PHILIPPINES' 50 RICHEST

Forbes Asia

SEPTEMBER 2020

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September 2020 | Volume 16 • Number 7

INSIDE

POWER BUSINESSWOMEN

18 | **Asia's Power Businesswomen**

The 25 business leaders on the 2020 list are demonstrating their mettle in difficult times.

Edited by Rana Wehbe Watson


52

SONNY THAKUR FOR FORBES ASIA

PHILIPPINES' 50 RICHEST

52 | Hard Landing
Lance Gokongwei is fighting one of the worst crises ever to hit his family's JG Summit.
By Roel Landingin

56 | Turbulent Times
The total wealth of the Philippines' 50 Richest fell 22% as the pandemic disrupted the economy.
By Grace Chung

THE INVESTIGATION

62 | The Barons of Casino Capitalism
"Democratizing finance" is trading app Robinhood's stated goal, but its founders have become billionaires by leading a new generation of rubes right into the jaws of Wall Street's most notorious sharks.
By Jeff Kauflin, Antoine Gara and Sergei Klebnikov

70 | Cloak and Router
Mitre runs some of the U.S. government's most hush-hush labs—it might be the most important organization you've never heard of.
By Thomas Brewster

ENTREPRENEURS

12 | Slackers Beware
Shunji Sugaya's software can tell if staff are working from home—or hardly working.
By Ruby Leung

13 | Seven-Figure TikTok Stars
These influencers have a bright future no matter the platform.
By Abram Brown

IMPACT INVESTING

14 | Just Keep Swimming
Overcoming personal adversity, Amy Novogratz has built the world's largest sustainable aquaculture investment fund.
By Chloe Sorvino

HEALTHCARE

38 | Keeping the Faith
April Anthony survived several crises to build her healthcare empire—and now faces her biggest with Covid-19.
By Hayley C. Cuccinello

42 | Biotech's Barnum and His Covid Cures
Billionaire medical-marketing maestro Patrick Soon-Shiong believes his drug therapies could defeat what he calls "the crisis of our time."
By Alex Knapp

48 | Moneymaking Medicine
Pablo Legorreta's Royalty Pharma made him billions, and now helps big pharma find new cures.
By Nathan Vardi

8 | Fact & Comment
Steve Forbes
A paycheck for everyone?

10 | Tech Connector
Rich Karlgaard
The boom of Zoom.

11 | Economics Matters
Yuwa Hedrick-Wong
The age of anxiety.

76 | Thoughts
On persistence.

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Sidelines

ENTREPRENEURIAL SPIRIT

Forbes has long supported businesswomen. The first issue of *Forbes*, published in 1917, had what it called a "unique section" mentioned on the cover: "Women in Business." Publishing that section—and featuring it on the cover—was progressive back then for any media. Fast forward 103 years for an updated take on "women in business," *Forbes Asia*'s annual Power Businesswomen list featured in this issue. All the entries in this year's list are new for 2020. The industries in which these women excel show a wide breadth—among them edtech, fast fashion, insurance, liquor, private equity, specialty chemicals and tea. Good entrepreneurs, in other words, can find opportunity almost anywhere.

Some are self-made and running their own companies, while others are taking forward organizations including corporations, law firms, universities or family businesses. Almost all have had to cope with the pandemic's impact in some way, especially those in pharmaceuticals or healthcare. The hope is that this list can serve as an inspiration not just to women but men as well—as it demonstrates the power of the entrepreneurial spirit regardless of gender.

The other list in this issue is that of the Philippines' 50 Richest. Here's another place where one can find examples of the entrepreneurial spirit. The feature on Lance Gokongwei describes how he is taking over leadership from his late father, John Gokongwei Jr., who passed away last November. The father, who started at the age 13 selling garlic-flavored peanuts, built JG Summit into one of the largest companies in the country. Lance, meanwhile, is working hard on turning around the company's airline, Cebu Air.

Another example is that of Tony Tan Caktiong. His fast-food chain Jollibee has taken a big hit, but he's responded by exploring the use of cloud kitchens. Others are willing to take risks, betting on the long-term growth of the Philippine economy by taking their companies public in the midst of the pandemic. The Ayala family made history by listing the country's first REIT in August, and a second REIT listing by tycoon Edgar Sia II may happen by year-end.

Thus, entrepreneurs have been able to pivot and adapt to the new normal. The work from home trend provided a boost to a Japanese entrepreneur whose company makes software allowing employers to monitor the productivity of at-home staff. To revise the old saying that crisis creates opportunity—in a pandemic, there is also opportunity.

As always, all comments welcome at editor@forbesasia.com.

JUSTIN DOEBELE
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A Paycheck for Everyone?

It's called universal basic income, and the idea is gaining ground here and in Europe, especially with Covid-19 hitting economies so hard. The government would pay every adult a certain amount of money every month, whether you work or not. Democratic party activists love the idea. So do some Republicans. The Pope came out in favor of the notion. A candidate for the Democratic presidential nomination, Andrew Yang, advocated paying every adult $1,000 a month. He didn't win, but his idea is catching on. Italy has a minimum-income measure that tops up one's income if it falls below a certain level. Spain is mulling over something similar.

While Yang's proposal sounds enticing—who wouldn't want an extra $12,000 a year?—it would do real harm.

Let's make clear that we are not talking about such safety-net programs as food stamps, unemployment benefits or Medicaid. A guaranteed income would be corrosive to people's work ethic, especially as politicians raised the benefits whenever elections rolled around. It would eat away at the crucial link between effort and reward and would lure many people away from pursuing more productive lives. This is wrong, morally and economically.

Work is critical to making our lives meaningful. It gives us purpose. It provides structure and encourages discipline, helping us to look beyond the immediate moment and think about the future. It encourages the can-do spirit that is unique to the American culture. Work produces the resources that we consume and the innovations that improve our standard of living.

Then there are the major practical problems of implementing such a program. It would be hideously expensive. It's estimated that Yang's scheme would cost $3 trillion a year. He would impose a 10% national supersales tax on top of all the other taxes you pay. And, realistically, that rate would have to be considerably higher. A car that currently costs $30,000 would set you back $35,000 to $40,000 under Yang's plan.

These new and very heavy tax burdens would damage the economy by destroying capital, thereby hurting the productive investments that are essential for higher incomes and a better standard of living. A stagnant economy would worsen opportunity and exacerbate inequality.

A more constructive approach would be to reform and expand the Earned Income Tax Credit, which is, in effect, a rebate of the payroll tax. This would give lower-income individuals higher take-home pay, tax-free.

And creating the conditions for a booming economy—such as tax cuts—would be the most beneficial plan of all. Remember, before Covid-19, the pay of lower-income workers was rising at a faster pace than that of anyone else.

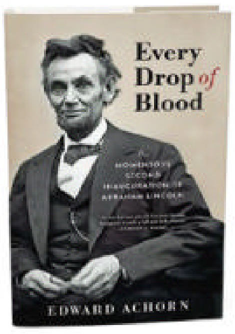
An Impressive History and a Great Adventure

Every Drop of Blood: The Momentous Second Inauguration of Abraham Lincoln—by Edward Achorn (Atlantic Monthly Press, $28). Abraham Lincoln's second inaugural address, delivered March 4, 1865, is the finest speech in American history, the only possible exception being his Gettysburg Address. President Lincoln surprised all by not being triumphant over having kept the nation together after a terrible war and by not outlining his postwar policies. No rousing patriotic oration here. Instead, in 700 often harrowing words, Lincoln told the nation that this horrific conflict was God's punishment for the original sin of slavery and that both North and South were guilty parties:

> *"Fondly do we hope—fervently do we pray—that this mighty scourge of war may speedily pass away. Yet if God wills that it continue until all the wealth piled by the bond-man's two hundred and fifty years of unrequited toil shall be sunk, and until every drop of blood drawn with the lash shall be paid by another drawn with the sword, as was said three thousand years ago, so still it must be said 'the judgments of the Lord are true and righteous altogether.'"*

Now was the time for mercy and reconciliation, not hate and vengeance. To Lincoln, the Civil War was one of transcendental importance, a momentous test of whether a nation based on the consent of the governed could endure.

Lincoln was not a churchgoer, and more than once during his life he expressed skepticism about religion. He loved reading the King James Bible, not for reasons of faith but because, as Achorn puts it, "To him it was a practical source of enlightenment, a moving, beautifully written, profoundly



wise book, a distillation of millennia of hard-earned human experience about justice, morality and self-advancement. He could quote entire chapters of it by heart." Yet he had clearly come to believe there was a larger force at work in the world, once telling a general, "Did I not see the hand of God in the crisis—I could not sustain it."

There has been no shortage of books about this crucial time in American history and about this speech. But Achorn, a noted editor and author, does a splendid job of recreating the atmosphere and experience of being in Washington on the day before and the day of Lincoln's second inauguration. He has a gift for evocative, elaborate detail, and his descriptions of Washington—from a canal of stinking sewage to the new Capitol dome to the brothels and the various social functions—give readers a full flavor of the good and the plentifully ugly.

Achorn is masterful at sketching known personalities, such as Frederick Douglass, Clara Barton and Generals Ulysses S. Grant and William Tecumseh Sherman, as well as the lesser known, such as the severely wounded General Selden Connor (who survived to become governor of Maine) and the Reverend John Bachman of South Carolina, who bring the era to life.

Especially moving is Achorn's portrait of Walt Whitman (whose book of poetry, *Leaves of Grass*, was hotly controversial; Salmon Chase, the newly minted Chief Justice who would swear in Lincoln for his second term, thought the book obscene). Whitman wrangles an easy clerical job in order to spend immense time on his true mission: tending to wounded and sick soldiers. "On his rounds, Whitman brought with him gifts of candy, fruit, tobacco, stationery, stamped envelopes, newspapers, small amounts of money—all materials the hospitals did not provide. But his greatest gifts were surely his sympathy, his encouragement and his presence."

The author does a fine job with Lincoln himself.

> *"Some of the most damaging ordeals any child could suffer—the loss of a mother, abandonment, nights filled with fear, loneliness, filth, cold and hunger—were among Lincoln's formative experiences. And when he was nineteen, his beloved sister, Sarah, died in the agonies of childbirth. In an 1862 letter to a grieving child, he wrote: 'In this sad world of ours, sorrow comes to all; and, to the young, it comes with bitterest agony, because it takes them unawares. . . . I have had experience enough to know what I say.'"*

Lincoln's rise in the world was jagged, but all his life experiences had prepared him well for the harsh ordeals of the war, in which disappointments and setbacks were constant. Looking back, one is still astonished at all the obstacles he faced, from incompetent generals to bitter political divisions in the North—and in his own party—not to mention domestic troubles and tragedy.

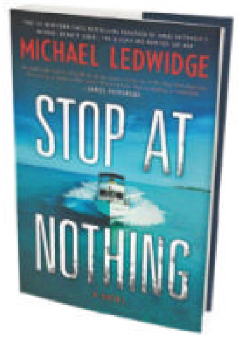
Achorn's book is filled with memorable anecdotes, such as General Sherman's blowing up 23 cannons in Charleston, South Carolina, including the one that fired the first shot at Fort Sumter, which formally began hostilities. Sherman blew up the cannons at the time he figured Lincoln would be taking his second oath of office.

Of course, over everything looms the sinister figure of John Wilkes Booth, a dashing actor. Distinctly interesting in this ugly episode was Booth's relationship with Lucy Hale, daughter of a prominent political figure: "Strangely, Lucy—who surely had extensive knowledge of Booth's activities leading up to the tragedy—would be left out of the investigation entirely."

The contemporary reaction to Lincoln's speech was all over the map. Lincoln's own assessment was that the speech would "wear as well as—perhaps better than—any thing I have produced; but I believe it is not immediately popular."

Stop at Nothing—by Michael Ledwidge (Hanover Square Press, $27). Here's a book that retired Lieutenant General Mike Flynn, victim of rogue agencies in Washington, would find grimly satisfying. The rest of us will simply enjoy a fast-paced thriller by an author who has mastered his craft, with lots of action, knowing detail, plenty of twists and turns and characters to cheer or hiss.

Mike Gannon, an American expat and Bahamas-based diving instructor, is out on his boat when he witnesses a Gulfstream crash into the ocean. He can't call for help because of a radio mishap that occurred when he was trying to haul in the proverbial big fish that got away. Surprised that no rescue planes or boats are coming to the site, he decides to go over the side and dive down to the wreckage. There are no markings on the aircraft, but inside are six dead bodies—and two cases that he brings up only to discover that one is loaded with hundred-dollar bills and uncut diamonds. Gannon's conclusion: drug runners. He decides to take the loot and hide it in an obscure blue hole—"cave-like water-filled sinkholes that had been formed by eons of rain eroding through the soft Bahamian limestone." This one has the advantage of an "amazing subway-like network of corridors and caves" that will make discovery by other divers impossible.



But instead of a windfall, Gannon soon learns he has poked an African hornets' nest of high-powered, highly placed government officials who have all the scruples of ISIS—beheaders with a deadly must-do agenda all their own. Torture, cold-blooded murder, cover-ups and quick but lethal gun battles abound. Along the way we learn that Gannon has a rather intriguing past of his own, which makes him a formidable foe. F

By Rich Karlgaard

The Boom of Zoom

Zoom CEO Eric Yuan

Here's a Pacific Rim recipe for success. Start with a newly arrived immigrant to the U.S. from Beijing—whose visa was rejected the first eight times he applied. Have the young man take a job at a California startup with fewer than 50 employees, whose two founders were from Beijing and Mumbai. Next step: get Silicon Valley giant Cisco to buy the young company, WebEx, whose service is videoconferencing.

But in a sadly familiar story, Cisco, then big and successful yet distracted by too many acquisitions, misunderstands the core strength of WebEx. And so the man from Beijing, now in his 40s, grows frustrated. He departs to start his own company. Venture capitalists tell him he's nuts. His wife despairs. The world does not need another videoconference company, they tell him. But the young man from Beijing, Eric Yuan, is convinced the videoconferencing opportunity is just beginning.

And thus Zoom is born. But the global diversity force multiplier of Zoom is only getting started. Turned down by most American VCs, Yuan convinces an odd pair to back him big. One, Doug Leone of Sequoia Capital, was born in Genoa, Italy, and arrived in the U.S. with his family at age 11. The other, Santi Subotvsky, was born and raised in Argentina. Today Subotvsky heads Emergence Capital. These two unorthodox VCs saw in Zoom, and in Yuan, an incredible opportunity for global growth.

In early September, I interviewed Yuan, whose personal shares in red-hot Zoom were worth $16.8 billon that day. The occasion was the annual TiEcon conference, started by Indian expats living in Silicon Valley and now one of the world's premier gatherings of entrepreneurs.

The thing that strikes one about Yuan is the simple clarity of his message. Asked to describe Zoom's company culture, he answers in one word: "happiness." Asked to elaborate, he says the missed mobile opportunity was a minor reason why he thought Zoom could zoom past the videoconferencing incumbents. A bigger reason, he says: "Their products did not make customers happy." Yuan explains: "When building Zoom, I decided that 'video is the new voice' would be our vision. Our goal would be to deliver happiness on day one."

"Here is why delivering happiness is important. Let's say every day when employees come to the office to work, if they do not feel happy, guess what? When they interact with other teammates, they will have a negative impact. You also dare not let them talk with customers. As the CEO of Zoom, my number one opportunity and my job is to make sure all Zoom employees are happy," he says.

Zoom's happiness strategy is key to winning big enterprise customers like Wells Fargo and the University of Sydney. Employees at big customers learn about Zoom often by using it for free at home or school. Back at work, their own corporate videoconferencing service seems cumbersome by comparison. Eventually employees happy with their free Zoom accounts begin to pressure corporate IT for a change. Happiness as a "land and expand" strategy may sound trite, but it has made Zoom worth $90 to $110 billion depending on which day you check its stock price.

It's only a personal theory of mine, but I think Eric Yuan's clear and simple way of managing his business is a direct result of the global diversity of his mentors, financial backers and management. "Video is the new voice" acknowledges the universal need to connect. Happiness is a feeling desired by all people. And Zoom's core value—"care"—is short and emotionally powerful. It's no surprise that Zoom's biggest and fastest-growing market outside the U.S. is India. Number three is Japan. Zoom was born for the digital world.

Rich Karlgaard is editor at large at *Forbes*. As an author and global futurist, he has published several books, the latest of which is *Late Bloomers*, a groundbreaking exploration of what it means to be a late bloomer in a culture obsessed with SAT scores and early success. For his past columns and blogs visit our website at www.forbes.com/sites/richkarlgaard.

ETHAN PINES FOR FORBES

By Yuwa Hedrick-Wong

The Age of Anxiety

The price of gold has risen by roughly 30% since mid-February and is now hovering near $2,000 an ounce. The price of 10-year U.S. Treasury bonds has also climbed over the same time period, bringing their yield down from 1.88% at the beginning of the year to just 0.7%, a negative rate of return once you factor in inflation. Not to miss the party, the stock market has also rallied: it has bounced back strongly from its March 23 low. The dollar index, however, has dropped roughly 10% against major U.S. trading partners' currencies.

GETTY IMAGES

WE NEED TO TAKE INTO ACCOUNT THE DEEP AND ALL-PERVADING UNCERTAINTY FACING INVESTORS.

These are interconnected developments. Gold is priced in dollars, and a weak dollar translates into a higher price for gold. The Federal Reserve's loose monetary policy is, at least in part, the cause of dollar weakness. That pushes real bond yields lower, which in turn makes gold look even more attractive. Furthermore, the Fed's stated intention that it will do whatever it takes to prop up the economy has fueled the stock market rally.

Look closer at the economic fundamentals, however, and this explanation doesn't add up. Gold has historically been a hedge against inflation, which is today low and falling. One may argue that the bet on gold is not about current inflation, but inflation expectations. But the last time investors bet on runaway inflation, it ended badly for them. In the aftermath of the global financial crisis, unprecedented levels of monetary stimulus led many to believe inflation was poised to accelerate. They were wrong.

Investors' memories may be short, but not that short. Gold is also an alternative to U.S. Treasuries as a safe asset, yet demand has climbed simultaneously for both gold and Treasuries. And a weak U.S. dollar is supposed to reflect a downbeat economic outlook, something directly contradicted by the stock market rally.

To understand what's going on, we need to take into account the deep and all-pervading uncertainty facing investors. In spite of the occasional, brave prediction for a quick, V-shaped rebound, nobody really knows what a post-pandemic recovery may look like, or, more troublingly, how much larger government deficits will get before it arrives. We also can't gauge just how much damage has been done to the real economy, because massive wage subsidies and business loans have masked it.

Only when these subsidies are withdrawn will we know how bad things really are. Add to this the concern that many of the jobs lost during the pandemic won't come back when it's over. Many businesses will have found ways to substitute workers with automation, robotics and algorithms. The bottom line is that Covid-19 compelled many governments to put their economies into the equivalent of an induced coma, cutting off both demand and supply. Our understanding of past recession-recovery cycles is, therefore, of limited use and perhaps even irrelevant.

This leaves us with a general sense of anxiety. The dictionary definition of anxiety is a state of apprehension about what may happen in the future. This is the emotional state behind the seemingly conflicting hedging behavior in markets. And gold's staggering rise may be not just a search for relative security, but a hedge against what some investors fear is the potential collapse of the entire monetary system. F

Yuwa Hedrick-Wong is Chief Economics Commentator for *Forbes Asia*. He is also a visiting scholar at the Lee Kuan Yew School of Public Policy, National University of Singapore. Having worked as an economist across the Asia-Pacific, Europe, Middle East and Africa in the past 25 years, he regularly writes columns about the global economy for *Forbes Asia*. Views expressed are his own. He can be reached at: yuwa@forbesasia.com.

By Ruby Leung

Slackers Beware

SHUNJI SUGAYA's software can tell if staff are working from home—or hardly working.

COURTESY OPTIM CORP.

Shunji Sugaya became a billionaire in mid-June—a few days before his 44th birthday—as shares of his company Optim soared along with demand for its remote-working tools. Tokyo-based Optim sells software to manage employees' mobile devices and monitor at-home productivity. Its shares have joined the global tech boom, nearly doubling this year.

"Before the pandemic, even when we had the technology for these kinds of things, people's reactions, especially from businesses, were kind of negative," says Sugaya in a video interview. "Now, they have no choice. They have to introduce those services, and both the business and user sides have been realizing the benefits."

Optim is also benefitting. In August, it posted profits of 12 million yen ($113,000) in the quarter through June as sales rose nearly 18% to 1.37 billion yen, reversing a 150 million yen loss from the year-ago quarter. The stock has retreated somewhat since August, but Sugaya's net worth remained above $900 million in early September.

In late May, Optim launched Optimal Biz Telework, which uses AI to gauge the productivity of staff working from home and alerts employers if they appear to be goofing off. Another of Optim's tools is AI Camera. Introduced in late 2018, AI Camera monitors congestion in workspaces—checking if staff are social distancing.

Optim has been offering staff management services since 2009, when it launched Optimal Biz. It can manage employees' devices from a web browser, and can block certain websites, and lock the device and wipe its data clean if lost or stolen.

A self-taught programmer, Sugaya began coding while in grade school, developing his own games and selling them to friends. When the time came for him to attend Saga University in southern Japan, however, he chose to earn a bachelor's in agriculture rather than programming. "IT was not so advanced," he says of his decision to study agriculture. "I assumed that I had already learned enough about IT."

Agro-technology is also part of Optim's offerings. The company has been selling drones that can monitor the health of crops and spray pesticides. In 2000, while still an undergraduate, Sugaya crossed paths with Masayoshi Son. The billionaire was judging a business-pitch contest, which Sugaya won with a proposal to place advertisements on screens while their users were downloading videos and software. Son offered Sugaya two choices: $2.8 million in cash, or join SoftBank and be showered in stock options. Sugaya rejected both. He wanted to start his own business and launched Optim later that year.

"In Japanese society, many companies are more focused on managing staff in offices," says Sugaya. "But after this pandemic, everything has changed, especially from the management perspective. Telework is an area where we could see more progress, especially in Japanese society." F

—With James Simms

By **Abram Brown**

Seven-Figure TikTok Stars

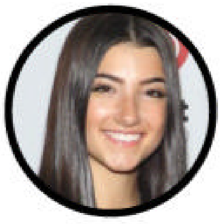
In late July, hours after President Trump issued his latest threat to ban TikTok in the U.S., 19-year-old Addison Rae Easterling posted a new video to the app, imagining what her life would be like in such a world: She'd be back at Louisiana State University, where a year ago she was just another anonymous freshman. Today she has 55.3 million followers and ranks No. 1 on our inaugural list of TikTok's highest-paid stars.

Easterling, who became famous for her dance TikToks, earned an estimated $5 million in the past year through branded merchandise (T-shirts, hoodies, phone cases) and sponsorships with companies including Reebok. She recently inked a deal to be the global face of American Eagle; began a weekly Spotify podcast, in which she discusses her life with her cohost mom; and launched a makeup line, Item Beauty. TikTok's fate was uncertain following Trump's order for its Beijing-based parent Bytedance to sell it to U.S. interests by November or face a ban, but have no doubt: These seven seven-figure influencers have a bright future no matter the platform.

Income estimates are pretax earnings from June 30, 2019, through June 30, 2020.

PHONE: JITTIMA KUMRUEN/GETTY IMAGES; ADDISON RAE: ANNA WEBBER-GETTY IMAGES

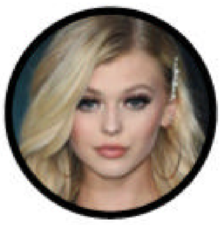
1. Addison Rae Easterling
$5 million



2. Charli D'Amelio
$4 million

3. Dixie D'Amelio
$2.9 million

From Norwalk, Connecticut, sisters Charli, 16, and Dixie, 19, have turned singing-and-dancing videos into deals with Hollister clothing and Morphe cosmetics. Dixie also premiered a single, "Be Happy," in July.



4. Loren Gray
$2.6 million

Gray, an 18-year old pop singer, joined Musical.ly, an early iteration of what became TikTok, way back in 2015. She has parlayed her success on the app into eight singles and a contract with Virgin Records.

5. Josh Richards
$1.5 million

Thinking beyond merchandise and deals, Richards, 18—who gained fame for dance TikToks and vlogs about his life—has cofounded a celebrity-management agency, TalentX, which represents 105 influencers. He's also the chief strategy officer of Triller, a small American TikTok rival.

6. Michael Le
$1.2 million

The 20-year-old's dance videos—two of him grooving on an escalator in particular—have become some of TikTok's most-shared content. Among his sponsorships is a multiyear partnership with Bang energy drinks.

6. Spencer X
$1.2 million

Seeking to become music's first big-time beatboxer, Spencer X, 28, has gone from couch-surfing in Los Angeles to recording singles in his own luxe two-story Hollywood apartment in less than a year. F

By Chloe Sorvino

Photograph by **Jamel Toppin** for Forbes

Just Keep Swimming

Overcoming personal adversity, AMY NOVOGRATZ has built the world's largest sustainable aquaculture investment fund.

L

Last year, Amy Novogratz gathered a seaweed farmer, an oyster-hatchery owner, the creator of a chip made from dehydrated salmon skins, a grocery buyer, a restaurateur and a reporter for a dinner party in her Manhattan loft. As her guests savored arctic char poached in saffron with heirloom tomatoes and a pistachio pesto, she rose to explain the fish's provenance: Matorka, a farm in Grindavík, Iceland, that raises its antibiotic-free fish on land in tanks using geothermal energy.

Back in 2016, when Novogratz's Aqua-Spark fund invested $2.5 million in it, Matorka was producing just 45 tonnes of fish a year. By the time of that dinner party, it was selling 2,700 tonnes, including to celebrity chef Nobu Matsuhisa and U.S. grocery delivery service FreshDirect. When Covid-19 hit and Matorka's restaurant sales dried up, Aqua-Spark helped out with a $750,000 bridge loan. "The brand is back to a good place now," reports Novogratz, who sees it growing to 5,400 tonnes by 2022—a "really good sweet spot where you can keep production controlled, know your market,

Amy Novogratz in her New York loft in August. A third of the capital for her Netherlands-based Aqua-Spark comes from U.S. investors.

know your customer, really trace everything."

