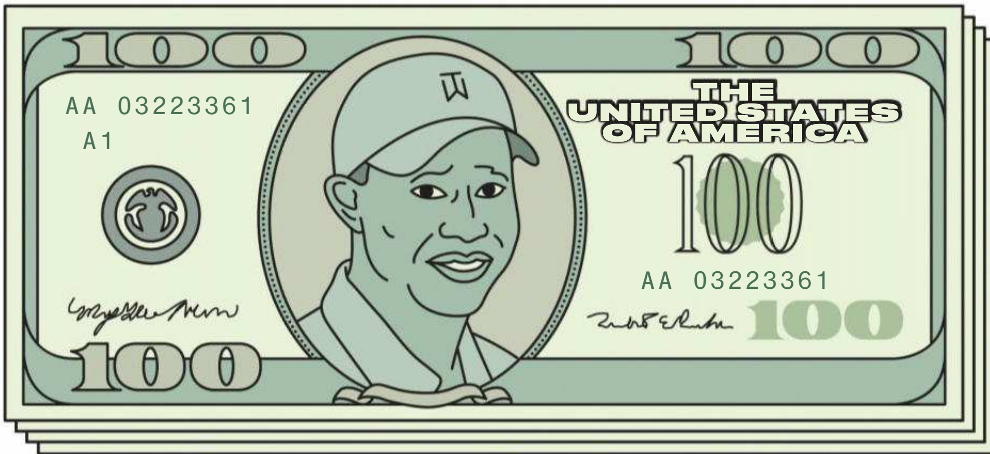
2. HERMES CAPE COD
To create the square-within-a-rectangle shape in 1991, Hermès's legendary artistic director Henri d'Origny took inspiration from Hermès's anchor chain motif. This year there are two new versions. The first features a dial coated with translucent lacquer and a Milanese mesh double-tour bracelet (pictured). The second one uses the anchor motif in the dial, in a black-gold or blue-lacquer finish. *$3,275*

3. RALPH LAUREN 867 COLLECTION
Named after the company's luxury flagship store at 867 Madison Ave. in New York, this watch comes with an off-white lacquered dial with Arabic and Roman numerals. It's powered by Swiss-made mechanics. The men's model comes in 18-karat rose gold or 18k white gold (pictured); a women's version is available with a diamond-set bezel. *$4,950*

4. TAG HEUER MONACO CALIBRE 11 CHRONOGRAPH
After its debut in 1969, the Monaco went on to become one of the most recognizable watches in the world. Steve McQueen wore one in 1971 in the film *Le Mans*, as did Bryan Cranston, more recently, in *Breaking Bad*. Tag Heuer has reissued a 39mm watch with many of the same design details—metallic blue dial, white highlights, and red minute hand—but it has a new Calibre 11 automatic chronograph movement with a 40-hour power reserve. *$5,900*

PROP STYLIST: KODY PANGBURN


1.
2.
3.
4.
RALPH LAUREN
MONACO
HEUER
AUTOMATIC
CHRONOGRAPH



The Cost of Being Tiger

A biography outlines the hardships faced by the first billion-dollar athlete

By John Paul Newport

The first 150 pages of *Tiger Woods*, an exhaustively researched biography of golf's biggest star, could be plucked out of a heartwarming children's movie: A young man of modest means, and a person of color as well, conquers the elite world of golf through hard work and steadfast vision. At 21 he wins his first professional major tournament, the 1997 Masters, by a record-shattering 12 strokes. On the final green at Augusta National Golf Club, our hero's father, Earl, embraces him and whispers, "I love you, son, and I'm so proud of you."

Cue the swelling violins as words crawl across the screen: Tiger Woods would go on to win 79 PGA tournaments, including 14 major championships, as the greatest golfer of all time.

