WIRED

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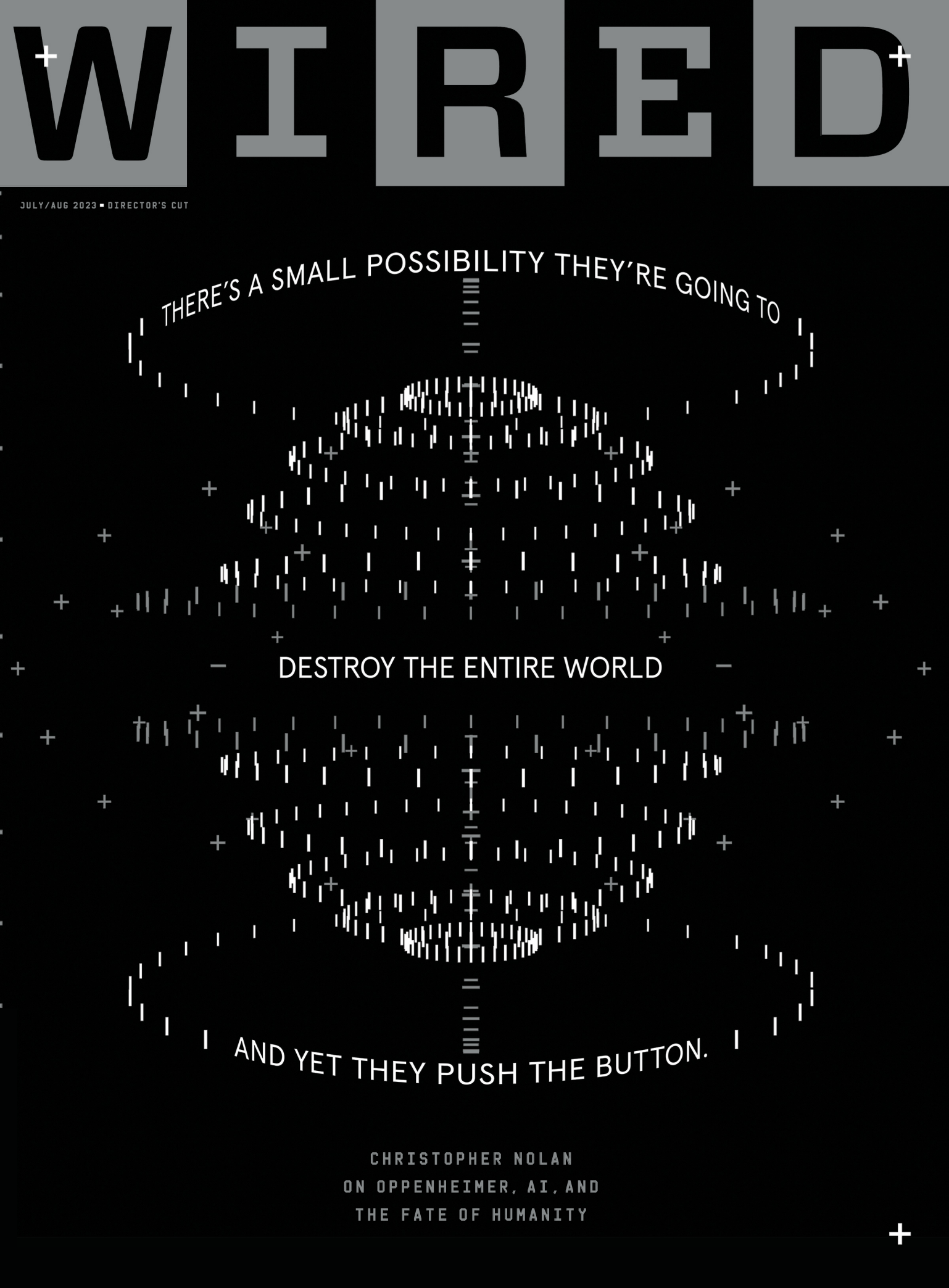

CHRISTOPHER NOLAN
ON OPPENHEIMER, AI, AND
THE FATE OF HUMANITY

DIARY OF AN ENTREPRENEUR

Leading from the Heart

WHEN THE FIRST SMARTPHONES and social media platforms were beginning to emerge, a young student in Saudi Arabia realized that the way people and enterprises communicate with each other was about to change forever.

Almost two decades after Ahmed Hamdan and his brother Hassan started a simple service to help students message large groups of contacts, the business that they launched has become one the Middle East's most successful homegrown technology companies.

Unifonic's open and collaborative culture has made it one of the region's top employers.

Harnessing the latest innovations in artificial intelligence (AI), cloud computing, and natural language processing, Unifonic today helps a wide range of organizations connect with their customers more effectively—just like that pioneering messaging service almost 20 years ago.

"We were just students who wanted to message the members of a student club," Ahmed Hamdan remembers. "We had no business acumen or plans to raise capital but we were always on the forefront of the digital transformation of communications. That has always been one of the secrets of our success."

Today, Unifonic has a growing portfolio of clients in sectors such as banking, retail, and e-commerce across the Middle East. Whichever way these companies want to connect to their customers, whether its messaging apps, email, social media, text, or voice, Unifonic makes it happen.

"Last year we processed more than 10 billion transactions, and each one contributed to a better experience for our clients and their customers," Hamdan says.

In the next two to three years, rapid developments in AI will transform the way people interact with companies, Hamdan predicts. To resolve any issue with the delivery of a product or with a banking service, businesses will use fully automated conversations, from understanding the initial concern to taking the action needed and updating everyone involved when the incident is resolved.

"While our technology adds value to a company's services, we will always make sure that customers can speak to a human representative, if needed," Hamdan adds. "We create personalized experiences that do not sacrifice the human touch."

Unifonic has always believed in the importance of investing in human values and developing young talents, ever since its earliest days as a startup. Today, this mindset is leading Unifonic into new markets and towards a new phase of growth.

"The young people of the Middle East are passionate about tech and have new ideas about why and how they want to work. They are the driving force for our future growth. With their passion for change, there is no limit to the impact we can make."

Cloud-based communications and AI are transforming customer engagement.

> We are touching the lives of thousands of businesses and millions of customers every day.

Ahmed Hamdan
CEO & Cofounder, UNIFONIC

The messaging service that Ahmed Hamdan and his brother launched in 2006 has grown into Unifonic, one of the Middle East's largest cloud-based communications businesses. Unifonic is a Saudi leader for all the possibilities of entrepreneurship, technology, and innovation to make a lasting difference to the world.

What funding challenges did you face in the early years?
During our bootstrap phase, we reinvested our revenue into the business for several years, as there were no venture capital or angel investment networks available in Saudi Arabia at that time. Entrepreneurs had to rely on family, friends, and those who believed in their passion to get financial backing. Today, the startup ecosystem has improved significantly, with investors becoming more active in the Middle East. After rebranding to Unifonic in 2018, we raised $21 million; in 2021, we raised $125 million in our Series B.

Did you ever imagine Unifonic would grow this large?
It has always been a dream for me. I wanted to do something to transform my life. We received tremendous positive feedback in the early days and we continued to develop the platform and add new features to make it more user-friendly and efficient. In 2016, we pivoted to cloud-based communications with the help of mentors in the Endeavor network of high-impact entrepreneurs. Since then we have continued to innovate and expand our services to meet the needs of our customers. For instance, our acquisition of Sestek, in 2022, has enhanced our ability to provide customers with AI-powered conversational solutions.

How do you work with other startups in the region?
I am very engaged with the ecosystem. It is part of my responsibility to give back to the community. This is why I joined the Endeavor Board in Saudi Arabia. I am also a mentor, coach, and personal investor in many startups that are going through what we did 16 years ago. As Unifonic, we want to be well-integrated with the ecosystem in each market. Entrepreneurship, startups, and SMEs are the main focus for the economy today.

We are striving to accelerate the process of digital transformation for both public and private enterprises across the Middle East. In order to achieve this goal, we have launched a program called Unifonic X, which is designed to foster the growth and progress of emerging SaaS (Software as a Service) startups.

How easy is it to find the tech talent you need to grow?
Attracting highly skilled and experienced talent is the key to the future of Unifonic. There is increasing competition for talent. We are doubling down on building a great work culture. We provide employees with a transparent, open, exciting, and challenging culture where they can be themselves and learn. My main focus now is on developing the right work culture and the right team.

What is the future for tech in the Middle East?
We are still in the early days of digital tech in the region. There are many opportunities to be pursued and vast spaces to be explored over the next 5 to 10 years. There is tremendous potential for growth and job opportunities. We can use technology to change people's lives for the better. It only takes a few talented people to change the world and make an impact that will last for generations to come.

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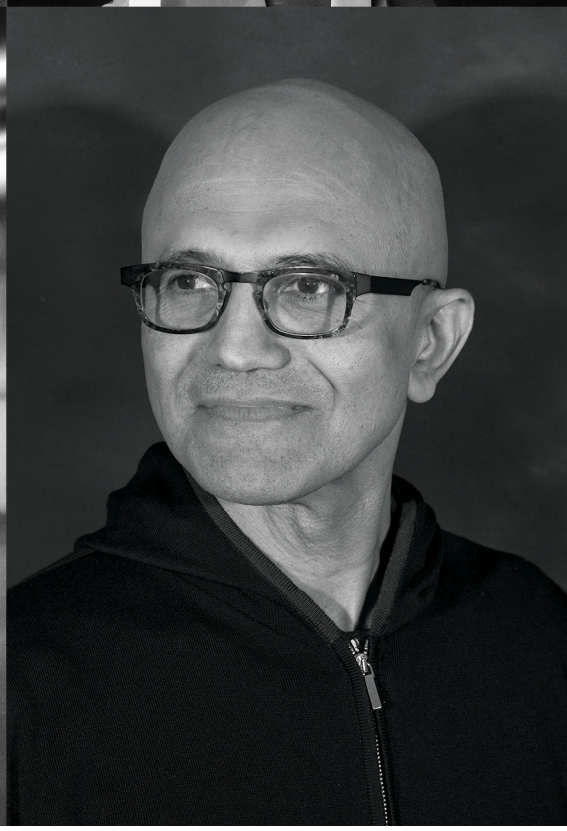

CLOCKWISE FROM TOP: MAGNUS NOLAN, TONJE THILESEN, MERON MENGHISTAB, ARGUS PAUL ESTABROOK

Features

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The Three Mounds at Red Cloud

How much truth and healing can forensic technology really bring? On the sites of Native American boarding schools, Marsha Small has made it her life's mission to find out.

by Rowan Moore Gerety


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On the Cover

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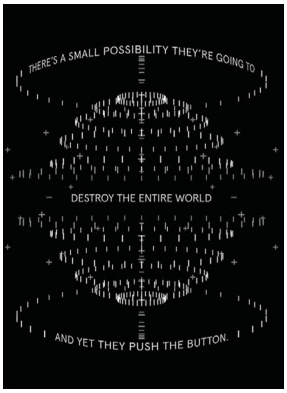

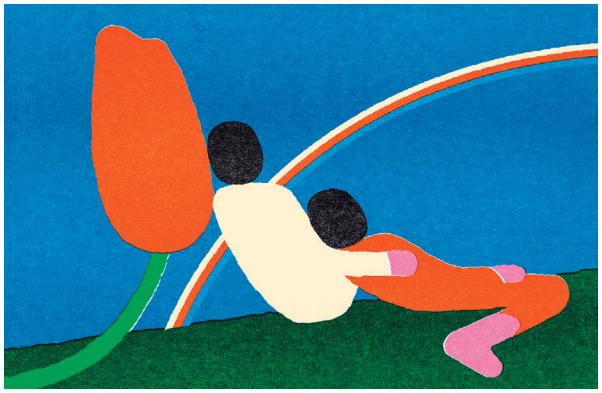

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Art by Vivek Thakker

When WIRED heard that director Christopher Nolan was making a biopic of J. Robert Oppenheimer, our ears perked up. People have been drawing a lot of comparisons lately between the development of AI and the invention of the atomic bomb. So Maria Streshinsky went to LA to talk to Nolan about his new film and hear what he thought of those connections. At one point, he said something about the Los Alamos project that felt eerily resonant across time. It was the perfect sentiment for our cover.

Start

Gear

Posts

Six-Word Sci-Fi

CLOCKWISE FROM TOP: SHAWN MICHAEL JONES; PRATIK PARULEKAR; OYOW

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THE WORLD WORKS WITH SERVICENOW™

Readers get riled about hacks, heat, and the human struggle.

In our June issue, Maria Streshinsky chronicled one climate activist's relentless quest to flip the oil and gas industry to geothermal power—starting in Texas. Kim Zetter went behind the scenes of the investigation into the SolarWinds hack, one of the most complex cyberattacks in history. And online, Malcolm Harris profiled former techno-optimist Douglas Rushkoff.

DAN WINTERS

RE: "INSIDE, EVERYWHERE, ALL THE TIME"

Right now, the United States does not have a shared narrative of cybersecurity history and major cyber events. The Cyber Safety Review Board should rectify this problem. A shared narrative allows the US government to lead in cybersecurity, rather than ceding that initiative to private companies and journalists. It also sets an example for state and local governments and federal agencies to follow regarding conducting thorough, impartial reviews after major cybersecurity incidents. Getting the CSRB to investigate these incidents will not be easy. There is a tremendous amount of pressure from different organizations that have prevented investigations up until this point, but it will be beneficial to have an impartial, public record of failures and how to avoid repeating them.
—Tarah Wheeler, Council on Foreign Relations, and Adam Shostack, Shostack + Associates

RE: "THE ENERGY TO SURVIVE"

Thank you for highlighting what I am convinced will be a transformative technology. Contactless millimeter-wave drilling tech, developed by a company called Quaise and MIT, is also showing promise. The systems coming online allow for geothermal nearly anywhere, and it can be a direct replacement for coal power and oil and gas.
—Peter Bahnsen

I'm not sure how I feel about the geothermal work Beard is doing. It may never generate affordable power the world over. Better to diversify the energy sector. Moreover, industry got us into this mess.
—Jamie Beaulieu

We built a house in North Carolina that uses a vertical geothermal pump system for heating and cooling. What struck me was that the pump sounded like a heartbeat. It would be nice if other buildings had such a heart.
—Cristina Mickiewicz

This piece of writing—journalistic vigor combined with empathy and vulnerability—made me cry.
—@dmitchell_by

RE: "DOUG RUSHKOFF IS READY TO RENOUNCE THE DIGITAL REVOLUTION"

A good number of people who have grown up with the promise of tech are pretty well disgusted by what it's delivered, which is mostly, "A handful of multibillionaires treating the rest of us as sets of eyeballs to be monetized at all possible costs." I grew up with the promises of the internet, and I have to agree with Cory Doctorow about "enshittification." Turns out, humans don't scale to a global conversation very well, and especially not when your goal turns into "ensuring they see as much of the platform as possible to view your ads." So, yeah. Good for him. The tech thing has rotted. Let's try something different.
—Syonyk, via Hacker News

The interview with Rushkoff brings to mind Albrecht Dürer's engraving *Melencolia I*. It summed up the despair at the apex of another technological age, the Renaissance. The more things change, the more they stay the same. Humanity cannot escape being human, no matter how hard we strive to reach escape velocity.
—John Zeigler

RE: "DOUG RUSHKOFF"

"We thought the internet could change society. Instead it became society."

—David Andress

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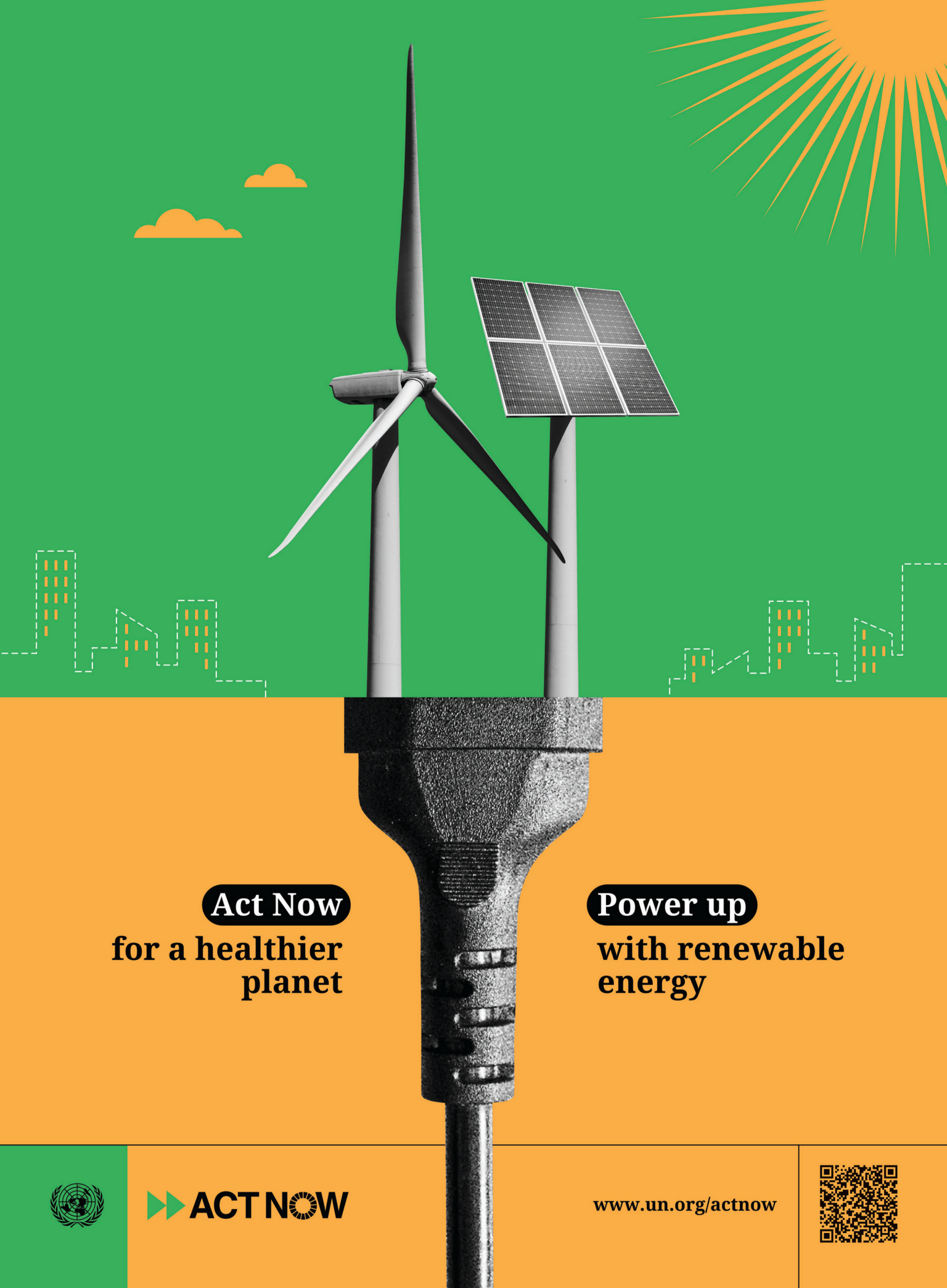
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BY SHEON HAN | PHOTOGRAPH BY SHAWN MICHAEL JONES

THE CASE FOR SOFTWARE CRITICISM

Software may be the defining cultural artifact of our age. It's time to build a culture of critical analysis around it.

HERE'S A QUICK typology of tech journalism today: news reporting ("Amazon Announces Layoffs Affecting 18,000 Employees"), gadget reviews, company and founder profiles, opinion essays (Zeynep Tufekci et al.), investigative work ("The Uber Files"), industry digests (TechCrunch), personal blogs, Substacks, and—if you're feeling generous—Hacker News comments and GitHub "issues." It's an incomplete catalog, but you get the idea. Yet surveying this landscape reveals a curious lacuna: software criticism.

To be clear: Technology criticism is nothing new. Depending on who you ask, it goes way back to Lewis Mumford, Herbert Marcuse, Martin Heidegger, and Marshall McLuhan. More recently, I assume you've at least heard of popular books like *The Age of Surveillance Capitalism* and *The Attention Merchants* and may even be familiar with technology critics like Jaron Lanier, Evgeny Morozov, and Ellen Ullman. Or Fred Turner, Gabriella Coleman, and Sherry Turkle, to name a few from the academic flank.

But software criticism is not the same as technology criticism. A work of software criticism is to Nicholas Carr's "Is Google Making Us Stupid?" what a *New York Times* book review is to Virginia Woolf's "Modern Fiction." The latter is a more synoptic assessment of the field, while the former is a focused interrogation of a single work.

So where are software critics? Like the rise of novels in the 18th and 19th centuries or jazz in the 1920s, isn't software a defining artifact of our time? How in Turing's name hasn't a culture of software criticism emerged?

The idea that a rhapsodic exegesis of fermented grape juice could be a legitimate category of criticism didn't gain traction until the likes of Robert Parker—whose legacy is, for the record, quite messy—made the genre serious. There had been wine reviews published in trade magazines, but there was no culture of wine criticism. Now there are more wine columns than (alas) poetry sections in major US newspapers.

Think wine is too different from software? Here's another example for you: car criticism. In 2004, Dan Neil of the *Los Angeles Times* won the Pulitzer Prize for Criticism for his "one-of-a-kind reviews of automobiles, blending technical expertise with offbeat humor and astute cultural observations."

Next up, architecture criticism, whose bona fides are well established. On this much we should agree: A piece of architecture can be as complex as a piece of software. In fact, the vocabulary of software engineering has many parallels to architecture. (The most obvious? Those who make high-level design choices are called software architects.) It may be no coincidence that Mumford, an early technology critic, served as the architecture critic for *The New Yorker*.

If grape juice and cars and buildings merit critical analysis for their complexity and design, shouldn't a piece of software qualify as an object of criticism too? It's a truism that great books, and insights extracted from them, help you understand society better than your own daily living experience. But so can products of engineering, like the Ford Model T, Boeing 747, and—a textbook example—the Singer sewing machine. The Chrome browser, which spans all layers of abstraction—from low-level network protocols to memory optimization to product features to UI elements—is surely no less complex an object than a Mini Cooper? →

If fermented grape juice and cars and buildings merit critical analysis for their complexity and design, shouldn't a piece of software qualify too?

WIRED

Gadget Lab

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We cannot come to a full understanding of our time without certain pieces of software. I recoil at this phrase, but software (like it or not) has been eating the world. And large language models are coming to eat your lunch. Hence critical knowledge of software products is vital.

When explaining the success of Slack, business analysts might look at market forces and demands ("product-market fit," in their lingo), but a software critic would evaluate software-specific aspects—user interface, frontend, backend, infrastructure. That critic might advance a thesis that Slack succeeded because it became what was thought to be unattainable by enterprise software: "likable." Then the critic could look at its design elements, not only visual ones but its signature Knock Brush notification sound, and assess its risky yet fruitful backend rewrite—rejection of the conventional wisdom that you should never rewrite your code—that made it go from being the butt of an industry joke to a scalable piece of software.

Software critics would help us answer this simple question that demands complex answers: "Why is this good?" Or, often more entertainingly, "Why is this so bad?" Take Microsoft Teams as an example. What commentary we get now is a fusillade of tweets or rage threads in r/MicrosoftTeams. But a software critic could nail the underlying malady and establish a rational basis for its terribleness. A good work of criticism is liable to make you love the software you hated and hate the software you loved.

So what would a piece of software criticism look like? At its most basic form, a rough blend of product review and literary criticism. But it's much more than that. The critic will anatomize the subject from several angles. Befitting the hybrid artifact that is software, they will adopt disciplinary anarchy, toggling from the commonsensical to the technical to the historical to the philosophical.

EXPIRED	TIRED	WIRED
Nuclear apocalypse	Ecological collapse	P(doom)
Smoking	Unhealthy diet	Loneliness
Microwaves	Lasers	Quantum energy teleportation
Rubber-based elastics	Petroleum-based elastics	Protein-based elastics
Race-baiting	Jungian interrogation	Prompt injection attack

Let's pick Google Docs as the patient zero of this new enterprise. A software critic may begin with some requisite cultural commentary on the labor of writing but then also provide a technical (even geeky) history-cum-explainer on how the operational transformation technology of Google Docs paved the way for real-time collaboration tools in other fields, such as Figma for design or Colab for programming. And how conflict-free replicated data type could make real-time collaboration the default mode of the future. Then the critic might explore what that means culturally and sociologically.

Here's what software criticism must not be: No ratiocination similar to Parker's point system for wines. No "buy on Amazon" links. A software critic could stand anywhere on the spectrum, from technological enthusiasm to optimism to skepticism to pessimism, but would need to avoid the extremes. They should sail between the Scylla of tech utopianism and the Charybdis of Luddism in order to invite all kinds of readers and avoid setting off ideological alarms.

And surely we can use some exciting prose! Burn that copy of *On Writing Well* and help yourself to some Nabokov soup. Exorcise the kind of homogenizing language that abounds in the rationalist blogosphere of Scott Alexander wannabes and avoid sounding as if the text were generated by a large language model trained on VC tweets. Self-medicate with William H. Gass, luxuriate in Lydia Davis, mainline Martin Amis, hallucinate with Geoff Dyer, get drunk on Peter Schjeldahl, and detoxify with the sobering yet adrenalizing eloquence of Parul Sehgal. We aren't writing a damn readme here.

Even if it remains a niche area of criticism—isn't criticism a niche genre to begin with?—the effort would be worthwhile. I'm reminded of what the music critic Alex Ross wrote, in a piece on Debussy, about what happens when a new creative form is born: "Debussy accomplished something that happens very rarely, and not in every lifetime: He brought a new kind of beauty into the world."

This is the first installment of WIRED Software Review. Read more at WIRED.com.

SHEON HAN *(@sheonhan) is a writer and programmer based in Palo Alto, California.*

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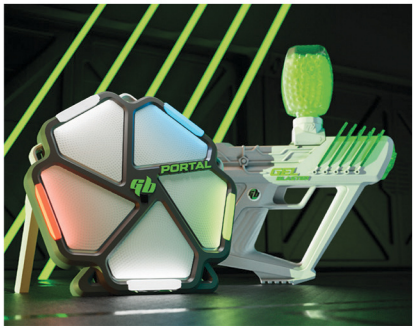

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START

BY PAUL FORD

LET'S DO LAUNCH

**We're almost there—the big release date.
Here's what to expect and how to handle it like a pro.**

Team,

We've worked toward this release date for well over a year, and soon we'll experience a full product launch. Of all the stretches, the home stretch can be the hardest, so I want to share some learnings from past launches to help you stay motivated through the next phase. We can do this!

First, and most important: I need everyone to set impossible expectations of success. You might be anticipating extra equity, huge salary increases, significant press coverage, or Product Hunt glory. You might think the one-liner you use on acquaintances and journalists and investors is puffed-up enough: "By creating a mobile-app-controlled kitty litter scooper, we're helping humans have better relationships with their cats." But you should go bigger. Every product can claim to make people's lives better; if you want to stand out, you must link your app to a real, immense global crisis. Try this: "Women spend more time caring for pets than men. By designing an app that controls an automated kitty litter scooper, we are freeing up women to focus on their communities and set their own agendas. WiskrSküps is critical feminist infrastructure." Can you link your product to mitigating climate change? Improving education? Smoking cessation? Panda habitat preservation? I can, in 30 different ways. That's why I'm your boss.

Our goal here is to build a balanced organization, so I also need you to take time for the other side of narcissistic self-aggrandizement: credit-hogging. Yes, without you, nothing could have shipped at all. Make sure to remind everyone of your value in every meeting. Walk around, if you're not remote, and say things like, "When we added emoji to the litter-scooping notifications, that really put this thing over the edge. I don't know if you know how important that is to mitigating climate change." Everyone will agree with you. What choice do they have? Credit-hogging is an essential part of any software release, and getting good at it is what defines a true organizational leader. I always make a lot of time for it. Again: That's why I'm your boss.

If all goes well, we'll spend the run-up to launch squashing bugs and alternating between fantasies of glory and a morbid fear of being ignored. Then comes the big moment. A launch day is very special. You might think it's an opportunity to throw a party and celebrate. But experienced product leaders know that this is the day you wake up and have a huge fight with your romantic partner, whom you've neglected for months while you hauled this bundle of code and missteps into the light.

Here's what you're going to do: You will sit down, open your laptop, and walk them through the product, focusing on all the tiny features added in the past two weeks, scrutinizing their face for reactions, insisting that the bugs that show up don't mean anything—and when you don't get exactly the reaction you're looking for, at exactly the right time, you'll slam the laptop closed and say, "Look, it's clear you don't have time for this," and stomp off while they watch in confusion. Personally, I try to have at least three of these fights for each product—one for alpha, one for beta, and a big one for the full release. [If you don't have a partner, a roommate or friend is fine.]

Once you've stomped out of the house, head to the office, where, after doing some light credit-hogging, you should spend as much time as possible on social media engaging in PLR, or post-launch reloading. While the vast majority of humans will be utterly indifferent to your announcement, you must drill in on the one or two who offer reactions that fall short of total excitement. Be sure to blow up any criticism or misunderstanding, no matter how small, into a flat-out organizational panic. Slack can be a great tool to coordinate your overreaction. You should share every tweet that insists your product is bad, old-fashioned, "guaranteed to kill pets," etc. "Real men don't own cats," the depressed men of Twitter will write. "What stage of late capitalism are we in where your litter box needs an app?" the anarchists of Mastodon will post. Who knows what they'll say on Bluesky, but be ready to freak out about that too.

Inevitably, right away, the app's login function will break. As a society we are incapable of authenticating users. It's a tragedy, one of our greatest failings. And when we fix that issue we will forget to turn server logging back on, so we will have no idea who's using the app.

After all that, the only thing left to do is to prepare yourself for the frigid silence of day two, then days three through 300. Think of it this way: You spent a year, maybe several years, digging a deeper and deeper hole [you can dig a pretty big hole if you grind every day], and now it's time for the world to pull you out. In your heart, you expected this to happen quickly. But it takes time. First people need to find the hole, then they need to want to visit the hole, then they need to put their email addresses in the hole.

Eventually people will show up, if marketing does its job. They might throw in some sticks and suggest you build a ladder. [This is called venture capital.] But most of us, frankly, just learn to live in the hole. People will ask how it's going down there in that thin shaft of sunlight. You will mumble something about product-market fit as you pray the sides don't collapse.

Team, let's get pumped for this launch. Let's file bugs. Let's call our partners and apologize for being so wrapped up in work. Don't put down your shovels yet. We still have a lot of digging to do.

