THE AGE OF UNICORPSES

FORTUNE

Why billion-dollar startups and even VC firms are going bust
BY JESSICA MATHEWS

How high-flying unicorn Bird nose-dived into bankruptcy

Lessons from a founder at the crossroads of failure

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Features February/March 2024

SPECIAL REPORT: **THE AGE OF UNICORPSES**

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WIPEOUT
The once high-flying e-scooter startup Bird has filed for bankruptcy.

Cover Illustration by JEREMY ENECIO

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Departments

WHAT OUR EDITORS ARE UP TO THIS MONTH

INNOVATION FORUM, HONG KONG
Experts, investors, and leaders of the world's largest companies in Hong Kong share insights on the forces reshaping the global economy as well as new strategies for growth. *(March 27–28)*

BRAINSTORM AI, LONDON
The top minds in European business, investment, policymaking, and academia discuss this pivotal moment for AI, and how to move forward responsibly in an increasingly competitive landscape. *(April 15–16)*

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PHOTOGRAPH BY SANTIAGO MAZZAROVICH

You Are Not Your Job

THE FIRST TWO YEARS of the pandemic—2020 and 2021—were wild for startups. Interest rates were near zero. Billions in government stimulus money were sloshing around. Venture capital firms raised giant multibillion-dollar funds, private company valuations soared, and exits were plentiful.

In 2013, when venture capitalist Aileen Lee coined the term "unicorn" to describe billion-dollar startups, only a few dozen companies fit the description. By 2021, that number had ballooned to over 1,200 worldwide. (Along the way, in 2015, *Fortune* announced "The Age of Unicorns.")

Fast-forward to today, and unicorns are failing at a rapid clip. Newly minted unicorns risk being eclipsed by "unicorpses"—former high-flying startups gone belly-up. In this issue, *Fortune's* Jessica Mathews explores the trends behind the body count, and our newest tech correspondent, Jason Del Rey, delves into Bird, a scooter startup that was valued at $2.3 billion three years ago—but filed for bankruptcy in December.

The toll of failure isn't just a hit to employees who lose their jobs or investors who lose their capital. It's a weight on the shoulders of the founders who hang all their self-worth on their startup's outcome.

Andy Dunn, the founding CEO of clothing company Bonobos, unpacks this common founder trap on page 42. "As entrepreneurs, we struggle to separate our egos from the prospects of our startups," he writes. "We conflate the fate of the enterprise with our value as human beings." And Dunn is speaking as a founder who was *successful:* Bonobos was acquired by Walmart for $310 million in 2017. For the growing numbers who fail, he reminds us, the pain can be excruciating.

Dunn has grappled with another challenge to his well-being: He has bipolar disorder. As he points out, mental health issues are unusually widespread among founders. While only 2% of the general population has bipolar disorder, for example, 11% of entrepreneurs do. They're far more likely than the general population to experience anxiety and depression, too.

As the waters of the economy get choppier, it's wise to keep in mind what Dunn realized the hard way: You are not your job. And you owe it to yourself to maintain your mental and physical wellness.

There are a few CEOs who seem to be doing things right, with the right perspective. In this issue, you'll find our 26th annual Fortune World's Most Admired Companies list—the companies that CEOs and executives at other companies look up to most.

One of the rapid risers on the list is chipmaker Nvidia, whose revenue nearly doubled in 2023 while it rode the AI wave. Despite his success, its cofounder and CEO, Jensen Huang, can relate to Dunn's message. In fact, he recently told a podcast host that if he could go back in time to his thirties, he wouldn't have started Nvidia at all. "If we realized the pain and suffering [involved] and just how vulnerable you're going to feel, the challenges that you're going to endure, the embarrassment and the shame, and the list of all the things that go wrong—I don't think anybody would start a company," Huang said. "Nobody in their right mind would do it."

Still, the business world is glad he did.

ALYSON SHONTELL
Editor-in-Chief, *Fortune*
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Our cover from February 2015, when running a startup was a lot less stressful.

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HOME GROWN
After a stint in the U.S. in the 1990s, Galperin returned to Argentina to launch an eBay-like marketplace.

In Focus

MARCOS GALPERIN

The MercadoLibre CEO has built his Uruguay-based marketplace into the "Amazon of Latin America." But the company is more than another Everything Store. Diversifying into fintech has made MercadoLibre Latin America's second most valuable company, worth $85 billion, and accelerated the region's digital adoption. Now, facing new rivals and fresh political uncertainty, Galperin is reinventing the business once more. BY **LEO SCHWARTZ**

"I was very enthusiastic about what I thought the internet was going to do to the world."

MARCOS GALPERIN, CEO, MERCADOLIBRE

WHEN MARCOS GALPERIN started online marketplace MercadoLibre in a parking garage, he wasn't trying to evoke the origin stories of U.S. tech companies like Hewlett-Packard and Apple. In Buenos Aires in 1999, the garage of his father's leather company was just the best option for fast broadband internet. "It was a building with terrible offices, but at least we had good connectivity," he says.

But like his Big Tech brethren, Galperin spun gold from the dingiest of spaces. Today, Galperin is one of the wealthiest men in Latin America, with an estimated net worth of over $7 billion thanks to MercadoLibre's astronomical growth. The company, now based in Uruguay, started as a clone of eBay but today is known as the Amazon of Latin America. The e-commerce site sold over $11 billion in goods in the third quarter of 2023, a nearly 60% increase year over year.

MercadoLibre's marketplace resembles Amazon, selling goods from electronics to supermarket basics with the promise of 24-hour delivery, but it would be a disservice to paint Galperin as a Jeff Bezos imitator. He has combined MercadoLibre's e-commerce prowess with payment tools to usher regional shopping into the digital age. By adapting to the complex challenges of Latin America and reinventing MercadoLibre over the course of 25 years, Galperin created a tech company with a market cap of nearly $85 billion, second only to Brazil's state-owned energy giant Petrobras in Latin America. Its regional dominance has little parallel in the rest of the world.

As U.S. and Asian competitors

PHOTOGRAPH BY **SANTIAGO MAZZAROVICH**

vie for Latin America's red-hot e-commerce market, and regional politics poses risks to its business, Galperin keeps pushing MercadoLibre into new sectors, from mutual funds to crypto. "We're always paranoid," he says. "We don't think it's game over by any means."

GALPERIN, 52, came of age in an Argentina that bears little resemblance to the country that today is suffering from skyrocketing inflation. The relative stability of the 1990s and his family's flourishing leather company gave Galperin the opportunity to attend the University of Pennsylvania. He enrolled at Stanford Business School in 1997.

Over a video call from his office in Uruguay, Galperin, who has salt-and-pepper hair and a quiet affect, recalls how he marveled over the digital advances of U.S. tech companies as a student in Palo Alto. Sites like eBay were converting droves of new online shoppers. Galperin even sold his Volkswagen Golf via an early online classified ad. "I was very enthusiastic about what I thought the internet was going to do to the world," he says. "And I was very frustrated because I had to come back to Latin America, and there was nothing."

Galperin was convinced that an eBay-type platform would explode in Latin America, where problems with retail ran deeper than a lack of web applications. Brick-and-mortar retail was available only in major urban areas, with more rural regions cut off from shopping. "People would rather live in a slum next to a big city than live in better conditions in the countryside," Galperin says. "So I was convinced this was going to work really, really well in Latin America."

Back in Argentina, Galperin and his early team erected makeshift cubicles in the parking garage. From the windowless space they conceived of MercadoLibre. (The building eventually kicked them out for violating safety codes.) Galperin had been inspired by eBay—and in fact, eBay was an early investor in MercadoLibre—but early on he abandoned its auction model; he wanted to build a platform that people came to for everyday shopping, not just the thrill of a ticking clock. MercadoLibre launched its marketplace that connects buyers with third-party sellers in 1999, a year before Amazon.

MercadoLibre expanded to Brazil and Mexico in its first year. By the time it went public in 2007, it had earned its "Amazon of Latin America" moniker, but its annual revenue remained low, crossing $100 million in 2008 and $1 billion in 2017. The pandemic accelerated growth, and revenue topped $10 billion in 2022.

Galperin doesn't mind the association with—or attention from—U.S. counterparts. He claims eBay came close to buying MercadoLibre several times, most recently in the 2010s. (eBay did not return a request for comment.) He says he admires Amazon's long-term vision, but Galperin set MercadoLibre on a different path as it navigated Latin America's logistical snarls. "MercadoLibre is not really the copy of Amazon in Latin America," says Guillermo Ochovo, director at consulting firm Cargo Facts. "They've been doing their own thing."

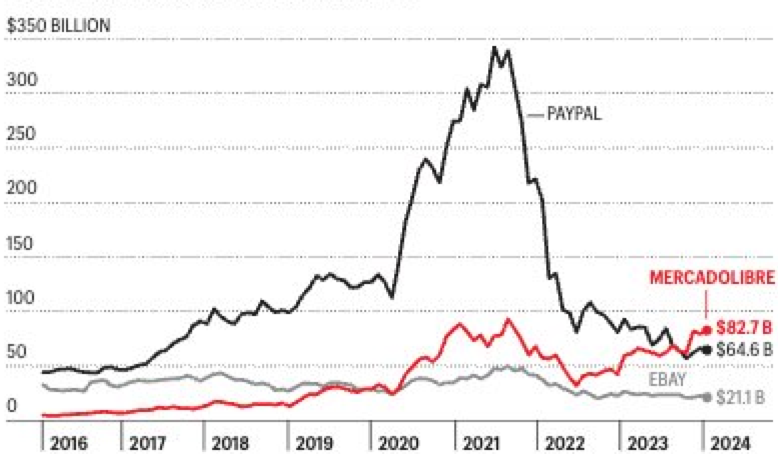
While Amazon established a second business out of cloud-hosting, MercadoLibre expanded into payments, more out of necessity than diversification. In Mexico, one of MercadoLibre's main markets, less than 25% of the urban population held a savings account in 2000. Sales that MercadoLibre facilitated between vendors and buyers often took place in person and in cash, with no way for MercadoLibre to verify transactions to earn its cut. "We were at the mercy of whatever the sellers claimed had happened," Galperin says.

So in 2003 MercadoLibre launched Mercado Pago, a payments system that let users load their balances with cash. Later it added features like a point-of-sale system and QR code payments that could be used outside its marketplace. Merchants—from

LATIN AMERICA'S TECH TITAN

MercadoLibre was inspired by eBay and later launched a lucrative payments business akin to PayPal. It's now worth roughly the equivalent of the two U.S. tech giants combined.

CHANGE IN MARKET CAPITALIZATION



SOURCE: S&P GLOBAL, AS OF JAN. 18, 2024


Jesse
Henkel

storefronts to food stalls—could accept payments via Mercado Pago. The innovations fueled adoption of online financial tools. In the first three quarters of 2023, Mercado Pago reported 167 million active users and processed over 6.5 billion transactions.

"People that have traditionally been unbanked are not willing to walk into a bank branch," says Galperin. "They feel that it's not for them and they will be laughed out of the place."

In 2017, the company expanded into the credit business, offering financing to customers and merchants to make purchases, build out their businesses, and even pay taxes. In the third quarter of 2023, fintech accounted for over 43% of MercadoLibre's revenue of $3.8 billion. "MercadoLibre is really a payments company," says Juozas Kaziukenas, founder of business intelligence firm Marketplace Pulse.

MercadoLibre also set itself apart by partnering with local companies to adapt to the logistical challenges of countries in the region. In Brazil, the largest market in Latin America, e-commerce companies struggled with deliveries, since homes there might not have addresses or may be in dangerous areas. Through logistics company Kangu, MercadoLibre connected sellers to local shops that served as delivery points. MercadoLibre acquired Kangu in 2021.

MercadoLibre has also benefited from "being a company of Latin America, from Latin America, and for Latin America," says Matteo Ceurvels, principal Latin America analyst for eMarketer. MercadoLibre went as far as to change its name in Brazil to MercadoLivre, Portuguese for "free market." Amazon, meanwhile, struggled to properly translate its website when it launched there, says Ochovo. (Amazon didn't return a request for comment.) In 2022, MercadoLibre accounted for 34% of online sales in Brazil—nearly the same share as its two largest competitors combined.

> "MercadoLibre is not really the copy of Amazon in Latin America. They've been doing their own thing."
>
> **GUILLERMO OCHOVO**, DIRECTOR, CARGO FACTS

Asian e-commerce companies like Temu, Shein, and Shopee may pose a greater threat to MercadoLibre than Amazon ever did, with their gamified shopping and low-priced inventory. MercadoLibre has responded in a few ways; it launched a short video platform called Clips in 2023 that mirrors its Asian rivals. But so far the new competition hasn't made much of a dent in MercadoLibre's business, Ochovo says. The upstarts are still struggling to figure out the particularities of different Latin American markets. After a much-hyped expansion, Shopee closed operations in four countries in 2022.

For now, Galperin remains focused on payments. In response to Argentina's economic turmoil, he wants to create hedges against inflation that reached 185% in 2023. In 2018, MercadoLibre started offering Argentine customers the option to invest in mutual funds. By late last year, 12 million users—equal to 25% of the nation's population—used the feature, MercadoLibre says. Starting in 2022, it added a tool to buy and sell cryptocurrencies, including U.S.-dollar-backed stablecoins. (Argentina's Central Bank banned the feature, but it's available in other markets.)

Among MercadoLibre's largest markets, Argentina is a distant second to Brazil, but it remains Galperin's spiritual, if not physical, home. And the country represents how the region's economic and political uncertainty poses a perpetual threat to its business.

Galperin has long clashed with Argentina's presidential administrations and has resided across the La Plata River in Uruguay for years. He returned under center-right Mauricio Macri, but in 2020 resigned as president of MercadoLibre's Argentina unit after a federal prosecutor accused Galperin and his board of fraud and insider trading. Galperin denied the charges but left the country again. The case has been dropped.

Argentina stunned the world in November by electing as president the self-proclaimed "anarcho-capitalist" Javier Milei, who has vowed to impose a bruising austerity campaign. Galperin is cautiously optimistic about the firebrand: "I'm enthusiastic about the ideas he advocates."

Galperin recognizes that Milei's economic policies are causing the prices of everyday items like diapers and beef to soar. The whiplash is challenging MercadoLibre's operations, but he says he's accustomed to volatility. After all, the company has operated in Venezuela since 2005.

Galperin says that the possibility of punishing days ahead evokes his early vision for MercadoLibre—to serve customers living on informal salaries or without ready access to goods. "What we do, at the end of the day, helps the weakest people in Latin America," he says. "I worry more about the country than I worry about the company."

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THE BRIEF

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HIGHER EDUCATION

Wall Street vs. the Ivy League

More corporate leaders are fed up with campus culture. Can business and academia find common ground?

BY JEFF JOHN ROBERTS

ILLUSTRATION BY **EDMON DE HARO**

In November of last year, a flood of alumni donations came pouring into Harvard—hardly an unusual event for a school that oversees a $50 billion endowment. But something stood out: Many of the donations amounted to exactly $1.

The piddling contributions were a protest of a campus culture that, in the eyes of critics, had restricted political speech while giving free rein to anti-Semitism. The action had been inspired by Marc Rowan, CEO of private equity giant Apollo, who a month earlier had called on fellow alums of the University of Pennsylvania—where he has been a prodigious donor—to join him in stiffing that school with $1 donations. And they came as another big Wall Street name, hedge fund manager Bill Ackman, launched a noisy campaign to oust the presidents of Harvard, Penn, and MIT after those officials testified before Congress about campus anti-Semitism in a way many viewed as hypocritical and insensitive. (By early January, the heads of Harvard and Penn had resigned.)

This Ivy League vs. Wall Street battle erupted in the context of bitter division over the Israel-Hamas conflict and its tragic cost in thousands of lives. It has also provided fodder for a much wider attack on diversity, equity, and inclusion (DEI), with opponents including Ackman, a Harvard College and Business School alum, portraying the Ivies' free-speech stumbles as the consequence of out-of-control "wokeness."

But even in that context, the breadth of the dollar-donation protest was striking, and so has been the continued dissatisfaction among alumni and donors. Ackman and his allies probably stand to the right of much of the business community on diversity issues, but his activism has struck a chord beyond culture-warrior circles because it tapped into a wider discontent. American business elites are heavily invested in the country's top universities—as donors, as employers of their graduates, and as parents of students or potential students—and many are unsatisfied with their ROI. Many fear that curriculums and campus life don't prepare graduates for the professional world; that the schools' outcomes don't justify their soaring costs; and that the institutions' leaders, most of them products of academia themselves, aren't equipped to address those problems.

39%

▲ **TWENTYSOMETHINGS WHO SAY THEIR COLLEGES HAD NOT TAUGHT THEM EMOTIONAL OR BEHAVIORAL SKILLS THAT WOULD PREPARE THEM FOR THE WORKPLACE**

SOURCE: MORNING CONSULT POLL FOR THE AMERICAN ASSOCIATION OF COLLEGES AND UNIVERSITIES, ET AL.

Philosophic differences between business and academic communities are hardly new, of course, and complaints about the behavior of "young people these days" go back to the time of Socrates. But the dysfunction around campus speech has brought new urgency to concerns, shared by corporate leaders and current students alike, that universities aren't producing good citizens—or good coworkers.

For some activists, the answer is to make universities more, well, corporate. After the resignation of Harvard president Claudine Gay in January, Ackman posted a long essay on X, comparing Harvard to a massive business that has long been mismanaged. "Universities should broaden their searches to include capable business people for the role of president," he added. (Ackman declined to be interviewed for this article.)

Unsurprisingly, those who work at universities see this as an attack on academic freedom. At Penn, for example, more than 900 faculty members signed a letter opposing Rowan's campaign, decrying an attempted "hostile takeover" by "external actors ... with no academic expertise." But as the levels of vitriol rise, it's worth asking: What, if anything, could academia learn from the business world about leadership and civil debate? And what would business gain if academia followed its lead?

Consensus concerns

Statistics compiled by the American Council on Education show just how rare it is for businesspeople to attain the top post at a university. In ACE's 2023 survey of higher education presidents, fewer than 20% reported a career background outside the academy, and only 4% identified their background as "business executive."

Kings of finance have seized on such statistics to criticize their university counterparts. But the prospect of running a school themselves would probably give these moguls pause. Think of a university as analogous to a sprawling corporation, with tens of thousands of employees and divisions with specialties ranging from Shakespeare to particle physics to medical research. Then imagine having to run this corporation when many of your senior managers cannot be fired, because of tenure. And while you're at it, you'll also be engaging in relentless fundraising, overseeing major construction projects, and maybe even presiding over a massive sports empire.

In such a complex environment, a businessperson accustomed to wielding "the buck stops here" executive authority is likely to struggle. "In higher ed, you have to build consensus to get anything done," says Bill Funk, a consultant whose firm, R. William Funk & Associates, has assisted in over 400 university president searches. "You just can't dictate."

It's misleading to imply, as some in the Wall Street camp do, that business voices are absent from that campus consensus-building. Charlie Eaton, a sociology professor at UC Merced and the author of *Bankers in the Ivory Tower,* says that while former business leaders hold few presidencies, they nonetheless wield outsize influence—reflected in the number of executives who sit on university boards and in the growing clout of the schools' chief financial officers and chief investment officers. In promulgating the idea that universities are business-ignorant, he says, "Bill Ackman's criticisms are all pretty silly and unserious."

The problem with a consensus culture, though, is that it makes it easy to avoid difficult conversations and to stumble into groupthink and inertia. One of the few high-profile university presidents with a business background is Mitch Daniels, who retired at the end of 2022 after nine years at the helm of Purdue, a public research university. A former governor of Indiana who had also spent a decade as a senior executive at pharma giant Eli Lilly, Daniels won praise freezing tuition throughout his tenure, during a period when the average college tuition in the U.S. rose 12% a year.

Daniels tells *Fortune* that soaring costs have "really begun to erode" public confidence in the value of college education (a sentiment to which most American families can relate). That inflation, he says, rises from a combination of colleges' pricing power and their need to satisfy all their internal constituents. College leaders' instinct is to figure out how much money it will take to keep the various factions happy, he says, "and then turn around and decide, What tuition do we charge to get that amount?" Daniels says his approach at Purdue was to ask harder questions that were more bottom-line-driven and strategic: "What do we need to do to make ends meet and serve our top priorities? ... I used to say, 'To solve the equation for zero, what do we need to do to avoid a tuition increase?'"

Such a mindset comes naturally to a businessperson. But for now, Daniels's example is likely to remain an outlier. Funk, the search consultant, says that many schools have expressed a greater desire to hire leaders with nonacademic backgrounds. But when push comes to shove, he says, they tend to stack search committees with academics, who in turn favor hiring fellow academics. It may take a lot more pressure from business members on university boards, and from schools' CFOs and CIOs, to open up college leadership to a greater diversity of ideas.

A speech statement

If business leaders are unlikely to change academia's managerial culture, they may be poised to find common ground with university leaders on the culture of campus discourse.

Universities have for decades enjoyed a reputation as places of free and open debate. The academy also skews to the left, and in some cases universities have used language such as "trigger warnings" and "safe spaces" and "speech codes" to guide discourse in and out of the classroom. Many of these concepts developed as defenses against hate speech, bias, and intimidation of minorities, but critics say they're increasingly undermining the exchange of ideas.

Antagonists point to evidence including the shouting down of speakers who hold controver-

> **"IN HIGHER ED, YOU HAVE TO BUILD CONSENSUS TO GET ANYTHING DONE. YOU JUST CAN'T DICTATE."**
>
> **BILL FUNK,** COLLEGE SEARCH CONSULTANT

Bill Ackman's criticism of Ivy League campus culture has tapped into broader concerns about how well colleges prepare students for civic life.

JEENAH MOON—BLOOMBERG/GETTY IMAGES

sial views, and the firing of faculty who teach material deemed to be offensive by a handful of students. (Most of this criticism has come from conservative-leaning advocates, but as cancel culture has crossed ideological boundaries, some liberals are also voicing concerns.) Most seriously, amid the emotions laid bare by the Gaza conflict, some college campuses have devolved to the point where students who disagree cannot muster the civility to speak with one another.

This is a problem for schools—and for companies. In business environments, employees cannot choose who they interact with and must learn to work with people who may hold very different worldviews than their own. This has posed a challenge for managers seeking to integrate recent college graduates into their ranks. And the graduates themselves share the frustration: In a recent survey of twentysomethings by a consortium of nonprofits including the American Association of Colleges and Universities, 39% said their colleges had not taught them emotional or behavioral skills that would help them transition into the workplace.

In this fraught climate, some schools are taking cues from an elite university that isn't Penn or Harvard. In 2015, the University of Chicago adopted principles requiring the school to "promote a lively and fearless freedom of debate and deliberation, but also to protect that freedom when others attempt to restrict it." More than 100 universities have since adopted the "Chicago Statement" or a version of it; in 2023, eight signed on, including Clemson and Virginia Tech, and the University of Michigan did so in January. According to Kristen Shahverdian of free-expression advocacy group PEN America, there has been a flurry of fresh interest in recent months as college leaders look to make debate on their campuses more constructive and less toxic.

"Lively and fearless freedom of debate," as it happens, is also something that business leaders want to cultivate. It's a cultural trait that's vital in an era of rapid technological advances, in which companies feel increasing pressure to be nimble and adaptable. A freedom-to-disagree culture has been a hallmark of CEOs like the late Jack Welch of General Electric and Virgin Group's Richard Branson; more recently, it has gained traction in leadership circles through books like *Radical Candor* by executive coach and ex-Googler Kim Scott. As CEO advisor Timothy Clark wrote last year in *Harvard Business Review,* "When employees at every level speak up, they circulate local knowledge, expand the universe of useful ideas, and prevent collective tunnel vision."

If the Chicago Statement principles catch on more widely on campuses, they could help students build skills in free and civil debate that could in turn become a bridge between their university tenures and their future careers. The statement could also serve as a reminder to business leaders about the value of free expression.

One leader who could benefit: Bill Ackman—who responded to recent plagiarism allegations against his wife by declaring that he would "unleash hell" against a publication that reported on them. For corporate titans, just as for college students, it takes practice to learn how to speak out without trampling others.

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EMPLOYEE SATISFACTION HAS BEEN a growing issue for today's business leaders—nearly six in 10 employees are quiet quitting, according to a 2023 Gallup report, which means they are putting in minimal effort on the job, causing decreases in productivity, customer loyalty, and profitability. This ongoing trend is costing the global economy $8.8 trillion, per the report.

Companies such as Teleperformance, however, have found successful ways to foster employee engagement. A global leader in digital business services, the Paris-based organization has created a culture in which employees feel heard and valued—ensuring individuals and the business thrive.

"Our founder and chairman, Daniel Julien, has said from day one that if you take care of your people, your people will take care of your customers," says Alan Winters, chief people officer and deputy chief compliance officer at Teleperformance. "It starts with listening to our employees."

Teleperformance has been fine-tuning its employee engagement efforts over several years by first analyzing how it measures and addresses employee engagement across its nearly 500,000-person team. It quickly found that the traditional annual survey didn't garner insights quickly enough to reflect rapidly evolving workforce trends.

"We wanted to know what was happening with our employees in real time," says Winters. "So we used our surveys on a daily, weekly, and monthly basis, allowing us to look at our people as their whole selves, not just a one-time snapshot of their well-being."

This realization led to implementing new tools, including Great Place To Work® surveys, allowing employees to log their happiness levels regularly and anonymously. The initiative was a rapid success, resulting in more timely insights that led the company to reach its highest participation rate with 69% of employees engaging with the survey across the organization and its trust index scores holding strong at 79% or higher for several years.

Beyond helping with retention, the company is using the survey data collected from candidates during the hiring process to boost recruitment efforts and bolster its ability to adapt quickly to changes in the workforce to meet new employee needs.

"Our team is focused on keeping our people in mind and making a more valuable proposition for our employees," says Winters. "And the data is telling us that we're moving in the right direction." ■

THE TELEPERFORMANCE TEAM SUPPORTS THE LGBTQ+ COMMUNITY WITH AN ON-SITE EXPERIENCE AND GROUP MARCH IN THE PRIDE PARADE IN MONTERREY, MEXICO.

TECH

The Chip Industry's Dirty Little Secret: It's Very Dirty

Semiconductor makers are in the midst of a factory building boom that critics worry will cause extensive environmental damage.

BY MICHAL LEV-RAM

ON SEPT. 24, 2021, Intel broke ground on two new computer chip factories in Chandler, Ariz., just one of many such projects companies are racing to complete across the country to fuel a seemingly bottomless demand for semiconductors. Amid the backdrop of dirt, steel, and bulldozers, Intel CEO Pat Gelsinger stood at a podium to address the crowd gathered to mark the occasion. "Isn't this awesome?" he said, gesturing to the massive construction site behind him. "If this doesn't get you excited, check your pulse."

Intel's plans for its campus near Phoenix are indeed remarkable: The chip giant is pouring $20 billion into the project, and says the new factories, or fabs, will create thousands of jobs, not to mention significantly boost its domestic capacity to churn out semiconductors used in products like personal computers and data center servers. But there's another, less celebratory side to the recent boom in chip manufacturing—not just Intel's, and not just in Arizona. Critics worry that the new plants could exacerbate the growing climate crisis, spoil the environment with chemicals, and suck aquifers dry. Here's why: While semiconductor chips are made in "clean rooms," manufacturing them is in fact quite dirty.

Producing the fingernail-size building blocks of electronics is an intricate and energy-intensive process. To that end, large fabs can use as much as 100 megawatt-hours of power hourly, more than what oil refineries or automotive plants consume, according to energy management provider Schneider Electric. Each semiconductor factory can also consume more than 1 million gallons of water daily, in addition to producing thousands of tons of chemical waste annually.

What's more, the challenges of mitigating these environmental hazards could soon become even harder. New technology used for making high-end chips requires even more energy and therefore is an even greater potential source of carbon emissions. And despite the industry's progress on making chipmaking cleaner, plenty of work remains.

To be sure, onshoring chip production has many upsides, including bolstering supply chains and even making the U.S. safer—one of the federal government's stated reasons for implementing the CHIPS and Science Act, signed by President Biden in 2022. The legislation authorized nearly $53 billion in subsidies and tax credits to incentivize semiconductor companies to invest more in domestic research and manufacturing. So far, it appears to be working.

Since the CHIPS Act was enacted, a number of chipmakers have committed billions of dollars to building new plants. In addition to its new factories in Arizona, Intel has broken ground on fabs in Ohio. Meanwhile, Taiwanese chipmaker TSMC, which makes most of Nvidia's processors, is also expanding in Arizona with a $40 billion build-out, reportedly among the largest foreign investments in U.S. history. And memory chip manufacturer Micron has plans for a massive plant in Boise, where the company is based.

It's no surprise that the industry has rallied behind the CHIPS Act. (Who wouldn't, with $53 billion in financial incentives?) But again, all of this expansion comes at a cost. And Intel and its rivals now find themselves having to come together to develop cleaner manufacturing. After all, they have a lot riding on their ability to both take advantage of the government's financial incentives and achieve the ambitious sustainability goals they have set for their companies. Intel, for example, has committed to reach net-zero emissions for its own operations by 2040.

That's why in November 2022, just a few months after the CHIPS Act was signed, the semiconductor industry formed a new group with 60 founding members that aims to accelerate the reduction of greenhouse gas emissions.

"We can't do it alone," says Todd Brady, Intel's chief sustainability officer. Brady joined the company 28 years ago, and he says that while today's challenges require the backing and

CLIMATE IMPACT

Chip factories use huge amounts of water and electricity.

1M

GALLONS OF WATER USED BY A CHIP FACTORY DAILY

100

MEGAWATT-HOURS CONSUMED BY LARGE CHIP PLANTS HOURLY

SOURCE: INTEL/SCHNEIDER ELECTRIC

Intel is building two new chip plants near Phoenix, part of an industrywide building spree across the U.S.

COURTESY OF INTEL CORPORATION

collaboration of the entire industry, Intel has been making headway on more sustainable manufacturing practices for decades.