The 45-year-old Novogratz is herself in a sweet spot these days. A decade ago, she was diagnosed with a brain tumor doctors warned could kill her. A risky 20-hour surgery excised the tumor but left her with balance and mobility problems—on top of blindness in one eye from a childhood accident. Today, she and her husband, Mike Velings, 50, run Aqua-Spark, a Netherlands-based sustainable aquaculture fund that has attracted $148 million from 190 investors across 29 countries. They include ImpactAssets, a Bethesda, Maryland–based donor-advised fund (it enables individuals to park their contributions in profit-making impact investments before ultimately distributing the money to operating charities) and the Louis Dreyfus Company, the commodities giant controlled by billionaire Margarita Louis-Dreyfus. Novogratz herself has notable connections. Older sister Jacqueline is founder and CEO of pioneering impact-investing venture fund Acumen and is married to TED Talks head Chris Anderson. Big brother Michael is a former billionaire macro hedge-fund trader turned prominent crypto investor.

Last year, Aqua-Spark's holdings in 19 portfolio companies were valued at $180 million and posted an impressive IRR of 21.8%. That return is net of the 1% annual fee and 20% of gains that go to a for-profit management company 60% owned by Novogratz and Velings. (The couple's foundation and employees own the other 40%.) Despite the pandemic, Novogratz expects an IRR this year in excess of 20%. (Accredited U.S. investors can buy into the fund with a minimum investment of $118,000.)

In simple dollar terms, Aqua-Spark is a minnow in the $265 billion worldwide aquaculture industry, which now supplies more than half of all seafood produced for human consumption. Yet as the first and largest investing fund in the world dedicated exclusively to environmentally sound aquaculture, it is having an outsized influence.

For example, in 2015, in its first investment, Aqua-Spark poured $3.4 million into Calysta, a Silicon Valley startup that makes a novel fishmeal. Calysta uses fermented microbes, derived from a byproduct of manufacturing natural gas, to create fish feed that is better for the environment than fish- or soy-based versions on the market. Aqua-Spark's money helped pay for a pilot plant which in turn helped Calysta attract $150 million in additional investment, including from Cargill and BP Ventures. It's now building a factory in China designed to produce more than 18,000 tonnes of feed a year—a potential game changer for the $40 billion global fish-feed market. "When I met [Novogratz and Velings], I said it could take 10 years," recalls Calysta cofounder and CEO Alan Shaw. "They really do trust."

With its in-it-for-the-long-haul approach, Aqua-Spark has yet to sell a single holding. It expects companies in its portfolio to pay all employees a living wage and to prioritize transparency for scientific results. Several of its investments are in farms, which must minimize antibiotics and chemical use and limit polluting discharge.

Aquaculture "was seen as a very dirty, disease-ridden industry. They've shifted the mindset on it and made it investible," says Lisa Kleissner, a prominent impact investor who sits on Aqua-Spark's board. Novogratz is the sixth of seven siblings whose U.S. Army colonel dad expected them to be up by 6 a.m. on weekends. After studying theater at New York University, she did a stint in Washington, D.C., researching policies affecting teenage mothers, then went to work with her brother-in-law, heading up the TED Prize, the annual award given to an individual behind a single change-the-world idea. That's how, in the spring of 2010, Novogratz found herself on a research ship in the Galápagos for a trip mixing ocean-

BIG MAC VS. BUG MAC

Red meat is increasingly seen as unsustainable and bad for your health, and alternative proteins are all the rage. How many burgers, worms or crickets does it take to get your fill? The average sedentary human needs at least 50 grams of protein per day. That equals . . .

2 Big Macs

2.5 Beyond Meat burgers

3.5 bags of Perky Jerky Tasty Teriyaki Plant-Based Jerky

367 Don Bugito dark chocolate–covered crickets

750 Cricket Flours Spicy Cayenne Worm Bites

LAST YEAR, AQUA-SPARK'S HOLDINGS IN 19 PORTFOLIO COMPANIES WERE VALUED AT $180 MILLION AND POSTED AN IMPRESSIVE IRR OF 21.8%.

CRICKET FLOURS: DORLING KINDERSLEY/GETTY IMAGES conservation lectures and scuba diving. On that trip she met Velings, a Dutch serial entrepreneur who started his first business at age 18.

Their relationship blossomed over the next seven months, but then Novogratz started having worrisome seizures. By October, she had received her brain tumor diagnosis. After the surgery, Velings proposed at her hospital bedside. She accepted but said she needed time to get her life back—she had to learn to walk again. Within a few months, Novogratz was back working at TED. "It was way too early," she admits now. "I didn't know how to stop pushing. It was my identity." Finally, she says, a TEDx conference scheduled for Doha made her take a step away. "I couldn't even walk on sand, and I had agreed to lead workshops in a desert. It was nuts." She bought a ticket to the Netherlands, where she and Velings started to build a life and company together.

The duo picked aquaculture because few investors cared about this big and troubled market. Some fish farms were actually compounding the problem of overfishing in the wild by using wild fish as feed. More sustainable farming operations, to the extent they existed, "were selling to really small upscale markets at a premium" and had little access to outside capital, Novogratz says. They had met with dozens of potential investors in Silicon Valley and Europe and were eyeing a September 2013 formal fundraising launch when tragedy struck again. Novogratz gave birth to their first child in July 2013, and the infant died just a month later. The launch was postponed—but not for long. By the end of 2014, Novogratz had given birth to a second child (she and Velings now have three healthy kids), and the couple had commitments for more than $8 million from 26 investors. They covered initial operating costs with $4 million of their own money.

The two of them aim eventually to have 60 to 80 companies in the Aqua-Spark portfolio, more than three times their current roster. Early on, they worried there might not be a big enough pipeline of investable businesses; now they're actively tracking at least 1,550.

Despite her disabilities, Novogratz has thrown herself into searching out prospects, climbing down boat ladders in Vietnam and walking on feeding platforms above crocodile-infested waters in Mozambique: "Sometimes I back away, but mostly I push myself through it." Although the pandemic currently prevents them from making such on-site visits, Novogratz and Velings are undeterred, doing their due diligence remotely. "Everything that is behind us is pushing us forward," she says. Ⓕ

THE IMPACT 50

These are the most notable investors working to make a difference with their dollars.

Jenny Abramson
Areas of impact: Education, Tech, Health Care
Abramson backs female tech entrepreneurs through her Rethink Impact, which has invested in some 25 companies. It closed its second fund in July, raising $182 million.

Bill Ackman
Areas of impact: Education, Housing, Health Care
His Pershing Square Foundation has put $30 million into Turner Impact Capital, some of which is funding affordable housing near workplaces for more than 16,000 residents.

Ibrahim AlHusseini
Area of impact: Environment
His FullCycle investment firm, with $50 million in assets, has invested in companies including Netherlands-based waste-to-energy firm Synova Power.

Steve & Connie Ballmer
Area of impact: Diversified
Ballmer-backed software firm Social Solutions, which serves nonprofits, announced in June that it would donate to Black Lives Matter and the Bail Project.

Marc Benioff
Area of impact: Diversified
Benioff has put money into four social-impact companies in the last year, including toilet paper maker Cloud Paper, which uses bamboo instead of trees.

David Bonderman
Area of impact: International
Cofounded by TPG chairman Bonderman, the Rise Fund raised nearly $2 billion for its second impact-focused fund last year. Its portfolio companies include India-based solar-energy startup Frontier Markets.

Jim Breyer
Areas of impact: Health Care, International
The venture capitalist has made social-impact investments in five African companies, including one in Ghana that improves access to medicine.

Howard Buffett
Areas of impact: International, Environment
The Oracle of Omaha's grandson created the Impact Rate of Return, which measures the impact return of investments; it's now used by more than 75 impact investors or funds.

Steve & Jean Case
Area of impact: Diversified
The former AOL chief executive and his wife lead the Rise of the Rest Seed Fund, which invests in small startups located outside of New York City, Boston and Silicon Valley.

Kesha Cash
Area of impact: Diversified
Her Impact America Fund has raised $54 million so far to back startups that promote an equitable future for low- and moderate-income people of color.

Scott Cook
Area of impact: Education
In 2019, Cook invested in ed-tech firms including ParentPowered, which provides early education support to parents.

James Coulter
Area of impact: International
Co-managing partner of the Rise Fund. Its investments include Latin American coding school Digital House, with some 8,000 students in São Paulo and Buenos Aires.

Mark Cuban
Area of impact: Diversified
The *Shark Tank* star and outspoken NBA owner recently invested in Strella Biotechnology, which aims to reduce food waste by using data to predict fruit and vegetable ripeness.

Ray Dalio
Area of impact: Diversified
The hedge-fund founder has put roughly $100 million into ventures such as the Global Health Investment Fund, which finances the development of drugs and vaccines for use in developing countries.

Impact 50 by Angel Au-Yeung, Deniz Çam, Hayley Cuccinello, Lauren Debter, Kerry A. Dolan, Antoine Gara, Alex Konrad, Jon Ponciano, Ariel Shapiro, Chloe Sorvino, Kristin Stoller, Giacomo Tognini and Jennifer Wang.

Michael & Susan Dell
Areas of impact: Education, International
Avanti Learning Centres, an Indian coaching startup they've backed with $4.3 million, has been running a free app for math and science classes for low-income students during the Covid-19 crisis.

John Doerr
Area of impact: Diversified
The Kleiner Perkins chairman's recent investments include mental-health benefits company Modern Health, which aims to improve employee well-being.

Dagmar Dolby
Areas of impact: Health Care, Tech
Her Dolby Family Ventures counts QurAlis, a biotech firm researching treatments for ALS and dementia, as one of its nearly 50 portfolio companies.

Cheryl Dorsey
Area of impact: Diversified
Dorsey's Echoing Green provides seed funding to social entrepreneurs. In 2019, she led $2.7 million worth of investments in 54 organizations.

Bill & Melinda Gates
Areas of impact: Health Care, Poverty/Inequality
Through the Bill & Melinda Gates Foundation, they've backed two German biotechs now developing vaccines for Covid-19: BioNTech and CureVac.

Kathryn Gleason & Tim Ring
Area of impact: Health Care
Gleason and her husband, Ring, cofounded TEAMFund, which invests in medical-tech startups to benefit low-income patients in India and Africa.

Al Gore
Area of impact: Diversified
The former U.S. vice president cofounded the $24 billion (assets) Generation Investment Management to invest in sustainable, low-carbon companies.

Arlan Hamilton
Area of impact: Diversified
Her Backstage Capital funded more than 130 early-stage companies led by minority and female founders, such as Hava Health, which has designed a vaporizer that reduces nicotine intake.

Reid Hoffman
Areas of impact: Civic Engagement, Tech
The LinkedIn cofounder has put $1.5 billion of his fortune into impact investments like OpenAi, which aims to build safe AI to benefit humanity.

Irwin Jacobs
Area of impact: Environment
The Qualcomm cofounder led a $4 million funding round in water-purification startup Cyclopure, the second investment he's made in the Encinitas, California–based company.

Justin Kamine
Areas of impact: Agriculture, Infrastructure
Kamine has built KDC Ag, a network that turns food waste from supermarkets into pet food, animal feed and organic fertilizers.

Mitch & Freada Kapor
Area of impact: Diversified
Since 2011, their Kapor Capital has invested solely in impact startups; 60 of their 102 portfolio companies have a woman or underrepresented person of color as a cofounder.

Shahid Khan
Area of impact: Civic Engagement
The auto-parts billionaire is majority owner of Black News Channel, which launched in February to provide 24/7 cable programming focused on news and perspectives of the African-American community.

Vinod Khosla
Area of impact: Diversified
The VC has helped finance startups like renewable jet biofuel maker LanzaTech, dairy-free egg replacement JUST Egg and battery company QuantumScape.

Dustin Moskovitz & Cari Tuna
Area of impact: Diversified
In May, the couple invested in Kainomyx, a San Francisco–based biotech company working to develop a new antimalarial drug.

Jacqueline Novogratz
Area of impact: Diversified
Her nonprofit impact fund, Acumen, has invested more than $125 million into about 130 companies tackling poverty, clean energy and education.

Amy Novogratz & Mike Velings
Area of impact: Aquaculture
Through investing firm AquaSpark, Novogratz and her husband, Velings, have minority stakes in 20 companies, many of which are sustainable farms.

Robyn O'Brien
Area of impact: Agriculture
O'Brien cofounded rePlant Capital with two others to use creative financing, like loans to farmers with terms based on soil-health metrics, to combat climate change.

Pierre Omidyar
Area of impact: International
Seeking to invest $300 million by 2024, Omidyar's VC firm, Flourish, funds fintech companies in the U.S. and emerging markets to provide banking opportunities for low-income communities.

Nancy Pfund
Area of impact: Diversified
More than 50% of the companies in which Pfund's venture-capital firm, DBL Partners (short for "Double Bottom Line"), invests have a female founder or a woman in the C-suite.

Laurene Powell Jobs
Area of impact: Diversified
Through her Emerson Collective, she co-led a $7.5 million round for Syndio, a human-resources analytics platform working to eradicate pay gaps stemming from gender and race.

Liesel Pritzker Simmons
Area of impact: Diversified
Blue Haven Initiative backs companies such as Field Intelligence, which assists pharmacies in Africa with financing and distribution.

George Roberts
Area of impact: Diversified
A pioneer of venture philanthropy, the Roberts Economic Development Foundation recently launched a $1.3 million impact lending fund to back social enterprises.

Valerie Rockefeller & Family
Areas of impact: Environment, Poverty/Inequality
Their Rockefeller Brothers Fund has committed $203 million to impact investments in areas including climate change and sustainable agriculture.

Eric & Wendy Schmidt
Area of impact: Environment
The couple has invested nearly $40 million in companies through their foundation, including Navajo Power, which develops solar-energy projects for tribal lands.

Ruth Shaber
Area of impact: Health Care
The California obstetrician's Tara Health Foundation has invested more than $70 million in companies that help improve women's health.

Jeff Skoll
Area of impact: Environment
His Capricorn Investment Group, with $5.2 billion in assets, backs outfits working on clean energy, including solid-state battery maker QuantumScape.

Will Smith & Jada Pinkett Smith
Area of impact: Environment
Their portfolio of sustainable companies includes Quidnet Energy, a company that develops storage systems for excess electricity produced by renewable-energy systems.

Jim Sorenson
Area of impact: Diversified
The Sorenson Impact Foundation, which he founded in 2012 with his wife, Krista, has invested $44 million in startups working on health care, education and clean energy.

George Soros
Area of impact: Diversified
Soros' Open Society Foundation has made more than $100 million in impact investments, including $15 million in two women-led funds, Alitheia IDF and Women's World Banking Capital Partners II.

Kat Taylor & Tom Steyer
Areas of impact: Poverty/Inequality, Environment
In 2013, the couple cofounded Radicle Impact, which has invested nearly $50 million in companies engaged in responsible finance, clean energy and healthy food.

Ben & Lucy Ana Walton
Areas of impact: Environment, Education
This grandson of Walmart founder Sam Walton started Zoma Capital with his wife, Lucy Ana, in 2013 to back companies combating environmental and social problems.

Serena Williams
Area of impact: Diversified
Her Serena Ventures, which invests in companies with women and minority founders, provided seed funding to Every Mother, an online fitness program for pregnant women and new moms.

Evan Williams
Area of impact: Environment
The Twitter cofounder's Obvious Ventures invests in sustainable companies such as Mosaic, which offers financing for solar-energy customers.

Jerry Yang
Area of impact: Diversified
The Yahoo cofounder's AME Cloud Ventures is invested in more than 100 companies, including meat-alternative maker Impossible Foods.

Mark Zuckerberg & Priscilla Chan
Area of impact: Diversified
The Chan Zuckerberg Initiative has funneled over $100 million into investments including Lovevery, which makes Montessori-inspired toys for babies and toddlers.

ASIA'S POWER BUSINESSWOMEN

In a year defined by a global pandemic that has challenged almost every aspect of life, leadership is being constantly tested. The 25 business leaders on the 2020 *Forbes Asia*'s Power Businesswomen list have risen to that challenge and are demonstrating their mettle in these difficult times.

Our listees this year represent a wide range of industries–from biotech, fintech and edtech to more traditional sectors such as retail, logistics and law. Each has a track record of success either running a company with sizable revenues or founding a start-up valued at over $1 billion. This year's list consists entirely of newcomers, and thereby expands our network of female business leaders shaping the business environment in the Asia-Pacific region.

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COURTESY OF HCL TECHNOLOGIES

Roshni Nadar Malhotra

Chairperson, HCL Technologies

AGE: **38** • **INDIA**

By **Megha Bahree**

In mid-July, Roshni Nadar Malhotra took charge as chairperson of HCL Technologies from her billionaire father Shiv Nadar, who had just turned 75. Nadar Malhotra, 38 and the only child of HCL's founder, has paid her dues before this long-planned succession. She's been an executive with the Noida, India-based company for 12 years, of which the last two were as vice chairperson. While in that post, she backed HCL's $1.8 billion purchase from IBM of a portfolio of its products. The acquisition, which closed last year, was the biggest by value in the company's 29-year history.

Reinforcing the family continuity, Shiv Nadar will remain active in the company as managing director and keep his long-held title of chief strategy officer. "He's really not going anywhere," says Nadar Malhotra, speaking by video from her home—her first interview in the new role. Despite the company's size, Nadar Malhotra wants it to behave like a startup. "You always have to keep agile, and quite hungry and entrepreneurial," she says. The company, she says, has a long history of "plunging into areas unknown."

The IT services giant is facing some pandemic-induced headwinds. HCL's first quarter results, released the same day that Nadar Malhotra was appointed chairperson, showed that revenues grew only 1% year-on-year to 178 billion rupees ($2.4 billion). Profits of 29 billion rupees were down 7.4% quarter-on-quarter. The company cautioned that quarterly revenue growth going forward might only be around 2% per quarter, a far cry from its usually strong growth.

The pandemic has also meant that some 90% of HCL's 150,000 staff worldwide are working from home, including Nadar Malhotra (with occasional trips to the office). The company expects at least half of its staff will work from home over the next 18 months. Some two-thirds of the company's revenues come from the U.S. market, which still leads the world in the number of Covid-19 cases—and the company's CEO is based in New York. One issue with muted effect on HCL, however, is the temporary freeze in the U.S. on issuing new H-1B work visas (used by many Indian expat tech workers), as two-thirds of HCL's U.S. staff are local hires.

Despite these challenges, HCL stands to benefit longer term from the enormous digitalization wave unleashed by Covid-19. Now as chairperson, Nadar Malhotra expects HCL to build on that trend. "There's been an accelerated emphasis on technology and how businesses are going to need it now to thrive and even differentiate themselves," she says. "There's a lot more focus on digitalization and that's something which uniquely has opened up a few opportunities."

The purchase of the IBM assets is instructive. While most Indian IT majors have some products in their portfolios, HCL is making a big bet on them with this deal. With the purchase, HCL launched a new division called HCL Software, which now has 2,000 customers. "We see tremendous potential for creating compelling 'as-a-service' offerings by combining these products with our traditional IT and next gen service," said CEO C. Vijayakumar in a press release when the deal closed last July.

Nadar Malhotra also sees opportunities in developing more partnerships. "We're always partnering, always carving out, acquiring. It's just in our DNA," she says. For example, in May, HCL expanded its two-year-old partnership with U.S. tech giant Broadcom to provide enterprise security consulting in addition to other software services.

Technology was not Nadar Malhotra's first love. After graduating with an undergraduate degree in radio, television and film from Northwestern University in 2003, she worked as a TV news producer at Sky News in the U.K. Three years later she went back to the U.S. for an M.B.A. at her alma mater, where she specialized in social enterprise.

In 2008, Nadar Malhotra returned home and the next year became CEO of HCL Corp., the holding company through which the Nadars own their stakes in listed HCL Technologies and HCL Infosystems. The HCL group at the time was one of India's major tech firms, along with Infosys, Tata Consultancy Services and Wipro, companies that created tech billionaires such as Azim Premji and N.R. Narayana Murthy.

Today HCL operates in 49 countries and has a market capitalization of about $26 billion. It ranks as No. 3 among India's largest tech firms by market cap and sales. Nadar Malhotra is the first woman to chair a listed tech firm in India—and one of a handful of female chairpersons in the male-dominated global tech industry.

The rise of HCL and its peers was in step with India's emergence as a global IT services hub. Her father Shiv Nadar, who started HCL as a maker of calculators and microprocessors with seven friends in 1976, pivoted in 1991 into IT-led services, including software, R&D and BPO, with HCL Technologies. The company's move into managing IT infrastructure some 15 years ago attracted large clients, cementing its position in the global tech industry.

Initially, Nadar Malhotra says, she avoided any role at the group's flagship HCL Technologies. She spent her first year overseeing the education initiatives of Shiv Nadar Foundation, the family's philanthropic arm, and set up two all-expenses-paid boarding schools for poor, rural students in Uttar Pradesh state, where HCL is headquartered.

In 2013, Nadar Malhotra was appointed to the board of HCL Technologies, and five years later made its vice chairperson. She says those positions provided her with "great exposure," not only to her father, but also to the company's working culture and executive talent, including past and present CEOs. She has also drawn from the expertise of board members including Harvard Business School's senior associate dean, Srikant Datar, and University of California, Berkeley's former dean of engineering, S. Shankar Sastry.

As an only child, she says, she spent much time with her father, absorbing how he built and ran HCL. A banker who knows father and daughter but who asked not to be named says Nadar Malhotra learned the ropes from her father. "If you had to tick 10 boxes to see if she meets the [chairperson] criteria, she would tick most of them," he says. "She's very smart, driven, intelligent, young, aspirational and has fire in her belly."

While the family has majority control of HCL Technologies, Nadar Malhotra insists "we are a board-driven company." She sits on all of the board's committees and has been involved in key decision-making, including the IBM deal and the selection of the current CEO. She is also head of the firm's CSR committee, where she oversees the company's involvement with about 120 NGOs doing community, education and health initiatives.

TECH SCOREBOARD

HCL RANKS AS NUMBER THREE AMONG INDIA'S FOUR BIGGEST TECH FIRMS.

	TCS	Infosys	HCL	Wipro
Billionaires (net worth)	Pallonji Mistry* ($15.5 B) 	N.R. Narayana Murthy ($2.7 B), Nandan Nilekani ($2 B) Senapathy Gopalakrishnan ($2.5 B), K. Dinesh ($1.7 B) and S.D. Shibulal ($1.5 B)	Shiv Nadar ($18 B) 	Azim Premji ($7.3 B) 
Market Cap	$116 B	$55 B	$26 B	$22 B
Revenue	$22 B	$13 B	$10 B	$8 B
Net Profit	$4.5 B	$2.3 B	$1.5 B	$1.3 B
Staff	448,464	242,000	150,000	175,000

*Mistry's wealth comes from a variety of sources, including TCS (Tata Consultancy Services).

Financial figures as of latest fiscal year 2019-2020. Net worth figures as of real-time billionaires on Sept. 4, 2020. Market cap as of Sept. 1. *Sources: Forbes Asia, HCL, Infosys, TCS, Wipro and Yahoo Finance.*

Kiran Nadar

ARTISTIC EXPRESSION

Apart from her new role at HCL, Nadar Malhotra has her own philanthropic interests. In 2018, she and husband Shikhar Malhotra, who is CEO of consulting arm HCL Healthcare, started a conservation group, The Habitats Trust, with personal funds that aims to protect India's wildlife and natural habitats. The family's philanthropy also extends to the arts through her mother Kiran Nadar, one of India's leading art collectors and a national bridge champion. ("I blame my parents for bad parenting because I neither speak Tamil nor do I play bridge," jokes Nadar Malhotra.) The family selected British-Ghanaian architect Sir David Adjaye to design the new Kiran Nadar Museum of Art in Delhi, though efforts to complete the paperwork for its development are now on hold during the pandemic. Her family is "excited" about the new museum, Nadar Malhotra says, which will be larger than its current premises to display her mother's 6,000-piece collection.