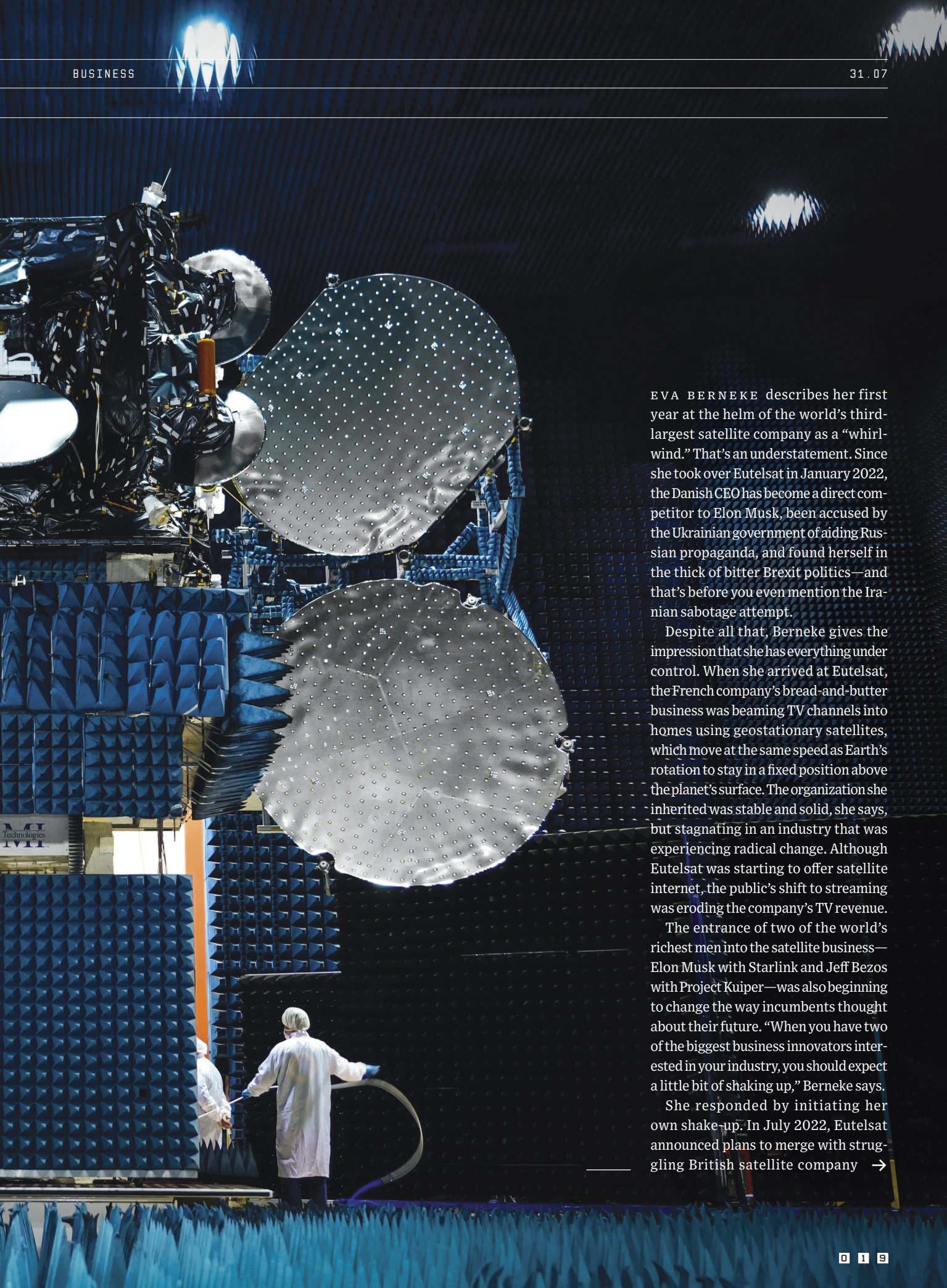
PAUL FORD *(@ftrain@tilde.zone) is a writer, programmer, and software entrepreneur. He lives in Brooklyn.*

BY MORGAN MEEKER

WATCH THIS SPACE

French satellite giant Eutelsat is taking on Elon Musk's Starlink—while navigating Russia's war in Ukraine, Brexit politics, and Iranian jamming attacks.

→ Testing a Eutelsat 7C's antennae at a facility in Palo Alto, California.



EVA BERNEKE describes her first year at the helm of the world's third-largest satellite company as a "whirlwind." That's an understatement. Since she took over Eutelsat in January 2022, the Danish CEO has become a direct competitor to Elon Musk, been accused by the Ukrainian government of aiding Russian propaganda, and found herself in the thick of bitter Brexit politics—and that's before you even mention the Iranian sabotage attempt.

Despite all that, Berneke gives the impression that she has everything under control. When she arrived at Eutelsat, the French company's bread-and-butter business was beaming TV channels into homes using geostationary satellites, which move at the same speed as Earth's rotation to stay in a fixed position above the planet's surface. The organization she inherited was stable and solid, she says, but stagnating in an industry that was experiencing radical change. Although Eutelsat was starting to offer satellite internet, the public's shift to streaming was eroding the company's TV revenue.

The entrance of two of the world's richest men into the satellite business—Elon Musk with Starlink and Jeff Bezos with Project Kuiper—was also beginning to change the way incumbents thought about their future. "When you have two of the biggest business innovators interested in your industry, you should expect a little bit of shaking up," Berneke says.

She responded by initiating her own shake-up. In July 2022, Eutelsat announced plans to merge with struggling British satellite company →

"Starlink has truly innovated, making launches much more industrial. We should be looking at that and saying, 'How can we move forward much, much faster?'" —Eva Berneke, CEO, Eutelsat

OneWeb. As part of the deal, Eutelsat absorbed OneWeb's constellation of 648 low-orbit satellites. At just 1,200 kilometers above Earth, the OneWeb fleet delivers faster internet speeds than Eutelsat's geostationary satellites, which beam signals from 35,000 kilometers high.

OneWeb is Eutelsat's ticket into the booming satellite internet market. Rural homes, ships, airlines, militaries, and autonomous vehicles are looking to stay connected in places previously considered dead zones. "Even in France, a country with very high fiber and 5G coverage, it's estimated that around 4 percent of households are without good connectivity," Berneke says. She expects this figure to rise as high as 15 percent in countries with less-developed internet infrastructure. "So it's not that small a niche."

The OneWeb–Eutelsat merger has been touted as Europe's entry into the space race and currently represents the only low-orbit rival to Musk's Starlink. But to claim the title of a European space giant, Eutelsat first has to navigate messy post-Brexit politics. Both France's Eutelsat and Britain's OneWeb were partially owned by their respective governments, which will continue to hold stakes in the new business when the deal is finalized later this year.

Berneke admits that Brexit does not make running the company easy. "But there's been a willingness on both sides to find a good way of collaborating," she says. If Europe actually wants a homegrown satellite giant, Britain and France will have to resolve their differences. "OneWeb's fleet is going to be one of the only non-US-based constellations for a while," she says.

Brexit politics is not the only challenge. OneWeb's satellites need replacing, and Eutelsat is planning to have more advanced satellites in orbit by 2027. Berneke says this upgrade will cost as much as €4 billion (about $4.4 billion), marking a dramatic change for a company with a reputation for playing it safe. Analysts at J.P. Morgan have described the merger as "high risk." But Berneke says this new approach is a conscious decision—partly influenced by Musk. "Starlink has really, truly innovated, making satellite launches much more industrial," she says. "That's something we all should be looking at and saying, 'How can we move forward much, much faster?' It's also being open to risk."

Starlink's attitude to risk was demonstrated by its close collaboration with the Ukrainian government, which exposed the service's satellites to Russian jamming attacks. Eutelsat, however, was pulled into the war. In November, Ukraine's culture minister, Oleksandr Tkachenko, published an article in the French newspaper *Le Monde* criticizing Eutelsat for continuing to broadcast TV channels that carried Russian propaganda. Berneke does not deny the claims. "We've always had what we call a policy of neutrality," she says. Eutelsat follows guidance from French media regulator Arcom on which channels are and aren't sanctioned.

Berneke resists the idea that companies should implement their own sanctions—a trend that has been gaining traction since Russia's invasion of its neighbor. Apple, for example, voluntarily halted product sales in Russia after coming under pressure from the Ukrainian government. "We're not going to try to do more ourselves," Berneke says. She argues that this stance gives the company more legitimacy to push back when regimes like Iran do not want some Western channels broadcast locally.

In late 2022, the company accused Iran of jamming its satellites. "We did all kinds of technical hoops and loops to make sure that we continued broadcasting, because we had paying customers and we thought it was important that channels were not sanctioned," she says. "So it goes both ways."

From left, a satellite dish at the Eutelsat Paris-Rambouillet Téléport; a Eutelsat Konnect VHTS (very-high-throughput satellite) being put in a thermal vacuum chamber for testing.

EUTELSAT; THALES ALENIA; OPENING SPREAD: MAXAR TECHNOLOGIES

MORGAN MEAKER *(@MorganMeaker) is* WIRED*'s senior European business writer.*

BY AMANDA HOOVER | ILLUSTRATION BY MARÍA MEDEM

CROWDED HOUSE

Startups are buying properties and wooing first-time real estate investors to purchase shares. The scheme could spell trouble for both renters and aspiring homeowners.

THE THREE-BEDROOM, two-bath, split-level house in Fayetteville, Arkansas, looks like a perfect family home: charming brick exterior, lush front lawn, fenced-in backyard that's perfect for hosting cookouts. It's on a quiet street with two schools and a Boys and Girls Club nearby. But this ideal family home has an unusual owner—or owners.

The property, these days known as the Soapstone, is "owned," in a roundabout way, by 102 investors who have collectively purchased just over $100,000 in shares through a company called Arrived Homes. The Soapstone is managed and rented out for $1,600 a month, a bit below the city's average rent of $1,795. Investors, who can buy in for as little as $100, get a cut of the profits.

And it's not just the Soapstone. Arrived, alongside a handful of other so-called fractional investment startups, is adding yet more noise to an already crowded real estate market. Investors can buy into hundreds of similar properties on the company's website, where each listing has an Airbnb-style profile that breaks down the neighborhood, costs, number of bedrooms and bathrooms—and return on investment.

In addition to Arrived, there's Lofty AI, which lets people invest using a token system. Another company, reAlpha, sells shares in homes that serve as Airbnbs. Landa lets people invest in shares valued as low as $5 for houses around Atlanta or $20 for Brooklyn apartment buildings. Daniella Lang, a product marketer at the firm, says investors "see this as an American dream opportunity" that lets them build wealth in real estate. Anyone can click a button to invest—but that doesn't really make them homeowners.

Fractional investment startups claim that they lower the barrier to investing in property—and make it as easy as booking an Airbnb. At Arrived, 40 percent of investors are renters themselves, according to CEO Ryan Frazier. The idea is that people locked out of the housing market can profit without taking on mortgage debt. But the scheme also adds small investors to the real estate feeding frenzy at a time when a housing shortage continues to push up prices, leaving many Americans stuck in expensive rental properties.

"Maybe some people will benefit from it, maybe they will make money," says Amee Chew, a senior research analyst at the Center for Popular Democracy, a progressive advocacy group. But, she adds, more real estate investments may come "at the cost of housing stability" and risk worsening a system where for-profit investors can "wreak havoc on low-income residents."

Right now, fractional investing startups represent a tiny niche, but the idea is "growing faster than ever," says Casey Berman, managing partner at venture capital firm Camber Creek, which has a stake in Fundrise, a pioneer in the space.

Founded in 2010 with the aim of making it easier for people to make small investments in real estate portfolios, Fundrise now has more than 387,000 active investors and a portfolio of apartments, industrial properties, and single-family rentals worth $7 billion. Newer fractional startups play off that small investing concept but let investors pick specific properties, mostly single-family homes. That's a hit too: Arrived has watched shares of new listings sell out in less than a day.

The fractional model plays into concerns that rental housing is primarily "being used for profit and an investment tool," says Katie Goldstein, the director of housing and health care campaigns at the Center for Popular Democracy. That's because, like institutional investors, the startups are backed by venture capital, use tech to scoop up properties, and keep a distance between renters and landlords through management companies.

These startups argue that they are simply opening up investing to more people. Frazier says Arrived gives regular people access to home equity sooner in life. But the hunger for fractional investing reflects a shift in priorities, he says, as younger folks are "looking for more flexibility" and want to be "less tied down by debt and assets."

Harsh economic conditions have forced younger people to adjust. The average age of first-time home buyers in the US has risen to 36, according to the National Association of Realtors. People are marrying later, are more likely to be burdened with student debt, and are stuck with more stagnant wages. All the while, property prices are rising: In Phoenix, the median home price in 2004 was $174,815; today it's $450,000. Average salaries from 2004 to 2021 increased 70 percent, lagging well behind housing prices.

That's part of what drew Emanette Peniche to the Soapstone. Peniche, who rents in Los Angeles, says she regrets not initially investing more through Arrived, and she now has a handful of properties in her portfolio. "I was immediately captured by the accessibility to investing in real estate," says Peniche, a 33-year-old who works in product marketing at Meta. She was so drawn to the model, in fact, that she shared her marketing expertise with Arrived as an unpaid adviser in 2021.

The first homes to be advertised on Arrived likely won't be sold for two to three years, giving them time to appreciate, says Frazier. Then investors can cash out. The average investor spends around $3,500 on five or six properties, Frazier says. But investments can top $25,000, says Bret Neuman, head of brand and content at Arrived. Still, most people invest less than $1,000. According to Arrived, in 2022 it delivered $1.2 million in dividends to investors, and its property portfolio appreciated by a total of $1.4 million.

Fractional investment startups are simply following trends set by other real estate investors. Since the Great Recession reshaped the US real estate market, large investors, backed by venture capital and bolstered by new technology, have swooped in and bought not just apartment buildings but also single-family homes in historically more affordable suburbs near cities like Atlanta, Phoenix, and Charlotte, North Carolina.

This move may have helped accelerate the financial recovery in some areas, according to the US Federal Reserve. But big investors have nudged home prices up, especially in predominantly Black neighborhoods.

Still, big and fractional investors aren't the only competition for individual home buyers. The real giants of American real estate? Smaller investors, or mom-and-pop landlords, who own 70 percent of rental properties, according to the latest US Census data.

If the fractional trend continues, it could shake up the market, particularly threatening the dominance of mom-and-pop landlords. "The barriers to entry have really come down," says Jay Parsons, chief economist at RealPage, a property management software company. "There are a lot of different players in the single-family rental market."

Those players now include people like Peniche. She doesn't hold the deed to the Soapstone or field complaints from its tenants, but her investment is making money. Even if she could afford to buy the whole property, she might not want to. Peniche says high interest rates and rising prices have made her rethink whether she wants to own her own home at all. And she's happy with the returns from her more passive investments. "I'm not sure home ownership is a goal of mine anymore," she says, "at least for the foreseeable future."

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BY REECE ROGERS | ILLUSTRATION BY ANGELICA ALZONA

UNFOLLOW ME

Think you're being tracked with an Apple AirTag? Here's how to check if someone is monitoring your location without consent.

WHEN APPLE launched the AirTag in 2021, the Bluetooth tracker was lauded as a step toward the future of augmented reality and a great way to find everyday objects, like that damn TV remote. But cybersecurity experts warned that stalkers would exploit the tracking device.

Unfortunately, those warnings were warranted: Multiple women soon reported stalking situations in which AirTags were slipped into their purse or taped to their car. Police departments across the US issued alerts about the potential criminal uses of AirTags. Newer AirPods also have tracking functionality, but their high cost makes them less attractive as a tracking device.

Sure, there are other tracking options, like Tile, that could be used for nefarious purposes, but the scale of Apple's ecosystem sets the AirTag apart. From the US Drug Enforcement Administration using the device to track international drug shipments to a man in Texas using it to find his stolen car and kill the suspect, AirTags are everywhere.

If you are concerned that a hidden AirTag may be recording your location, here's what to do.

TRY TO FIND IT

The type of smartphone you have affects how easily you can discover an uninvited AirTag. iPhones running iOS 14.5 or newer should display a push alert whenever an AirTag is away from its owner and moving in tandem with you for an extended period of time. Apple does not provide an exact time frame for when this alert is triggered.

People with newer iPhones should turn on Bluetooth and check the settings to ensure they'll receive such notifications. Under Settings, go to **Privacy & Security** and toggle **Location Services** on. Scroll to the bottom of that page, tap on **System Services**, and activate **Find My iPhone**. Also, search for the **Find My** app, visit **Me** on the bottom right, then tap **Customize Tracking Notifications** to double-check that notifications are enabled.

When you click on the alert for an unrecognized AirTag, you may be given the option to play a sound on the AirTag to help locate it. If you're using an iPhone 11 or later, you might be able to use precision location data to ferret out the device.

Don't have an iPhone? Months after the release of the AirTag, Apple launched the Tracker Detect app for Android phones. Unlike the iPhone security features, the Android app does not automatically look for unknown AirTags. Instead, users must initiate the scan.

According to Eva Galperin, director of cybersecurity at the Electronic Fron-

tier Foundation, the reasons behind the app's limited functionality are complicated. "This is actually a limitation of how the Android ecosystem works and how Android apps can work," she says. "I have called on Apple and Android to work together to incorporate the level of mitigations that Apple provides in iOS into Android, but this requires a lot of cooperation between two groups who are normally rivals." (In early May, Google and Apple revealed a joint proposal of industry specifications to help users find trackers, and Google separately announced Android updates that will provide "unknown tracker alerts.")

While some guides to finding AirTags recommend using Bluetooth scanners, Galperin does not consider this method reliable. "I have tried using various Bluetooth scanners to detect AirTags, and they do not work all the time," she says.

Millions of Americans still do not own a smartphone. Without a device on hand, you must rely on visual and audible clues to find AirTags. The white disc is slightly larger than a quarter. As reported by *The New York Times*, a woman named Ashley Estrada discovered an AirTag lodged under her license plate, and her video documenting the incident has been viewed over 20 million times on TikTok.

When the AirTag was first released, the tracker would beep if it was out of Bluetooth range of the owner for longer than three days. Apple has since shortened that time to 24 hours or less. Despite the update, you might not want to rely only on sound to detect an AirTag. Numerous videos on YouTube offer DIY instructions for disabling the speaker, and trackers that were modified to be noiseless were available for a short time on Etsy.

THERE IT IS. WHAT NOW?

The best way to disable an AirTag is to remove the battery. First, flip the AirTag so the metallic side with the Apple logo faces up. Press down on the logo, and give it a quarter-turn to the left. Now you will be able to remove the cover and pry out the battery.

Apple's support page for the AirTag suggests reaching out to the police if you believe you are in danger: "If you feel your safety is at risk, contact your local law enforcement, who can work with Apple to request information related to the item. You might need to provide the AirTag, AirPods, Find My network accessory, and the device's serial number." You can get the serial number (before removing the battery) by holding the top of an iPhone or other near-field-communication-enabled smartphone to the white side of the AirTag. A website with the serial number will pop up. This page may also include a partial phone number of the device's owner. If you feel hesitant about scanning the AirTag or do not have the ability, you can also find the serial number beneath the battery.

WHO SHOULD BE CONCERNED?

In stories shared online and in police reports, women are often the victims of AirTag stalking, but Galperin cautions against framing unwanted tracking as an issue solely for women. "I have been working with victims of tech-enabled abuse for many years," she says, "and I would say that about two-thirds of the survivors that come to me are women. But a third of them are men. I suspect that number would be higher if there wasn't such a stigma around being an abuse victim or survivor."

Galperin emphasizes how anyone can be a victim of abuse, as well as a perpetrator: "When we paint it all with this really broad brush, we make it really hard for victims who don't fit that mold to come forward."

For more resources, visit the National Domestic Violence Hotline at www.thehotline.org. You can also contact the hotline by calling 1-800-799-7233 or texting "START" to 88788.

Service writer **REECE ROGERS** *(@thiccreese) helps readers get the most out of their software, apps, and devices.*

Readout

The world, quantified.

75B

Particles of microplastic in each cubic meter of filtered wastewater from a typical recycling facility. Shredded plastic sloughs off the particles during multiple stages of washing.

1,900

Przewalski's horses left in the wild. The first genetic clone of the endangered central Asian mammal, named Kurt, was born in August 2020 from eggs frozen 40 years ago.

53%

Percentage of CNET's AI-written articles that have required corrections since the tech news site started publishing bot-generated stories in November.

40

Average age at which the human brain starts shrinking, as more brain cells die than are replaced. This is accompanied by declines in cognitive function.

READOUT SOURCES: *JOURNAL OF HAZARDOUS MATERIALS ADVANCES*, SAN DIEGO ZOO WILDLIFE ALLIANCE, THE VERGE, *ACTA NEUROPATHOLOGICA*
READOUT ILLUSTRATION: ANJALI NAIR; GETTY IMAGES

BY MARAH EAKIN

SONIC BOOM

With hundreds of thousands of podcasts competing for listeners, hosts are using IRL events and other strategies to make their shows more of an "experience." Fans dig it.

EARLY THIS YEAR, during an otherwise bleak couple of days in Brooklyn, New York, thousands of podcast fans enjoyed a special treat: They got to be a part of *My Favorite Murder*.

No, they didn't become victims of some bound-for-true-crime massacre; they were invited to the Pod Loft, a pop-up version of *My Favorite Murder*'s original podcasting studio. After spending countless intimate hours listening to the show, these so-called Murderinos were finally able to inhabit a version of the room where it happened, one filled with fan art, listening experiences, and tributes to the pod's motto, "Stay sexy and don't get murdered."

The Pod Loft was one of many installations at this year's On Air Fest, which also featured spaces dedicated to *Radiolab*, *The Heart*, *Object of Sound*, and *On Being*. The Podcast Experience, as it was dubbed, may have seemed like marketing—an "activation," in industry jargon—but it was also an exploration of the genre's future. With about 220,000 podcasts releasing at least one episode per week, creators need new ways to keep fans engaged. They've sold shirts and gone on tour, but if the On Air Fest asked anything, it was this: What's next?

Jemma Rose Brown, one of the event's organizers, thinks the landscape has changed dramatically. "The levers that could be pulled don't exist in the same ways," she says. "Now you have to create a moment, and you have to create a story. Every podcaster should be thinking about innovation and play and experimentation."

Podcasts have always been a deeply personal experience, thanks in part to how most people listen to them: with headphones in, while commuting, cooking, or cleaning. Now, though, the most successful podcasts are the ones that cultivate communities. There's clout and kinship in being a Murderino, a Friend of the Pod, or part of the Daddy Gang.

For Paul Scheer, cohost of *How Did This Get Made?* and *Unspooled*, "having a podcast is continually trying to grow it." He has done live shows, sure, but also started playing around with ways to engage on Twitch. "If it's just a podcast, you're going to have a harder time attracting new listeners," he says. "Now you have to think about what people are doing, how they're listening, and how they want to get involved with your show."

Object of Sound host Hanif Abdurraqib's quest for community meant turning his Podcast Experience space into a listening lounge where visitors could spin their favorite tunes and step into a shower turned studio to record a message to the show. "So many portrayals of music fandom in film and television treat it as this sacred thing, like anyone who doesn't rise to your level of enthusiasm or who doesn't have an understanding of the things you do needs to be looked down upon," he says. "I really wanted to upset that and tell people that I'm eager to hear about what makes them excited about music."

Abdurraqib says he spent hours in his space chatting with listeners about everything from their first concert to the best artists from Oklahoma. That was important, he says, not just because it excited existing fans and potentially generated new ones, but because it helped spark genuine connection outside a digital realm. Abdurraqib says it has become increasingly daunting to talk about music online, with everyone feeling both passionate and emboldened by anonymity.

Chris Gethard gets it. As the host of *Beautiful/Anonymous*, he has long prized the ability to talk to people for hours about their lives, secrets, and desires. Gethard brought those conversations into the light with Beautiful/CONonymous, a weekend of in-person activities for fans of the show held in May. Many of the attendees were from the podcast's 35,000-member-strong Facebook community, which Gethard calls "one of the only genuinely chill, respectful corners of the internet." Others, though, came from the podcast's roster of anonymous guests; Gethard estimates that in addition to the dozen past guests he and his producer booked, six or seven more just showed up on their own.

There are more than 360 episodes of *Beautiful/Anonymous*, and that mountain of content has certainly contributed to the show's rabid fan base. "The longer you listen, the richer the experience," says Adam Sachs, senior vice president of podcast programming for SiriusXM. "You can't build a canon in 20 episodes.

Scenes from the Podcast Experience at this year's On Air Fest in Brooklyn, New York.

It's really hard to establish inside jokes in a short amount of time."

Sachs knows this from experience. He came to SiriusXM after it acquired Conan O'Brien's podcast company, Team Coco. Even before O'Brien launched his own podcast, *Conan O'Brien Needs a Friend*, Team Coco had been attracting a fan base that it was able to build on when the podcast launched. One big boost came from uploading clips on the YouTube channel that had hosted bits from O'Brien's late-night TV show. YouTube listenership grew, and Sachs says the fans appear to be different—and younger—than those who may have found the show via traditional podcast platforms.

That trend doesn't apply to just YouTube. Sachs notes that more than 14 million TikTok followers consume clips of *Podcrushed*, cohosted by *You* star Penn Badgley, and at least some of them are likely to become full-episode listeners.

From Scheer's point of view, building community is all about offering listeners a unique experience. For instance, when *How Did This Get Made?* tours, they'll record the shows for eventual release but cut out parts, meaning only attendees get the full experience. "When you go out on the road with a podcast, you're going to see a different show every single night," Scheer says. "Because of that, we'll have people follow us from town to town. It's kind of like going to see the Dead."

Then there's Twitch, where Scheer and *HDTGM* cohost Jason Mantzoukas recently live-reacted to the *Fast X* trailer, much to the delight of 130,000-odd viewers. Scheer says that afterward, he removed the video, then cut it down and released it as a podcast. Thus, he says, "if you weren't there for that stream, you couldn't see it." He has also taken to posting old episodes on his YouTube channel under the heading "Matinee Monday."

It's this kind of messaging that people like On Air Fest's Brown think can really help shape the future of the medium. "Everyone should be thinking about, 'How do I take that core nugget of what my show is and try to express it in different ways?'" she says. On Air Fest cofounder Scott Newman agrees, adding, "As much as listening is about pressing Play on your podcast app and having headphones in your ear, it's much more about ideas and context and identity, as well as reflecting this moment in culture." Podcasts that can cultivate a fandom eager to go on this journey are the ones poised to survive.

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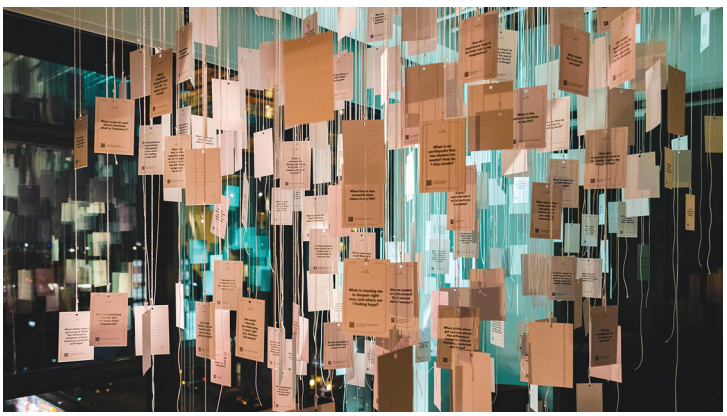


PHOTOGRAPHS: ON AIR FEST

BY SABRINA WEISS | ILLUSTRATION BY JAMES MARSHALL

Every year, thousands of dogs develop tumors very similar to those found in people. Find drugs that work for canines, and human treatments should follow.

OUR BEST FRIEND IN THE CANCER FIGHT

JELLYBEAN CONTINUES TO DEFY expectations. The 5-year-old Labrador retriever mix jumps up from the couch and walks around the living room with such ease, it's as if she'd never had metastatic cancer. Her owners, Patricia and Zach Mendonca, still can't quite believe it. "She's got a little bit more of a tug to her step," Patricia says.

Their beloved dog was diagnosed with a bone cancer called osteosarcoma in a hind leg almost three years ago. Even after an amputation and chemotherapy, the cancerous cells quickly spread through her blood to her lungs, as happens to dogs in 90 percent of such cases. Survival time at this stage averages two months. "We didn't have any hopes of curing her," Patricia says. "We were pretty devastated."

In November 2020, the Mendoncas enrolled Jellybean in a clinical trial at Tufts University, about an hour's drive from their Rhode Island home. Jellybean was given a trio of pills, at no cost, which the Mendoncas stuffed daily into her favorite chicken-flavored treats. By February 2021, Jellybean's tumors had disappeared, and they haven't come back. Her response surprised even the vets treating Jellybean and raised hopes that these drugs could help not just other dogs but humans too.

Osteosarcoma also affects people—particularly children and teens. Fortunately, it's fairly rare in humans: Some 26,000 cases are diagnosed worldwide each year. But there have been no new treatments for over 35 years, and those available aren't very effective, says veterinary oncologist Amy LeBlanc, who directs the Comparative Oncology Program at the US National Cancer Institute. Osteosarcoma patients have a survival rate of around 30 percent if cancerous cells metastasize.

Canine studies, like Jellybean's trial, could change all this. Cancers that arise in dogs are similar to those in people—strikingly similar for osteosarcoma. Under a microscope, tissue samples from canine and human tumors are indistin-

guishable. But osteosarcoma is at least 10 times more common in dogs, which means there are lots of canine cancer patients out there to help with research and drug testing.

In addition, medical treatment of dogs is not subject to the same regulations as that of humans; veterinarians are much freer to use existing drugs off-label against diseases for which there are no good treatments. This makes for quicker and cheaper clinical trials.

Such trials are part of the Cancer Moonshot initiative that US president Joe Biden relaunched last year. "They're designed to fill a knowledge gap that is not sufficiently filled by traditional studies in mice or by data that cannot yet be easily gathered in humans," LeBlanc says.

Dogs are better suited to these studies than lab mice. Whereas researchers raise mice in cages and induce cancer in them by injecting malignant cells, dogs live in environments similar to humans and are studied when tumors occur naturally.

Dogs also respond to treatments much like humans do, as shown by several recent clinical studies. In 2019, scientists at Colorado State University completed a trial of 28 dogs with osteosarcoma that had spread to the lungs. In addition to a commercially available cancer drug, they prescribed a common blood pressure pill, losartan, which blocks an immune system response that stimulates tumor growth. The pair of drugs helped shrink or stabilize lung tumors in 50 percent of the dogs. (Jellybean is receiving these along with a third drug, not yet approved for humans, as part of a parallel study at Tufts.)

This research is having a knock-on effect for humans. Around 40 children with resistant or recurrent osteosarcoma are receiving losartan and a human version of the canine cancer drug in a study to determine the safety and dose range of the treatment. It's a promising step, but it's too early to assess the impact it could have in people, says Steve Dow, a veterinarian and director of the Center for Immune and Regenerative Medicine at Colorado State University. Dow says the human trial "is not at the high-dose range yet, which is where we saw activity in dogs."

But another trial has advanced a step further: Scientists are testing how effective a vaccine made from the bacterium *Listeria monocytogenes* is at treating osteosarcoma in humans. This nasty bug usually causes food poisoning, but in a weakened form it stimulates the immune system. In earlier studies on dogs, the vaccine spurred immune cells to patrol the body and destroy cancer cells. The results of the human trial are expected later this year.

LeBlanc says the canine trials overseen by the National Cancer Institute are helping scientists better understand cancer in general. Blood tests and DNA analyses, for example, provide important insights into the genes that drive the development and growth of cancers.

Medical companies have also recognized the potential of pet cancer data, especially in precision medicine, where patients receive treatments that target cancer-causing mutations in their genes. This personalized approach relies on analyzing huge amounts of genetic information. Gaining enough data to reliably predict how a drug will perform is one of the biggest challenges in developing a new cancer treatment, says James Zou, an assistant professor of biomedical data science at Stanford University.

In a study published in January, Zou and his colleagues demonstrated that dogs can expand the pool of useful clinical data. The team worked with a data set of nearly 800 dogs that had been treated for different types of cancer and whose tumor tissue had been sequenced to detect mutations. Based on a comparison with data from a small number of human studies, the researchers found that dogs and humans that have similar genetic mutations and receive similar treatments experience similar clinical outcomes.

Jellybean was given a trio of pills. Three months later, her tumors were gone, and they haven't come back.

Once researchers access canine data and analyze which gene-drug combinations appear to be effective in dogs, it's possible to repurpose existing drugs or develop versions for humans without starting from scratch. The traditional pipeline for a single cancer drug is at least 10 years and costs billions of dollars. Applying machine learning to huge canine cancer data sets could speed up the process.

LeBlanc believes Zou's research underscores the promise of precision medicine and sets the stage for follow-up studies in which drugs are prescribed to dogs in a controlled setting. But she stresses that research and development efforts must continue to be guided by the principle that dogs with cancer are not just study subjects, but patients first. "Their care and welfare as they help us along this journey are always going to be our top priority," she says.