But what investigative journalists Jeff Benedict and Armen Keteyian make clear in *Tiger Woods* (Simon & Schuster, $30) is that life for Woods was never free from extraordinary pressure. His father called him the "Chosen One" and predicted he would "change the course of humanity"—burdening the young Woods, in the authors' opinion, with "more impossible expectations than any parent in the history of sports." Kultida, his Thai mother, helped inculcate his assassinlike instincts on the golf course, too. "You have to go for the throat," she would say, because if you don't, "they come back and beat your ass."

From a golf perspective, the parenting strategy worked. The authors estimate that Woods surpassed 10,000 hours of deliberate practice—the amount of time some experts believe is required to achieve mastery in any discipline—by age 12. He was the PGA Tour Player of the Year a record 11 times and, in his early 30s, became the first athlete to earn more than $1 billion.

What Benedict and Keteyian do better than in any biography I've read about Woods is detail the human costs of this machine-like focus. Most chilling are the anecdotes from those who were once close to him: He dispatched his high school girlfriend, who'd changed her college plans to be near him, by leaving her suitcase at the front desk of a hotel with a curt letter saying he never wanted to see her again. In 2002 he dismissed swing coach Butch Harmon in a similar cold-hearted way.

And when excellence in golf wasn't enough, Woods sought adrenaline rushes through body-damaging workouts, Navy SEALs training, high-stakes gambling, and, most famously, extramarital affairs with dozens of women. The MGM Grand in Las Vegas provided a secluded, back-alley door for some of these trysts; at the Bellagio's exclusive nightclub, a VIP host would help set them up by advising a pretty girl on the dance floor that "Tiger would love to meet you," and escorting her to his table.

Despite the tawdry details, readers may find their sympathies for Woods growing as the Shakespearean tragedy of his life unfolds. Rich, famous, and dominant on the course, the man depicted here was often miserable, particularly after his father died in 2006. Only when his infidelities were exposed in 2009 did Woods, according to the authors, begin to recognize the degree to which his life was a lie. More than 40 million people watched or listened live to a 13-minute apology to his then-wife in February 2010. For a proud and private Woods, the humiliation was overwhelming.

Last May, his story seemed to take an even worse turn when he was arrested for driving under the influence of a disabling cocktail of painkillers after a spinal fusion procedure. The surgery seems to have worked, though: In his last three tournaments, Woods has finished near the top of the leaderboard for the first time since his last win in 2013. Improbably, he'll enter the Masters on April 5 as a betting favorite.

Should Woods start winning again and make a credible run at Jack Nicklaus's record of 18 major championships, it may not matter whether, behind the scenes, he's a better man today. He played some of his best golf in 2008, while his personal life spiraled out of control. The authors present Woods as a man "both blessed and cursed" by his otherworldly ability to separate his off-the-course problems from his performance on it. *Tiger Woods* is a fascinating analysis of the former, but for golf fans—and probably for Woods himself—his worth will still be judged by the latter. Ⓑ

ILLUSTRATION BY JACI KESSLER LUBLINER

Ahead Of the Curve

In a world of indistinguishable stemware, the MarkThomas Allround wine glass stands out
Photograph by Joanna McClure

THE CHARACTERISTICS
Since Austrian designer Thomas Zichtl founded MarkThomas in 2012, elite dining destinations have adopted the company's wine glasses, including Michelin three-starred restaurant El Celler de Can Roca in Spain and Minneapolis's cozy Bachelor Farmer. The sides of the handblown Allround are only about a half-millimeter thick, making the glass lighter than most. Gently beveled curves near the base of the bowl aren't merely cosmetic; the design creates a larger surface area to aerate the wine and highlight its flavors.

THE COMPETITION
At $70 per glass, the MarkThomas Allround is within range of the top-shelf options from Riedel and Zalto, two other Austrian names that dominate the market. (Spiegelau, another well-known glassmaker, was acquired by Riedel in 2004.) Riedel specializes in specific varietal glasses and has become a wedding registry staple, but its Sommeliers series includes glasses for rare whites and reds that cost three figures. Zalto, like Riedel, has been around for decades. Lately, its $59 Denke'Art Universal glasses have become a status symbol at wine-focused restaurants such as New York's Charlie Bird and Le Bernardin.