KIRAN: COURTESY OF HCL TECHNOLOGIES; SHIV: AMIT VERMA/FORBES INDIA

AYA KOMAKI

President and CEO, Sanrio Entertainment

AGE: **61** • JAPAN

Komaki's career has been a long round-trip. After joining Sanrio (of Hello Kitty fame) from Japan's prestigious Tokyo University, where she earned a master's in education, she quit in 1984 to raise a family. But in 2003, after the loss of one of her children and a divorce, she returned to the company. Once back, she survived breast cancer and a hysterectomy to become a board director in 2015 at Sanrio's amusement subsidiary, Sanrio Entertainment, and the next year was put in charge of its Puroland theme park. Komaki led a turnaround of both Puroland and a second Sanrio park, Harmonyland, by creating Instagram-worthy entertainment and food at the parks that didn't require big outlays or new technology. By early 2018, the park operations were back in the black. Even after a five-week pandemic shutdown, they posted higher per-customer revenue in the latest fiscal year (ended March 31). *—James Simms*

LUCY YUETING LIU ➡

Cofounder and President, Airwallex

AGE: **29** • HONG KONG

An alum of the Forbes 30 Under 30 Asia class of 2017, Liu and her three cofounders have built a company valued at nearly $1.9 billion. The founders have raised $362 million in funding since Airwallex started in 2015, including $160 million in April from investors such as DST Global, Sequoia Capital China and Tencent. Airwallex helps customers conduct multi-currency cross-border transactions more cheaply than banks. Headquartered in Hong Kong, it has 440 staff in offices in 10 cities from Bangalore to Tokyo. Clients range from China's JD.com to Australian startup Cosmetics Now. The digital payments market is booming, driven by pandemic demand, Liu says. This year Airwallex began offering payment acceptance solutions with Tencent's WeChat Pay, bank feed integration from New Zealand cloud accounting firm Xero and virtual Visa debit cards in Australia. *—Rana Wehbe Watson*

TRUONG THI LE KHANH

Founder and Chairwoman, Vinh Hoan

AGE: **59** • VIETNAM

Over the past 23 years, Khanh has built her listed company into Vietnam's largest seafood firm by market capitalization. Last year the firm was also the best performer in the country's seafood industry, with $50 million net profit on $340 million revenue. Khanh spent a decade working at state-owned companies before launching Vinh Hoan in 1997. Today she has more than 6,000 employees and six processing plants. As most sales are international, Khanh says the global downturn in the F&B industry will cause a 20% revenue drop this year. To find new growth, Khanh aims to expand locally and through partnerships in Europe. *—Lan Anh Nguyen*

COURTESY OF AIRWALLEX; COURTESY OF SANRIO; RIN TRAN/FORBES VIETNAM

CAROLYN CRESWELL

Founder and CEO, Carman's Fine Foods

AGE: **46** • AUSTRALIA

Australia's top muesli brand by market share got a bump in March as stockpiling shoppers snapped up boxes of Carman's Fine Foods porridge, protein bars and snack foods. The company ramped up production in response, but Creswell says it's now back to business as usual. She's been in cereals since 1992, when at age 18 she paid A$1,000 ($1,350) for 50% of a muesli-making company where she worked part-time. Creswell bought out her partner two years later, finished university with an arts degree and started shopping her brand to supermarket chains. Today, Carman's sells more than 80 products in 36 countries. Its 5,000sqm Melbourne office boasts a yoga studio, massage room, garden and a dining table big enough for staff to lunch together every day. *—Jennifer Wells*

JANG IN-A

CEO, Smilegate Entertainment

AGE: **44** • SOUTH KOREA

Jang is one of the few women worldwide to run a gaming company. Joining Smilegate Entertainment as a game developer in 2007 when it had just 20 employees, she rose through the ranks to become CEO in 2015. She now heads one of South Korea's largest gaming companies (sales), with $451 million in revenue last year and about 600 game developers. Under Jang, Smilegate Entertainment's flagship Crossfire has become one of the world's most popular first-person shooter games, with the company claiming a billion registered players in 80 countries. She also broke Crossfire into the lucrative yet competitive China market, making it one of the most popular first-person shooter games there by number of players—a distinction Crossfire also enjoys in the Philippines and Vietnam. *—Jihyun Park*

JAREEPORN JARUKORNSAKUL

Cofounder, Chairman and Group CEO, WHA Group

AGE: **53** • THAILAND

Jareeporn and her husband Somyos Anantaprayoon started the WHA Group in 2003, growing it into Thailand's leading industrial estate developer and services provider. After Somyos died in 2018, Jareeporn took the reins and pursued expansion across Southeast Asia and at home, including developing commercial districts for high-tech industries under Thailand's Eastern Economic Corridor initiative. Normalized net profit fell 35% to 715 million baht ($23 million) in the first half from a year earlier, but Jareeporn is confident WHA will rebound from the pandemic-led downturn. She remains focused on an ambitious 52-billion-baht, five-year plan that sees the group adding its 11th industrial estate this year to its Thai portfolio and diversifying its power and utilities businesses. *—Danielle Keeton-Olsen*

COURTESY OF CARMAN'S KITCHEN; COURTESY OF SMILEGATE ENTERTAINMENT; BRENT LEWIN/BLOOMBERG

DIVYA GOKULNATH

Cofounder, Byju's

AGE: **34** • **INDIA**

With India's school-age children stuck at home because of the pandemic, Gokulnath has had her hands full. "We've added 20 million students just in the last four months," says Gokulnath, who heads content, user experience and brand marketing at edtech company Byju's, which offers online courses for K-12 students. Gokulnath and her husband Byju Raveendran saw the need for an app to educate high school-age students almost a decade ago while tutoring business school applicants struggling with math and science. The firm, which counts 64 million active users across 1,700 cities in India and overseas, recently added live tutoring and Indian-language modules to its program lineup. "Every student has a front row seat" with the platform, says Gokulnath. Byju's has raised $1.6 billion in investment funding so far and is valued at $10 billion.
—Anuradha Raghunathan

OLIVIA LIMPE-AW

Chairman and CEO, Destileria Limtuaco

AGE: **57** • **PHILIPPINES**

Limpe-Aw is the fifth-generation head of the Philippines' oldest distiller, which her great-great granduncle founded in 1852. An immigrant from China, he brought with him a family recipe for herbal wine sold as "Vino de Chino." Since taking the helm in 2004, she has added new products and focused on growing overseas. The company now sells more than 40 spirits, wines and liqueurs, including tropical-fruit blends, and exports within Asia and to the U.S. When some cities in the Philippines earlier this year banned booze amid quarantine restrictions, Destileria Limtuaco switched to making hand sanitizer and disinfectants. The fifth of seven daughters, Limpe-Aw is also president of a book publishing company.
—Jennifer Wells

GERIC CRUZ/BLOOMBERG; GAYATRI GANJU FOR FORBES ASIA

RACHEL ENG

Founding Partner and Managing Director, Eng and Co.

AGE: **52** • SINGAPORE

Eng is a trailblazer in Singapore's traditionally male-dominated legal profession. In 2010, she became the first woman to lead one of the largest law firms (by number of lawyers) in Singapore, WongPartnership. And in 2018, Eng shook the city-state's conservative legal circles when she jumped to global professional services firm PwC, becoming the highest-profile lawyer in Asia to leave a traditional firm to join the increasing number of integrated legal services that combine legal services with related advice in areas such as cybersecurity and regulatory issues. Less than a year after joining, she was appointed to PwC's global legal leadership team—the only woman in the nine-member team—helping oversee the network's 3,600 lawyers across roughly 100 countries. Eng now heads PwC's Singapore member firm, which now bears her name, Eng and Co. Her advice for women in business: "We sometimes doubt our own capability, so believe in yourself. That will go very, very far." *—John Kang*

MELANIE PERKINS

Cofounder and CEO, Canva

AGE: **33** • AUSTRALIA

Perkins, an alum of the 2016 Forbes 30 Under 30 Asia, cofounded Canva with Cameron Adams and Cliff Obrecht (now her fiancé) in 2013 while an undergrad at the University of Western Australia. The graphic design software company has raised more than $300 million since, with the latest round ($60 million) in June valuing it at $6 billion. Canva started out as a free-to-use website offering design tools enabling amateur designers to turn out professional-looking graphics, from party invites and posters to corporate brochures. It has since expanded to offer paid, premium packages for professionals and enterprises, helping it turn profitable in mid-2017 and putting it in competition with the likes of Adobe. Now available in more than 100 languages, Canva has more than 700 employees and over 30 million active monthly users in 190 countries. *—Rana Wehbe Watson*

NGUYEN BACH DIEP

Chairwoman, FPT Retail

AGE: **48** • VIETNAM

Since joining FPT Retail eight years ago and becoming chairwoman in 2017, Nguyen Bach Diep has helped build the company into Vietnam's second-largest electronics retailer by number of outlets, with more than 630 stores nationwide. In 2017, she added pharmaceutical retailing with the purchase of a majority stake in the Long Chau drugstore chain, and expanded it from four stores to roughly 160. To capture rising demand during the pandemic, FPT Retail plans to open 60 more drugstores by the end of the year. In 1997, Diep started at FPT Retail's parent company FPT, a leading IT provider, after getting a business administration degree from Ho Chi Minh City Open University. *—Lan Anh Nguyen*

COURTESY OF ENG AND CO. LLC; DEAN MACKENZIE/IDC FOR FORBES; MAIKA ELAN/FORBES VIETNAM

Samantha Du

Founder, Chair and CEO, Zai Lab

AGE: **56** • **CHINA**

By **Yue Wang**

Samantha Du is a force to be reckoned with in China's booming pharmaceutical market—and her success is unrelated to Covid-19 demand. The 56-year-old entrepreneur leads Shanghai-based pharma company Zai Lab, whose $6 billion market cap has increased threefold since its IPO valuation on Nasdaq in 2017. The company has filed for a secondary listing in Hong Kong, but hasn't announced size or pricing of the planned offering.

She founded Zai Lab in 2014, when Beijing was preparing to shake up China's healthcare industry by slashing red tape and fast-tracking drug approvals. Du got a jump on competitors by adopting a licensing model, acquiring the rights—often exclusive—to sell foreign firms' drugs in China.

Zai Lab's bestselling ovarian cancer drug Zejula, for example, is licensed from GlaxoSmithKline. After winning approval last December to start selling Zejula in mainland China, the company's first-half revenues surged almost sixfold year-on-year, to roughly $19 million. Also boosting sales was Optune, a device to kill cancer cells, that Zai Lab launched in May in mainland China under license from Jersey-based Novocure.

Investors like Zai Lab despite it not having yet broken even. Sales in China's biopharma market reached $137 billion in 2018, making it second only to the U.S., and U.S.-based data and analytics company Iqvia projects it will grow to as much as $170 billion by 2023. "Dr. Du pays a lot of attention to the market potential of licensed products," says China Renaissance analyst Zhao Bing in Shanghai. "And she really has the China know-how to commercialize them."

Du has the experience needed to spot promising imports. After graduating in 1994 with a Ph.D. in biochemistry from the University of Cincinnati, she landed a job at Pfizer. In 2001, she became chief scientific officer at Chi-Med, a cancer-drug developer in Hong Kong backed by billionaire Li Ka-shing. During her tenure, Chi-Med developed Fruquintinib, which in 2018 became the first homegrown cancer drug to win regulatory approval in China. In 2011, Du joined Sequoia China to hunt for healthcare investments, then started Zai Lab three years later.

To fend off other licensed-drug rivals such as Nasdaq-listed BeiGene and Hong Kong-listed Innovent Biologics, Du has been boosting Zai Lab's R&D capability. Two of the 15 drugs in its product pipeline—one to treat tumors and the other for immunological diseases—were developed in-house. Both are in early clinical trials.

Du says there are plenty more drugs that Zai Lab can import. "Over the next three years," she told analysts in a call last month, "we expect to have a steady stream of approvals and commercial product launches in Greater China across multiple therapeutic areas."

COURTESY OF ZAI LAB

ANNABELLE LONG

Managing Partner, Bertelsmann Asia Investments

AGE: **47** • CHINA

Annabelle Long counts more than 20 unicorns in the $3 billion portfolio of startups she oversees at Bertelsmann Asia Investments, the investment arm of German media group Bertelsmann. She joined Bertelsmann in 2005 in New York after earning a Stanford M.B.A., then returned to Beijing in 2007 after convincing the company to set up a fund to invest in China's burgeoning internet sector and let her run it. She has since taken more than 10 companies public, including Nasdaq-listed shopping site Mogu and online consumer lender Lexin. With more consumers going online during the pandemic, she's now investing in everything from e-commerce to e-learning. "A lot of markets will be transformed this year," she says. *—Yue Wang*

NABILAH ALSAGOFF

Cofounder and COO, Nusa Satu Inti Artha

AGE: **53** • INDONESIA

In 2005, when Alsagoff started a website with Bali's tourism board, she noticed local banks couldn't process the online payments it attracted. So she and two friends cofounded Jakarta-based Nusa Satu Inti Artha, best known by its brand name Doku (local slang for "wallet"). Doku pioneered cashless transactions in Indonesia, leapfrogging domestic banks to offer e-wallet services. In 2016, Indonesia media group Elang Mahkota Teknologi bought a majority stake in Nusa Satu for an undisclosed sum, but Alsagoff remains Doku's chief operating officer. Last year, Doku handled 63 trillion rupiah ($4.3 billion) in payments, 50% more than in 2018 and making it Indonesia's leading e-payments service. Transactions are surging as homebodies shun the pandemic, and Doku has expanded into consulting to help more businesses transact online. *—Pudji Lestari*

LILY KONG

President, Singapore Management University

AGE: **55** • SINGAPORE

Kong is the fifth president of Singapore Management University and the first woman to lead one of the island-state's top universities. A geography professor who in 2011 helped set up the Yale-NUS College between Yale University and the National University of Singapore, Kong took the helm of SMU in January 2019. Since then, she has continued to expand SMU's entrepreneurship capacity for students. In February, SMU opened a new building that includes 700sqm of incubation space designed to foster innovation and entrepreneurship among students, alumni and local businesses. "Innovation and entrepreneurship are something that we have greatly invested in, and the new building is a big part of it," says Kong. "Just in the last 20 months, we had very good success." *—John Kang*

COURTESY OF BERTELSMANN ASIA INVESTMENT; COURTESY OF DOKU; COURTESY OF SINGAPORE MANAGEMENT UNIVERSITY

CAROLINE RUSSELL

Executive Chairman and CEO, BOH Plantations

MALAYSIA

Russell is the third generation to lead Malaysia's largest tea producer by output, BOH Plantations, founded by her grandfather in 1929 (BOH stands for "best of highlands," a reference to Malaysia's tea-growing highlands). The family-owned business has four plantations spread over 1,200ha that annually produce about 4.5 million kilograms of tea—about 70% of Malaysia's tea output. Russell joined BOH's marketing department in 1988 after getting a commerce degree with honors from University of Edinburgh. Taking the helm as CEO in 2003, Russell has expanded BOH's range of teas and international sales. She also focuses on sustainable growth, including biodegradable products, recyclable packaging and partnering with environmental NGOs. Russell was named executive chairman after her father retired last year. *—Karsha Green*

COURTESY OF BOH PLANTATIONS; COURTESY OF B.GRIMM POWER

PREEYANART SOONTORNWATA

President and CEO, B.Grimm Power

AGE: **63** • THAILAND

Over the past two decades, Preeyanart has grown the power unit of Thai conglomerate B.Grimm into a $3.7 billion company that operates 47 power plants in Thailand, Laos and Vietnam, with five more in development; and oversaw its IPO in 2017. B.Grimm Power has been unfazed by Covid-19, with net profit surging more than 60% in the second quarter ending in June year-on-year, on increases in production capacity and industrial customers. Its portfolio combines conventional and renewable projects, including gas, solar, hydro and wind power generation. Preeyanart started at B.Grimm 28 years ago as chief financial officer, and was named to lead B.Grimm Power when it was established in 1996.
—Suzanne Nam

COURTESY OF UNIQLO

Maki Akaida

CEO, Uniqlo Japan

AGE: **41** • **JAPAN**

By **James Simms**

Maki Akaida has stormed up the corporate ladder since 2001 when she joined Fast Retailing, operator of the global fast-fashion retailer Uniqlo. Now CEO of Uniqlo Japan, she has been tapped by Fast Retailing's CEO Tadashi Yanai, Japan's richest person, as a possible successor.

If Akaida does take over at Fast Retailing, she would join a handful of women who have run or are running multibillion dollar enterprises in Japan, including Yoshiko Shinohara of temporary staffing outfit Persol Holdings and Miwako Date at property developer Mori Trust. Japan has struggled against deeply rooted traditions to get more women into its shrinking workforce, especially senior corporate roles. The government aimed to fill 30% of management and executive jobs with women by year-end, a goal now estimated to remain at least a decade away.

Fast Retailing, which had almost $22 billion in sales in its latest fiscal year, has bucked the trend by actively promoting women. Nearly 40% of Fast Retailing's managers are female—more than double the national average. The company aims to raise that figure to 50% by supporting its female staffers' career development with steps such as in-office day care and paid leave for elder care.

Akaida has been at the forefront of that effort. She won promotion to store manager just six months after joining Fast Retailing out of university. She later ran flagship Uniqlo outlets in Shanghai and Tokyo, as well as Fast Retailing's human resources department and Uniqlo Japan's public relations. "What I want to tell women is, 'Realize early on that you have a much higher potential than you think!'" Akaida, 41, says in remarks on the company website's page on diversity. The company declined *Forbes Asia*'s interview requests.

In early 2019, Fast Retailing, which has over 3,600 stores, promoted Akaida to group executive officer. In June that year, she was named CEO of Uniqlo Japan, the company's most profitable business. The person to hold that slot the longest? Yanai.

The media was quick to pin the heir-apparent label on Akaida. Yanai fueled the speculation not long afterward, telling an interviewer that he thought a woman would be best to take over his position and acknowledging Akaida as a potential successor. "The job is more suitable for a woman," he said, adding that women "are persevering, detail-oriented and have an aesthetic sense." (Yanai hasn't set a date to step down.)

Akaida isn't content to rely on vested qualities. "Brilliance can't beat hard work," she told a local fashion magazine recently. "Leaders need to work harder than everybody. Every day, I regret not trying harder."

ZHAO YAN

Chairman and General Manager, Bloomage BioTechnology

AGE: **54** • CHINA

Since Zhao bought Bloomage BioTechnology in 2001, it has become the world's largest maker of hyaluronic acid—used in pharmaceuticals, cosmetics and food supplements—with a third of global market share. The company went public on Shanghai's Sci-Tech Innovation Board in 2019 after delisting in Hong Kong two years earlier. Since then, its share price has climbed by nearly two-thirds, making Zhao one of China's richest women, worth $6.4 billion. In 2019, net profit rose 38% to 586 million yuan ($84 million) year on year on a 49% jump in revenue to 1.9 billion yuan. Zhao also chairs Bloomage International Investments Group, with interests in real estate, finance and sports. Her first job was selling refrigerators and later she ran a clothing factory. *—Jane Ho*

AMEERA SHAH ➡

Managing Director, Metropolis Healthcare

AGE: **41** • INDIA

Shah was at home caring for her newborn son in March when the pandemic hit India. She swung into action, and her diagnostics firm was the first private-sector company to win government approval to offer Covid-19 testing. Metropolis labs operated around the clock meeting demand for tests, with staff working overtime amid a nationwide lockdown. Since taking over her father's pathology lab in 2000, Shah has grown Metropolis into one of India's biggest listed diagnostics services operators, with 125 clinical labs across 210 cities nationwide. She led the purchase of 22 labs before Metropolis went public in 2019. The company's shares have climbed nearly 60% over the past 12 months, pushing her family's fortune over $600 million.
—Anuradha Raghunathan

NUALPHAN LAMSAM ⬆

President and CEO, Muang Thai Insurance

AGE: **54** • THAILAND

Best known as Madame Pang, Nualphan became president and CEO of Muang Thai Insurance in 2014, and became the literal face of the company last year in its ad campaign, "Trust Pang." Muang Thai Insurance is countering pandemic-pinched profits by offering flexible "mini" insurance plans. Nualphan hails from one of Thailand's wealthiest families. Her cousin Banthoon Lamsam ran Kasikornbank, Thailand's largest (assets) commercial bank for 28 years before stepping down earlier this year. Her brother Sara Lamsam heads Muang Thai Life Assurance. Nualphan also chairs a Thai soccer team and was general manager of the Thai national women's soccer team, gaining international attention at the 2019 World Cup by crying tears of pride when Thailand scored its single goal during its 1-5 loss to host Sweden. *—Danielle Keeton-Olsen*

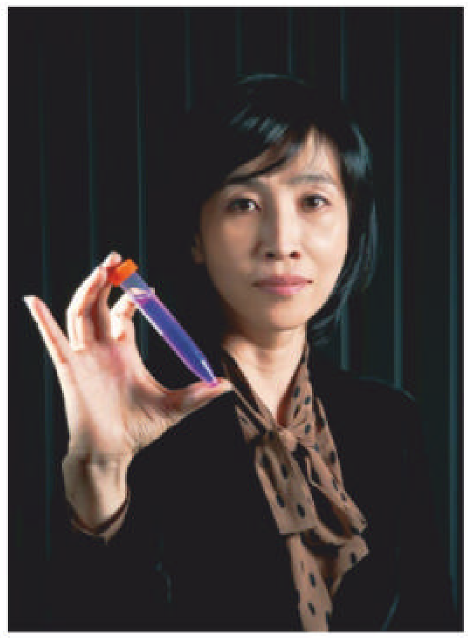
AMPHOL THONGMUEANGLUANG/PACIFIC PRESS/NEWSCOM; ASKA LIU/FORBES CHINA; FORBES INDIA

VINATI SARAF MUTREJA

CEO and Managing Director, Vinati Organics

AGE: **36** • INDIA

Mutreja joined her father's specialty chemicals company Vinati in 2006 as an executive director after earning a dual degree in engineering and finance from the Wharton School of the University of Pennsylvania. Since then she's overseen a 170-fold improvement in Mumbai-based Vinati's profits, a 16-fold increase in sales, and a 500-fold rise in market cap. Her family's stake in Vinati—which her father named after her—is now worth nearly $1 billion. Mutreja grew the company from one selling just two products domestically into one with 20 products and three-quarters of its sales overseas. Vinati is also now one of the world's largest producers of the raw material for ibuprofen. The pandemic hasn't stopped Vinati. Despite India's lockdown in late March and early April, its two plants are at 70% capacity. *—Anuradha Raghunathan*



YANG YOON-SUN

Founder and CEO, Medipost

AGE: **56** • SOUTH KOREA

Yang realized umbilical cord blood's potential in 2000 while a doctor at a prominent Seoul hospital. Umbilical cord blood contains stem cells useful in treating illnesses and injuries. Yang quit her job to launch Medipost that year, offering cord blood research, therapy and storage. In 2005, Medipost raised 16.5 billion won ($14 million) in an IPO on Korea's Kosdaq exchange. It is now valued at roughly 470 billion won, with 46 billion won in sales last year. Medipost runs Korea's largest cord-blood bank, storing 43% of the country's cord blood, according to government data. Medipost is now working on a treatment for damaged joint cartilage. "The new treatment will play a significant role in achieving Medipost's goal of helping more people age well," says Yang. *—Jihyun Park*

DEWI MULIATY

President Director, Prodia Widyahusada

AGE: **57** • INDONESIA

Muliaty was studying for a pharmacist's license when her professor, Andi Wijaya, cofounder of Indonesia's largest (sales) clinical laboratory operator, hired her in 1988 as assistant manager. Two decades later she became President Director and led a national expansion that boosted the number of clinics from 107 in 2010 to 285 today. She also ramped up testing for autoimmune disorders and other diseases, which made up nearly a fifth of last year's revenue. After a drop-off in demand pushed first-half sales down 18% to 657 billion rupiah ($44 million), Muliaty switched gears to offer rapid Covid-19 testing that can be administered in a drive-through, clinic or at home, with results posted online. *—Pudji Lestari*

ADITI TAILANG/FORBES INDIA; COURTESY OF PRODIA; OH SANG-MIN/FORBES KOREA

SINGAPORE: STAYING THE COURSE

The city-state keeps its focus firmly on the horizon as it helps businesses navigate the impact of Covid-19 and positions itself for long-term success.

More than six months after the Covid-19 virus first emerged, the global economy continues to feel the effects of this unprecedented healthcare crisis. Countries that had appeared to have the pandemic under control are now facing second and third waves of infections. Meanwhile, businesses continue to suffer heavy losses due to safe distancing and travel restrictions.

Singapore has not been spared the fallout, and its ability to navigate difficult conditions is once again on show during this difficult period. The government has rolled out a series of five budget packages worth about S$100 billion (US$73 billion) to support businesses and workers who have been hit hard by the pandemic.

Besides cushioning the economy from the near-term shocks, policymakers have kept their eyes firmly on the horizon as they persevere with the country's longer-term transformation. Whether it's supporting local companies in their efforts to restructure their operations for the digital era, to spread their wings abroad, or to upgrade their workers' skills, Singapore is once again positioning itself for success in the long run.

Nimble Response

Covid-19 has also highlighted the need for businesses to react quickly to a fast-changing landscape. With consumer needs shifting rapidly due to the pandemic, companies will need to leverage innovation to develop offerings that are relevant to their customers.

Painting solutions specialist Nippon Paint, for instance, is ramping up its investments in research and development during this time to deliver valuable customer-centric solutions. One key initiative in this effort involves the development of painting products that inhibit the growth of viruses on surfaces.

Nippon Paint is supporting communities that have been adversely impacted by the pandemic in other ways—from cash injections to donations of antiviral coatings to hospitals. In China, for instance, the company has donated 2 million yuan (US$290,000) to the Red Cross in Xianning city, Hubei province.

There are others who see interest in their company-led solutions amid the crisis. For example, in the insurance sector, Covid-19 has prompted consumers to review their need for financial protection. According to Swiss Re's Covid-19 Consumer Survey, more than a quarter of the 6,000 respondents surveyed across 10 markets in Asia-Pacific are worried about how they will come out of the pandemic financially, and many are prioritizing insurance as a "must have" during this time.

Long-Term Focus

Furthermore, the pandemic is threatening efforts of business leaders to deal with longer-term issues such as climate risk. Global property insurance leader FM Global notes that Covid-19 has the potential to compound the impact of natural catastrophes due to restrictions on movement and essential services.

A survey conducted by the firm before the pandemic found at least 34% of Asia-Pacific executives thought their organization is significantly exposed to climate risk, while 57% of Asia-Pacific respondents said addressing climate risk was a high priority in their company.

The Singapore government has shown its commitment to climate action, even as it deals with more immediate problems. In February, it announced measures in its annual budget to promote sustainable living and to support the use of electric vehicles.

This persistent focus on the long term has helped Singapore overcome uncertainties time and again since its independence 55 years ago, and positioned the country to emerge stronger after each crisis.

SWISS RE: CHARTING A NEW COURSE FOR INSURANCE IN ASIA

Data analytics and new technologies lead the Zurich firm's approach to helping insurers understand the needs of their customers across the region.

Russell Higginbotham, CEO of Swiss Re Asia

Since the opening of its Singapore representative office in 1968, Swiss Re's presence in the city-state has grown in tandem with the country's post-independence rise as a global business and financial hub. The Zurich-based reinsurance leader established its first formal office here in 1975, before designating Singapore as its Asia headquarters in 2018, housing about 300 employees.

"We have had a long association with Singapore. Today it is at the center of Asia, where we have been operating for over 150 years," says Russell Higginbotham, CEO of Swiss Re Asia, who moved to Singapore to take up his current role in July last year.

Swiss Re had its first insurance contract in Asia in 1913, and opened its maiden office in the region in the 1950s. Looking ahead, Asia-Pacific is expected to be a key growth driver in the group's global portfolio, as the region's fundamentals remain largely intact despite the economic and social impact of the Covid-19 pandemic.

Delivering Solutions for a New Normal

Swiss Re's business is comprised of three core pillars: its bread-and-butter reinsurance business, the transactions segment that is related to helping companies better manage their capital, and the newest solutions arm that leverages data and technology to help insurers anticipate and protect against the risks they face.

Data-driven solutions is the smallest but fastest-growing business among the three pillars, and reflects Swiss Re's goal of remaining relevant to its clients amid a fast-changing landscape marked by disruption.

"Solutions is the most exciting part of our business, and revolves a lot around data and technology. It's very dynamic, but it's something that we think is going to be a big part of the future," says Higginbotham.

By leveraging the growing volume of data generated by its clients, insurers are able to better serve the companies at each stage of their journey. With data, an insurer can recognize when a customer is likely to want a life insurance product, and approach them at the right time with a relevant offering.

"You start to understand customers better through the data that you get on them, enabling you to design products that are more

Swiss Re's Hong Kong office in Central Plaza

Swiss Re's Bangalore office

appropriate to their needs. You are also able to approach them at a time when they actually need the product, whether they're moving house, getting married or having a child," explains Higginbotham.

Data also makes the process of buying a policy more seamless by helping to automate the underwriting process. And as more data becomes available, Higginbotham envisions a time when underwriting practices will be largely automated using analytics tools.

Finally, data can play a role in continuing to engage the customer once they have bought a policy. By gathering data through wearable and other mobile devices, insurers can provide their customers with useful information—such as their driving or lifestyle habits—that can improve their life expectancies.

"We've done business for over 100 years in many countries around the world. And our job is to be able to bring the insights we have gathered through technology to our clients, the insurers," says Higginbotham.

Swiss Re's office in Bangalore

Leveraging Collaboration

A large part of Swiss Re's strategy for developing data-driven solutions involves collaborating with leading players in various industries. For instance, the group has tied up with Microsoft to develop a solution that offers insurers a broader understanding of risks and their ripple effect on society, governments and economies.