It's also the primary concern for Jellybean's owners. Out of 23 dogs that received the same treatment in the Tufts trial, she is the only patient still alive. The median survival time was about five months. "The work that Tufts has done and the science behind it have touched our lives so strongly and saved our dog," Patricia says, adding that she's glad to know that Jellybean's ongoing treatment and regular checkups could help other dogs and people in the future. But Patricia says what she's most grateful for, on a day-to-day basis, is "just the fact that she's still with us." W

GETTY IMAGES

Freelance journalist **SABRINA WEISS** *(@SabrinaMWeiss) is a regular contributor to* WIRED *who covers science, health, and the environment.*

BY MEGHAN O'GIEBLYN | ILLUSTRATION BY ASYA DEMIDOVA

Dear Cloud Support:

"I'm the best man in my friend's wedding this summer, and I'm dreading the speech. I have absolutely no idea what to say. Should I get an AI to help me? Or would that make me the worst man?" —Lost for Words

Dear Lost,

You're certainly not alone in realizing that some onerous creative or emotive task can be completed relatively painlessly with AI. The same thought has undoubtedly occurred to the tongue-tied Tinder user who discovers that he can enlist a digital Cyrano to pen his opening lines to a prospective date; or to the exhausted mother who recognizes that she has at her fingertips a tireless Scheherazade that can produce an infinite scroll of bedtime stories for her children; or to the overworked son who realizes that he can generate, in seconds, a personalized poem for his father's retirement party.

Creatively expressing our feelings to others is time-consuming, uncompensated, and emotionally taxing—that is, at any rate, the message implicit in some of the marketing of large language models. When Microsoft, for instance, introduced its AI Copilot products in March, it imagined a mother using the software to generate a speech for her daughter's high school graduation.

There are multiple ways you might use an LLM to produce a moving toast, ranging from the least intrusive (asking ChatGPT for writing tips or a quick proofread) to the more hands-on (generating a draft of the speech, which you can then customize). New sites like ToastWiz have built tools on top of GPT-4 that allow you to plug in "your stories and feelings" and generate three unique outputs for $30. Meanwhile, wedding-planning apps like Joy have incorporated AI that promises to help users with their "toughest wedding-related wordage." The feature can produce toasts, or even vows, in the style of Shakespeare or Rumi, and aims to help users "bring their emotions on to paper in fun and creative ways."

These aren't the first commercial products that have promised to offshore the difficult work of human expression—or what is increasingly called "emotional labor." Long before the recent AI boom, people turned to human ghostwriters to pen wedding speeches. ("Toast whisperers," as *The New York Times* noted in 2015, were an under-the-table service that many clients were too embarrassed to admit paying for.) And I imagine that you, like many people, have for years sent greeting cards that leverage the words of a professional writer to articulate what are allegedly your own thoughts and emotions. This practice, of course, was not without controversy and critics. Hallmark's very first slogan, introduced in 1944, was "When you care enough to send the very best," a linguistic sleight of hand that inverted the most common critique of commercial greeting cards—that relying on the words of professionals was, in fact, evidence that you did not care enough to speak from your heart.

Such products have long approached what sociologist Arlie Russell Hochschild calls the "commodity frontier"—the threshold of activities we deem "too personal to pay for." It's a perimeter that exists even when the products we enlist are (for the moment) free, and the arrival of new technologies calls for its constant renegotiation. In the case of AI, there have already been some breaches of this still-hazy border. When Vanderbilt University enlisted ChatGPT to generate an email offering condolences to the victims of the mass shooting at Michigan State, the school was criticized for using automated tools for a gesture that demanded, as one student put it, "genuine, human empathy, not a robot."

Writing a wedding speech would seem to require similar emotional engagement. But perhaps you have reasoned that intent and selection—"It's the thought!"—are what matters in these situations. You are, after all, the one providing the model with the essential, albeit rough, emotive ingredients to produce the finished product. In conversations about AI-generated text, the prompt is often spoken of as the *logos*, the spiritual breath of human authenticity that animates the synthetic output (dismissed as so much mechanical "wordage") with life and meaning. Just as the computer was, for Steve Jobs, a "bicycle for the mind," so language-generation tools might be regarded as the vehicle that transports the spirit of our emotions from their point of origin to a desired destination.

But I'm not sure it's so easy to separate intent from expression, or emotions from behavior. Some psychological experiments have demonstrated that it's our words and actions that allow us to experience emotions, not the other way around—like the famous example of how forcing oneself to smile can induce a feeling of happiness. It's possible that expression, including linguistic expression, is not a mere afterthought in our emotional lives, but the whole point. If that's true, then the decision to outsource your speechwriting might contribute to a kind of emotional atrophy, a gradual loss of the ability to truly inhabit your internal states—or modulate them. A podcaster recently boasted that a friend of his who struggles with anger management uses AI "tone filters" when communicating with people who provoke his temper, feeding rageful rants into ChatGPT and asking the model to rewrite them "in a nicer way."

If I can offer some more prescriptive parting advice, Lost, I'd urge you to consider that the logic of the commodity frontier can work in reverse. It's not that there are certain realms of human experience that are intrinsically too sacred to automate, which seems to be what you're getting at when you ask whether using AI for your speech would make you the "worst man." On the contrary, it may be that human intimacy blooms in precisely those pockets of life that have not yet been widely exploited by commercial or mechanical forces. Perhaps our very notion of meaningful human connection depends on our refusal to relinquish such emotional work.

In the end, it's the effort we put into a task that determines its subjective significance. If you decide to hand over the speechwriting work to a machine, then you are essentially confirming that it is meaningless boilerplate. If, on the other hand, you decide to write the toast yourself, you will undoubtedly come to see this work—and the end product—as important, if only because your actions have reinforced your belief that it is worthy of your time and attention. Maybe the speech won't achieve a toastmasterish polish or a Hallmark card's concision, but your words may lead you to your own emotions, which, for the time being, we aren't so eager to automate.

Faithfully,
Cloud

MEGHAN O'GIEBLYN *is the author, most recently, of* God, Human, Animal, Machine.

Cloud Support: Spiritual Troubleshooting for the Digital Age. For philosophical guidance on encounters with technology, write to cloudsupport@WIRED.com.

BY THE WIRED REVIEWS TEAM | PHOTOGRAPHS BY PRATIK PARULEKAR

ECO WARRIORS

Don’t let every purchase add fuel to the environmental fire. Tread more gently on the planet by choosing products that are repairable, upgradable, and made from recycled materials.

Owala FreeSip Water Bottle

Being a smart and informed citizen, you've already cut single-use plastics out of your life by investing in a reusable water bottle. Now you deserve a luxury upgrade. The German company Owala only makes water bottles, and its 24-ounce FreeSip is its premium model. The leakproof, flip-top lid springs open with the press of a button. Under the cap are two openings, one with an integrated straw for sipping and a larger opening for chugging. The lid's lock mechanism is solid; in our testing, no water spilled in our backpacks or jacket pockets. $28

For more reviews and buying advice, visit WIRED.com/gear.

Gantri Analog Task Light

Chris Granneberg's design for this lamp is sure to remind you of a certain Soviet video game—a dangerous thing for a desktop task light, as you might start daydreaming about falling blocks instead of concentrating on your failing code. However whimsical the lamp's design, Gantri is dead serious about sustainability. Each piece is 3D-printed at the company's California factory out of a bioplastic derived from sugarcane, then finished with a water-based paint. The swiveling head houses an LED that's controlled by a dimmer switch on the power cord, shining a soft, warm light on your workspace. $248

Nimble MagSafe Disc Case

You may have forgotten about compact discs, but our landfills haven't. Zillions of those plastic coasters are (very) slowly breaking down in trash heaps around the world, where they'll keep on polluting for centuries. The mobile accessory company Nimble has recycled countless copies of *Freedom Rock* into clear, postconsumer plastic for use in its iPhone cases. They fit all the latest iPhone models (regular, Plus, Pro, and Pro Max) and work with MagSafe and Qi accessories—including Nimble's own wireless chargers, which we also recommend. A bumper around the case's edge protects the phone from impacts and provides a bit of grip to prevent drops in the first place. $34

Nixon Time Teller OPP

You down with OPP? We hope so, because in this case it stands for Other People's Plastic. Nixon has redesigned its iconic Time Teller to be ecofriendly. The 39.5-mm case is made of postconsumer plastic, is waterproof to 100 meters (Nixon is a surf brand after all), and houses a three-hand Japanese quartz movement. The 20-mm silicone strap is secured by a locking quick-release loop. Choose one of the dressy muted tones or more striking models with faces designed by surf and skate artists like Hannah Eddy and Jim Phillips. $100 and up

STYLING BY BESSIE LACAP; COURTESY OF OWALA AND NIXON

Framework Laptop 13 ▶

When your laptop conks out, you typically have two options: pay through the nose to get it serviced by a pro or buy a new machine. A better option, for the planet and your wallet, is to fix it yourself. Framework's laptops have a modular design that makes it simple to repair, replace, or upgrade components like storage, memory, batteries, screens, keyboards, cameras, and fans. Even if nothing's broken, you can tweak your PC's capabilities by swapping in a new port configuration or even upgrading the mainboard. The company sells 13- and 16-inch models with either 13th-gen Intel Core chips or AMD Ryzen 7040 Series processors. Order one loaded with Windows or, for true DIY daredevils, install Linux yourself. **$849 and up**

(re)Zip Stand-Up Snack Bags

Stop using flimsy, single-use ziplocks and stash your wasabi peas in these washable, reusable bags instead. They're made of PEVA, a type of vinyl that's produced without chlorine. It's far less toxic to manufacture than PVC but feels the same and is just as waterproof and durable. The pouches are stiff enough to stand up on their own, which makes filling them easier. The seal at the top clicks when you close it—a nice bit of sensory feedback to let you know your precious snacks are safe and secure. Each bag holds 1 cup, which is just enough room for a sliced nectarine, a couple of hard-boiled eggs, a serving of trail mix, or a weekend's worth of dog treats. **$10 for a 2-pack**

▼ Arc'teryx Sima Hoody

This ultra-lightweight hoodie is made with Diem, a synthetic fabric made from 100 percent recycled polyester. The fibers excel at wicking moisture, so the zip-up keeps you comfortable and dry on hikes and bike rides where you need an airy, breathable outer layer. The fabric is also quite soft and stretchy, and it provides SPF 50 sun protection. The hood fits under a helmet without compromising your peripheral vision. The men's hoodie has a full zipper and a chest pocket; the women's is a quarter-zip with a side pocket and comes in more exciting colors. (Sorry, fellas.) **$150**

How to Dispose of Used Electronics

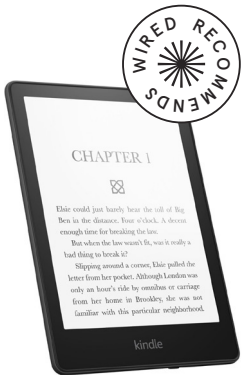
Old gadgets shouldn't go in the trash—they'll leach toxic chemicals into soil and waterways. But what to do with them? If a device still works, sell it, hand it down, or find a new use for it. Old phones and tablets make great e-readers, remote controls, and dedicated screens for watching videos. A portable speaker with a shot battery still sounds great if you keep it plugged in. If your nonworking, non-repairable tech must be discarded, look for a local e-waste recycling program that's certified R2, an international standard. Also choose recyclers that disclose which vendors they send materials to, and be sure those vendors are R2-certified. Retailers like Target, Walmart, and Best Buy recycle most electronics, but do the R2 check on their recycling partners. Apple, Amazon, Microsoft, Dell, and other companies will take old devices—sometimes even if it's not one of theirs. Just be sure to wipe all your data first.

WIRED RECOMMENDS

Hippy Feet Socks

Minneapolis-based Hippy Feet crafts its socks using mostly recycled cotton and polyester sourced from T-shirt trimmings. When the company needs to weave in some virgin material, it uses organic cotton and sustainably sourced merino wool. The results are not only comfy and responsible but fun too, with bright and bold designs, plus whimsical collaborations with Instagram-famous artists. On top of (and in tune with) its ethical mission, the company donates 50 percent of its profits to organizations that support unhoused youth. $19

Rumpl NanoLoft Flame Blanket
This lightweight cover-up has a split personality. One side sports Rumpl's standard recycled polyester that feels like the exterior of a sleeping bag. The other side is fire-resistant fabric that makes the blanket great for snuggling by the campfire. The blend of cotton and modacrylic—a petroleum-derived material with flame-retardant properties—can stave off burn holes from sparks and small embers. The insulation, which will keep you toasty down to 45 degrees Fahrenheit, is a recycled plastic NanoLoft material that feels and works just like natural down. There's also a "cape clip" to secure the blanket around your shoulders, freeing up your hands for making more s'mores. $130



Amazon Kindle Paperwhite

When e-readers first came out, swapping dead-tree books for yet another plastic-swathed, battery-powered device didn't feel like the most responsible move. But e-readers have grown friendlier to the planet. The newest Paperwhite is made from mostly recycled materials; 60 percent of the plastic and 70 percent of the magnesium is sourced from postconsumer waste. The battery in the waterproof tablet lasts up to 10 weeks, and the 8 GB of storage holds hundreds of ebooks. The 7-inch backlit E Ink screen is among the sharpest available, making the Paperwhite our top pick among e-readers. When you're done with it, send it back to Amazon to be refurbished, resold, or just recycled. $140

Parade Underwear

We've tried a variety of briefs, panties, and bralettes from Parade and have found them to be comfortable, flattering, and affordable. We also like the company's commitment to recycling; more than 80 percent of its skivvies use scrap yarn and fabric recovered from manufacturing waste, material derived from responsibly harvested pine and eucalyptus, and other ecofriendly fiber sources. Parade is in the process of switching to a bio-based alternative to elastane that will give its garments a more sustainable stretch. The product listings in the company's online store explain exactly what each item is made with, so you always know what's slipping against your skin. $8 and up

Targus Zero Waste EcoSmart Backpack

Its modest looks won't turn heads, but the EcoSmart backpack is a solid option for all your work or school schlepping needs. Inside are 21 liters of storage space and a padded sleeve that safeguards laptops up to 16 inches. Two zipper pockets in front and two sleeves on the sides keep keys, wallets, water bottles, and bike locks in check, while the ventilated shoulder straps help prevent sweat marks. The pack is largely made from recycled polyester, but Targus' most thoughtful innovation is the packaging. Fold up the recycled plastic sleeve that the backpack ships in and slide it behind the laptop pocket. It provides structural support and added protection for your precious tech. $60

Fair Harbor Anchor Swim Trunks

These trunks are made of 88 percent recycled polyester produced from that old garment-world standby: repurposed plastic water bottles. Instead of the scratchy mesh interior found on other eco-polyester trunks, these have a soft, quick-drying liner (also former bottles) similar to a boxer brief. The shorts aren't perfectly sustainable—the other 12 percent of the material is Spandex, which is made of plastic polymers—but they're better than most offerings in the swimwear world, which is infested with synthetics and polluting dyes. The Anchor trunks have an 8-inch inseam, but Fair Harbor has other options in 5-, 6-, and 7-inch lengths. $68

COURTESY OF AMAZON, TARGUS, AND FAIR HARBOR

Fairphone 4 ▼

Humans threw away more than 5 billion phones last year. How many of those devices would have stayed in use and out of landfills if they'd been more easily repairable or upgradable? That's a question the Dutch company Fairphone is eager to answer with its modular and tinker-friendly Android handset. Replacement parts—USB-C port, cameras, battery, screen, speaker—for the Fairphone 4 are cheap ($20 to $50 for most). You can perform the repairs at home with regular tools, keeping the phone in service for a year or three longer than your average iPhone or Pixel. The company sells its handsets only in Europe for now, but we're hoping similar environmentally responsible designs soon spread far and wide. **$625**

Rothy's Driving Loafer ▲

Though Rothy's is known for its flats, sneakers, and dressy accessories for women, it makes men's shoes too. This sharp loafer is the classiest of its recent masculine additions. Like many of Rothy's other shoes, the upper is woven from plastic-bottle yarn. The soles are natural rubber, with a funky tortoiseshell coloring. When these shoes get completely worn out, the company will take them back, deconstruct them, and convert the pieces back into raw materials to make more shoes. They're machine washable, but be sure to let them air dry, since that recycled plastic could melt in a hot tumble cycle. **$169**

Preserve Toothbrush ▶

When you toss out old toothbrushes, they often end up in the ocean, where all that plastic breaks down into microplastics that are swallowed by sea life. How very unhygienic! The Preserve's comfortably curved handle is recycled #5 plastic (mostly yogurt cups). The bristles—the only part of the brush made from virgin nylon—are available in ultrasoft, soft, and medium variants. When your brush is long in the tooth, send it back to Preserve to be made into more toothbrushes. (Don't worry, the recycling process obliterates germs.) **$22 for a 6-pack**

Product reviewers: Michael Calore, Sophie Charara, Julian Chokkattu, Scott Gilbertson, Medea Giordano.
For more buying advice, visit WIRED.com/gear.

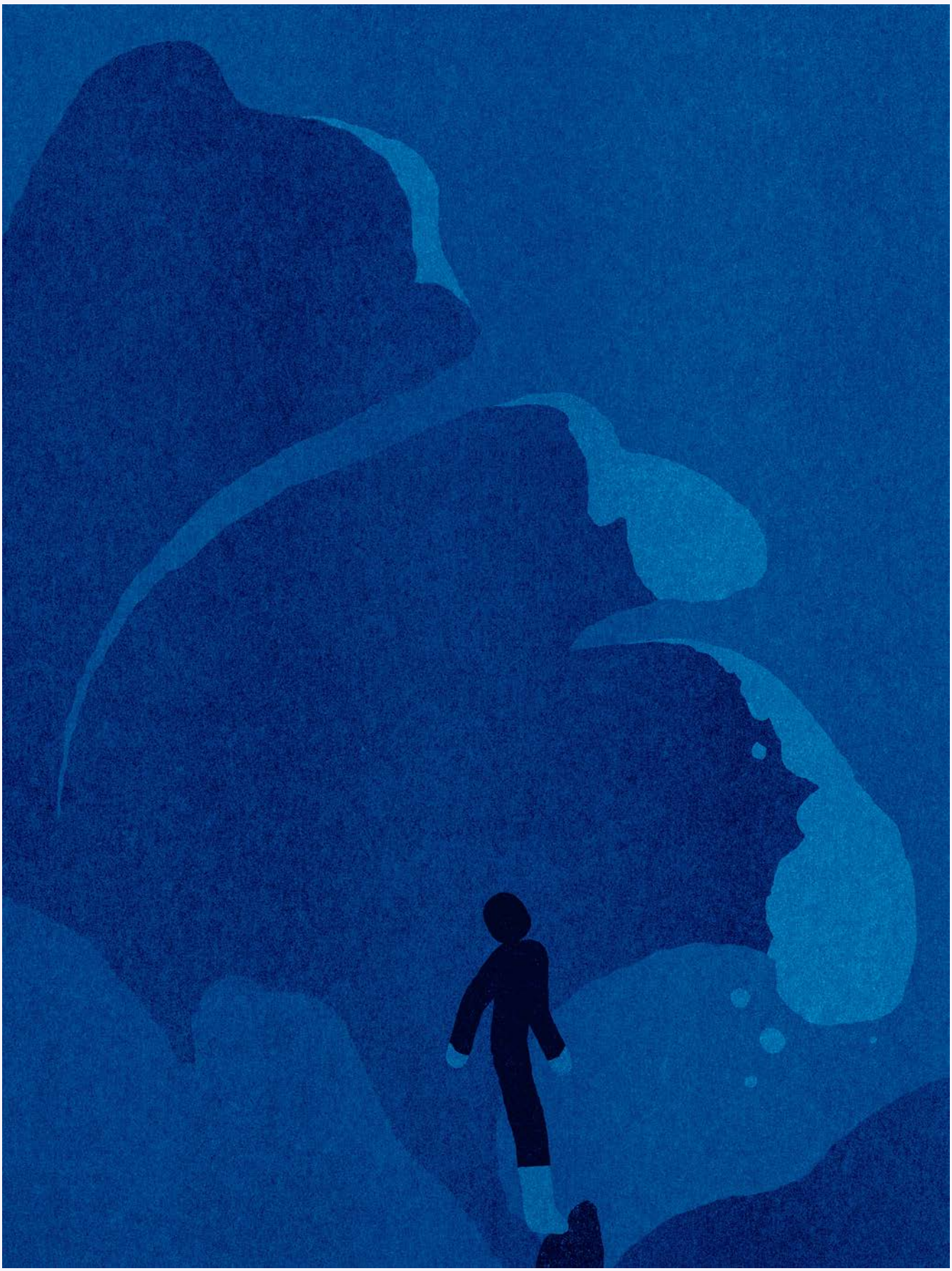
How Plastic Bottles Become Fabric

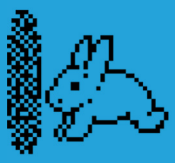
Much of the apparel featured here is made with recycled polyester, a fabric derived from plastic water bottles. The clear PET bottles you toss in the blue bin are dried, shredded, and formed into pellets. The pellets are then melted down and extruded into yarn, which is woven into fabric. The process uses a lot of energy and resources, but it produces far less pollution and waste than manufacturing virgin polyester and other petroleum-based fabrics. It's not all unicorns and rainbows though: Recycled polyester is typically dyed and blended with other fabrics, making it nearly impossible to recycle again. It also sheds as many plastic particles in the wash as the virgin stuff. An even better option? Wear the clothes you already own for longer.

COURTESY OF ROTHY'S AND PRESERVE

Bee's Wrap
Plastic wrap is polluting (it's plastic) and annoying—it sticks to itself more than anything else. Leave the flimsy stuff alone and preserve your comestibles with these cotton wraps coated with beeswax, jojoba oil, and tree resin. The beeswax and plant derivatives make them waterproof and durable, lasting more than a year. The 3-pack includes sizes that are perfect for sealing a salad bowl, packing a sandwich, and coddling half an avocado. You can even wrap sticky things like soft cheeses if you use a layer of parchment paper. Gently scrub these wraps under cold water to clean them (hot water will melt the beeswax). Strict vegans who refuse to exploit bee labor can get wraps made with plant-based wax. **$18 for a 3-pack**

BY CHRIS COLIN | ILLUSTRATIONS BY OYOW





RABBIT HOLE:

Tripsitting

With the psychedelic boom, more people are finding themselves in scalding psychedelic terror. A new kind of first responder is ready.

EVERYTHING WAS INSANE and fine. The walls had begun to bend, the grain in the floorboards was starting to run. Jeff Greenberg's body had blown apart into particles, pleasantly so. When he closed his eyes, chrysanthemums blossomed.

A tech executive of 54, Greenberg had eaten 5 grams of psychedelic mushrooms that afternoon. He, like your cousin and your coworker and maybe you yourself, had discovered in recent years the world-expanding powers of psilocybin. But world expansion can be dicey. At some point that afternoon, Greenberg's thoughts took a dark turn, and soon dark melted into horrifying.

The psychiatrist Stanislav Grof called psychedelics "nonspecific amplifiers" of the psyche. Any thoughts, feelings, or memories on hand are subject to unplanned wild magnification. Frequently that results in a thrillingly revelatory experience. Occasionally it toggles over into indescribable

RABBIT ILLUSTRATION: JOHN PROVENCHER

terror, which in turn comes in many flavors: Paranoia. Ghastly hallucinations. Intense grief. Fear of insanity, fear of death.

Greenberg thought of his puppy. He and his ex-wife shared it from when they'd been married, and now a memory came tumbling out of some corner of his mind: One day, in the aftermath of the divorce, he'd dropped off the dog with his former father-in-law. The two had always enjoyed a friendly relationship, but once the handoff was complete, the older man had slammed the door in his face.

And now it wouldn't stop slamming. How had he done something so awful that a fellow human would slam a door on him after being handed a puppy? A dam burst. The difficult elements of Greenberg's life—family, career, parenting—began exploding in dark technicolor. What had happened? Who was he? He felt the mushrooms clamping his head in front of a massive screen showing the movie of his life. According to his Fitbit, his heart rate spiked from 90-something to 150.

Greenberg was looping. Passing thoughts became black holes clawing him to untold depths, playing and replaying in a mad, warping whirlpool. Tricks that would have typically changed the channel—classical music, a splash of water to the face, waiting it out, crying it out—had no effect. Worst of all, he had no help. This wasn't a guided journey, after all, just a man alone in his house, losing his mind. Who do you call in such a state? Who could possibly understand this otherworldly misery with its indescribable new dimensions, its billowing revelations, its slithering dream logic?

Of course, Indigenous communities spent thousands of years mastering that very stuff: the understanding, the preparation, the support structures that help make a brain-exploding experience positive. But Western culture, having gotten its hands on these substances, showed little interest in that wisdom—at least until recently.

By chance, Greenberg found himself in one of those rare moments when the cultural plates begin to shift. In response to the growth of psychedelics, a new figure has emerged on the psychic landscape. Call them psychedelic first responders, versed in the science of existential first aid and operating, at times, apart from the traditional sphere of psychiatrists and therapists. Where once you might take a free CPR class on a Saturday, you now can learn to escort the addled through the thickets of their own heads.

So it was that, in a fleeting instant of lucidity, Greenberg remembered to reach into his pocket.

I'M NOT HERE to herald the current psychedelic boom; it's been heralded. What interests me is something that gets discussed far less often: the horrific and sometimes life-altering experiences many of those people will have. What do we do with that?

I don't mean to sound alarmist. Skiers sometimes smack into trees, and I still consider theirs a worthwhile activity. But mountains have ski patrols. The help available to someone spinning out on psychedelics has historically been limited. Moreover, despite the popularity of using these substances with a professional guide, a shaman, or on an organized retreat, most won't. The majority of journeys are unsupervised and unsupported—at a concert, at a party, at home reeling from a puppy-based memory.

One summer night 20-plus years ago, a friend and I ate a goodly amount of mushrooms. Idea had been to peel back a few layers, behold unfamiliar vistas, and generally become unstuck in our perceptions. It worked! In *Frontiers in Pharmacology* terms, the reduction of my serotonergic control, ascendance of my dopaminergic system, and expansion of functional connectivity in my primary visual cortex was "producing a more unified brain, with connections between disparate regions that normally lack communication with each other." For the first hour I created the universe anew. Vast processions scrolled through my mind, as ornate and elaborate as Chartres.

Then, and with apologies for being 22 at the time, I slipped into what I can only call a post-structuralist crisis. The world, suddenly, was a hollow facade of itself. I suppose some residue of college was working itself out: For four years I'd poked recklessly at ideas and traditions and constructs with no regard for consequences; now, staggering around Lower Manhattan, I saw the flimsy Potemkin reality I'd been so eager to expose, entire ecosystems of meaning drained of substance.

At some point my friend and I made it back to the apartment I shared with my girlfriend. For the next God-knows-how-long, the poor woman assured me the stories in my head were chemical-induced delusions—nightmares, essentially. I lay on my rooftop a long time, willing my sanity to return. But it never did.

Kidding! I'm fine! By dawn I had fully returned to consensus reality. I was unspeakably grateful. Only later, in the months and years that followed, did I realize I had feelings besides relief. A kind of irresolution began to haunt me. *Why* were those ideas so scary? What unresolved concerns were trying to surface in my cretin mind? Terrifying as the ordeal had been, it had undeniably contained information—the kind you don't get access to every day. Instead of willing the nightmare to end, what if I'd somehow pushed through?

Which brings me back to Greenberg. The day before his trip, he'd downloaded an app he'd seen mentioned somewhere. Called Fireside Project, it billed itself as a "psychedelic peer support line," reachable by phone or text. Now, fishing out his phone, he managed to hit the call button.

What happened next was life-changing, Greenberg told me. A volunteer named Jasmine picked up the phone. Immediately she emitted a gentle, knowledgeable, and grounded vibe. She didn't try to distract him from his anguish or minimize it. On the contrary, she validated what he was feeling and gave him permission to explore his pain further. "Very quickly she turned it into something I felt that I could go through," he said.

Greenberg spoke with Jasmine for nearly an hour and a half, then called again later, as the crisis softened into something

more like curiosity. With her help, his angst metabolized into a searing peek under the hood. Where before he'd felt abject terror, he now saw an invitation to make real changes in his life.

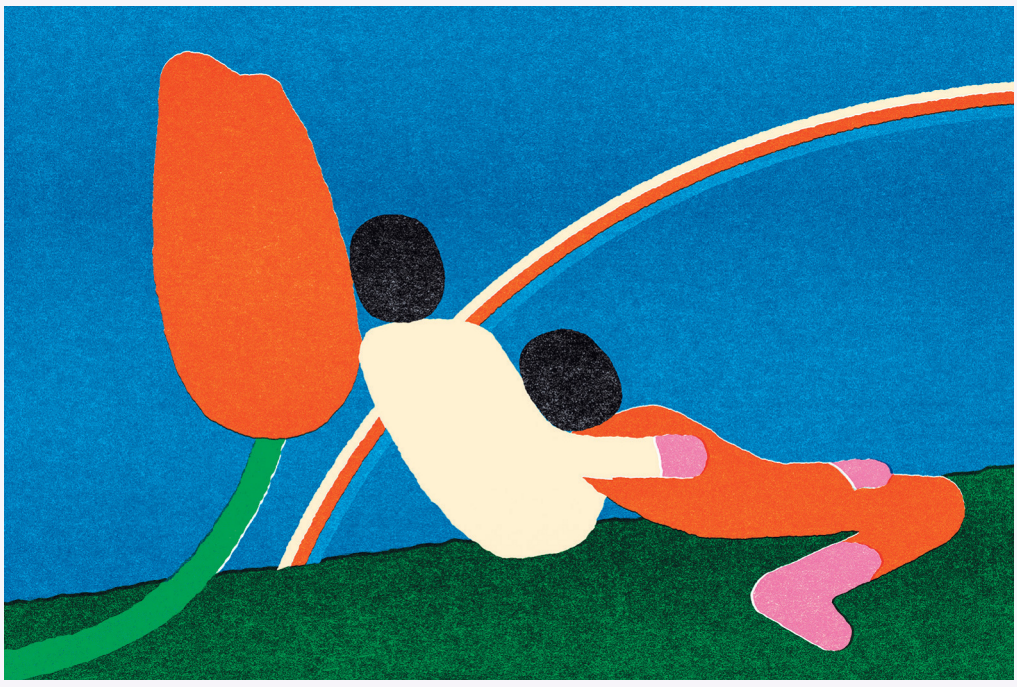
I set out to learn about the Jasmines of the world, and the burgeoning movement they belong to. But as I looked into the Fireside Project and similar operations, I watched a slightly different story come into focus. In the emergence of this new citizen tripsitter is a broader story about how we've historically conceived of wellness, how we conceive of suffering—and how we respond to our own minds when they venture off course.

IT'S NOT LIKE everyone's out there having experiences like Greenberg's; the planet's drug of choice will probably always be alcohol. But what these substances lack in booze-level numbers they make up for in the sheer depth of their impact. Insofar as the decade-of-therapy-in-a-day adage holds true for the millions of people using psychedelics every year, that strikes me as a remarkable disruption of our psychological status quo.

Historically, the options available to someone in rough shape ranged from indifference to county lockup. To the extent that anyone attempted to alleviate such psychic distress, efforts centered around obliteration. Such was the mindset on a rainy Friday in 1969, when a soggy battalion of medical workers began fanning out across Max Yasgur's upstate New York farm. Acid had already become a feature of festivals. (At San Francisco's Human Be-In two years earlier, Owsley "Bear" Stanley famously distributed some 300,000 tabs of white lightning to the crowd.) But Woodstock promised all new levels. So the medical workers came armed with Thorazine, a powerful antipsychotic that resolves a frightening drug experience much as a ballistic missile resolves a ground skirmish.