According to Brady, the company's carbon emissions peaked in 2006, and have since been declining because of a growing reliance on renewables. Globally, Intel now gets 93% of its electricity from "clean" sources such as solar and wind.

Still, those energy demands are huge. A 2020 paper titled *Chasing Carbon: The Elusive Environmental Footprint of Computing* found that chip manufacturing was responsible for the majority of the carbon output of a consumer electronic device, rather than usage over its entire life cycle. And the process could get even more energy-intensive.

"The newer fabs for the most advanced [chip] designs will come with even heavier electricity demands," researcher and paper coauthor Carole-Jean Wu tells *Fortune* in an interview.

Intel and its rivals have plenty of reasons to keep reducing their carbon footprint, and not just because of their ambitious goals. While most new and existing semiconductor hubs in the U.S. welcome their investments, local communities and organizations worry about the environmental impact.

Use of water is of particular concern, especially in parts of the country like Arizona where it's not exactly plentiful. Chips must be rinsed with ultrapure water during the manufacturing process, in addition to water being used to cool equipment, as in data centers.

But here, too, companies like Intel have made progress, with a growing percentage of water used being recycled after cleaning. Intel says it has already reached "net-positive water" in the U.S. and India and will hit this same goal in all countries by 2030, even with the new sites and the increased water use they require. To fully meet its goal, the company is also working with nonprofits. Those projects, such as helping local communities use water more efficiently, offset water lost in manufacturing, mostly due to evaporation.

Much work still needs to be done to come up with greener chemistry in chipmaking, as several types of chemicals that harm the environment are currently used and then pumped into the atmosphere. At Intel's Arizona campus, where the new facilities are still unfinished, the company already emits about two tons of hazardous air pollutants quarterly.

Intel's Brady says this is one area in which a concerted effort by the whole industry could make a difference, in order to come up with alternatives to harmful chemicals. This, he says, is the dirtiest part of chipmaking. And the CHIPS Act, with all of its incentives to build bigger and faster, is making it more critical for chipmakers to act, including reducing the use of chemicals that contribute to greenhouse gases. After all, while onshoring chip production creates jobs at home, it also brings the pollution closer.

"We set our 2040 goals knowing we're going to be expanding," says Brady. "It's going to be a lot of work." F

TECH

AI's Battle Shifts to the Corridors of Power

Tech companies are sparring with regulators over how they can use and develop artificial intelligence. **BY VIVIENNE WALT**

BY MIDNIGHT, all the cookies had been eaten. The vending machine was out of coffee. The sandwiches ordered in for dinner were long gone. Still, about 700 lawmakers remained holed up inside the European Union's soaring executive chamber in Brussels. Finally, as the sun rose on an icy Dec. 8, 2023, they staggered home to nap and shower before returning for a further 17 hours, until—out of exhaustion or expediency—they agreed on a package of laws about one of the thorniest issues on which they had ever voted: artificial intelligence.

The marathon negotiations over the EU's AI Act, as it's now known, were among the most intensive in the bloc's memory, and produced the world's first rule book for a sprawling new technology with seismic implications. The EU's 27 member nations were hardly alone in trying to pull off this legislative feat. President Joe Biden last October issued an executive order, setting out guidelines to protect Americans against discrimination and massive job losses caused by AI—a placeholder while Congress and U.S. agencies like the Department of Commerce attempt to turn the order into hard rules. Meanwhile Japan, the U.K., South Korea, and other major economies have all issued similar proposals that vary from cracking down on misinformation and deepfakes to protecting people's privacy and revealing the data used for AI machine learning. And at an AI safety summit in the U.K. last November, convened by Prime Minister Rishi Sunak, 28 countries agreed to fight "serious, even catastrophic, harm" from the technology.

The deluge of rules and the potential for more have opened a new battlefront for companies developing and using artificial intelligence. How the fine print

ILLUSTRATION BY **BRATISLAV MILENKOVIC** is interpreted and enforced will have a far-reaching impact on the tech industry's future by dictating the kinds of products businesses can create and how they can harness customer data. At stake are hundreds of billions of dollars in future corporate revenue and market value. So, too, are national interests. Countries are weighing the protection of their citizens from dangers like privacy violations, bioweapons, and large-scale cyberattacks against a desire to become leaders in the technology in order to boost their economies and their militaries in the all-important global arms race. "This is so important, so transformative, not only for us, but for the whole world," says Dragos Tudorache, the EU's lead AI negotiator.

For regulators in the U.S. and Europe, the conundrum is this: Regulating too lightly could create unexpected dangers, while regulating too heavily could stifle innovation—the central argument pushed by investors and tech execs in arguing for companies to be allowed relatively free rein.

What's more, with AI changing at lightning speed, regulations currently under discussion around the world could soon be obsolete. "You're trying to regulate a moving target that very few people are technically competent to understand, and which government agencies have a hard time attracting the right skills to effectively regulate well," says Bill Whyman, president of Tech Dynamics, a Washington, D.C.–based advisor to tech firms. "You don't know what you are going to get in the end, when you open that Pandora's box of regulations."

When EU politicians opened that Pandora's box, they found two issues almost guaranteed to ignite fierce arguments among the union's 27 countries. First was facial recognition—something many lawmakers in Europe, with its strict privacy laws, saw as violating individual rights and reenforcing innate biases. Ultimately, EU lawmakers agreed to limit the use of AI facial recognition to law enforcement, and even then only for the purpose of solving serious crimes, like terrorism.

Second came the debate over how big AI companies must be before they should be compelled to abide by the full raft of EU regulations. "That really got the alarm bells ringing at these companies," says Bram Vranken, campaigner for Corporate Europe Observatory, a Brussels-based NGO that monitors companies' activities in the European capital. Vranken's group found that Google, Microsoft, and other tech giants spent millions lobbying EU lawmakers during the months leading up to the AI vote.

Tudorache, the lead EU negotiator, says he was bombarded by text messages and emails from lobbyists and industry groups parroting the talking points of tech companies, "requesting hundreds and hundreds and hundreds of meetings," he says. That is no surprise to AI experts. "These companies have more power than ever before," says Luciano Floridi, founding director of Yale University's new Digital Ethics Center. "They are richer than a couple of hundred countries around the world."

The specter looming over the Brussels negotiations was whether companies' AI foundational models—those, like AI chatbot ChatGPT, capable of being used for an almost endless variety of purposes—could cause grave harm in the hands of malicious actors. That fear has hugely increased with the explosive popularity of ChatGPT, which OpenAI launched in 2022. France and Germany argued hard to protect their own AI champions, specifically Paris-based startup Mistral AI (founded by former Meta and Google scientists) and Aleph Alpha in Germany, each of which has raised hundreds of millions of dollars in venture capital.

In the end, the EU act compelled the biggest tech giants (largely American) to be fully compliant, while likely giving Europe's startups years to grow before being subjected to the same rules. "We're in the very early stage of regulating an absolutely novel phenomenon," says Robert Spano, an attorney who specializes in AI-related law at Gibson Dunn & Crutcher in Paris and London. "Probably for the next decade it will be two steps forward, one step back. There will be a lot of disputes as to what the regulation requires."

Unlike the EU's AI Act, the Biden administration's executive order is a set of guidelines for about 50 federal agencies to follow. Under the order, companies would need to watermark AI-generated content, test their models for potential security risks, and invest in more AI engineers. But critics say the order lacks enforcement mechanisms and downplays human rights concerns. While Europe tightly restricts

"THIS IS SO IMPORTANT, SO TRANSFORMATIVE, NOT ONLY FOR US, BUT FOR THE WHOLE WORLD."

DRAGOS TUDORACHE, THE EU'S CHIEF AI NEGOTIATOR facial recognition software, the U.S. will rely on its federal standards and technology agency to test those new applications. "That does NOT sound reassuring at all," says Don't Spy EU, an NGO monitoring AI regulations in the U.S. and EU, in an analysis of Biden's executive order. Likewise, the group criticized the EU for allowing security services to use facial recognition, saying, "There is no way to predict how law enforcement will in fact employ these systems."

To democratic and authoritarian governments alike, the AI race is crucial to cementing their countries' political clout in the years ahead. "Whoever becomes leader in this sphere will become the ruler of the world," Russian President Vladimir Putin said as far back as 2017. Likewise, China has declared AI technology a key national strategy. It exports AI facial recognition technology to its allies abroad, and at home bans Western AI apps like OpenAI's ChatGPT and Google's Bard. China's government also requires companies to show that their algorithms reflect "core socialist values," and tightly controls the data fed into AI machines. That ensures that Chinese chatbots do not, for example, tell users that the Chinese dream is to move to America—as two apps did several years ago.

Despite the clashing—indeed, hostile—ideologies, companies insist the hodgepodge of rules worldwide should be standardized as much as possible to make it easier to do business. But in today's deeply divided world, that's "a daunting challenge," says Chris Meserole, executive director of the Frontier Model Forum, an industry group created in January by OpenAI, Microsoft, Google, and emerging AI powerhouse Anthropic, to push for favorable laws.

The ink had barely dried on the EU's AI Act when Margrethe Vestager, one of the EU's top officials, with the fanciful title of Executive Vice President for a Europe Fit for the Digital Age, landed in San Francisco in early January to lay out its implications for Big Tech. In a two-day blitz around the Bay Area, Vestager—a Danish politician who has waged antitrust cases against Google and Apple over the past decade in Brussels—raced between meetings with CEOs Tim Cook of Apple, Sundar Pichai of Google, Nvidia's Jensen Huang, and OpenAI's Sam Altman.

Pausing for an hour to meet with journalists, she said she had told all those men that AI laws could wait no longer. "When ChatGPT launched, all of a sudden, more or less everybody on the planet realized this is something really massively important," she said. When skeptical journalists asked why Big Tech would listen to lawmakers 5,000 miles away, Vestager said bluntly, "If there is not compliance, we stand ready to open noncompliance cases," adding that under the AI Act, EU countries could fine errant businesses up to $30 million or between 2% and 6% of their global revenues, or order them to break up their vastly powerful companies.

It might take years to come to that—if it ever does. Europe's laws come into full effect only in 2026, and U.S. and U.K. versions are lagging behind that. The activity in Brussels, however, has fired the starting gun. Says Whyman, of Tech Dynamics: "The odds of getting it right are hard. But that doesn't mean we should do nothing."

REGULATORY ROULETTE

Governments worldwide have floated or voted on AI regulations, creating a smorgasbord of rules. Here's how they've tackled some of the top issues:

▸ Facial recognition

This is among the most contentious types of AI and is heavily criticized by civil rights groups. The EU's AI Act would restrict its use to law enforcement for tracking serious crimes like terrorism. But President Biden's executive order is more flexible, instructing a federal agency to evaluate new systems as they are launched.

▸ Copyright

Another hot-button issue, with authors and artists filing a slew of lawsuits in U.S. courts, claiming that several companies have used their content to train algorithms, without their consent. The EU would require companies to disclose the data they use, while Biden's order instructs U.S. patent offices to study the issue and report back.

▸ Deepfakes

Global regulators largely agree on this issue. Both the EU and Biden want to crack down on the proliferation of manipulated AI-generated images, or deepfakes. Both would require companies to watermark fake, or synthetic, content, so that users could tell the difference between images that are real and not.


FORTUNE
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Our health is the most important thing we have.
It deserves the most helpful technology of all.
Self-driving robots deliver lunch. Smart watches adjust the temp at home. Everywhere, technology empowers us. Shouldn't it also empower what matters most–our health?
This is the question driving a new era of innovation at Abbott. We're creating technology that gives us insight and control over our health like never before.
Our health is simply too important for the status quo. Let's make health tech the most helpful tech of all.
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CONNECTED HEALTH | OPTIMIZED NUTRITION
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WELL

The Unexpected Upside of an Aging Workforce

Hiring and retaining older workers can help boost your company's bottom line.

BY ALEXA MIKHAIL

ILLUSTRATION BY
MARYSIA MACHULSKA

THE GRAYING OF the U.S. workforce is gaining momentum. A Pew Research survey found nearly a fifth of Americans age 65 and older were employed in 2023, nearly double the three decades prior. Employees 55 and older will constitute over a quarter of the global workforce by 2031, according to an analysis from Bain & Co. last year.

Finding ways to capitalize on an increasingly intergenerational workforce is top of mind for Jason LaRue, national managing partner of talent and culture at KPMG, who supports the firm's 36,000 U.S. partners and professionals.

"We're absolutely going to have to be able to attract workers across a wide set of generations, including people who have had longer careers already," LaRue tells *Fortune*. "There's no magic about, 'I turned X age, and therefore I am capable or not capable of doing something else.'"

This marks an unprecedented time for most workplaces, where the presence of retirement-age workers used to be rare. However, given the current U.S. labor shortage, it could be a win-win for those older workers and their employers alike. As the pool of older workers grows, so does the evidence that their presence on multigenerational teams can boost a company's bottom line, foster innovation, and help combat widespread burnout. In the war for talent, employers must implement novel ways to integrate and engage both longtime and new cohorts of experienced workers.

For practical and professional reasons, adults are working longer. For some, the financial impact of caregiving and the need for a steady paycheck to support their longer, healthier life spans have made traditional retirement impossible. "We're having to try and invent a life that hasn't been lived before," says John Beard, director of the International Longevity Center–USA and professor at the Robert N. Butler Columbia Aging Center.

Other older Americans continue to work to maintain social connections, for a sense of purpose, or to reimagine a career in a novel decade of opportunity—like Elizabeth White, author of *55, Underemployed, and Faking Normal.* She joined a startup incubator at age 68 and became a founder at 70. "I think that the days of retirement being a one-time, one-way exit and then you're done are over," she tells *Fortune.*

65+

▲ NEARLY ONE-FIFTH OF AMERICANS AGE 65 AND OLDER WERE EMPLOYED IN 2023.

25%

▲ EMPLOYEES 55 AND OLDER WILL CONSTITUTE OVER A QUARTER OF THE GLOBAL WORKFORCE BY 2031.

SOURCES: PEW RESEARCH; BAIN & CO.

The case for hiring and retaining older workers

While generations are not monoliths, research suggests older workers are the most loyal employees and tend to stay in their jobs longer. According to the Organization for Economic Cooperation and Development (OECD), companies whose proportion of older workers is 10% higher than that of other firms see 4% less turnover compared with companies with a lower proportion. That may not seem like a big difference, but losing and replacing an employee can cost companies between one and two times the employee's annual salary.

Older workers also possess what Bethany Iverson, cofounder of the Coven, a co-working space for underrepresented groups, calls crystallized intelligence. "As we age, we get better at formalizing knowledge. We get better at giving advice and sharing feedback," she says.

Dr. Linda Fried, director of Columbia's Age Boom Academy and the Robert N. Butler Columbia Aging Center and the dean of the Columbia Mailman School of Public Health, says older workers also possess more "prosocial motivations," that is, an empathy and a desire to serve others. "As people get older, maybe because of their problem-solving capabilities plus a huge dose of generativity, [they want] to leave things better for subsequent generations," Fried tells *Fortune.* Companies benefit from an older employee's desire to make improvements and help others avoid mistakes.

Older workers may also be a solution to high burnout rates. Research suggests a fourth of the workforce faces burnout symptoms such as feeling overwhelmed, anxious, or distressed, which can lead to high turnover and absenteeism, costing companies billions in lost productivity.

But according to a 2022 survey from Gallup, baby boomers have the lowest levels of burnout and the highest engagement at work. Iverson hypothesizes older workers don't feel the pressure to climb the ladder as they did when they were younger. Not only are older workers less likely to leave, their calmer, more relaxed perspective can rub off on younger workers in an intergenerational workplace.

The power of an intergenerational workforce

Extensive research from the AARP found that teams composed of older and younger workers are more productive than homogeneous age groups. According to a 2020 International Longevity Centre study in the U.K., teams with an age range of 25 years or more met or exceeded management's expectations 73% of the time, compared with 35% for teams with an age gap of less than 10 years.

"Older workers are bringing a whole different layer of experience—a savvy ability to problem-solve—that when you mix it with younger brackets, it produces a high amount of output," says Gary A. Officer, CEO of the Center for Workforce Inclusion.

Despite the case for retention, many older workers don't feel supported in their growth once they reach the age society deems graying.

Pervasive ageism

A significant barrier to thriving at work is the ageist assumptions around older employees. Fried says the false assumption that older workers take jobs from younger ones—the "lump of labor" fallacy—propels ageism and creates barriers to age-inclusivity.

"We're socialized to be ageist," she says, adding that older workers do not often compete with younger workers for the same job.

A vast majority, 82%, of workers between age 50 and 80 report experiencing at least one form of ageism in their daily lives, a University of Michigan poll found; one in six older adults says they haven't gotten a job because of their age, according to the AARP; 40% of employers do not have policies in place to support older workers, according to the Coven. "We don't celebrate the expertise, the knowledge, and the wisdom in the ways that we should," Iverson says of older workers.

BABY BOOMERS HAVE THE LOWEST LEVELS OF BURNOUT AND THE HIGHEST ENGAGEMENT AT WORK.

Fostering age-inclusivity

Over 1,000 companies have pledged to create equal opportunities for older workers as part of AARP's Employer Pledge Program. While the pledge is a good start, Fried says putting age-inclusive policies and accommodations into action is most impactful. As standard retirements become a thing of the past and many older workers hope to stay working, employers must rebut baked-in ageism and see their most tenured employees as assets.

"We are in a war for talent continually, and that war for talent gets lost, which has a direct effect on the bottom line, if the people at your company don't feel like they belong," says Jessica Kriegel, the chief scientist of workplace culture at Culture Partners. Kei Bullock, the vice president of talent acquisition at Northrop Grumman, which hires 10,000 employees a year, says its iReturn program has led to an 80% retention rate since 2017. The training and mentoring program is designed for mid- to late-career workers who have taken at least a two-year career break and are looking to reengage.

Beyond hiring, LaRue says, it's what happens within the closed doors of an office setting that dictates whether or not older workers feel seen.

KPMG's caregiver concierge benefits target those who may be caring for an older parent coupled with work responsibilities. Caregiving benefits, such as in-home aides, paid time off, and flexible work schedules, can scale beyond an employee's child to their aging parents, who are living longer and often lean on their adult children for support.

As 90% of older workers say their job must feel meaningful to accept a position, employers have to find innovative ways to reengage and support them.

"There's a massive opportunity to reimagine how roles are designed, helping organizations absorb the wisdom of older employees before they eventually transition out of the workforce," says Iverson. She envisions evolved roles capitalizing on older employees' crystallized intelligence, such as documentation positions where people can synthesize their knowledge for future workers.

"It's great for the organization, because when they do eventually retire or leave the workforce, there is an artifact of all of the things that they were working on, and that they were great at," Iverson says.

Offering advisory, coaching, mentoring, or part-time roles can help retain older workers, Iverson adds, along with flexible working hours and remote options. Iverson also suggests asking older workers how they might imagine their role evolving to keep them as engaged and fulfilled as possible. Managers shouldn't assume that older employees have no interest in growing on the job.

As we live longer, it's time to redefine what it means to work. How can that look different and create more fulfillment for individuals as they age while supporting companies? Working is no longer solely about climbing the ladder. Maybe it's also about making a lateral move, creating something new later in life, or pivoting completely.

"I get very excited about the social capital that older adults could bring," Fried says. "This is astoundingly optimistic if we can take down our blinders and think about how to design for a society in which people can stay engaged."

INVESTING

5 Steady-Rising Stocks for 2024

Cast aside in the surge of enthusiasm for all things tech, these five non-tech options are arguably poised for big years ahead.

BY LARRY LIGHT

ILLUSTRATION BY CHRIS GASH

THERE'S NO QUESTION technology stocks are exhilarating. Last year, the ETF tracking the Nasdaq 100—the QQQ—soared 54.8%. But there's a dark side to all that potential upside: Tech stocks are notoriously volatile. The QQQ in 2022 fell a dizzying 32.6%, far more than the market as a whole. Which got us thinking—after a year in which tech was the story, what other stocks might have gotten overlooked? Below, we found five steady bets that each enjoyed double-digit returns over the past decade, which speaks to their staying power, a characteristic that Wall Street seers call "quality." And they're still poised to deliver tech-like returns, while rounding out a broader portfolio.

CME Group (CME)

- 10-YEAR ANNUALIZED PRICE RISE: **12.6%**
- MARKET CAP: **$72 billion**

The world's largest derivatives exchange operator, CME Group, stands apart from the largely plodding share performance of its financial services peers. Its stock vaulted 31% last year, yet its price/earnings ratio, at 24, is still not much more expensive than the S&P 500 (with a price/earnings ratio of 21), and far cheaper than the QQQ (32).

CME's outperformance doesn't surprise Max Wasserman, cofounder and senior portfolio manager at asset management firm Miramar Capital. Reason: It has great growth potential. "They are very profitable," he says, "and they have more volume in the works."

Indeed, derivatives keep expanding in scope, adding futures and options on all manner of assets, from commodities to currencies to stocks to interest rates, per the World Federation of Exchanges. In dollar terms, derivatives enjoy double-digit annual growth.

Globally, the derivatives market is about seven times the size of the equities market. The recent boost in interest rates actually helped CME, because that increases the need for interest rate hedges, via derivatives.

CME (originally named the Chicago Mercantile Exchange) has gobbled up rivals like the Chicago Board of Trade as it pushed beyond futures for crops and livestock. As Morningstar analyst Michael Miller writes, CME "has assembled a diverse set of derivative products ... Weakness in one product is often offset by strength in another."

Nike (NKE)

- 10-YEAR ANNUALIZED PRICE RISE: **11%**
- MARKET CAP: **$155 billion**

A temporary stumble on the track obscures the strength of Nike. It has had to work down bloated inventory, endure a sales slowdown in its important Chinese market, and beat back competition from upstarts like Hoka. The stock is off its 2021 high of $180, and took a new tumble starting in December after Nike tamped down sales expectations.

Still, the company, ranked as the world's most valuable brand by consulting firm Brand Finance, hasn't lost its cachet. Nike is embarking on $2 billion in cost cuts over three years, as well as a plan to hike its use of technology and automation to streamline operations.

"This is a turnaround story, and Nike has to take its medicine," says Jay Woods, chief global strategist at Freedom Capital Markets. Nike is focusing on direct-to-consumer sales, hoping to increase this profitable channel from 45% up to 60% of revenue. Nike wants to return its earnings before interest, taxes, depreciation, and amortization (Ebitda) margin, lately 13.2%, to the mid-teens, where it was in 2021. And there's good reason to believe that Nike can, you guessed it, just do it.

Visa (V)

- 10-YEAR ANNUALIZED PRICE RISE: **19.4%**
- MARKET CAP: **$533 billion**

Visa introduced the world to the credit card in 1956—and has fended off competitors fiercely ever since. "A wide moat surrounds the business, and Visa's position in the global electronic payment infrastructure is essentially unassailable," writes Morningstar analyst Brett Horn. Small wonder that the stock has done well: Over 10 years, it beat the QQQ, and increased 26.2% in 2023. In snakebitten 2022, the stock lost just 3.4%. For the fiscal year ended last Sept. 30, Visa's earnings jumped 15% and revenue was up 11%. In a shareholder-friendly move, during the past fiscal year, it bought back $12.4 billion in stock, and the board authorized more repurchases at double that amount. The company's profit margin is a stunning 55%.

Visa has the most credit cards in circulation, with almost half the market, according to Bankrate. Mastercard comes in second at 36%, leaving Discover and American Express claiming small shares.

Visa's asset-light business involves licensing its cards to banks. So it has relatively low debt, with a ratio to Ebitda of just 1.0. Return on capital over the past five years is a healthy 29%.

NextEra Energy (NEE)

- 10-YEAR ANNUALIZED PRICE RISE: **13.4%**
- MARKET CAP: **$127 billion**

For decades, electric utilities have been plodders, their stocks edging up in small, single-digit increments. They are typically the lowest performers among the 11 S&P 500 equity sectors.

That's not the picture of NextEra Energy, which owns utilities—and is the largest renewable-power generator in the U.S. NextEra stock has regularly beaten the S&P 500 index for the past 10 years. "NextEra has been a market darling, and the clear leader on clean energy," observes Burns McKinney, a senior portfolio manager at NFJ Investment Group.

By 2030, the world will need to quadruple its spending to upgrade aging electricity infrastructure and build new capacity, a McKinsey & Co. study finds.

Electricity-hungry data centers, EVs, and household heat pumps are all thirsty for power. Enter NextEra, whose strong balance sheet and solid profitability are more than able to pay for the transformation to renewables. Dividends are healthy, sporting a 3% yield. Earnings per share have climbed at a rapid clip over the past few years, topping analysts' forecasts. The company is divided into two parts: one an old-school cash cow making up 70% of the business called Florida Power & Light, the other the renewables unit. FPL has two nuclear power plants and a network of natural gas pipelines, and services a state with a swelling population.

Operating throughout the U.S. and Canada, this non-carbon division is one of the world's biggest producers of solar and wind power. For forward-looking energy investors, NextEra is well positioned.

Sherwin-Williams (SHW)

- 10-YEAR ANNUALIZED PRICE RISE: **17.7%**
- MARKET CAP: **$76 billion**

"A housing boom is coming, and Sherwin-Williams will piggyback onto it," predicts Freedom Capital's Woods.

With rates likely coming down and a growing population, young adults who have been delaying homeownership may get a chance to jump in—and that's great news for the world's largest paint and coatings producer. Sherwin-Williams has 4,900 stores and adds nearly 100 new ones yearly, while its products also stock the shelves of big-box stores. More than three-fourths of Sherwin-Williams's business occurs in North America, with much of its international exposure acquired through the 2016 purchase of Minneapolis-based Valspar.

Sherwin-Williams mainly caters to professional painters. "Its strategic focus on building this segment has created a strong value proposition for contractors," writes Morningstar analyst Spencer Liberman in a research note. "Job site delivery, in-app ordering, and a capacity for high-volume orders save time for customers and allows for premium product pricing."

Revenue and earnings have steadily risen. The stock, while on the pricey side with a P/E of 32, gained a market-beating 32.5% in 2023 and has the second-best 10-year price history of our five picks.

With stats like those, investors could be forgiven for overlooking tech stocks in favor of steady favorites this year. ■

VENTURE-CAPITAL-FUNDED PRIVATE MARKETS FUELED THE CREATION OF HUNDREDS OF BILLION-DOLLAR STARTUPS OVER THE PAST DECADE. NOW THOSE MARKETS ARE IN UPHEAVAL—AND THE UNICORNS ARE IN CRISIS.

RUNNING OUT OF OXYGEN

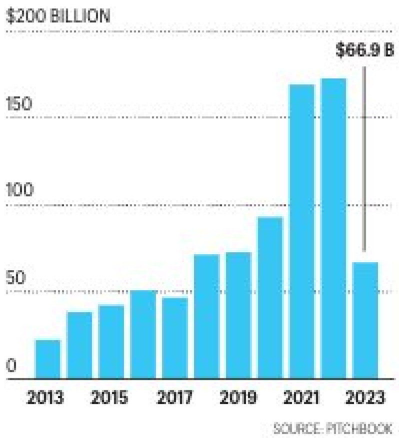
BY JESSICA MATHEWS

ILLUSTRATION BY **JUSTIN METZ**

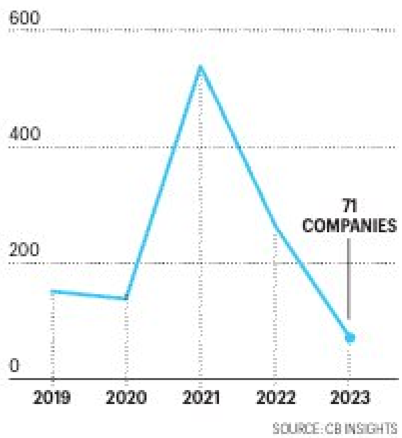
ENDANGERING THE UNICORNS

Rising rates have made it harder for venture firms to raise money from investors, while a weaker M&A market, chilled by antitrust concerns, has reduced the odds of a big exit. One result: a sharp decline in new billion-dollar valuations for startups.

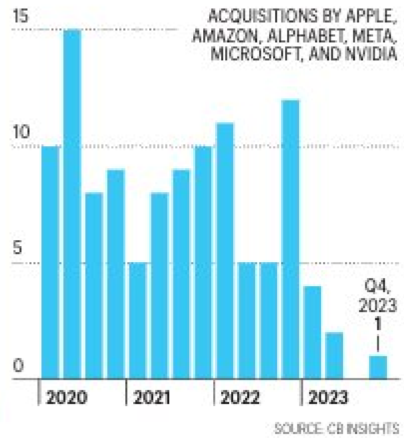
U.S. VC FUNDRAISING ACTIVITY



NEW UNICORNS MINTED



BIG TECH M&A ACTIVITY



In its prime, the Seattle-based freight network company Convoy was one of tech's esteemed startup success stories.

Two Amazon veterans set off on their own in 2015 to build a platform that would connect shippers with carriers who had extra, unfilled space on their tractor trailers—making supply chains more efficient and reducing emissions. Flush with more than $1 billion in equity funding and debt it had accumulated over the years from some of the tech industry's most prominent investors, entrepreneurs, climate activists, and lenders, Convoy had at one point hired 1,300 employees and built out a network of more than 400,000 trucks across the country.

By 2022, Convoy had started to dabble in a wide array of business lines outside its initial purview: a fintech offering for quick payments; a fuel card for discounts on diesel; a trailer-rental service. By the end of that year, Convoy's gross margin had grown to a respectable 18%, according to a document seen by *Fortune*. But its hefty fixed expenses, including steep engineering and product team costs and an expensive lease in Seattle, were weighing down its financials, according to someone close to the company. Those expenses kept Convoy from turning a net profit.

Three years ago, that may not have been a problem. But the market had turned. Last October, Convoy became one of many casualties of a painful reset within the private markets. Just 18 months away from a fresh $410 million cash infusion from a Series E round and line of credit, Convoy suddenly laid off nearly everyone on its staff, shut down its core business, and, shortly after, raffled off its technology platform to another freight startup. In a memo to employees that was obtained by GeekWire, its CEO, Dan Lewis, said Convoy had hit a "perfect storm": a collapse in the freight market, paired with a "dramatic monetary tightening" that "dampened investment appetite and shrunk flows into unprofitable late stage private companies."