Powered by Microsoft's automotive data capabilities, for instance, Swiss Re will be able to develop a much deeper analysis of automotive risks, such as a car's safety performance when using the latest driving assistance technologies. By providing data-driven insights from this type of intelligence, Swiss Re can help insurers design innovative motor-insurance products, such as pay-as-you-drive covers.

In a similar vein, Swiss Re has also worked with BMW to access data from vehicles' Advanced Driver Assistance Systems (ADAS) to accurately assess risk pricing models. ADAS come with features such as a lane departure warning, active park distance control and sensors to slow or stop vehicles to avoid a collision. The technology has the potential to reduce the frequency of motor accidents by up to 25%, and cut car insurance premiums by US$20 billion by the end of 2020, according to research by Swiss Re and HERE Technologies, an automative tech firm.

"Cars today are extremely sophisticated instruments that generate data that you can use as part of your underwriting process. This helps you to make your products and your propositions more attractive to customers, and also more tailored to their needs," says Higginbotham.

A Silver Lining in the Crisis

Like most industries, the insurance sector has not been spared from the fallout from Covid-19. However, the healthcare crisis has prompted consumers to be more aware of their need for adequate and relevant insurance products.

According to Swiss Re's Covid-19 Consumer Survey conducted across 10 Asia-Pacific markets in the first half of 2020, over a quarter of the 6,000 respondents said they are worried about how they will come out of the pandemic financially, and many are prioritizing insurance as a "must have" at this time.

"From the survey, we can see that there is a priority to keep insurance policies in times of extreme stress like Covid-19," says Higginbotham. "So people are less likely to lapse or to cancel their insurance, which is a good thing."

Looking ahead, he is optimistic that Singapore will rebound strongly from the current crisis and continue to play an important role in driving the growth of Swiss Re's businesses in Asia-Pacific.

"I am hopeful that given the progressive, calm and structured nature of how the current situation has been handled in Singapore, that the nation and the economy will bounce back positively, and hopefully quickly," he adds.

Swiss Re

www.swissre.com

NIPPON PAINT: TAKING UP THE FIGHT AGAINST CORONAVIRUSES

Asia's No. 1 paint company uses technology to help protect against viruses and bacteria.

Nippon Paint VirusGuard+ is an advanced antimicrobial interior paint.

Nippon Paint, the largest paint company in Asia by sales, is firmly positioned at the vanguard of innovation. It has a long history of developing first-of-a-kind products in response to pressing community and environmental needs.

In 2013, Nippon Paint released VirusGuard in Singapore—an interior paint created to protect surfaces against viruses amid then-spiking H1N1 and hand, food and mouth disease epidemics—followed by sales in Malaysia two years later.

In 2008, Nippon Paint launched SolaReflect, a solar reflective exterior paint, in Singapore and Malaysia. This innovative "cool paint" reflects infrared rays of sunlight away from building surfaces to lower indoor temperatures and save energy. While the product was not an instant bestseller, with the unstoppable rise of climate activism and government requirements for green buildings, it is now attracting a groundswell of interest from the public and private sectors.

Two years ago, Nippon Paint launched Infinite Air in China. It was the first eco-friendly paint in the market made with certified renewable raw materials, such as sustainable palm oil and Scandinavian wood residue.

In 2020, a year that has been dominated by Covid-19, Nippon Paint has tackled what is arguably humanity's greatest current threat head-on with the development and launch of VirusGuard+ in Singapore. The company says it is the first antiviral paint to be proven effective against human coronaviruses, and fast-tracked its market launch.

Copper Ion Technology and Strokes of Genius

VirusGuard+ uses an old remedy in a brand-new way. The antimicrobial property of copper is well established in science and medicine. For centuries, copper has been used by holistic medical practitioners to help wounds heal faster. More recently, scientific studies have supported its use for surface areas in hospital wards and operating theaters to decrease the risk of pathogen transmission.

In developing VirusGuard+, Nippon Paint drew on the best available technologies. The final product was formulated with advanced Corning Guardiant™ technology, which encapsulates active copper ions in a glass ceramic powder. When coronaviruses come into contact with a wall that has been painted with VirusGuard+, the copper ions penetrate viruses' outermost capsid protein layers and fragment their genetic material so that they are unable to reproduce themselves, effectively killing them.

While the immediate relevance of VirusGuard+ is plain to see, the paint also heralds potentially significant benefits for disease prevention in the years to come. Epidemiologists have warned more pandemics will follow Covid-19. Forewarned is forearmed, and VirusGuard+ will be one more weapon that can be deployed when the next outbreak occurs.

Orchestrated Local Responses to a Global Problem

In addition to the launch of VirusGuard+ in Singapore, Nippon Paint has rolled out a range of new products across Asia in response to Covid-19.

An antimicrobial paint that features advanced silver ion technology was launched in Malaysia, Indonesia and Sri Lanka. Anti-Virus Kids Paint, which eliminates almost 100% of feline calicivirus, a highly contagious virus that causes upper respiratory infections, was introduced in China earlier this year.

In Japan, Nippon Paint signed an agreement with the University of Tokyo to collaborate on the research and development of antiviral paints to suppress the spread of coronaviruses for use during the current pandemic and in the event of future outbreaks.

Giving What is Needed Most, Where it is Needed Most

Around Asia, Nippon Paint South East Asia (NIPSEA) Group companies are not only launching new products to respond to current and emerging needs, but are offering help in other ways, such as cash contributions and the donation of antiviral paints to hospitals.

In China, Nippon Paint gave 2 million yuan (US$290,000) to the Red Cross in Xianning city, Hubei province, to support the local fight against Covid-19. In partnership with multinational materials supplier Corning Incorporated, it donated 5 million yuan (US$723,000) in antiviral paints to cover 120,000 square meters in coronavirus-designated hospitals. Nippon Paint also provided paint products, including putty and primer, to cover 10,000 square meters of exterior walls in the fast-tracked Zhuhai Xiaotangshan hospital construction project.

In Bangkok, Nippon Paint contributed antiviral paints to Sirindhorn Hospital and Lerdsin Hospital.

Antiviral paint donation by Nippon Paint China to coronavirus-designated hospitals.

Nippon Paint Japan and the University of Tokyo sign a research collaboration agreement.

"It is often said that the only constant in life is change. The year 2020 made that painfully apparent. Now more than ever, it is clear that corporations must rally together not just for profit but for the common good of people, who are, after all, our customers. Nippon Paint will continue to invest heavily in research and development, to create paints that serve people in ways that were unimaginable even in my lifetime," says Wee Siew Kim, CEO of NIPSEA Group.

Paints Can Do So Much

With the launch of VirusGuard+, NIPSEA Group has shown that paint can do so much more than beautify walls. In the future, decoration may be a secondary benefit of paint, behind more noble purposes such as disease prevention and climate-change mitigation. That's not to say Nippon Paint is taking its eye off the ball of consumer trends. In almost every market in which it operates in Asia, it remains the leading paint manufacturer across the commercial, industrial and consumer sectors.

"It is often said that the only constant in life is change. The year 2020 made that painfully apparent. Now more than ever, it is clear that corporations must rally together not just for profit but for the common good of people, who are, after all, our customers. Nippon Paint will continue to invest heavily in research and development, to create paints that serve people in ways that were unimaginable even in my lifetime."

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ABOUT NIPSEA GROUP

As a total painting solutions specialist, NIPSEA Group aims to beautify urban landscapes while creating superior products to enhance people's lives. With more than 70 NIPSEA companies spread throughout Asia, it understands the local needs of its customers.

Headquartered in Singapore, NIPSEA Group has more than 22,000 employees and 82 manufacturing facilities and operations across 18 geographical locations, serving all aspects of the business, from production to customer satisfaction. Within the group, each company embraces diversity and operates synergistically, pooling resources and sharing ideas for the benefit of both its customers and its stakeholders.

NIPPON PAINT

www.nipponpaint.com

BUSINESS LEADERS MUST RETAIN FOCUS AS ASIA'S RISKSCAPE EVOLVES

The region's executives are forward thinking when it comes to climate risk, but there is more work to be done, says property insurer FM Global.

Disaster events don't wait for an invitation. Real world property damage and related costs have led to an increasing awareness of climate risk in Asia-Pacific. As economic recovery takes the forefront, it is vital that businesses continue to protect themselves from the ever-present risk of natural catastrophes.

While Asia-Pacific business leaders recognize the need to address the adverse financial impacts of climate risk, there remains work to do, according to a recent survey of several hundred CEOs and chief financial officers of the world's largest companies by global property insurance leader, FM Global.

The survey, conducted pre-pandemic, found that at least 34% of Asia-Pacific executives believe their organization is significantly exposed to climate risk, and 57% of Asia-Pacific respondents said addressing climate risk was a high priority in their company. In this respect, Asia-Pacific-based companies scored higher than their peers in Europe and the U.S.

The higher level of awareness and preparedness in Asia-Pacific is unsurprising given the increasing number of climate-related catastrophes in the region since 2018, where bush fires, typhoons, floods and droughts have wreaked financial havoc.

Business leaders are right to be concerned. Asia-Pacific's evolving riskscape is becoming more complex with each year. In 2018, almost half of the 281 natural disasters worldwide occurred in the Asia-Pacific region, including eight out of the 10 deadliest. Indonesia alone was struck by two tsunamis and one earthquake in quick succession while Japan, perhaps the most disaster-prepared country globally, experienced unprecedented flooding, followed by an anomalous heatwave.

Today, the Covid-19 pandemic threatens to exacerbate the impact of natural catastrophes. While not directly impacting property and infrastructure as do earthquakes, floods or wind events, the pandemic has the potential to compound the impact of climate risks due to the restrictions on movement and essential services.

The good news is that there is a clear shift in thinking toward increasing focus on loss prevention strategies to mitigate potential climate risk to property and infrastructure. The survey found that business leaders predict an increase in their responsibilities, with most agreeing that executive management will be accountable for adverse financial impacts on their business due to climate events.

The challenge facing Asia-Pacific's business leaders is to retain this focus during the Covid-19 recovery period, when bottom lines are strained. To stay the course, there are four steps that business leaders can take in this evolving riskscape: increase capital allocation, enhance disaster recovery and business continuity plans, invest in property loss prevention measures, and reassess their supply chain risk management strategy.

Companies should allocate more capital to reduce the financial risk related to potential natural disasters, and have the ability to factor in uninsured costs to avoid volatile balance sheets. Based on FM Global data, for every US$1 spent to protect structures from wind- and flood-related damages, the estimated property loss and disruption exposures decrease by an average of US$105. It follows that businesses that take this path tend to produce a significant return on investment.

FM Global

www.fmglobal.sg

KEEPING THE FAITH

APRIL ANTHONY SURVIVED SEVERAL CRISES TO BUILD HER HEALTHCARE EMPIRE—AND NOW FACES HER BIGGEST WITH COVID-19.

BY **HAYLEY C. CUCCINELLO**

PHOTOGRAPH BY **JEFF WILSON** FOR FORBES

April Anthony at her home in Highland Park, Texas.

"I spend my drive to the office praying," says April Anthony, her voice breaking during a phone interview earlier this year. The CEO of the fastest-growing division of publicly traded Encompass Health, she runs the country's fourth-largest Medicare-approved provider of home healthcare.

Since the global pandemic was declared in early March, she's been working overtime from her office on the 13th floor of a Dallas high rise to keep her 8,000-plus nurses and therapists safe from Covid-19. She's also responsible for 40,000 high-risk patients. Most are elderly and many are dying or chronically ill. She fought to secure protective gear and devised a system to monitor Encompass's clinicians, who take their temperature daily and self-screen using a Centers for Disease Control questionnaire. She is offering telehealth visits for the first time even though Medicare doesn't reimburse for those appointments. Beyond the immediate health risks to her staff and patients, the coronavirus has wreaked havoc on her business, knocking visits down by as much as 30% in mid-April.

Throughout her career, Anthony, 53, has beaten the odds in one of the most difficult corners of U.S. healthcare. In December 1997, she was fired while giving birth. In the nineties, when caps on Medicare reimbursements and burdensome regulatory changes wiped out nearly a third of home care providers, she acquired more than a dozen failing agencies and established her first company, Encompass Home Health & Hospice. She amassed her $700 million fortune by gradually selling stakes in Encompass and a lucrative software business she'd spun out of it.

Nothing prepared her for Covid-19, but her experience, determination and Christian faith help her cope on the darkest days. Now with many states reopening, and elective procedures such as hip replacements restarting, patient visits are nearly back to pre-Covid levels. While she acknowledges new lockdowns could change everything again, she sees home care as a safer—and cheaper—alternative to nursing homes ravaged by the pandemic. "We can care for patients in their home where their only exposure is to their family and their individual caregiver who comes in with a fresh set of PPE every time," she tells *Forbes* in an interview last spring. Medicare-reimbursed home visits cost nine times less than the average daily nursing home fee.

Anthony did not set out to be a home healthcare mogul. Growing up in the Houston suburb of Kingwood, she imagined she'd lead a quiet, traditional life. The daughter of an accountant and a homemaker, she went to church three times a week with her family. "I thought I was going to be a stay-at-home mom," she says. "I'd just get a job for a year or two first." In 1991 she married her college classmate, Mark Anthony, who was beginning a career as a stockbroker.

The following year, she took a job that changed her life. Through her brother, whose business partner owned the company, she got a controller post at a Fort Worth home health agency with a subsidiary, Liberty Health Services, that had run up losses of $150,000 and was on the verge of shutting down. A new agency with some 25 employees, it serviced 50 homebound patients in the greater Fort Worth area. It had gotten caught in a maze of government bureaucracy that delayed its Medicare payments.

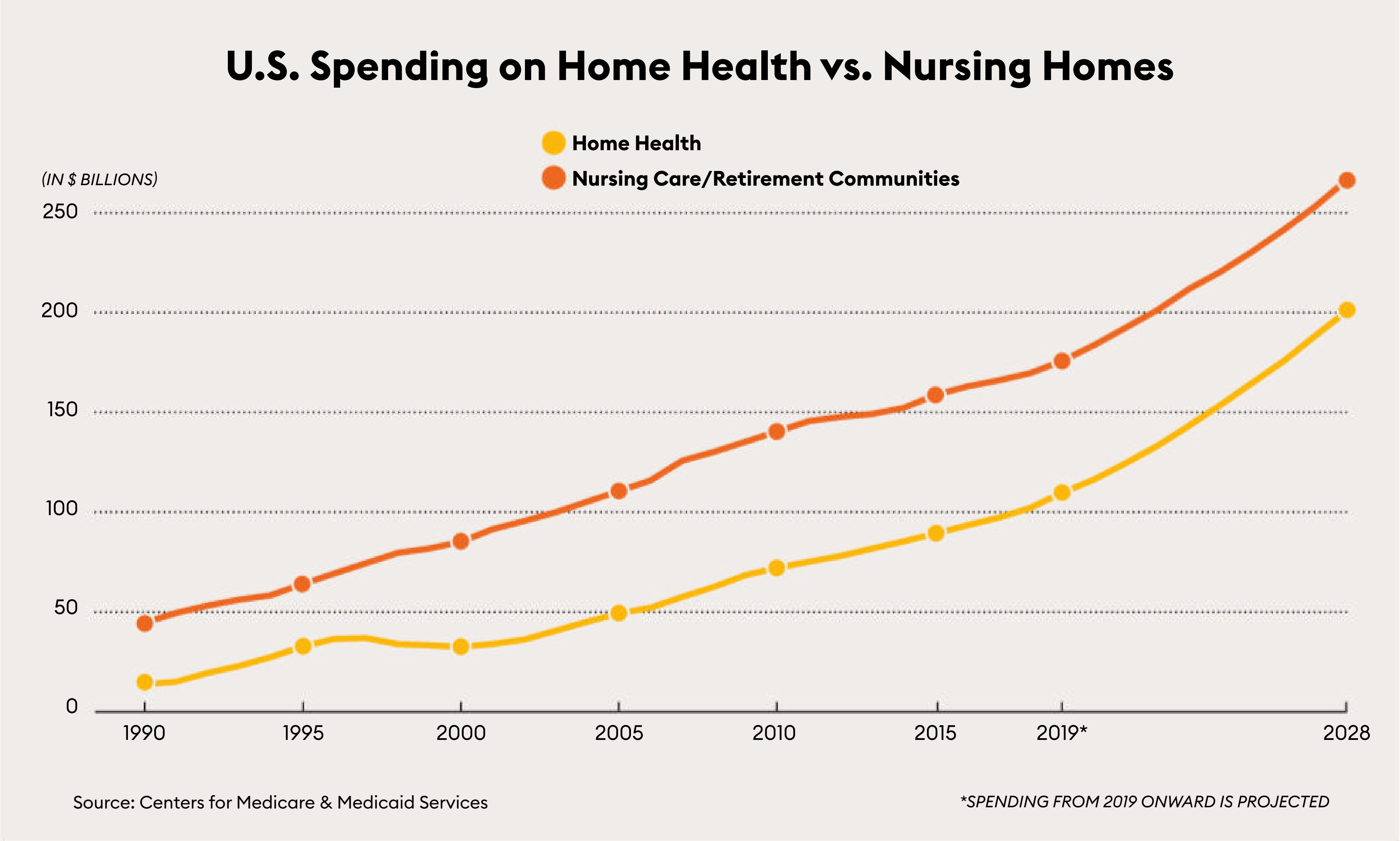
At her boss's request, she tried to find an acquirer, but after a dozen meetings, she came up empty. "I don't like to lose," she says. She made a rash proposal: if she could reverse the losses within seven months, her boss should make her the company's new owner. He agreed and she got a $150,000 line of credit with her father-in-law as the guarantor.

Within a year, she'd turned the losses into profits, paid back what she'd borrowed and squeezed out a $10,000 salary for herself. Her strategy: fire all but two office staffers and handle most of the accounting and administrative work herself. She went on home visits with her health aides so she could talk convincingly with doctors about how Liberty cared for patients with chronic heart and lung conditions. She was able to bring Liberty's cost of treatment 25% below what Medicare would reimburse. To raise operating capital, in 1993 she sold an 85% stake to Dallas investor Mark O'Brien.

After her first child, a daughter, was born in 1995, she set up a nursery next to her office with a full-time nanny. In 1996, Liberty's revenue hit $32 million. At the end of the year, Home Health Corporation of America (HHCA) bought Liberty for $40 million in stock and cash. Anthony joined the parent company as a vice president for the southwest region.

It was a terrible fit. In a meeting at HHCA's King of Prussia headquarters, she recalls, "all these guys were just f-bombing all over the place. On top of just being crude, everything they're saying is just so opposite of the way we had run our business." In the meeting, she says she learned that HHCA overpaid to rent office space in assisted living facilities and hired patient care coordinators to work in doctors' offices, effectively giving kickbacks for patient referrals.

When she refused to follow suit, concerned about potentially violating Medicare law, she says she became an "outsider" in the company. Less than a year later, while she was giving birth to her second child by scheduled C-section at a Dallas hospital, her bosses sent a termination letter to her home fax machine.



“It turned out to be the best day of my career,” she says. Seven months later, HHCA began downsizing. It closed its Texas operations and later filed for bankruptcy. A subsequent criminal investigation found that HHCA had violated federal anti-kickback law. (HHCA settled in 2005.) Anthony filed a wrongful discharge claim with the EEOC and settled with HHCA, which paid out her contract. (HHCA liquidated in 2010.)

HHCA's implosion voided her noncompete agreement, and drawing on the $3 million in cash she'd made when she sold Liberty, she went on a buying spree. She acquired 17 struggling home healthcare providers for less than $500,000. The deals launched the company, Encompass Home Health & Hospice, where she built her fortune. To help manage the government red tape that was decimating the industry, she hired a team to develop medical records software. The project drained $2.5 million from Encompass's cash reserves and in 2001, she spun it out as Homecare Homebase.

At the start, the software company kept losing money but Anthony held on. “I was so bullheaded, I refused to fail,” she says. She finally scored a $4 million contract to sell her source code to healthcare giant Gentiva in 2006. The deal attracted customers and Homecare Homebase became cash-flow positive in 2007.

In 2011, she and her husband sold a 40% stake in Homecare Homebase to private investors at a $150 million valuation. She now calls that sale her worst deal ever. “I should have held on,” she says. Two years later, Hearst bought out those investors and most of the Anthonys' stake at a $625 million valuation. Homecare Homebase was worth $2 billion when she sold the last of her stake to Hearst healthcare group in early 2020. She still made $422 million after tax from the sales.

“I had no business owning a business at 25. But I knew from that time forward that this is WHAT GOD WAS CALLING for me.”

“She created the most efficient software because she was the most efficient operator,” says Paul Kusserow, CEO of one of her main competitors, Baton Rouge-based home healthcare provider Amedisys. “She split her companies, spun them out and hit a double,” he says. Meanwhile, Encompass, the home healthcare business that she continued to run, was thriving and attracting its own suitors. In 2004 she started selling off chunks to private equity firms, including a 67% stake to Chicago-based Cressey & Company at a valuation of $280 million.

She says that by 2014 some 45 buyers were clamoring to acquire stakes in Encompass, including publicly traded HealthSouth, which wanted to make Encompass a subsidiary. But she was reluctant to sell the whole company after getting burned by HHCA. While she was concerned that HealthSouth's reputation had been battered more than a decade earlier by a massive accounting scandal, its 21% market share in the inpatient rehab industry offered a great patient referral network. She accepted HealthSouth's offer in late 2014. (The parent company changed its name to Encompass Health in 2018.)

For nearly two decades, Anthony served as CEO of two demanding companies, while raising three children (the youngest was born in 2000). This January, she left the software job, thinking she might finally get to work less. With her children out of the nest, she spent weekends golfing (she has an 8 handicap) and zipping around Dallas in her three sports cars, including a new deep plum-colored Bentley, a black 2018 Rolls-Royce Wraith and a white 2016 McLaren 650S.

The pandemic changed everything. Since March she hasn't driven much farther than the six minutes to the office, her time to gather her thoughts and connect with God, she says. Faith is a defining theme in her life. Though Texas is reopening, she and her family are still taking precautions and worshipping at home, attending virtual Sunday services given by Preston Road Church of Christ in Dallas. She and her husband have donated $57 million to their alma mater, Abilene Christian University. At new employee orientations, which happen 40 times a year, she repeats a proverb that she says has guided her life: “God does not call the equipped, he equips the called.”

“I had no business owning a business at 25,” she says. “But I knew from that time forward that this is what God was calling for me.” What is God calling for her next? Her competitor Kusserow says it's time for her to start another company. “There would be a line around the block of people who would give her money,” he says.

Her current priority is making sure Encompass weathers the storm, but she has been contemplating founding a care-management company that both helps elderly patients before they fall ill and delivers affordable, compassionate palliative care. “People get sick, they go to the hospital, spend a ton of money, they go to home health, spend some more money, they get no care for a while and then they get sick again,” she says. “Patients at the end of life are spending so much money on chronic conditions and no one's really sat down and asked, ‘What do you want?’”

The Covid-19 crisis has renewed her determination to help people find a more humane way to die. One Encompass hospice patient, locked down in a nursing home, was unable to see her husband, who was suffering from congestive heart failure. Encompass made it possible for the wife to come home so the couple could get hospice care and die together, surrounded by their children. “Life is going on, death is going on, unrelated to Covid,” she says, her voice breaking a second time. “How can we turn an awful death into a good death?”

BIOTECH'S BARNUM AND HIS COVID CURES

BY **ALEX KNAPP**

PHOTOGRAPH BY
ETHAN PINES FOR FORBES

BILLIONAIRE PATRICK SOON-SHIONG'S RADICAL CANCER TREATMENTS MADE HIM ONE OF THE WEALTHIEST PHYSICIANS ON EARTH. NOW THE MASTER OF MEDICAL MARKETING BELIEVES HIS DRUG THERAPIES COULD DEFEAT THE "CRISIS OF OUR TIME"—AND THERE ARE PLENTY OF REASONS TO THINK HE'LL DELIVER MORE HIPPOCRATES THAN HYPE.

Patrick Soon-Shiong knows when he realized that the Covid-19 pandemic was going to pose a serious threat. It was February 24, and the part-owner of the L.A. Lakers was at the Staples Center in Los Angeles for Kobe Bryant's memorial service.

With sudden, untimely demise on his mind, he found himself thinking about the emerging pandemic. Even though Covid-19 hadn't yet caused a single reported death in the United States, Soon-Shiong was worried. He recalls turning around to California Governor Gavin Newsom and telling him, "We're in trouble."

His sense of urgency hasn't gone away. "If I thought I was scared on February 24," he says, "I'm more scared now." The reason, he explains, is that "what we've learned is that this virus acts like cancer." He says he has left his house only once since Bryant's memorial, and that was to film a video about the coronavirus for the *Los Angeles Times*, which he bought, along with *The San Diego Union-Tribune*, for $600 million two years ago. "I shut myself off from the world," he says.

And so one of the planet's richest medical doctors, who made a $6.7 billion fortune developing breakthrough treatments for cancer and diabetes, seeks to battle the pandemic. The weapons in his arsenal: the cancer treatments he has spent the past decade and a half developing. He's aiming them at all aspects of the coronavirus, from a vaccine to treatments for mild cases to therapies targeted toward patients on ventilators.

It's an enormously ambitious plan from a man who has often been accused of being a hype artist. In an earlier incarnation, Soon-Shiong was a respected surgeon and professor at UCLA Medical School, but throughout his wildly successful entrepreneurial second act, he has been derided as more showman than scientist, thought guilty of overinflating results and taking undue credit. A few years ago, for example, he boasted about using a breast cancer drug to treat a patient with cervical cancer—but other groups were already seeing similar successes. As we wrote in a 2014 cover story, "While he's undeniably brilliant, Soon-Shiong is equally undeniably a blowhard."

But he also has fierce defenders of his approach to both cancer and Covid-19, including former Senate majority leader Harry Reid, who says the 68-year-old South Africa–born doctor "saved my life" in 2019 by providing an experimental treatment for his stage IV pancreatic cancer. Researchers say his methods are conceptually grounded in good science, though the verdict on his work will ultimately depend on results.

"We've been tracking and seeing an increase in the number of these cell-based therapies, whether they're being repurposed from oncology or even other disease conditions," says Esther Krofah, a senior analyst who monitors the clinical development pipeline for Covid-19 vaccines and therapies for the Milken Institute. A number of them—from large pharmaceuticals and small biotech startups alike—are going into clinical trials. For many of the latter, the pandemic offers a chance to show what their treatments can do in a shorter time frame than cancer drugs typically require. "For small companies, it's a worthwhile exercise to see if it's successful," Krofah says.