Enter Wavy Gravy and the Hog Farmers, swooping in from their New Mexico commune to provide security for the event. Over the next three days, at trip tents and in the wet grass, the Hog Farmers practiced a radical new approach. Rather than arrest or medicate people having difficult drug experiences,

Zendo didn't want to talk these trippers down. Central to its mission was a respect for the journey, however challenging.



Their first year, Fireside conducted some 2,550 conversations with callers.

they simply talked to them—distracted them, soothed them, gently reeled them back to earth. To the Thorazine crowd, it must've seemed like chatting someone out of cancer.

According to the *Journal of Emergency Medical Services,* some 797 trippers were treated that weekend. Woodstock became a template for psychedelic harm reduction. In the years that followed, at concerts and gatherings and in 4 million Dead parking lots, "talking someone down" became standard operating procedure. Compared to previous approaches, it was so humane that nobody gave much thought to where it fell short.

Start peeling back the evolution of tripsitting and pretty soon you're looking at larger shifts. Where once the benefits of these substances were relegated to some questionably spiritual plane, emerging research has shown measurable—and often remarkable—therapeutic benefits. As the value of a psychedelic journey came to be reassessed, so too was the impulse to curtail an unpleasant one.

Forty-three years after Woodstock, at Burning Man, a cardboard yurt appeared on the sun-baked Playa. Inside the structure—shady, fabric-draped, benches here and there—psychedelic harm-reduction history was lurching forward again, with the first official iteration of Zendo Project.

To the untrained eye, the volunteers sitting with distraught Burners were delivering a familiar form of harm reduction—a safe, nonjudgmental alternative to whatever the cops or medical tent would offer. But Zendo, an initiative of the Multidisciplinary Association for Psychedelic Studies (MAPS), a research and advocacy nonprofit, didn't want to talk these trippers down. Central to its mission was a respect for the journey, however challenging. To quote one of Zendo's guiding pillars, "Difficult is not necessarily bad."

At this point, maybe you've noticed my labored avoidance of the phrase "bad trip." Those words have fallen out of favor in psychedelic circles, as research shows that even the most challenging journeys can lead to positive outcomes. Minor semantic shift, fairly radical idea.

Kelley O'Donnell is the director of clinical training at the NYU Langone Center for Psychedelic Medicine. As she characterized the new thinking to me: Achieving those positive outcomes means leaning into the experience, pleasant or otherwise.

Otherwise can come in many forms, per the Zendo training manual, from reliving traumas to identifying with the victimization of others throughout history. Some merge with nature and experience pollution or the death of a species acutely. Many just think they've lost their minds. Through active listening and a gentle reassurance that the experience will pass, the idea is to calm the trippers enough that they might be able to explore those nightmares. Rather than talk them down, talk them *through*.

Like the guy who just wanted to run.

"He would run, and then drop to the ground and not move. Then he'd leap up and exclaim, 'I'm alive.' Again and again he did this," says Chelsea Rose Pires, Zendo's executive director. "Finally we were able to explore what was going on, and he was able to talk about his childhood and his fear of dying."

The training manual states:

> *Rule #1, under any condition, is that we honor and respect the person having the crisis. Even if we don't understand what's happening (the person having the crisis might be much more developed than we are, lost in worlds unknown to us, or reliving a drama we can't comprehend), we serve as an anchor, a resting place, and a quiet center …*
>
> *We have to remember that tens of millions of people have used psychedelics, in many different, sometimes not very supportive, environments, and returned home safely. With support, knowledge, and integrative work there is very little danger in the psychedelic experience itself. Even the most frightening and bizarre behavior, when explored and worked with, will turn out to be beneficial and enlightening.*

SINCE 2012, ZENDO has been a mainstay at Burning Man and festivals around the world, assisting some 6,000 trippers and training 4,000 sitters in this new protocol. Meanwhile, the harm-reduction movement has grown internationally too. Kosmicare delivers similar services, having started at Portugal's Boom Festival many years ago. Within the club scene across Europe, several groups have expanded their harm-reduction efforts to include trip assistance. Stuck at home? Tripsit.me offers real-time, 24/7 peer support for those in need. For its part, the Organization of Psychedelic and Entheogenic Nurses brings nursing expertise into the realm of psychedelic care. And then there's Joshua White.

A longtime lawyer in the San Francisco City Attorney's Office, as well as a volunteer at a local parenting support hotline, White had an eye for undernoticed communities not getting the help they need. He knew that more people were using psychedelics, he understood the outsize power these drugs wielded—and he knew that good support was not only hard to find but often inaccessible. (This is particularly true for those left out of the psychedelic movement in decades past. To that end, the organization committed to offering "identity-based integration support," connecting any caller who is BIPOC, transgender, or a military veteran with a volunteer who shares that identity.) In April 2021, Fireside Project started answering phone calls—lots of them. Hanifa Nayo Washington, an equity and training adviser at Fireside, describes a general sense of alienation behind the boom. "People are really suffering from disconnection, from being alone and not having a community to talk with," she told me.

That first year, Fireside trained more than 100 volunteers and conducted some 2,550 conversations with callers—including Greenberg. Within months of reaching Jasmine, he had walked away from his job (and psychedelically high salary) to focus on work "that adds value to the universe." Eventually he got on the phone with Fireside again—this time not to ask for help but to offer it. By the time we spoke, he'd donated $100,000 and was poised to start as the organization's CTO, working for free.

There's a fairly obvious point I should make, maybe one that sometimes gets lost: While exceedingly rare, psychedelics *can* cause serious harm. A family history of mental illness can propel someone into a psychotic episode. And the symptoms of a trip can potentially obscure a simultaneous medical crisis. A 2022 lawsuit found MAPS partially responsible for the death of Baylee Gatlin, who received care from Zendo volunteers at a music festival in 2017 and later died from organ failure and heat stroke.

"What this movement is doing is absolutely helpful for many people," says Charles Nemeroff, codirector of the Center for Psychedelic Research & Therapy at Dell Medical School at the University of Texas at Austin. But while the "vast number of case reports would suggest that these substances are relatively safe," he adds, we're still in the data-gathering phase.

For her part, O'Donnell calls the harm-reduction approach "incredibly valuable." She also cautions that a single session with even a well-trained tripsitter won't necessarily be enough for someone whose past trauma is suddenly surfacing, or who is otherwise having a deeply disturbing experience.

The stakes, Nemeroff notes, are even higher than any one individual's well-being. "What none of us want to have happen is that the unregulated use of psychedelics lead to tragedies, which then will result in a backlash," he says. "It's been so long since we've been able to actually study psychedelics."

For now, there seems little danger of reversing our *interest* in psychedelics. Sara Gael, a harm reduction officer at MAPS, describes a societal inflection point behind the current psychedelic renaissance. As waves of dysfunction—economic despair, climate change, white supremacy—have surfaced in recent years, people have increasingly looked to these substances to turn the prism on their worlds.

All of this makes me wonder about the real essence of the psychedelic peer support movement. It is, of course, a movement specific to these substances, rooted in a specific context: a time when drug policy remains insistently retrograde and official support systems have crumbled. But maybe it's also more than that.

Jail, Thorazine, Wavy Gravy, Zendo: As nodes on an arc, these represent a decades-long, mostly underground evolution in how we understand a very particular species of psychic distress, but also in how we help one another at a more general level.

Pires told me that the principles behind contemporary psychedelic peer support apply to regular life too—she uses some of those same skills with her kids. *Slow down. Offer calm. Let feelings arise*. Maybe good tripsitting isn't all that different from being a good partner, a good friend, a good relative. And maybe one day we'll look back and be struck by this era—not so much by our growing interest in these substances, but our shifting understanding of ourselves in their midst.

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BY KATE KNIBBS | PHOTOGRAPHS BY YAEL MALKA

How to Survive and Thrive in Amazon's World

Andy Hunter's ecommerce platform, Bookshop.org, was a pandemic hit. Now he's on a mission to prove that small businesses can scale up without selling out.

"DO YOU REMEMBER what kind of beer it was?"

Andy Hunter pauses for so long before answering my question, it's awkward. He's racking his brain. I've asked him to tell me about the night he came up with the idea that led to his improbably successful bookselling startup, Bookshop.org. As a former magazine editor, he wants to get the details right.

He remembers the easy stuff: It was 2018. He was on the road for work. At the time, Hunter ran the midsize literary publishing house Catapult, a job that required schmoozing at industry events. The night of his big brainstorm, he was away from his two young daughters and his usual evening obligations—dishes, bedtime rituals—and had a rare moment to think, and drink a beer.

But what kind of beer? "It was, uh, a Dogfish Head IPA," Hunter finally answers. OK, so, picture this: There he is, alone in a tidy Airbnb, a light-blue bungalow on a quiet road in Berkeley, California. His brown hair is a little mussed, and he's nursing a pale ale. He's grooving to music. ("You can say I was listening to Silver Jews," Hunter says.)

He couldn't stop thinking about something a board member of the American Booksellers Association, the industry's largest trade group, had said to him during a recent work dinner. *What if ecommerce was a boon for independent bookstores instead of being their existential threat?* The Booksellers Association ran IndieBound, a program that gives bloggers and journalists a way to link to indies instead of Amazon when they cite or review a book. But it hadn't gained much traction.

That night, in Berkeley, the unusual combination of evening solitude and a touch of alcohol knocked something loose in Hunter's brain. Or maybe it knocked something together. Either way, by the morning he wasn't hungover and he had a proposal for how to grow IndieBound, including simplifying the logistics of buying online and integrating it with social media. Plus: "I wanted it to be better-looking," he says.

When he got back home to New York, Hunter sent his proposal to Oren Teicher, then the CEO of the Booksellers Association. Teicher liked the idea but said no. The trade organization wasn't actually interested in expanding IndieBound. But if Hunter was willing to take on the project himself, to create this new-and-improved version on his own? Well—the group could invest some money.

Even though Catapult kept him plenty busy, Hunter really believed in his vision of a souped-up ecommerce platform uniting the indies. Little stores deserved to find customers online, too, even if they didn't have the resources to set up their own online shops. Offering them a way to band together felt like a righteous crusade. Plus, Hunter figured it could be a low-effort side gig.

What started as a favor done on a business-trip whim has since become the great project of Hunter's pro- →

→ Bookshop.org founder Andy Hunter (pictured here at Spoonbill & Sugartown Books) developed his love for books early. "I became a reader, in the beginning, because it provided me solace," he says.


1984

fessional life. In its first few years of existence, Bookshop defied even its founder's expectations and demonstrated how helpful its model could be for small businesses. Now, Hunter has a new plot twist in mind: He wants to show business owners how to scale up without selling out—without needing to kill the competition.

THE PROBLEM FOR independent bookstores is that many of them don't have the bandwidth to run their own online stores. Their inventories and shipping capabilities are limited by their non-Amazonian budgets. Plus, sometimes they don't want to participate in ecommerce; the romance of stuffed shelves and reading nooks and thoughtfully selected staff picks are central to their existence. Removing those experiences seems antithetical—even though it might be necessary—to the bottom line.

Bookshop offers another option. Say you're a small-bookstore owner. It takes only a few minutes to set up a digital storefront on Bookshop's website, list what books you want to sell, and, if you want, curate collections of titles to reflect your store's worldview. You don't have to actually stock any of the books yourself; Bookshop partners with the wholesaler Ingram to fulfill orders, so you're off the hook for inventory and shipping. You get a 30 percent cut of the cover price on any book sold through your storefront. (If you're a blogger, writer, influencer, or other bookish type, you can join Bookshop as an individual, even if you don't own a brick-and-mortar bookstore, and take home a 10 percent cut on whatever you sell.)

Bookshop itself also sells books—you can type a name in the search bar at the top of its homepage and soon find yourself staring at an Add to Cart button. Physical stores can make money off of these sales, too, if they join the company's profit-sharing pool. Bookshop gives 10 percent of these sales to the pool.

Technically, Bookshop doesn't need independent stores to join its platform. If the goal were merely to sell books online, it could do just that, like Barnes & Noble or an early-days Amazon. But then, of course, it wouldn't be special. And Hunter would never have bothered. Helping the indies is the whole point, something he feels an almost spiritual drive to do.

Hunter had the turbulent childhood of a young-adult-novel protagonist. His dad left when he was 11, and his mother was institutionalized for mental illnesses at different points throughout his youth. Many times, Hunter and his older brothers had to figure things out on their own. Without an adult regularly looking after him—someone to make sure he had clean clothes or shampoo—Hunter struggled to make friends. He spent a lot of time alone.

His Massachusetts town didn't have a bookstore, but it had a library; he headed there after school and on weekends. "I became a reader, in the beginning, because it provided me solace," he says. He read everything; he read all the time. The Chronicles of Narnia, Judy Blume. He became so obsessed with *Watership Down* that he carried a copy with him wherever he went. Even his teachers teased him about it.

One summer, when Hunter was 16, his mother took him and his brothers to a cabin in Maine. While the others swam and sunbathed, Hunter raided the cabin's library. The owners had shelves of books that astounded the teenager: *Soul on Ice,* by Eldridge Cleaver, *The Autobiography of Malcolm X*, *The Women's Room*, by Marilyn French, James Simon Kunen's *The Strawberry Statement*. "Those books completely blew my mind," Hunter says. He went on a countercultural binge, staying up late and reading by the fire.

During the next few years, Hunter's social life took a turn. "By the time high school ended, I was in a better place socially than I was at 11," he says. "Because I didn't have parents around, we had huge keg parties … That made me popular." Hunter remained an avid reader—he studied philosophy at the University of Massachusetts—but he no longer lived in the margins. In 1993, shortly after graduating from UMass, he cocreated a music fanzine with the Freudian title *Mommy and I Are One* and hosted events and parties with performers like Cat Power.

After graduation, Hunter wasn't sure what to do. He moved to LA and started working at Disney—not exactly his dream job. After six years, he finally landed a gig as the editor of *Mean* magazine, a freewheeling project started by some former staffers of the Beastie Boys' *Grand Royal* magazine. While there, he began dabbling in small-scale publishing on the side—an early sign of his entrepreneurial spirit. "If you wanted a magazine, I'd make a magazine for you," he says. Clients ranged from the music festival Lollapalooza to a neuroscience organization. (It put out a magazine called *Brain World*.) He also met a visual artist, Alison Elizabeth Taylor. They fell in love.

In 2004, Taylor got into graduate school at Columbia, and they moved to New York to live together in student housing while Hunter worked remotely for *Mean*. Taylor would go on

to establish herself as a significant force in certain contemporary art circles, and watching his partner pursue her creative dreams, Hunter wondered whether he should take his own writing ambitions more seriously. He enrolled in Brooklyn College's MFA program, where he met Scott Lindenbaum, a fellow student. As they commiserated over how hard it was for literary magazines to find audiences, Hunter's publishing itch returned. He and Lindenbaum decided to make a magazine anyone could read online for free. In 2009, Electric Literature debuted; it drummed up buzz by releasing a Rick Moody short story line-by-line on a nascent service called Twitter. It was a proudly techno-utopian creation, one Hunter and Lindenbaum claimed was the first literary magazine with an app.

"Electric Literature was born in a time where there was tons of anxiety about what digital was going to do to literary culture," Hunter says. "We decided to become the optimists in the room." The literary establishment disdained digital, but it turned out people wanted to read about books on their laptops.

Electric Literature was a hit from the start, attracting established writers like Colson Whitehead, Michael Cunningham, and Lydia Davis and accumulating a loyal readership. It was never a huge moneymaker, and its operating budget was measly. They shifted to a nonprofit model in 2014. Hunter, now hooked on entrepreneurship, began eyeing his next projects.

He had made connections with people such as Morgan Entrekin, the president of the independent publishing company Grove Atlantic, who liked what he was doing with Electric Literature. With Entrekin, Hunter cofounded the newsy literary-culture website Literary Hub in 2015.

That same year, he also cofounded Catapult, with Elizabeth Koch. (Yes, from *that* Koch family.) Catapult soon merged

If Bookshop's goal were merely to sell books online, Hunter would never have bothered. He feels an almost spiritual drive to help indie stores.

At the start of the pandemic, Bookshop was the sourdough of ecommerce. It rose with surprising velocity, taking even its teensy staff by surprise.

with Counterpoint Press, which meant Hunter was suddenly in charge of an imprint that had put out books from authors who had blown his young mind, such as Gary Snyder. Catapult also hosted writing classes and published an online magazine. Electric Literature had brought Hunter into the publishing world, but Catapult took him to a new level. For a time, Hunter worked for the three companies simultaneously, and though that meant shelving his 650-page novel, *God Exploded*—about a guy who tries to start a religion around the idea that the big bang was actually the suicide of a deity—Catapult's books and magazines won critical recognition, including a National Magazine Award and a PEN/Faulkner Award.

(This year, Catapult abruptly shuttered its writing classes and magazine as Koch shifted her focus to Unlikely Collaborators, the New Agey nonprofit organization she founded in 2021.)

All the while, Hunter watched as Amazon steadily obliterated bookstores. He started obsessing over how to stop it. The answer seemed to lie in getting small, independent booksellers online. He remembers discussing the idea of a nonprofit alternative to Amazon with industry insiders—and being met with derision.

AFTER THE AMERICAN Booksellers Association passed on Hunter's plan to enhance IndieBound, he decided to go ahead and bring his vision for ecommerce to life. But to do so, he had to find more money. Hunter was still working full-time as the publisher of Catapult, while also serving as the publisher of LitHub and chair of Electric Literature. Whenever he could, he aggressively pitched potential investors. "I was schlepping from meeting to meeting," he says. "It was just me, and it was very lonely." As soon as he had enough funding, he went looking for help.

In 2019, Hunter approached the boisterous, bearded veteran magazine publisher David Rose, who had spent years at the *London Review of Books* and *Lapham's Quarterly*. When Hunter laid out his plan in their first meeting, Rose remembers "seeing dollar signs." He thought it was wild that the model Hunter was proposing didn't exist already. Here, thought Rose, was the rare lit nerd with a business brain. Hunter considered it a miracle that the well-respected Rose believed in him, and he brought Rose on as executive director—Bookshop's first hire.

At the time, Rose had been consulting for the left-wing magazine *The Baffler*. For a while the pair tag-teamed the startup sprint, with Rose handling administrative details and Hunter working on the logistics of launching an ecommerce site on a shoestring budget. Eventually, they hired two others to manage the company's social media presence and to develop partnerships with booksellers.

Rose continued to work for *The Baffler* and had a desk in the magazine's office. He didn't like trekking to the Catapult office, which was small and hot, so he asked *The Baffler*'s then executive director, Valerie Cortes, whether Bookshop could also squat in *The Baffler*'s Manhattan headquarters. The two staffs mingled, sometimes grabbing drinks or going out for karaoke—but not even Rose's involvement could convince the team at *The Baffler* that Bookshop was a good idea. "People weren't on board at first," Cortes says. According to Rose, the Bookshop team felt like the "weirdos in the corner," grinding away at a pipe dream. "There was a running joke about how long we could last," he says. Going up against Amazon seemed like a fool's errand.

Even Bookshop's investors, including Morgan Entrekin, didn't have high hopes. "In my email to the handful of friends that I asked to get involved, I said, 'Look, supporting this is a very worthy thing to do. But you're not going to get a VC return,'" Entrekin says. Still, Hunter got his money, includ-

ing an investment from William Randolph Hearst III. He persuaded around 200 bookstores to sign up in advance of the launch, and he struck a deal with Ingram, the book wholesaler, which ensured that getting books to buyers wouldn't be an issue.

On January 28, 2020, Bookshop.org went live, and it made its first sale at 7 am. Some *Baffler* staffers suppressed their skepticism long enough to celebrate with the Bookshop squad that evening. Even then, Hunter erred on the side of restraint: Rose teased him about bringing a single bottle of champagne for the whole group to share. Hunter, who says he expected only his staff—of four—to be there, believed in the project, but he worried about its chances. "We had a very, very short runway," he says.

Hunter figured maybe, eventually, they might earn a million dollars. He kept his day job as the publisher at Catapult.

BUT THEN, THE pandemic. "A stroke of luck for Bookshop," as Entrekin puts it. Lockdowns left many independent shops, dependent on foot traffic, in deep trouble—they didn't have digital stores. But here was Bookshop, with a low-stakes ecommerce option for brick-and-mortar booksellers. All they had to do was create a digital storefront, and Bookshop took care of everything else, including fulfilling orders and paying taxes.

The financial and promotional support from the American Booksellers Association helped legitimize the new company in store owners' eyes. Bookshop didn't have an advertising budget, but Hunter hired a publicist, and she pushed the anti-Amazon angle hard. Stuck at home, people wanted to support local businesses; Bookshop's first wave of press showed them that there was an easy way to do so just as they went looking for one. Suddenly, Bookshop became the sourdough of ecommerce. It rose with surprising velocity, taking even its teensy staff by surprise.

Bookshop smashed Hunter's million-dollar goal in four months. "We sold $50,000 worth of books in February," he remembers. By the end of March, Bookshop was doing about $75,000 per day in sales, setting a new daily sales record of $102,000 on the 31st. Hunter and his handful of employees worked frantically, sometimes logging 18- or 20-hour workdays to keep up with customer service requests and ensure orders were shipped on time. "We really had to scramble," Rose says. They knew people were trying them out for the first time, so botched orders could sink their reputation. "It was intense," he says.

That summer, Bookshop got even bigger, reaching a sales apex it hasn't yet replicated. "$900,000 in one day," Hunter says.

Every six months, Bookshop dumped 10 percent of its sales, in equal shares, into the accounts of bookstores that had opted into its earnings pool. Some store owners were caught by surprise when they checked their accounts. VaLinda Miller, who runs Turning Page Bookshop in the suburbs of Charleston, South Carolina, was facing a crisis after a broken air conditioner caused a gnarly mold outbreak in her shop. She realized she would have to move but couldn't afford to give a new landlord several months' rent, replace damaged merchandise, and pay movers all at once. When she finally remembered to check her Bookshop account, she was astonished to see that Turning Page had more than $19,000—enough to cover the move. "It hit during the perfect time," she says. "It's been a blessing."

Danielle Mullen, a former art curator and the owner of Semicolon Bookstore in Chicago, never liked worrying about online sales. Her curatorial flair makes her store a distinctive community space: Art she selects hangs on the walls, shelves are stocked with books primarily from writers of color, and her sales associates are knowledgeable and chatty. She was focused on the store as an in-person experience, a gathering place. But one night, while drinking spiked hot apple cider with a friend, she signed up for a Bookshop page on a whim. For her, too, the service suddenly became the store's "lifeblood," she says. "The most necessary thing."

As uprisings for racial justice swept the United States in the summer of 2020, Bookshop highlighted Black-owned bookstores and curated anti-racist reading lists. Mullen is only the third Black woman bookstore owner in Chicago—a fact that appealed to book buyers looking to support Black businesses. "I think we did $2 million on Bookshop that year," she says. "It was crazy."

I met Mullen last summer at a café next to her shop on a busy street in Wicker Park. It was so hot out that the metal patio tables burned to the touch. Mullen was in a great mood. Semicolon was doing great. So great, in fact, that she was planning to open an outpost in Miami. She wasn't sure she'd stick with Bookshop indefinitely. She preferred focusing on her brick-and-mortar store, and she didn't especially like the

Hunter's daughter's pet rat, Agent Jellybean, lives in a two-story cage next to his desk.

Although Bookshop doesn't have a pitch tailored for traditional venture capital, Hunter raised over $2 million to expand into ebooks.

idea that indies needed a third-party tech company to compete in online sales, even if said third-party tech company had good intentions.

Mullen isn't alone in her ambivalence. Jeff Waxman, a former bookseller who now works as a publishing sales representative, was a consultant for Bookshop before it launched. He worries that the company is diverting people who would have bought directly from their local store to its own website. "The fact is, it's always going to be better to buy a book directly through a store than through a middleman," he says.

Hunter understands these critiques. He agrees that the best way to buy a book—for bookstores, the economy overall, and for local communities—is to wander into your local shop and purchase one in person. He doesn't even think Bookshop is the second-best way. That would be buying directly from these local bookshops' own online stores, if they have them. Hunter sees Bookshop as the third-best option, the Good Samaritan middleman. And this third-best way happens to be critical because of the most popular way people actually buy books: They click "Purchase" on Amazon.

AMAZON CONTROLS MORE than half of the US book market, according to Peter Hildick-Smith, president of the book-audience-research firm Codex-Group. Jeff Bezos' company sells approximately $4 billion to $5 billion in new books each year. By comparison, Hunter says that Bookshop sells around 1 percent of Amazon's share. Between Bookshop and Amazon, it's not apples and oranges so much as a single heirloom apple tree versus the world's largest commercial citrus grove.

But Hunter wants to grow. Approximately 2,200 stores in the US and UK participate in Bookshop's profit sharing. Someday, Hunter wants to take the Bookshop model beyond books to help small businesses like hardware stores or toy stores with their own affiliate platforms—to be another Everything Store of sorts, but one built around preserving small businesses instead of competing with them.

For now, that's a daydream, but a real expansion is underway. Hunter wanted to compete with Audible, Amazon's audiobook and podcast service, by helping independent stores offer alternative formats to physical books. In 2020, he set up a partnership with Libro.fm, a startup that sells audiobooks. Like Bookshop, it partners with independent stores and splits the profits, so teaming up felt natural. Now Bookshop customers are directed to buy audiobooks on Libro.fm.

Last year, after considering a few directions he could take Bookshop, Hunter set his sights on ebooks. He set out to raise $2 million for the project, but Bookshop doesn't have a pitch tailored for traditional venture capital. If anything, it has the opposite. Bookshop's stockholder agreement forbids a sale to Amazon and its ilk ("any retailer then-presently ranked

among the top 10 largest retailers"), which means there won't be any big acquisitions down the road. Despite the rocky economic climate and his un-VC-friendly pitch, Hunter has raised over $2.3 million. (I can attest to how persuasive he sounds when he waxes poetic about the importance of alternative ebook platforms.) The largest investor is, as was the case the first time around, William Randolph Hearst III.

People will be able to read Bookshop's ebooks in their browser or on apps that will work on Apple and Android devices (but not, as of yet, on Kindles or through Kindle apps). This arrangement will make for a difficult business proposition and a clunky experience for readers. For starters, Apple takes a 30 percent cut of all revenue made through its app store. Hunter is hoping people will take the extra steps of buying Bookshop ebooks through their browsers rather than Apple's app store and then reading them on Bookshop's app, which would circumvent the Apple tax.

One ebook startup has already attempted this kind of project and failed, unable to woo customers away from the Kindle world. Hummingbird Digital Media, which also allowed indie stores to set up their own storefronts and take a portion of the profits, has since been purchased and rebranded—it's now called Booksio—pivoting to donating to charities instead of bookstores.

Hunter is optimistic he can succeed by building on Bookshop's existing customer base. Part of his plan is to connect ebooks to the social web, to "make them more of the online conversation." He wants to make it easier for people to share links to ebooks, the way they share snippets and links to paywalled content from *The New York Times* or *The Washington Post*. He has hired one engineer so far and is bringing more on board. "We're using a lot of open source technology that has been built to support an alternative ebook system already," Hunter says. "But up until this point, it's pretty much been libraries using the technology." He aims to have the platform in beta by the end of the year.

There's more. This fall, Bookshop will publish a collection of short stories by Lydia Davis—a partnership about as glam as having Miuccia Prada design a capsule collection for some tiny boutique.

It was all Davis' idea, too. When she published her last book, she realized how much she disliked the idea of Amazon profiting off her work. "I made up my mind. For the next book, I would do everything I could to avoid Amazon," she said. Her agent supported the decision; her longtime publisher, Farrar, Straus and Giroux, however, nixed it. ("Contracts and repercussions," Davis offers by way of vague explanation.) Davis' agent suggested asking Hunter for advice on publishers who might be willing to alienate the Everything Store. "It was a surprise to both of us when he said he wanted to publish it himself," Davis says. She's been delighted by the process. "He's been very fast, very efficient, very resourceful." Davis knows her sales will suffer, but she doesn't care. It's the debut of a project called Bookshop Editions, to be sold exclusively through Bookshop and independent stores. Hunter isn't planning to turn it into a full-fledged imprint, but Davis, for her part, hopes her actions might inspire other authors. "I'm just really happy I'm doing it," she says. "I have no regrets whatsoever."

WHEN I CAUGHT up with Danielle Mullen of Semicolon on a gloomy Chicago afternoon, the sun hadn't been out in days. It was the kind of weather that compels you to Google SAD lamps—or move to Florida. Mullen had been jubilant the last time we talked, brimming with her own expansion plans. Independent bookstores were on an upswing. More than 300 new shops had opened in the past few years. There are people—just enough of them, it seemed—who simply prefer physical stores like Semicolon, so I was expecting a happy update from Mullen. Had she opened her Miami outpost yet?

"No," she said. "Actually, everything has changed."

Her beautiful Wicker Park shop had flooded repeatedly, and the landlord was no help. It got so bad that Mullen decided to move the store back to its original location, a smaller spot on the ground floor of a 130-year-old apartment building in River West, a bustling neighborhood with trendy Italian restaurants and luxury condos.

She is putting in an offer to buy the whole building, with hopes of having a permanent presence in Chicago. Exciting stuff—but expensive. So expensive that Mullen has once again found the money Semicolon generates from Bookshop crucial: "Kind of like how it got us through the pandemic."

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ART BY SOPHIE PARKINSON

by MARIA STRESHINSKY

Photographs by MAGNUS NOLAN

THE APOCALYPTIC OPTIMISM OF CHRISTOPHER NOLAN

The director says his new biopic, *Oppenheimer*, might just terrify you.

At the very least, it'll force you to ask questions about history, fear, technology—all of it.

WHEN WIRED HEARD that Christopher Nolan and his producer—and wife—Emma Thomas were coming out with a biopic of J. Robert Oppenheimer, we were perplexed. At least for a moment. It is hard for WIRED to resist a Nolan-Thomas film. Nolan has a real love of science, just like us. (We know this because, well, it's pretty obvious in some of his movies, but also because Nolan guest-edited an issue of WIRED back in 2014 when his film *Interstellar* came out and we got him to geek out over physics.) Add to that, the duo like to bend their audience's minds. And their eyeballs.

They make superhero movies! It's so much chum for WIRED.

So, *Oppenheimer*. A biopic, a look back at history. Alas. WIRED parlance is more often about looking *ahead*. (Not that we didn't like *Dunkirk*.) So we kinda thought maybe we weren't the magazine to dive into this one.

But we couldn't get the idea out of our minds, because so many conversations in the office and in meetings and around technology were about the potentially apocalyptic time we are living in. Climate, war, yes. But also, *generative AI*. Over and over, I was hearing people compare this moment to the mid-1940s, when we stepped across the threshold into the nuclear age, or to the years when Oppenheimer was heading up the project to build the bomb in New Mexico.

Here comes the full disclosure: I know something about Oppenheimer, and his path to Los Alamos. I helped edit a biography about him and three women who were central to his life, written by my mother, Shirley Streshinsky, and the historian Patricia Klaus. I started to want to know what Christopher Nolan thinks of the time we are *in*, considering he has spent his last few years steeped in the time so many people kept *referring* to. Perhaps Nolan and Thomas line up with WIRED interests all over again.

So I headed to LA, to a quiet neighborhood where the couple keep an office. I had hoped to talk to them both, and as I entered a glass-walled, stylish conference room overlooking a garden, happily, Thomas was standing there too. I burbled something about how often her name gets left out of interviews. She thanked me for that. Turns out she couldn't stick around. But toward the end of my conversation with Nolan, he told me, "Everything we do is in lockstep. I mean, she's the best producer in Hollywood, without question." And their latest film, though it's set firmly in the past, might just be their most forward-looking yet.

MARIA STRESHINSKY: Maybe this is presumptuous, but looking at your films in reverse, it feels like your and Emma's work has been, all the while, leading up to *Oppenheimer*. In ways, it makes so much sense.