Convoy's assets are now in foreclosure, and it is in litigation with employees who say they didn't get paid. Its investors—including Alphabet's growth investing arm CapitalG; Greylock Partners; Y Combinator's growth stage fund; Amazon founder Jeff Bezos; Salesforce CEO Marc Benioff; and Al Gore's climate fund Generation Investment Management, to name a few—lost the entirety of their investment, according to The Information. Convoy, whose investors determined it was worth a heaping $3.8 billion as recently as April 2022, is now worth nothing at all.

The world of startups is well-accustomed to failure: Approximately nine in 10 shut down. But those failures rarely attract the attention of the broader public. They tend to happen early in a startup's life—when the people who run it are still in trial-and-error mode. As a company gets bigger and achieves enticing revenue growth, it gets more love from some of the thousands of thick-pocketed venture capital firms that write checks so companies can scale quickly. As those investors pour in more and more capital, failures become less frequent.

Or at least they used to. Since the

first quarter of 2022, everything has changed. Macroeconomic forces have refashioned every link in the chain of the startup ecosystem. Those changes are now rippling through private markets in what has turned into a reckoning for startups—and especially for unicorns, the privately funded companies valued at more than $1 billion that are Silicon Valley's most elite and prized darlings.

"It's one thing to fail when you're a small company and you fail to get product-market fit," says Geoff Love, head of venture capital at Wellcome Trust, which has invested in several venture funds, including those at Accel and Venrock. "It's quite something else to fail when you are at a valuation in the many billions and have raised hundreds of millions of capital. That's awful."

The atmosphere has turned undeniably sour for startups. Just two years ago, founders were elbowing investors out of their oversubscribed funding rounds; now some are struggling to raise at all, and are facing the harsh reality that their businesses are worth much less than they thought. The IPO market has dried up relative to 2021, and M&A deals have become harder to secure and close—keeping investors from being rewarded for their bets. After more than a decade of an overabundance of capital, cash has suddenly become scarce.

So far, the market has seen only a handful of unicorns formally call it quits. Health startup Olive AI shut down in October. Design startup InVision said it would discontinue its business in January. Modular building company Veev announced a shutdown in November. Of course, there was the high-profile, scandalous blowup of the crypto exchange FTX, which shut down in 2022.

But much of the pullback has been quietly playing out behind the scenes. While macroeconomic changes immediately sway the share prices of publicly traded stocks, their impact takes a while to appear in private markets. Private companies aren't required to disclose financials or material business changes to the public, so dramatic slowdowns aren't always apparent—until a sudden announcement or press report announcing major layoffs or a full-on demise.

Nearly two years after the IPO markets effectively closed to most venture-backed startups, we've only just recently begun to see the full effects. When new funding dried up in 2022, many of these companies still had about 18 to 24 months of runway before they would run out of cash, according to Anand Sanwal, executive chair and cofounder of CB Insights, which conducts research on venture-funded businesses.

"We're just coming up on the end of that window," he says, noting that he's expecting an "intensification" of shutdowns and acqui-hires in the first part of this year.

The reasons for failure at every company are different. There is no direct link from Convoy, which was facing enormous headwinds from a freight recession, to FTX, whose founder Sam Bankman-Fried was eventually convicted of multiple counts of fraud. But one thing is for certain: When capital is suddenly hard to come by, the wheat is always separated from the chaff.

IT WASN'T LONG AGO that the term "unicorn" went from metaphor to misnomer.

Until the past decade, companies rarely became so valuable when they were private. That's why "unicorn" was first coined in 2013—if a company could achieve a valuation of $1 billion as a private company, it was a rare badge of success. When *Fortune* published a cover story about these burgeoning behemoth startups in 2015, there were only around 80 that had joined the $1 billion club.

Now there are more than 1,200, spread out around the world, according to CB Insights. And "unicorn" hardly seems like the right label for some of today's private-company successes, which are scaled more like blue whales. Elon Musk's space company SpaceX boasts a reported valuation of $180 billion, and TikTok parent ByteDance one of $225 billion, while ChatGPT creator OpenAI could reportedly notch a $100 billion valuation in its next funding round.

So what led to the unicorn boom? Low interest rates made the venture sector more enticing to investors, as other, less risky alternatives became less lucrative. Venture returns were also far exceeding those of the public markets, which drew new investments into the space, according to Theresa Hajer, head of U.S. venture capital research at Cambridge Associates, which advises venture funds' limited partners. Then there was the success of startup IPOs, which drew in hedge funds and mutual funds like Coatue, Fidelity, and T. Rowe Price, all aiming to take advantage of pre-IPO growth by becoming private-stage backers of companies like Uber,

"THE EUPHORIA CAN HAPPEN REALLY QUICKLY, AND THE DOWNTURN—THE VALVE SHUTTING OFF—CAN ALSO HAPPEN REALLY QUICKLY."

BEEZER CLARKSON, SAPPHIRE PARTNERS

Snap, and Pinterest.

Add the pandemic-induced tech boom in 2020 and the extraordinary $2 trillion stimulus to that equation, and we ended up with what you could either describe as two banner years for venture capital or a nonsensical frenzy of record funding, record exits, and record valuations in 2020 and 2021. With capital freely flowing throughout the ecosystem, companies with hardly any revenue—in some cases, none at all—were going public at more than billion-dollar valuations during that period, amid unprecedented demand from investors.

"There were companies that were doing $5 million in revenue that were being valued at $1 billion," CB Insights' Sanwal says, adding, "We were seeing 100x, 200x multiples."

But between February 2022 and the end of 2023, the economic climate darkened. The Federal Reserve gradually raised its baseline interest rate more than tenfold, to 5.33%. There was a steep correction in the public markets, with software, internet, and fintech stocks dipping well below where they had traded prepandemic. War broke out in Ukraine (and, more recently, the Middle East). Tensions heightened between the U.S. and China, where a series of VC firms had made a fortune.

In May 2022, Sequoia Capital blasted out a slide deck to its portfolio companies, warning that the tech industry faced a "crucible moment." It was one of a handful of ominous warnings the firm has issued over the years when its partners anticipated a correction (not always accurately). But this warning was quickly echoed by other firms, including noted startup incubator Y Combinator. "The era of being rewarded for hypergrowth at any cost is quickly coming to an end," Sequoia partners warned.

Rising interest rates, in particular, tend to stymie venture-capital activity. Interest rates are directly correlated to discount rates, which investors use to calculate the present value of future cash flow of a company—which in turn influences valuation at later stages. Higher rates also mean that capital is more expensive to borrow, making it more difficult for startups to maintain a fast pace of growth. Beezer Clarkson, who leads Sapphire Partners' investments into venture funds, puts it simply: "The free money stopped."

Rising rates pose another threat to startup fundraising, though their impact is less immediate. Higher rates make less-risky assets, like fixed income or infrastructure, more attractive to the pension plans, endowments, charitable organizations, family offices, and sovereign wealth funds that usually invest with VC firms. These backers, called limited partners or LPs, are the ones whose money is ultimately funding the whole ecosystem. Historically, research has shown that rising rates lead to less LP investment in venture capital—and less money going into venture funds ultimately means less money going into startups.

WE'RE SEEING ALL OF THIS play out in real time, to devastating effect. When public markets faltered, unicorn darlings that had gone public in the previous two years plummeted in

SKY-HIGH
Elon Musk–backed rocket company SpaceX has so far bucked the trend of plummeting private-market valuations; it's reportedly valued at $180 billion.

JOE RAEDLE—GETTY IMAGES

value. Buy-now, pay-later company Affirm, which went public in January 2021, saw its stock drop from a peak of more than $168 per share to around $30 by mid-March 2022. Private companies were left with valuations that no longer seemed realistic relative to their public peers; the IPO market effectively closed in 2022, as that mismatch erased potential demand for their shares. That year, there was a 95% reduction in proceeds from companies going public in the Americas versus 2021, according to EY's Global IPO Trends Report.

Only a couple of growth-stage startups have tried to go public since then—despite there being a slew waiting for the right time, including fast-fashion retailer Shein, social media site Reddit, and data intelligence company Databricks.

There's good reason to be shy. Instacart was forced to take an enormous haircut, clipping its valuation on several occasions before its IPO last September. Since then, shares of the grocery delivery startup have fallen more than 30% as of mid-January. The company now has a market capitalization of about $7 billion—a remarkable discount to the $39 billion valuation Instacart boasted as a private company in 2021.

"There's a vast majority of companies who raised these mega rounds in 2021 who will probably never be worth, at any point in time, the valuation that they were given" when they were private, Jamin Ball, partner at venture capital firm Altimeter Capital, said of software companies on the *20VC* podcast earlier this year. The challenge, he continued, is what to do when you come to that realization.

Meanwhile, Big Tech companies including Google, Meta, Microsoft, Apple, and Amazon have retreated from M&A deals as they tighten their budgets. And antitrust regulators have become more aggressive in challenging acquisitions they say are anticompetitive. In December, Adobe called off its $20 billion megadeal to acquire the design unicorn Figma after facing backlash from regulators in the European Union and the U.K. That was shortly after the U.S. Federal Trade Commission won a court appeal that led the biotech company Illumina to divest the cancer-test startup Grail, which it had acquired for $7.1 billion two years prior.

The lack of funding and dried-up acquisition market played key roles in the demise of Convoy, which was seeking a buyer in its final hours. "We spent over four months exhausting all viable strategic options," Lewis, the CEO, wrote in his memo to employees. "M&A activity has shrunk substantially and most… logical strategic acquirers of Convoy are also suffering from the freight market collapse."

The shift in the market has led venture firms to radically mark down their investments in their funds. But a lack of IPOs and M&A deals is causing another problem: Venture funds aren't able to return money to their own investors, the limited partners. That leaves the LPs either overexposed in this high-risk sector—and thus unwilling to put in new money—or without liquid capital to reinvest in new funds. And that breaks another link in the chain of startup capital.

"Every LP that I know is doing this math right now," Sapphire's Clarkson says, noting that LPs are calculating whether the cash their venture firms call to invest will outpace distributions they get from startup exits, and how much money they have temporarily trapped in the venture capital system. She adds: "The rational human behavior is to concentrate your dollars into the managers you have the highest conviction in."

These new realities make it especially difficult for new venture firms and managers to raise their own funds right now. (Last year was the worst time in 10 years to try to raise a first-time fund, according to PitchBook data.) They also put pressure on the fundraising efforts of some of the billion-dollar firms that have raised megafunds in the past few years. In some isolated cases, venture firms are shutting down or deciding not to raise new funds. OpenView, a 74-person firm based in Boston, started to wind down its operations in December. More recently, hard-tech fund Countdown Capital told investors in January that it would shut down, according to TechCrunch.

"The overall business takes a while to build and to produce exits, but the euphoria can happen really quickly, and the downturn—the valve shutting off—can also happen really quickly," Clarkson says.

WHO WILL SUCCEED and who will fail in this environment? That's the question keeping many investors on the sidelines, waiting until they can be more certain of what a company is worth, or whether it will survive.

Bryan Roberts, who leads the storied early-stage venture firm Venrock, closed a $650 million fund in January, larger than the three $450 million funds it raised over the past decade.

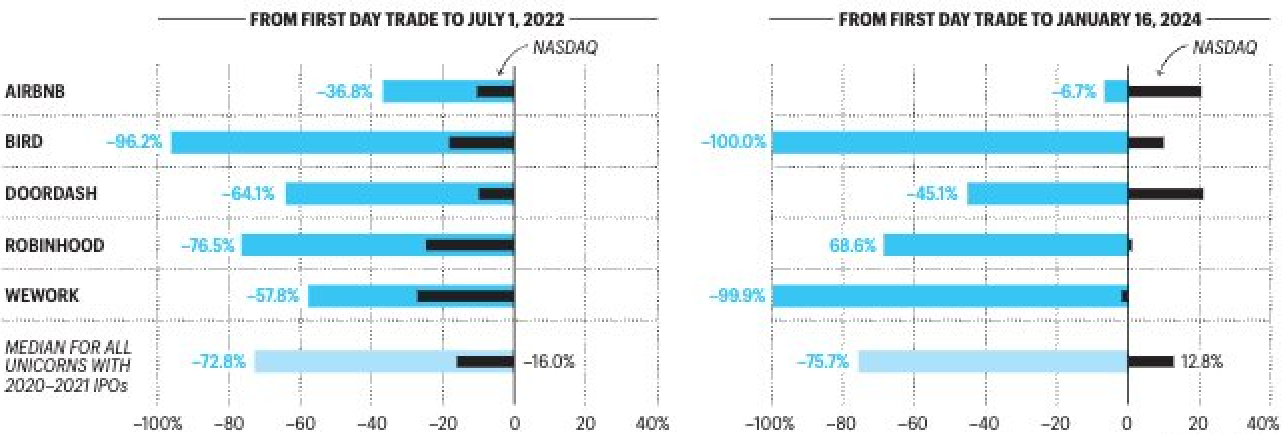
"EVERY INVESTOR ON THE PLANET IS GOING TO HAVE A SET OF COMPANIES THAT THEY DON'T BELIEVE IN AND EITHER SHUT DOWN OR TRY TO SELL FOR VERY LITTLE."

BRYAN ROBERTS, VENROCK

A POST-IPO WIPEOUT

Unicorns that went public during the boom years of 2020 and 2021 were hit particularly hard when rising rates clobbered stocks in early 2022. Eighteen months later, most still lag the Nasdaq. Below, the performance of five well-known examples.

CHANGE IN UNICORN MARKET CAPITALIZATIONS



SOURCE: S&P GLOBAL

This isn't an entirely bullish move; it reflects his belief that there will be fewer investors willing to back its companies in later rounds, and that Venrock will have to put more money into those it wants to support.

"Every investor on the planet is going to have a set of companies that they don't believe in and either shut down or try to sell for very little," he says. "And they'll have some that they say, 'No, I think this is worth it. And I'm going to take an added dose of risk of capital and risk to my reputation and my performance of my fund and my firm to give this company a shot at realizing their vision.'"

Roberts says Venrock's choices about which startups to back will be centered on the people who run them, and whether they are doing something differentiated in the market.

Growth investors, who invest when a company is further along in its business, are thinking more about numbers and financials, and whether companies will be able to control their costs and become profitable.

"We're seeing a fork in the road between those companies who were able to reset their cost base to align with slower market growth, and those who were not," Lila Preston, who leads growth-stage private investments at Al Gore's Generation fund, wrote in an email to *Fortune*. "A lot of this has come down to business model, which influences the scale required to get to profitability and the funding required to get to that scale."

The data shows that startups in the AI sector have the best shot at getting funded now, and are securing the highest valuations. The median Series B valuation for AI companies is 59% higher than non-AI deals, according to CB Insights, and median valuations are 21% higher for AI companies at the seed stage. However, some investors and limited partners suggest there may be more excitement around AI than is warranted. "Venture is an industry that loves the hype cycle ... There's always going to be something, and this seems to be it," Clarkson says.

Companies that are building something "mission-critical"—tools and technologies that enterprises can't afford to cut, such as cybersecurity—also have a good shot at being more resilient, according to Cambridge Associates' Hajer.

The tech industry has always attracted optimists. That characteristic is often necessary to build a company in a high-growth, high-fail-rate world. But those who are best positioned to get through 2024 may be those who exercised restraint and didn't get carried away with the markups on private tech shares that made so many founders rich on paper just a couple of years ago—founders who stayed disciplined with hiring decisions and with the number of shiny high-risk projects they took on.

"The companies that I admire or respect don't really get affected by the cycle," says Josh Reeves, co-founder and CEO of Gusto, an HR tech services platform last valued at approximately $9.6 billion in 2022. "You always want to be building a good business. You always want to have good unit economics."

He adds: "What matters more is focusing on what's in your control. And that actually doesn't really change based on the cycle."


Play boldly to win

BY JASON DEL REY

ROAD KILL

BIRD'S ELECTRIC SCOOTER BUSINESS HAD ALL THE MAKINGS OF THE NEXT

Like many professionals working outside of tech, Edward Fu was skeptical when he first heard about venture-backed startups focused on a quite mundane business: scooter rentals. But when one of them, a company called Bird, offered him a job interview at its headquarters in Santa Monica, a city Fu had never visited, he was curious enough to go see what the fuss was about.

"I decided on my way to the interview that I ought to ride one of these things," Fu, a former corporate attorney with a computer science degree, told *Fortune*. "When you're in Santa Monica on a nice summer day, that's an amazing experience. It's transformational."

He was sold.

Fu wasn't alone. Back in 2018, fascinated city dwellers and tourists from Santa Monica to Dallas were flocking to a new phenomenon of "dockless" electric scooters. Months earlier, a former Uber and Lyft executive named Travis VanderZanden had launched the Bird scooter company, with 10 consumer-grade vehicles available along the balmy Pacific coast. Competitors popped up across the world.

PHOTOGRAPHS BY **JOE TORENO**

SHARING-ECONOMY SMASH HIT. **SO WHY DID IT GO SO WRONG?**

Customers were dazzled by the ability to instantly locate a two-wheeled ride with a phone's GPS, start up the scooter with an app, and ditch it anywhere afterward. Bird's pitch of less-traffic-congested streets and more environmentally friendly transportation was another plus. Maybe most important, the scooters were just darn fun.

Within eight months of Bird's launch, the startup boasted of surpassing 1 million rides, often in cities where government officials hadn't expressly approved its arrival. No matter. A couple of months later, venture capital investors valued Bird at $1 billion, marking the fastest valuation ascent for any company at that time. Uber for scooters was a unicorn.

By 2019, it had raised hundreds of millions of dollars at valuations that nearly hit $3 billion. With a fleet of scooters that would eventually surpass 100,000 in more than 300 cities, the Bird hype was real.

Unfortunately, so too would be the fall from grace.

Less than two years after its November 2021 debut on the New York Stock Exchange via a special-purpose acquisition company, Bird's stock was delisted as its share price

and business crumbled. Instead of changing the world's transportation and generating oodles of wealth, the scooter startup had racked up $1.6 billion in accumulated losses as of September. In December, Bird filed for Chapter 11 bankruptcy protection as it seeks a buyer. The end for Bird isn't yet here, but it could be near.

How did the tech world's next big thing end up on life support?

As in any business postmortem (or near postmortem), different parties with different perspectives can point to events that played a part in Bird's trajectory—with lessons for startup founders, employees, investors, and even local government officials.

But the rise and fall of Bird also says something important about Silicon Valley's revered and oft-imitated playbook. It's a reminder that the celebrated sharing-economy business models that propelled new industry titans like Uber and Airbnb to blockbuster success also seduced countless startups with similar dreams but different complexities, leading to sharply diverging outcomes.

FROM THE OUTSET, Bird had all the markings of being the next sharing-economy sensation. Not only did Travis VanderZanden have the Uber pedigree, he even had the same first name as Uber's famous cofounder, Travis Kalanick.

"Having grown up riding a public bus driven by his mother in Appleton, Wisconsin ... VanderZanden was inspired to solve the 'first- and last-mile' challenge for millions of public transit riders," Bird would say in its prospectus to go public.

And while it took Uber a couple of years (and a switch from limos to more affordable shared cars) to take off, Bird's scooters were a hit with consumers straight out of the gate. For investors, it was almost impossible to resist.

"I would stare out of my 6th floor office while on phone calls and literally watch 5 Birds pass our office every 2–3 minutes," the prominent Santa Monica–based venture capitalist Mark Suster wrote in a 2018 blog post. Finally, Suster wrote, he scootered straight to Bird's office "and pleaded with Travis to take money from us."

Silicon Valley heavyweights Sequoia Capital and David Sacks' investment firm Craft Ventures signed on alongside other eager investors too, pumping in a staggering $700 million in total VC funding in Bird's first two years. (Through a spokesperson, Sacks declined to comment, as did Sequoia. VanderZanden did not respond to interview requests for this story. A Bird spokesperson declined an interview request for the company's interim CEO, citing the bankruptcy proceedings.)

Bird initially followed the aggressive growth strategy pioneered by Uber, Airbnb, and other sharing-economy stars, asking for forgiveness from irked local officials only after having established a presence. "Where there's no laws, that's where we go in," VanderZanden said in 2018.

But cities had been through the Uber experience; they were prepared. And unlike with Uber's car-based service, it was easy to impound scores of scooters if officials deemed them illegal. Accidents and deaths involving scooter riders also had local government officials wary. Bird's "big miscalculation," according to Ali Griswold, author of the Substack newsletter Oversharing, was thinking that it could mobilize its users against city restrictions as Uber successfully did. Bird would eventually reverse course and take a more collaborative approach with local and state officials, but the company sometimes struggled to reconcile being a good citizen with its hardwired growth imperatives.

In Washington, D.C., for example, the company programmed its scooters to travel up to 12 or 13 mph even though the local government had implemented a 10-mph maximum, which, according to a former employee, company officials deemed a poor rider experience. In a move aimed at inching toward profitability, the startup also occasionally unloaded more scooters onto a city's streets than its agreement permitted.

"Cities would get upset, threaten to pull our permit, and then the pendulum would swing back and [Bird executives] literally would be like, Do whatever we need to continue to operate," a former Bird employee told *Fortune*. "And then you make all of these promises, then they get worried about profitability, and it starts again. It was just this really nasty cycle that happened a couple times a year."

FOR ALL THE EXUBERANCE about Bird's potential to be another Uber, the business differed from its role model in one important way: While Uber was mainly a software business that relied on using other people's cars, Bird was mainly a hardware business that had to spend heavily on its own fleet of vehicles.

"THIS IS A GREAT CAUTIONARY TALE OF WHAT WENT WRONG IN VENTURE IN THE LAST COUPLE OF YEARS."

BRADLEY TUSK,
AN EARLY BIRD INVESTOR

The electric scooters Bird sprinkled throughout cities had to be purchased, charged, and repaired (according to one analysis, the early scooters that Bird purchased lasted less than 30 days on average). Bird began to design and manufacture its own scooters, hiring an in-house R&D team with aerospace and automotive experience. VanderZanden was "obsessed" about vehicle design and creating a green ride "better suited for short-term transportation than Tesla cars," Suster, the Bird investor, told *Fortune,* though the move would drive up operating expenses.

To keep its first-mover advantage, Bird spent enormous sums shipping scooters around the globe and into the U.S. "The amount of money we spent on airfreighting in 2018 was mind-blowing," a former Bird executive said.

The economies of scale Bird hoped to reap by producing its own scooters may have been at least partially offset by questionable design choices. Unlike many of its rivals, Bird resisted adopting swappable scooter batteries. When a Bird scooter ran out of juice, a worker had to retrieve the vehicle and replace it with a fully charged scooter. While a Bird executive argued in a 2020 blog post that swappable batteries could be dangerous and less sustainable, former Bird sustainability chief Melinda Hanson told *Fortune* the company's resistance "made no sense."

As a result of needing to pull dead Bird scooters off the road each day, the company was essentially "buying two scooters to get one ride," a former senior company official said.

After initially hiring contract workers to maintain its scooters, Bird outsourced the job to "fleet managers," a franchise-type model that came with major tradeoffs. Bird could recommend that fleet managers do things like put more scooters in one city location, but it couldn't compel them to do so. Bird was lowering its fixed costs but ceding control of crucial facets of its operations.

BY 2022, Bird's economics were still putrid, with growth coming mainly from producing more scooters to put in new markets. The company had recovered somewhat from the pandemic, which caused rides to plummet and Bird to lay off hundreds of employees. But Bird was still averaging only about one customer ride per scooter per day, compared with roughly three per day before the pandemic. The company's net loss had swelled 67% from $215 million in 2021 to $359 million in 2022, while revenue grew just 28%.

A few years earlier, Bird might have been able to convince investors that the market opportunity was still so great as to be worth the risk. But with rising interest rates and inflation, a money-sucking, complicated business was no longer an attractive investment—especially one that had gone public via the SPAC process, a red flag that many investors associated with low-quality or defective businesses. Bird was in "a public-company death spiral," said Suster: As the stock price plummets, it becomes difficult to find flexible financing options and to retain employees who no longer see upside in their stock.

In January 2023, a few months after warning investors that it had substantial doubts about its ability to continue as a going concern, Bird secured a capital infusion of $30 million from Bird Canada, a separate e-scooter company that had licensed Bird's name and technology years earlier. Bird Canada took control of the board and installed its own leadership team, which saw Bird's founder VanderZanden, who by then had stepped down as CEO but was still the chairman of the company's board, exit his company altogether. Less than a year later, Bird was delisted from the New York Stock Exchange, and its U.S. business filed for bankruptcy.

In hindsight, it's easy to wonder what could have been in a world without a pandemic taking the road out from under Bird's wheels so early in its journey, or in a world where cities truly valued and supported alternatives to cars.

"Most cities in the U.S. did very little to try and make it work in terms of building infrastructure or otherwise putting skin in the game," said Hanson, Bird's former head of sustainability. "In some cases, the company actually paid money to the city, which felt like a requirement to win permits but was never gonna be financially workable." In some cities, fierce competition led to unprofitable operations for everyone. In others, tight restrictions on scooter numbers led to low density and thus high prices, turning the services mostly into tourist attractions rather than the commuter option Bird needed for long-term success.

For Bradley Tusk, a political strategist who advised both Uber and Bird on regulatory issues as well as an early Bird investor who contributed $1 million to the Series A round, the pressure that some investors put on Bird to expand was too much: "This is a great cautionary tale of what went wrong in venture in the last couple of years."

Some of Bird's scooter competitors are still rolling: Lime, Bird's top U.S. rival, recently teased a future IPO, though it has done so before. In Europe, where Bird still operates through a subsidiary not part of the bankruptcy, two large players announced plans to merge and form the continent's largest e-scooter company.

Many others have collapsed or been swallowed up in fire-sale acquisitions. Even if Bird ends up as a loser, those involved in the startup's saga still hold out hope that a clean, short-distance city transportation option eventually catches on.

"We didn't get there," said the investor Suster, "but I hope someone does." F

FACE TO FACE WITH FAILURE

ECONOMIC TURMOIL POSES A DAUNTING CHALLENGE TO FOUNDERS: BALANCING THEIR STARTUPS' FUTURE WITH THEIR OWN MENTAL HEALTH.

BY ANDY DUNN

PHOTOGRAPH BY **LYNDON FRENCH**

Somewhere I heard that a startup doesn't fail when it fails. It fails when the founders give up.

In this "money is no longer free" market, that begs two questions: When should founders give up? And how should those founders manage their psychology while seeking the answers to such a momentous question?

I AM FACING THIS EXACT dilemma right now. My new consumer software startup has not gone particularly well by one sort of important measure: growth. It's been a four-year grind to find some signal of product-market fit—and we haven't found it yet. At one point, we had 12 people. Soon, it might just be my cofounder Jen Greenwood and me, at least until we rebuild in a more methodical way.

It's been like panning for gold in a turbulent river: Sometimes the prize feels closer, other times farther away. Still other times it feels like we are drowning in aimlessness and exasperation. An identity crisis looms for any high achiever flirting with failure, and a calculation begins on the conflicting forces of sunk costs and lost time on the one hand, and reputational harm on the other. As entrepreneurs, we struggle to separate our egos from the prospects of our startups. We conflate the fate of the enterprise with our value as human beings.

Our startup has burned through $10 million of cash, much of it our own. Were it not for the privilege of access to capital that comes from my being an "exited" founder, we'd have been dead in the water years ago. As Marc Andreessen warned me during a Zoom meeting in 2020 (which did not lead to an investment): "Make sure you don't raise too much money—or you'll be stuck working on this for a long time. Raise just enough to get to the milestones that justify the next raise."

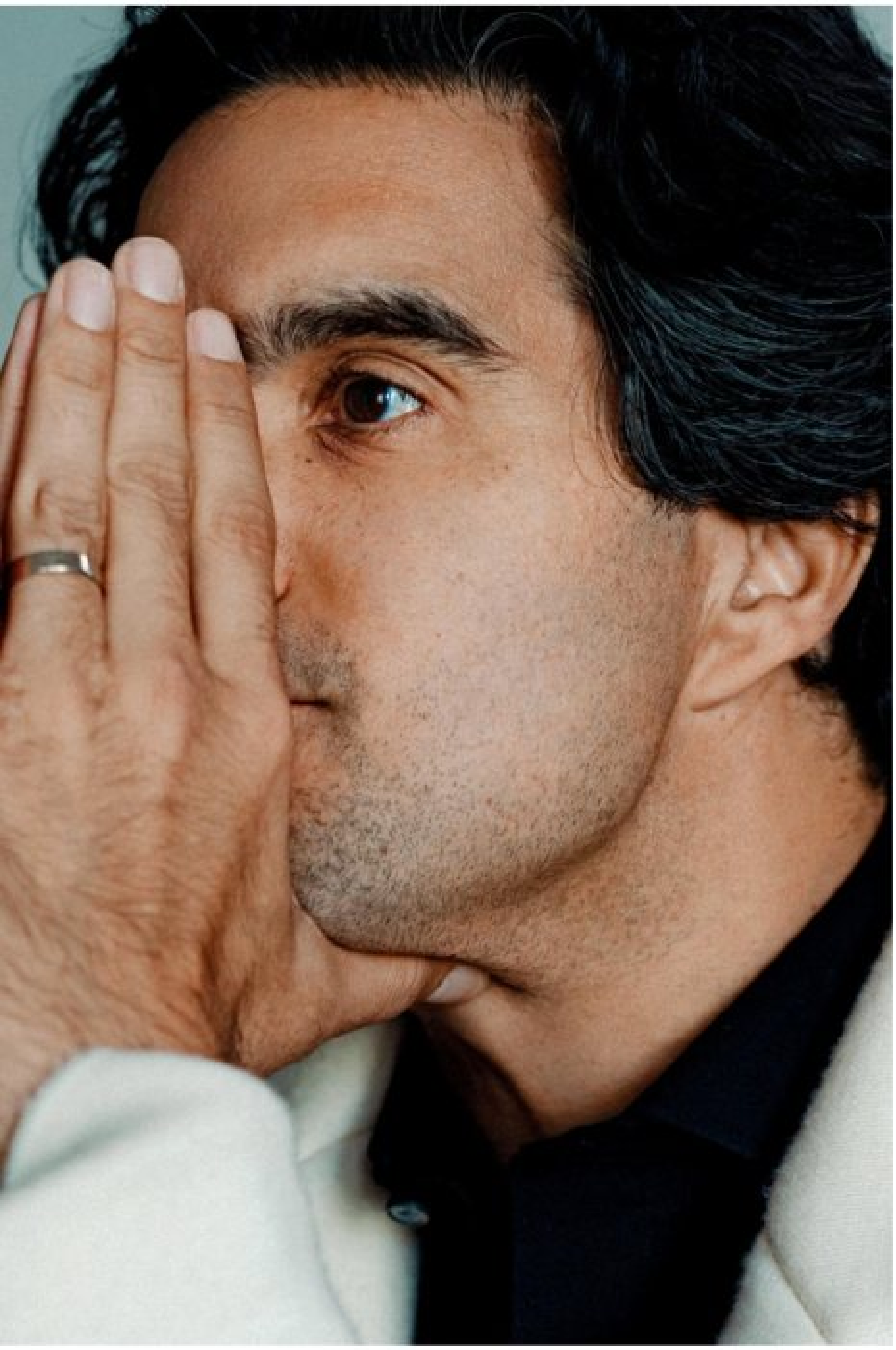
Oops.