It may seem counterintuitive, but advances in knowledge about the immune system, and how it might help kill cancer, have real applications for infectious diseases. "To me, a cancer cell and a virus-infected cell are one and the same," says Dr. Wayne Marasco, an immunologist at Harvard Medical School who is currently researching coronavirus treatments. The immune system, he adds, seems to think the same way. Which is a good reason to take Patrick Soon-Shiong seriously.

Born in Port Elizabeth, South Africa, in 1952, Soon-Shiong is no stranger to the intersection of the immune system, cancer and infectious disease. Having graduated from medical school at age 22, he focused his early surgical career on transplants and cancer, both of which involve a complex pas de deux with the immune system. Crossing disciplines, he says, led him to look at the "body as a system, not a single little cell. We are a biological system."

Such interdisciplinary thinking may be what led to the medicine that made his fortune: Abraxane, which took an existing chemotherapy drug, Toxol, but wrapped it in protein that made it easier to deliver to tumors. It's now used to treat advanced cases of lung, breast and pancreatic cancer. In 1998, to develop Abraxane, he purchased Fujisawa, a small, publicly traded business that sold injectable generic drugs. Soon-Shiong used its revenues to quickly move Abraxane through the regulatory process. The FDA approved it in 2005, and in 2007 Soon-Shiong split the business in two, spinning out a company called Abraxis that focused on the new cancer drug. He sold the generics business to Fresenius in 2008 for $4.6 billion. Two years later, he sold Abraxis to Celgene for $4.5 billion. Celgene, itself acquired by Bristol Myers Squibb in November 2019, reports that sales of Abraxane exceed $1 billion annually.

The complex business deals that went into Abraxane, however, left Soon-Shiong with "a reputation as more of a wheeler-dealer than a scientist," as we noted in 2014. Back then, he posted to Twitter under the grandiose handle @solvehealthcare, but today he simply uses his name. Over several recent Zoom conversations, he evinces very little showmanship. He's visibly tired, exhibiting the most excitement when he starts talking about intricate scientific details. "I'm burning out a little bit," he candidly admits, adding that he's been getting only about four to six hours of sleep a night since February. Over that time, he says, his companies have concentrated on both continuing to develop his cancer treatments and working to employ them against Covid-19. He peppers his statements about his company's approach to both cancer and the coronavirus with qualifiers about the results of pending studies, carefully avoiding seeming to overpromise.

Soon-Shiong has multiple interrelated businesses organized in a complex corporate structure that would have puzzled the Byzantines. But his Covid-19 efforts come from the two companies he founded that work on developing cancer immunotherapies: NantKwest, a publicly traded outfit based in San Diego, and the privately held ImmunityBio.

Cancer immunotherapy is based on the notion that the body's own immune system can be stimulated to treat the disease. That idea dates to the 19th century, when scientists first observed tumors getting smaller after patients developed a type of skin infection. This led to some of the first experiments in which the immune system of cancer patients was stimulated. Early efforts proved difficult to reproduce, though, and the field got sidetracked by advances in chemotherapy and radiation. Interest spiked anew in 1959, when a paper showed that the tuberculosis vaccine inhibited tumor growth in mice. After decades of intense research, the first cancer immunotherapy was approved by the FDA in 1986.

Other types of immunotherapies followed, ranging from purified antibodies that attack cancer to drugs that turn off the chemical switches that let tumor cells hide from the immune system. The latest advances involve CAR-T cell therapy, which first gained FDA approval in 2017 and involves genetically engineering immune cells from patients so that they attack certain targets found in tumor cells.

Founded in 2002, Soon-Shiong's company NantKwest focuses on developing so-called "natural killer" (NK) cells, which the immune system uses to destroy virally infected cells as well as early-stage tumors. The company has been working to develop a line of "off-the-shelf" NK cells called NK-92, which can be used to treat certain cancers as well as viral infections.

RINGO CHIU/ZUMA/NEWSCOM

Soon-Shiong at Nant's Los Angeles headquarters in 2017. "I see [the complexity of the immune system] like an orchestra, but the challenge is to separate the violin from the cello from the drums."

The company, which has yet to post any meaningful revenue, has lost nearly $400 million since it went public at $25 a share (a $2.6 billion market cap) in 2015. The stock has recently traded in the $10.50 range, off a bottom of around $1 a share in 2019. One reason for the stock's surge, says Jefferies analyst Biren Amin, is the company's reported research into the coronavirus pandemic. The second, he suggests, involves former Senator Reid's cancer treatment, which made use of the company's products.

Former Senator Harry Reid, pictured the same month he began treatment for pancreatic cancer with Soon-Shiong, says being in remission a few months later was "kind of like a miracle."

BILL CLARK/CQ ROLL CALL/GETTY IMAGES

Harry Reid, who represented Nevada in the upper chamber from 1987 to 2017, was diagnosed with pancreatic cancer in 2018 and started chemotherapy that July. He didn't respond well. "I was so sick they stopped the chemo" that October, he says. In July 2019, a scan of his liver showed that the cancer had spread. That meant his only option was more chemotherapy. Around the same time, Joe Kiani, founder and CEO of Irvine, California-based health IT company Masimo, met with Soon-Shiong to discuss acquiring $50 million worth of assets from NantHealth. During that initial meeting, the conversation turned to Soon-Shiong's other projects, which later led Kiani to phone the former senator. "I called up Harry and I said, 'Look, I just left this meeting. This person could have the cure. I don't know if he does, but what do you have to lose? Reach out to him and see what happens,'" Kiani recalls.

Two weeks later, Soon-Shiong and Leonard Sender, a doctor from NantKwest, were working with Reid, using treatments from NantKwest as well as Soon-Shiong's ImmunityBio. Those treatments aren't yet officially approved but were permitted under the FDA's compassionate-use rules. Reid was treated with a combination of Abraxane, NantKwest's natural killer cells and a drug from ImmunityBio called N-803, which stimulates the immune system to produce its own killer cells. Soon-Shiong compares it to the "triangle offense" often employed by the Lakers. In November 2019, Reid reported that his scans were completely clear, showing no signs of cancer. "I admire Dr. Soon-Shiong a great deal," he tells *Forbes*. "Both for what he's done for me personally and what he's done for the health-care delivery system in this country."

Reid's is an extraordinary story, as pancreatic cancer remains one of the deadliest forms of the disease. Within five years of diagnosis, it kills some 90% of patients, accounting for 7% of cancer deaths globally. *Jeopardy!* host Alex Trebek, who also suffers from pancreatic cancer, has received the same treatment, as have two other unidentified patients. But Sender cautions against declaring a cure. "It's too early to tell, because this is a very nasty form of cancer," he says. That's why NantKwest is now focused on a new randomized clinical trial, he adds, which is looking to recruit nearly 300 pancreatic cancer patients with advanced forms of the disease. Those who sign up will be given a course of treatment similar to the one Reid received.

As part of these treatments' development, Soon-Shiong has spent the past five years working with the National Cancer Institute. His companies have a collaborative agreement with the NCI involving several types of treatments, including NK-92 and N-803, as well as some vaccines against two kinds of tumors. Dr. Jeffrey Schlom, chief of the NCI's laboratory of tumor immunology and biology, recalls being in sync with Soon-Shiong from the start. "At our first official creative meeting, we presented our slides of our approach," he says. "And then he got up and presented his approach, and they were almost identical." Schlom's group has since published in peer-reviewed journals 15 papers regarding Soon-Shiong's treatments, in both preclinical and clinical settings.

Since February, NantKwest and ImmunityBio have redirected some of their attention toward the coronavirus pandemic, using a number of weapons in their collective arsenal. The first is a vaccine, based on the system Soon-Shiong's companies are developing for cancer, that has already shown positive results against Covid-19 in a study involving mice. It's also being studied in monkeys as a part of the federal government's "Operation Warp Speed."

As for human trials, Soon-Shiong says he's ready to go. "My timeline is now dependent on the FDA letting me get out of the gate," he says. "I'm in the gate, the bell hasn't rung and the racehorse is frothing at the mouth."

This vaccine is delivered to the body in a common cold virus called an adenovirus that has been stripped of all the parts that can cause harm to people or trigger the body to attack it. That modified virus contains two individual segments of the Covid-19 coronavirus: the spike protein, the surface protein on the virus that triggers an antibody response; and a nucleocapsid protein, which is found in the center of the virus. Most of the more than 100 vaccines that are currently in clinical development for Covid-19 focus on the spike protein to generate an immune response. Soon-Shiong thinks that won't be enough, though, which is why he's including the nucleocapsid protein. "My concern is that the spike protein mutates," he says. "It's mutated even through this pandemic."

Beyond potential mutations, another concern about merely eliciting an antibody response is that from the data seen so far, antibodies to the Covid-19 virus just don't last very long. Levels of antibodies in the blood are "really low after a few months," says Marasco, who's not associated with Soon-Shiong's companies or their vaccine research. "I think it's uncertain how long immunity will remain after successful vaccination." Using the nucleocapsid protein "couldn't hurt," he adds, and it could elicit not only antibodies but virus-killing T-cells as well.

The second weapon is the application of NantKwest's NK-92 and ImmunityBio's N-803 against Covid-19. NK-92 is being adapted to directly attack virus-infected cells, while the N-803 stimulates the patient's immune system to produce its own natural killer cells against the virus. The treatments might be used either together or separately depending on the particular patient, Soon-Shiong says. Human trials of these treatments have already begun. "It's a fantastic thing that they're applying them to infectious disease to see how patients fare," says Gigi Gronvall, an immunologist at Johns Hopkins Center for Health Security, who is not involved in the research. "The concept is great," she adds, cautiously, "but we need to see what the data says."

The third weapon NantKwest and ImmunityBio are developing to combat Covid-19 involves the use of mesenchymal stem cells, which are derived from bone marrow. This type of stem cell has been investigated over the past decade for diseases—like Covid-19—that can cause the body's immune system to go into overdrive and attack itself. This treatment would be for the most severely sick Covid-19 patients, who are experiencing a "cytokine storm," in which the immune system overreacts. Small-scale studies have suggested this might be an effective treatment, and several companies, including Melbourne, Australia–based Mesoblast, are already in late-stage clinical trials for severe Covid-19 patients. Soon-Shiong's companies are working with hospitals to recruit patients for human trials.

If Soon-Shiong's approaches to Covid-19 bear fruit in clinical trials, the next step may prove harder still: getting those treatments to needy patients. This is especially so for the vaccine, because at the moment neither NantKwest nor ImmunityBio has the resources to scale up manufacturing. "I'm now behind the eight ball," Soon-Shiong admits, "because there's no way I could have 100 million doses unless somebody supports me. Maybe I have a million doses or 2 million doses." He expresses some frustration at the government: "Billions of dollars are going to companies that have billions [in] revenues." He's not wrong about that. In July, pharma giant Pfizer (2019 revenue: $51.8 billion) received a $2 billion federal contract to manufacture a vaccine it's developing.

Things are brighter for the companies' N-803 and NK-92 products, as NantKwest has the ability to manufacture at scale, but these treatments will face certain competition from others being developed by a number of pharmaceutical companies. "I think there are a lot of alternatives that are more practical than a cellular therapy for an acute infectious disease," Marasco says, though he does acknowledge that the companies' plans to use stem cells against the more severe cases of disease have potential.

"My timeline is now dependent on the FDA. I'M IN THE GATE, THE BELL HASN'T RUNG and the racehorse is frothing at the mouth."

Despite his frustrations, Soon-Shiong appears determined to do his part in the healthcare industry's war against the coronavirus. "This is the crisis of our time," he says. "It's almost existential. The United States could have 20 to 30 million infected. You could have a million deaths—this is not a joke." F

MONEY-MAKING MEDICINE

PABLO LEGORRETA'S ROYALTY PHARMA MADE HIM BILLIONS, AND NOW HELPS BIG PHARMA FIND NEW CURES.

BY **NATHAN VARDI**

DAVID PAUL MORRIS/ BLOOMBERG

If discovering blockbuster drugs is the pinnacle of pharmaceutical industry success, then the next best thing is getting rich by earning pennies from every pill sold.

For 24 years, that is exactly what a little known Wall Street investor named Pablo Legorreta has been doing. Few have heard of him, but millions have benefited from the top selling drugs his company Royalty Pharma draws income from. Names like Humira for sufferers of Crohn's disease, Lyrica, the most successful anti-epileptic remedy and blood cancer treatment Imbruvica. The giant companies behind these drugs, names like Pfizer, Johnson & Johnson and AbbVie, do all the heavy lifting—producing and marketing the drugs while Legorreta sits back and collects his mailbox money.

In mid-June, the financial details of Legorreta's operation were publicly revealed for the first time when he sold $2.18 billion of stock in an initial public offering that valued Royalty Pharma at $16.7 billion, making it the biggest U.S. IPO so far this year in terms of funds raised. The company's prospectus revealed a trove of 45 different drug royalty streams including 22 where each is generating more than $1 billion in annual sales.

Legorreta's investment triumph highlights the biotechnology boom of the last two decades that has taken place against the backdrop of scientific advances and innovation, and the ever-increasing price of therapeutics. Last year, Royalty Pharma recorded $2.1 billion of cash receipts, which have compounded by 11% since 2012 on an annualized basis. *Forbes* estimates Legorreta's net worth is $2.9 billion.

Pablo Legorreta's immense wealth is testament to the effects of financial engineering on the drug development business—decried by many for encouraging soaring drug prices but also a necessary source of funding in the race to find cures for scourges ranging from Covid-19 to breast cancer. Through it all, Legorreta, 56, has remained nearly invisible, shunning interviews and public appearances. He declined to comment for this story, citing the quiet period that regulators mandate prior to IPOs.

Originally from Mexico, Legorreta studied industrial engineering at Mexico City's Universidad Iberoamericana but ultimately found his way to famed investment banking firm Lazard Frères where he put together mergers and acquisitions in Paris and New York. In 1996, Legorreta left to create his New York private equity firm to buy small stakes in the future revenues of novel therapeutics. In this way his plan was to provide respectable exits and liquidity to academic institutions and small companies that helped develop approved drugs, years before those drugs hit peak sales.

For the next seven years, Legorreta raised about $300 million from endowments and pensions for Royalty Pharma funds. Beginning in 2004 Legorreta expanded his operation and returns by cleverly employing debt to his drug royalty buying business. Securitizing pharmaceutical royalties and syndicating the debt allowed him to convert his investment partnership structure to a more permanent perpetual capital vehicle that did not have to cash-out its investors and could use cash it generated to fund new royalty acquisitions. Over the next seven years, Legorreta deployed $5.1 billion on such transactions.

As Legorreta's investment operation grew to manage $18.6 billion last year, he also started to purchase royalties related to drugs that were still in development and began funding research and development. That transformed Legorreta from merely being a drug toll collector into a direct source of capital for innovation. For example, in 2016, Royalty Pharma agreed to provide as much as $300 million to help fund two new clinical trials for Pfizer's Ibrance to determine if the blockbuster breast cancer drug could be effective in treating pre-metastatic disease.

Some of Legorreta's purchases have been home runs. In 2018 alone, Royalty Pharma collected $499 million of Humira's nearly $20 billion of sales, a royalty Legorreta acquired in 2006 for $700 million from AstraZeneca, when the drug generated $2 billion annually. Last year, nearly a fifth of Royalty Pharma's revenue, $349 million, came from its stake in Imbruvica's $8.1 billion of total sales. In 2013, Quest Diagnostics hastily sold its mid-single digit royalty on the worldwide sales of Imbruvica to Legorreta, four months before the drug was first approved by the U.S. Food and Drug Administration for the treatment of mantle cell lymphoma.

Like a typical leveraged buyout artist, Legorreta has benefited from gigantic fees, paid for by his partners. He is the sole owner of RP Management, the investment manager of Royalty Pharma. Last year, Legorreta was paid $28.5 million from the management fees RP Management received from Royalty Pharma, a SEC filing shows. He has also been paid performance fees otherwise known as carried interest over the years that in total were valued at $747 million at the end of last year.

Billionaire Legorreta is poised to become an even BIGGER FORCE IN THE U.S. PHARMACEUTICAL SECTOR as most of the proceeds from his IPO will be used to buy into more royalty streams.

BLOCKBUSTER REMEDIES AND THEIR BOUNTY

Two decades of opportunistic buying, and royalties ranging from 1.5% to 18% from top selling drugs, have turned Legorreta's Royalty Pharma into a cash machine. Below are 9 of the 45 drugs paying royalties to his company.

DRUG	THERAPEUTIC AREA	MARKETER	ROYALTY PHARMA'S 2019 ROYALTY RECEIPTS
Imbruvica	Blood cancer	AbbVie/J&J	271
Janauvia, Janumet	Diabetes	Merck	143
Letairis	Pulmonary arterial hypertension	Gilead	113
Lyrica	Neuropathic pain	Pfizer	128
Tecfidera	Multiple Sclerosis	Biogen	150
Trikafta, Kalydeco	Cystic Fibrosis	Vertex	425
Truvada, Genvoya	HIV	Gilead	263
Tysabri	Multiple Sclerosis	Biogen	333
Xtandi	Prostate Cancer	Pfizer/Astellas	120

FIGURES ARE IN $ MILLIONS
Source: SEC filing

The only problem with Legorreta's investment model has been that it has lacked an exit strategy. Royalty Pharma's most lucrative royalty streams are like annuities and for many years that income is protected by patents. But when those patents expire, Royalty Pharma's royalties typically fall off a cliff, as they did when Humira started to go generic in 2018. The patent-cliff nature of its business meant that Legorreta really could not sell Royalty Pharma's assets and cash-out his investors, or even himself. In order to make way for the IPO, Legorreta and a few of his senior partners borrowed billions in loans from a Wall Street bank as a pledge against a big chunk of their equity in the Royalty Pharma investment partnerships. The IPO restructured his investment partnerships by folding their assets into a new Royalty Pharma corporation.

As chief executive of a publicly traded company, Legorreta is now poised to become an even bigger force in the nation's pharmaceutical sector as most of the proceeds from his IPO will be used to buy into more royalty streams. His RP Management will continue to be paid what is essentially a management fee equal to 1% of assets under management and a performance fee or carry, that is 6.5% of adjusted cash receipts. Last year, the performance fee alone would have amounted to $137 million. In addition to Royalty Pharma, Legorreta also is a cofounder of Pharmakon Advisors, a $3 billion debt capital fund based in the same NYC offices, that provides loans to the life sciences industry. It has already provided sizable loans to companies like Sarepta Therapeutics and Optinose.

In his last major public appearance, at the Milken Institute conference in 2018, Legoretta gave attendees a glimpse of the future of biotech fueled by innovative financings, something he refers to as the "golden age." Said Legoretta, "There are so many different therapeutic classes that still require huge investment." F

ALVEO FORGES AHEAD

The innovative property developer is poised to spearhead growth in the commercial and office space with progressive urban designs in Metro Manila and beyond.

The Philippine economy is expected to bounce back with a vengeance next year as businesses recover their momentum. This means now is an opportune time to consider new investments on the horizon.

Alveo Land, one of the country's most respected and reliable names in real estate, is targeting visionary business investors with its extensive and strategic project portfolio. Banking on the heritage of its parent Ayala Land, the industry leader is forging ahead with innovative and exciting developments that are sure to make a lasting impact on the new business landscape.

Broadfield Commercial District

In the middle of Metropolitan Manila, Alveo shines with its award-winning **Stiles Enterprise Plaza**. This 29-story building is Alveo's flagship office-for-sale project in Circuit Makati, Ayala Land's booming riverside district that is the city's latest rising business address. Integrating eclectic office and lifestyle zones with dynamic workspaces, Stiles Enterprise Plaza is designed to provide an adaptable and inspirational environment for budding creatives, startups and entrepreneurs.

Ayala Land's Arca South development in Taguig City is emerging as a cutting-edge, technology-charged urban hub. Strategically located at the convergence of major business districts and transport corridors in Metro Manila, the estate's progressive urban design is complemented by verdant open spaces.

At the hub's gateway rises Alveo's **Tryne Enterprise Plaza**, another choice office-for-sale development offering flexible workspaces for future-focused businesses. With access to diverse retail destinations and lifestyle options, this master-planned estate is the next desirable business location for savvy urbanites.

Just outside Metro Manila, Alveo is contributing to the growth of emerging economic centers with **Broadfield**, Ayala Land's newest estate in the Calabarzon region. Its location is highly accessible to the game-changing Cavite-Laguna Expressway, a key corridor of the Metro Luzon Urban Beltway.

Stiles Enterprise Plaza

Broadfield's future-proof master plan upgrades the region to the next level, boasting green open spaces, pedestrian-friendly sidewalks, dedicated bike lanes and parks lined with shops and restaurants. This vibrant community will attract those seeking a healthy, invigorating environment to live, work and play in the south.

Multiple investment opportunities abound in the area—commercial land prices have quadrupled in the past 10 years. Leveraging the captive market of surrounding areas (including Laguna Technopark, multiple residential enclaves such as Alveo's Aveia and Venido, and De La Salle University Laguna), Broadfield's retail and commercial prospects are certain to take off as the estate progresses.

"On the road to recovery, we believe that we will see greater demand for developments that are greener, more spacious, adaptable and people-friendly," says Robert Lao, Alveo Land President. "Thankfully, these sensibilities align with the values and principles that guide the master-planning of all our communities. Alveo is more than ready to fulfill these needs as we anticipate a brighter and healthier future for us all."

ALVEO

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www.alveoland.com.ph

Hard Landing

LANCE GOKONGWEI IS FIGHTING ONE OF THE WORST CRISES EVER TO HIT HIS FAMILY'S JG SUMMIT.

BY **ROEL LANDINGIN**

PHOTOGRAPHS BY **SONNY THAKUR FOR FORBES ASIA**

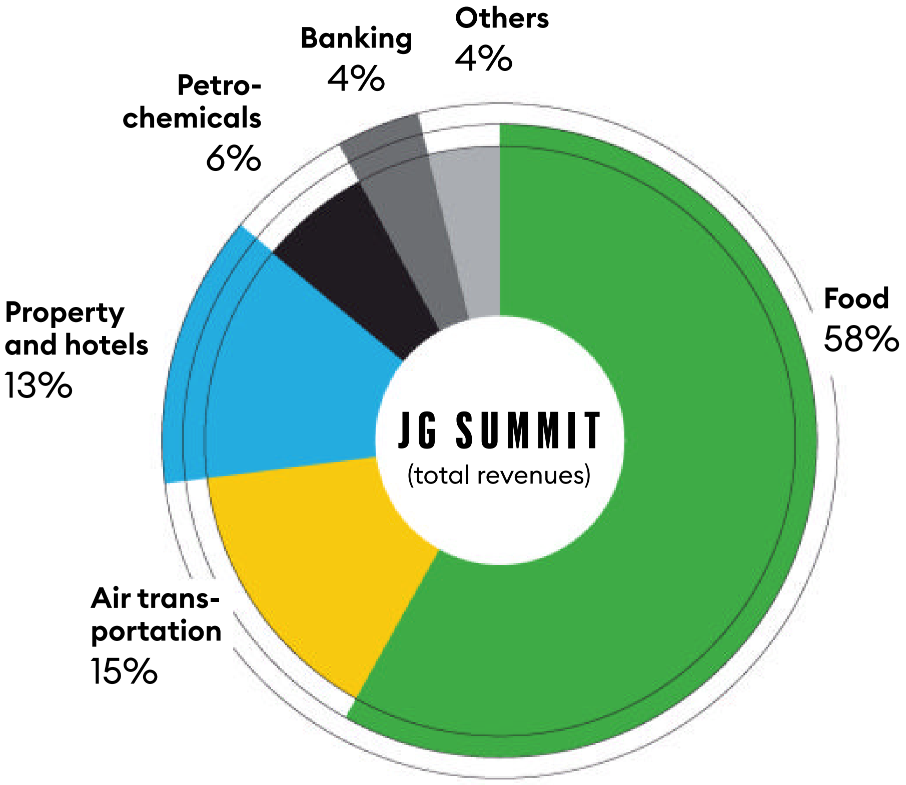
L**ance Gokongwei enters** a spacious but bare 43rd-story conference room at JG Summit Holding's headquarters, with downtown Manila stretched out below. Wearing a face mask, he offers an elbow bump in lieu of a handshake and then takes a seat behind a transparent acrylic barrier for extra safety. The 53-year-old CEO of JG Summit, the Philippines' third-largest company by market cap, puts a positive spin on Covid-19 reality. "It opened my eyes to a new way of working," he says, adding that he's now a fan of virtual meetings. This July interview is the first he's given since the death in November of his father, John Gokongwei Jr., the company's founder.

That loss was followed by another blow a few months later, when the pandemic struck and forced him to navigate one of worst crises in the company's 30-year history. In JG Summit's first half results to June, released in mid-August, revenues fell 26% year-on-year to 117 billion pesos ($2.4 billion), leaving the company with a net loss of 720 million pesos, down from a profit of 17 billion pesos a year ago. Prospects are dismal for the rest of the year, with the economy of the Philippines, where JG Summit makes most of its profits, expected to shrink by up to 8% this year. Despite the turmoil, Lance and his five sisters still have a combined fortune of $4.1 billion, putting them as No. 4 on the Philippines' 50 Richest list.

Summing Up

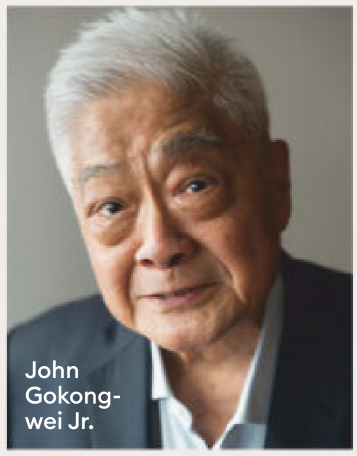
JG Summit gets most of its revenues from five businesses.

(PERCENT OF TOTAL FIRST-HALF 2020 REVENUES)



SOURCE: JG SUMMIT HOLDINGS

FOUNDING FATHER



Like many Chinese-Filipino tycoons who built their fortunes after World War II, John Gokongwei Jr. began with trading. He built a profitable business buying and selling goods during the war years, then spent the next decade making annual trips to the U.S. to buy secondhand clothes and other goods in demand back home.

He shifted to manufacturing in the mid-1950s with a factory to make cornstarch, an ingredient needed for beer, noodles, drugs and paper. In the 1960s, he diversified into food products, including coffee, flour, snack food, ice cream and candies, and became one of the country's biggest food manufacturers with Universal Robina Corp (URC). The next decades marked his expansion into textiles, hotels, department stores and sugar refining.