CHRISTOPHER NOLAN: I don't think that's at all presumptuous. It's how I feel about the film.

(Also, I don't mean to say your career is over.)

I've tended to feel this way with every project I've done. Because I'm trying to build on what I've learned before. Every time you finish a film, there are questions left hanging. And so with the next film, you kind of pick up the thread. In the case of *Oppenheimer*, very literally, there is a reference to Oppenheimer in *Tenet* [Nolan's previous movie].

So he's been in your head for a while.

Oppenheimer's story has been with me for years. It's just an incredible idea—people doing these calculations, and looking at the relationship between theory and the real world, and deciding there's a very small possibility they're going to destroy the entire world. And yet they pushed the button.

It's very dramatic.

I mean, it's literally the most dramatic moment in history. In history.

A lot of people may not know that when we dropped the bomb in 1945, it was not only a horrifying moment but maybe also the one in which it was *understood* that humans could now wipe out all humanity.

My feeling on Oppenheimer was, a lot of people know the name, and they know he was involved with the atomic bomb, and they know that something else happened that was complicated in his relationship to US history. But not more specific than that. Frankly, for me, that's the ideal audience member for my film. The people who know nothing are going to get the wildest ride. Because it's a wild story.

His personal story, you mean.

And they need to, because, you know, he's the most important man who ever lived.

You have a line in the movie, someone says to Oppenheimer, *You can get anybody to do anything*. Something like that. He was a brilliant manager. He was brilliant at knowing, in that room, those scientists are doing x, and in that other room, those scientists are doing y. He was the one who could keep it all in his mind.

He knew how to motivate people through the theatricality of his persona, the projection of his own brilliance. He gave all the scientists and officials and everyone a focal point.

He had real charisma.

Charisma. That's the perfect word. It made it all come together.

NOLAN'S NEW FILM, *OPPENHEIMER*, IS TOLD MOSTLY FROM THE PERSPECTIVE OF ITS TITLE CHARACTER—PLAYED BY CILLIAN MURPHY.

The film deals with this a lot, the idea that these academics, these theorists could come together and build something with their own hands of this magnitude, of this importance. It's miraculous.

Speaking of building something of magnitude, I was at the TED conference in Vancouver recently, and one of the most interesting sessions was a series of talks about generative AI. So many of the speakers mentioned the atomic bomb, nuclear weapons. The last speaker was a technologist—who happened to grow up in Los Alamos, by the way—who talked about the inevitable growth of the use of AI in weaponry. He ended his talk by saying that the only way to keep world order was to have better AI weapons. That it was a deterrent. Which sounded a lot like how people thought of the atomic bomb. Feels like you couldn't have planned your film release for a better time.
I think the relationship is an interesting one. It's not the same. But it's the best analogy—which is why I used it in *Tenet*—for the dangers of unthinkingly unleashing a new technology on the world. It's a cautionary tale. There are lessons to be learned from it. Having said that, I do believe the atomic bomb is in a class of its own as far as technologies that have changed and endangered the world.

And the origins of these technologies weren't the same.
There is a fundamental difference. The scientists dealing with the splitting of the atom kept trying to explain to the government, *This is a fact of nature.* God has done this. Or the creator or whoever you want it to be. This is Mother Nature. And so, inevitably, it's just knowledge about nature. It's going to happen. There's no hiding it. We don't own it. We didn't create it. They viewed it as that.

In other words, they felt they were just revealing something that was already there.
And I think you'd be very hard-pressed to make that argument about AI. I mean, I'm sure some will.

You must've grown up in the shadow of the bomb.
I grew up in the 1980s in the UK, and we had the Campaign for Nuclear Disarmament, all that. People were very, very aware. When I was 13, me and my friends, we were convinced we would die in a nuclear holocaust.

But you didn't, and the world moved on.
I was talking to Steven Spielberg about this the other day. He grew up under the threat of the Cuban Missile Crisis in the '60s. Same thing. Absolutely. There are times in human history when the danger of nuclear warfare has been so palpable and tactile and visible to us that we're very aware of it. And then we can only be worried for so long, and we move on. We worry about other things. Um, the problem is that the danger doesn't actually go away.

Right. I mean, I feel like a month ago we were all worried that Putin might be serious about using a nuclear weapon.
What I remember from the '80s is that the fear of nuclear war had receded in favor of fear of environmental destruction. It was almost like we couldn't sustain the fear of it for that long. We have a complicated relationship with our fear. And yes, Putin has been using that doomsday threat and that fear to saber-rattle. It's extremely unnerving.

As unnerving as the threat of an AI apocalypse?
Well, the growth of AI in terms of weapons systems and the problems that it is going to create have been very apparent for a lot of years. Few journalists bothered to write about it. Now that there's a chatbot that can write an article for a local newspaper, suddenly it's a crisis.

We, folks in the media, have been doing that for years. Navel-gazing. Some of us are writing about AI because it can put us out of a job.
That's part of the problem. Everybody has a very—call it a partisan point of view. The issue with AI, to me, is a very simple one. It's like the term *algorithm*. We watch companies use algorithms, and now AI, as a means of evading responsibility for their actions.

Say more about that.
If we endorse the view that AI is all-powerful, we are endorsing the view that it can alleviate people of responsibility for their actions—militarily, socioeconomically, whatever. The biggest danger of AI is that we attribute these God-like charac-

MELINDA SUE GORDON; OPENING SPREAD: GETTY IMAGES

teristics to it and therefore let ourselves off the hook. I don't know what the mythological underpinnings of this are, but throughout history there's this tendency of human beings to create false idols, to mold something in our own image and then say we've got God-like powers because we did that.

That feels very, very right now. Like we're at that tipping point.
Exactly.

With these large language models, the machines might even be able to teach themselves the next step.
There was an interesting article in the *LA Times* about ChatGPT and OpenAI. It basically said it's a sales pitch, that they're a private company now. And they have the greatest sales pitch in the world, which is, *This is a really dangerous thing. Maybe we shouldn't put it out there*. So now everyone wants it. Doesn't mean there isn't a real danger here, because I feel that there is. But I personally, and this is just my opinion, I identify the danger as the abdication of responsibility.

People keep saying there needs to be a governing body for this stuff. They say you all need to deal with it. Like *you* governments. There should be an international agency.
But that's the oldest political trick in the book of the tech companies. Right? That's what, you know, SBF was doing with FTX. Zuckerberg's been asking to be regulated for years. That's the oldest political trick. 'Cause they know that our elected officials can't possibly understand these issues.

As we see from congressional hearings.
And how could they? I mean, it's very specialist stuff, and it's incumbent on the creators and Oppenheimer—to bring it back to Oppenheimer—

Please do.
Because it's an interesting conversation. The thing with Oppenheimer is that he very much saw the role of scientists postwar as being the experts who had to figure out how to regulate this power in the world. And when you see what happened to him, you understand that that was never going to be allowed to happen. It's a very complicated relationship between science and government, and it's never been more brutally exposed than in Oppenheimer's story. I think there are all kinds of lessons to be learned from it.

Such as?
So he tried to work from within the establishment and not just turn around and say, you know, what we need is love or whatever. He was very practical in his approach, but he still got crushed. It's very complex, and I think from our inventors now, it's very disingenuous for them to say, "We need to be regulated."

There was a moment when Oppenheimer wanted the science to be shared.
Candor was the word he used. Candor.

That seems to have shifted with the H-bomb, or do I have that wrong?
No, no, he believed it about the H-bomb as well. He—I mean, it's funny talking about it, because in a way these are spoilers for the film. But in another way it's history, you can Google it. There is this important moment where, as the H-bomb program gears up, he took to making speeches where he would say, *I wish I could tell you what I knew. I can't. If you knew what I knew, you'd understand that we all have to share information*. It's the only way we'll not destroy the world, essentially. So candor was what he viewed as the most practical means of that. We were all coming together,

AFTER THE MANHATTAN PROJECT, OPPENHEIMER WORKED WITH EINSTEIN [PLAYED BY TOM CONTI] AT THE INSTITUTE FOR ADVANCED STUDY.

MELINDA SUE GORDON

and he viewed the UN as being a powerful body in the future, with real teeth. He viewed international control of atomic energy as the only way to ensure world peace. That hasn't happened, obviously.

He didn't foresee what's happening now, the slow decline of democracies. The rise of autocracies. The North Koreas.
I don't think he saw that at all. It was a very optimistic moment.

That's what I worry about with the talk of needing a world-wide governing body for AI. We have nonstate actors, or state actors ...
Right. But that's the thing in dealing with tech companies who have refused to be bound by geographical limitations. Systemically, tech companies are encouraged and enabled to circumvent government regulation. It's an ethos. By the way, I'm coming across like I think that Silicon Valley's evil and all these people are terrible. I don't. It's just the system. It's just the way it works.

Plus, there's an odd element of, well, *safety* I guess, with nuclear weapons, because you have to have specific ingredients to build a bomb. That's very different than facing the potential of supercomputing.
During World War II, the British program for their bomb was very sophisticated. They had a lot of great scientists. But Churchill and his government realized they just didn't have the resources. So they gave the Americans everything they had. They said, *You have the size, the distance from the front line, the industrial base*. I read a statistic at some point in my research about the number of Americans who were involved in making the first atomic bomb. It was something on the order of 500,000. It was all these companies. It was a massive physical process, which is why to this day it's easy to spot when a country's doing it. So there's certain things that give us a bit of reassurance that the process can be managed. And I don't think any of this applies to AI.

No, I don't think it does—especially when some of what we're talking about with AI is a softer threat. Disinformation on hyperspeed, technological unemployment.
It is, but I'm less—I feel that AI can still be a very powerful tool for us. I'm optimistic about that. I really am. But we have to view it as a tool. The person who wields it still has to maintain responsibility for wielding that tool. If we accord AI the status of a human being, the way at some point legally we did with corporations, then yes, we're going to have huge problems.

Are you seeing anything in AI that could be wonderful for, in particular, filmmaking?
Oh definitely. The whole machine learning as applied to deepfake technology, that's an extraordinary step forward in visual effects and in what you could do with audio. There will be wonderful things that will come out, longer term, in terms of environments, in terms of building a doorway or a window, in terms of pooling the massive data of what things look like, and how light reacts to materials. Those things are going to be enormously powerful tools.

THE BIGGEST DANGER OF AI IS THAT WE ATTRIBUTE THESE GOD-LIKE CHARACTERISTICS TO IT AND THEREFORE LET OURSELVES OFF THE HOOK.

Will you take advantage, personally?
I'm, you know, very much the old analog fusty filmmaker. I shoot on film. And I try to give the actors a complete reality around it. My position on technology as far as it relates to my work is that I want to use technology for what it's best for. Like if we do a stunt, a hazardous stunt. You could do it with much more visible wires, and then you just paint out the wires. Things like that.

It'll improve the ease and efficiency of visual effects, you're saying.
It's not starting from nothing. It's starting from a much more detailed and data-driven idea. It might finally break the barrier between animation and photography. Because it's a hybrid. If

you tell an artist to, say, draw a picture of an astronaut, they're inventing from memory or looking at references. With AI, it's a different approach, where you're actually using the entire history of imagery.

Using actual images.
Using actual images, but in a completely, fundamentally rebuilt manner—which of course raises significant artists' rights issues, and that will have to be dealt with.

Let's get back to science and your films. In the December 2014 issue of WIRED that you guest-edited, there was a line where you said, "The relationship between storytelling and the scientific method fascinates me. It wasn't really about an intellectual understanding. It was a feeling of grasping something." Talk to me about your love of science.
Well, I've always been interested in astronomy, in questions of physics. I got to explore that in *Interstellar*. When my brother wrote the script, he would look at Einstein's thought experiments, and he identified a particular melancholy that some of them had. It's all to do with parts in time. All to do with, like, twins who get separated and one goes away and comes back and the other's older, you know? There's a very literary quality to Einstein onward in terms of thinking about physics and how you would do these thought experiments, how you conceive of these ideas and how they work. The process of visualization that physicists need isn't so different from a literary process.

Do you feel something like that at the editing stage of a film?
I feel it at every phase, at every phase. A lot of my job is trying to articulate instincts and feelings about the shape of things. It can be difficult and complicated.

THE SCIENTIFIC METHOD SO ELEVATED HUMAN THINKING BEYOND ANY OTHER FORM—RELIGION, WHATEVER.

NOLAN AND HIS DOG, CHARLIE, IN LOS ANGELES, IN A PHOTO TAKEN BY HIS TEENAGE SON MAGNUS.

I find that if I'm working on a story and I don't know the structure, I don't know the flow, something's wrong. I can't speak of the piece in a way that makes sense.
There's a geometry or a geography. I think in very geographical terms or geometric terms about structures and patterns. Over the years I've tried adopting a sort of ground-up approach to structure, but ultimately it's very much an instinctive process: Does the feeling have the shape of a narrative, and how does that come together? And I was fascinated to realize that physicists have a very similar process going on. It's really fun.

Maybe this is a nod to *Interstellar*, but physicists always seem so in love. In love with physics, that is.
I'm passionately committed to truth. I love the scientific method. I hate to see it distorted either by scientists in the media or by media speaking for scientists. The pure scientific method, the idea that science seeks to disprove itself constantly, it so elevated human thinking beyond any other form—religion, whatever—that we've chosen to engage in as a species.

Before this interview, my mom and I watched some of your films together—because of her book, she was curious about what you'd do with Oppenheimer—and at one point she said it feels like your movies can have a very anti-nihilistic message. *Dunkirk*. *Interstellar*. *Batman*. Or, is it optimism?
I mean, the end of *Inception*, it's exactly that. There is a nihilistic view of that ending, right? But also, he's moved on and is with his kids. The ambiguity is not an emotional ambiguity. It's an intellectual one for the audience. It's funny, I think there is an interesting relationship between the endings of *Inception* and *Oppenheimer* to be explored. *Oppenheimer*'s got a complicated ending. Complicated feelings.

How are early viewers reacting?
Some people leave the movie absolutely devastated. They can't speak. I mean, there's an element of fear that's there in the history and there in the underpinnings. But the love of the characters, the love of the relationships, is as strong as I've ever done.

And the complexity of the subject matter.
Oppenheimer's story is all impossible questions. Impossible ethical dilemmas, paradox. There are no easy answers in his story. There are just difficult questions, and that's what makes the story so compelling. I think we were able to find a lot of things to be optimistic about in the film, genuinely, but there's this sort of overriding bigger question that hangs over it. It felt essential that there be questions at the end that you leave rattling in people's brains, and prompting discussion.

I have a strange question, a weird one. My husband fought cancer for four years. Since he died, I'm so raw, emotionally. My head is a mess. I worry about the world's ills, the people in war zones, the cats that are not being fed, all of it. I know this is *far* from the same, but I've been thinking, what would it have been like to be in Oppenheimer's head before—and god, after—the bomb was dropped? What do you think it was like to be in his head?
It's not a strange question at all. The answer is very much in the film. I wrote this script in the first person. It's what I told Cillian [Murphy, who plays Oppenheimer]: *You are the eyes of the audience.* And he takes us there. The bulk of the storytelling, we don't go outside his experience. It's my best attempt to convey the answer to that question.

I'm a little nervous about seeing the whole thing.
I think you might have to wait a long time before you do. It is an intense experience, because it's an intense story. I showed it to a filmmaker recently who said it's kind of a horror movie. I don't disagree. It's interesting that you used the word *nihilism* earlier, because I don't think I'd quite managed to put my finger on it. But as I started to finish the film, I started to feel this color that's not in my other films, just darkness. It's there. The film fights against that.

Does that get into you? Do you sleep OK?
I do now that I—you know, I was relieved to be finished with it, actually. But I enjoy watching the film tremendously. I think you'll understand when you see the film. It's a complicated set of feelings to be entertained by awful things, you know? Which is where the horror dimension comes in.

Have your kids seen it?
Oh yeah.

Had they known anything about Oppenheimer before?
I told one of my sons about it as I started to write it, and he literally said to me: *But nobody really worries about that anymore.* Nuclear weapons. Two years later, he's not saying that. The world's changed again. And that's a lesson for all of us, but particularly for the young. The world changes fast.

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THE THREE MOUNDS AT RED CLOUD

How much truth and healing can forensic technology really bring? On the sites of Native American boarding schools, Marsha Small has made it her life's mission to find out.

by **Ro**wan **Mo**ore **Ge**rety

Photographs by **Ta**ilyr **Ir**vine

JUSTIN POURIER WAS working maintenance at the Red Cloud Indian School in 1995 when a supervisor asked him to check out a leak in the school's heating system. It was early winter in Pine Ridge, South Dakota, when daytime temperatures often dip well below freezing. At the time, Red Cloud's 500 students—ranging from kindergartners to high school seniors—relied on a network of steam pipes to keep warm. At 28, Pourier wasn't much older than some of the kids, and like most, he was a citizen of the Oglala Lakota Nation.

Tracing the old plumbing, Pourier made his way through the bowels of the oldest structure on campus, Drexel Hall. Built in 1887—back when Red Cloud was a Jesuit mission and boarding school called Holy Rosary—Drexel Hall originally housed classrooms and a dormitory. Now it was a drafty red-brick admin building where a steam boiler hissed and sputtered belowground. Broad-shouldered and over 6 feet tall, Pourier had to stoop as he descended a narrow wooden staircase that led to an out-of-the-way corner of the basement. At the bottom, he says, he opened the door to a low-ceilinged room with a dirt floor.

Pourier doesn't recall whether he spotted the leak or not. But what he did find startled him. There, he says, aligned in a row, were three loaf-shaped dirt mounds, each about as long as one of Red Cloud's youngest students is tall and, as Pourier remembers it, topped with small white, wooden crosses.

At the sight of them, Pourier turned around and climbed the stairs, certain about what he'd seen—and frightened by what it implied. "I knew it was wrong for them to be in Holy Rosary," he said. "With all the cemeteries in these hills, why were they in the basement?"

That afternoon, when Pourier told his supervisor, one of the handful of Jesuits who still ran the school, about what he'd seen, he recalls that the response was swift and sharp: "Quit bleeping nosing around! Stay out of there!" Later, Pourier told his girlfriend and a few close friends about what he saw, but he didn't bring it up again at work. "I just let it go," he says. "It bothered me, but at the time I just took care of myself with prayer and sweat lodge ceremonies. I knew it was there, and I knew somehow, eventually, it was going to come to light." He soon left his job at Red Cloud. Two years later, work crews began renovations on Drexel Hall, and whatever Pourier had seen in the basement was covered with a thick concrete slab.

Pourier put aside the memory of what he'd found for two and a half decades. Then in May 2021, evidence of unmarked graves of as many as 200 Native children was discovered at a former boarding school in Kamloops, British Columbia. The finding, which came years after the Canadian government began examining its role in the history of Native American boarding schools, made headlines amid a broader, rolling North American reckoning with white supremacy. In the US, though, it wasn't until 2021, when secretary of the interior Deb Haaland became the first Indigenous person to hold a cabinet level position, that the federal government first attempted to compile a list of the boarding schools it had operated or supported, as part of her Federal Indian Boarding School Initiative. (Last summer, Haaland embarked on a yearlong "Road to Healing" tour.) Between the two countries, some 500 boarding schools for Indigenous children served as instruments of colonialism—not just in the distant past, but through the middle of the 20th century. Countless Native children were taken from their homes, forced to give up their languages and cultures, and in many cases made to suffer and die from neglect, abuse, and disease.

All of that context was painfully familiar to Native communities. The notion that missing children had died and may have been buried at boarding schools wasn't new or surprising. For many, the shock of the Kamloops news wasn't the discovery so much as the sense of awful validation. In the US, the Boarding School Initiative's first investigative report ultimately identified 53 burial sites "with more site discoveries and data expected as we continue our research."

Back in Pine Ridge, Pourier thought of coming forward about those three mounds in Drexel Hall for the first time in 26 years. In that time, Red Cloud had undergone major shifts. In 2019 the school hired its first non-Jesuit leader, and many of Red Cloud's administrators are now tribal members who grew up on the reservation. Key concepts from the Lakota clinical social worker Maria Yellow Horse Brave Heart have become central to how the school operates. She saw kinship between the Lakota experi-

Red Cloud still has some ties to the Catholic Church, an institution that was complicit in the centuries-long, hemisphere-spanning genocide.

ence and that of Jewish descendants of Holocaust survivors, in the sense that the devastating losses of genocide had come to form a pivotal part of Lakota identity. Disease, war, forced assimilation: "The rapidity and severity of these traumatic losses, now extended by high death rates from psychosocial and health problems, has complicated Lakota grief," she writes. Red Cloud adopted Yellow Horse Brave Heart's model for addressing such trauma, a sequence with four stages: confrontation, understanding, healing, and transformation.

By spring 2021, the school was already more than a year into its process of "truth and healing," led by Maka Black Elk, who had attended high school at Red Cloud and spent five years as a history teacher there. Black Elk's role was a complicated and delicate one. Red Cloud still has some ties to the Catholic Church, an institution that was complicit in the centuries-long, hemisphere-spanning genocide, and the Pine Ridge community has long harbored its own accounts of the school's abuse of students, including its demands for them to speak only English. At the same time, some elders offer fierce defenses of the education the school provided. Today, Red Cloud offers a Lakota-language dual immersion program. Even Justin Pourier sends his kids there. When the news of the unmarked graves at Kamloops broke, old stories about the hard labor and corporal punishment that students endured at Holy Rosary took on renewed significance. Blood-red graffiti went up on churches around the reservation: "Remember our children."

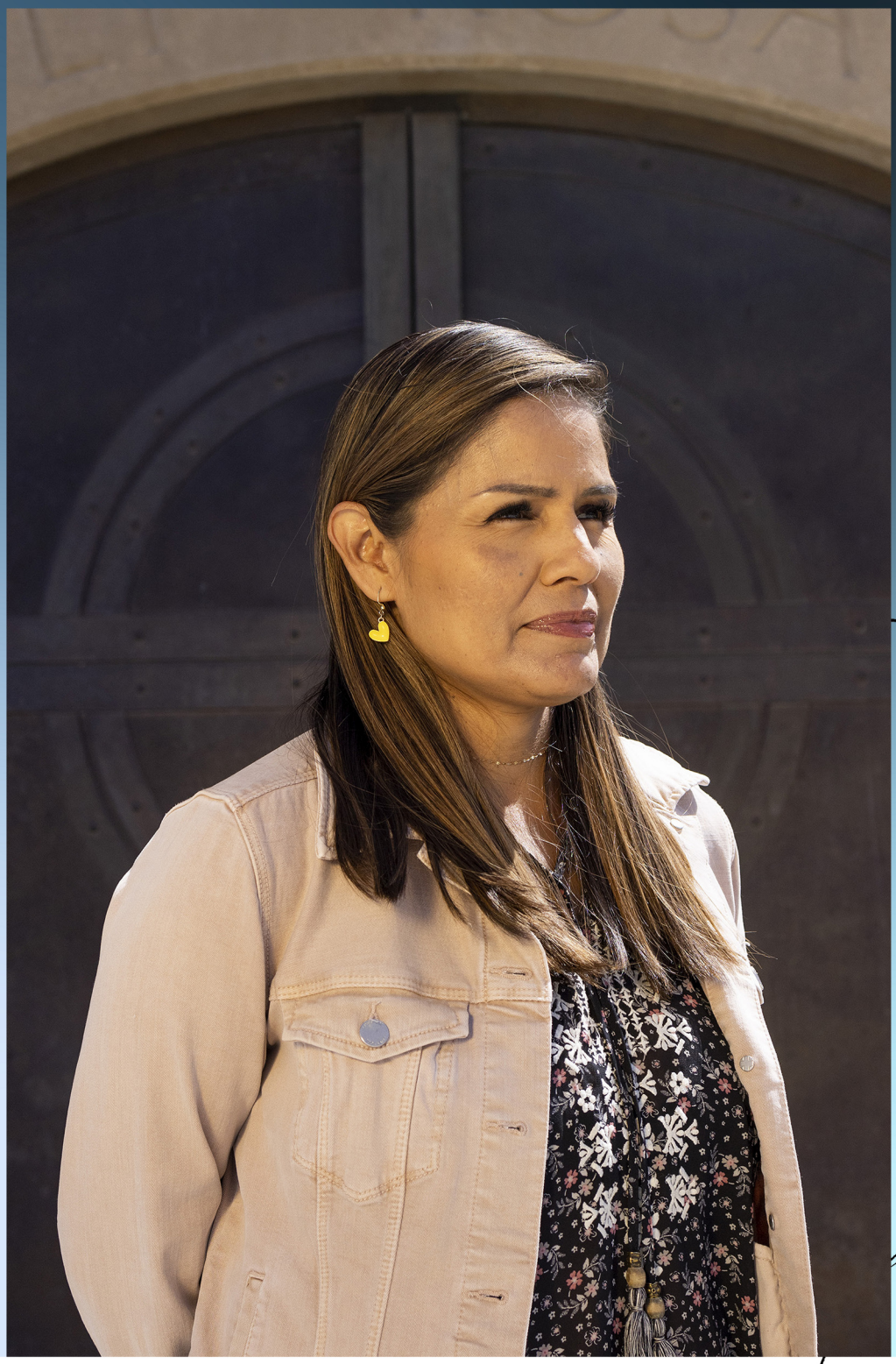
That June, Pourier sent a text to Tashina Banks Rama, the executive vice president at Red Cloud and an old friend of his. "I had an experience and I wanted to share it with you," he wrote. "What's a good time?" Banks Rama called him immediately and took notes as they spoke.

Banks Rama's grandmother and great aunts all attended Holy Rosary, and she herself sent all 10 of her children to Red Cloud. Following the Kamloops news and after hearing Pourier's story, she too found herself reexamining what she thought were settled feelings about the place, which some of her colleagues still referred to as a "perpetrator institution." Banks Rama promised to follow up with Pourier. "I told him we would do everything we could to pursue the truth," she recalls.

She invited him to campus the next day, and with the school's vice president of facilities, they retraced his steps down to the basement of Drexel Hall, to the concrete floor of an empty room crisscrossed by HVAC ducts. A few days later, school administrators escalated the issue: Black Elk brought Pourier's account to the National Native American Boarding School Healing Coalition, a nonprofit that has spearheaded a campaign to investigate historical trauma from the boarding school system. (Black Elk served on its board.) The coalition's director connected him to one of the very few Indigenous researchers who use ground-penetrating radar, and the only one with significant experience using the technology at boarding schools: a doctoral student at Montana State University named Marsha Small.

The Red Cloud administrators asked Small to help them find resolution to the old mystery given new urgency: Were children buried in Drexel Hall's basement?

Small reacted to the invitation with a blend of excitement and skepticism. Above all, she wanted to be sure the survey wasn't simply a way for the Catholic Church to clear its name. It was hard to believe that the same institution that had presided over so many abuses—not only in founding and operating board-



Following the Kamloops news and after hearing Justin Pourier's story, Tashina Banks Rama, the executive vice president of Red Cloud, also found herself reexamining what she thought were settled feelings about the place.

The Red Cloud Indian School opened in 1888 under the name Holy Rosary, one of the hundreds of boarding schools in the US for Indigenous children that functioned as instruments of colonialism.

ing schools, but in its long-standing cover-up of sexual predation by priests—would be prepared to entertain a process that yielded uncomfortable results. "You should know who you're dealing with here," Small remembered thinking when she got that first email. "Because I hate you."

At the same time, Small recognized that Red Cloud—which sits just 10 miles from the site of the 1890 massacre of Lakota people at Wounded Knee—was at least in part a genuinely Lakota institution, led by people like Banks Rama and Black Elk. And for years Small had been hoping for an opportunity like this: to survey a boarding school with the support of both the church and the surrounding tribe as it pushed for greater accountability. The fact that the invitation had come through the National Native American Boarding School Healing Coalition was no small thing. A couple weeks later, with caution, she responded to the school's email and accepted the gig.

Small's visit to Red Cloud in May 2022 began with a public presentation in the school gymnasium. If the community was going to be able to process the results of any survey that engaged with, or perhaps even contradicted, Pourier's testimony, Small knew that people needed to understand how ground-penetrating radar works—how it can't *see* underground so much as detect evidence of past digging. To operate a ground-penetrating radar machine, the user methodically pushes it back and forth in a grid, sending pulses of high-frequency radio waves into the ground and registering their reflections. Each pass, or transect, creates a series of traces that can be assembled into a radargram, a 2D snapshot that provides clues about the composition and density of what's below-ground. But they are only clues. What the radar pulses really detect is change, so that the clarity of one spot on the map is only relative to the spot next to it. Using specialized software practitioners can combine all the radargrams side by side into a 3D image, which can then be sliced horizontally so that each image shows the survey's entire area at different soil depths. Hearing Small's explanation, one elder in the audience pointed out that a scan at Red Cloud would undoubtedly find all kinds of disturbances: the place where a vegetable garden was dug, where trash was buried, where a large chicken coop was kept. Without some means of triangulation, Small cautioned—testimony, archival records, aerial imagery—all kinds of anomalies could look like graves.

Small was also at pains to emphasize the limits of what technology could do to reconcile the past. By relying only on ground-penetrating radar, or any other scanning technology, "you're not healing," she said. "All you're doing is pointing fingers." For the technology to serve any larger purpose at Red Cloud, it would have to work in unison with Lakota traditions of ceremony and storytelling, the same practices that boarding schools had striven to root out.

> You ask me to forgive
> How can we forgive when
> every day is a continuing
> onslaught of iniquity?
>
> —*Marsha Small*

After lunch, community members took turns pushing a ground-penetrating radar machine, which looks like a small lawnmower, back and forth in an open field. At the same time, within sight of the GPR demonstration, a group of activists from the local chapter of the International Indigenous Youth Council—including former Red Cloud students—arrived on horseback and rode circles around the school's chapel, where they'd placed a sign that read, "We are the grandchildren of the Lakota you could not remove." One of the activists burned a copy of the Catholic Church's "Doctrine of Discovery"—the justification of its support of colonial expansion (which the Vatican just repudiated this March).

The Youth Council seemed unsure whether to consider Small an ally or an enemy. In an Instagram post made during her visit, they noted that Small had invited one of their members to work alongside her as an intern. "We honor our brother for taking on such an important role for healing and justice," they wrote, and expressed thanks to Small and others for helping to bring Lakota children home. But the Youth Council had been pushing Red Cloud to scan its entire campus with GPR, not just one room of one building. In broad terms, the activists were just as skeptical about the auspices of the project as Small had been: "Why are we allowing the oppressors to investigate themselves?" the group's spokesperson asked at a tribal council meeting.

Small went ahead with her survey of the room in the Drexel Hall basement, pacing each square meter slowly as the ground-penetrating radar took its readings; it took an entire afternoon to cover an area not much bigger than a couple of parking spaces. Once she gathered and analyzed all the data, she found two anomalies consistent with possible graves. The only way to confirm it, however, was to come back and dig.

Sixty-four years old and just about 5 feet 5 inches tall, with high cheekbones and a round face, Small carries the irreverent air of someone who's used to being ignored by people in positions of authority. Her manner is by turns stern, direct, and playful. Born and raised on the Northern Cheyenne reservation in Montana, Small was the youngest child in a ranching family whose members had largely scattered by the time she turned 10. Her parents, who had both been sent to boarding schools, split up. Her mother began spending weekdays working in a town off the reservation, and her father went to live with a new family 12 miles up the road. One brother, a year older, went back and forth between home and a family friend's house, and Small's other siblings went off to college. Small herself was the only one who remained in the family's original home full-time. Her father didn't see the point in teaching his children to speak Cheyenne. Her mother, who came from a lineage of medicine men and women, clung tightly to the seasonal rituals of gathering plants and keeping sacred songs. But there was one legacy that both of her parents seemed to share: "They never learned how to be good parents, and that's from boarding schools: a straight pipeline."