THE CASE
The glass's eye-catching design doubles as a functional feature: If you're a purist, the lower bend marks a precise 6-ounce pour. Despite its lightweight feel, holding one is an easy balancing act; the bigger-than-average base gives you a sense of stability when you set it down. The glass is also lead-free, so it's dishwasher-safe and won't cloud with multiple washings. Best of all, the thin walls and maximized surface area give the nose a boost, making the glass ideal for medium-bodied wines, whether French pinot noirs or California chenin blancs. *$70; markthomasusa.com*

Azmat Yusuf

The guy who helped make sense of public transit tries remaking the system itself. *By Arianne Cohen*

Azmat Yusuf grew up in Pakistan and Kuwait and has lived in New York, Singapore, and Washington without ever owning a car. But when he moved to London eight years ago to work at Google, he was flummoxed by the transit system, the maze of buses in particular. "I just thought, Why is it so hard to figure out?" he says. He decided to build an app to help himself out.

Yusuf started with Busmapper, which calculated the most efficient routes across town, and soon expanded it to include trains, subways, taxis, and bikes in its itineraries. Today, about 20 million commuters in 39 cities around the world use the app, renamed Citymapper in 2011. Whether you take a subway in Brussels, a streetcar in Toronto, a minibus in Moscow, a ferry in Amsterdam, or a bike in Seoul, Citymapper will efficiently get you to where you're going.

"There's a very strong emotional attachment between the user and the application," says Bernard Liautaud, managing partner at Balderton Capital, which led Citymapper's Series A funding in 2014. "There aren't many products where the testimony from the users is amazing. They say things like, 'I can't live without Citymapper.' "

b. 1980, Pakistan

-

Still tests Citymapper by traveling to far-flung corners of London and seeing how efficiently he's routed home

-

Is a die-hard reader of science fiction

Citymapper has so far routed about a billion trips, giving it an invaluable cache of data on how people ride public transportation. Yusuf is starting to use that to improve transit itself, starting with—what else?—buses. "Right now they're kind of stupid," he says. "They're not really tied to demand. This is not the future." Last summer, Citymapper began beta testing its own fleet of minibuses in London that respond to demand in real time, with trackable arrival times, tap-to-pay consoles, comfortable seats, and USB outlets. This was followed by CM2, a nighttime hop-on, hop-off service, and Black Bus, which isn't a bus at all, but rather a partnership with the ride-hailing service Gett to operate shared cabs running on underserved routes during rush hour. In March the company introduced SmartRide, a carpool service it's offering for a fraction of the price of Uber.

Any of these strategies could evolve into a way to monetize Citymapper, which has raised roughly $50 million so far. Yusuf is also open to licensing his software, but "cities are a bit slow to change," he says. "We think it's good for us to do this ourselves and actually make the whole thing work." Ⓑ

ILLUSTRATION BY SAM KERR


SEE
HUNDREDS OF DIFFERENT WORLDS WITH A WIDE RANGE OF MOVIES, DOCUMENTARIES AND MORE.
HEAR
NOTHING BUT WHAT YOU WANT WITH THE NOISE CANCELLING DENON HEADPHONES.
TASTE
THE BEST FOOD ON AIR SERVED BY OUR FLYING CHEFS.
SMELL
TRADITION WITH FRESHLY BREWED TURKISH COFFEE.
TOUCH
COMFORT WITH SPECIALLY BUILT-IN MASSAGING SEATS.
"SEE, HEAR, TASTE, SMELL, TOUCH. EXPLORE YOUR SENSES. WIDEN YOUR WORLD."
DR. OZ
Features may vary depending on flights.
TURKISHAIRLINES.COM
A STAR ALLIANCE MEMBER
TURKISH AIRLINES