As an entrepreneur who loves fundraising, I kept Jedi-mind-tricking myself into believing I'd achieved the milestones to raise more. Over last year's holiday, Jen and I took stock of where we were. Years of iteration. An exhausted team. And yet: still $2 million left in the bank.

Should we try to sell or merge with another startup or company? Should we return capital to our investors, at 16 cents on the dollar? Or should we keep iterating, perhaps consider yet another pivot, even if it means we might run out of cash and end up with goose eggs for our investors, our team, and our time?

ACCORDING TO KEN CHENAULT, the legendary former CEO of American Express and current chairman

TEMPERING HOPE WITH REALITY
Andy Dunn guided Bonobos to a successful exit—while navigating major mental health challenges. What he learned prepared him for today's tough climate.



of venture firm General Catalyst, the job of a leader is to deliver on two sometimes conflicting mandates: creating hope, and defining reality.

The reason we call the entrepreneurial journey a roller coaster is because—as with so much of the human experience—hope can be a peak and reality can be the pits. My observation is that it is nearly impossible to be hopeful and realistic at the same time.

To fulfill Chenault's mandate, some days I publicly project hope, usually when I am genuinely feeling optimistic. Other days I privately suffer the reality of things going nowhere, and then attempt to share just the right amount of the difficulty with the team. At my best, I offer enough of a dose of disinfecting sunlight to build trust through transparency, but not so much that doubt and demoralization run rampant. I don't want to lead those I'm leading to update their LinkedIn profiles.

MY ROLLER COASTER is amplified by an underlying mood disorder called bipolar I. (I've shared my journey with the condition in a memoir and a subsequent TED Talk.) For the first nine years I spent building my previous startup, Bonobos, I was in denial that I had a mental illness. I assumed if people knew about my college diagnosis, I'd never be able to recruit a team or raise capital.

In reality, there are droves of entrepreneurs with challenges like mine. According to a study from the University of California at San Francisco, neurodiversity correlates with entrepreneurial drive. Bipolar disorder might affect 2% of the adult population, but 11% of entrepreneurs. Five times higher. That type of disproportionate representation is also seen for entrepreneurial leaders with depression, ADHD, generalized anxiety disorder, and substance-use disorder.

In some strange way, I process this fact as luck. The wake-up call I received when a manic episode landed me at Bellevue Hospital for a week, and then in jail for a day, catalyzed life changes that provide mental scaffolding I didn't have before. The foundations of my regimen look like this:

* Two sessions with my psychiatrist every week.

* Medication every day (in lieu of self-medication with alcohol).

* Eight hours of sleep a night, with a verifying screenshot from my Whoop app sent every morning to my wife, doctor, mother, and sister.

Building a company is a mentally unhealthy endeavor. It attracts folks with mental health issues, perhaps exacerbating them, and it may *create* mental health issues for others.

Still, each of us, neurodivergent or not, has mental fitness to maintain. And while everyone is different, everyone needs a regimen. Whether that regimen entails meditation, medication, exercise, therapy, executive coaching, eating keto, morning sunlight, cold plunges, or just listening to Andrew Huberman podcasts on repeat, do it.

If we don't secure our own oxygen masks, we're not going to be able to secure anyone else's either.

THE FINANCIAL HEALTH of a company and the mental health of its founder often track together.

For our last round of fundraising, in the back half of 2022, venture capital was beginning to evaporate. In some ways, I deserved to be stymied. I hadn't proved that I could find a product that worked.

To stay alive, I sought out a high-net-worth entrepreneur to lead a down round that enabled us to keep operating. I used to think down rounds spelled the end. But with the support of seasoned insiders like venture capitalists Kirsten Green and Jeremy Liew, who realized they'd rather own some of their stake for something rather than 100% of it for nothing, and with a rebooted equity pool for the team, a down round could be a new beginning. Sure enough, both Green and Liew invested more.

Flat is the new up. And down is the new flat.

The entrepreneur who led that round is precisely who I called this past December to get advice.

EV WILLIAMS, cofounder of Twitter and the founding CEO of Medium and Blogger, picked up the phone. I laid out my hopes and fears for him about where we were. He asked all the right, skeptical questions—about our metrics, our team's morale, and where I was. And at the end of the call he delivered a judgment that was more upbeat than I expected:

"I wouldn't stop right now. Keep going."

Keep going.

Those words rang in my ears the rest of winter break. Jen and I made some tough decisions in the ensuing days. We planned to take the team down to the studs and rebuild from there. Some good people would be going part-time, or leaving. At least three months of severance helped dull the blow—something we could do because we assessed the crisis that was coming before it became an actual crisis. We reduced burn by two-thirds, deciding to focus on go-to-market rather than deepening our technical investments.

With this renewed focus, we actually started growing at over 10% a week. We moved the headquarters of the company. And we went all-in on one key product move, and on one key market: sweet home Chicago.

Things are picking up. Or are they? More aptly put: How long will it be before the roller coaster tops out and begins a new plunge?

Hope springs eternal in the world of startups. Because it has to.

As we embarked on 2024, I resolved to microdose reality every day, rather than wallowing in the troughs, to make it possible to metabolize the hard stuff and stay more buoyant, more stoically and resiliently optimistic, every day.

Past need not be prologue.

The truth is that we sometimes have a moral obligation to keep going—to our teams, to our customers, and to our shareholders. It's not always about what's best for us in the moment. The memories of having been through difficult times at Bonobos, and having endured, provide ballast. The lasting culture we built, the solid financial outcome, the fact that the brand has doubled in size since we sold it—it's all a reminder that it can be worth it.

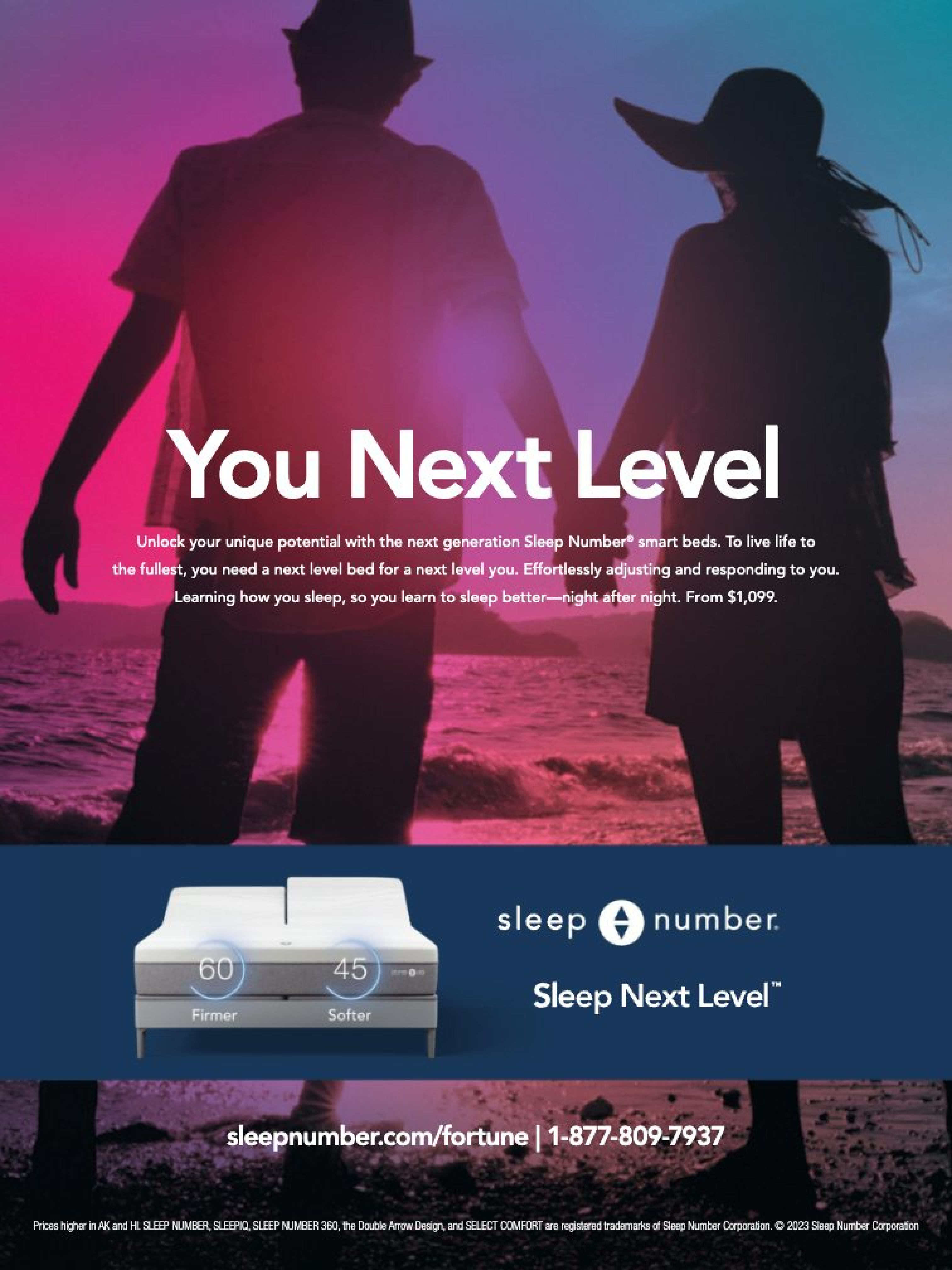
It calls to mind something that kept me going during darker days at Bonobos, when catatonic depression had me sometimes feeling like I didn't want to live. It was a book one of our first employees, Kevin Kelleher, gave me called *Cowboy Ethics*. One page had a photo of a cowboy on horseback, getting pummeled by freezing rain.

The caption reads: *When you're riding through hell, keep riding.*

Of course in pop culture, cowboys are stoic loners who push their bodies and minds to the limit. They're not typically paragons of vulnerability. But in real life, we entrepreneurial cowboys and cowgirls need to take care of body and mind, and ask for help when we need it. We also need to hold ourselves accountable for our own mental health, and make sure we don't cause harm to others. Stick to that mentality, and you'll have the fuel you need, whichever way your company goes.

And if you can, and if you should… *Keep going.* ■

Andy Dunn is the founding CEO of Bonobos and Pie and the author of Burn Rate: Launching a Startup and Losing My Mind.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HOW AI IS CHANGING THE WAY ORGANIZATIONS GET PAID

Artificial intelligence is helping accounts payable departments tackle inefficiency, increase visibility, and manage risk.

AS THE INITIAL HYPE AROUND ARTIFICIAL intelligence (AI) dissipates, strong business cases will start to emerge. One clear example is the use of AI in accounts payable (AP) automation. While only 9% of AP departments are fully automated today, according to the Institute of Financial Operations & Leadership, two-thirds of finance professionals expect their AP departments to be fully automated by 2025—and for good reason. Businesses that continue to rely on manual AP processing face inefficiency, lack of visibility, and increased risk.

"Today, businesses are expected to do more with less," says Sam Levy, senior vice president of growth operations at Oracle NetSuite. "To do that, they need to change the way they operate. The latest advancements in AI help make that possible."

To help businesses harness the power of AI, NetSuite, an Austin-based software company used by more than 37,000 businesses, has developed an AP automation product that uses AI to provide a scalable, fast, and easy way to process invoices.

"Automating business processes and having a reliable, single source of data is critical to help a business scale," says Levy. "If its current system is hampering these efforts, it'll find it hard to compete."

For one family-owned business, NetSuite was able to address the pains in its AP department when its legacy enterprise resource planning (ERP) software couldn't keep up with its pace of growth. NetSuite AP Automation automatically generated the company's payments based on existing purchase order data—significantly increasing the accuracy and speed of bill processing and converting sales into revenue quicker.

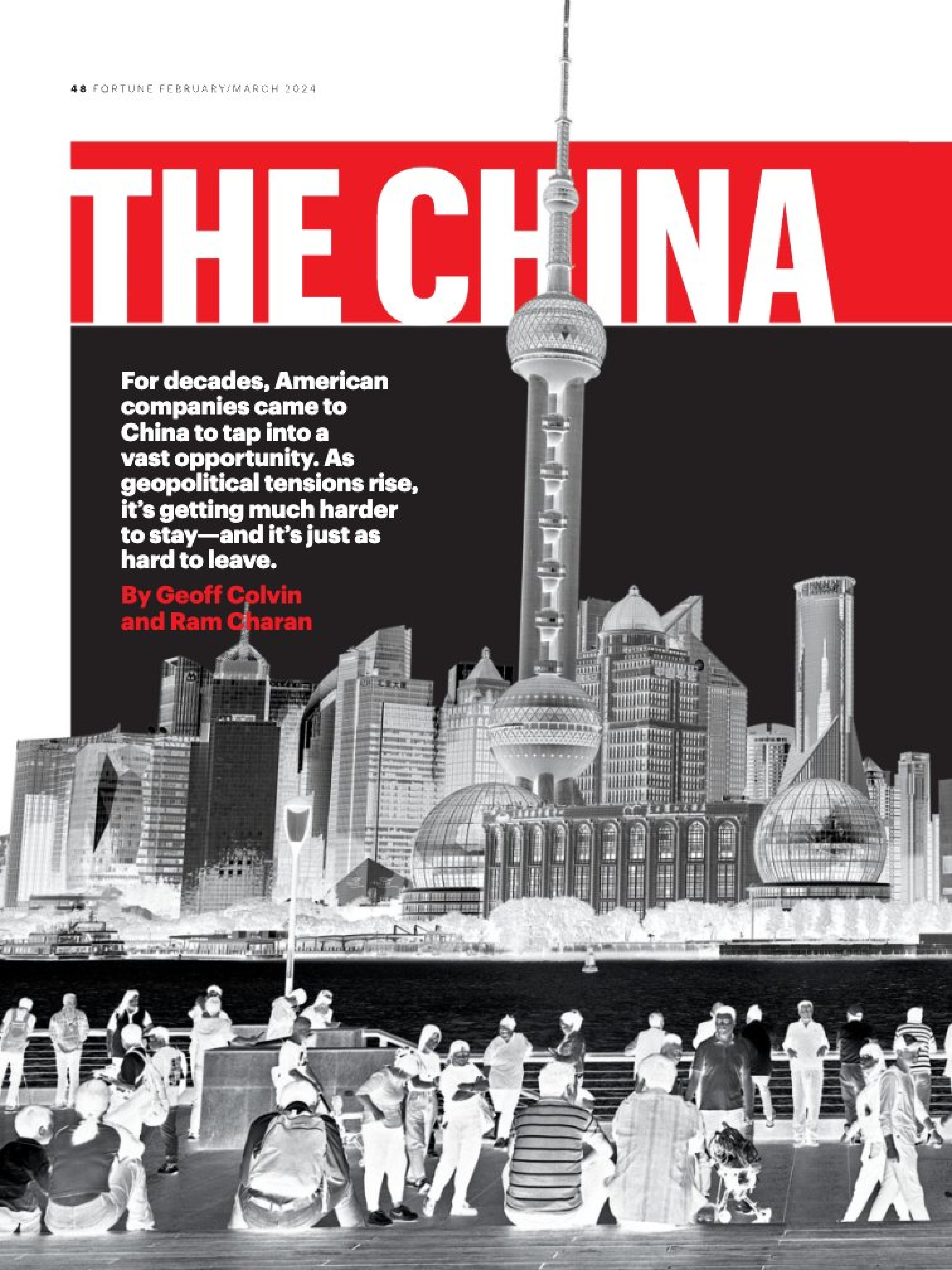
"By eliminating tedious tasks—such as coding invoices, chasing internal approvals, mailing checks, and reconciling payment—teams can focus on more value-added tasks," says Levy. "The time NetSuite AP Automation gives back helps our customers boost productivity, increase employee job satisfaction, and ultimately support their business growth."

AI makes this progress possible. An intelligent rules engine automatically matches invoices with associated purchase orders and receiving documents, while the platform ensures details such as unit pricing, quantity, and totals are accurate and flags discrepancies for accounting staff to review. Invoices are also automatically routed to the appropriate personnel for review and approval.

"As a business grows, it needs more insights, control, and productivity," says Levy. "When it can leverage an automated and integrated system with reliable data from across the company, it is a force multiplier for a business."

To further help its customers, NetSuite is also exploring new ways AI capabilities can be applied to AP automation. "We're constantly learning from our customers," says Levy. "We want to continue to help businesses use their data to gain better, faster insights and be even more efficient." ■

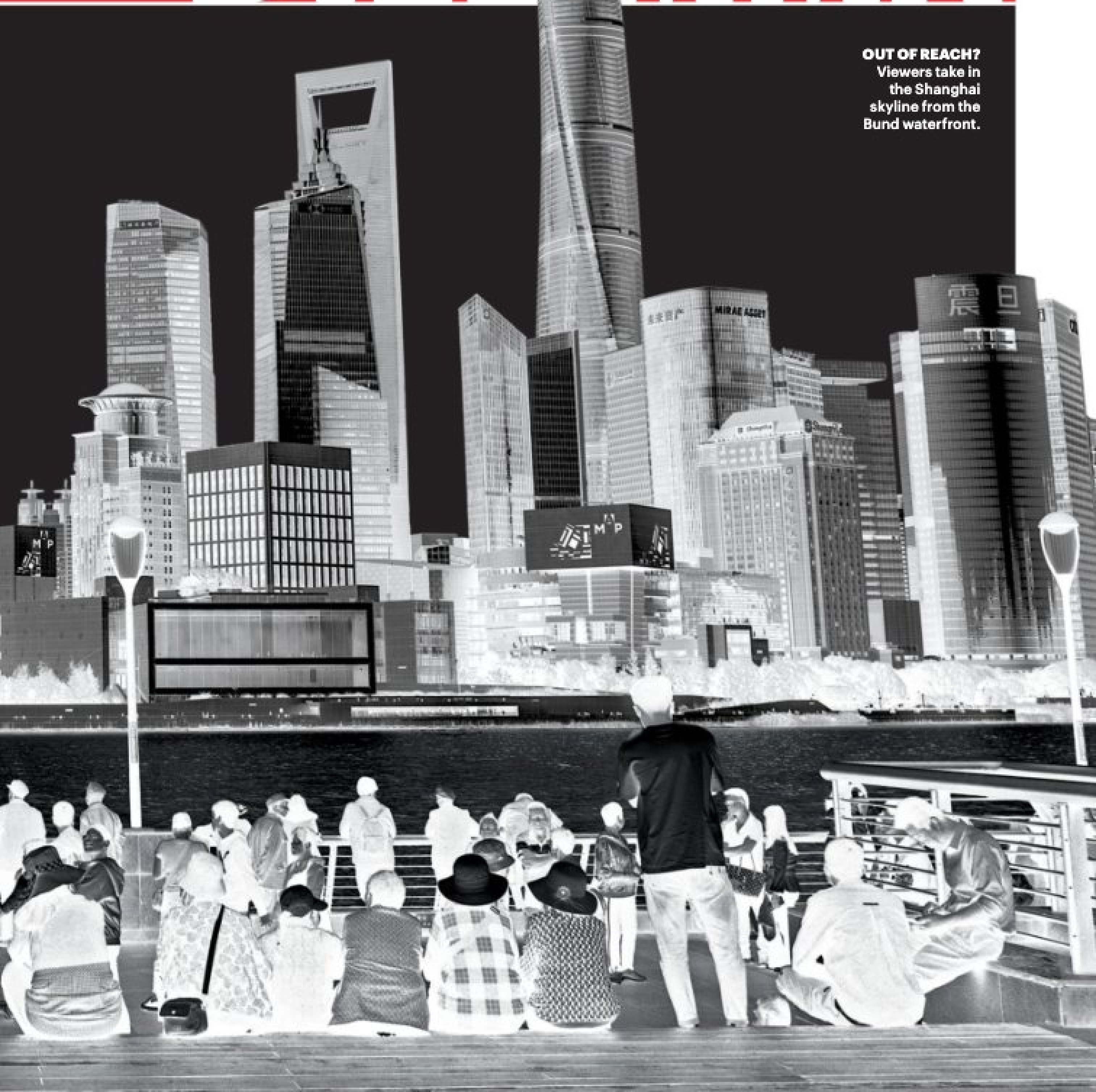
THE CHINA



For decades, American companies came to China to tap into a vast opportunity. As geopolitical tensions rise, it's getting much harder to stay—and it's just as hard to leave.

By Geoff Colvin and Ram Charan

DILEMMA



OUT OF REACH? Viewers take in the Shanghai skyline from the Bund waterfront.

The scale of the raids was modest.

Their psychological impact was huge.

Last March, Chinese authorities shut down the Beijing office of a U.S. consulting firm, Mintz Group, detaining five employees for 24 hours. A few weeks later, authorities visited the offices of another American consultant, Bain & Co., reportedly seizing phones and computers. Months later, a Beijing municipal department said Mintz had carried out "foreign-related statistical investigations" without obtaining approvals. The Bain visit remains unexplained. At least two executives of U.S. companies, one from Mintz and one from the risk and advisory firm Kroll, have been put under exit bans; they cannot leave China.

The events sent a chill through the hundreds of U.S. companies doing business in China. Before Moody's Investors Service downgraded China's credit rating in December, the *Financial Times* reported, it advised staff not to come to the office that week. "Everyone knows why," a China-based employee told the newspaper. "We are afraid of government inspections." Today, the CFO of a U.S. company doing business in China wonders, "If we send in auditors to audit our business there, are they in danger of being detained?" "Fear is rampant," says a high-level executive at a U.S. business services firm that operates in China. "No one wants to talk about what they're thinking or what they want to do."

Three years ago, all of this would have been unimaginable. For decades China welcomed U.S. companies with open arms and generous incentives, part of the nation's efforts to convert to a market economy. Now, for many of those companies, the relationship has become uncomfortably icy. The shift reflects broader, rising tensions between China and the U.S.—tensions that include not only geopolitical clashes, but also economic conflicts with world-changing implications. And as China's homegrown industries increasingly compete successfully on a global level, the battle for market share is a new front in the superpower rivalry.

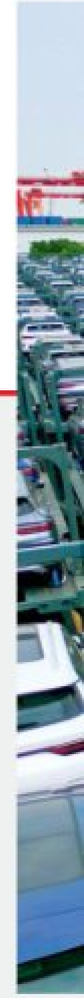
That rivalry is becoming hotter in both actions and rhetoric. Beijing now routinely sends military planes into the airspace of Taiwan, a U.S. ally, asserting more loudly its long-standing territorial claim to the self-governing island. That conflict could heat up now that Taiwan has elected a president, Lai Ching-te, who vows to defend the island against Chinese threats. The U.S. House of Representatives, meanwhile, has established a Select Committee on the Strategic Competition Between the United States and the Chinese Communist Party; the panel declared in a recent report that the CCP "has pursued a multi-decade campaign of economic aggression against the United States."

China's government in turn argues, as it has for years, that Washington has launched trade wars and has unfairly subsidized many U.S. industries—including with recent legislation that backs makers of semiconductors, aerospace technology, electric-vehicle batteries, and other goods.

For many U.S. companies, the environment in China has turned dark and threatening. A strict data privacy law enacted in 2021 prevents some ships from broadcasting their locations or cargoes. China last year barred many Chinese organizations from buying products made by the U.S. company Micron Technology, saying they were not secure. China's counterespionage law, expanded last year, invokes national security in new language so broad that the U.S. State Department warned U.S. companies they could risk punishment by conducting ordinary business. Meanwhile, the two nations are increasingly trading tit-for-tat sanctions. For example, in October the U.S. imposed controls on the export of advanced semiconductors to China; in December, China curbed exports of graphite, a central element in electric-vehicle batteries, to the U.S.

The shift is profoundly influencing the world's most important bilateral relationship, and businesses in both countries are suffering the consequences. But U.S. companies, having invested far more effort and money to compete in China than Chinese companies have in the U.S., are particularly vulnerable as the business climate changes.

How are U.S. business leaders responding to the new reality? To find out, we interviewed four dozen CEOs, CFOs, and board members of U.S. companies doing business in China, plus other China experts and consultants. Most of them insisted on



ELECTRIC SUPERPOWER Electric vehicles made by China's BYD wait at a port in Suzhou, China, to be shipped abroad. Government subsidies of its manufacturing capacity have helped put BYD on track to become the world's top seller of EVs.

anonymity so they could speak candidly. Nearly all the interviewed businesspeople are lowering expectations and planning to bring capital out of China. But at the same time, they're adapting to the new environment and trying to stay in business there as long as possible. Their attitudes ranged from wonderment to grim perseverance to bafflement about what to do next. Many are braced for more surprises.

The consulting-firm raids continue to stun executives who spent decades building businesses and relationships in China. Some feel they face personal risks as well as business risks. A U.S. CEO who has overseen Chinese operations for multiple companies—he estimates he has visited 1,000 Chinese factories—says he has not traveled there since the pandemic. Would he go today? "I have no reason to believe I would be targeted," he says. "But the partner of our U.S. law firm who's based in Hong Kong says, 'You should not go. I don't want to be the one negotiating to get you out of there.'"

The newly hostile environment is rewriting corporate plans, as surveys of U.S. companies in China show. When the U.S.-China Business Council polled its members last summer, record-high percentages reported unprofitability, reducing or stopping investment in China, and moving or planning to move operations out of China. For the first time in the poll's 20-year history, the No. 1 issue affecting respondents' five-year outlook was geopolitics.

The deteriorating business environment seems like a strong case for leaving. "The vast majority of companies are trying to figure out how to reduce their supply chain from there, manufacturing there—everything that has to do with coming out of China, they're trying to reduce or eliminate as fast as they can," says the recently retired CEO of a company doing all those things. Even so, most U.S. companies are caught in the new China dilemma: Dissatisfied and fearful though they may be, they feel they can't afford to leave anytime soon.

THE PROBLEM BEGINS with why they are there. It's no longer because of low labor costs: those costs have steadily risen in China in recent years. These companies are in China because they're relying heavily on Chinese-made products, on the vast Chinese market, or frequently both. As one CEO tells *Fortune*, "I've got 20% of my business in China. I can't get out."

They feel chained to China because, like it or not, its products frequently offer the best combination of quality and cost in their industries. Consider an extreme case: Huawei, which makes equipment for telecom companies. Much of its gear is banned in the U.S. and several European countries because of fears that it could be used to spy on communications and send information to China's government. (Huawei has repeatedly denied that its products could be used in that way.) Still, Huawei is the largest player in its industry by far because in markets where it's welcome, it very often wins. A recently retired top executive at a global telecom company says, "I'm not an expert in politics, but they produce superior technology. Today Huawei will outperform any vendor in terms of cost, quality, speed of delivery, and service operations, hands down."

Multiply that example across the economy. China makes all manner of intermediate industrial products that Western companies buy—bulk antibiotics, engine parts, 3D printers, polyester fibers, pharmaceutical ingredients, and countless others. If U.S. companies bought those components elsewhere, they'd struggle to compete. The recently retired chief of a U.S. heavy equipment manufacturer says that's why he kept buying Chinese parts even after the environment turned unfriendly. "It's not because I love China," he says. "It's because that's the only place I can buy a given part at anything close to the price I have today. That's a big problem."

Separately, many U.S. companies feel they can't leave because they gain powerful advantages by selling their Chinese-made goods in the uniquely vast Chinese market, reaping significant revenue and saving money through huge economies of scale. They can also export those products to the U.S. and other countries under their own brand names.

For years this multipart system worked great for both sides. It still works for many U.S. companies. The problem is that, increasingly, China doesn't need those companies anymore.

In China, "the door opened to foreign participation for very strategic reasons," says Kenneth DeWoskin, professor emeritus at the University of Michigan Ross School of Business and a longtime China consultant to U.S. companies. "Those reasons are inbound foreign direct investment capital, technology, and immediate access to foreign markets." With each of those elements, China now needs much less U.S. participation, because many of its companies have achieved the competitiveness and scale to do without it.

Inbound capital to China from the U.S.? It rocketed to an all-time high of $126 billion in 2022, the most recent year for which data is available. U.S. companies have since begun bringing their China profits back to the U.S., but China seems willing to bear the loss. Access to the U.S. market? Even with higher U.S. tariffs on Chinese imports since 2018, the U.S. imported $564 billion of goods and services from China in 2022, a new record.