One of three Native students in her class at a majority-white public school, Small says she spent much of her childhood "running or fighting." As a single mother in her early twenties, she developed an addiction to cocaine, then to methamphetamines. For two decades, she worked a string of jobs as a union boilermaker and lived on and off the streets, as her daughter lived mainly with Small's mother. "I didn't do my daughter justice," Small told me. It was only after becoming a grandmother that Small began repairing her relationship with her daughter, and she went to live with her in Oregon for a time. But she was still adrift. During this stay, in 2007, Small's daughter encouraged her to find a sense of purpose, perhaps by returning to school.

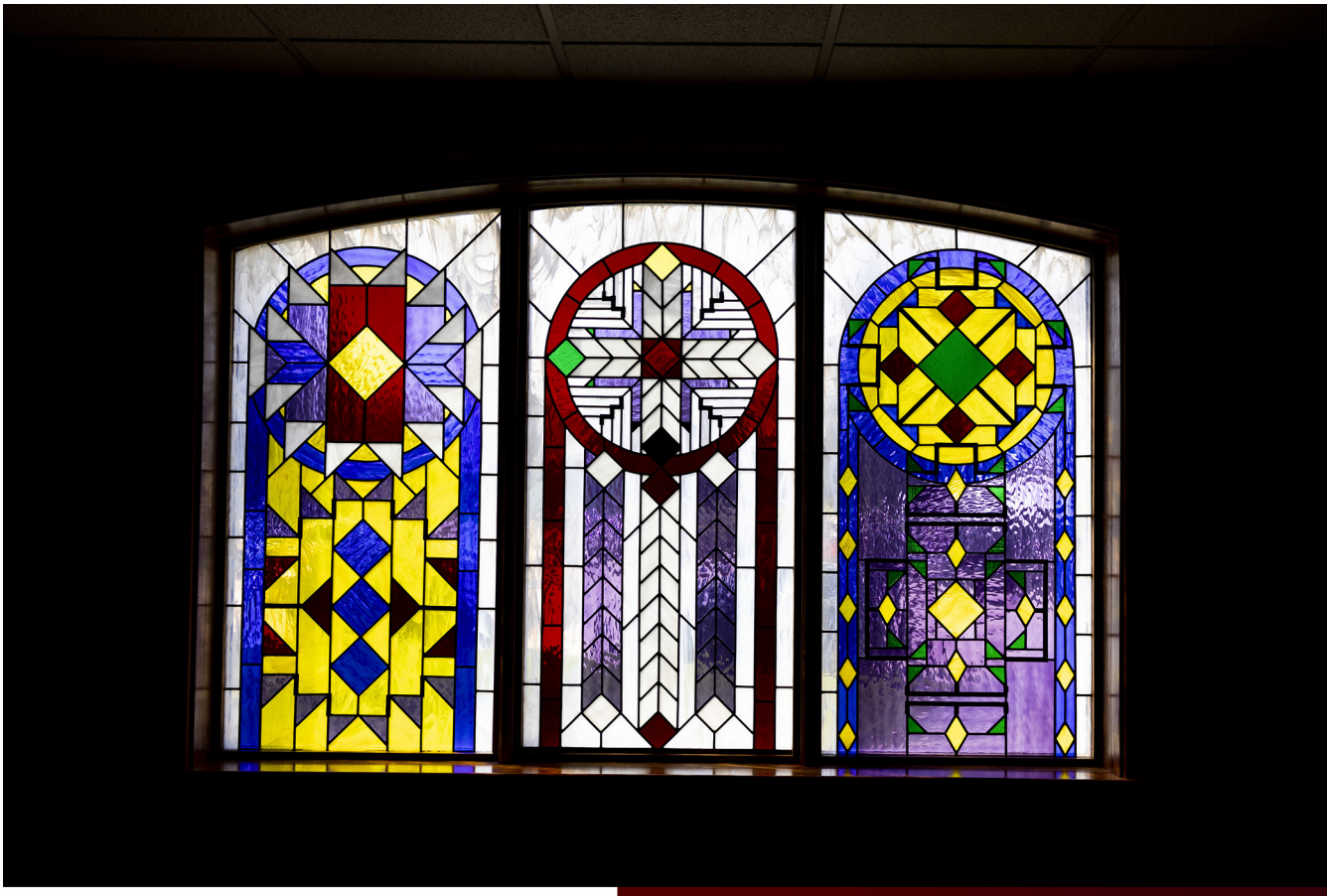
One morning, Small emerged from the fog of a weekend spent partying at an old friend's house, and walked to a bus stop at the corner. "It was 50 cents to go anywhere," she said. "I put my 50 cents in and just kept on riding." About 15 miles later, when she got off in Ashland, she heard drums coming from what turned out to be Southern Oregon University. "Those aren't hippie drums," she said to herself. "Those are Indian drums." She followed the music to a powwow being held in a small theater. Small introduced herself to a woman from Alaska, who offered her ice cream made with seal fat and cloudberries. "It was the most disgusting thing I ever tasted," she said. "The grease just coated my mouth, but too, it reminded me: That was her stuff. Where was my stuff?" By the time Small left, she'd decided she wanted to follow her daughter's advice and go back to school.

Small completed a bachelor's degree in environmental science and policy at Southern Oregon in 2010 and discovered that she loved ecological fieldwork. Then she started a master's degree program in Native American studies at Montana State University, but she didn't know how to fuse her interests. That's when Robert Kentta, a friend and longtime cultural resources director with the Siletz Tribe in Oregon, offered Small a suggestion that pertained to an old Native boarding school in Salem: "Hey, why don't you go over there to Chemawa and get one of those machines that looks like a baby buggy—see how many kids they got in that cemetery? A lot of people have been wondering for years."

For the first time in her life, a path opened up with ease, with what she took as nudges ("and sometimes shoves") from her ancestors—a travel grant here, funding for lodging at a conference there. So she followed Kentta's advice. That summer, between the first and second years of her master's program, she reached out to the historic preservation office of the Confederated Tribes of Grand Ronde. Members of the tribe counted relatives among those buried at Chemawa, and the tribe owned a brand-new ground-penetrating radar system. The preservation office proposed that Small conduct her survey of Chemawa as an internship: Small would get an institutional affiliation that might help smooth the way to accessing federal property and getting academic credit, and the tribe might finally get some answers.

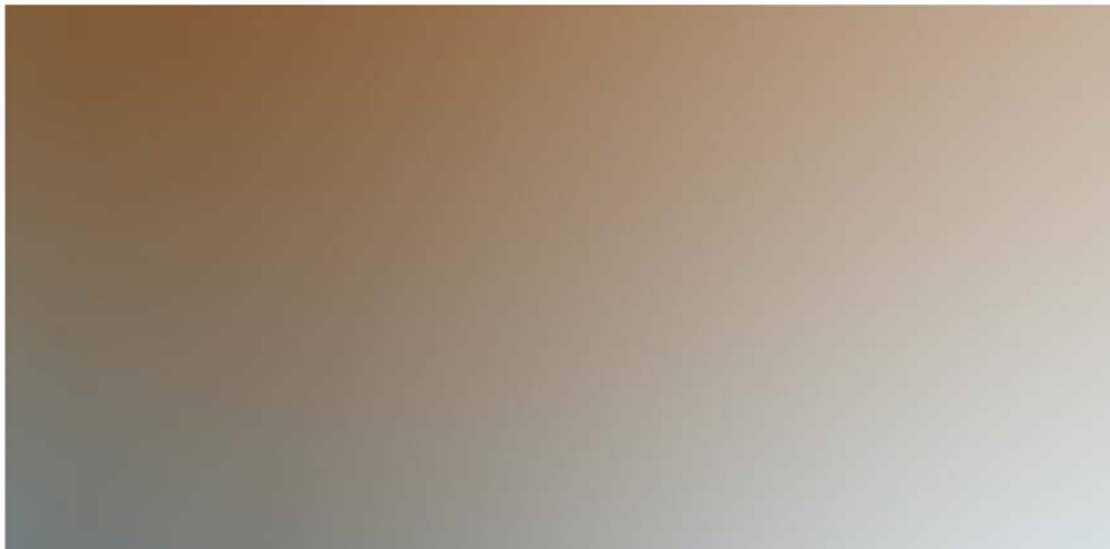
Beginning in 1880, children were sent to Chemawa from dozens of tribes, sometimes from hundreds or thousands of miles away. The cemetery, which has been neglected for

At the hundreds of boarding schools in the US and Canada, countless Native children were taken from their homes, forced to give up their languages and cultures, and in many cases made to suffer and die from neglect, abuse, and disease.



Graduates of Red Cloud have carved their names into the bricks of Drexel Hall.

The stained-glass windows of the chapel at Red Cloud were designed by Francis He Crow and a group of high school students in 1997.



Students sit outside of Drexel Hall.

decades, is separated from the boarding school—still in operation today—by a set of railroad tracks. Over the years, Grand Ronde elders told stories about grave markers being removed and replaced, so it was no longer clear—if it had ever been—how many bodies were buried there.

When Small entered the cemetery for the first time in the summer of 2012, she burned sweetgrass—a plant with spiritual significance across Native cultures. "The sweetgrass brings the spirits in, wakes them up," she said. She spent her first days walking through the rows, cross-referencing a list of burial plots with the names carved into each grave marker. One day at dusk, when she reached the fence at one end, she gazed to the horizon. The sun was setting, and Small's eyes followed the long shadows reaching back toward the school. All the graves, she noticed, were laid out according to Christian custom with their feet pointing east—blatant disregard for the multitude of burial practices and belief systems that different tribes hold around death.

"I got super emotional," Small recalled. "I couldn't write no more, couldn't focus no more—because there were so many of them. And a lot of them were babies. A lot of them were sisters and brothers. I seen the family name Davis in there three, four times, and I thought, 'You wiped out a whole family! A generation.' It just took my breath away." She walked to her car and sat silently in the driver's seat.

After a while, a train rumbled past the cemetery. She got out and walked over to the tracks—the same line that would have brought children to Chemawa 100 years earlier. "I was trying to focus on that moment," Small explained. "The horror of it, the unfamiliarity. Maybe even, for some, the excitement of it, doing something new." She bent down and touched her cheek to the cool steel of the rails.

By the time Small had been using the GPR machine in the cemetery for a couple of days, she felt transfigured by a sense of calling. Standing there among the graves of children who'd never gotten to go back home, she felt like there was important work to be done, work she knew she could do if she continued to push forward. "I felt I found my place in the whole spirit of things," she said. "Not just the world, but in the universe."

But she still had a tremendous amount to learn, and few clear paths to professional enlightenment. Typically employed as a tool to study groundwater, soils, and bedrock, ground-penetrating radar was first used by a researcher in 1929 to measure the depth of a glacier in the Austrian Alps. The technology is commonly used today to identify buried utility lines. Both utility lines and graves are dug in sites with a history of other uses, each leaving their own traces underground, but because trenches for utilities differ so much from the surrounding soil and contain metal pipes, water-filled plastic, gravel, or sand, they are easier to identify.

Any anomaly—a pocket of air, a layer of soil that's holding moisture differently than what surrounds it—can show up either as a visual gap (in the way that soft tissue can be nearly invisible on an

x-ray) or as a solid, a bright spot, like a hard drive going through an airport baggage scanner. Modern data processing software can help, but underground surveying can still be a vexing, often ambiguous, process.

When Small submitted a partial survey of the Chemawa cemetery comparing the location of graves and grave markers for her master's thesis, she also shared some of her GPR imagery with the company that had supplied the machine. She was hoping for affirmation. Instead, an anthropologist there who works on forensic applications of GPR politely explained that Small's imagery didn't necessarily show graves where she said it did. She realized she'd been badly misguided as she conducted her survey and interpreted the data. She'd done most of her fieldwork without supervision, and no one at Montana State had direct experience with GPR used in this way. "It was defeating, really defeating," Small said. "At the time, I still thought you could see bones with the damn thing."

But Small didn't give up; even as she entered her PhD program, the calling to get reliable data on Chemawa stuck with her. Realizing she "needed someone to teach me GPR on a nuclear level," she found her way to Jarrod Burks, an archaeologist who lives in Columbus, Ohio, and conducts surveys for the Defense POW/MIA Accounting Agency on recovery missions for missing soldiers. He agreed to join her doctoral dissertation committee. In 2017, Small invited Burks to help produce a new report on Chemawa. After five days of meticulous work at the cemetery, the new data that Burks and Small gathered cleared up where she'd gone wrong. He confirmed the basic limitation of Small's earlier analysis—tree roots and grave shafts can look alike in raw radar data, and Small had neither the experience nor a large enough data set to tell the difference. "Marsha, I don't see any graves here," Burks said, pointing to a spot where she had thought there were some.

Confronted with Chemawa's maze of Douglas fir roots, Burks and Small relied on secondary instruments—a magnetometer, which detects changes in the Earth's magnetic field, and an electromagnetic induction meter, which measures the velocity of liquid—to cross-reference the data they'd generated through GPR. The resulting report, completed in 2019 for the Boarding School Healing Coalition, offered a cogent analysis and was written with striking moral clarity. There were, according to the data, at least 222 potential graves in the cemetery and only 204 markers, with "a good possibility that additional, undetected graves are present." And, because of the mismatch between the location of markers and the location of potential graves, there was no easy way to identify who was buried where. "Some of these children were brutally taken away from their families and all they had ever known; some were not," Small wrote. "Some voluntarily entered the boarding school system but died there and are now lost. Our goal is to find as many as possible."

Maka Black Elk, who attended Red Cloud, is leading the school's process of "truth and healing."

As Small gained more expertise in GPR, she saw that the demand for the technology was growing. In a June 2021 statement timed to the launch of Secretary Haaland's Federal Indian Boarding School Initiative, the Interior Department states that the primary goal of the initiative

is to "identify boarding school facilities and sites; the location of known and possible student burial sites located at or near school facilities; and the identities and Tribal affiliations of children interred at such locations." Small wanted to protect tribes from placing their faith in the technology without a clear sense of what it could deliver, and from the rush of cynical companies that she foresaw. She'd already gotten one call from a tribe that wanted her help using ground-penetrating radar to investigate the case of a missing boy. When Small asked about the machine they'd be using, she learned that the tribe had spent close to $10,000 on a device that provided readings no deeper than a few inches below the surface—better suited to archaeological work like scanning for ancient tool fragments than for locating grave shafts.

Together with two Native historians of boarding schools, Farina King and Preston McBride, Small began developing a set of suggested practices for "Tribal nations and Indigenous communities that are beginning to survey Indian boarding school cemeteries and burial sites for their children who never returned home or are lost in the on-reservation Indian boarding school cemeteries." To Small's mind, even tribes that could afford to hire independent experts or work with public agencies faced a host of potential pitfalls—including contractors who might not follow spiritual requirements or enlist tribal members as real collaborators, illegible or useless data, and failures to plan for the human and community consequences of a scientific process.

The protocols, published in the summer of 2021 during the flood of publicity that followed the revelations at Kamloops, are organized around the principles that tribes should be careful to consult with elders and members who may have hesitations about any activity on burial sites, that Native people should be involved in every step of survey work, and that tribes should control how the results are used. "I don't need you to surface, 'Oh, we got 418 lives lost,'" Small says. "We need the numbers, but I'm not *concerned* with the numbers. I want the healing to happen."

I look forever to the Ancestors
to guide me, every day, every
night, for I get very little rest.

—Marsha Small

Last October, Small returned to Red Cloud to proceed with a full excavation of the tiny room that had haunted Justin Pourier for half his life. Small's nephew, a hulking man with a long ponytail and glasses who was there to assist her, led an opening ceremony. He crumbled a handful of sage—a purifying plant for both the Cheyenne and Lakota—in a small ceramic dish and lit it on fire. He walked to each corner of the basement and paused for a moment to let the smoke coil to the low ceiling. Then he swept the dish around the edges of each doorway. He presented the dish to Black Elk, who used cupped hands to spread the wispy clouds of smoke over his head, then down each shoulder and along his chest, arms, and legs. Then Small's nephew repeated the process, known as smudging, with everyone in the room.

After the ceremony, Small turned to Black Elk: "I absolutely adore you," she said. "I don't know how this is gonna end."

"I've talked to a lot of elders, and I think they want the church gone," she went on—meaning they wanted Red Cloud to end its relationship with the Catholic Church. "Are you prepared for that?" she asked. Black Elk let out a deep breath.

"I'm scared," Small continued. "I'm scared we're gonna find something, and I'm scared we're not gonna find something. Because if we don't find something, they'll say the church bought us off."

Cutting up and removing the concrete took most of that Friday. Over the weekend, Small and I drove an hour and a half to Rapid City to get supplies for the dig. As we cruised in the fast lane, north on Highway 41, she began explaining how her approach to ground-penetrating radar differs from non-Native practitioners. "I have to visualize what that energy's doing," she said. "They just think in terms of velocity and gradient and RPM." Just at that moment, I noticed a small herd of grazing bison on the side of the highway. Small reacted in ecstasy. She slowed to 40 miles an hour, veered to

the right lane to get a better look at the hulking animals, and began shouting out the window. "*Hotoa'e*, *hotoa'e*, *hotoa'e*! *Néá'eshe*!" (Bison, bison, bison! Thank you!) And then, in English, she said, "Do you know me? I know you." Giggling in delight, she reached into the compartment on the driver's side door and pulled out a sprig of sage, which she extended into the wind as an offering, crumbling it between her fingers. "That was cool," she said, thanking me for spotting them as she stepped on the gas. "It makes you feel we're still part of the circle."

Periodically, Small reached into a paper bag to grab a maple doughnut. Unopened packs of Skittles and Reese's Pieces lay on the floor of the rented minivan. Her sugar cravings, she said, were triggered by the stress of leading a dig in a setting she regarded as both a sacred site and a potential crime scene. She repeated a prophecy attributed to the 19th-century Northern Cheyenne leader Sweet Medicine: A young white child will come to you, and if you follow him, the children will howl like coyotes, and you'll go crazy. "For a long time, I thought it was meth," she said. "Now I think it's sugar."

At the Lowe's in Rapid City, Small pushed a flatbed cart rapidly through the aisles, shoes shuffling as she walked. She picked up trowels, buckets, a roll of black plastic drop cloth, paint brushes, and wooden boards to help with sifting dirt. She seemed to be conjuring a mental model of the area outside Drexel Hall as she peered at the shiny floor of the hardware store, squinting and using a finger to trace the outline of the ground she'd have to cover with tarps. Standing before a wall of cleaning supplies, Small rehearsed the brushing movements she'd be making to clean off objects during excavation, first with a hard-bristled scrubber, then with a soft dustpan brush, before throwing them both onto the cart. "Every once in a while, I get impostor syndrome," she said, looking at her haul. "What am I doing?"

After Small gathered and paid for her supplies, we stopped at a kiosk for coffee, where the barista, whose knuckles bore a tattoo of the chemical formula for caffeine, said that it had taken her 14 years to find her calling. "It only took me about 50 years," Small replied. "The ancestors said, 'You have to find the kidnapped children in the Indian boarding schools.' And then I said, 'I don't want to.' And then they said, 'You have to.' I don't like the work, but I do like bringing kids home."

When we arrived at Red Cloud the next morning, a maintenance crew was assembling a tent and chain-link fence to establish a perimeter around Drexel Hall. Burks and three assistants had flown in from Ohio, and now they got to work unloading Small's minivan. Two FBI agents in fleeces, crew cuts, and cowboy boots took pictures of the basement. The atmosphere was somber but leavened by familiarity. The feds worked most of their cases with the tribal police detectives who were also there. "They're our bosses, basically," one federal agent said. Everyone else seemed connected by the ties of small communities and large families. Justin Pourier was there with a travel coffee mug that read "*Maȟpíya Lúta Owáyawa*"—Lakota for "Red Cloud School." Someone brought around a tray of hot sausage biscuits from the cafeteria.

Things proceeded slowly at first. Burks and one of his assistants outlined 16 sections of the ground, each measuring 1 square meter, to be excavated one by one. Then they got to work with their trowels, methodically filling bucket after bucket with dirt as they dug down 20 centimeters at a time. It would take several days to dig out the full meter down. The rest of Burks' team took turns with the federal agents, hauling full buckets up the stairs then pressing clods of dirt through steel-mesh screens. Anything they found that wasn't dirt, rock, or wood was gently brushed off and placed in a ziplock bag labeled with the square from which the object was taken.

Small directed traffic and reminded people to take breaks and eat the fruit and doughnut holes lined up on a bench nearby. She encouraged a teenage Red Cloud graduate, who'd come to help haul buckets, to speak up if she felt anyone was disrespecting the site, telling her, "Remember, you're the Native here."

As the procession of dirt continued, the Lakota detectives passed around photos of an architectural drawing that had been prepared for the 1997 renovation of Drexel Hall, in which the room adjacent to the boiler room—the space they were now excavating—was marked "Graveyard." Banks Rama said the label referred to an old Halloween tradition, the supplies for which were stored in the basement. Nonetheless, the detail seemed to validate both Pourier's memory and the lingering traumas so many in the community still associate with Red Cloud.

Later that morning, Small emerged from the basement holding a triangular piece of bone, textured on one side and smooth on the other, and stood outside looking at it with a jeweler's loupe. "Some kind of large, flat bone," one of Burks' assistants said. "Right off the ulna," Small said. Burks, walking by, offered a skeptical rejoinder: "A large animal bone." (The actual assessment of any objects sifted from the dirt was done by a forensic analyst later that week.)

"I'm looking forward to getting some conclusiveness,"

The old girls' dormitory in Drexel Hall. "I don't even remember going to school," one former student said. "All we did was work."

Small said. But conclusiveness never comes quickly in her line of work, if it comes at all. It would be several months before she and Burks finalized the report on what they'd found at Red Cloud.

The Indigenous protocols

that Small helped to write offer plenty of guidance for tribes surveying burial sites—always consult elders, follow the majority's opinion, take ownership of the data—and the Red Cloud excavation followed that guidance. But there's one outcome the protocols don't anticipate: What should happen in the event that a survey doesn't find evidence of buried children? How, then, is a tribal community to proceed toward healing?

Weeks after the Drexel Hall excavation, though Small and Burks were still months from finalizing their full report, the Red Cloud administration, eager to share some sense of what had happened, published its own statement describing the survey's key results. The excavation found only two anomalies, the school said. "The first anomaly was related to building products (mortar for laying bricks and nails). The second anomaly was related to animal activity (several places where rodents burrowed)." The statement noted that the FBI and community members were present throughout the entire excavation. The school was careful to avoid saying that no children had been buried in the basement, but offered, rather, that "no human remains were found in the soil survey."

When I visited Pine Ridge, people around town, including many former Red Cloud students, had only a hazy notion of the chain of events that had brought Small to the reservation. But everyone had heard something, and they all referred to the situation with an ominous shorthand, along the lines of "I heard they found some bodies over there."

That none were found doesn't disprove Pourier's testimony, and may not change anyone's mind. GPR results are never absolute, and the excavation had only covered a small area—there was no way to account for the possibility that Pourier had misremembered the spot where he'd seen the mounds, or that graves might exist elsewhere. Whatever the school's present reputation, many people on the reservation regard it still as a place haunted by a dark history. They tell stories about swings that move without children in them, doors that open and close by themselves, bells that ring on their own on a windless day.

"I don't even remember going to school," said Shirley Bettelyoun, who went to Red Cloud starting at age 6. "All we did was work." Dale McGah, 70, was kicked out of school before he graduated, but he still remembers Mr. Schak, a teacher who hit students on the head with a metal ring heavy with keys,

The inconclusiveness of Small's survey is hard for many, including herself, to begin to understand.

and he recalls being told to guard a fellow student who had tried to run away. Yet McGah's own grandchildren attend Red Cloud today. "It's probably one of the better schools on the reservation," he said. Another elder, Phyllis White Eyes DeCory, who had previously worked for the Catholic Diocese in Rapid City, was offended by even the suggestion that Red Cloud needed to investigate. She told me sharply, "They're not gonna find anything but dirt down there."

In the months after Small completed the excavation, she went back and forth with administrators at Red Cloud about how best to characterize the fact that no human remains were discovered. She wouldn't rule out the possibility that there had been graves there at one time. The school was trying to demonstrate that it had nothing to hide.

Small seemed torn between hewing to the dry language of geophysical inquiry and reflecting the genuine Lakota anger toward the Catholic Church, anger with which she identified so deeply. For all the careful work she'd done to ensure that tribes were prepared for the healing that would follow the discovery of unmarked graves, evidence that pointed in the other direction presented its own set of complications. If the school has indeed completed the first of Maria Yellow Horse Brave Heart's four stages for healing from historical trauma—confrontation—then they stand at the precipice of the second, understanding. Even though the school's administrators may want to move on, the inconclusiveness of Small's survey is hard for many in the community, including Small herself, to begin to understand.

When I asked Small how she thought the community would react to her survey results, she said, "What I see on the horizon is that community rising up against that church. And if they do it right, they'll kick 'em out. Then they'll bring me in, or they'll bring somebody else in, and we'll find bodies. They still have that breath of fire."

ROWAN MOORE GERETY *is a reporter and audio producer based in Phoenix, Arizona.*

by VIRGINIA HEFFERNAN

Photographs by ARGUS PAUL ESTABROOK

THE UNPARALLELED SQUARENESS OF PETE BUTTIGIEG

Sure, the US secretary of transportation has thoughts on building bridges.

But infrastructure occupies just a sliver of his voluminous mind.


9

THE CURIOUS MIND of Pete Buttigieg holds much of its functionality in reserve. Even as he discusses railroads and airlines, down to the pointillist data that is his current stock-in-trade, the US secretary of transportation comes off like a Mensa black card holder who might have a secret Go habit or a three-second Rubik's Cube solution or a knack for supplying, off the top of his head, the day of the week for a random date in 1404, along with an uncondescending history of the Julian and Gregorian calendars.

As Secretary Buttigieg and I talked in his underfurnished corner office one afternoon in early spring, I slowly became aware that his cabinet job requires only a modest portion of his cognitive powers. Other mental facilities, no kidding, are apportioned to the *Iliad*, Puritan historiography, and Knausgaard's *Spring*—though not in the original Norwegian (slacker). Fortunately, he was willing to devote yet another apse in his cathedral mind to making his ideas about three mighty themes—neoliberalism, masculinity, and Christianity—intelligible to me.

Because Buttigieg, at 41, is an old millennial; because as a Rhodes Scholar at Oxford he got a first in PPE (Philosophy, Politics, and Economics), the trademark degree for Labour Party elites of the Tony Blair era; because he worked on optimizing grocery store pricing at McKinsey; because he joined the Navy in hopes of promoting democracy in Afghanistan; because he got gay-married to his partner Chasten in 2018; and because, as mayor of South Bend, Indiana, he agitated to bring hipster entrepreneurism and "high-tech investment" to his rust-belt hometown, I had to ask him about neoliberalism, the happy idea that consumer markets and liberal democracy will always expand, and will always expand together. I was also fascinated by the way that Buttigieg, who has long described himself as obsessed with technology and data, has responded to the gendering of tech, and especially green tech, by fearsome culture warriors, including Marjorie Taylor Greene.

Buttigieg, whose father was a renowned Marxist scholar, was himself a devotee of Senator Bernie Sanders as a young man. He now recognizes that the persistence of far-right ideology, with its masculinist and antidemocratic preoccupations, is part of the reason that neoliberalism has come undone. Not everyone, it seems, even *wants* a rising standard of living if it means they have to accept the greater enfranchisement of undesirables, including, of course, women, poor people, Black people, and the usual demons in the sights of the world's Ted Cruzes and Tucker Carlsons.

He also talked about his faith. Lefties these days are said to be less religious than right-wing evangelicals, but between Buttigieg, whose Episcopalianism grounds his decisionmaking, and his boss, President Joe Biden, whose robust Catholicism drives his sincere effort to revive America's soul, perhaps a religious left is rising again.

VIRGINIA HEFFERNAN: What is neoliberalism, and what happened to it?

PETE BUTTIGIEG: When it comes to neoliberalism, we got mugged by reality. That's one cheeky way to put it.

Poor liberals. Always getting mugged by reality, or muggers.

Look, in the early part of my adulthood, neoliberalism was described almost as a consensus that just made sense—at least to everybody in positions of influence. Now it's very different. We have experienced the end of the end of history. We have experienced the limitations of the consensus. None of the assumptions from between roughly 1991 and 2008 have survived.

Specifically?

Certainly not the idea that the global move toward democracy is a one-way street. Nor the idea that greater integration between markets and governments means greater harmony politically. Nor the idea that if we acted to make sure the pie gets bigger, everyone's slice would follow suit, which was the promise that was made to the industrial Midwest at the time of NAFTA.

The lived reality of the younger generations is that they are experiencing climate issues not as a theoretical possibility but as a clear and present danger. These are generations that have experienced the reality that disparities, including racial disparities, left alone, will only compound. They won't cure of their own gravitational tendency.

... or tendencies of the market?

Right. Because market tendencies depend very much on what you have to begin with—the initial endowment, as the economists call it. But your initial endowment looks very different if your previous generation was dispossessed. Last year I was in Berlin as they were confronting the tectonic disruption that had been caused by Russia's invasion of Ukraine. They have this very German word for it: *Zeitenwende*. A turning point. The war blew up their presumption that when it came to Russia, more integration between it and Europe would mean more stability.

This has been our presumption about China too—that greater economic integration would mean not just greater stability, but a more or less inevitable move on the part of China into greater acceptance of democratic norms, market norms, and a rules-based international order. We've come to the point where we are super-integrated, but that economic relationship with China has not yielded the kind of comfort that was promised.

As we careen toward the second quarter of the century, suddenly industrial policy sounds less retro and more like a response to the times.

"Industrial policy"—is this paleoliberalism?
Well, there are some new, or at least renewed, ways of thinking about transportation policy we work on at DOT that embrace the importance of public investment, which is a big part of the philosophy of the infrastructure bill. There are more than 32,000 new infrastructure projects now underway in every state and territory, all across the country. We created an interactive map so people can see what's up in their communities.

We're also facing the effects of anticompetitive behavior in pretty much every industry connected to the movement of people and goods.

Was there, maybe, a comeback of a pared-down version of neoliberalism—or at least the hope that markets and democracy might work in sync—when Ted Cruz coined "Woke Coke" to show contempt for Coca-Cola's protest of voter suppression in Georgia?
Well, yes, there's something delicious about the way that Cruz and the rest of them have positioned themselves on one side of the fence. And Netflix, Coca-Cola, Disney, and Bud Light are on the other side. Along with most of America.

There may in fact be a center of gravity in this country that includes both a democratic majority of the American people, and even something of a consensus, at least among mainstream business leaders. We have certain commitments around democracy and inclusion that are really elemental to the whole system.

True. But the right likes to dismiss any political action—even in the name of elemental American ideals—as pretense. I think of how Putin defined the Kremlin's enemy as foie gras, oysters, and "gender freedoms." An American conservative might hear him and say, OK, foie gras, pronouns—annoying, pretentious, sure. But do Republicans really want to be dragged into a bigger far-right project, the renunciation of democracy, modernity, human rights?
Look, the mainstream right's political project was twofold. It was to prevent legal access to abortion and to sustain lower taxes for the wealthy. Those are kind of the two greatest pillars of the mainstream right now. They're now the dog that caught the car. And, to switch metaphors, they rode a tiger to get there. They made a lot of distasteful bargains in order to get there.

Sometimes the military—the *military*, of all institutions—comes under attack from the far right. On ideological grounds. Yet another front in the culture war.

The woke Pentagon.
You could add that to the list: Bud Light, Coke, football, Disney ... and the Army. You can only put yourself on the wrong side of so many red, white, and blue American institutions, and the question becomes, is this about you?