His entrepreneurial drive didn't wane even when he was in his late 60s and his various companies were known as the Gokongwei group. He launched Cebu Air when he was 70 and planning his retirement. At age 78, he initiated the launch of what became one of URC's bestsellers, a bottled tea drink branded C2. His managers balked initially and argued the Philippines was not a nation of tea drinkers. Gokongwei prevailed. Until he died at age 93, he kept a connection to the company, with his long-held title of chairman emeritus. The younger Gokongwei sums up his father's ethos: "You have to continue to be hungry."

The losses at JG Summit, however, were selective. Of its five main businesses—an airline, financial services, food production, petrochemicals and property—three turned a half-year profit. But those gains weren't enough to offset losses elsewhere—more than half came from Cebu Air, which flies the regional budget carrier Cebu Pacific. The airline lost 9 billion pesos in the first half versus a 7 billion net profit a year earlier.

Thus Lance's main focus is to stop the bleeding at the airline, as the company's financial future now rests on reversing losses there. It's a daunting challenge. Following a three-month lockdown in parts of the country, Cebu Pacific remains almost completely grounded, operating at about 2% capacity versus a normal 75%. Cebu Air's revenue in the first half of the year slumped 61% from a year ago to 17 billion pesos. "You just cannot operate in an environment where you have four months of zero revenue. And foreseeably for the next—we don't know—four, six, eight months, one year, there [will be] no revenue," Gokongwei says. "There is no economic model for that."

Gokongwei's rescue plan? So far, he has laid off about a quarter of the airline's staff (about 1,000 employees) since mid-March, scaled down the airline's operations and shelved expansion efforts. To save cash, which halved to 9.7 billion pesos on its books in the first half, Cebu Air will cut capital expenditure by more than 70%, to 8.3 billion pesos, this year. To further trim costs, it has sent 14 of its 77 planes for storage in Australia.

"We're preparing for a much smaller future," says Gokongwei, projecting the airline will operate at half its previous capacity by mid-2021 and won't recover completely until 2023 at the earliest. Meanwhile, the company is preparing to raise fresh funds, he says, but declined to disclose details.

Before the pandemic, Cebu Air was one of Asia's most profitable budget airlines, earning 9 billion pesos for full-year 2019, a fat 11% margin on 85 billion pesos revenues. Its debt-to-equity ratio is a low 2.2 (AirAsia's ratio is 6.4). These figures mean Cebu Air is better positioned to weather the pandemic than some of its Asian rivals, says analyst Brendan Sobie at Sobie Aviation in Singapore. "The bad news is every airline is extremely impacted right now. Even those airlines that have a good long-term growth story have short-term pressures," he says.

SONNY THAKUR FOR FORBES ASIA

O rchestrating an airline turnaround wasn't on Gokongwei's radar back in January—instead he says he had been working on a growth plan for JG Summit. Such ambition is typical for Gokongwei, the only son in a brood of six. His father groomed him for years for succession. He excelled in his studies, graduating summa cum laude from the University of Pennsylvania with a double degree in engineering and economics—finishing the program six months early. "He really struck me as someone who knew right away what was important in a particular subject," says Dennis Mendiola, the former governor of the Philippine Red Cross who was a year behind Lance at the University of Pennsylvania.

Gokongwei joined the family business in 1988 after graduating, working a variety of posts to learn about the company. He recalls driving around Manila in a delivery truck, followed closely by bodyguards in a separate car as a precaution against kidnapping. (His elder sister had been kidnapped years before and rescued by the police). "They're trying to act inconspicuous behind you but it's pretty obvious," he says. After that, he worked mainly at the head office, "just shadowing" his father and uncle, James Go, the company's long-time chairman.

In 1996, his father decided to launch an airline and asked Gokongwei, then 30, to head it. "He came to my office one day and said, 'Hey Lance, I just bought four aircraft. Do you know anyone who can run an airline?'" Gokongwei recalls. The airline was his father's big bet on public demand for cheap, no-frills flying in an archipelago nation. The strategy paid off. Cebu Air soon overtook full-fare flag carrier Philippine Airlines, and now holds over a 50% share for domestic passengers flown. Over the years, Cebu Air also added international destinations.

Though the airline is a major focus, Gokongwei is also trying to pandemic-proof the entire company by raising cash and accelerating digitalization efforts. In July, JG Summit went to the global bond market for the first time in seven years, raising $600 million through a 10-year fixed-rate note. For digitalization, Gokongwei actually started implementing a strategy two years ago, but the pandemic turbocharged this effort.

"Because of the [lockdown], both our drug store and supermarket [businesses] were able to launch their e-commerce sites within two months," he says, explaining that with physical stores closed, the firms could focus on more quickly building the platforms. Over the past three years, JG Summit has also branched into investing in tech startups in the region, buying minority stakes in Singapore's Sea Ltd. and Hong Kong-based fintech Oriente.

While Gokongwei is unsure when things will normalize—Covid-19 cases in the Philippines continue to rise—he's confident in the country's long-term prospects. He's betting on a continual rise in local consumer spending. "We're going to invest in areas which will benefit from the growing middle class in the Philippines, so basically consumer businesses [and] utility businesses that benefit from growing consumer purchasing power," he says. JG Summit's financial clout, diversified operations and scale will enable it to survive the pandemic and eventually thrive, says Niceto Poblador, a retired business professor from the Philippines.

Meanwhile, Gokongwei wants to get more Cebu Air's planes flying, and has been enticing customers with discounts. But in early August, Manila's main airport closed unexpectedly for two weeks—a disruption that Gokongwei shrugs off as the new normal. "You have to work in a very agile way," he says. F

Lance Gokongwei in his office, next to a bronze bust sculpture of his father.

TURBULENT TIMES

The total wealth of the Philippines' 50 Richest fell 22% as the pandemic disrupted the economy.

BY **GRACE CHUNG**

Edgar Sia II was this year's biggest gainer

Despite one of the world's strictest lockdowns—an 80-day quarantine imposed in March for Metro Manila and elsewhere in the Philippines—Covid-19 cases nationwide surpassed 250,000 in September, Southeast Asia's highest number of cases. The country's benchmark stock index, the PSEi, reflected the economic challenges the pandemic poses, falling 26% since fortunes were measured a year ago. The collective wealth of the Philippines' 50 Richest dropped to \$60.6 billion from \$78 billion a year earlier.

A total of 32 listees saw their net worths decline. The **Sy siblings** took the biggest hit in dollar terms but remain at No. 1 with \$13.9 billion. Their fortune was down by \$3.3 billion amid a contracting economy and soaring unemployment. Property tycoon **Manuel Villar** suffered a \$1.6 billion drop in his net worth to \$5 billion but held on to his rank as the country's second-richest.

Banking fortunes were especially hard hit. The **Ty siblings** of GT Capital and Metrobank shed 46% of their fortune, to \$1.4 billion. **Frederick Dy** was down more than 46% to \$190 million as shares in his Security Bank fell 52% over the past year.

Oscar Lopez, who holds a majority stake in TV network ABS-CBN, saw his net worth nearly halve to \$240 million after Philippine lawmakers in July rejected the company's bid to renew its 25-year broadcast license; the shares have lost close to 65% of their value over the past year.

Of the 10 listees whose fortunes rose, **Edgar Sia II** was this year's biggest gainer in both percentage and dollar terms. He added \$300 million, or 75%, to his net worth, which is now \$700 million. That rise was partly due to the successful IPO of his MerryMart in June; shares of the grocer have nearly doubled since the listing as quarantine measures boosted sales.

Six names dropped off the list, including Edgar Saavedra of Megawide Construction. Megawide's shares fell by more than 65% after reporting a first-half net loss of 398 million pesos (\$8 million). Megawide's cofounder **Michael Cosiquien**, however, stayed on the list as most of his wealth is tied to an earlier sale of the company's shares. The estate of San Miguel's Eduardo Cojuangco, who died in June, was inherited by his wife, **Soledad Oppen-Cojuangco**, who came in at No. 16; she shares the fortune with their four children—Carlos, Luisa, Margarita and Mark.

Similarly, **Lance Gokongwei** and his siblings debuted on the list at No. 4, replacing their father John Gokongwei Jr., who died in November 2019. Lance Gokongwei shares the fortune with his five sisters: Faith, Hope, Lisa, Marcia and Robina.

Four returned to the ranks: **Mikel Aboitiz, Lourdes Montinola, Michael Romero** and **Luis Virata**; their comeback was largely due to this year's lower cutoff, which fell 23% from last year's list to \$100 million.

Reporting by Grace Chung, John Kang, Sean Kilachand, Anuradha Raghunathan, Anis Shakirah Mohd Muslimin and Yue Wang.

METHODOLOGY

The list was compiled using information from the individuals, stock exchanges, analysts, private databases, government agencies and other sources. Net worths were based on stock prices and exchange rates as of the close of markets on August 28, 2020. Private companies were valued by using financial ratios and other comparisons with similar publicly traded companies. Since 2017, we're no longer including families in which the founder of the business has died, unless the successors are wealthy enough to make the cutoff individually; in these cases, we combine the inherited fortunes.

SONNY THAKUR FOR FORBES ASIA

Not So Jolly

TONY TAN CAKTIONG

Fast food billionaire Tony Tan Caktiong suffered a pandemic-induced blow to his wealth this year. While nearly 90% of his Jollibee eateries had reopened by the end of June, most were limited to delivery and takeout. The lack of dine-in service cut sales by nearly half and sent Jollibee's shares down more than 40%, dropping Tan Caktiong's net worth by 37% to $1.9 billion.

That's a far cry from 2018, when Tan Caktiong was quoted as saying he wanted Jollibee to be the world's largest food company. While the company operates more than 3,300 outlets in the Philippines and over 2,500 overseas—including U.S.-based chains Smashburger and Coffee Bean & Tea Leaf—it's had to shutter close to 70 outlets overseas. His home market is also suffering. "Lockdowns significantly affected the Philippine business where the bulk of revenues still come from dine-in sales," says DBP-Daiwa Capital Markets analyst Renzo Candano in Manila.

"We have a lukewarm view on Jollibee and other consumer companies that are dependent on discretionary spending and nonessential foot traffic," says Philippine National Bank research head Alvin Joseph Arogo. The bank forecasts Jollibee's net loss at 7.8 billion pesos ($159 million) this year. The company declined to comment. To offset its challenges, Jollibee hopes to expand its use of cloud kitchens—after opening its first one in the UAE in March. —*Grace Chung*

JULIAN ABRAM WAINWRIGHT/ONASIA.COM FOR FORBES

CHANGE IN WEALTH KEY: ▲ UP ▼ DOWN ◀▶ UNCHANGED ★ NEW TO THE LIST ↩ RETURNEE

PHILIPPINES' 50 RICHEST

1. SY SIBLINGS
$13.9 BILLION ▼
SM INVESTMENTS

2. MANUEL VILLAR
$5 BILLION ▼
GOLDEN BRIA
AGE: 70

3. ENRIQUE RAZON JR.
$4.3 BILLION ▼
INTERNATIONAL CONTAINER TERMINAL SERVICES
AGE: 60

4. LANCE GOKONGWEI & SIBLINGS
$4.1 BILLION ★
JG SUMMIT

5. JAIME ZOBEL DE AYALA
$3.6 BILLION ▼
AYALA CORP.
AGE: 86

6. ANDREW TAN
$2.3 BILLION ▼
ALLIANCE GLOBAL
AGE: 71

7. LUCIO TAN
$2.2 BILLION ▼
LT GROUP
AGE: 86

8. RAMON ANG
$2 BILLION ▼
SAN MIGUEL
AGE: 66

9. TONY TAN CAKTIONG
$1.9 BILLION ▼
JOLLIBEE
AGE: 67

10. LUCIO AND SUSAN CO
$1.7 BILLION ▼
PUREGOLD PRICE CLUB
AGES: 65, 62

PHILIPPINES' 50 RICHEST

11. MERCEDES GOTIANUN
$1.5 BILLION ▼
FILINVEST DEVELOPMENT
AGE: 92

12. TY SIBLINGS
$1.4 BILLION ▼
GT CAPITAL HOLDINGS

13. VIVIAN QUE AZCONA & SIBLINGS
$1.34 BILLION ▲
MERCURY DRUG

14. ISIDRO CONSUNJI & SIBLINGS
$1.3 BILLION ▼
DMCI

15. ROBERTO ONGPIN
$1.2 BILLION ▼
ALPHALAND
AGE: 83

16. SOLEDAD OPPEN-COJUANGCO
$1.15 BILLION ★
SAN MIGUEL
AGE: 82

17. RICARDO PO SR.
$1 BILLION ▲
CENTURY PACIFIC FOODS
AGE: 89

18. INIGO ZOBEL
$990 MILLION ▼
AYALA CORP.
AGE: 63

19. WILLIAM BELO
$900 MILLION ▲
WILCON DEPOT
AGE: 75

From left to right: Isidro A. Consunji, Jorge A. Consunji, Luz Consuelo A. Consunji and Maria Cristina C. Gotianun.

DMCI HOLDINGS

Battening Down

CONSUNJI SIBLINGS

The Consunji siblings—Isidro, Jorge, Josefa, Luz, Maria Cristina and Maria Edwina—face a serious challenge. The family's DMCI is in many businesses badly hit by the pandemic: construction, mining, property development and power generation.

In first half results to June, released in August, DMCI said net profit fell almost 70% to 2 billion pesos ($41 million) as property earnings fell by 97% and earnings from mining by almost two-thirds.

DMCI's share price has dropped more than 50% over the past 12 months, bringing the family fortune down 35% to $1.3 billion. Isidro, who at 72 is DMCI's chairman and CEO, said in an August stock exchange filing that DMCI was "severely affected" by low market prices. "We expect weak demand and low selling prices to affect most of our businesses," he said during an online media briefing in July.

To offset losses, the company has cut capital expenditures, including land purchases, says a DMCI spokesperson. At the July briefing, Isidro said he is looking for a recovery next year. "Hopefully, the government will relax on its permits, [particularly] permits in the area of mining," Isidro said. "That will be a very big boost immediately." *—Yue Wang*

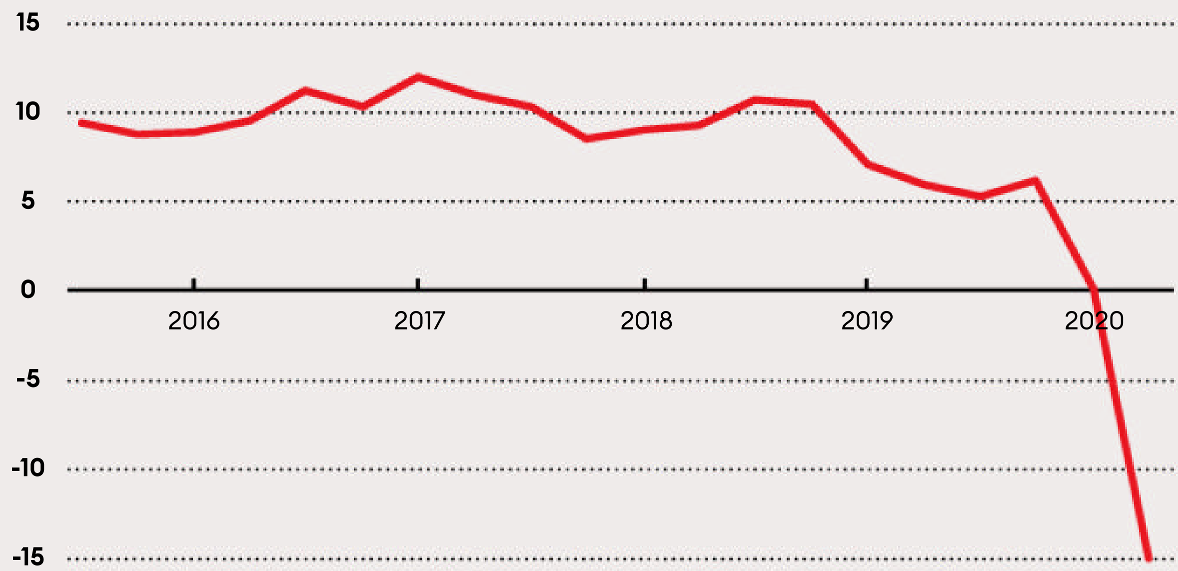
Wealth Creation

Contracting Trend

The global pandemic has hit the Philippines hard. For the first time in five years, the country's GDP growth is negative and the unemployment rate spiked to over 17% in the first quarter.

Negative Territory

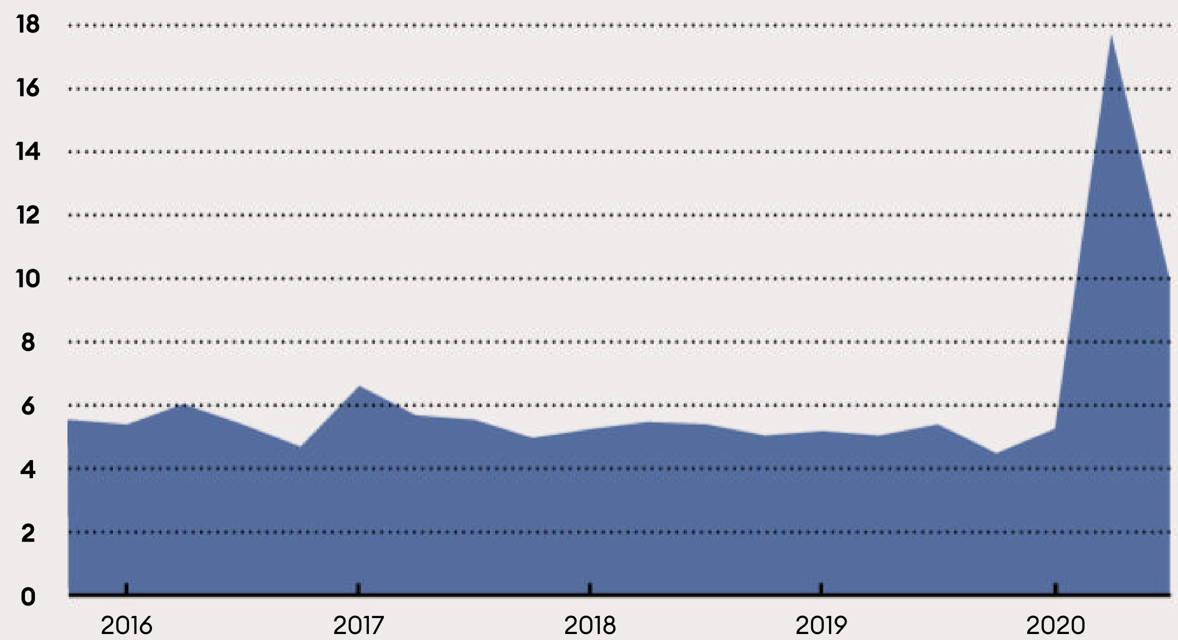
Quarterly GDP growth year-on-year was negative for the first time in five years.



SOURCE: PHILIPPINE STATISTICS AUTHORITY

Jobless Spike

The unemployment rate has been around 5% since 2016–until this year.



SOURCE: PHILIPPINE STATISTICS AUTHORITY

20. ROBERT COYIUTO JR.
$890 MILLION ▼
PRUDENTIAL GUARANTEE & ASSURANCE
AGE: 67

21. EDGAR SIA II
$700 MILLION ▲
DOUBLEDRAGON PROPERTIES
AGE: 43

22. DENNIS UY
$650 MILLION ▼
UDENNA
AGE: 46

23. CAMPOS SIBLINGS
$600 MILLION ▼
UNILAB

24. DEAN LAO
$500 MILLION ▼
D&L INDUSTRIES
AGE: 61

25. JACINTO NG
$490 MILLION ▲
ASIA UNITED BANK
AGE: 78

26. MARIANO TAN JR.
$350 MILLION ◀▶
UNITED LABORATORIES
AGE: 58

27. DELFIN J. WENCESLAO
$340 MILLION ▼
D.M. WENCESLAO & ASSOCIATES
AGE: 76

28. TOMAS ALCANTARA
$300 MILLION ◀▶
ALSONS CONSOLIDATED RESOURCES
AGE: 74

29. MANUEL ZAMORA JR.
$280 MILLION ▼
NICKEL ASIA
AGE: 81

30. CARLOS CHAN
$260 MILLION ▼
OISHI
AGE: 79

CHANGE IN WEALTH KEY: ▲ UP ▼ DOWN ◀▶ UNCHANGED ★ NEW TO THE LIST RETURNEE

PHILIPPINES' 50 RICHEST

31. **WILFRED STEVEN UYTENGSU JR.**
$250 MILLION ▲
ALASKA MILK
AGE: 58

32. **OSCAR LOPEZ**
$240 MILLION ▼
ABS-CBN CORP.
AGE: 90

33. **P.J. LHUILLIER**
$230 MILLION ▲
CEBUANA LHUILLIER
AGE: 75

34. **JORGE ARANETA**
$220 MILLION ▼
ARANETA GROUP
AGE: 84

35. **ALFREDO YAO**
$210 MILLION ▼
MACAY HOLDINGS
AGE: 76

36. **EUSEBIO TANCO**
$200 MILLION ▼
STI EDUCATION SYSTEM
AGE: 71

37. **FREDERICK DY**
$190 MILLION ▼
SECURITY BANK
AGE: 65

38. **BETTY ANG**
$185 MILLION ▲
MONDE NISSIN

39. **JOSE ANTONIO**
$180 MILLION ▼
CENTURY PROPERTIES
AGE: 73

Felipe Gozon (left) and Menardo Jimenez of GMA Network

Split Screen

FELIPE GOZON, MENARDO JIMENEZ, OSCAR LOPEZ

The Philippine government's decision earlier this year to force the country's top TV network ABS-CBN off the air hit the fortune of the network's 90-year-old owner Oscar Lopez, but was a boon to the owners of its biggest rival GMA Network—Felipe Gozon, 80, and his brother-in-law Menardo Jimenez, 87.

Lopez's net worth fell 48% to $240 million this year after the government failed to renew ABS-CBN's 25-year free-to-air broadcast license. The network stopped broadcasting May 5, the day after its license expired, sending its shares down 58% by late August. The company was still allowed to launch a free-to-air family entertainment channel in June, and operate its other businesses, such as cable, internet and amusement centers.

Shares of GMA jumped on the news but have since erased those gains. Gozon's fortune is up 17% to $170 million, although Jimenez' net worth fell 4% to $125 million. After ABS-CBN failed to air one of his 2016 campaign ads, Philippine President Rodrigo Duterte last December vowed to force it off the air. A congressional committee in March began reviewing ABS-CBN's license renewal application but failed to reach a decision before the license expired in May. In July, the committee rejected ABS-CBN's application, saying it had violated the terms of the license. ABS-CBN didn't respond to requests for comment but it has publicly denied the allegations. GMA also did not respond to a request for a comment. *—John Kang*

Oscar Lopez of ABS-CBN

LOPEZ: LOPEZ HOLDINGS; GOZON AND JIMENEZ: COURTESY OF GMA NETWORK

CHANGE IN WEALTH KEY: ▲ UP ▼ DOWN ◄► UNCHANGED ★ NEW TO THE LIST RETURNEE

Real Estate

Hope Floats

SOME LISTEES ARE TAKING THEIR COMPANIES PUBLIC AMID A MARKET SLUMP.

MerryMart grocery store in DoubleDragon Plaza.

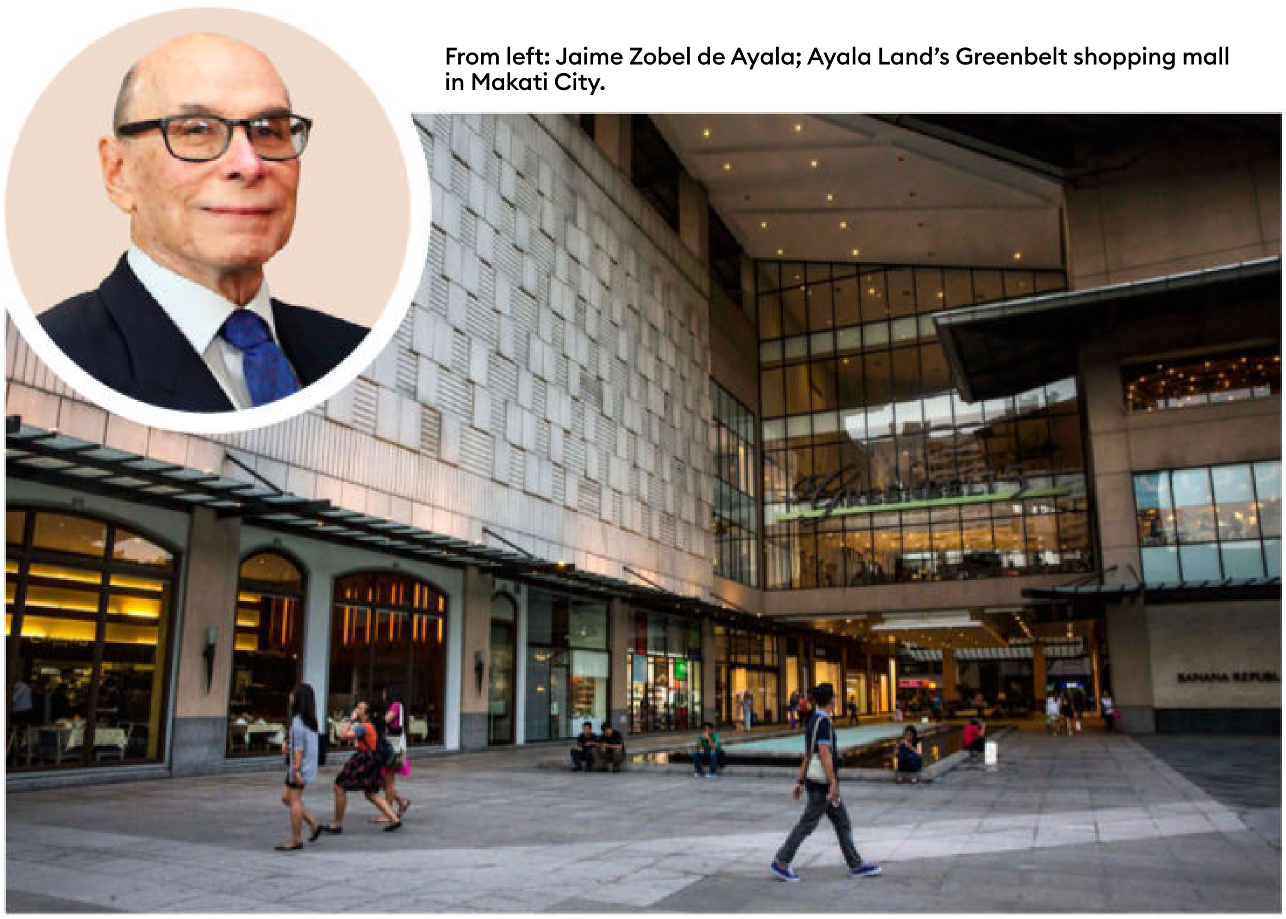
Despite the benchmark PSEi declining 26% over the past year, some of the Philippines' wealthiest remain bullish and are taking their companies public or have vowed to do so this year. Ayala Land, controlled by Jaime Zobel de Ayala and his family, made history on August 13 by listing the country's first-ever REIT, the AREIT, raising 13.6 billion pesos ($278 million). The stock's price has stagnated, however, since its IPO.