Technology? That is by far the most valuable asset U.S. companies have contributed. As they clamored to access the market, China often insisted that they hand over some technology as the price of entry. In a common arrangement, a U.S. entrant would be required to form a joint venture with a Chinese company. The partner would thus see the U.S. company's proprietary software, formulas, processes, and other technology. In addition, some technology would inevitably be stolen (a problem not unique to China, as Chinese officials note). But the technology alone wasn't enough to transform Chinese companies into competitors. They needed two other factors, both of which required time. They needed know-how—years of experience using the technology. They also needed growth. One former CEO of a U.S. company with a substantial Chinese

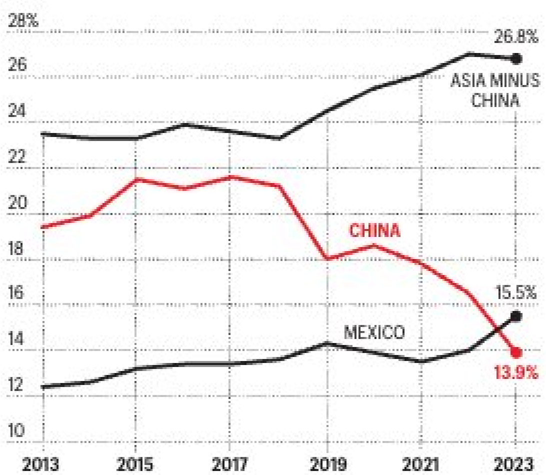
83% OF U.S. EXECUTIVES DOING BUSINESS IN CHINA ARE LESS OPTIMISTIC ABOUT THE BUSINESS CLIMATE THAN THEY WERE IN 2020.

SOURCE: U.S.–CHINA BUSINESS COUNCIL

BACKUP PLANS FOR WESTERN BUSINESS

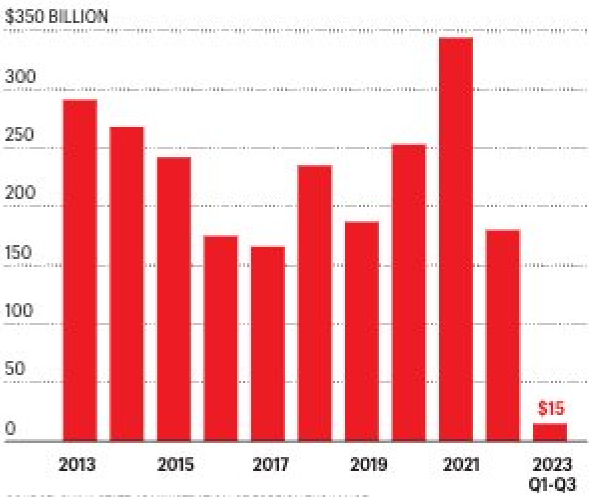
As tensions with China have risen, U.S. companies have turned to other import partners. And foreign companies overall have sharply cut back investments in China.

U.S. IMPORT OF GOODS BY COUNTRY OF ORIGIN



SOURCE: CENSUS BUREAU

NET FOREIGN DIRECT INVESTMENT IN CHINA



SOURCE: CHINA STATE ADMINISTRATION OF FOREIGN EXCHANGE

business says that partners stole from him multiple times. "It didn't matter," he says. "I still beat them. When they're at scale, though, making more units than I am and investing more in technologies, that's called competitiveness."

After decades of development, Chinese companies using leading-edge tech are achieving lift-off. As they do so, U.S. companies' roles are changing. "If they need you, they will help you," says a former U.S. CEO who oversaw multiple Chinese operations. "But the day they don't need you, they'll cut you off."

China has reached a historic turning point in its journey from a poor country to a prosperous one, from a struggling economy to a superpower. "The reform-and-opening phase is over," says a former longtime U.S. diplomat. For U.S. companies, "risks are definitely up. Profit is definitely down."

CHINA NOW DOMINATES several strategically important industries—telecom infrastructure, batteries, solar panels, and others—with more in its crosshairs. And it's using a game plan that has been hard to beat. A key element is creating overcapacity, which has helped China become the world's largest producer of steel, aluminum, cement, and many chemicals, as well as solar panels. By building more manufacturing capacity than the market requires, China can flood that market with products, achieving economies of scale while pushing prices down to ruinous levels for competitors—what a longtime China hand calls "global price destruction" (a characterization that Beijing contests). Chinese companies, often helped by state ownership or subsidization, have been willing to endure the short-term financial pain; in a sense, foreign firms are competing not so much with Chinese companies as with the CCP.

Government support helped Huawei achieve global telecom dominance, and the CCP shows every sign of running the same playbook in other industries. The most striking example is EVs. With more than 100 companies, China's automotive industry could produce about 50 million light vehicles a year—more than double China's light vehicle sales in 2023. (For comparison, *global* new vehicle sales in 2023 were about 86 million.) Though final data isn't in, China may have surpassed Japan as the top car exporter in 2023. The biggest Chinese automaker, BYD, recently passed Tesla as the world's largest EV producer. And it doesn't hide its ambition to be the global No. 1. It has announced plans for a new plant in Europe and has ordered new ships to carry its vehicles around the world.

Arguably even more important is being the world's No. 1 EV battery maker. China's CATL dominates that industry globally. "For a long time, Japan's Panasonic and South Korea's LG couldn't get registration to sell automotive batteries in China," says a U.S. China expert who lived in the country for years. "CATL was the only real player. China used central government investment, regulatory management, product registration, investment approval, product safety—every tool in the toolbox to give advantage to domestic makers." Now CATL, like BYD, has overtaken every other manufacturer.

It has all happened so fast. BYD was mainly a maker of small batteries (for cell phones, for example) until it invested in an auto company in 2002. By then General Motors had been in China for five years, Ford for 10, and Volkswagen for 24. Today BYD far outsells GM and Ford in China. VW has long been China's No. 1 vehicle seller, but its sales have been declining, and this year BYD will likely overtake it. Ford, meanwhile, is dropping out of the contest. CEO Jim Farley told the *Financial Times* last year that Ford will reduce its capital in China, explaining, "If you just reinvest in a new cycle of EVs in China, there is no guarantee, or no data, that would suggest the Western companies win."

WHAT IS A U.S. company's best strategy in today's China? In the near term, the answer depends on its industry and its business relationships.

The future looks bright in industries that aren't technologically sensitive. With China still welcoming many U.S. consumer goods and services, McDonald's recently announced plans to add thousands more restaurants. "We're incredibly bullish on the opportunity," CEO Chris Kempczinski tells *Fortune*. "There's no reason China couldn't be our largest market." Like other U.S. companies, McDonald's set up its China operation as a freestanding entity that pays dividends to the parent; McDonald's owns 48% and state-owned China International Trust Investment Corp. owns 52%.

U.S. financial services companies have performed well in China because they achieve efficiencies by being global. Chinese finance companies, in contrast, have a poor record outside China: for example, few Westerners know of ICBC (Industrial and Commercial Bank of China) even though it's the world's largest bank by revenue. But last December the CCP published an article stating that the finance sector will be expected to follow Marxist principles. In practice, U.S. firms may now struggle to invest Chinese clients' funds in U.S.-based assets. Citigroup announced in October that it is selling its mainland consumer wealth business to HSBC Bank China, while Vanguard said it will close its mainland operations.

Consulting firms face an even dicier future, as the Bain and Mintz raids underscore. Recent laws broadly regulating how companies can possess data or move it across borders are especially restrictive for consulting firms, since their business is gathering, analyzing, and communicating data.

Facing the toughest futures are companies making products that China wants to produce on its own. As an executive with decades of China experience notes, "If you are anywhere near a product that has been put under export controls by the U.S. government"—sectors include semiconductors, AI, robotics, biotech, and more—"you know the Chinese government is doing anything it can to support your Chinese replacement." Other high-priority technologies for China include pharmaceuticals, aerospace, electronics, and renewable energy. Going against Chinese competitors in any of them will be a long, hard slog.

A few companies are special cases by virtue of their scale; still, their actions suggest they're mulling life beyond China. Apple assembles and sells millions of iPhones in China. But as the CCP has helped Huawei become a stronger competitor, Apple has explored other options; it reportedly plans to move 25% of its iPhone manufacturing to India. Walmart imports massive quantities of merchandise from China, but it, too, has diversified its sources. Over the past five years its Chinese imports to the U.S. have dropped from 80% to 60% of the company's total, Reuters reports, while imports from India have grown from 2% to 25% of the total.

While every short-term case is unique, the long-term trend seems to be toward China squeezing most U.S. companies until they have to leave. One CEO of a U.S. company with a significant business in China says that 10 years ago his Chinese operation generated 23% of his profit. Now it generates 15%. He predicts it will go to 5%, at which point he will have to shut it down. Some companies have decided not to put new capital into China, opting to use only the money their existing operations generate. Others are taking capital out. "Eventually, China

FACE-OFF Presidents Biden and Xi, shown at a summit in California in November, have seen economic relations between their nations deteriorate.

A BIGGER ROLE FOR CAPITOL HILL AND UNCLE SAM?

Congressional Democrats and Republicans don't agree on much, but both concur the U.S. should take a much tougher economic stance toward China—and in defense of U.S.-based companies. A new House select committee on U.S.-China competition released its first report in December. The report frames the U.S.-China business relationship as an urgent matter of national security, a term it uses some 65 times. As the report observes, "Never before has the United States faced a geopolitical adversary with which it is so economically interconnected." It also urges the federal government to take a more active role in supporting U.S. multinationals in the economic rivalry.

NOTABLE AMONG ITS 130 RECOMMENDATIONS:

New controls on access of foreign adversaries including China to technologies including AI, quantum computing, biotech, optics, and space-based technologies.

Tax breaks and other incentives for U.S. companies developing technologies with national security uses.

Stress tests for U.S. banks to gauge their ability to withstand sudden loss of access to China.

Tariffs on commodity semiconductors from China, to prevent it from dominating that market.

Public disclosures of key China-related risks by large U.S. public companies.

will have less need to regulate foreign companies out of their marketplace because their domestic competitors will outperform them," says DeWoskin. "That's the dynamic which to me is the most basic rule of thumb about how China is evolving."

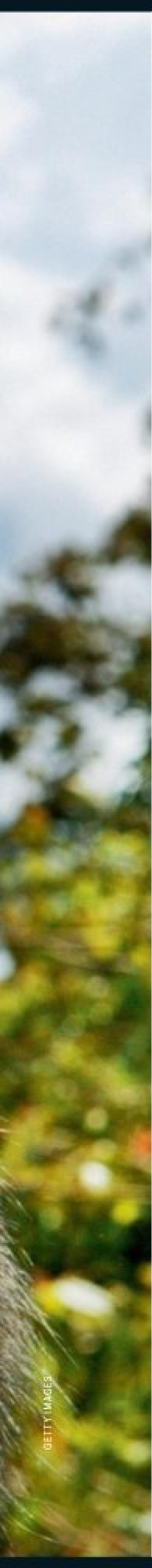
XI JINPING, CHINA'S president since 2013, has helped set the new economic agenda. For now, his vision doesn't seem to be bearing fruit. The World Bank predicts China's economic growth will continue to slow, from 5.2% in 2023 to 4.5% this year and 4.2% in 2025. The Shanghai Stock Exchange index has been plummeting since last May. Deflation in consumer prices could spark a downward growth spiral. Xi came to the Asia-Pacific Economic Cooperation meeting in San Francisco in November and implored U.S. CEOs to bring their capital back. But he isn't changing direction. Instead, he's preparing China for hard times. In a recent speech to the nation, Xi said, "On the path ahead, winds and rains are the norm."

Many U.S. companies are already going "China-light" with reshoring and near-shoring. In 2023, for the first time in at least 20 years, the U.S. imported more goods from Mexico than from China. Some are finding opportunities in the largest countries of the global south—India, Indonesia, Pakistan, Brazil. A worsening geopolitical atmosphere might encourage some to speed up those efforts. As tensions rise and hostilities potentially escalate, U.S. CEOs may want to play out a scenario exercise: What if the U.S. imposed sanctions on China like those imposed on Russia after it invaded Ukraine? Those sanctions heavily restrict U.S. companies' interactions with Russian individuals, banks, and businesses. "It's not a far-fetched idea," says an executive with years of China experience. "CEOs are finding they have a lot more China vulnerability than they thought."

Nearly every American executive working today has known China only in its reform-and-opening phase. Now that it's over, as the business climate deteriorates, CEOs face one of the hardest challenges in business and in life: discarding the old playbook and looking ahead to new risks and opportunities. "There's a big shift with the current leadership," says a prominent former CEO, now a director of a U.S. company with Chinese operations. "I sense that in every way. And it's scary." ∎

Geoff Colvin is Fortune's *senior editor-at-large. Ram Charan is an advisor to CEOs and boards of directors worldwide.*

MONKEY IN THE MIDDLE
Over 95% of primates imported to the U.S. for biomedical work are long-tailed macaques.


GETTY IMAGES

BIG PHARMA'S **MONKEY BUSINESS**

A CRACKDOWN ON MACAQUE SMUGGLING HAS DISRUPTED A VITAL DRUG DEVELOPMENT SUPPLY CHAIN. INSIDE THE HIGH-STAKES BATTLE OVER THE FUTURE OF AMERICAN MEDICAL INNOVATION, AND THE PRIMATE SPECIES IT DEPENDS UPON.

BY ERIKA FRY

W**HEN MASPHAL KRY** was taken into a back room for questioning at New York's J.F.K. International Airport one morning in November 2022, it wasn't immediately apparent to him that he was going to miss his connecting flight.

The director of wildlife and biodiversity for Cambodia's Ministry of Agriculture, Forest, and Fisheries (MAFF), Kry was en route to an international wildlife conference in Panama when agents of the U.S. Fish and Wildlife Service ushered him into an interview room. They informed the 46-year-old bureaucrat that the United States had a warrant for his arrest, charging him with smuggling wild primates. Kry assured them they had made a mistake, according to a transcript of the encounter later released in court proceedings.

"I'm from a conservationist background," he told them. He encouraged them to check his bag (perhaps to show it contained no monkeys) and to talk with his friend, a more capable English speaker, who was headed to the same conference and out in the airport with Kry's luggage.

The transcript suggests that Kry was confused, a man whose day had taken an unexpected turn but who was mostly worried about making his plane. He could not have guessed then, of course, that more than a year later he'd still be in the U.S.—on house arrest, awaiting trial on charges that carry a maximum sentence of 145 years in prison.

Nor could he have imagined that his arrest would entangle him in an epic, messy, international drama that's still dragging on. It set off a chain of events that has left more than 1,200 monkeys in caged limbo in U.S. corporate labs, shaken a lucrative trade sector for his country, and kneecapped America's multibillion-dollar pharmaceutical testing industry—critical for the development and approval of drugs and medical treatments.

FOR THE U.S. Fish and Wildlife Service, apprehending the Cambodian official was a victory in a yearslong investigation. "Operation Longtail Liberation" had uncovered deep and alarming flaws in the supply chain of captive-bred lab monkeys used in America's biomedical research and pharmaceutical industries. Implicated in the scheme was one of the trade's supposed regulators: Kry's employer, the agency charged with protecting wildlife in Cambodia, which was and remains responsible for issuing permits to ensure the legal trade of animals. (Cambodian government offices in the U.S. and Phnom Penh did not respond to requests for comment. In a statement at the time, MAFF said it was "surprised and saddened" by Kry's arrest and that it upheld the laws and principles of international wildlife trade.)

The eight-count, 27-page indictment, unsealed after the arrest, alleges a sprawling criminal scheme enabled by officials at the top of Cambodia's bureaucracy. Kry, along with the Forest Administration's top boss and six employees of a Hong Kong–based company with monkey breeding farms in Cambodia, is accused of conspiring to sell hundreds of wild-caught monkeys, packaged with falsified permits, into the highly regulated pipeline of captive-bred animals for laboratory testing. Two unnamed American companies are also mentioned as "unindicted co-conspirators."

There is even grainy cell phone video that purports to catch Kry in the act. In the video, submitted as evidence in the court case and viewed by *Fortune*, Kry, dressed in a blue gingham shirt and sunglasses, watches as workers unload caged monkeys from the back of a pickup truck at the Cambodian breeding facility.

In the scheme, the U.S. government alleges, wild monkeys were given identification tags transferred from sickly captive-bred animals that would later be euthanized. And, it alleges, the wild-caught macaques were exported to the U.S. with Cambodian government-issued permits that falsely identified them as captive-bred.

"The practice of illegally taking [macaques] from their habitat to

TEST SITE
Charles River Laboratories works with every major drug company and 80% of their medicines.

INDUSTRY INSIDERS AND CRITICS AGREE, THE BEST LONG-TERM SOLUTION IS TO NOT USE ANIMALS IN RESEARCH AT ALL. BUT THE TECHNOLOGY IS NOT THERE YET. FOR NOW, AMERICA STILL NEEDS ITS LAB MONKEYS.

end up in a lab is something we need to stop," declared Juan Antonio Gonzalez, then–U.S. Attorney for the Southern District of Florida, after Kry's arrest. "Greed should never come before responsible conservation."

The monkeys aren't the only victims, said Edward Grace, assistant director of the U.S. Fish and Wildlife Service, in a press release. Wild-caught monkeys passed off as captive-bred can present disease risks, and can skew scientific research: "The health and well-being of the American public [is] put at risk when these animals are removed from their natural habitats and sold illegally in the U.S. and elsewhere."

Few would disagree with that rationale. But in America's $586 billion biopharmaceutical industry, Kry's arrest created a crisis: It effectively halted the import of Cambodian long-tailed macaques, which had made up some 60% of the industry's lab monkey supply. Known in the field by the more clinical, distancing term "nonhuman primates," or NHPs, these animals were used in the quick development of vaccines for Ebola and COVID, and in research involving everything from fertility disorders to gene therapies.

The sudden severing of the industry's main monkey supply chain was a jolting debacle for drug development companies that rely heavily on monkeys to test the safety of new medicines. (Pharmaceutical companies generally don't do this work themselves, but outsource it to contract research organizations.)

For much of the past year, the homepage of the National Association for Biomedical Research has screamed, "ADDRESS THE NHP CRISIS TODAY!" and warned that the throttling of the Cambodian NHP supply chain "has put the development of new drugs to treat thousands of diseases for which there is no treatment or cure at significant risk." Some in the industry even argue that the U.S. is ceding its scientific edge—and national security, especially in another pandemic—to China, which has both a robust monkey-breeding infrastructure and world-dominating biotech ambitions.

And industry insiders whisper that the crackdown isn't so much about conservation or the purity of the lab testing supply chain as it is about catering to the interests of their longtime adversary: animal rights activists, who want to put a stop to all primate testing.

In any case, the controversy has thrown a spotlight on an aspect of biomedical work that many prefer to keep in the shadows—the uncomfortable and unpopular reality that medical progress, at least for now, depends on sacrificing some of our closest mammalian relatives. (If lab animals don't perish in pharmaceutical testing, they are generally euthanized.) And it adds new urgency to an age-old question: Do benefits to humans justify undeniable harm to so many other living, breathing, sentient creatures?

Man's reliance on monkeys for medical insight goes back centuries: Galen, famed physician of ancient Rome, used macaques for his influential anatomical studies in the second century AD. Today, monkeys make up just 0.5% of all animals used in scientific research, but they are in high demand for some of the most urgent areas of science: Their close relation to humans makes them key to infectious disease and brain research, and they are often considered the only relevant animal model for testing the fast-growing class of drugs known as biologics. At least 20% of drugs use NHPs in their required safety testing.

Fortune talked to dozens of primatologists, research scientists, conservationists, animal rights advocates, and biotech industry representatives. Each sees the issues at the core of this still-unfolding story as incredibly high-stakes—a matter of life and death, really—but for vastly different reasons, and for different beings.

They disagree over nearly every aspect: Is Kry a craven wildlife trafficker, or simply a government official who carried out orders on the job, in the interest of public health? Is the biomedical supply chain riddled with monkey-smuggling, or are crimes like those described in the indictment rare, isolated incidents? Are long-tailed macaques endangered, or a "hyper-abundant" nuisance? Does the industry desperately need monkeys to create lifesaving drugs—or could we be doing better, more humane science without them?

Most urgently: What's to be done now? More than a year after that fateful day at J.F.K. airport, Kry's case moves slowly through the federal court system of Florida's Southern District. The supply chain that feeds America's pharmaceutical research apparatus remains snarled. And the future of a primate species mankind has relied upon for medical advancement hangs in the balance.

KRY'S ARREST and its knock-on effects arrived at the worst possible moment for the biomedical research community, which was already years into a cascading, geopolitically fraught monkey supply crisis. The Kry incident was just the latest domino to fall.

When China, previously the largest source of lab monkeys for the U.S., cut off exports of the animals at the beginning of the COVID pandemic, the looming shortage that had long been an anxiety for scientists

and researchers became acute. U.S. importers pivoted almost overnight to breeding farms in Cambodia to fill the massive shortfall. Between 2020 and 2022, Cambodia provided the U.S. with about 18,000 of the roughly 30,000 nonhuman primates that were imported each year. Still, as the COVID vaccine race ramped up, there simply weren't enough monkeys. In that period, prices increased tenfold, soaring from around $2,000 per animal to more than $20,000. Unborn Asian monkeys were even being purchased as "futures" in the frenzy, one U.S. government official said.

The high-profile arrest and its aftermath threw another major wrench into the works—and as Cambodian macaques disappeared from the market, the price of monkeys rocketed up even higher, to $55,000 per animal or more in some cases.

The problem now, gripes the industry, is the federal government. Its effective ban on Cambodian long-tailed macaques is clear to see by the numbers: In 2022, 17,992 Cambodian long-tailed macaques traveled to the U.S., and in 2023, just 189 made that journey. (Imports from Vietnam and Mauritius have increased in that period.)

Since late 2022, the U.S. Fish and Wildlife Service has refused to clear shipments from Cambodia without incontrovertible evidence that the animals were genuinely bred in captivity. That's a hurdle the industry still hasn't managed to clear. It's working on potential solutions including genetic testing to prove monkeys were bred in captivity, but more than a year later, industry representatives grumble that the agency has never explained the abruptly implemented policy or what's required of them.

Fish and Wildlife disputes this characterization. In an email to *Fortune*, a spokesperson said that "the Service hasn't implemented any new policies," but is simply upholding its obligations to ensure wild-caught macaques are not illegally imported or exported. To the U.S. regulators, the role of Cambodia's wildlife permitting authority in the alleged conspiracy raised questions about the legality of *all* monkey trade from the country. Meanwhile, a spokesperson with the U.S. Food and Drug Administration suggests that the industry's concerns about the NHP shortage are, at least for now, overblown, telling *Fortune*. "We are not aware of a slowing of innovation."

Caught up in the confusion are those 1,200 Cambodian monkeys, which Charles River Laboratories, one of America's largest contract research organizations, imported between late 2022 and early 2023. Those animals, an "inventory" worth $20 million by the company's estimate, now inhabit an odd and indefinite limbo—residing at the company's labs but off-limits for scientific use.

Some say this government crackdown is overdue, and that the biomedical research industry has willfully ignored smuggling in the monkey supply chain for years—an explosive allegation. The Cambodian NHP pipeline runs to the labs that serve America's largest pharmaceutical companies and most renowned institutes (some of them, like the National Institutes of Health, belonging to the U.S. government itself). None of these entities were eager to contemplate the possibility that monkeys they used to develop American medicines were nabbed from the woods or streets by traffickers in Southeast Asia.

Meanwhile another storm cloud hovers for the industry: the possibility that the long-tailed macaque, the monkey most used by far in private industry, will be declared entirely off-limits. In 2022, the respected International Union for Conservation of Nature (IUCN) classified the species as endangered, naming demand for research animals as one of its primary threats. The designation doesn't immediately impact the monkey's trade, but it leaves the industry fighting another awkward accusation: that it's driving the long-tailed macaque to the brink of extinction. It's a narrative that the industry outright rejects, arguing that the creature is plentiful, running rampant in Southeast Asia.

UNDERCOVER DELIVERY
In a video submitted as evidence against Masphal Kry, the Cambodian wildlife official (dressed in a blue gingham shirt and sunglasses) watches as workers unload caged macaques from the back of a pickup truck.

AT THE VERY CENTER of this global, high-stakes tug-of-war is the long-tailed macaque (pronounced ma-CACK), a scrappy everyman of the monkey kingdom that ranges across Southeast Asia and is the world's most traded primate.

In the U.S., 95% of monkeys imported for lab work are long-tailed macaques, the species Kry was accused of smuggling. A monkey of many names—*Macaca fascicularis*, the crab-eating macaque, and the cynomolgus monkey (cyno, for short)—the brownish-gray primate is about the size of a very large house cat, possessing neither the physical majesty nor the spectacular colors of the great apes.

As its name indicates, the long-tailed macaque does have an impressively long tail, which it uses to balance as it leaps great distances, as well as sharp teeth, close-set eyes, and a tuft of Trumpian hair that can spike into a fluffy gray mohawk. It can be seen swimming and scurrying, and is so adept at using tools—to, say, forage for food or floss its teeth—that its own intelligence is a hot topic of academic study.

Above all, the long-tailed macaque is adaptable, a trait that has served it well as deforestation and development have transformed Southeast Asia.

These days, the animals often amass at temples and other tourist sites, where they're well fed and engage in spectacles—showing off their dexterity by "taking selfies" with tourists, for example. They tend to thrive in human proximity, growing fat, reproducing prodigiously, and creating a sense they've taken over. They're known to raid crops, break into homes and stores, and snatch things like cell phones to cleverly ransom back for food.

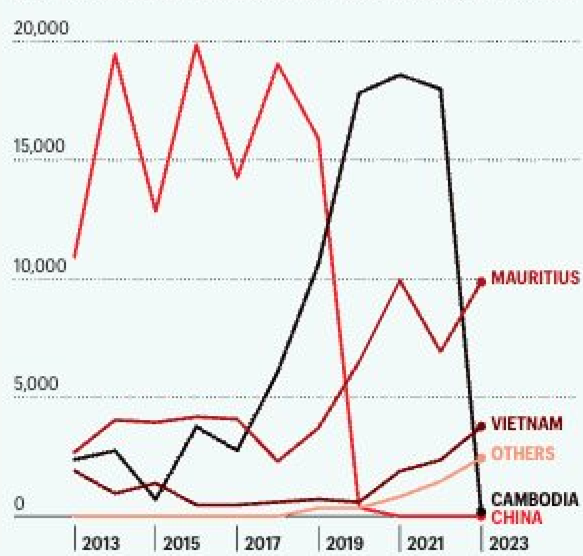
You can't blame monkeys for being monkeys (especially when they've been displaced by people), but managing the human-macaque interface is a real issue for governments in Southeast Asia. Facing public outcry, some resort to sterilization or even mass culling.

Opportunistic trappers are also out to get the long-tailed macaque, for sale into the TikTok-fueled pet monkey market or other channels of their illegal trade. According to the indictment, Kry and his superior also found a way to profit from the country's wild monkeys—funneling them into the biomedical supply chain.

The long-tailed macaque only became industry's favored lab monkey in recent decades. It was the rhesus macaque that played a starring role in the polio vaccine race: Between the 1930s and the 1950s, America sometimes imported more than 100,000 per year from India—monkeys that were taken from the wild, as was common practice then. That brisk trade ended in 1978, when India, already concerned about depleting stocks, banned exports after learning the U.S. used some of the monkeys in military experiments during the Cold War arms race.

Readily available across Southeast Asia, the long-tailed macaque emerged as a winning alternative. The species had the virtue of being slightly nicer (less likely

U.S. IMPORTS OF LONG-TAILED MACAQUES, BY ORIGIN



SOURCE: CENTERS FOR DISEASE CONTROL AND PREVENTION to bite handlers) and smaller (saving money on drugs in preclinical studies) than the rhesus macaque.

> "THERE'S ACTUALLY ZERO WAY THAT THE TENS OF THOUSANDS [OF MONKEYS] THAT ARE BEING BROUGHT IN [CAME FROM] A FACILITY THAT ONLY HAS X AMOUNT OF ANIMALS ... THOSE NUMBERS DON'T JIBE."
>
> **TIM SANTEL,** A RETIRED FISH AND WILDLIFE OFFICIAL

AS IT TURNS OUT, the monkey-breeding operation that Kry is accused of conspiring with in Cambodia, part of the Hong Kong–based company Vanny Bio-Research, is no bit player in the industry. (Vanny did not respond to requests for comment, but in a statement at the time of Kry's arrest, the company denied any wrongdoing.)

Up until then, Vanny had been the principal monkey supplier to one of America's top importers of nonhuman primates, the Indiana-based contract research organization Inotiv. Fish and Wildlife's investigation into Inotiv's NHP sourcing began years ago, with two of its subsidiaries receiving grand jury subpoenas in 2019 and 2021. In May 2023, Inotiv was notified that the SEC was investigating its monkey imports. (Inotiv also made headlines in early 2022 when the government seized 4,000 beagles, 446 in acute distress, from its Virginia dog-breeding facility.) Inotiv did not respond to multiple requests for comment.

At Inotiv's Boston-area competitor, Charles River Laboratories—which uses more nonhuman primates than any other American company and had sourced 60% of them from Cambodia—executives quickly heard of Kry's November 2022 arrest, which set the industry aflutter. But they weren't worried about their own monkeys, says Birgit Girshick, the company's chief operating officer. Vanny was not among Charles River's direct suppliers, and its own Cambodian breeder had been a trusted partner for some years (and has not been indicted).

But by February, Charles River had become ensnared in the government's investigation too. That month, it received a grand jury subpoena from the Department of Justice related to shipments from its Cambodian supplier. Since then, the company has disclosed that it's the subject of parallel federal criminal and civil investigations, as well as an SEC probe, related to its nonhuman primate sourcing from Asia. The company stresses that it's cooperating with the investigations and believes it has done nothing wrong.

Speaking on an earnings call several days after the company received its subpoena in February 2023, Charles River CEO James Foster framed the government's effective block on Cambodian monkey imports as an industry-hobbling headache. "We have to get through this logjam," he told investors. "This is not an acceptable situation for patients or for drug development."

It was also potentially very bad for business: In recent years, the lucrative work of conducting preclinical safety tests for pharmaceutical companies had delivered blockbuster growth for Charles River, in part because of the soaring price of monkeys and the panic over their scarcity. In 2021 and 2022, drug companies were booking animal-testing services two years in advance, simply to reserve a spot in line. The Cambodian NHP impasse with the U.S. government could shave up to $160 million off Charles River's revenues in 2023, Foster warned.