Speaking of is-this-about-you, have you followed the masculinity crusade of former TV personality Tucker Carlson—testicle warming and the rest?
I mean, where to begin on this? Fears about masculinity are a way into the fear of displacement. Masculinity establishes a default place, and that place is being shifted and threatened by modernity. A man as the head of the household. The only one who earns income. The default leader in any social or political organization.

I THINK WE ARE ALL NEARER TO OUR SPIRITUAL POTENTIAL WHEN WE'RE ON THE MOVE.

The politicization of masculinity is code for *Nothing in your life has to change*. The problem is, of course, lots of things have to change. Either because there was something wrong with the old way—or because, even as the old way seemed perfectly fine, it's not an option.

This is true with the realities of climate change. If you can't face that change, you might retreat to the default place of masculinity. Maybe that's why someone characterized electric vehicles as emasculating. I think it was Marjorie Taylor Greene.

Are they not?
To me, a car is a car. Actually, the electric truck has got more torque than a regular truck. And it'll tow just as well.

And yet EVs unaccountably fall on the femme side of the ledger, like Impossible burgers.

Right. A lot of this discussion about masculinity doesn't have anything to do with the immediate *function* that's at stake.

I'm thinking about burgers, right? I love a good cheeseburger. I hate a bad veggie burger. I like a good veggie burger. The Burger King Impossible Whopper with bacon is not a bad combo.

Likewise, when it comes to driving, I mean, there's a very literal, physical, technical sense in which power is at stake when you drive. It feels good to be driving a vehicle with a lot of power.

The vehicle I get around DC in is a Mustang Mach-E. The fact that Ford made one of its first electric vehicles a Mustang is probably not an accident. It has three modes. Whisper, Engage, and Unbridled. There are propulsion sound effects involved in the different modes to help you feel conscious of the power of the engine.

Clearly, we have a chance to rewrite some of these easy gender tropes. My life happens to cut across them. I like drinking beer, lifting weights, splitting wood. I'm also gay and I like playing piano. I do a lot of the caregiving for our toddlers and other things that supposedly aren't masculine.

Your secrets are safe with me. So what's going to stop the androgen-addled, Putin-besotted ideologues?
When it comes to conspiracy theories and extreme partisan ideologies, I found two things are true. One, it's always more people than you would think. Disturbingly so. But it's also, almost always, much less than a majority.

The problem, of course, is there are some features of the American system where you could be a long way from the majority and still take control of certain decisions. We've seen a lot of counter-majoritarian movements, with, of course, abortion being an example. But facts still matter. And when a fact is challenged, or a supposed fact, like "the Russian Federation's army is unbeatable." Right? I have to think that catches up to you.

At a certain point, in Russia, for example, you see those charts by region of the areas that suffered the most casualties. Just as a statistical matter, it is impossible for a false narrative to hold.

And here in the US the confrontation with reality comes every time I get a letter of support from a House Republican for a transportation project using funds from the bill they voted against. It's shameless. But it's also reassuring that they're the first to come to a ribbon-cutting when we fund a project in their community.

It's a reminder that there is such a thing as true and false. These funds are helping all over the country. That's true. And one thing that's false is that it was a good idea to be against these funds. It was a bad idea.

People like infrastructure. Even Marjorie Taylor Greene isn't pro-pothole.
Exactly. Everyone here cares about delivering on the president's view that the way we vindicate democracy, at a time when democracy really is being challenged frontally, is we take care of the basics. In my corner of this administration, we work on things like fixing bridges and holes in the road and keeping people safe in the transportation systems.

Another major goal of ours is to reverse the rise of roadway deaths in this country. Early data suggests we may be seeing those numbers stop rising and then go down. That could be the most important thing we do here, because a day's worth—one day's worth—of roadway deaths in this country represents more death and destruction than a year's worth of losses across the rest of our transportation system. So given how hard we work to push the number of, for example, accidental railway casualties

DEPARTMENT OF TRANSPORTATION SECRETARY PETE BUTTIGIEG IN MID-APRIL AT HIS AGENCY'S HEADQUARTERS IN WASHINGTON, DC.

from the single digits toward zero, and to make sure there are not just no airline crashes but no close calls with airlines, what it would mean to reverse that rise in roadway deaths, which claims about 40,000 lives a year—yeah, that's an enormous one.

Do you think the administration's work on the basics is getting through?

Every time I go to celebrate a new bridge, we have a great time with local leaders who fought so hard to get it done. But it bears little chance of penetrating the national news of the day. Our task here is to deliver so much good news that the volume of it outweighs the tendency to focus on what went wrong.

I think we might do this. One formulation is that we've delivered the most significant economic legislation since FDR, the most important infrastructure initiative since Eisenhower, and the second-most-important health care work since LBJ. All while dealing with the first land war in Europe since Truman and facing the biggest public health crisis since Wilson, with the slimmest governing majority in Congress in almost 100 years.

You see it that way and you think, *Well, yeah. That's right. We've gotta shout that from the rooftops*.

Let's talk about Christianity.

Well, every policy decision I make should be equally fair to people of every faith and no faith. It should be as defensible to me as somebody who is religious as it would be if I were not.

At the same time, you can't help but notice certain rhymes between your religious convictions and the choices you're called on to make in a job like this. There's a lot in the faith tradition that I hold close about "the least of these" [the imperative to help the needy]. This doesn't just go to the worth of your choices, but even your worth as a person, which depends in no small measure on how you make yourself useful to those who have the least power and the least means.

When you're making public policy, you're often asking yourself, "How does this choice help people who would have the least going for them?" So that's part of it.

Running DOT seems to suit you. Are there more ways the challenges of transportation speak to your spiritual side?

There's just a lot in the scriptural tradition around journeys, around roads, right? The conversion of Saint Paul happens on the road. I think we are all nearer to our spiritual potential when we're on the move. Something about movement, something about travel pulls us out of the routines that numb us to who we are, to what we're doing, to everything from our relationships with each other to our relationships with God. That's part of the reason why so many important things in the Bible happen on highways.

And then journeys—they're also just marvels. Every flight is a marvel that pulls us out of that in the same way that religious rituals, holidays, liturgies are one kind of routine that pulls us out of another kind of routine. When you get on a plane, people buckle their seat belts and listen to the flight attendants' very predictable pronouncements. It's routine. It's almost a ritual, right? And yet you're preparing to fly through the heavens.

Life is a combination of drudgery and miracles. Part of what keeps me at home in the Episcopal faith is that it is liturgically rather conservative. I like that routine.

Interesting. I've come to consider January 6 as a triumph of something like drudgery. Even after terrible violence came to the US Capitol, Congress returned to carry out its clerical workday. The paperwork got filed. The flag of the ordinary was still there.

Yeah, I agree there's something that bears more attention about how Congress stayed, came back, finished the job. That's real. And the fact that the Republic held is real. And another under-remarked fact is the courts did a good job of surfacing what was true and what was false. Because in the US court of law there are actual consequences to lying, and you have to actually present evidence in favor of your client, so it turns out to be less susceptible to the warping of reality.

That being said, part of why we would hesitate to assign any triumph to that day—in addition to just the awfulness of it—is that we don't yet know how the story ends. When we look back at moments further in history, we think of the outcome as settled and stable. We have to go out of our way to be rightly afraid of how close we came. If you study the Cuban Missile Crisis, it's a study in leaders doing the right thing. But, also, the more you put yourself in their shoes, the more terrifying it is.

How do you think this particular crisis will resolve?

I think a lot now about the worst experience of my life, the critical hospitalization of my son. He was treated for RSV, which is a respiratory disease. Like many viruses, it takes a course where it gets worse and worse and worse. It reaches the worst moment. And if the patient survives, then it gets better and better. The terror of it as a parent is, the only way you know it's getting better is when it's stopped getting worse. There are a lot of things like that in the world. The conditions of our democratic institutions—we don't know how much rougher things might get before things get better.

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THE TRILLION-DOLLAR AUCTION

OCEAN CREATURES SOAK UP HUGE AMOUNTS OF HUMANITY'S CARBON MESS. SHOULD WE VALUE THEM LIKE FINANCIAL ASSETS?

BY GREGORY BARBER

ILLUSTRATIONS BY ISRAEL G. VARGAS

TO SAVE THE WORLD

YOU ARE SEATED in an auction room at Christie's, where all evening you have watched people in suits put prices on priceless wonders. A parade of Dutch oils and Ming vases has gone to financiers and shipping magnates and oil funds. You have made a few unsuccessful bids, but the market is obscene, and you are getting bored. You consider calling it an early night and setting down the paddle. But then an item appears that causes you to tighten your grip. Lot 475: Adult blue whale, female.

What is the right price for this masterwork of biology? Unlike a Ming vase, Lot 475 has never been appraised. It's safe to say that she is worth more than the 300,000 pounds of meat, bone, baleen, and blubber she's made of. But where does her premium come from? She has biological value, surely—a big fish supports the littler ones—but you wouldn't know how to quantify it. The same goes for her cultural value, the reverence and awe she elicits in people: immeasurable. You might conclude that this exercise is futile. Lot 475 is priceless. You brace for the bidding war, fearful of what the people in suits might do with their acquisition. But no paddles go up.

Ralph Chami has a suggested starting bid for Lot 475. He performed the appraisal six years ago, after what amounted to a religious experience on the deck of a research vessel in the Gulf of California. One morning, a blue whale surfaced so close to the ship that Chami could feel its misty breath on his cheeks. "I was like, 'Where have you been all my life?'" he recalls. "'Where have *I* been all my life?'"

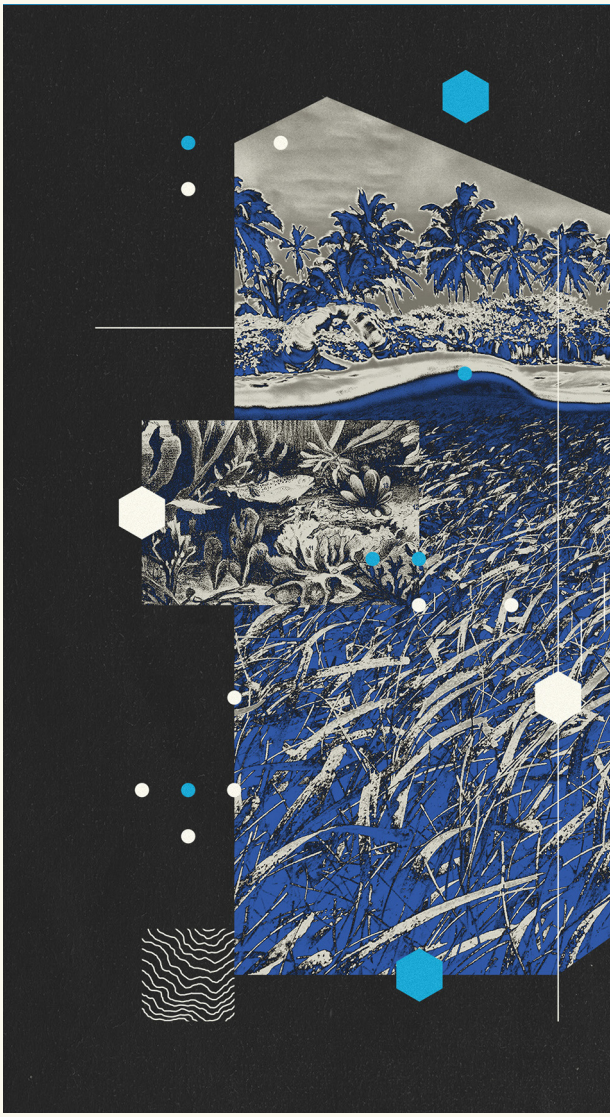
Chami was 50 at the time, taking a break from his job at the International Monetary Fund, where he had spent the better part of a decade steadying markets in fragile places such as Libya and Sudan. "You become fragile yourself," he says. When he saw the whale, he sensed her intelligence. He thought: "She has a life. She has a family. She has a history." The moment brought him to tears, which he hid from the others on board.

That evening, Chami fell into conversation with his hosts, who told him the unhappy tale of the seas. The ocean, they explained, has been left to fend for itself. Trapped between borders, largely out of reach of law and order, its abundance is eroding at an alarming rate. The water is warming and acidifying. More than a third of fisheries are overexploited, and three-quarters of coral reefs are under threat of collapse. As for whales, people might love them, might pass laws to ban their slaughter and protect their mating grounds, but people also love all the things that threaten whales most—oil drilled from offshore platforms that pollute their habitat, goods carried by cargo ships that collide with them, pinging sonar signals that disrupt their songs.

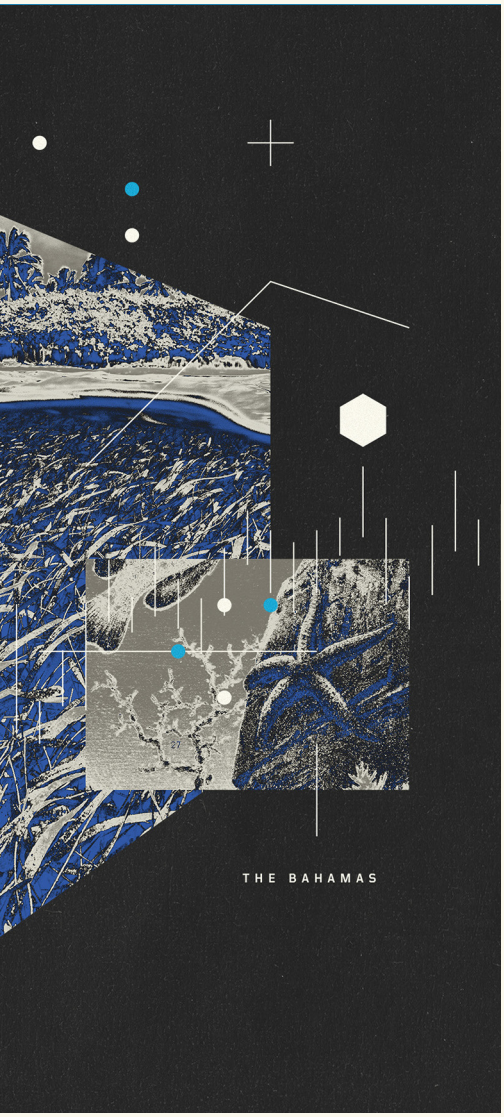
Chami had always loved the water. Growing up in Lebanon, he toyed with the idea of becoming an oceanographer before his father told him "in your dreams." As he heard the researchers' story, something awakened in him. He sensed that the same tools he had used to repair broken economies might help restore the oceans. Were they not a crisis zone too?

Chami's hosts sent him scientific papers, from which he learned about the whale's role in the carbon cycle. She stored as much as 33 tons of carbon in her prodigious body, he calculated, and fertilized the ocean with her iron-rich poop, providing fuel to trillions of carbon-dismantling phytoplankton. This piqued Chami's interest. In a world economy striving to be greener, the ability to offset greenhouse-gas emissions had a clearly defined value. It was measured in carbon credits, representing tons of carbon removed from the atmosphere. While the whale herself couldn't—shouldn't—be bought and sold, the premium generated by her ecological role could. She was less like an old painting, in other words, than an old-growth forest.

So what was the whale worth in carbon? It appeared no one had done the calculation. Chami loaded up his actuarial software and started crunching the numbers over and over, until



SOURCE IMAGERY COURTESY OF CRISTINA MITTERMEIER, GUIOMAR DUARTE (PORTRAIT), RALPH CHAMI (PORTRAIT), DREW MCDOUGALL, WILSON HAYNES, BENEATH THE WAVES, GETTY IMAGES, ALAMY



he could say with confidence that the whale would pay dividends with every breath she took and every calf she bore. He concluded that the whale's value to humanity, on the basis of the emissions she helped sequester over her 60-year lifetime, was $2 million. A starting bid.

For Chami, this number represented more than a burned-out economist's thought experiment. It would allow for a kind of capitalistic alchemy: By putting a price on the whale's services, he believed he could transform her from a liability—a charity case for a few guilt-ridden philanthropists—into an asset. The money the whale raised in carbon credits would go to conservationists or to the governments in whose waters she swam. They, in turn, could fund efforts that would ensure the whale and her kin kept right on sequestering CO_2. Any new threat to the whale's environment—a shipping lane, a deepwater rig—would be seen as a threat to her economic productivity. Even people who didn't really *care* about her would be forced to account for her well-being.

It was a "win-win-win," Chami believed: Carbon emitters would get help meeting their obligations to avert global collapse, conservationists would get much-needed funds, and the whale would swim blissfully on, protected by the invisible hand of the market.

What's more, Chami realized, every wild organism is touched by the carbon cycle and could therefore be protected with a price tag. A forest elephant, for example, fertilizes soil and clears underbrush, allowing trees to thrive. He calculated the value of those services at $1.75 million, far more than the elephant was worth as a captive tourist attraction or a poached pair of tusks. "Same thing for the rhinos, and same thing for the apes," Chami says. "What would it be if they could speak and say, 'Hey, pay me, man?'"

Chami's numbers never failed to elicit a reaction, good or bad. He was interviewed widely and asked to value plants and animals all over the world. He gave a TED Talk. Some people accused him of cheapening nature, debasing it by affixing a price tag. Cetacean experts pointed to vast gaps in their understanding of how, exactly, whales sequester carbon. But it seemed to Chami that by saying a blue whale must remain priceless, his detractors were ensuring that it would remain worthless.

In 2020, Chami was invited to participate in a task force about nature-based solutions to climate change whose participants included Carlos Duarte, a Spanish marine biologist at Saudi Arabia's King Abdullah University of Science and Technology. Duarte was widely known in conservation circles as the father of "blue carbon," a field of climate science that emphasizes the role of the oceans in cleaning up humanity's mess. In 2009, he had coauthored a United Nations report that publicized two key findings. First, the majority of anthropogenic carbon emissions are absorbed into the sea. Second, a tiny fraction of the ocean floor—the 0.5 percent that's home to most of the planet's mangrove forests, salt marshes, and seagrass meadows—stores more than half of the carbon found in ocean sediments.

After the task force, the two men got to talking. Duarte told Chami that scientists had recently mapped what he believed to be 40 percent of the world's seagrass, all in one place: the Bahamas. The plant was a sequestration powerhouse, Duarte explained. And around the world, it was under threat. Seagrasses are receding at an average of 1.5 percent per year, killed off by marine heat waves, pollution, development.

Chami was intrigued. Then he did a rough estimate for the worth of all the carbon sequestered by seagrass around the world, and he got more excited. It put every other number to shame. The value, he calculated, was $1 trillion.

"I NICKNAMED SEAGRASS THE UGLY DUCKLING OF CONSERVATION," DUARTE SAYS. IT CAN PUT AWAY CARBON AS MUCH AS 10 TIMES FASTER THAN A RAINFOREST.

SEAGRASS HAS a long history of being ignored. Though it grows in tufted carpets off the coast of every continent but Antarctica, it is a background character, rarely drawing human attention except when it clings to an anchor line or fouls up a propeller or mars the aesthetics of a resort beach. Divers don't visit a seagrass meadow to bask in its undulating blades of green. They come to see the more charismatic creatures that spend time there, like turtles and sharks. If the seagrass recedes in any particular cove or inlet from one decade to the next, few people would be expected to notice.

When Duarte began studying seagrasses in the 1980s, "not even the NGOs cared" about what was going on in the meadows, he recalls. But he had a unique perspective on unloved environments, having tramped around bogs and swamps since graduate school and gone on dives in the submerged meadows off Majorca. The more he studied the plants, the more he understood how valuable they could be in the fight against climate change.

Seagrasses are the only flowering plants on Earth that spend their entire lives underwater. They rely on ocean currents and animals to spread their seeds (which are, by the way, pretty tasty). Unlike seaweeds, seagrasses not only put down roots in the seabed but also grow horizontal rhizomes through it, lashing themselves together into vast living networks. One patch of Mediterranean seagrass is a contender to be the world's oldest organism, having cloned itself continuously for up to 200,000 years. Another growing off the coast of Western Australia is the world's largest plant.

Those massive networks of rhizomes, buried beneath a few inches of sediment, are the key to the seagrasses' survival. They're also how the plants are able to put away carbon so quickly—as much as 10 times as fast, Duarte eventually calculated, as a mature tropical rainforest. And yet, no one could be convinced to care. "I nicknamed seagrass the ugly duckling of conservation," he told me.

Then one day in 2020, Duarte connected with a marine biologist named Austin Gallagher, the head of an American NGO called Beneath the Waves. Gallagher was a shark guy, and the seagrass was largely a backdrop to his work. But his team of volunteers and scientists had spent years studying tiger sharks with satellite tags and GoPro cameras, and they had noticed something in the creatures' great solo arcs around the Bahamas: The sharks went wherever they could find sea turtles to eat, and wherever the sea turtles went, there were meadows of seagrass. From the glimpses the team was getting on camera, there was a lot of it.

Gallagher knew about Duarte's work on seagrass carbon through his wife, a fellow marine scientist. Together, the two men came up with a plan to map the Bahamian seagrass by fitting sharks with 360-degree cameras. Once they verified the extent of the meadows, Chami would help them value the carbon and organize a sale of credits with the Bahamian government. The project would be unique in the world. While some groups have sought carbon credits for replanting degraded seagrass meadows—a painstaking process that is expensive, uncertain, and generally limited in scale—this would be the first attempt to claim credits for conserving an existing ecosystem. The scale would dwarf all other ocean-based carbon efforts.

The government was eager to listen. The Bahamas, like other small island

nations, is under threat from sea-level rise and worsening natural disasters—problems largely caused by the historical carbon emissions of large industrialized nations. In 2019, Hurricane Dorian swept through the islands, causing more than $3 billion in damage and killing at least 74 people; more than 200 are still listed as missing. For the government, the idea of global carbon emitters redirecting some of their enormous wealth into the local economy was only logical. "We have been collecting the garbage out of the air," Prime Minister Philip Davis said to a summit audience last year, "but we have not been paid for it."

The government formalized its carbon credit market last spring, in legislation that envisions the Bahamas as an international trading hub for blue carbon. Carbon Management Limited, a partnership between Beneath the Waves and local financiers, will handle everything from the carbon science to monetization. (The partnership, which is co-owned by the Bahamian government, will collect 15 percent of revenue.) The plans at first intersected with the booming crypto scene in the Bahamas, involving talks to have the cryptocurrency exchange FTX set up a service for trading carbon credits. But after FTX collapsed and its CEO was extradited to face charges in the US, the organizers changed tack. They project that the Bahamian seagrass could generate credits for between 14 and 18 million metric tons of carbon each year, translating to between $500 million and more than $1 billion in revenue. Over 30 years, the meadows could bring in tens of billions of dollars. Far from being an ugly duckling, the seagrass would be a golden goose.

Duarte sees the project in the Bahamas as a blueprint (pun intended, he says) for a much grander idea that has animated his work for the past two decades: He wants to restore all aquatic habitats and creatures to their preindustrial bounty. He speaks in terms of "blue natural capital," imagining a future in which the value of nature is priced into how nations calculate their economic productivity.

This is different from past efforts to financialize nature, he emphasizes. Since the 19th century, conservationists have argued that protecting bison or lions or forests is a sound investment because extinct animals and razed trees can no longer provide trophies or timber. More recently, ecologists have tried to demonstrate that less popular habitats, such as wetlands, can serve humanity better as flood protectors or water purifiers than as sites for strip malls. But while these efforts may appeal to hunters or conservationists, they are far from recasting nature as a "global portfolio of assets," as a Cambridge economist described natural capital in a 2021 report commissioned by the UK government.

"ALL OF THESE POOR COUNTRIES TODAY ARE GOING TO FIND OUT THAT THEY'RE VERY, VERY RICH," CHAMI SAID.

Ralph Chami (above, left) met Carlos Duarte (above, right) in 2020 on a task force about nature-based solutions to climate change.

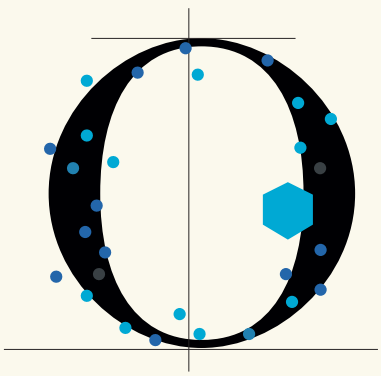
NO ONE IS GOING TO PAY TO PROTECT A CARBON SINK THAT WOULD DO FINE ON ITS OWN, THE THINKING GOES. A BILLION-DOLLAR OPPORTUNITY REQUIRES A COMMENSURATE THREAT.

Duarte and I first met in the halls of a crowded expo at the 2022 UN Climate Conference in Sharm el-Sheikh, Egypt. He had traveled a short distance from his home in Jeddah, where he oversees a wide array of projects, from restoring corals and advising on regenerative tourism projects along Saudi Arabia's Red Sea coast to a global effort to scale up seaweed farming (using, yes, revenue from carbon credits). In Egypt, Duarte was scheduled to appear on 22 panels, serving as the scientific face of the kingdom's plan for a so-called circular carbon economy, in which carbon is treated as a commodity to be managed more responsibly, often with the help of nature.

Chami was there too, wearing a trim suit and a pendant in the shape of a whale's tail around his neck. He was participating as a member of the Bahamian delegation, which included Prime Minister Davis and various conservationists from Beneath the Waves. They had arrived with a pitch for how to include biodiversity in global discussions about climate change. The seagrass was their template, one that could be replicated across the world, ideally with the Bahamas as a hub for natural markets.

The UN meeting was a good place to spread the gospel of seagrass. The theme of the conference was how to get wealthy polluters to pay for the damage they cause in poorer nations that experience disasters such as Hurricane Dorian. The hope was to eventually hammer out a UN agreement, but in the meantime, other approaches for moving money around were in the ether. Since the 2015 Paris Agreement, countries had been forced to start accounting for carbon emissions in their balance sheets. Big emitters were lining up deals with cash-poor, biodiversity-rich nations to make investments in nature that would potentially help the polluters hit their climate commitments. Chami's boss at the IMF had suggested that nations in debt could start to think about using their natural assets, valued in carbon, to pay it off. "All of these poor countries today are going to find out that they're very, very rich," Chami told me.

At a conference where the main message often seemed to be doom, the project in the Bahamas was a story of hope, Chami said. When he gave a talk about the seagrass, he spoke with the vigor of a tent revivalist. With the time humanity had left to fix the climate, he told the audience, "cute projects" weren't going to cut it anymore. A few million dollars for seagrass replanting here, a handful of carbon credits for protecting a stand of mangroves there—no, people needed to be thinking a thousand times bigger. Chami wanted to know what everyone gathered in Egypt was waiting for. "Why are we dillydallying?" he asked the crowd. "So much talk. So little action."



ONE DAY THIS past winter, a former real estate developer from Chattanooga, Tennessee, named David Harris piloted his personal jet over the Little Bahama Bank. From his cockpit window,

the water below looked like the palette of a melancholic painter. Harris was bound for a weed-cracked landing strip in West End, Grand Bahama, where he would board a fishing boat called the *Tigress*. Harris and his crew—which included his 10-year-old daughter—would spend the rest of the week surveying seagrass meadows for Beneath the Waves.

They were tackling a great expanse. While the total land area of the Bahamas is a mere 4,000 square miles, the islands are surrounded by shallow undersea platforms roughly 10 times that size. These banks are the work of corals, which build towering carbonate civilizations that pile atop one another like the empires of Rome. When the first seagrasses arrived here about 30 million years ago, they found a perfect landscape. The plants do best in the shallows, closest to the light.

Harris, who speaks with a warm twang and has the encouraging air of a youth baseball coach, had been traveling to the Bahamas for years in pursuit of dives, fish, and the occasional real estate deal. He met Gallagher on a fishing trip and soon began helping with his tiger shark advocacy. That work was an exciting mix of scientific research—including dives alongside the notoriously aggressive animals—and playing host to crews for Shark Week TV programs and their celebrity guests. Eventually, Harris sold his company, retired, and threw himself into volunteering full-time.

He had not expected to spend his days looking at seagrass. But here he was, leading a blue carbon expedition. With help from Duarte, Beneath the Waves had created its shark-enabled seagrass map. The group pulled in a Swedish firm to scan the region using lidar cameras affixed to a small plane, allowing them to peer through the water and, using machine learning, infer from the pixels how dense the meadows were.

Now Harris and his crew were validating the aerial data, a painstaking process that required filming dozens of hours of footage of the seafloor and taking hundreds of sediment cores. The footage was meant to verify the lidar-based predictions that separated the seagrasses from beds of empty sand and algae. The cores would be sent to a lab in a prep school outside Boston, Gallagher's alma mater, where they would be tested for their organic carbon content. When all the data was combined, it would reveal how much carbon the meadows contained.

The *Tigress* was set to autopilot along a straight line, hauling GoPro cameras off the starboard side. From this vantage, the scale of the task was easy to appreciate. At a lazy 5 knots, each line took about an hour. This patch of sea—one of 30 that Beneath the Waves planned to survey around the banks—would require about 20 lines to cover. Harris' daughter counted sea stars and sketched them in a journal to justify a few days off from school. Her father surveyed the banks in hopeful search of a shark. At the end of each line, the crew retrieved the cameras, dripping with strands of sargassum, and swapped out the memory cards.

Harris' crew would eventually present their protocol for assessing the carbon storage potential of seagrass to Verra, a nonprofit carbon registry. Verra develops standards to ensure there's

Beneath the Waves has taken hundreds of sediment cores in the Bahama Banks in its effort to map seagrass carbon.

CARBON CREDITS AROSE FROM A "FAILURE TO CONTROL GREED," DUARTE SAYS. BEYOND THAT, THEY ARE NOT DESIGNED FOR THE PROTECTION OF NATURE. RATHER, THEY USE IT AS A MEANS TO AN END.

real value there before the credits are sold. To meet the organization's requirements, Beneath the Waves must prove two things: first, that the seagrass is actually sequestering carbon at the rates it estimates; second, that the meadows would put away more carbon if they were protected. No one is going to pay to protect a carbon sink that would do fine on its own, the thinking goes. A billion-dollar opportunity requires a commensurate threat.

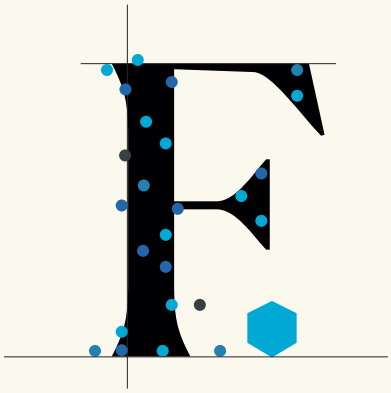
Harris told me that Beneath the Waves was still in "the exploratory phase" when it came to quantifying threats. They had various ideas—mining near shore, illegal trawl fishing, anchoring, water quality issues. As far as the carbon calculations went, though, Harris and his team felt confident in their approach. Prior to the outing on the *Tigress,* Beneath the Waves had already set up a for-profit company to bring its tools and methods to other blue carbon projects. It was in talks with government officials from across the Caribbean, Europe, and Africa. (Gallagher told me the company would pass the profits back to the nonprofit to continue its advocacy and research.)

Meanwhile, the head of Carbon Management, the scientific and financial partnership behind the project, told me he was pitching the investment to his clients, mostly "high-net-worth individuals" looking to diversify their portfolios while fighting climate change. Oil companies and commodities traders are interested too, he told me, as well as cruise lines and hotels that do business in the Bahamas. The Bahamian government has not yet said how it will allocate the money from the seagrass project. Hurricane recovery and preparedness could be on the list, as could seagrass conservation.

The *Tigress* crew worked until the

light began to fade, then headed back to port. Harris said he was happy to be doing his part out on the water. All that money would be a good thing for the Bahamas, he thought, especially as the country planned for a future of bigger storms. In the days after Hurricane Dorian, which hit Grand Bahama with 185-mph winds and heaved the shallow waters of the Banks over the land, Harris had flown to the island to help a friend who had survived by clinging to a tree along with his children. The storm's legacy is still apparent in ways small and large. At a restaurant near the *Tigress*' berth, there was no fresh bread—"not since Dorian," when the ovens were flooded, the waitress told me with a laugh. Then she stopped laughing. The recovery had been slow. The young people and tourists had not come back. The airport had not been repaired. She wondered where her tax dollars were going.