The lackluster performance isn't denting optimism. "Being the first to list a REIT in the Philippines has its advantages, especially when it comes to market perception, so Ayala Land would have wanted to capitalize on that opportunity," says Regina Capital analyst Anna Corenne Agravio in Manila. "Over the long term, it's been proven historically that the [real estate] industry has been quicker to rebound."

While legislation allowing REITs to list was passed more than a decade ago, recent changes that eliminated taxes and relaxed regulations attracted property developers and investors. "It's going to be less volatile because they are giving away 90% of earnings as dividends," says Maybank ATR analyst Romel Francis Libo-on. "It's a safer bet for investors."

A second REIT listing is slated for October from DoubleDragon's Edgar Sia II. His grocery chain MerryMart went public in June—the PSE's first IPO this year—raising 1.6 billion pesos. The stock has since almost doubled, buoyed by strong pandemic-fueled demand for consumer essentials. "It's a rare chance for a new player to quickly grow in a shorter span of time than it would in good times," said Sia in an email; his net worth jumped 75% to $700 million.
—*Grace Chung*

From left: Jaime Zobel de Ayala; Ayala Land's Greenbelt shopping mall in Makati City.



TAYLOR WEIDMAN/BLOOMBERG

FOR MORE INFO, GO TO FORBES.COM/PHILIPPINES

40. MICHAEL COSIQUIEN
$175 MILLION ▼
MEGAWIDE CONSTRUCTION
AGE: 46

41. JOSE MA. CONCEPCION
$174 MILLION ▼
CONCEPCION INDUSTRIAL
AGE: 62

42. FELIPE GOZON
$170 MILLION ▲
GMA NETWORK
AGE: 80

43. JULIETTE ROMUALDEZ
$160 MILLION ▲
BANCO DE ORO
AGE: 84

44. ERRAMON ABOITIZ
$150 MILLION ▼
ABOITIZ EQUITY VENTURES
AGE: 64

45. PHILIP ANG
$140 MILLION ▼
NICKEL ASIA
AGE: 79

46. MICHAEL ROMERO
$135 MILLION
GLOBALPORT 900
AGE: 47

47. MENARDO JIMENEZ
$125 MILLION ▼
GMA NETWORK
AGE: 87

48. LUIS VIRATA
$115 MILLION
NICKEL ASIA
AGE: 66

49. MIKEL ABOITIZ
$110 MILLION
ABOITIZ EQUITY VENTURES
AGE: 66

50. LOURDES MONTINOLA
$100 MILLION
FAR EASTERN UNIVERSITY
AGE: 92

Robinhood cofounders Baiju Bhatt (left) and Vladimir Tenev

ILLUSTRATION BY **LARS LEETARU**

THE BARONS OF CASINO CAPITALISM

By hooking disillusioned Millennials on its zero-commission, gamified trading app, **ROBINHOOD** has forever changed the retail brokerage business. "Democratizing finance" is the stated goal, but its founders have become billionaires by leading a new generation of rubes right into the jaws of Wall Street's most notorious sharks.

BY **JEFF KAUFLIN, ANTOINE GARA** AND **SERGEI KLEBNIKOV**

WELCOME TO THE STOCK MARKET, ROBINHOOD-STYLE.

It's just after midnight on Friday, July 31, and the Todd Capital Options Community, a $20-per-month subscription Slack channel favored by thousands of novice options traders, is buzzing with life. For weeks, the club's youthful members have been loading up on speculative call options using the mobile trading app Robinhood.

Unemployment is soaring and governments worldwide are desperately trying to fend off economic collapse. But members of this online enclave are partying, quite literally, like it's 1999—the infamously frothy day-trading year before the dot-com bubble burst in March 2000. Despite the pandemic, Amazon, Apple, Facebook and Google have just released jaw-dropping financial results, a staggering $205 billion in combined quarterly sales and $34 billion in earnings during a stretch when U.S. gross domestic product plunged at an annualized rate of 33%. Now the Todd Capital Options Community members are ready to cash in their options bought through Robinhood.

Baiju Bhatt (left) and Vladimir Tenev (pictured in 2015) met as physics students at Stanford. Even the best modeling could not have predicted that $1,200 stimulus checks would propel them to billionaire status.

"Literally, NOTHING will make me sell my AMZN 10/16 calls tomorrow. I don't care what happens. . . . I'm holding everything. Keep ya boi in your prayers," says one user named JG. As dawn approaches, "NBA Young Bull" announces: "Good morning future millionaires . . . is it 9:30 yet?"

For these speculators, the adrenaline rush turned to euphoria after Apple not only beat earnings expectations but announced a 4-for-1 stock split, luring more small investors to the iPhone maker's stock party. At 9:30 a.m. Friday, when trading begins, the call options on Apple and Amazon held by many of these market newbies pay out like Las Vegas slot machines hitting 7-7-7 as both tech giants gain a collective quarter-trillion dollars in market value. Throughout the day and over the weekend, a stream of posts scroll by from exuberant Robinhood traders going by screen names like "See Profit Take Profit" and "My Options Give Me Options." On Monday, August 3, the Nasdaq index sets a new record high.

Since February, as the global economy collapsed under the weight of the coronavirus pandemic, millions of novices, armed with $1,200 stimulus checks and nothing much to do, have begun trading via Silicon Valley upstart Robinhood—the phone-friendly discount brokerage founded in 2013 by Vladimir Tenev, 33, and Baiju Bhatt, 35.

The young entrepreneurs built their rocketship by applying the formula Facebook made famous: Their app was free, easy to use and addictive. And Robinhood—named for the legendary medieval outlaw who took from the rich and gave to the poor—had a mission even the most woke, capitalism-weary Millennial could get behind: to "democratize finance for all."

Covid-19 and the flow of government handouts have been manna from heaven for Robinhood. The firm has added more than 3 million accounts since January, a 30% rise, and it expects revenue to hit $700 million this year, a 250% spike from 2019, according to a person familiar with the private company's finances. Not since May Day 1975, when the SEC deregulated brokerage commissions, giving rise to discount brokerages like Charles Schwab, has there been a more disruptive force in the retail stock market. Robinhood's commission-free trading is now standard at firms including TD Ameritrade, Fidelity, Schwab, Vanguard and Merrill Lynch.

And Robinhood's merry traders are moving markets: Certain stocks—Elon Musk's Tesla, marijuana conglomerate Cronos, casino operator Penn National Gaming and even bankrupt car-rental company Hertz—have become favorites, swinging wildly on a daily basis. For the first time ever, according to Goldman Sachs, options speculators like the ones Robinhood has cultivated have caused single-stock option-trading volumes to eclipse common-stock trading volumes, surging an unprecedented 129% this year.

"I think you've seen a unique situation in the history of financial markets," Tenev tells *Forbes*, working remotely from his home not far from Robinhood's Menlo Park, California, headquarters, which resemble a beach house. "Typically when a market crash is followed by a recession, retail investors pull out. Institutions benefit. . . . In this

ROBINHOOD

case, Robinhood customers started opening new accounts and existing customers started putting in new money. This bodes positively for society and our economy if millions are investing when they otherwise wouldn't have."

Like any skilled trader, Tenev is talking his book. His proclamations ring a bit hollow, though, once you look more closely at what is actually driving his digital casino. From its inception, Robinhood was designed to profit by selling its customers' trading data to the sharks on Wall Street who have spent decades—and made billions—outmaneuvering investors. In fact, an analysis reveals that the more risk Robinhood's customers take in their hyperactive trading accounts, the more the Silicon Valley startup profits from the whales it sells their orders to. And while Robinhood's successful recruitment of inexperienced young traders may have inadvertently minted a few new millionaires riding the debt-fueled bull market, it is also deluding an entire generation into believing that trading options successfully is as easy as leveling up on a video game.

Stock options are contracts to buy or sell underlying shares of stocks for a set price over a specified period of time, typically at a fraction of the cost. Given their complexity, options trading has long been the realm of the most sophisticated hedge funds. In 1973, three Ph.D.s—Fisher Black, Myron Scholes and Robert Merton—developed an options pricing model that eventually won them the Nobel Prize in economics. Today their mathematical model, and variations of it, are easily incorporated in trading software so that setting up complicated—and risky—trades is no more than a few clicks away. Even so, making wrong bets is easy. According to the Options Clearing Corporation, more than 20% of all options trades expire worthless versus 6% "in the money."

In June, Robinhood witnessed firsthand what can happen when such tools are marketed to inexperienced investors. While it's impossible to discern every factor contributing to suicide, one of Robinhood's new customers, a 20-year-old college student from Illinois named Alexander Kearns, took his own life after mistakenly thinking that one of his options trades put him in debt to Robinhood for more than $730,000. His death prompted questions from several members of Congress about the platform's safety.

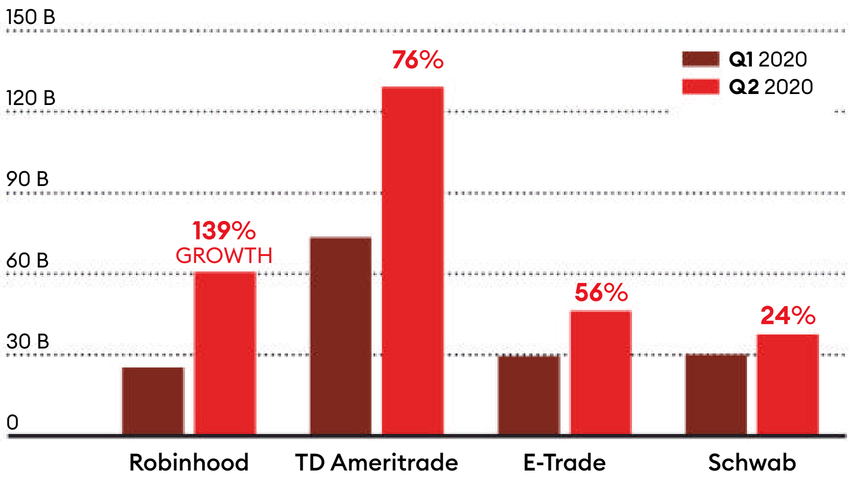
Despite these problems, millions continue to flock to the addictive app, and Tenev and Bhatt sit on a potential gold mine reminiscent of Facebook in its pre-IPO days. Amid its Covid-19 business surge, Robinhood has raised $800 million from venture investors, ultimately giving it a staggering $11.2 billion valuation, affording its cofounders a paper net worth of $1 billion each. But in light of Morgan Stanley's success with its $13 billion acquisition of E-Trade in February and Schwab's earlier purchase of TD Ameritrade for $26 billion, some think Robinhood could garner a $20 billion valuation if it went public or were acquired.

The problem is that Robinhood has sold the world a story of helping the little guy that is the opposite of its actual business model: selling the little guy to rich market operators with very sharp elbows.

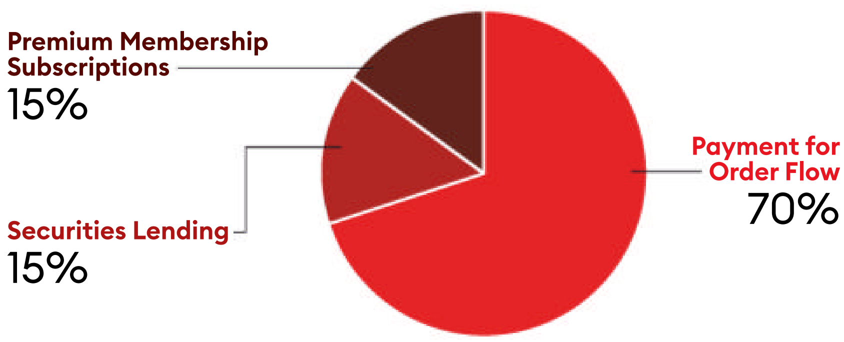
LORD OF THE BUYS

THE COVID-19 BULL MARKET HAS BEEN A GODSEND FOR RETAIL BROKERS, BUT ROBINHOOD AND ITS SWARM OF NEWBIE TRADERS ARE SCHOOLING THE COMPETITION.

Trading Volume at Online Brokerages (Number of Shares)



Robinhood Q1 2020 Revenue Breakdown



Sources: Robinhood financial disclosures and a person familiar with the company's finances.

The rise of Vladimir Tenev and Baiju Bhatt is a familiar one in the era of technology disruption. They met as undergrads at Stanford University in the summer of 2005. "We had some astounding parallels in our lives," Bhatt tells *Forbes*. "We were both only children, we had both grown up in Virginia, we were both studying physics at Stanford, and we were both children of immigrants because our parents were studying Ph.D.s." Tenev's family emigrated from Bulgaria, Bhatt's from India.

Tenev, the son of two World Bank staffers, enrolled in UCLA's math Ph.D. program but dropped out in 2011 to join Bhatt and build software for high-frequency traders. That was shortly after Wall Street's 2010 Flash Crash, a sudden, near-1,000-point plunge in the Dow Jones Industrial Average at the hands of high-speed traders. The extreme volatility exposed how financial markets had mostly moved away from the staid, but stable, New York Stock Exchange and to a smattering of opaque quantitative trading pools dominated by a handful of secretive firms. These so-called "Flash Boys," who worked milliseconds ahead of orders from both retail and institutional investors, had emerged from lower Manhattan's back offices and IT departments, as well as university Ph.D. programs, to become the new kings of Wall Street.

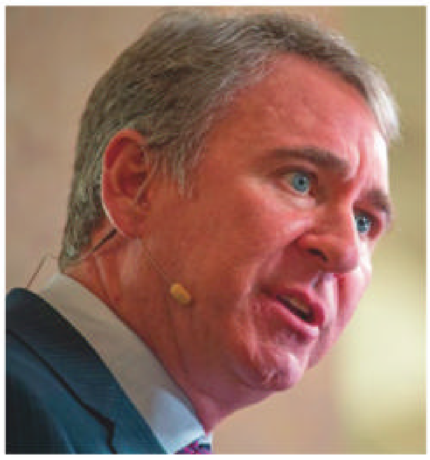
At the same time Tenev and Bhatt were getting an insider's education in how high-frequency traders operate and profit, the outside world was in turmoil, recovering slowly from the battering of the 2008–2009 financial crisis. It all played into the official Robinhood creation story: When the 2011 Occupy Wall Street movement materialized as a protest of bailouts on Wall Street and foreclosures on Main Street, one of Tenev and Bhatt's friends accused them of profiteering from an unequal system. Soul searching led the pair in 2012 to conceive Robinhood, a trading app with a name that was an explicit reference to leveling the playing field. The most obvious—and disruptive—innovation: no commissions and no minimum balances, at a time when even low-cost rivals like E-Trade and TD Ameritrade made billions on such fees.

Initially, Tenev and Bhatt used the allure of exclusivity to capture interest. For their 2013 launch, they restricted access, building up a 50,000-person waiting list. Then they turned the velvet rope into a game, telling prospective users they could move up the waitlist by referring friends. By the time they launched on Apple's App Store in 2014, Robinhood had a waitlist of 1 million users. They had spent virtually nothing on marketing.

Bhatt focused maniacally on app design, trying to make Robinhood "dead simple" to use. iPhones flashed with animations and vibrated when users bought stocks. Every time Bhatt came up with a new feature, he'd run across the street with staffers from Robinhood's Palo Alto office to Stanford's campus, approaching random students, asking for feedback. The app won an Apple Design award in 2015, a prize given to just 12 apps that year. Millennial customers started downloading it in droves.

By the fall of 2019, Robinhood had raised nearly $1 billion in funding and swelled to a $7.6 billion valuation, with 500 employees and 6 million users. Tenev and Bhatt, both minority owners of Robinhood with estimated 10%-plus stakes, were rich. Then, in September 2019, Goliath bowed low to David. Over a 48-hour span, E-Trade, Schwab and TD Ameritrade, industry giants many times Robinhood's size, cut commissions to $0. A few months later, Merrill Lynch and Wells Fargo's brokerage unit followed suit. As this source of revenue evaporated, brokerage stocks plunged, and TD Ameritrade soon entered a shotgun marriage with Schwab, while E-Trade ran into the arms of Morgan Stanley.

Two Millennials had done something that discount giants like Vanguard and Fidelity could never accomplish. They had dealt the final blow to the easy-money trading commissions that had fed generations of stockbrokers and formed the financial foundation of Wall Street brokerage firms.



No one loves Robinhood trades more than Wall Street's billionaire quants. Citadel, owned by Ken Griffin (above), No. 34 on The Forbes 400, is the biggest buyer.

DAVID PAUL MORRIS/BLOOMBERG

The secret sauce of Robinhood's success is something its founders are loath to publicize: From the beginning, Robinhood staked its profitability on something known as "payment for order flow," or PFOF.

Instead of taking fees on the front end in the form of commissions, Tenev and Bhatt would make money behind the scenes, selling their trades to so-called market makers—large, sophisticated quantitative-trading firms like Citadel, Two Sigma, Susquehanna International Group and Virtu Financial. The big firms would feed Robinhood customer orders into their algorithms and seek to profit executing the trades by shaving small fractions off bid and offer prices.

Robinhood didn't invent this selling of orders—E-Trade, for example, earned about $200 million in 2019 through the practice. Unlike most of its competitors, though, Robinhood charges the quants a percentage of the spread on each trade it sells, versus a fixed amount. So when there is a large gap between the bid and asked price, everyone wins—except the customer. Moreover, since Robinhood's customers tend to trade small quantities of stocks, they are less likely to move markets and are thus lower-risk for the big quants running their models. In the first quarter of 2020, 70% of the firm's $130 million in revenue was derived from selling its order flow. In the second quarter, Robinhood's PFOF doubled to $180 million.

Given Tenev and Bhatt's history in the high-frequency trading business, it's no surprise that they cleverly built their firm around attracting the type of account that would be most desirable to their Wall Street trading-firm clients. What kind of traders make the most saleable chum for giant sharks? Those who chase volatile momentum stocks, caring little about the size of spreads, and those who speculate with options. So Robinhood's app was designed to appeal to the videogame generation of young, inexperienced investors.

Besides being given one share of a low-priced stock to start you on your investing journey, one of the first things many notice when trading stocks on Robinhood, and are authorized to trade options, is the bright orange button right above BUY that says TRADE OPTIONS.

Options trades also happen to be prime steak for Robinhood's real customers, the algorithmic quant traders. According to a recent report by Piper Sandler, Robinhood gets paid—by the quants—58 cents per 100 shares for options contracts versus only 17 cents per 100 for equities. Options are less liquid than stocks and tend to trade at higher spreads. While the company says only 12% of its customers trade options, those trades accounted for 62% of Robinhood's order-flow revenues in the first half of 2020.

The most delectable of these options trades, according to Paul Rowady of Alphacution, may very well be so-called "Stop Loss Limit Orders," which give buyers the opportunity to set automatic price triggers that close their positions in an effort either to protect profits or limit losses. In October 2019, Robinhood gleefully announced to its customers, "Options Stop Limit Orders Are Here," a nifty feature which essentially puts trading on autopilot.

"That [stop limit] order is immediately sold to a high-speed trader who now knows where your intention is, where you would sell," says one former high-speed trader. "It's like you're writing a secret on a piece of paper and handing it to your broker, who sells it to someone who has an interest to trade against you."

Robinhood refutes the notion that its model preys on inexperienced investors and claims most of its customers use a buy and hold strategy. "Receipt of payment for order flow is a common, legal and regulated industry business practice," says a Robinhood spokesperson who insists the the app helped customers save $1 billion on trades this year. "We are focused on providing a platform that makes finance accessible and approachable and where people can make thoughtful, informed investing decisions."

Billionaire competitor Thomas Peterffy, the founder of Interactive Brokers, says stop limit orders are the most valuable orders a sophisticated trader can buy. "If people send you orders, you see what they are. You can plot them up along a price axis and see how many buy and sell orders you have at each of those prices," he says.

For instance, if a buyer sees sell orders bunched up around a certain price, it means that if the stock or option hits that price, the market is going to fall hard. "If you are a trader, it's good for you if you can trigger the stop—you can go short and trigger the stop, and then cover much lower," Peterffy says. "It's an old technique."

In a sense, Covid-19 has been both a blessing and a curse for Robinhood. The pandemic forced millions of future Robinhood customers home to shelter in place, free from diversions like sports and armed with fast internet connections and free money from the government. The stock market, meanwhile, provided edge-of-your-seat excitement as it plunged and then soared, propelling superstars like Amazon and reviving walking-dead stocks like Chesapeake Energy. The result was unprecedented growth for the upstart brokerage. Robinhood now has more than 13 million registered customer accounts, nearly as many as the 49-year-old Charles Schwab, with 14 million funded accounts, and more than twice as many as E-Trade, with 6 million accounts.

The company has also been a game changer for some of its clients. Taylor Hamilton, 23, an IT worker who graduated from the University of Pennsylvania in 2018, opened a Robinhood account and began trading in March. He began buying put options against plummeting travel-industry stocks like Delta and Uber, and later bought calls on Boeing and other beaten-down companies, correctly figuring that they would benefit from the government's de facto bailout via the bond market.

After four months and 300 trades, Hamilton has netted nearly $100,000 and paid down his $15,000 in student loans. "It felt like a once-in-a-lifetime opportunity," says Hamilton, who reports that he has transferred most of his profits to his bank account to eliminate the temptation to trade away his gains.

The pandemic has also exposed Robinhood's warts. During the market's 5% one-day swoon and subsequent rebound in early March, Robinhood's customers were completely shut off from their accounts for nearly two days as the brokerage firm's technology systems crumpled under the weight of a tenfold jump in order volume. Angry customers lashed out against Robinhood on social media, and more than a dozen lawsuits were filed against the company. In the last few months, Robinhood has quietly been restructuring. Tenev says it's making major technology investments to increase capacity and add redundancy. A sizable chunk of its $800 million in fresh venture capital is going toward upgrades and adding engineers to the 300 already on staff.

OPTIONS TRADES ARE PRIME STEAK FOR ROBINHOOD'S REAL CUSTOMERS, THE ALGORITHMIC QUANT TRADERS.

In the wake of the Kearns tragedy, Robinhood's options-trading interface is also being overhauled. The company has pledged to help educate its customers on the highly speculative nature of the trades. That includes hiring an "Options Education Specialist" and "rolling out improvements to in-app messages and emails" that it sends to customers about their complex options trades. In August, the brokerage app said it would hire hundreds of new customer-service representatives in its Texas and Arizona offices by the end of 2020.