Indeed, the freeze on Cambodian monkeys had the whole industry spooked. NHPs are a particularly tricky supply chain to rebuild because monkeys aren't widgets; they take years to breed, and the global competition for those captive-bred animals is stiff. Rumors swirled: Would the government go after Vietnam's breeders next?

What made the situation "frustrating," Foster said, was that this urgent supply crunch had an obvious solution. "It's not like there literally aren't enough animals in the world to satisfy demand," Foster told analysts. "The animals are available."

Adding insult to injury, Charles River already *had* enough monkeys in its labs to fill a large elementary school—those 1,200 from Cambodia that it had already purchased, imported, and transported to its facilities. It just wasn't allowed to use them.

CHARLES RIVER LABORATORIES began humbly 76 years ago when a bow-tie-sporting veterinarian named Henry Foster purchased 1,000 rat cages from a Virginia farm and set up a one-man lab in Boston. Before long, he was breeding rodents for other researchers in the region. (Their progeny later included the Astromice, the first earth animals exposed to moondust.)

Over time, Charles River became an increasingly sophisticated, full-service partner to life sciences companies and researchers. Today, under the leadership of Henry's son James, the company doesn't just provide the animals; it designs and runs studies, identifying drug targets and evaluating the safety and efficacy of new medications. Its clients include big pharmaceutical companies and the National Institutes of Health, as well as small biotechs, academic researchers, and even the occasional parent trying to develop a cure for a child's rare disease.

In the wider business landscape, Charles River doesn't particularly stand out: Its $4 billion in annual revenue makes it just America's 745th largest company. But the contract research organization based in Wilmington, Mass., with 21,000 workers has quietly become an outsize player in America's pharmaceutical and biotech industries: It works with every major drug company and on more than 80% of the medications that come out of them.

Put simply, Girshick says, "They couldn't get drugs to market without us."

When I first spoke to Girshick last April, Charles River had enough monkeys in the U.S. to do its scheduled studies, but Girshick said they were down to a couple of months' supply. "The time is really ticking," she told me.

Meanwhile Matthew Bailey, longtime president of the Foundation for Biomedical Research as well as the National Association for Biomedical Research (NABR), industry groups that represent academic institutions and multinational companies like Charles River, wasn't just frustrated with the federal crackdown on Cambodian NHP imports: He was also suspicious.

To the career lobbyist, hardened by years of battles with the industry's most persistent nemesis, the whole federal case smacked of animal activism—from the code name, Operation Longtail Liberation, to the deployment of undercover video, a common tactic of People for the Ethical Treatment of Animals (PETA) and similar groups. A Fish and Wildlife spokesperson said the service "rejects the idea that its decisions are driven by activist pressure; its actions are driven by its conservation mission and its obligations to enforce the law."

ON A WARM FRIDAY morning in April 2023, a handful of protesters from PETA stood in a line outside a Miami federal courthouse. A few hoisted signs—"No gag order on monkey-smuggling evidence!"—while others held macaque masks over their faces.

Lisa Jones-Engel, a senior scientific advisor with the organization's laboratory investigations department, previewed the day's expected proceedings in front of a camera for a PETA broadcast, while a middle-aged man in a suit who didn't identify himself filmed the scene—a menacing gesture, Jones-Engel thought—on his cell phone.

Once a globe-trotting field primatologist, Jones-Engel is now four years into a battle to dismantle the industry she once worked for, on a mission to end the use of primates in biomedical research, full stop.

She celebrates Operation Longtail Liberation as a blow to a despicable and corrupt trade, and had come all the way to Florida from her home in Utqiagvik, Alaska, to watch the case against Kry unfold. She gasped when the video of Kry at Vanny's farm played in the courtroom—disturbed, she told me later, by the distinct vocalizations of young long-tailed macaques in distress.

The suffering and death of animals for the sake of science has always been an ethically fraught and divisive issue. Animal rights organizations and the scientific community have been duking it out for years. Vocal activists tend to dominate the public debate, arguing that animal research, which they consider a form of intolerable cruelty, is unnecessary (couldn't technology do that?) and misleading (can we really understand a human disease by studying a monkey?).

Scientists and industry representatives reflexively rebut both those points—and complain mightily about the misinformation that some animal advocates spread. But many prefer not to engage for fear of being targeted by a group like PETA, a 9-million-member-strong

MACAQUE-TIVISM
Lisa Jones-Engel, (right) and other animal activists want to end all primate lab testing.

organization whose tactics have included protesting at researchers' homes and infiltrating labs. (The general public is split on the matter, with 52% of Americans opposing animal research in a 2018 survey by the Pew Research Center.)

It's worth noting that the question of whether animal testing is right or should continue is *not* what's at issue in the case against Kry and his codefendants, or the restrictions on Cambodian monkey imports. The animal advocates outside the courtroom in Miami were there to cheer on the government's case, but Fish and Wildlife's Operation Longtail Liberation is not, on its face, aligned with their efforts to end all animal testing on moral grounds.

Conservation—the protection of wildlife and upholding of the rules governing its international trade—is the focus of the federal case.

The industry of captive breeding farms that took root in Southeast Asia was supposed to reduce pressure on the wild population of long-tailed macaques. Still, the 2022 IUCN assessment asserted that demand from the biomedical trade is one of the threats endangering the species. If U.S. or international wildlife regulators adopt a similar stance, the industry faces a far more serious supply disruption: A ban or severe restriction of the species' trade could end its use in research for good.

PETA's Jones-Engel, who has petitioned the U.S. Fish and Wildlife Service to do just that, talks openly about this being her end game. And if the effort is successful, Bailey, the industry lobbyist, says that would be a disaster: "I think the net effect is that preclinical research for this species in the United States is over."

Industry insiders and critics agree, the best long-term solution is to not use animals in research at all. The FDA opened the door for pharmaceutical companies to use nonanimal alternatives in safety testing several years ago. And promising tech, including AI and organs-on-a-chip—miniature systems that mimic the properties of human tissues and organs—are advancing quickly and helping reduce the number of animals used in studies. But those technologies are not yet robust or established enough to adequately assess the risk of drugs to humans in most cases, the FDA told *Fortune*.

In other words, America still needs lab monkeys.

THE BIOMEDICAL COMMUNITY professed shock at the allegation that a wide-ranging wild-caught macaque smuggling scheme existed in its supply chain. Industry representatives said they believe smuggling is largely prevented by in-country regulation and company audits.

Girshick of Charles River Laboratories told me that she remembers being "dumbfounded" when she first heard about Kry and Vanny's alleged crimes: That a breeder would take the risk of infecting the captive-

bred population with diseases from wild monkeys just didn't make sense, Girshick said, purely from a self-interested business point of view.

But conservationists, primatologists, and others who have tracked the issue in Southeast Asia say the Kry case is the tip of the iceberg, and that for years wild long-tailed macaques have been smuggled into the region's breeding farms to prop up the industry's inadequate supply chain.

Dave Windley, a financial analyst who covers Charles River and Inotiv for Jefferies, has struggled to square the industry's claims that it has sufficient safeguards to prevent these kinds of shenanigans with his own research. "We've dug out a bunch of news stories and white papers and things like that, that just talk about how prevalent smuggling is, and honestly how it's been going on for a long, long time," he says. (This reporter found a similarly robust and persuasive historical record.)

As for the Cambodian breeding facility, Vanny Bio-Research, that Kry is accused of delivering monkeys to, it should have been obvious that there was a problem, says Tim Santel, a retired Fish and Wildlife Service special agent who oversaw Operation Longtail Liberation until his retirement in 2020. "The light bulb was like, there's actually zero way that the tens of thousands that are being brought in, [from] a facility that only has X amount of animals—it can't be," he says. "Those numbers don't jibe."

THERE'S AN INESCAPABLE math that makes breeding NHPs a several-years-long, complicated process. Female long-tailed macaques aren't sexually mature until the age of 4 or 5. They'll give birth to a single monkey after a gestation period of 165 days; the baby will be weaned after six to eight months. Biomedical research and pharmaceutical

A SOMBER DEBT
Man's reliance on monkeys for medical insight goes back centuries. The U.S. imported hundreds of thousands of rhesus macaques during the race to develop a polio vaccine between the 1930s and the 1950s. More recently, the long-tailed macaque was key to developing COVID vaccines.

testing require monkeys of varying ages, but most need to be at least three years old.

The European Union requires that monkeys used for research must be at least two generations removed from their wild forebears, and while the U.S. has no such requirement, it's considered desirable here too. Because of all this, there are limits to a monkey farm's potential productivity.

Even so, Cambodia somehow managed to ramp up its monkey exports very quickly, according to wildlife trade data. Between 2019 and 2020, the year that China stopped its outbound trade, Cambodia more than doubled its worldwide exports of captive-bred long-tailed macaques, from 13,992 to 29,466.

It's a big business that some say is interwoven with the country's government. Radio Free Asia has reported on links between powerful politicians and the nation's monkey farms. In a country where the GDP per capita is $1,800, the economic incentive to catch and sell a macaque for a couple hundred dollars is strong.

On its web page, Vanny Bio-Research's two Cambodia operations look more tropical resort than monkey farm, with stately white villas and lush topiary trimmed into the word "VANNY." Media photographs and recent drone footage offer a somewhat different view: a vast expanse of cleared land dotted with rows and rows of uniformly placed monkey sheds.

Founded in 2000, the Hong Kong–based company has campuses in Phnom Penh and in Pursat, a mountainous province with dense forest. Up until the U.S. government indicted six of its employees, Vanny had the industry's highest seal of approval—an accreditation from the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC International), the industry nonprofit body that audits breeding farms and animal laboratories in 50 countries around the world. AAALAC removed Vanny from its list of accredited organizations in the days following the indictment.

Vanny is accused of paying millions of dollars to several black-market distributors between 2017 and 2022 to purchase thousands of wild long-tailed macaques for the company's farms, bolstering the numbers it was breeding in captivity.

Among the alleged black-market suppliers was Kry's employer, Cambodia's MAFF, which the U.S. government says sourced monkeys from national parks and protected areas. The agency collected $150 to $220 for each animal it delivered to Vanny, charging the higher $220 price for "unofficial" monkeys that it agreed to hide from local officials, according to the indictment. Kry is singled out for dropping off 92 wild monkeys at Vanny on four dates between August 2019 and June 2020 and, on one of those occasions, advising Vanny personnel to create a back road to the farm that would be "more safe for the smuggling." (The latter incident is captured on a cell phone video surreptitiously recorded by a confidential informant, who was then working at Vanny; *Fortune* has viewed the video, which is an exhibit in the case.)

In a motion to dismiss the case, Kry's defense attorneys argue that he was a bureaucrat simply doing his job, carrying out official duties that he was authorized to perform. Documents purporting to support this claim include communications from 2018 that show Cambodia's MAFF granted Vanny permission to collect 2,000 long-tailed macaques from public places in order to "reduce the risks to people and tourists." In exchange for "conservation and royalty fees," the government allowed Vanny "to raise, care, and breed" the animals.

Kry's defense attorneys argue that Kry had no idea whether Vanny planned to misrepresent those wild monkeys as captive-bred and export them to American labs. And they accuse the U.S. government of improperly launching "a full-on assault" on a foreign ministry. (It's unclear who's footing Kry's legal bills, but he is represented by attorneys from Akin Gump Strauss Hauer & Feld, an American firm that the Cambodian government had hired for lobbying purposes in early 2022.)

KRY AND HIS ASSOCIATES stand accused of fudging paperwork certifying wild monkeys as captive-bred, but the implications are broader than that: Animals misidentified as captive-bred can bring unknown disease risks to one another and humans, and unwittingly introduce variables into the controlled scientific process.

Amid those concerns and the broader lab-monkey supply crisis, some in the industry argue the only way to guarantee the U.S. has a reliable, high-integrity supply is to expand domestic breeding.

But breeding monkeys in America "just doesn't work," Foster of Charles River Laboratories told an investor audience last March. He knows this from experience: Charles River tried to get into the monkey-breeding business in the 1970s when the company started a colony of rhesus macaques on two uninhabited islands in the Florida Keys. By the mid-1980s, the animals numbered over 1,000, and neighboring communities were complaining that the monkeys had destroyed mangroves, polluted the water with their poop, and even escaped to other islands. A judge finally evicted the colony, but not before Hurricane Georges hit in 1998—killing eight monkeys and loosing 150.

Foster recalled the operation as "a nightmare." Hurricane aside, Foster said, it had been a money pit—cash-flow-negative for 12 years. Meanwhile, he pointed out, the animals are "running wild in Asia and Africa." All you have to do, he added, is take those feral animals and breed them. Put another way: The business of raising lab monkeys is easier and cheaper to do somewhere other than the United States.

That truth sets up a strange and jarring disconnect that underpins the global nonhuman primate supply chain: The monkeys that end up in America's gleaming, high-tech labs often started their lives in open-air monkey farms in much poorer countries, where workers wearing only light PPE are paid little to raise and handle animals.

With only basic technology and the practice of keeping the animals in large pens, Girshick concedes that until recently, "recordkeeping was basically nonexistent" at such breeding operations "deep in the woods."

WILL CAMBODIAN NHPS ever return to America? Foster, Charles River's CEO, isn't so sure, and he doesn't particularly care. For now, his company has averted the NHP doomsday scenario that Girshick had worried about with a crafty workaround: Canada.

As a global company, Charles River has labs outside the U.S. where it can ship Cambodian monkeys. It just had to move the contract work. (PETA has appealed to the Canadian government to block Cambodian monkeys, but the country stands by its process.)

The company still maintains that the government's claims are without merit, but it is running a tighter ship when it comes to its monkey suppliers: stepping up audits that had fallen by the wayside during the COVID pandemic, and making further investments to help breeding farms upgrade their processes.

Meanwhile, demand for NHPs has eased with 2023's biotech slump, leading Charles River to use 25% fewer NHPs in 2023—11,400 compared with 15,272 in 2022. Still, Bailey and others in the research community stress that the shortage remains dire.

PETA celebrates the reduction, taking its wins where it can. Last March, after flooding the Fish and Wildlife Service with calls and stationing members outside Charles River's facilities, it declared victory in stopping the company from sending the 1,200 Cambodian monkeys back to Cambodia—to be "funneled back into the forest-to-laboratory pipeline," in the organization's words. (Charles River denies that it ever planned to send the animals back to their origin country.)

But PETA's proposed solution—to send the stateless monkeys to a sanctuary—hasn't yet worked out, partly because it's dauntingly expensive. Angela Grimes, CEO of Born Free USA, which runs a primate sanctuary that holds 250 monkeys in Texas, says it would cost $125 million to buy the land, equipment, and supplies necessary to provide lifetime care for all those monkeys. She wants to help the animals, but says there's no funding mechanism for such strange circumstances. So the monkeys remain at Charles River—in cages at a lab, but not used as lab monkeys.

Kry remains in a sort of caged limbo as well, awaiting trial in March and living under house arrest in the northern Virginia suburbs. Last summer, the judge granted the former wildlife official a few nightly walks around the neighborhood per week.

He is still the only one of the eight indicted individuals in U.S. custody. Cambodia continues to export monkeys for biomedical research—just not to the U.S. And Vanny is still in business. According to its website, it now offers paternity testing and microchipping to assure clients their monkeys didn't come from the wild.

Kry remains the silent center of the case. Through his defense team, he declined to comment for this story. At the time of his arrest, his profile on the social media app Telegram offered, as a sort of personal statement, the saying often attributed to Mao: "Everything under heaven is in utter chaos; the situation is excellent." F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A wealth manager is more than a person to manage a portfolio. A wealth manager is someone who helps their clients plan for their future, and their children's future, and that advisor/client relationship is a vital piece of the puzzle. That's why it's important to many clients to find someone they can stick with for the long haul.

Five Star Professional has been researching and recognizing outstanding wealth managers for more than a dozen years. In that time we've seen all kinds of different wealth managers, and we've also identified a need to help people find a wealth manager who is a great personal fit for them. To that end, we're recognizing our Five Star Wealth Managers who are under 40. Each of the featured advisors was under the age of 40 as of January 1, 2023.

What makes this group so unique is that they are already part of an exclusive group — they're all Five Star Wealth Managers. Winners of the Five Star Wealth Manager award have already been vetted by a third-party research process that includes 10 objective criteria. The set of award winners listed below has an additional distinction: They all satisfied those criteria and won the Five Star award at a young age.

Hats off to our 40 and under Five Star award-winning wealth managers!

RESEARCH DISCLOSURES

In order to consider a broad population of high-quality wealth managers, award candidates are identified by one of three sources: firm nomination, peer nomination or prequalification based on industry standing. Self-nominations are not accepted. Award candidates were identified using internal and external research data. Candidates do not pay a fee to be considered or placed on the final lists of Five Star Wealth Managers.

- The Five Star awards are not indicative of a professional's future performance.
- Wealth managers may or may not use discretion in their practice and therefore may not manage their clients' assets.
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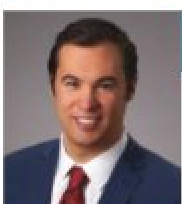
For more information on the Five Star Wealth Manager award program, research and selection criteria, go to fivestarprofessional.com/research.

DETERMINATION OF AWARD WINNERS

Award candidates who satisfied 10 objective eligibility and evaluation criteria were named 2023 and/or 2024 Five Star Wealth Managers.

Eligibility Criteria – Required: 1. Credentialed as a registered investment adviser or a registered investment adviser representative. 2. Actively employed as a credentialed professional in the financial services industry for a minimum of five years. 3. Favorable regulatory and complaint history review. 4. Fulfilled their firm review based on internal firm standards. 5. Accepting new clients.

Evaluation Criteria – Considered: 6. One-year client retention rate. 7. Five-year client retention rate. 8. Non-institutional discretionary and/or non-discretionary client assets administered. 9. Number of client households served. 10. Education and professional designations.



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This award was issued on 02/01/2024 by Five Star Professional (FSP) for the time period 04/10/2023 through 10/31/2023. 4,421 Boston-area wealth managers were for the time period 10/10/2022 through 05/05/2023. 4,274 Dallas/Fort Worth-region wealth managers were considered for the award; 336 (8% of candidates) were 2,580 Denver-area wealth managers were considered for the award; 247 (10% of candidates) were named 2023 Five Star Wealth Managers. This award was issued on award; 132 (8% of candidates) were named 2023 Five Star Wealth Managers. This award was issued on 01/01/2024 by Five Star Professional (FSP) for the time period Managers. This award was issued on 02/01/2024 by Five Star Professional (FSP) for the time period 05/15/2023 through 11/30/2023. 3,339 Seattle-area wealth managers was used for rating. This rating is not related to the quality of the investment advice and based solely on the disclosed criteria.

Wealth managers do not pay a fee to be considered or placed on the final list of Five Star Wealth Managers. The award is based on 10 objective criteria. Eligibility criteria – required: 1. Credentialed as a registered investment adviser (RIA) or a manager has not; A. Been subject to a regulatory action that resulted in a license being suspended or revoked, or payment of a fine; B. Had more than a total of three settled or pending complaints filed against them and/or a total of five complaints registered through FSP's consumer complaint process; feedback may not be representative of any one client's experience; C. Individually contributed to a financial settlement of a customer complaint; D. Filed for personal bankruptcy 6. One-year client retention rate; 7. Five-year client retention rate; 8. Non-institutional discretionary and/or non-discretionary client assets administered; 9. Number of client households served. 10. Education and professional designations. assets. The inclusion of a wealth manager on the Five Star Wealth Manager list should not be construed as an endorsement of the wealth manager by FSP or this publication. Working with a Five Star Wealth Manager or any wealth manager

FIVE STAR WEALTH MANAGERS — UNDER 40

Daniel Rogowski

Financial Advisor, Managing Partner, MBA

Daniel is a Texas-raised Harvard and Rice graduate and an Eagle Scout. His firm Harman Rogowski & Associates, is held to a higher fiduciary standard. Their financial advisors collaborate with a team of CPAs to optimize your entire financial life, including taxes, investments and planning.

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FIVE STAR WEALTH MANAGER AWARD WINNER

Jessica Tai

Vice President, Financial Advisor

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She works with her clients through all stages of life, which includes everything from saving for the purchase of a first home to retirement planning and legacy planning for future generations.

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David Charles Hobbs

Certified Financial Planner™, Owner, Wealth Manager

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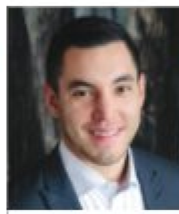

Levi G. Sanchez

Founder, Financial Planner

Financial Planning for Your Future, for Your Experiences, for Your Life

Levi started Millennial Wealth in 2018 with the vision of providing holistic wealth management services to millennials in the tech industry.

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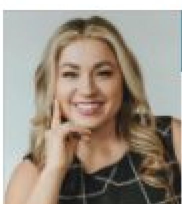

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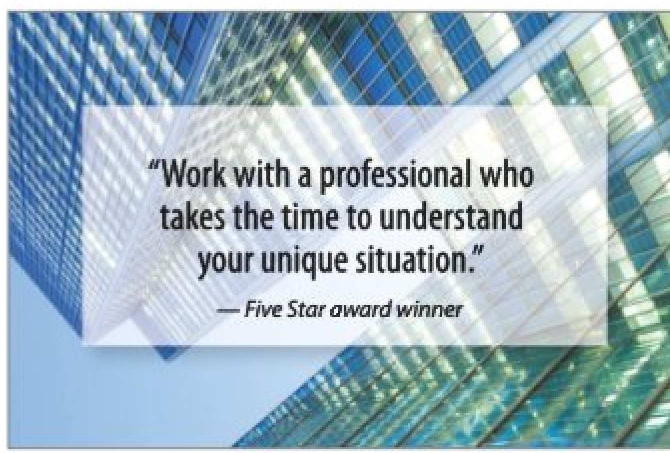

considered for the award; 580 (13% of candidates) were named 2024 Five Star Wealth Managers. This award was issued on 07/01/2023 by Five Star Professional (FSP) named 2023 Five Star Wealth Managers. This award was issued on 10/01/2023 by Five Star Professional (FSP) for the time period 12/12/2022 through 06/30/2023. 09/01/2023 by Five Star Professional (FSP) for the time period 11/14/2022 through 05/31/2023. 1,594 Indianapolis-area wealth managers were considered for the 04/10/2023 through 10/31/2023. 1,897 Kansas City-area wealth managers were considered for the award; 136 (7% of candidates) were named 2024 Five Star Wealth were considered for the award; 260 (8% of candidates) were named 2024 Five Star Wealth Managers. Fee paid for use of marketing materials. Self-completed questionnaire

registered investment adviser representative; 2. Actively licensed as a RIA or as a principal of a registered investment adviser firm for a minimum of 5 years; 3. Favorable regulatory and complaint history review (As defined by FSP, the wealth settled, pending, dismissed or denied complaints with any regulatory authority or FSP's consumer complaint process. Unfavorable feedback may have been discovered through a check of complaints registered with a regulatory authority or within the past 11 years; E. Been terminated from a financial services firm within the past 11 years; F. Been convicted of a felony); 4. Fulfilled their firm review based on internal standards; 5. Accepting new clients. Evaluation criteria – considered: FSP does not evaluate quality of services provided to clients. The award is not indicative of the wealth manager's future performance. Wealth managers may or may not use discretion in their practice and therefore may not manage their clients' is no guarantee as to future investment success, nor is there any guarantee that the selected wealth managers will be awarded this accomplishment by FSP in the future. Visit www.fivestarprofessional.com.

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Anastasia Sophia Nikolaou

CFP®, CRPC™, Financial Advisor, Associate Vice President

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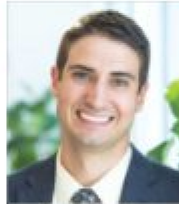

Eric Mullins

CFP®, CRPC™, Financial Advisor

Inspiring Confidence for Your Journey

Eric inspires confidence through his clarity-driven process. He empowers families to enjoy a life of fulfillment both now and into the future by connecting their values with their financial picture.

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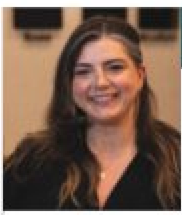

Jennifer Tarantino

Managing Director, Private Wealth Advisor

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Jennifer focuses on helping clients define and achieve their life goals through customized financial plans. She believes engaging in personal relationships and client education are the foundation for success. Jennifer will help you define what's most important and create a comprehensive wealth strategy that suits your lifestyle and legacy goals. Jennifer is a 2023 Five Star Wealth Manager.

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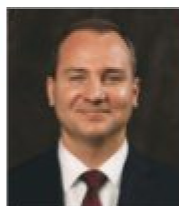

Eric J. Pascarella

CPA, PFS, CFP®, AIF®, Financial Advisor

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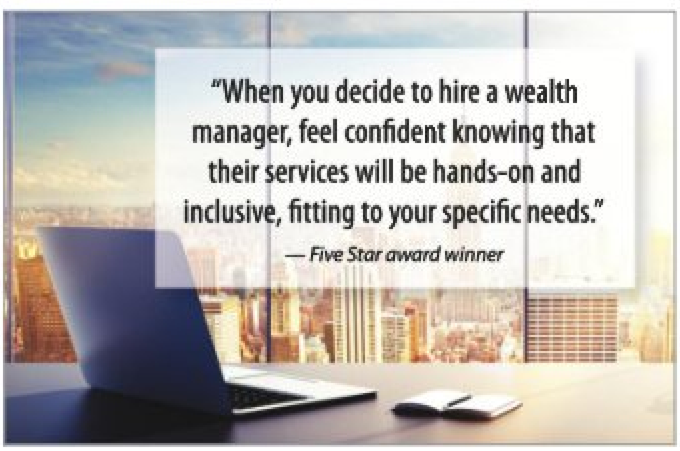

Left to right: Nicholas Frazetta, Vice President of Operations; Nicholas A. Subich, CPFA, President, CEO; 2023 winner Joshua R. Yoskosky, Wealth Manager

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Wealth managers do not pay a fee to be considered or placed on the final list of Five Star Wealth Managers. The award is based on 10 objective criteria. Eligibility criteria – required: 1. Credentialed as a registered investment adviser (RIA) or a manager has not; A. Been subject to a regulatory action that resulted in a license being suspended or revoked, or payment of a fine; B. Had more than a total of three settled or pending complaints filed against them and/or a total of five complaints registered through FSP's consumer complaint process; feedback may not be representative of any one client's experience; C. Individually contributed to a financial settlement of a customer complaint; D. Filed for personal bankruptcy 6. One-year client retention rate; 7. Five-year client retention rate; 8. Non-institutional discretionary and/or non-discretionary client assets administered; 9. Number of client households served; 10. Education and professional designations. assets. The inclusion of a wealth manager on the Five Star Wealth Manager list should not be construed as an endorsement of the wealth manager by FSP or this publication. Working with a Five Star Wealth Manager or any wealth manager

FIVE STAR WEALTH MANAGERS — UNDER 40

To see the full list of winners, visit www.fivestarprofessional.com.

Baltimore

2,126 Baltimore-area wealth managers were considered for the award; 256 (12% of candidates) were named 2023 Five Star Wealth Managers.

Joe Breslin · Armstrong Dixon · 443-563-1111

Christopher William Oxenham · Oxenham Financial · 410-423-4482

Boston

3,923 Boston-area wealth managers were considered for the award; 578 (15% of candidates) were named 2023 Five Star Wealth Managers.

Ryan F. Christensen · RWA Wealth Partners · 617-321-2376

Jeffrey Kenneth Corey · Claro Advisors · 617-449-0640

Christopher M. Eppich · Atlantic Planning Group · 781-894-7000

Raymond Pedrick · SFP Wealth · 781-239-2071

Jack Wolff · Lightship Wealth Strategies · 617-581-6100

Chicago

5,549 Chicago-area wealth managers were considered for the award; 405 (7% of candidates) were named 2023 Five Star Wealth Managers.

Nathan Chapel · Tru Financial Strategies · 847-370-8198

Jeff Delcorse · Equilibrium Wealth Management · 773-494-3997

Cincinnati

1,649 Cincinnati-area wealth managers were considered for the award; 240 (15% of candidates) were named 2023 Five Star Wealth Managers.

Henry Hampton · Thrivent Investment Management · 513-788-1472

Connecticut

3,564 Connecticut-area wealth managers were considered for the award; 313 (9% of candidates) were named 2023 Five Star Wealth Managers.

Rob Cassella · Prudential Advisors · 203-215-9631

Michael A. Mendillo Jr. · Lobo & Pascale Wealth Management, LLC · 203-269-3700

Steven Mondolino · Wealth Enhancement Group · 203-656-5506

Dallas/Fort Worth

4,274 Dallas/Forth Worth–region wealth managers were considered for the award; 336 (8% of candidates) were named 2023 Five Star Wealth Managers.

Ginnie Baker · Beaird Harris · 972-383-0506

Michael DeGroat · Ameriprise Financial Services, LLC · 972-232-1683

Jennifer Dragon · Main Street Retirement Planning · 972-393-0376

Brett W. Ginn · Ginn Wealth Managment · 817-473-7100

Chase Perry · Beaird Harris · 972-383-0572

Delaware

522 Delaware-area wealth managers were considered for the award; 55 (11% of candidates) were named 2023 Five Star Wealth Managers.

Andres Bonell · Bryn Mawr Capital Management · 302-277-7608

Christopher J. Metkiff · MML Investors Services · 302-932-1543

Houston

3,347 Houston-region wealth managers were considered for the award; 179 (2% of candidates) were named 2023 Five Star Wealth Managers.

Jay E. Campbell · Ameriprise Financial Services, LLC · 281-212-2730

William McNutt · Mercer Global Advisors · 713-561-9314

Indianapolis

1,594 Indianapolis-area wealth managers were considered for the award; 132 (8% of candidates) were named 2023 Five Star Wealth Managers.

Sean P. Grannan · Principal Securities · 317-874-3863

Los Angeles

4,527 Los Angeles-area wealth managers were considered for the award; 158 (3% of candidates) were named 2024 Five Star Wealth Managers.