According to insiders, there's a sense of urgency at the company these days. For two years, Robinhood has been speaking publicly about an IPO. With interest rates near zero and the stock market roaring, the public-offering window is wide open, but it won't be forever. A better option—especially considering Robinhood's current problems—might be a quick sale to a full-service firm such as Goldman Sachs, UBS or Merrill Lynch. Such a sale would surely provide billion-dollar windfalls for its young founders, Tenev and Bhatt. And as any good trader knows, it's much better to sell when you can than when you have to.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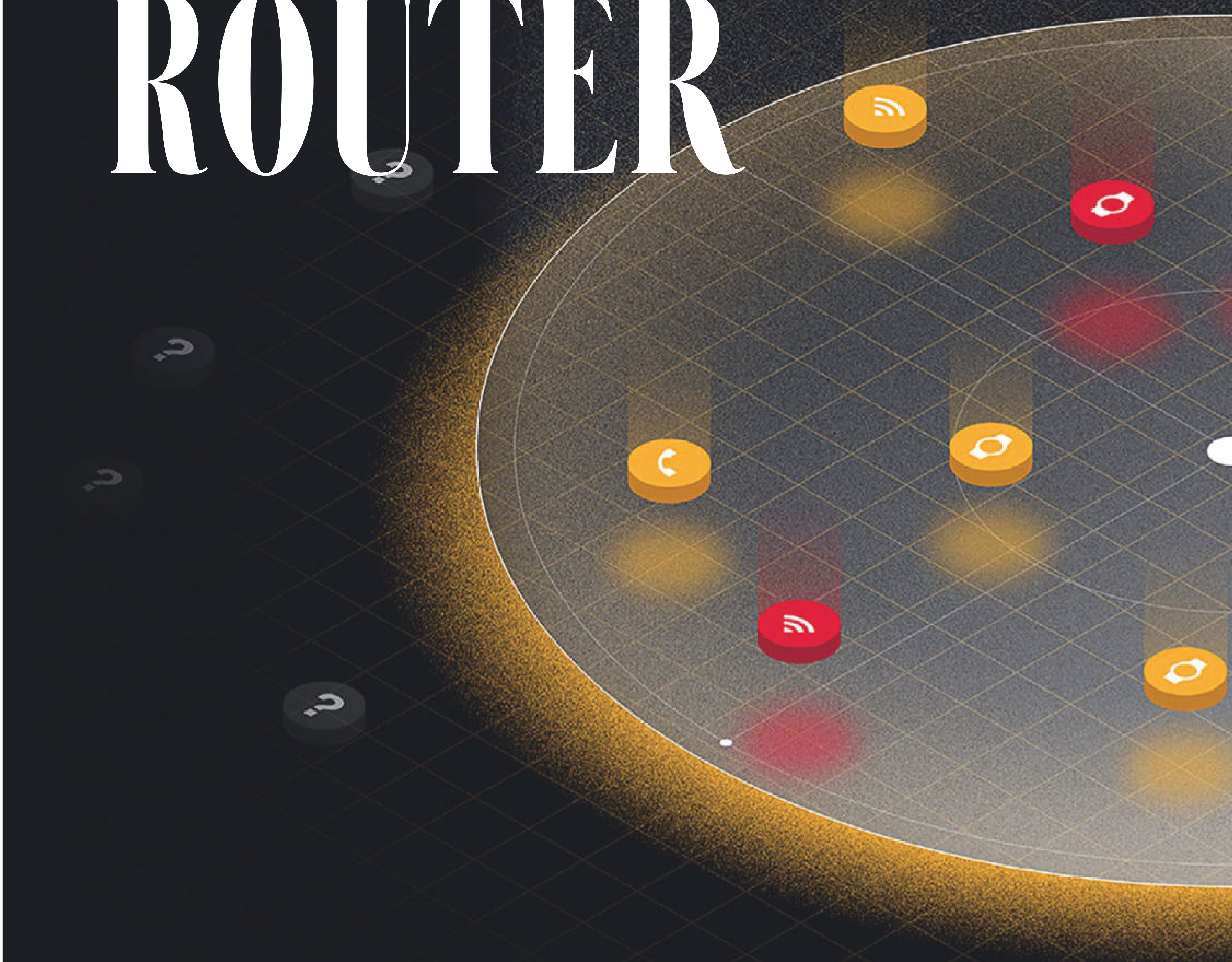

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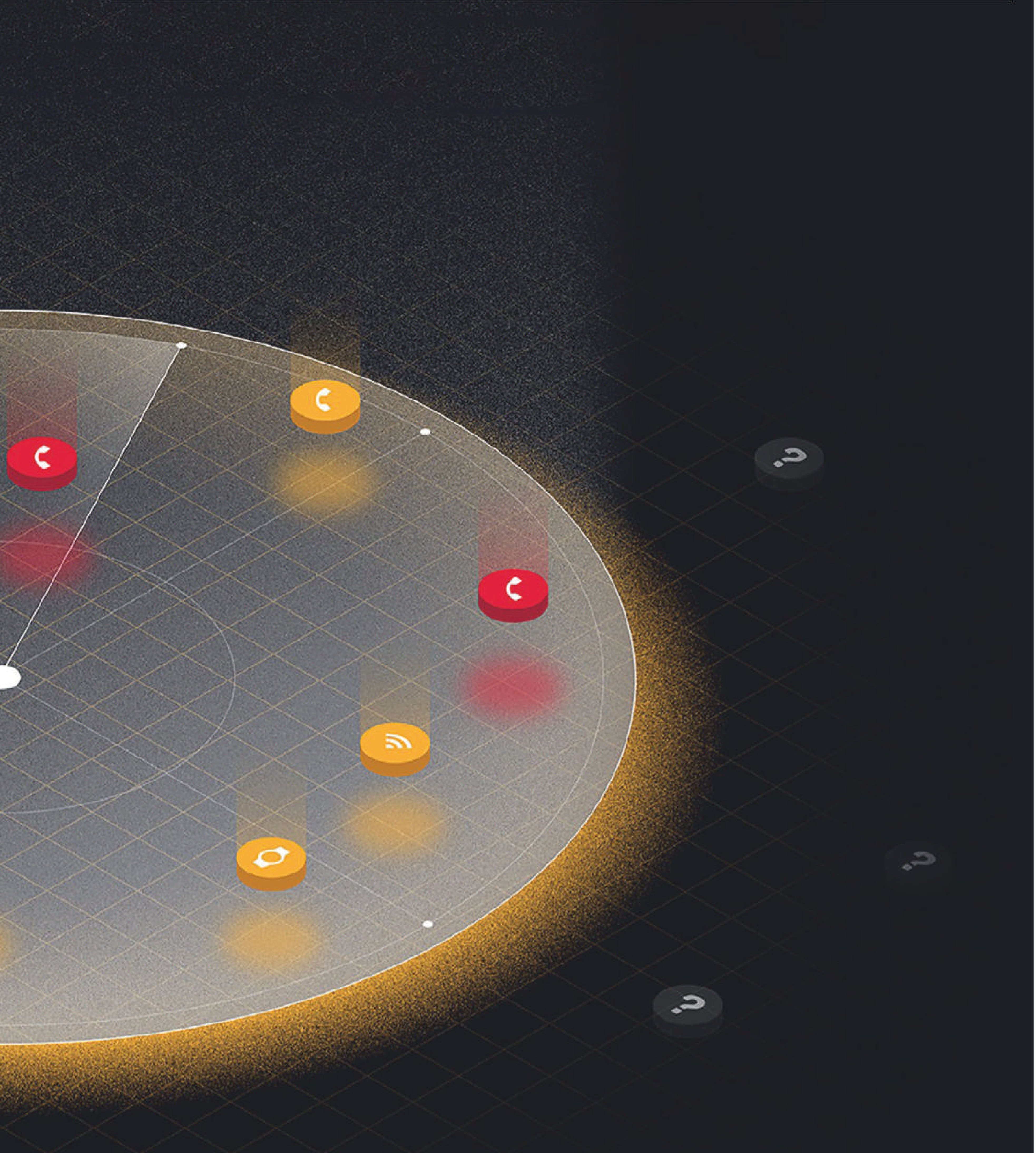
THE INVESTIGATION



BY THOMAS BREWSTER

W

Whether it's an invisible Aston Martin or an exploding pen, whenever James Bond needs a high-tech edge, he heads right for Q and his secretive MI6 lab. In the real world, American agents often rely on a less clandestine, but far better-funded group. Armed with 8,000 employees and an annual budget of between $1 billion and $2 billion of taxpayers' money, Mitre Corp., a government-linked Skunk Works, has been making bleeding-edge breakthroughs for U.S. agencies for more than six decades. With its HQ housed in four towers atop a hill in McLean, Virginia, Mitre's research centers employ some of the nation's leading computer scientists and engineers to build digital tools for America's top military, security and intelligence organizations.

Among the government's wilder Mitre orders: a prototype tool that can hack into smartwatches, fitness trackers and home thermometers for the purposes of homeland security; software to collect human fingerprints from social media websites like Facebook, Instagram and Twitter for the FBI; support in building what the FBI calls the biggest database of human anatomy and criminal history in the world; and a study to determine whether someone's body odor can show they're lying.

These varied, multimillion-dollar projects, revealed in hundreds of pages of contract details obtained via Freedom of Information Act requests, as well as interviews with former Mitre executives and government officials, provide just a glimpse into this sprawling contractor's secretive world. Mitre's influence goes far beyond its vast tech development; it's also a major consultant for myriad government agencies on how best to deploy tech and policy strategies. Its latest gig: helping the Centers for Disease Control and Prevention (the CDC) and Homeland Security's ominously named Countering Weapons of Mass Destruction office craft sweeping plans for curtailing the Covid-19 pandemic.

"If there's a national security or public interest [problem], Mitre probably has a hand in it," says former Mitre cybersecurity engineer Matt Edman. Bald, bearded and baritone-voiced, Edman could have worked at his pick of hot Silicon Valley tech companies, but instead focused his talents on challenging national security problems. During his time at Mitre, Edman partnered with the FBI, using his hacking skills to help take down the infamous Silk Road dark web drug bazaar. Shortly after he left Mitre, he was allowed to finish the job in October 2013, and was in Reykjavik, Iceland, alongside FBI agent Ilhwan Yum, to shutter the site run by the Dread Pirate Roberts (real name: Ross Ulbricht), who is now serving a life sentence. Edman was also at Mitre when it helped the FBI hack and monitor users of multiple child exploitation sites as part of Operation Torpedo, in what then attorney general Loretta Lynch hailed as a landmark dark web investigation.

Mitre's history is full of such uncredited public service. As its promo material says: "You may not know it, but Mitre touches your life most every day." Wanting to know the extent of Mitre's touch, *Forbes* launched an investigation to pull Mitre's staggering range of work from the shadows. What we found is an elite institute that has proved a major boon to the U.S. government, providing tools for surveillance of criminals, diseases and immigrants illegally trying to enter the country.


While at Mitre, engineer Matt Edman partnered with the FBI to take down the infamous online drug bazaar, Silk Road.

COURTESY OF MATT EDMAN

But some of the same projects are setting off alarm bells among human rights organizations and privacy advocates like the American Civil Liberties Union, which are concerned about surveillance overreach from Mitre's sophisticated technology. Despite multiple requests to meet with Mitre executives in person and visit its headquarters, Mitre declined to provide comment for this article. The FBI and DHS acknowledged requests for comment but have not provided any.

Few have heard of Mitre or know its mission, despite its vital importance to the security of the nation. Even locals who live near its large office complex often have no idea it's been such a stalwart supporter of American national security and defense over the last six decades. "It was just miles away from where I was living and had been there since the mid-50s," says Shawn Valle, who went to the campus for the first time for a job interview in 2008. "I'd never heard of it." Valle ended up working on cybersecurity for the U.S. Air Force and looking for security issues in Google's Android operating system during his five years there.

While out of the public eye, Mitre's history is remarkable. The nonprofit company was born out of the Cold War, spun out of perhaps the world's most famous tech campus, the Massachusetts Institute of Technology. (The MIT acronym provides Mitre the first half of its name). In the late 1950s, facing the threat of a Soviet nuclear strike, the Air Force called on MIT to help it create an air defense system that would help it detect incoming bombers. The institute came up with the Semi-Automated Ground Environment (SAGE). The system combined radar, radio and network communications to detect incoming enemy aircraft, alert and continually update nearby Air Force bases, which would scramble jets to intercept approaching threats. It was the first air defense system of its kind in America, and Mitre was founded by MIT administrators in 1958 to manage SAGE and its future development.

Over the next 40 years, Mitre was behind the scenes of now-famous air surveillance technologies such as the Airborne Warning and Communications Systems (Awacs) and the Surveillance Target Attack Radar System (Stars). It also played a significant role in the development of much-used tech like GPS and the commercial airline Traffic Collision Avoidance System. Today its remit is even wider, leading all manner of cybersecurity initiatives and healthcare projects, while sticking to its core role of protecting national security.

Mitre's HQ is situated just up the road from the McLean Washington Metro stop and right next door to another of America's biggest defense suppliers, Northrup Grumman.

"The characteristic of Mitre that I've always explained to people is that when we say we do information sciences, we go way beyond what people would typically call IT," Martin Faga, the Mitre CEO from 2000 to 2006, tells *Forbes*. It would, for example, design a specialized antenna to go on military aircraft to send and receive data from a communication satellite, says Faga, a white-haired, suitably inconspicuous longtime employee of U.S. intelligence agencies and contractors. Mitre would then design the satellite communications system, too, as well as the radar—basically "every kind of information system," he adds.

Its broad expertise is now being employed to help yank America out of its Covid-19 crisis. In a $16.3 million contract signed with the CDC in late June, Mitre was asked to help build "an enduring national capability to contain Covid-19." The CDC, which spent $20 million with Mitre on disease surveillance tech and services in 2019, hadn't responded as *Forbes Asia* went to press on requests for more detail on those pandemic plans.

Meanwhile, on March 17, four days into the national emergency caused by Covid-19, the DHS Countering Weapons of Mass Destruction (CWMD) office called on Mitre to effectively act as a fulcrum of a pandemic response plan, to "engage, inform and guide" mayors, governors and emergency response leaders dealing with a pandemic. Mitre would also create disease models to track a pandemic and determine what "nonpharmaceutical interventions" (a.k.a. NPIs—think closing schools, stores and implementing social distancing) could help lawmakers "bend the curve."

The $200,000 contract (microscopic by Covid spending standards) states: "As the pandemic progresses, the contractor will identify, collect and analyze data to enable near real-time learning to state and local leaders for the eventual appropriate retrograde of NPI implementation efforts." In other words, Mitre is helping America's leaders decide when and how to open up again. (Neither Mitre nor the DHS explained why the CWMD unit was managing such a contract.) And pro bono, Mitre has created a contact tracing system called Sara Alert that's been helping various states—Arkansas, Pennsylvania and Vermont, to name a few—monitor outbreaks. The system lets people known to be at risk of Covid-19 infection upload their symptoms and temperature to their state and local health bodies' databases. In Arkansas, 12,861 have enrolled since early April, updating the health department via text, call, email or website on their condition. "This system allows us to more readily identify secondary cases, really establishing a better handle on social clusters, which has been a challenge," says Dr. Mike Cima, chief epidemiologist at the Arkansas Department of Health. It's been so successful that Cima plans to carry on using Sara Alert for other infectious diseases beyond Covid-19's eventual demise.

Mitre differs from other military and intelligence contractors in that it has no mandate to make any money. Unlike commercial contractors like Northrup Grumman, Raytheon and General Dynamics, it runs seven of those Skunk Works, known in the industry as "federally funded research and development centers" (FFDRCs), a mundane name belying their influential work. Mitre only charges for employees' time, with a small fee, usually around 3% of the overall cost, that supports further independent research, says Faga. "People come forward with a great idea and say, 'Gee, if I had $100,000, I could turn this into something great.' And the company can give it to them."

This put the former CEO in an unusual position among his Beltway rivals. "I'd go to the annual meeting of the board. I go to my report and say, 'We worked hard this year. And we broke even.' And they'd all cheer. Any other CEO would hear, 'You're fired!'"

Mitre doesn't commercialize the technology it creates. Once a prototype is built, it's licensed to either the government, private business or academic institutions. Since 2014, it's transferred more than 670 licenses to industry and university partners.

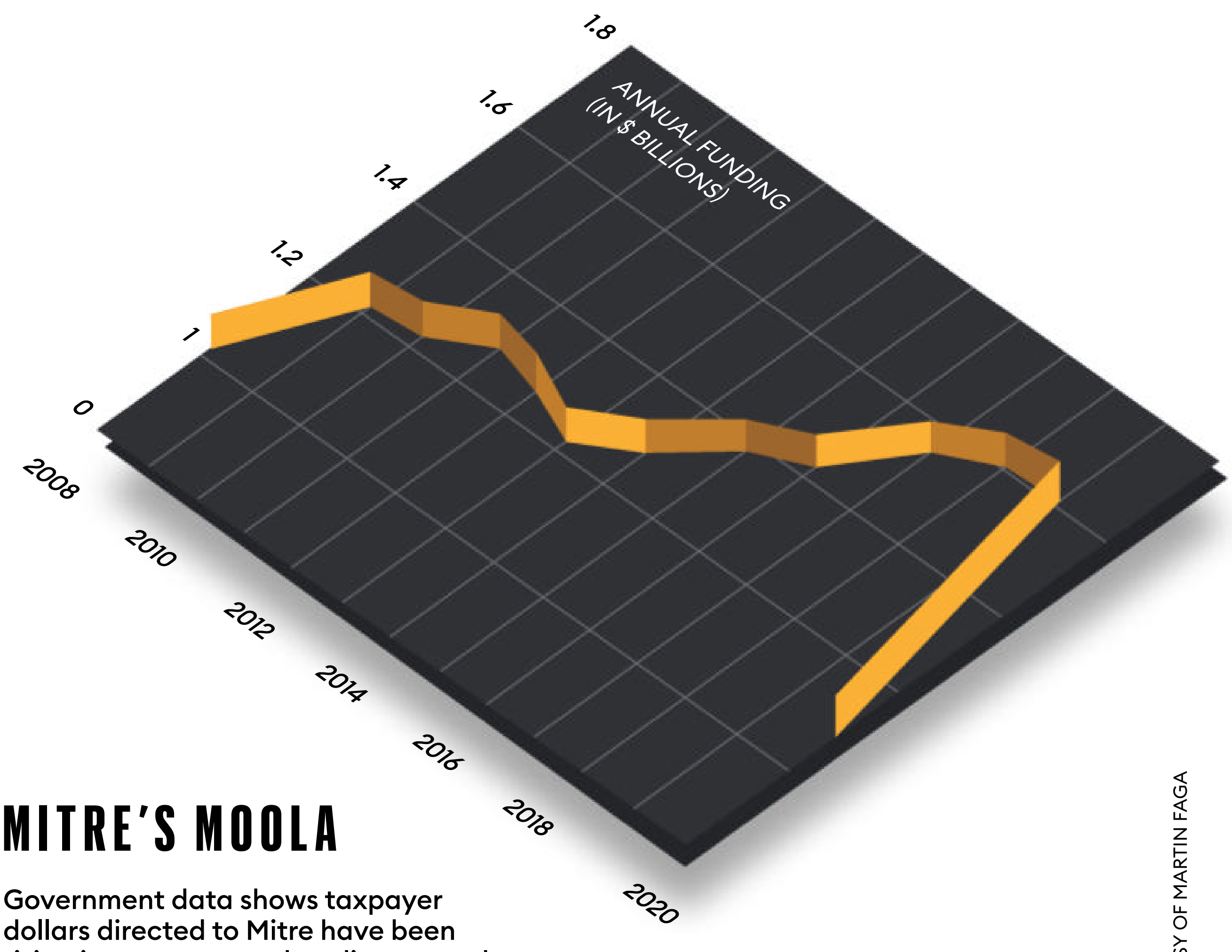
As Mitre CEO during 9/11, Martin Faga helped rebuild the Pentagon's communication network and developed tech to search for Ground Zero survivors by looking for cell signals in the rubble. None were found.

Unshackled from commercial pressures, Mitre's given latitude to develop some of the more radical answers to the government's most pressing questions. Take a project to collect fingerprints from peoples' Facebook, Twitter and other social media posts. Emails and details of a Mitre contract obtained by *Forbes* outline a $500,000 "social media image fingerprinting project" for the FBI, which started in 2015. It was run by an FBI hacking unit in Quantico, the Operational Technology Division, and funded by a previously unreported research funding body called Triad.

Chris Piehota, the recently retired chief of the FBI's Security & Technology Branch, says that Triad was designed to fund innovative research from objective outside bodies and that "image fingerprinting" is as literal as it sounds: trying to capture biometric information from social media images. Think of gang members who put up photos of themselves online, making gang signs with their hands, explains Piehota. "They're also giving us access to their fingerprint patterns," he adds. "[The FBI] can take your fingerprint characteristics from those images and they can build fingerprint files or fingerprint characteristics for individuals [for whom] we don't have biographic information." This could be useful for individuals violating immigration laws where the U.S. doesn't have a record of their fingerprints in another database, adds Piehota. It could also be used to identify someone in a child exploitation video or, as in an investigation in the Welsh city of Swansea, catch drug dealers using tools like WhatsApp.

The technology, if it works as described, is potentially useful for the law enforcement and intel agencies Mitre works with, and potentially dangerous for personal privacy. Nate Wessler, staff attorney at the ACLU Speech, Privacy and Technology Project, says the surveillance project raises "serious privacy concerns," especially during a time of nationwide civil unrest over the Covid-19 pandemic and racial inequality. "Nobody expects that by posting a digital photo online, they are exposing their unique biometric identifiers including their fingerprints, to collection in a law enforcement database," he says. "Not only are we seeing historic protests against anti-Black racism and police brutality, but we're also seeing historic levels of digital recordings of those photos of those protesters by the media and by law enforcement.... The prospect of law enforcement agencies being able to cheaply, easily and quickly obtain people's fingerprints off of those photos is extraordinarily chilling." Piehota notes that as a privacy precaution the FBI would only take fingerprints from social media images where the target was a valid suspect and it wouldn't simply trawl the likes of Facebook for all available prints.

Mitre has a history in assisting the U.S. government's expansion of biometric surveillance. Another 2014 contract details Mitre's work assisting the FBI on facial recognition tools, right down to "creating local watch lists by flagging subjects of interest." It's also helping the FBI build the Next Generation Identification (NGI) system, which is one of the biggest databases of criminal suspects' faces, fingerprints and other identifying body parts on the planet. According to the FBI, the NGI is "the world's largest and most efficient electronic repository of biometric and criminal history information." It's cost the FBI at least



MITRE'S MOOLA

Government data shows taxpayer dollars directed to Mitre have been rising in recent years, heading toward $2 billion. Mitre says its overall revenue for 2019 was $1.8 billion.

COURTESY OF MARTIN FAGA

$500 million since its inception in 2007, much of it going to early developer Lockheed Martin, according to a review of contract records. Piehota says that all manner of law enforcement agencies, from local to federal, can access it to check the identity and background of a criminal. And Mitre, since at least 2013, has received millions in contracts to provide technology and guidance to build it as part of a previously unreported project called "Sugar Bowl II," an unexplained code name, FOIA records show.

Mitre's high-tech snooping also extends to the fast-growing world of connected devices: Think smartwatches, speakers, TVs and security cameras. In a $500,000, September 2017 contract, the DHS asked Mitre to create a system that could locate and hack into smartwatches, fitness trackers, home automation devices or anything that could be classed as an Internet of Things (IoT) system. The contract says the tech could be used either by law enforcement or border officials to help them "rapidly detect and exploit for evidentiary purposes IoT devices in a security or crime scene environment," or for use at "physical security boundaries" to hack into devices "passing through or approaching the boundary." Think of people crossing the U.S.-Mexico border and a surveillance tool that scans every device coming through, checking which ones are smartwatches or other IoT systems. When one is worn by a criminal suspect, it could quickly be drained of data and evidence of their activities gathered, from their text messages to their previous locations.

One source, a former police officer and surveillance industry expert who claimed knowledge of the contract, says the tech was only ever used by Customs and Border Protection (CBP). Another source, a former Mitre and government employee, says Mitre has long provided digital forensics expertise to CBP staff carrying out searches of electronic devices at the border. And FOIA-obtained contracts worth more than $13 million show Mitre has provided expansive CBP technical support since at least 2016, including a study of the efficacy of Rapid DNA technology—another controversial tool that's led to an outcry among civil rights organizations, who say the tools infringe on immigrants' privacy. Designed to help uncover immigrants lying about being related to each other at the border, it can quickly determine whether people entering the U.S. are related. As the government cannot legally detain migrant children for longer than 20 days, they're typically released before an immigration court hearing and ICE has claimed this is being used as a loophole to smuggle children into the country.

The power to hack into smart IoT devices could be hugely advantageous for federal agents, though the government wouldn't tell *Forbes* where or how it's been deployed. As explained in the September 2017 project outline, police have been lacking in the skills and resources to acquire evidence from these kinds of technologies. "IoT devices capture a lot of telemetry and I can imagine lots of places where this is useful," says Jake Williams, a former NSA analyst turned cybersecurity practitioner, who adds that he was shocked that such a tool would be used at border checkpoints. It's got civil rights lawyers spooked too. "It would appear to only require the person using the tools to be in range of the device signals and would not require physical possession or access," says Jerome Greco, a public defender in the Digital Forensics Unit of the Legal Aid Society. "Law enforcement use would be troubling, and it would be difficult to hold them accountable for how they use it."

Mitre isn't just helping the government interrogate tech; it's done some work on human interrogation, too. Going back to 2009, the year when the Homeland Security-funded Mitre lab—the Homeland Security Systems Engineering and Development Institute—was founded, some more left-field work was being undertaken in a study dubbed "Human Odor as a Biometric for Deception." In research reminiscent of the left-field projects more often associated with the CIA, Homeland Security set out to see whether there was any scientific basis to the saying "I think I smell a rat." Its aim was to investigate the possibility of using the "human odor signature" as an "indicator for deception." Samples were taken from volunteers before and after they committed or didn't commit some deceptive act to see whether or not there was a difference. They also wanted to find evidence to "support the hypothesis that an individual's odor signature can serve as a biometric identifier." The essential question was: Do you have an odor that is entirely unique to you when you lie? Yes, was the answer, according to Homeland Security, which hadn't responded to other inquiries about Mitre's operations. In the executive summary of their final report in 2011, the authors said the "results indicate that measurable variations in human odor do seem to permit differentiating between deceptive and nondeceptive individuals."

Former FBI science head Chris Piehota was previously appointed by Robert Mueller as the director of the agency's Terrorist Screening Center.

COURTESY OF CHRIS PIEHOTA

This may be an example of Mitre's more outré research, much of which remains stored in the vaults of those McLean towers or locked up under classified seals in government servers. But such is its standing, even when the value of the work is doubted, Mitre's name is enough for it to be taken seriously within the halls of government. Faga, the former CEO who remains on an advisory board at Mitre, recalls a recent trip to the Pentagon, where a meeting had been called to discuss worrying vulnerabilities in GPS. A delegate anxious to know just how worried they should be about the security weaknesses asked where the Pentagon got the information. When an official said Mitre, the atmosphere in the room changed, says Faga. Everyone, adds Faga, concluded, "Okay, well, then it's real."

Persistence

“The drop of rain maketh a hole in the stone—not by violence, but by oft falling.”
—Bishop Hugh Latimer

“Patience and time do more than force and rage.”
—Jean de La Fontaine

“The best way out is always through.”
—Robert Frost

“Long live the rose that grew from concrete when no one else even cared.”
—Tupac Shakur

“Nothing in this world can take the place of persistence. Persistence and determination alone are omnipotent.”
—Calvin Coolidge

“Keep a little fire burning, however small, however hidden.”
—Cormac McCarthy

“Dare, and the world always yields—or, if it beats you sometimes, dare again, and it will succumb.”
—William Makepeace Thackeray

“Whatever menaced, harassed, warned, I passed impetuous by. Still bright on clouds of suffering dim. Shines that soft, solemn joy.”
—Charlotte Brontë

“A hundred failures would not matter, when one single success could change the destiny of the world.”
—Arthur C. Clarke

“Perseverance is the foundation of all actions.”
—Lao Tzu

The Endless Sumner

October 17, 1994

Fate had already tried to finish off Sumner Redstone. “At 56, he stared death in the face” after getting badly burned in a hotel fire that he survived by hanging from a third-floor window ledge. **“Somehow reenergized, he pulled his way from being just another wealthy man to a media magnate on a level with Rupert Murdoch and Ted Turner.”** Fifteen years later, the 71-year-old Redstone was still actively adding to his $3.8 billion fortune—beating out Barry Diller a year earlier in a bid for Paramount—and would continue to do so for decades, even as his deteriorating health left him bedridden and unable to speak. He died at 97 in August, just eight months after finishing his latest bit of empire tending: recombining CBS and Viacom.

SOURCES: FABLES, BY JEAN DE LA FONTAINE; A SERVANT TO SERVANTS, BY ROBERT FROST; THE ROSE THAT GREW FROM CONCRETE, BY TUPAC SHAKUR; THE ROAD, BY CORMAC McCARTHY; THE LUCK OF BARRY LYNDON, BY WILLIAM MAKEPEACE THACKERAY; JANE EYRE, BY CHARLOTTE BRONTË; 2001: A SPACE ODYSSEY, BY ARTHUR C. CLARKE; PRINCIPLES, BY RAY DALIO.

“If you feel passionate about something in your soul, continue to pursue it. Pursue it with all the love you have.”
—Common

“Never rule out a goal because you think it’s unattainable. Be audacious.”
—Ray Dalio

“I always try to convert a moon shot into an Earth shot.”
—Martine Rothblatt

“Timing, perseverance and ten years of trying will eventually make you look like an overnight success.”
—Biz Stone

“I did not have the most experience in the industry or the most money, but I *cared* the most.”
—Sara Blakely

“We are afflicted in every way, but not crushed; perplexed, but not driven to despair; persecuted, but not forsaken; struck down, but not destroyed.”
—2 Corinthians 4:8

FINAL THOUGHT

“Persistence earns more than a mere existence.”

—B.C. Forbes

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