Kyle J. Whitten · Ameriprise Financial Services, LLC · 818-704-6675

Milwaukee

1,636 Milwaukee-area wealth managers were considered for the award; 173 (11% of candidates) were named 2023 Five Star Wealth Managers.

Patrick C. Bortz · Paramount Financial Strategies · 262-269-1043

Nathan R. Derks · Landolt Securities · 262-334-9131

Gabriel Paul Schneiss · Schneiss Financial Group · 414-501-1237

New Jersey

6,606 New Jersey-area wealth managers were considered for the award; 407 (6% of candidates) were named 2023 Five Star Wealth Managers.

Steven Crevar · Mercer Global Advisors · 973-605-8311

Peter Carl Hoglund · Wealth Enhancement Group · 908-821-9760

Daniel J. Monzi · ICG next · 732-359-3838

Alexander Daniel Orlando · Tributary Wealth Management · 201-674-3632

Eric Saenz · Ascendancy Financial Group · 732-292-3318

Adam J. Seltzer · Barnum Financial Group · 973-487-9791

Tanya Walliser · Condor Capital Wealth Management · 732-356-7323

Philadelphia

3,885 Philadelphia-area wealth managers were considered for the award; 328 (8% of candidates) were named 2023 Five Star Wealth Managers.

Daniel S. Melville · Financial Voyages, LLC · 215-256-7845

James O'Donoghue · BCG Securities · 856-624-4166

Phoenix

2,286 Phoenix-area wealth managers were considered for the award; 97 (4% of candidates) were named 2023 Five Star Wealth Managers.

Matthew Walker · Fortitude Family Office · 602-550-3432

Portland

1,490 Portland-area wealth managers were considered for the award; 98 (7% of candidates) were named 2023 Five Star Wealth Managers.

Phil Jasso · Bridgetown Wealth Management · 503-280-7155

Rhode Island

637 Rhode Island-area wealth managers were considered for the award; 136 (21% of candidates) were named 2023 Five Star Wealth Managers.

Marja Sweet · Oak Leaf Wealth Management, LLC · 401-765-1711

Richmond

1,095 Richmond-area wealth managers were considered for the award; 67 (6% of candidates) were named 2023 Five Star Wealth Managers.

Jared C. Lewis · Irongate Capital Advisors · 804-250-8920

Sacramento

946 Sacramento-area wealth managers were considered for the award; 107 (11% of candidates) were named 2023 Five Star Wealth Managers.

Ryan Allen Breedwell · Capitol Planning Group · 916-570-6001

San Francisco

2,346 San Francisco-area wealth managers were considered for the award; 40 (2% of candidates) were named 2023 Five Star Wealth Managers.

Riley Gordon Barr · Freestone Capital Management · 415-510-6825

San Francisco East Bay

1,291 San Francisco East Bay-area wealth managers were considered for the award; 87 (7% of candidates) were named 2023 Five Star Wealth Managers.

Elizabeth Mintzer · Rainer Wealth Management · 925-217-4280

Seattle

2,994 Seattle-area wealth managers were considered for the award; 268 (9% of candidates) were named 2023 Five Star Wealth Managers.

Tom Bakamus · Merit Financial Advisors · 425-392-2200

Crystal Beineke · Olympic Investment Group · 425-312-6463

Ross M. Krause · LPL Financial · 847-501-1538

Jackson Miller · Edward Jones · 253-661-3155

St. Louis

2,691 St. Louis-area wealth managers were considered for the award; 167 (6% of candidates) were named 2023 Five Star Wealth Managers.

John C. Wahl · One Bridge Wealth Management · 314-924-8009

Twin Cities

4,080 Twin Cities-area wealth managers were considered for the award; 633 (16% of candidates) were named 2023 Five Star Wealth Managers.

Mark Patrick Booth · Morgan Planning Group, LLC · 952-270-0457

Jason Thomas King · Oakwood Capital Advisors, LLC · 612-930-4196

Alexander B. Klinkhammer · Klinkhammer Financial · 507-581-1325

Graham Nicholas Kuehner · Ameriprise Financial Services, LLC · 952-758-6363

Casey Allen Larson · Larson & Larson Financial · 952-641-6740

Kyle Laube · Ameriprise Financial Services, LLC · 952-444-2003

Brian Limburg · EFS Advisors · 651-472-5577

Josh C. Wyman · Ameriprise Financial Services, LLC · 952-486-4229

were considered for the award; 462 (7% of candidates) were named 2024 Five Star Wealth Managers. This award was issued on 06/01/2023 by Five Star Professional 2023 Five Star Wealth Managers. This award was issued on 12/01/2023 by Five Star Professional (FSP) for the time period 02/13/2023 through 08/31/2023. 4,527 Los by Five Star Professional (FSP) for the time period 03/13/2023 through 09/29/2023. 4,280 Twin Cities-area wealth managers were considered for the award; 637 (15% related to the quality of the investment advice and based solely on the disclosed criteria.

registered investment adviser representative; 2. Actively licensed as a RIA or as a principal of a registered investment adviser firm for a minimum of 5 years; 3. Favorable regulatory and complaint history review (As defined by FSP, the wealth settled, pending, dismissed or denied complaints with any regulatory authority or FSP's consumer complaint process. Unfavorable feedback may have been discovered through a check of complaints registered with a regulatory authority or within the past 11 years; E. Been terminated from a financial services firm within the past 11 years; F. Been convicted of a felony); 4. Fulfilled their firm review based on internal standards; 5. Accepting new clients. Evaluation criteria – considered: FSP does not evaluate quality of services provided to clients. The award is not indicative of the wealth manager's future performance. Wealth managers may or may not use discretion in their practice and therefore may not manage their clients' is no guarantee as to future investment success, nor is there any guarantee that the selected wealth managers will be awarded this accomplishment by FSP in the future. Visit www.fivestarprofessional.com.

HOT MESS

Huy Fong sriracha rose from nowhere to become an iconic American food brand. Here's how a feud between partners knocked it off its throne.

By Indrani Sen

PHOTOGRAPHS BY SPENCER LOWELL

ON THE DAY that the foundation of Craig Underwood's business collapsed, he was on vacation—at the beach with his wife, daughters, and grandchildren in Hawaii.

It was November 2016, and the fourth-generation California farmer had just completed a perfect pepper harvest—another high point for a business, Underwood Ranches, that had grown exponentially over three decades on the strength of a single crop. As the sole supplier of the juicy red jalapeños for sriracha, Huy Fong Foods' iconic fiery-red chili-garlic sauce, Underwood's empire of peppers had spread from a 400-acre family farm in the 1980s to 3,000 acres across two counties outside Los Angeles.

Sriracha's rise had by then become the stuff of business legend. That spicy, slightly sweet, good-on-everything sauce, in the instantly recognizable bottle with its white rooster emblem and bright green nozzle, was the brainchild of David Tran, who had first devised the recipe and sold the stuff in L.A. in 1980 as a Vietnamese refugee starting a new life for his family.

Tran's business motto is "make product, and not profit," but Huy Fong had become the No. 3 hot sauce brand in America—all as a private company, without selling even the smallest share to the country's Big Food titans. At the time, Tran's green-tipped bottles could be found in one in 10 American kitchens and on the International Space Station.

Sriracha's success grew from the firm ground of Underwood and Tran's business partnership: Underwood supplied all Huy Fong's chilies, and Tran was Underwood Ranches' only pepper buyer. By 2012, Tran had built a gleaming 650,000-square-foot factory less than two hours from Underwood's Ventura County headquarters. On a tour of the site, he told Underwood that together they would fill it with chilies.

The two men came from different worlds, but they had a lot in common: Soft-spoken patriarchs with kind eyes and faces craggy with laugh lines, both had remained workaholics well into their seventies. Over the 28 years they'd been in business, the two had broken bread together with their wives, watched each other's children grow up, stood together through hard times and business crises. They had even met up, with their families, to talk about succession.

Just days earlier, after the last truckload of the 2016 harvest had been delivered, Underwood and Tran had sat together and mapped out the 2017 growing season, and what Tran would pay in advance for the tens of millions of pounds of peppers Underwood promised him. As usual, the agreement was verbal, sealed with a nod and a handshake, not contracts or lawyers.

Then, on Nov. 10, at his vacation rental on Kauai, Underwood got a call with news that he could barely take in. His farm's chief operating officer, Jim Roberts, told him that the relationship had ended, severed in one afternoon by an argument over payment for next season's crop. Underwood Ranches and Huy Fong Foods would never do business together again.

"That's one way to ruin a vacation," Underwood now says ruefully.

FUEL FOR FIRE Harvesting red jalapeño peppers—the secret to good sriracha—at Underwood Ranches.

THE SCHISM TURNED OUT to be even more catastrophic than either company could have imagined. It left Tran without the peppers he needed to meet the ever-growing demand for his sriracha. Since he lost Underwood's chilies, his massive factory in Irwindale, Calif., has operated sporadically, at a fraction of its capacity. For the first year after the split, Huy Fong got by on stockpiled mash and Mexican chilies, which were cheap because of a glut. But supply has often been spotty since then: In the first half of 2023, Huy Fong had no chilies at all.

Underwood, meanwhile, faced financial ruin: The vast swaths of land that he had purchased or leased to grow jalapeños couldn't be planted without a buyer. He was locked into 25-year leases on much of the land he had expanded into, and he didn't have cash on hand to pay his own suppliers. He took out loans, sold some parcels, and laid off 45 workers.

Both businesses lost millions. The two men became bitter enemies—and they offer sharply contrasting accounts of what went wrong.

At first, Underwood recalls, he was confused and hurt. "We were trying to figure out what the hell's going on,"

TEAM OF TWO David Tran (left) built Huy Fong Foods around his hit sriracha recipe; Craig Underwood was his exclusive chili supplier.

he tells me when I visit his offices in Camarillo, Calif., in December. "Because we were really vulnerable, both in the percentage of our business that he commanded—and I guess our belief that we were going to have a long-term relationship." But he soon became convinced, Underwood tells me, that Tran's intentions were bad, and had been for some time. "Basically, he really was out to destroy me," he says. "He didn't give a damn about me or our family or all that we'd done together."

Over at Huy Fong, feelings were similarly raw. Tran felt betrayed, and blindsided by accusations that he had been underhanded. For most of three decades, he had remained loyal to Underwood as his only pepper producer, and each year he had handed over millions on the promise of a harvest, a gesture that he saw as an act of faith. Now all that trust had collapsed in a petty argument over money.

Tran has come to believe that Underwood was trying to drive him to bankruptcy, then steal his sauce business. "I helped him because he grew chili for me," he says. "He made money, he owned land. But it is not enough. He wanted to take over my business." It felt like being "stabbed in the back," adds Donna Lam, Tran's sister-in-law and executive operations officer.

Following the 2016 blowup, months of tense negotiations between the two parties to try to resuscitate the business arrangement failed. In 2017, Huy Fong Foods sued to recover an overpayment for the 2016 harvest, and Underwood Ranches countersued, alleging fraud and breach of contract. A jury found in the farmer's favor, awarding him $13.3 million in compensatory damages and $10 million in punitive damages. It also found that Huy Fong had overpaid Underwood $1.4 million for the 2016 growing season, and ordered Underwood Ranches to reimburse that amount.

But the legal resolution didn't ease either company's struggles. Meanwhile, the fallout from the breakup continues to leave sriracha lovers scrambling to get their fix. Those once-ubiquitous bottles became scarce and at times disappeared from supermarket shelves. Headlines about the Great Sriracha Shortage led to stockpiling, and the sauce started selling on the online resale market for up to $80 a bottle. Dozens of copycat srirachas have thrived amid the original's scarcity, including versions from the likes of Tabasco and Roland, and generics from supermarket chains.

There's a cruel irony to the predicament of Craig Underwood, who's now 81, and David Tran, 78. One man with

TRAN: COURTESY OF HUY FONG FOODS

thousands of acres of pepper fields, but nobody to buy his peppers. Another with a massive pepper factory, and not enough peppers to keep it running. Meanwhile, an adoring fan base pines for the product the men made together, even as the two remain estranged—victims, perhaps, of their own runaway success.

WHAT MAKES SRIRACHA special? Tran's sauce is a simple uncooked and unfermented puree, made by grinding together fresh red jalapeños, sugar, garlic, vinegar, and two preservatives. And it truly is good on everything, food writer and chili sauce aficionado Matt Gross says: "It's just a really great, balanced blend, and it adapts well. It's not too spicy. It's not too garlicky. It's not too vinegary."

Tran's striking product design helps: The iconography of the rooster picture (to commemorate the year of Tran's birth, 1945, in the Chinese astrological calendar) and that jaunty green nozzle make a Huy Fong sriracha bottle hard to miss. "It is a gorgeous, gorgeous object," Gross says.

Though Tran loosely based his sauce on a Thai fermented dip for eggs and seafood, and named it for the coastal Thai town of Si Racha, Huy Fong's sriracha is quite different—thicker and less sweet. Still, its being named for a town meant that "sriracha" couldn't be trademarked in the U.S.—a fact that became significant when other brands began using the product name.

Tran's timing for launching sriracha was impeccable; it arrived just as American tastes were beginning to broaden and become more adventurous. In 1980, when Tran started bottling his sauce in an industrial space he rented near Los Angeles' Chinatown, America was not yet a place of ghost-pepper-eating contests or tattooed hipster chefs touting bespoke chili-sauce brands. "I wasn't thinking of selling it mainstream to the Americans," he explained in 2013 for a Vietnamese American oral history project at the University of California, Irvine. "I was going to sell it to Chinese or Vietnamese."

Huy Fong made three chili sauces, but it was sriracha that really caught on, first in California's immigrant communities, and then on a much vaster scale. Kara Nielsen, a food trends researcher, remembers first encountering the sauce when she was a pastry chef in the 1990s at a farm-to-table restaurant in Berkeley. Although it wasn't offered to customers, there was always a bottle of the "rooster sauce" on the table during staff meals, she says: "It was used by the Latino and Asian cooks to basically add chili heat to anything." Within a few years, she says, foodies had taken to the product, eagerly squirting it on their Vietnamese banh mi sandwiches in San Francisco's Tenderloin district.

As demand ramped up, Tran's big challenge was finding a stable source of fresh, red jalapeños—the freshness being, in his view, the key to his sauce's flavor. At first he relied upon local supermarkets and wholesalers at L.A.'s Central Market. But the supply was inconsistent and the timing was tricky: Most jalapeños are sold when they're crisp and green, but Tran's sauce requires the sweeter, less-grassy version of the fruit, after it ripens to red—but before it overripens and becomes soft. That makes it a finicky product for farmers to grow and transport.

> Tran came to believe that Underwood was trying to bankrupt him: "He made money, he owned land. But it is not enough. He wanted to take over my business."

THE ANSWER to Tran's conundrum came in a letter. In nearby Ventura County, Craig Underwood was facing headwinds keeping his family farm going. California's conventional vegetable farming landscape was changing, and Underwood had pivoted to growing baby vegetables and salad greens. The advent of "baby-cut" carrots (larger carrots cut to snackable size) threatened that business too. In 1988, a seed supplier mentioned to Underwood that he had heard about a guy pounding the pavement for peppers for chili sauce in L.A., Underwood recalls: "I wrote a letter to David and said, 'Would you like me to grow some peppers?'"

Tran contracted Underwood to grow 50 acres—and so began a lucrative relationship for both men. Over the next three decades, they became, if not exactly close friends, at least friendly associates. When the city of Irwindale tried (unsuccessfully) to evict Tran's new sauce factory in 2013, saying the chilies were releasing spicy fumes into the surrounding neighborhoods, Underwood testified on his behalf at a city council meeting.

Meanwhile, sriracha took off on a scale nobody could have predicted. As the American culinary palate has become more international, Huy Fong's rooster sauce has grown ubiquitous. Huy Fong remained an independent company, turning down offers to buy or invest from large food corporations, and has never spent a penny on advertising. But the brand spread rapidly by word of mouth, creating a fandom that has made the sauce into a kind of identity statement, with festivals, online videos, rooster-branded T-shirts, and streetwear brand collabs. Huy Fong doesn't disclose revenue figures, but according to the market research firm IBISWorld it had sales of $131 million in 2020.

Sriracha has achieved the rare feat of creating its own category of culinary product, a craveable flavor that has shown up in mass-marketed foods from McDonald's chicken sandwiches to Doritos' Screamin' Sriracha chips, and in the kitchens of Michelin-starred chefs. "The lure of Asian authenticity is part of the appeal," the *New York Times* food writer John T. Edge observed in 2009, describing the "polyglot purée" beloved by chefs including Jean-Georges Vongerichten.

THE EXCLUSIVE, symbiotic relationship that Huy Fong Foods and Underwood Ranches developed was "highly unusual in the processing business," Underwood says in a 2013 documentary. "But as long as they're selling more product, we have to be growing it for them. It's a big job. A huge job."

That film, *Sriracha,* now feels like a kind of time capsule—a snapshot of the two businessmen flying closer and closer to the sun. The relationship of the sauce maker and the farmer was the emotional heart of the film, and its director, Griffin Hammond, remembers finding the men's relationship "beautiful": "They both spoke so fondly of each other," he tells me.

How did that beautiful relationship fall apart so quickly and brutally? It's a question both Underwood and Tran still puzzle over, and sriracha fans speculate about online. But the basic story is laid out, starkly, in court papers from the lawsuit and countersuit that followed the imbroglio.

As Huy Fong's business grew, so too did Tran's need for massive quantities of chilies, and Underwood kept increasing the farm's pepper fields, reducing his other crops. To reassure the grower that he wouldn't be financially wiped out if one year's pepper crop failed, the companies agreed in 2008 to switch to a system of acreage instead of volume, with Huy Fong assuming the risk by prepaying at the beginning of the growing season to cover the costs of seeds, equipment, and labor. Working this way, the two companies kept ramping up yields and production, to a height of 100 million pounds of peppers in 2015.

That's the year that trust between the two companies began to erode. Tran started a separate company, ChiliCo, to buy and sell chili peppers. Underwood didn't want to work with ChiliCo because he feared it wouldn't have the assets to guarantee payments. To make matters worse, Underwood says, Tran and Lam made several failed attempts to hire Roberts, his COO, to work for ChiliCo. (Lam says the offers to Roberts were always intended to supplement his income at Underwood Ranches, and not to poach him.)

Things came to a head that terrible afternoon in November 2016. Recollections differ, but what's agreed upon is this: On Nov. 9, Roberts drove over to Huy Fong's factory at Tran's request, to look at some equipment. Tran and Lam called Roberts into his office for a conversation, which turned contentious.

They disagreed about what price Huy Fong should prepay for next season's peppers, and whether Tran could get those jalapeños cheaper from overseas; whether Roberts should accept Tran's offer to work for him; and whether Huy Fong had overpaid for the 2016 season.

The row raged on and on. Things were said that couldn't be taken back. And by the time Roberts left a few hours later, a 28-year business relationship was effectively over.

SEVEN YEARS AFTER the rift, both companies are creaking along, doing the best they can to move forward.

On a visit to Huy Fong's factory in December, I watched bottles of sriracha being filled, sealed, topped with green nozzles, and packed into boxes to ship out to 26 nations. Workers, mostly dressed in sriracha-themed T-shirts from the factory swag shop, wore hairnets and masks but seemed accustomed to the throat-tickling

RUNNING LOW Huy Fong's factory outside Los Angeles converts barrels of chili mash (right) into sriracha; these days, the tanks are often empty.

capsaicin fumes in the air.

Ominously, there were no unprocessed chilies on hand—none had come in lately. Part of the problem, Tran and Lam explain, is quality control: Freshness is what makes Huy Fong's sauce better than the competition, and Tran says he often has had to turn away truckloads of that delicate red jalapeño because they didn't make the journey from suppliers intact, were not properly refrigerated, or were picked when green.

Even with the disruptions in production caused by the ongoing chili supply crisis, Huy Fong hasn't laid off any of its 115 employees, Lam tells me. "David paid out of his pocket to keep them there," Lam says. "This is not the person that would cheat someone."

Meanwhile, an hour and a half's drive away, Underwood has launched his own chili sauce business. Underwood Ranches has a long way to go before it can put the disaster of the past few years behind it, but its fields are now planted with a mix of tomatoes for canning, potatoes, onions, Brussels sprouts, pumpkins, and other crops.

At Underwood's processing facility in Camarillo, the ribbon mixers were churning out the last of a much smaller 2023 pepper harvest to make its own sriracha, known as Dragon Sriracha. It's a brand that hasn't broken through yet, but it's growing—with a couple of big distribution deals on the horizon, Underwood says. He recently started shipping his sriracha to 24 Costco branches. However reluctantly, Tran's onetime partner is joining his growing field of competitors.

THE 800-POUND gorilla in American hot sauce is, of course, Tabasco, which produces the nation's most popular chili sauce. The McIlhenny Company, founded in 1868 on Louisiana's Avery Island, launched its own sriracha in 2014. It wasn't until 2022, however, that Tabasco's version of Tran's sauce really took off, and Lee Susen, McIlhenny's chief sales and marketing officer, makes no bones about why: It was the "shelf voids" that the shortage of Huy Fong's product left, he tells *Fortune*.

Tabasco wasn't going to let Huy Fong's crisis go to waste, so in September 2022 it launched the website srirachashortage.com. "LOOKING FOR SOMETHING?" it asks in large white block letters as a Tabasco sriracha bottle surges upward, looking at first just like a Huy Fong bottle (though with a nozzle that's olive green rather than bright green).

Previously the challenge Tabasco faced with its sriracha, Susen says, was that "most consumers saw sriracha as a brand. They didn't recognize it as a product type." But when Huy Fong's iconic bottles disappeared and were replaced by various other srirachas, that began to change: It became just another pantry staple. The brand loyalty that had been Huy Fong's economic "moat"—business parlance

"Nobody can understand what it was like," says Underwood. "In this, everybody turned out to be a loser."

for a competitive advantage one company holds in its sector—started to erode.

And that's when the biggest hot sauce brand in America swooped in and took the crown. Tabasco had the bestselling sriracha in the country for the second half of 2023, according to NielsenIQ. Sriracha, the product, is more popular than ever—it's now in one in three U.S. kitchens, according to market research firm Circana—but most of it is not Huy Fong's. "It's a very exciting time to be in the hot sauce business," Susen says. "And certainly the sriracha business."

TABASCO'S WIN is Huy Fong's loss. And it's an epic comedown for a great American brand, an ignoble ending to a storied American business partnership between a hardworking Vietnamese refugee and a salt-of-the-earth California farmer.

Maybe Craig Underwood and David Tran were, on some level, victims of their own success? "We hooked onto that wagon and it really took off," Underwood says now. "And we never could have predicted it when we started."

Indeed, when Tran was grinding chili sauce in his kitchen and Underwood was farming baby carrots, neither could have imagined that they'd one day be managing hundreds of employees and making deals worth millions of dollars. In retrospect, Underwood says, he wishes they had built in more legal safeguards to protect their businesses from the beginning. He wonders whether he should have spread out his risk, instead of treating the arrangement between the two companies as a partnership. He wishes sometimes that he had sold his pepper production operations to Huy Fong Foods (an offer he made at one point) and started afresh.

Both Tran and Underwood brought great qualities to the partnership: grit, inventiveness, passion, ambition. But the skills and disposition necessary to make a startup a success are quite different from the competencies that people running large companies need. That's one reason many founders end up selling or taking investments, says Maurice Schweitzer, a professor of operations, information, decisions, and management at the Wharton School. Doing so can feel like "selling out," but bringing in a more experienced partner can also be stabilizing.

It's impossible to know for sure, but a change in ownership structure might have made all the difference, Schweitzer says. Human relationships are fraught, and almost always include an element of competitiveness. Unchecked, that competitiveness can grow like a weed and take over, especially when a business is expanding rapidly: "There's going to be some point of friction; there's going to be some miscommunication," Schweitzer says. "We need some mechanism to correct that and put it back on track."

For instance, when a dramatic leadership crisis erupted last November at the AI startup OpenAI, Microsoft's role as a major investor helped force a quick resolution. "With Microsoft, there's a grownup in the room," Schweitzer says. "They can keep their eye on the ball."

But with Huy Fong and Underwood Ranches, Schweitzer points out, "it's just two people left on their own ... There isn't, like, some arbitrator or banker; there wasn't a third party to bring them together."

A BROKEN BUSINESS DEAL doesn't quite rise to the level of tragedy. But there is something very sad about how David Tran and Craig Underwood were willing to walk away from each other, leaving all that they'd built in peril and untold millions on the table. Once their trust was broken, their enmity grew stronger even than their desire to succeed.

With so much at stake and so much opportunity remaining, I ask each man: Would they ever come back together?

Absolutely not, Tran tells me. "I need chili, but a guy like that? Why?" he says. "Without his chili, yeah, we make less money. But no." Lam says her family has tried to put the affair behind them. "At the end it just got really messy," she says. "And David and I, we don't want to talk about it, because what's done, it's done. It doesn't matter ... What's lost is lost. And that's the sad part about it. We're not going to think about the past. We need to think about the future."

Underwood is similarly adamant when I ask whether he'd ever work with Huy Fong again. "Not with David," he says. "If somebody else took over, purchased Huy Fong Foods, yeah, we'd certainly want to do business. But not with David."

Looking back is hard for Underwood, too, he tells me, and he sometimes wonders how he got through those first few years after the breakup. "Nobody can understand what it was like to go through that whole thing," he says. "I mean, it was hell."

Of course there's one person who probably could understand it. And seven years later, that's one thing the former partners still have in common, as Underwood acknowledges: "In this," he says, "everybody turned out to be a loser."

THE WORLD'S MOST ADMIRED COMPANIES

BIG TECH COMPANIES were once the disrupters at the edges of the global economy; now they're the engines at its center. The 26th edition of the Fortune World's Most Admired Companies All-Stars list shows how much esteem those giants command among other business leaders. For the 17th straight year, Apple finished first in our annual ranking of corporate reputation, based on a poll of some 3,700 executives, directors, and analysts. And for the fifth year in a row, Amazon and Microsoft rounded out the top three. Meanwhile Nvidia, whose GPU chips are powering the world's forays into generative AI, soared to its highest-ever ranking at No. 10. In other industries, megaretailer Walmart (No. 9) returned to the top 10 for the first time in 14 years, while COVID-vaccine maker Moderna (No. 37) became a first-time All-Star. (FOR MORE DETAILED RANKINGS, VISIT FORTUNE.COM.)

THE 50 ALL-STARS THESE COMPANIES WON ADMIRING VOTES FROM INSIDE AND OUTSIDE THEIR INDUSTRIES.

Rank	Company	Category	Last year's rank*
1	APPLE	COMPUTERS AND COMMUNICATION	1*
2	MICROSOFT	COMPUTERS AND COMMUNICATION	2
3	AMAZON	COMPUTERS AND COMMUNICATION	2
4	BERKSHIRE HATHAWAY	FINANCIALS	4
5	JPMORGAN CHASE	FINANCIALS	5
6	COSTCO WHOLESALE	STORES AND DISTRIBUTORS	7
7	ALPHABET	COMPUTERS AND COMMUNICATION	9
8	AMERICAN EXPRESS	FINANCIALS	10
9	WALMART	STORES AND DISTRIBUTORS	13
10	NVIDIA	PRECISION	45
11	DELTA AIR LINES	TRANSPORT	12
12	WALT DISNEY	MEDIA AND ENTERTAINMENT	6
13	MARRIOTT INTERNATIONAL	MEDIA AND ENTERTAINMENT	16
14	NIKE	CONSUMER PRODUCTS	16
15	COCA-COLA	CONSUMER PRODUCTS	15
16	STARBUCKS	STORES AND DISTRIBUTORS	14
17	FEDEX	TRANSPORT	18
18	PROCTER & GAMBLE	CONSUMER PRODUCTS	24
19	HOME DEPOT	STORES AND DISTRIBUTORS	20
20	PFIZER	NATURAL RESOURCES	8
21	SALESFORCE	COMPUTERS AND COMMUNICATION	11
22	TARGET	STORES AND DISTRIBUTORS	21
23†	NETFLIX	MEDIA AND ENTERTAINMENT	29
23†	USAA	FINANCIALS	26
25	TOYOTA MOTOR	TRANSPORT	36
26	BLACKROCK	FINANCIALS	25
27	JOHNSON & JOHNSON	NATURAL RESOURCES	22
28	BMW	TRANSPORT	28
29	SINGAPORE AIRLINES	TRANSPORT	31
30	GOLDMAN SACHS GROUP	FINANCIALS	19
31†	NORDSTROM	STORES AND DISTRIBUTORS	27
31†	UPS	TRANSPORT	35
33	ACCENTURE	COMPUTERS AND COMMUNICATION	32
34	ELI LILLY	NATURAL RESOURCES	N.R.
35	PEPSICO	CONSUMER PRODUCTS	34
36	MORGAN STANLEY	FINANCIALS	40
37	MODERNA	NATURAL RESOURCES	N.R.
38	VISA	FINANCIALS	47
39	SOUTHWEST AIRLINES	TRANSPORT	23
40	MASTERCARD	FINANCIALS	N.R.
41	DANAHER	PRECISION	43
42	BANK OF AMERICA	FINANCIALS	37
43	L'ORÉAL	CONSUMER PRODUCTS	N.R.
44	3M	NATURAL RESOURCES	30
45	SAMSUNG ELECTRONICS	PRECISION	42
46	ADOBE	COMPUTERS AND COMMUNICATION	N.R.
47	LOWE'S	STORES AND DISTRIBUTORS	49
48	IBM	COMPUTERS AND COMMUNICATION	39
49	PUBLIX SUPER MARKETS	STORES AND DISTRIBUTORS	44
50	CVS HEALTH	CONTRACTED SERVICES	33

*LAST YEAR'S RANK

N.R. COMPANY NOT RANKED LAST YEAR

†A TIE IN RANK

DROPPED OUT OF THE TOP 50
McDONALD'S (RANKED NO. 38 LAST YEAR), NESTLÉ (41), UNILEVER (46), LOCKHEED MARTIN (48), AND CHARLES SCHWAB (50)

THE 50 ALL-STARS BY CATEGORY

- COMPUTERS AND COMMUNICATION
- CONSUMER PRODUCTS
- CONTRACTED SERVICES
- FINANCIALS
- MEDIA AND ENTERTAINMENT
- NATURAL RESOURCES
- PRECISION
- STORES AND DISTRIBUTORS
- TRANSPORT

INDUSTRY STANDOUTS
AS RANKED BY THEIR PEERS

WHERE RIVALS SHOW RESPECT

OVER THE PAST YEAR, as chipmaker **Nvidia** vaulted into the top ranks of American tech companies, its rise took some business leaders by surprise. Followers of the Fortune World's Most Admired Companies list might have seen the leap coming seven years ago.

It was in 2017, after all, that Nvidia knocked Intel from its perch as *Fortune*'s most admired semiconductor company. Back then, Intel was about 10 times Nvidia's size by revenue, riding high on its dominance in chips for PCs and laptops, and the change felt like a mouse-beats-cat moment. But Nvidia held on to the top spot for six of the next seven years—and in 2023, generative AI turned the company into a trillion-dollar-market-cap monster.

The Nvidia story says something about the predictive power of *Fortune*'s industry rankings. The Most Admired Companies list is really two lists (see our methodology on the right). There's the All-Stars list, which ranks companies by the acclaim they win from the wider business community. The industry rankings, meanwhile, ask insiders about their own companies and, more important, about their immediate rivals, prompting respondents to score companies on a 1-to-10 scale in nine categories, including quality of management, innovativeness, and ability to attract talent. In short, this is where people in the know get granular about who's good at what, and who's on the rise. (You can find more detailed results online at fortune.com.)

In this year's survey, respondents gave Nvidia credit for being good at almost everything. The company finished in the top 10, among all companies, in seven of our nine categories. **Apple** did the same: Not coincidentally, Apple claimed the top ranking in the computer industry, for the 14th time in 15 years. Nvidia can't rest on its laurels, of course, not least because **Advanced Micro Devices (AMD)**, which strives to compete with Nvidia for AI chip dominance, finished in the top 10 in five categories.

It's not uncommon for big companies to top their industry ranking for a decade or more. In this year's survey, **Starbucks** (food services) and **BlackRock** (securities/asset management) took No. 1 honors for the 12th consecutive year; **U.S. Bancorp** (superregional banks) and **UnitedHealth Group** (health insurance and managed care) collected their 14th titles in a row. And Warren Buffett's **Berkshire Hathaway** has finished atop the property and casualty insurance industry for 26 straight years—every year of our survey's existence.

That said, stability isn't the norm. In all, 15 of the 47 industries we tracked saw a change at No. 1 this year, including changes that ended long streaks. In food production, the top spot went to **Corteva**, the agricultural-chemical company spun off from DuPont in 2019; its victory ended a seven-year streak for poultry producer Tyson Foods. In pharmaceuticals, Johnson & Johnson's 10-year reign was ended by **Eli Lilly**, which is riding the success of obesity and diabetes drugs and promising experimental results from an Alzheimer's treatment.

The entertainment industry saw perhaps the biggest shake-up of any business sector, as **Netflix** took the No. 1 spot from Disney—which had held it for the previous 20 years. That result reflects, in part, the growing dominance of streaming, which Netflix practically invented and which Disney has yet to master. Being ahead of the curve turns out to be a great way to impress your peers.

—Matt Heimer and Scott DeCarlo

HOW WE DETERMINE THE LIST

AS WE HAVE in the past, *Fortune* collaborated with our partner Korn Ferry on this survey of corporate reputation. We began with a universe of about 1,500 candidates: the 1,000 largest U.S. companies ranked by revenue, along with non-U.S. companies in the Fortune Global 500 database that have revenues of $10 billion or more. We winnowed the assortment to the highest-revenue companies in each industry, a total of 660 in 29 countries. The top-rated companies were picked from that pool of 660; the executives who voted work at the companies in that group.

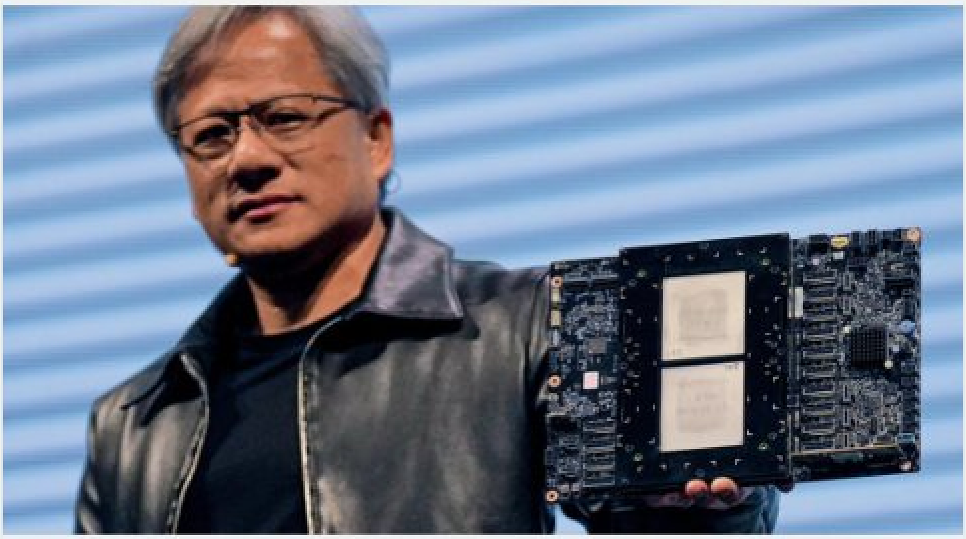
To determine the best-regarded companies in 52 industries, Korn Ferry asked executives, directors, and analysts to rate enterprises in their own industry on nine criteria, from investment value and quality of management and products to social responsibility and ability to attract talent. A company's score must rank in the top half of its industry survey to be listed. (For complete rankings, visit fortune.com.)

To select our 50 All-Stars, Korn Ferry asked 3,720 executives, directors, and securities analysts who had responded to the industry surveys to select the 10 companies they admired most. They chose from a list made up of the companies that ranked in the top 25% in last year's surveys, plus those that finished in the top 20% of their industry. Anyone could vote for any company in any industry.

The difference in the voting rolls explains why some results can seem at odds with each other. For example, Lockheed Martin fell off the All-Stars list but ranked No. 1 within the aerospace and defense category when votes from only those in that industry were counted.

KORN FERRY

THE EBB AND FLOW OF REPUTATION
HIGHLIGHTS FROM THIS YEAR'S SURVEY



Nvidia CEO Jensen Huang displays an Nvidia "superchip" designed for use in generative AI.

NVIDIA: RIDING THE AI BOOM TO THE TOP RANKS

The gusher of investment into generative AI has fueled an unprecedented rise for chipmaker Nvidia and its CEO and cofounder, Jensen Huang. Graphics processing units (GPUs) are essential infrastructure for the machine learning and large-language-model training on which the AI boom depends. Nvidia, the dominant designer of GPUs, has cashed in on the soaring demand: Its revenue nearly doubled in 2023, topping $44 billion, and its market capitalization has soared past $1 trillion. Last year's boom times won't be easy to repeat, as competitors flood the field and Nvidia copes with restrictions on U.S. chip exports to China. Huang, who steered the company through multiple near-death experiences in its early years, is unlikely to get complacent: He recently said of Nvidia, "The company is always in peril, and we feel it."

DISNEY: DIPPING

Entertainment giant Walt Disney marked its 100th anniversary in 2023. But respondents in our World's Most Admired Companies surveys weren't celebrating: Disney fell out of the All-Stars top 10 for the first time since 2012, landing at No. 12. Among the factors dimming its luster: lingering unease over the 2022 ouster of Bob Chapek and his replacement by his predecessor, Bob Iger; ongoing losses in the Disney+ streaming division; and signs of audience fatigue with the once-unstoppable Marvel Cinematic Universe. Under pressure from investors, Iger faces a daunting task: He's aiming to right the ship, in part through cost-cutting, without hurting Disney's still-mighty brand.

WEIGHING IN ON CEOs

Each year, we ask survey respondents to nominate the "most underrated" Fortune 500 CEOs. They tend to pick leaders who deliver strong results without generating drama. No surprise, then, that Microsoft's Satya Nadella—riding the wave of his prescient investment in OpenAI—won the Most Underrated poll for the eighth straight year. Other big vote-getters: Nvidia's Jensen Huang; Apple's Tim Cook; and Mary Barra, who has helped General Motors reach a landmark labor deal while steering the company through a choppy electric-vehicle transition. "Most overrated," in respondents' eyes: Tesla's Elon Musk and Disney's Bob Iger were Nos. 1 and 2.

FROM LEFT: DISNEY'S BOB IGER, MICROSOFT'S SATYA NADELLA, AND GM'S MARY BARRA.

HUANG: WALID BERRAZEG—SOPA IMAGES/LIGHTROCKET/GETTY IMAGES; IGER: ALLEN BEREZOVSKY—GETTY IMAGES; NADELLA: BEN KRIEMANN—GETTY IMAGES; BARRA: JEFF KOWALSKY—BLOOMBERG/GETTY IMAGES


CHINA
MOUTAI
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CHINA MOUTAI
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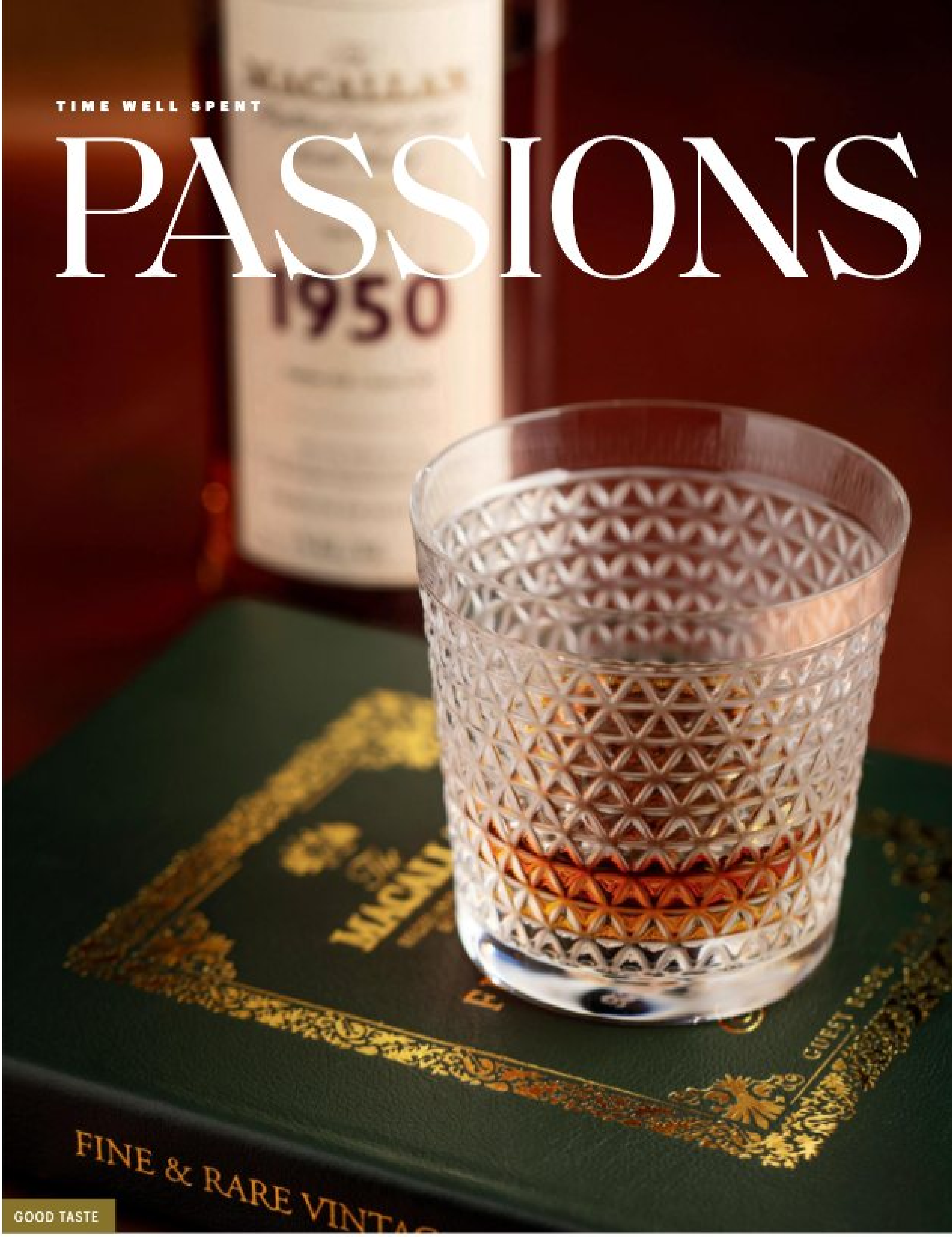
TIME WELL SPENT

PASSIONS



GOOD TASTE

What Even *Is* Luxury?

After two decades of covering food, travel, and the finer things in life, a writer still sometimes wonders, "Am I doing this right?" **BY ADAM ERACE**

SIP IT SLOW At the Sea Island Resort in Georgia, a $6,000 glass of Macallan 1950 isn't just a drink. It's a whole experience.

COURTESY OF SEA ISLAND

▶ Who would drop $6,000 for a dram of whisky? The answer is in The Book. Only a handful of people have ever seen its moss-green cover, inscribed with gold lettering. Hidden like a Horcrux on the tony resort of Sea Island, in Georgia, the volume simply referred to as "The Book" is taken out only when a guest orders a glass of Macallan 1950 at the resort's sumptuous Georgian Rooms restaurant bar.

When a $6,000 order for this 74-year-old elixir from the Scottish Highlands is placed, an entire ritual is set in motion. A bespoke Lalique tumbler appears. The kitchen sends out a suite of hors d'oeuvres. A bat signal goes out to the resort's beverage director, Nic Wallace, who drops whatever he's doing to deliver The Book to the guest, like an altar boy bearing a Bible to a priest.

Inside, the ivory paper bears messages from others who have tasted this particular liquor. One visitor who, Wallace tells me, had just sold his company for $2 billion offers a challenge: "For those of you that are worthy … take the journey."

Who is worthy of such an experience? The question nags me as I consider that bottle, sitting in pride of place on the top shelf of the brass-and-glass back bar. "We're the only place in the country where you can have that by the glass," Wallace says. "It's a snapshot of history. Just being able to taste throughout those decades is really special."

I believe it. But whenever I'm confronted with any version of such a refined experience, I can't help but ask myself, *Am I tasting what I should be tasting? Am I doing this right?* A florid distiller points out notes of blackstrap molasses and sun-warmed chamomile in an añejo rum, and I outwardly nod while inwardly straining to catch those elusive flavors, like butterflies in a net.

There can be something profoundly awkward about the experience of luxury, I've found in the two decades that I have been writing about it—an impostor syndrome that creeps into the periphery. No matter how many vineyards I've visited, I feel a twinge about wanting red wine colder than is deemed proper by the authorities, and white wine less wildly acidic than is currently in vogue. And I still can't swirl either without looking like a T. rex holding a glass for the first time.

Perhaps that's the value of all the ceremony surrounding that Macallan 1950. The ritual around drinking that precious Scotch gives the experiencer a way to mark the moment in memory, something to *do*: take one's time reading through notes from previous inductees, perhaps add some thoughts to The Book with an elegant felt-tipped Macallan pen. There's even a certificate, embossed with a wax seal.

"It's a whole dog and pony show," Wallace tells me, "and so much fun."

That show is of course the point, as much as the taste of the whisky itself. You may remember from Psychology 101: Ritual gives meaning to experience. This is especially true in the luxury space. Stripped of pomp and circumstance, the customer is just another high-networth individual blowing a mere mortal's mortgage payment on a sip of old liquor.

And that's true far beyond the leather banquettes and billiard-green walls of Sea Island's Georgian Rooms restaurant. Without the pageantry and performance (whether in real life or on social media), a hyped Nike sneaker drop is just a shoe; 50-yard-line Super Bowl tickets are just seats; an $880 meal at Noma is just … dinner.

That influential Copenhagen restaurant, now in the midst of a Cher-like extended farewell before its closing at the end of this year, is perhaps the epitome of this kind of elevated sensory experience. By the time they have trekked to Denmark to sample the culinary stylings of René Redzepi, most have already digested reams of discourse: endless exultation and criticism; detailed explorations of every peculiar berry and foraged limpet. The film *The Menu* roasted this style of fine dining like campfire marshmallows. And—spoiler alert—the person deemed least "worthy" of the rarefied luxury is rewarded for her skepticism with a perfect, Proustian cheeseburger.

Sometimes it's that contrast, the high-low juxtaposition, that contextualizes the luxury experience. Years ago when I visited Orcas Island, Wash., the bijou tasting menu of indigenous critters and flora at Hogstone's Wood Oven featured a surprise pizza

There can be something profoundly awkward about the experience of luxury—an impostor syndrome that creeps into the periphery.

course—served in a brown cardboard takeout box. (A similar stunt involving a Pequod's Chicago deep-dish pizza wowed a diner in the restaurant dramedy *The Bear*.) Hogstone's has since closed, and that pie is what stands out in my memory: a joyful disruption and nod to the restaurant's humble origins.

The ultimate flex, perhaps, is transforming something simple and prosaic into a high-level luxury experience. That's what Randy Rucker, a talented and cerebral chef disguised as a jolly Texan, pulled off when I dined at his award-winning Philadelphia restaurant River Twice. He served a half-dozen inventive little haikus of winter citrus, esoteric herbs, oysters, seaweed, and caviar before introducing the "Mother Rucker." This obscene double cheeseburger, its grass-fed patties glistening with fat and blessed with Cooper Sharp and pink pickled onions, remains the best burger I have ever eaten.

Taking a moment to educate oneself can also enhance an experience of true luxury. On a recent trip to Kyoto, I could have just bought the yuzu-scented incense off the shelf at POJ Studio, the beautiful boutique at my inn, Maana Homes Kiyomizu. Instead, in a private incense-making workshop in the store's sun-dappled upstairs atelier, I participated in a tea ceremony and learned what goes into making those fragrant cones.

Incense isn't lit lightly in that ancient capital, and so after a day of sightseeing I indulged in my own ritual back in my room: I filled the Shigaraki ceramic bathtub, touched a match to a cone, and inhaled deeply as citrus filled the bathroom.

Back at Sea Island, Wallace, a retired Hollywood stuntman with the slicked-back black hair and bone structure of a Tim Burton character, arranges himself on a plaid barstool to talk me through Macallan's Fine & Rare collection—he also stocks bottles from 1952, 1989, 1990, and 1991.

That's when the general manager comes over and politely asks whether he can bring me a jacket.

"Actually, the temperature is perfect," I tell him. He hesitates. "I'm so sorry to ask…" And suddenly I understand. Among all the gentlemen in jackets, I'm a rebel in charcoal cashmere. He returns with a black blazer.

That's the thing about rituals: They're only valuable if everyone agrees to participate: play by the rules, perform the moves, wear the costume. I shrug on the coat, eye the Macallan, and instead order the Ex-Pat, a spiced bourbon cocktail anointed with tart cherry and saffron bitters.

It's $18 and perfectly delicious. But there's still about half a bottle of the 1950 left, if you'd prefer.

THE MOTHER RUCKER

Philadelphia chef Randy Rucker assembles his sublime cheeseburger.

MIKE PRINCE

WARNING: This product contains nicotine. Nicotine is an addictive chemical.

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U.S. Securities Counsel, Associate Counsel
Shell USA Inc.
Vero Beach, FL

Joseph P. Babits serves Shell USA Inc. as lead U.S. securities counsel and associate counsel. Well-versed in national securities law, he represents Shell plc in interactions with government entities and ensures compliance with the SEC's regulations. He also possesses comprehensive knowledge of European securities regulations. Awarded the Capital Markets Award by the SEC, he has also been a faculty member of the Practicing Law Institute's seminar on global capital and U.S. securities law. He is running for the Republican nomination to represent Florida's 8th Congressional District in the U.S. House of Representatives. His key issues are securing the border, implementing term limits in Congress, and preventing coercion by federal agencies.

ERNANI FERRARI

Founder, Chief Consultant
Mondo Strategies Consulting
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Ernani Ferrari founded Mondo Strategies Consulting in 2005 after years in executive-level management roles within the software industry. Assisting small- to medium-sized software companies in optimizing their product management processes and improving strategies to boost growth, he is also responsible for marketing, sales, operational diagnostics and strategic planning. Since Mondo's founding, Mr. Ferrari has cultivated a client base of more than 100 software organizations, including Microsoft and IBM, with many achieving a 100% increase in productivity and growth rates. Presently, he is writing a book to help businesses foster growth and expand employment opportunities through leveraging productivity and cross-functional collaboration.

THOMAS E. GATES, ESQ., PE, FASCE

Attorney, Civil Engineer
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Tukwila, WA

Thomas E. Gates draws upon over 45 years' experience in the fields of law, civil engineering and consultancy. Since 2004, he has served as an attorney with Gates Law, PLLC, having also lent his expertise as a pro tem judge in Federal Way, Washington, since 2013. He won the Lifetime Achievement Award from America's Top 100 Attorneys in 2017 in light of his legal prowess. Diversified in several vocations, Mr. Gates worked in engineering-related capacities with Battelle Pacific Northwest Laboratories, PLG Inc., Westinghouse Hanford Co. and Riley County Public Works and contributed his knowledge to articles in technical journals.

W. SCOTT GRONER

Founder
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W. Scott Groner founded Atlantic505 Consulting in 2015, a provider of pharmaceutical consulting services in regulatory affairs and quality assurance. Supported by over 30 years' experience, he previously served at Warner-Lambert/Pfizer and Tris Pharma. For the past 10 years, he has supported companies in NDA oncology sterile and ANDA non-sterile. He has been known for his SME in CMC changes, as he "looks around the tree, not the tree in front of you." He chose to be a leader and mentor rather than a follower, remaining adaptable to changes in government regulations. He earned a bachelor's degree from Western New England College and studied for a master's degree at Rutgers University.

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CARRIE HAMN

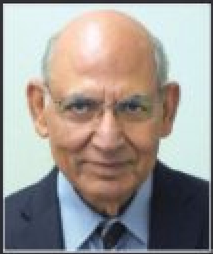
Director of Talent Acquisition
DCS Corp
Stafford, VA

Carrie Hamn, an expert in business services and recruitment, is the director of talent acquisition at DCS Corp. Supported by over 25 years of experience, she won the OnCon Icon Award, with recognition in the Top 50 Talent Acquisition Professional Category in the World in 2021, 2022 and 2023. DCS also won the Top 50 Talent Acquisition Team award for 2023. She was featured as the cover story in CIO News Magazine and recognized among the 10 Most Successful Leaders in the Talent Acquisition Industry in 2023. She previously served DCS as a senior technical recruiter and recruiting manager and holds a human resources management certification from George Mason University.

DR. JOSEPH G. R. MARTINEZ

Regents' Professor (Retired)
University of New Mexico
Albuquerque, NM

Dr. Joseph G. R. Martinez, an expert in mathematics education, served as a Regents' Professor at the University of New Mexico from 1986 until his retirement in 2012. In his post-retirement years, he serves local schools as a mathematics advisor, referee, and book and manuscript reviewer. Drawing upon nearly 50 years of experience, he co-authored, alongside his wife, the 1996 book, "Math Without Fear: A Guide for Preventing Math Anxiety in Children," in addition to several other mathematics education books. He received a Certificate of Recognition from the National Council of Teachers of Mathematics in 1998, among other accolades.



PREM N. MEHROTRA

President, Chief Executive Officer
General Energy Corporation
Schaumburg, IL

Since 1985, Prem N. Mehrotra has thrived as the president and chief executive officer of the General Energy Corporation. Developing energy-efficient engineering solutions, the corporation has assisted 30 local school districts and the University of Chicago, among other institutions. Placing an emphasis on environmental sustainability, he has explored pathways in renewable energy, such as wind farming, to aid those in need. Moreover, he remains dedicated to cultivating positive relationships with his employees. For his abundant success, he earned the Lifetime Achievement Award for his commitment to volunteer service by President Biden in 2022 and the Energy Efficiency Award from ASHRAE.

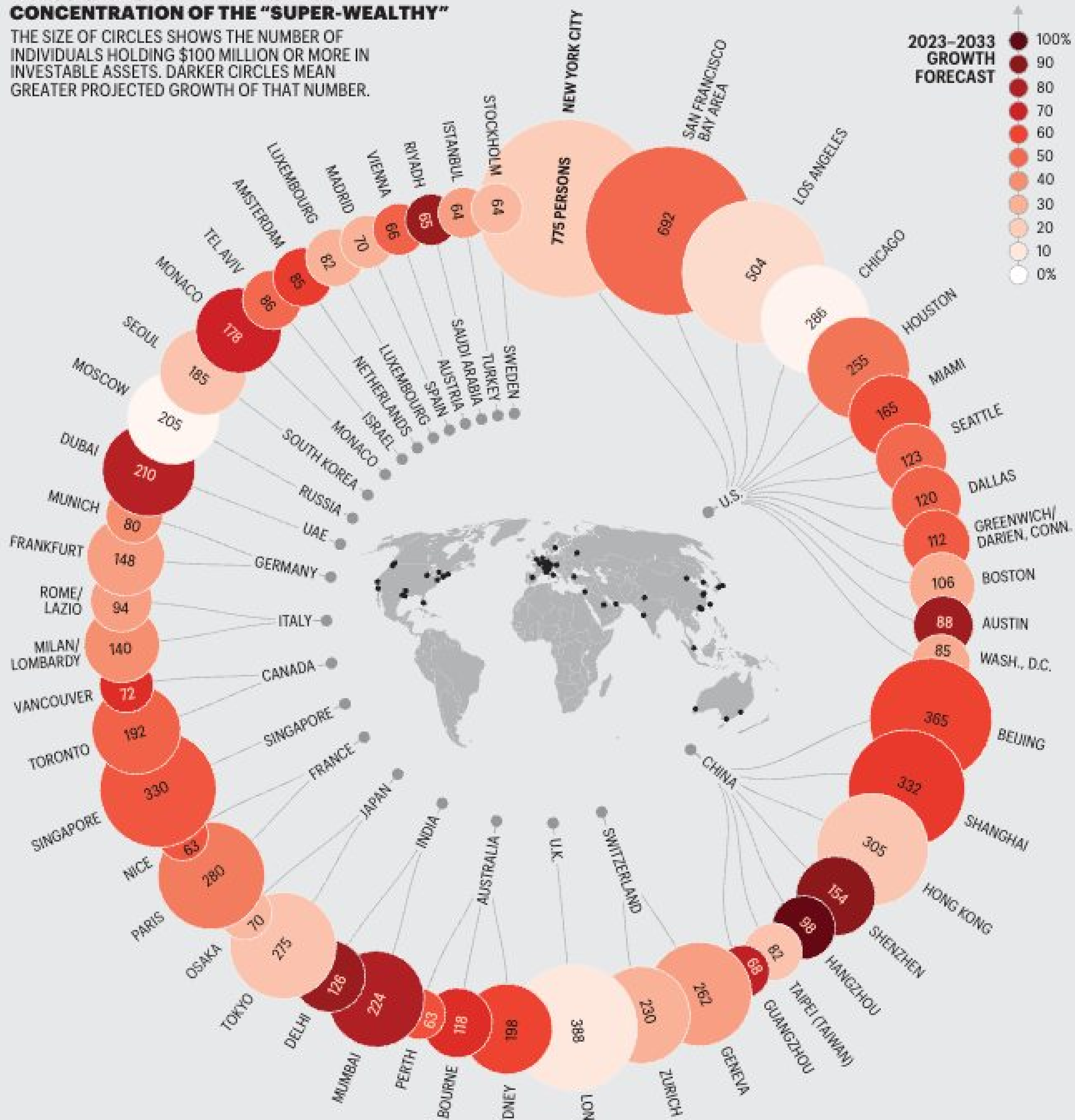
ART MORRICAL

Quality Manager (Retired)
AT&T Bell Laboratories/Lucent Technologies/Alcatel-Lucent
Orlando, FL

An expert in communications technology, Art Morrical retired from AT&T Bell Laboratories/Lucent Technologies/Alcatel-Lucent after serving as its quality manager for many years. Specializing in cybersecurity, cloud research and development of cloud standards, he helped Bell Laboratories pilot the first multinational TL9000 certification for its flagship product, the 5ESS Switch. Deriving fulfillment from community service, he excelled as the vice chairperson of the Telecom Business Excellence Quest Forum and the vice president of Sugar Grove Public Library. He earned the President Award from Bell Laboratories in 2018 and was named a lifetime fellow of Quest Forum in 2016, among other honors.

THE 50 CITIES WITH THE HIGHEST CONCENTRATION OF THE "SUPER-WEALTHY"

THE SIZE OF CIRCLES SHOWS THE NUMBER OF INDIVIDUALS HOLDING $100 MILLION OR MORE IN INVESTABLE ASSETS. DARKER CIRCLES MEAN GREATER PROJECTED GROWTH OF THAT NUMBER.



ATLAS OF THE ULTRARICH

ONE WAY TO MEASURE THE ECONOMIC VITALITY of a city is to tally how many super-wealthy folks opt to live and do business there. This graphic shows where the planet's 28,420 centimillionaires—people with $100 million or more in investable assets—are most likely to cluster, and how fast each city's ranks of the rich are projected to grow. (There are about 12 times as many "centis" as billionaires; it's lonely at the very top.) New York, the Bay Area, and Los Angeles boast the largest centi populations worldwide. But cities in China, India, and the Middle East are catching up fast as their economies expand. The ultrawealthy roster is expected to grow 85% or more by 2033 in Hangzhou, Delhi, and Riyadh. America's fastest-growing centi city? Austin, the once and future tech hub. —**MATT HEIMER**

INFOGRAPHIC BY **NICOLAS RAPP**

SOURCES: HENLEY & PARTNERS; NEW WORLD WEALTH