That night, over dinner in the ovenless restaurant, Harris showed me a photo of his vintage Chevy Blazer. He said he hoped the seagrass project would generate enough carbon credits to offset the old gas-guzzler. This was a joke, obviously, but it expressed a deeper wish. The promise of carbon credits is that, wielded in their most ideal form, they will quietly subtract the emissions humans keep adding to the atmospheric bill. Every stroke of a piston, every turn of a jet engine, every cattle ranch and petrochemical plant—every addiction that people can't give up, or won't, or haven't had a chance to yet—could be zeroed out.



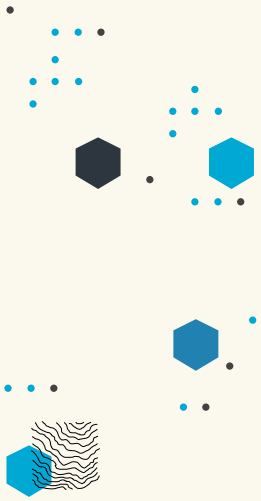
FOR GOVERNMENTS, assigning nature a concrete value could take many forms. They could encourage the development of sustainable ecotourism and aquaculture, where the value of the ecosystem is in the revenue it creates. Or they could confer legal rights on nature, effectively giving ecosystems the right to sue for damages—and incentivizing polluters to not damage them. But in Duarte's 30 years of advocating for creatures and plants like seagrasses, politics have gotten in the way of biodiversity protections. Only carbon trading has "made nature investable," he says, at a speed and scale that could make a difference.

That is not to say he loves the system. Carbon credits arose from a "failure to control greed," Duarte says. Beyond that, they are not designed for the protection of nature; rather, they use it as a means to an end. Any plant or creature that packs away carbon, like a tree or a seagrass meadow—and perhaps an elephant or a whale—is a tool for hitting climate goals. It's worth something. Any creature that doesn't, including those that Duarte loves, like coral reefs, is on its own.

Duarte also worries about "carbon cowboys" trying to make a buck through sequestration projects that have no real scientific basis or end up privatizing what should be public natural resources. Even projects that seem to adhere closely to the market's rules may fall apart with closer scrutiny. Earlier this year, a few weeks after the *Tigress* sailed, *The Guardian* published an analysis of Verra's methodologies that called into question 94 percent of the registry's rainforest projects. Reporters found that some developers had obtained "phantom credits" for forest protection that ended up pushing destruction one valley over, or used improper references to measure how much deforestation their projects avoided. (Verra disputes the findings.)

When it comes to carbon arithmetic, trees should be a relatively simple case: addition by burning fossil fuels, subtraction by photosynthesis. The forestry industry has honed tools that can measure the carbon stored in trunks and branches. And yet the math still broke, because people took advantage of imperfect methods.

Seagrass is also more complex than it might seem. After an initial wave of enthusiasm about its carbon-packing powers, increasing numbers of marine biologists expressed concerns when the discussion turned to carbon credits. For one thing, they argue, the fact that seagrass removes CO_2 through water, rather than air, makes the sequestration value of any particular meadow difficult to appraise. In South Florida, a biogeochemist named Bryce Van Dam measured the flow of CO_2 in the air above seagrass meadows. He found that in the afternoons, when photosynthesis should have been roaring and more CO_2 being sucked into the plants, the water was releasing CO_2 instead. This was the result, Van Dam suggested, of seagrass and other creatures that live in the meadows altering the chemistry of the water. (Duarte contends that Van Dam's premise was flawed.)

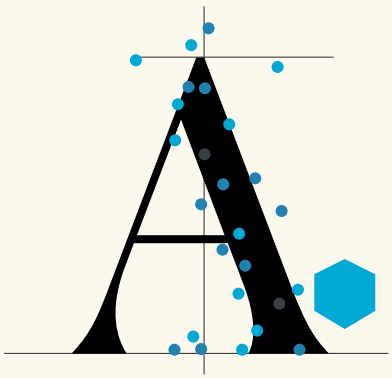


Another issue is that, unlike a rainforest, which stores most of its carbon in its trunks and canopies, a seagrass meadow earns most of its keep belowground. When Sophia Johannessen, a geochemical oceanographer at Fisheries and Oceans Canada, took a look at common assessments of carbon storage in seagrass, she concluded that many were based on samples that were far too shallow. Though this carbon was considered permanently locked away, the sediment could easily be disturbed by animals or currents. When Johannessen saw the ways that nonprofits and governments were picking up the science as though it were gospel, she was stunned. "I hadn't known about 'blue carbon,' so perhaps it's not surprising they didn't know about sediment geochemistry," she told me.

Chami's solution to these niggling scientific uncertainties is to focus instead on the global picture: Earth's seagrass meadows sit atop vast stores of carbon, and destruction has the potential to visit all of them. He likens natural capital to the mortgage market. When a prospective homeowner gets a loan from a bank, the bank then sells the loan, which is swapped and bundled with other loans. Each loan contains unique risks, but the bundled asset controls for that uncertainty. Financiers have no problem with uncertainty, Chami notes; it is the locus of profit. The money they invest gets poured back into the mortgage market, allowing banks to issue more loans. The characteristics of the individual homes and borrowers don't matter that much. "You can't scale up when every case is a unique case," he says. "You need to homogenize the product in order to make a market." Scale is the bulwark against destruction. One seagrass meadow can be ignored; a seagrass market, which encompasses many meadows and represents a major investment, cannot.

When each ecosystem is treated the same—based on how much carbon it has socked away—the issue of quantifying threats becomes simpler. Chami cites the example of Gabon, which last year announced the sale of 90 million carbon credits based on recent rainforest protections. Skeptics have pointed out that nobody has plans to fell the trees. The government has replied that if it can't find a buyer for the credits, that may change. In the Bahamas, Prime Minister Davis has invoked a similar idea. Seagrass protection, he has said, could be reframed as a payment to prevent oil companies from drilling in the banks for the next 30 years. Seen one way, these are not-so-veiled threats. Seen another, they reveal a fundamental unfairness in the carbon markets: Why can't those who are already good stewards of nature's carbon sinks get their credits, too?

The numerous seagrass scientists I spoke with expressed a common wish that Chami's simplified carbon math could be true. Seagrass desperately requires protection. But instead they kept coming back to the uncertainty. Van Dam compares the standard methods for assessing seagrass carbon to judging a business based only on its revenue. To understand the full picture, you also need a full accounting of the money flowing out. You need to trouble yourself with all of the details. This is why the rush to monetize the meadows—and offer justification for additional carbon emissions—worried him. "Now that there's money attached to it," he told me, "there's little incentive for people to say 'stop.'"



A FEW MONTHS after the *Tigress* outing, members of the Bahamian conservation community received invitations to a meeting in Nassau. The invitees included scientists from the local chapter of the Nature Conservancy and the Bahamas National Trust, a nonprofit that oversees the country's 32 national parks, as well as smaller groups. Gallagher kicked off the meeting with a review of what Beneath the Waves had achieved with its mapping effort. Then he came to the problem: He needed data about what might be killing Bahamian seagrass.

This problem wasn't trivial. The government's blue carbon legislation required that the project adhere to standards like Verra's, which meant figuring out how conservation efforts would increase the amount of carbon stored. Beneath the Waves was drawing a meticulous map of the seagrass and its carbon as they exist today, but the group didn't have a meticulous map from five years ago, or 30 years ago, that would show whether the meadows were growing or shrinking and whether humans were the cause.

Gallagher told me he is confident that the multibillion-dollar valuation of the seagrass reflects conservative assumptions. But the plan itself is in the hands

WHAT HAPPENS WHEN THE EQUATION DOESN'T BALANCE? MORE CARBON, MORE HEAT, MORE HURRICANE DORIANS. A GIFT TO POLLUTERS.

of the Bahamian government, he said. Officials have not spoken much about this part of the process, despite early excitement about eye-popping valuations and rapid timelines for generating revenue. (Government officials declined multiple interview requests, referring WIRED back to Beneath the Waves, and did not respond to additional questions.)

Some of the local conservation groups had received the meeting invitation with surprise. Among many Bahamians I spoke with, frustration had been simmering since Beneath the Waves first proclaimed its seagrass "discovery," which it described as a "lost ecosystem that was hiding in plain sight." Many locals found this language laughable, if not insulting. Fishers knew the seagrass intimately. Conservationists had mapped swaths of it and drawn up protection plans. "You've had a lot of white, foreign researchers come in and say this is good for the Bahamas without having a dialog," Marjahn Finlayson, a Bahamian climate scientist, told me. (Gallagher said that as a well-resourced group that had brought the seagrass findings to the government, it only made sense that they would be chosen to do the work.)

It was not clear that any of the groups could offer what Beneath the Waves needed. For one thing, most locals believe the seagrass to be in relatively good condition. There are threats, surely, and interventions to be done, but as Nick Higgs, a Bahamian marine biologist, told me, they likely vary with the immense diversity of the country's 3,100 islands, rocks, and cays. Higgs gave the example of lobster fisheries—an industry that many people mentioned to me as among the more potentially significant threats to seagrass. His own research found little impact in the areas he studied. But if the fisheries are harming seagrass elsewhere, who will decide their fate from one community to the next? Protecting seagrass is a noble goal, Adelle Thomas, a climate scientist at the University of the Bahamas, told me. The question for Bahamians, she said, is "Do we have the capacity to maintain these things that we're claiming to protect?" Money alone won't solve the seagrass's problems, whatever they might turn out to be.

The creature at the heart of this debate appears to be in a sort of limbo. The prospect of a price has showered attention on seagrass, putting it in the mouths of prime ministers and sparking an overdue discussion about its well-being. Perhaps, if you ask Chami, it has helped people value the plant in other ways too—for how it breaks the force of storms hitting the islands, for the habitat it provides other animals, maybe even for its intrinsic right to go on growing for another 30 million years.

But can the math of the carbon market get it there? On one side of the equation, where carbon is added to the atmosphere, the numbers couldn't be clearer: They're tabulated in barrels and odometers and frequent flier accounts. On the other side, where carbon is subtracted, there is uncertainty. Uncertainty about how carbon moves through a seagrass meadow, or a whale, or an elephant, and how money moves to protect those species. What happens when the equation doesn't balance? More carbon, more heat, more Hurricane Dorians. A gift to polluters. As Finlayson put it, "You're taking something from us, throwing a couple dollars at it, and then you're still putting us at risk."

Chami has faith that the math will balance out in the end. He wants people to care about nature intrinsically, of course. But caring needs a catalyst. And for now, that catalyst is our addiction to carbon. "I'm conning, I'm bribing, I'm seducing the current generation to leave nature alone," he told me. Perhaps then, he said, the next generation will grow up to value nature for itself.

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OFFICE

by **LAUREN GOODE**

Photographs by TONJE THILESEN

THE WITCHY AMBITION OF SIMA SISTANI

WeightWatchers' CEO was tasked with helping her company catch up in the digital age.

Now she's scrambling to keep it relevant in the Ozempic age.

SCHAUB'S BURGERS AND melted ice cream: Those are the food items logged in my memory from the night I first met Sima Sistani. This was a decade ago, before she became the chief executive of WeightWatchers. Sistani was working at Yahoo, and I had just moved to Silicon Valley. A mutual friend connected us, and Sistani invited me over for dinner. I accepted with "What can I bring?" ¶ This is how I ended up buying charcoal-colored beef patties at her preferred butcher. That night we talked about Yahoo's content business. We talked about Sheryl Sandberg's *Lean In*. We talked for so long the ice cream became soup in our bowls. It was some kind of indoctrination into the Valley. It was also evident that Sistani wanted to *be* someone. Her sharp observations about the tech industry continued long into the night. What wasn't obvious—because why would it be, and

whose business was it anyway—was that Sistani was logging her food in the WeightWatchers app. She and her husband had recently had their first baby, Adrian, and she was attempting to lose the weight she'd gained during pregnancy.

Sistani's career has been a winding one. After jobs at Goldman Sachs, Creative Artists Agency, and a short-lived tech startup, she became the head of media for Yahoo-owned Tumblr. Then the VP of media for Meerkat, a buzzy livestreaming video startup. She and a Meerkat founder decided to stealthily launch a second live-video app called Houseparty. In 2019, Epic Games acquired that venture for a reported $35 million.

Sistani didn't need to work again, but in 2020 she contacted WeightWatchers and expressed interest in advising the company on its digital strategy—planting a seed that would eventually result in the chief executive role. Something about WeightWatchers' emphasis on community was appealing. It was, in fact, this sense of community that had set the company apart in its earliest days. It started in 1962 in Jean Nidetch's living room, and by 1968 it had a million members across the world.

In 2018, WeightWatchers attempted a rebrand, changing its name to "WW" and focusing on general well-being instead of dieting. The company tried to capitalize on the *wellness* movement that people were gravitating toward as a kind of salve for society's ills. (And we hadn't even lived through a pandemic yet!) It didn't go well.

When Sistani took the helm in March 2022, WeightWatchers was on the path to recording a loss of over $250 million that year. The pandemic had nearly killed its in-person retail business, but its digital business, which charges for access to science-backed nutrition plans and a "members only" social network, was also in decline. Sistani was brought in to chart a digital path through a post-pandemic world, to give the service more social juice both online and offline.

Of course, the company's renewed mission is now colliding head-on with the body positivity movement, which encourages acceptance instead of weight change, and competing with digital apps (like Noom and MyFitnessPal) and drugs (like Ozempic) that promise to make dropping pounds oh so easy. It's weight-loss whiplash. What a time to be the new CEO of WeightWatchers, a service that, despite its millions of still satisfied subscribers, has hoards of critics calling its points-based system the epitome of unhealthy diet culture.

So in April I asked to spend some time with Sistani and met her at Shiraz Kitchen and Wine Bar, a Persian restaurant in Manhattan's Chelsea neighborhood. The next day, I made my way to the high-ceilinged WeightWatchers offices on Sixth Avenue. I sat with Sistani in her private office and in various meetings—including one where staffers talked about new weight loss medications, at length.

TUESDAY, APRIL 18: SHIRAZ RESTAURANT

A server delivers a platter of desserts and three mugs of tea, and says, "This is baklava. This is a Persian love cake. That's a chocolate mousse. That's saffron ice cream."

LAUREN GOODE: Oh wow.

SIMA SISTANI: Thank you very much.

How many points is this?

Oh, I can do this in my head. Right off the top I would say … each one of these is going to be 5 points. My guess here [gestures to the baklava] is the nuts are going to drive this one higher. I bet this [points to ice cream] is like 8 points.

And then the chocolate mousse is anyone's guess.

Yeah, well, "Everything's on the menu." You really have to try this saffron ice cream. It's a Persian delicacy.

You're a first-generation American, right?

Yes. I was born in Texas. I grew up in Alabama, but my parents were immigrants from Iran. They didn't expect to stay here. My dad was getting his master's degree in soil science, and then Iran imploded. When my mom got pregnant with me, the war and the Iran hostage crisis were happening, and my mom said, "You know what, we're not going back."

I'm taking us on a tangent, but the year I graduated from Duke, my mom got her PhD in food science. She's also a registered dietician. The year I got the job at WeightWatchers, my mom became chair of her department of consumer sciences. It ends up coming full circle.

Your prior job was at Epic, after the company acquired Houseparty. From social video games to weight management—what's the connection there?

You know, when I moved to North Carolina because I was taking the job at Epic, I thought, "I'm leaving my career behind." Because my career *was* Silicon Valley, and I was moving out here.

But when WeightWatchers came up, it was a moment to say, "Oh, I can just take all those learnings from my past, and I can apply them to a totally different business and industry. The things I'm passionate about, like growth tech and the social internet, I can apply to networks that will actually have massive health outcomes." That was eye-opening for me.

And you decided to split time between North Carolina and New York City. Did you take time off between jobs?

We did have one week. My first day at WeightWatchers was, because I'm a little witchy, the Persian New Year. March 21 is the vernal equinox. [She rolls up her sleeve.] This is 14 in Farsi, in my mother's handwriting. My father has this tattoo and my brother does too. Fourteen is the date of my son Adrian's birthday, my daughter Ariana's birthday, my brother's birthday, my parents' anniversary. When we moved to North Carolina, it was on June 14 of 2021. I accepted this job on February 14 of 2022 … I'm not planning this stuff.

Witchy? What do you mean by that?
Oh, it just means that I believe in a higher power. I believe in doing good and in karma, the golden rule. I didn't grow up with religion. Technically I'm Muslim, but my parents never ascribed to organized religion. But growing up in the South in a very Christian community, where kids would go to summer camps, I did wish for religion. Sometimes I feel sad that I'm not taking my kids to those places, because there's really great community there. Where I've netted out in my life is, it's a mountain. And different people have different paths up the mountain. I describe it as "witchy" because "agnostic" suggests you don't care.

Your community is largely women, right? And you, as CEO, have a sphere of influence. What's your position on women's health where you live, in North Carolina, or where you work, in New York?
And our employees are 75 percent women. So we were very clear [when *Roe v. Wade* was overturned] that we would help our employees have access to reproductive rights, no matter where they are. Last year we also did a lot of work on food insecurity.

So what is on your docket now?
Well the onus is on us again, because now we're having this conversation about these GLP-1 [diabetes] medications. Most people who are taking them are either paying cash or they're working for a company like ours and have insurance coverage. Which means that the communities that need it most do not have access. So that's a place we can try to move policy so that Black and brown communities that need it more than most of the rest of the population have access.

WEDNESDAY, APRIL 19: WEIGHTWATCHERS HEADQUARTERS

In your marketing meeting just now, your team really leaned on the story of Jean Nidetch for the 60th anniversary campaign. Tell me about Jean.

That was one of the craziest things I discovered when I joined. WeightWatchers is a company founded by this woman, Jean Nidetch, and—especially when the world went through its girl-boss moment—nobody talks about her. When she first started this company, she couldn't even sign the lease. Her husband had to sign it for her. And then she got divorced and started dating Fred Astaire. Her story is wild.

You're tied to this legacy brand, but you've been brought in to propel a digital transformation and to bring in new customers. Let's say I'm a proxy for that new person. I don't understand the slogans and phrases. How do you transform WeightWatchers?

"WW" IS FINE, BUT WE'RE GOING TO RE-EMBRACE THE WEIGHTWATCHERS OF IT ALL.

You know, the whole move to calling the company WW in 2018 was a glossy way of trying to be like, "We're wellness, we're wellness." But I decided, "No, let's have the hard conversation." What we're trying to say is that living overweight and with obesity is a health detractor. If we want to be the best at helping people manage their weight, the conversation is about weight and health. That's why you come to us. Not for meditation or sleep advice or fitness. "WW" is fine, but we're going to re-embrace the WeightWatchers of it all.

What does that mean?
It means we are having the hard conversation about what that means in a world of body acceptance. What does that mean in a world where there's so much stigma and bias against people who live overweight? Let's try to reduce the shame around that conversation. I can't tell you how many times I've listened to a podcast where people say, "Well, it's a bunch of white men trying to get us to shrink ourselves for the male gaze." And

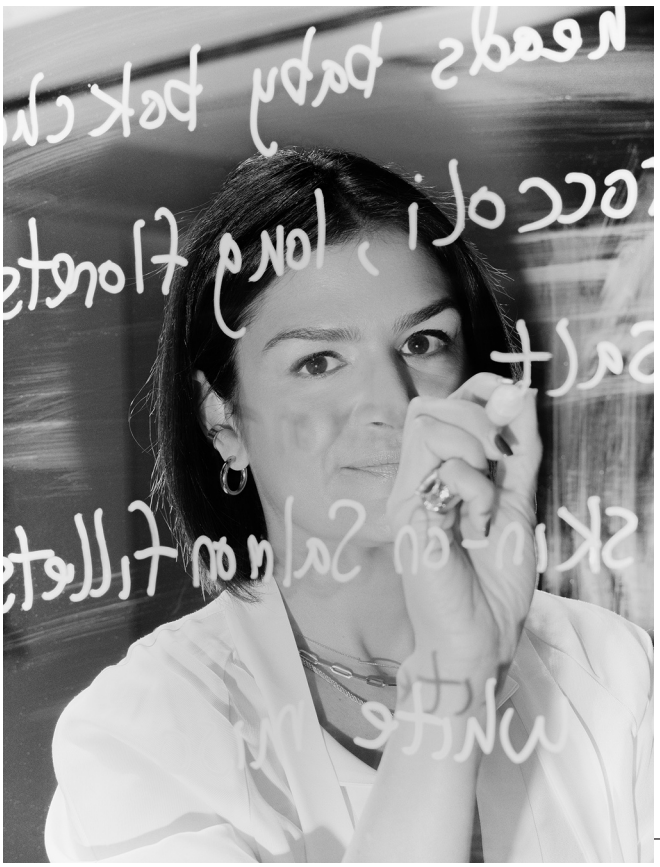
OPENING SPREAD: GETTY IMAGES

I'm like, "Excuse me: woman of color here running this company. No." That's not why I would ever come here. There's a lot of misinformation about who we are, why we exist in the world. And, yes, some of that is rooted in a part of our past.

Do you think it's possible today to have a conversation about weight in general where it's positive?
That's what we're trying to get at.

But it's extremely hard, right?
It's incredibly hard. I think that the narrative has shifted to the idea that if you are talking about the desire to lose weight, that is somehow at odds with body positivity and body acceptance. And it all lives within this conversation around the patriarchy. That's an important conversation. But we've jumped the shark a bit in saying, "Well, that means we need to also be OK with sick bodies." For me the positive part of the conversation is, "We all come in different shapes and sizes and everything, but we also need weight health."

That's the pivot we're trying to make. Even right now, the clinical conversation has become, "Well, people are going and getting these medications and taking them away from people with diabetes." There's bias in that statement right there. You're saying that somebody who's living with obesity is less important than somebody living with diabetes, and you are also saying that that is not a chronic condition that deserves care.



WEIGHTWATCHERS CEO SIMA SISTANI AT THE COMPANY HEADQUARTERS IN NEW YORK CITY.

In the conversation about who should get Ozempic or the like, there's still an assumption that being overweight equals unhealthy. For some people, being a larger body—who actually makes the judgment that that is unhealthy?
Scientists. There's a body of science that says that if you are living overweight and/or with obesity, even if you are healthy at this moment, you are more likely to develop cancer or heart disease, high cholesterol, diabetes. To me, this is like the anti-vaxxer conversation. And there is—

In what way?
Meaning, there are people who are going to look at a certain set of data and they're going to see it one way, and some people who are going to not accept that data and believe that it comes from a biased source. The data is there, and the data says that if you're living with overweight and obesity that this is a chronic condition.

There are some data sets that are problematic, though, and there have been studies around certain health measurements where their methodology is not correct either. Take BMI as an indicator of health and weight.
Which is true. BMI, I totally agree, is in some respects a problematic metric. But over time the science—the community of medical doctors and scientists who have used it—has come to say, "Well, it is still the best metric that we have." There are also all of these beyond-the-scale metrics that people take into account. I think that's important until we come up with a better measurement than BMI.

It seems like that sets people up against impossible metrics.
But the hard part is that we're all knocking heads with each other. Whether you say "I would like to lose weight because my joints hurt" or "I would like to lose weight because I have a history of heart disease in my family" or, in my case, "I would like to lose weight because I gained 60 pounds when I had my baby and I don't feel good in my body"—who are we to judge?

The social internet has elevated these conversations to such heated, polarized levels. If somebody chooses that they want to lose weight because they want to live a healthier life, the fact is there's now this backlash. I mean, you obviously see it with celebrities and influencers who post about this, but I think you also see it in smaller groups. When I was trying to lose weight, I felt a lot of shame saying, "I'll get the salad at lunch," because it was like, "Oh, what, you're not eating?" Immediately there was this feeling, "Do you have disordered

eating?" I was like, "No, I'm just trying to be healthy right now." I wanted to get back into my clothes. I want to be able to walk without losing my breath. And I couldn't lose the weight.

And you did WeightWatchers then, right?
I did. I also had developed a thyroid condition through the pregnancy, so for me, Synthroid was part of my therapy, to get back to a place where I felt healthy again. But I feel like that is what connects me to this member community, because it's a really emotional experience. I've never worked on a product before where emotion was so at the center of it.

You've just overseen the multimillion-dollar acquisition of Sequence, a telehealth company. How will this work?
We're still figuring out the integration. But in general what they're doing is providing access to a clinician who can say whether or not it's medically appropriate to be on medications. And then if it is, you are creating an easier adherence to our traditional WeightWatchers program.

These medications and the clinical trials that are showing 15 to 20 percent weight loss after a year, those clinical trials involve combination therapy. The people are taking the medications and being advised by a nutritional and lifestyle expert to actually have a better diet alongside it. I mean, I can't tell you the misinformation behind all of this. "I want to take these drugs so I can eat all the pizza and ice cream that I want." That's not how it works.

So the synergy … God, I hate that word—come on, somebody come up with something better. OK, we can *combine* to create an experience that I think doesn't exist. Now when somebody goes to a GP to get medications, their doctor doesn't really understand obesity therapies. My brother is a doctor, and throughout his whole education he had one class on nutrition. One class!

When I've heard you talk about Ozempic before, it feels like an inevitability—that the horse is out of the barn. And you want to be a part of that rather than being left behind.
There's a massive paradigm shift, a huge innovation in science. And of course we would embrace it. But to me it's not about being left behind. That's not the way I think in general.

When I joined WeightWatchers, I actually didn't know about these medications. And then at the scientific advisory board meeting, my first month here, they did a readout on all the clinical trials that were happening with these medications. The FDA had approved Wegovy. We dug into it. We even met with Novo Nordisk. And I thought, "How can we embrace it? How can we take it and help our members?"

A friend said the other day, "Why would I ever use WeightWatchers if we're all getting shots someday that are going to suppress our appetites?"

That probably comes from somebody who's privileged and understands healthy eating. For a lot of people, they're still going to need education. We're now able to address the hungry gut through the medications, but still the part that is missing is the hungry brain. It's about understanding foods with high nutrient density, ways for me to ensure that I'm protecting my lean muscle mass. Those are all going to be important long-term.

Can you explain the hungry gut and the hungry brain?
Behavior-change therapy addresses cognitive patterns—the hungry brain—but there is only so much that you can adhere to with behavioral modification if your biological factors are working against you—the hungry gut. The dual-action support with medications and behavioral interventions allows members with this chronic condition to make behavioral changes more easily as each—brain and gut—is provided with the necessary support.

You're already seeing that, by the way. If you go on TikTok, you'll find a lot of people who are on the medications who are doing it alongside WeightWatchers.

Going back to the question you started with, which was like, "Did you feel you would be left behind?" To me, it's even interesting that you're asking that question here. Because the difference is, we would never judge, for instance, a more traditional tech company for introducing new features or adopting AI or trying to do the new thing.

Oh, we do judge them a lot though.
You think?

Well, it depends. But yes.
But also, we have this expectation and desire for those companies, the establishment, if you will, to disrupt themselves and understand when, in the past, they were wrong or when they could be doing better. I think about something like Instagram; clearly right now there's an impact on mental health.

And so the question is, "What can we do better?" I think here, this is an opportunity for us to say, "Oh wow, we didn't recognize the hungry gut for most of our existence. But the science has evolved now, we know more, we've learned more, we're going to do better for those members." That's how I see it.

LAUREN GOODE *(@LaurenGoode) is a senior writer at* WIRED. *Her last interview for the magazine was with Max Levchin, CEO of Affirm, a buy now, pay later company.*

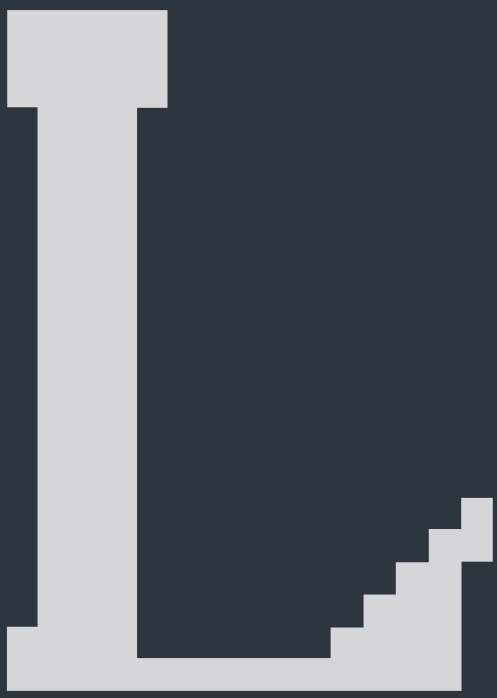
Photograph by
DeSean McClinton-Holland

When Elon Musk's reign of toxic chaos began, Christopher Bouzy didn't just go looking for a rival place to post. He joined the crowded race to create one. (It got difficult.)

by Brendan I. Koerner

"BUILDING A PLATFORM LIKE TWITTER IS NOT

DIFFICULT"



Looking back, I believe I can pinpoint the exact day I loved Twitter most: May 24, 2011. I was in a small Oregon town for work, coping with loneliness and stress in a shabby motel. With a 22-ounce bottle of high-proof beer, I whiled away the evening by churning out a random assortment of tweets: an article I'd read about the hunt for wild garlic in Quebec; images of an apocalyptic Los Angeles mural; my reasons for adoring the 1985 B movie *American Ninja*. In a reflective moment, I also managed to craft an earnest observation about my job: "The more social media makes journalism an Everyman's game," I mused, "the more I'm inspired to dig deep for non-digitized sources."

To my surprise, that tweet earned what seemed at the time like an avalanche of approval—a whopping six retweets, plus an admiring reply from a minor internet celebrity. This validation sent me over the moon: The account I'd always thought of as mere public scratch paper actually had an audience that considered my ramblings worthwhile.

I kept chasing that same high over the next decade-plus, but it mostly proved elusive, even when my retweet counts occasionally soared into the thousands. As the platform ballooned, I became self-conscious about drafting tweets. I worried that any slight misstep in phrasing or context might reveal to the masses that I am, in fact, an idiot. I regularly found myself sucked into trivial controversies over some pundit's stupid take; once the thrill of scrolling through the resulting dunks faded, I'd feel dirty for having once again been turned into a cog in the Global Outrage Machine.

There was, of course, nothing unique about the arc of my relationship with Twitter. Almost everyone who became a hardcore user went through a honeymoon phase before posting gradually devolved into a chore with diminishing psychic rewards and an increasing quotient of scathing abuse. My Twitter compatriots posted bewilderment over their inability to leave "this hell site"; our joy at being heard had morphed into a fear of being ignored.

The end for me came last June. I decided to take a break from Twitter until Labor Day, but early September came and went and I never returned to posting. I still used the platform as a search engine, a way to find on-the-ground coverage of breaking news and grainy highlights from paywalled soccer games, but even those visits became rarer over time.

I never thought of rebooting my social media presence elsewhere until Elon Musk completed his $44 billion takeover of Twitter last fall. As the new regime axed hundreds of engineers and moderators, the platform rapidly frayed. Service hiccups became routine, the algorithmic feed degenerated into a soup of useless tweets, and Musk kept trolling through it all. As Twitter became an ever more miserable place,

I watched as the users in my timeline began to strike out for new territory.

It started in October with a wave of defections to Mastodon, an open source, ad-free, decentralized community that was hosted on an archipelago of independent servers. For the briefest of moments, everyone seemed to agree that this brainy successor was destined to save social media. But the enthusiasm quickly waned as people struggled to navigate the platform's sprawling "Fediverse," and the Twitter exodus flowed elsewhere. Media obsessives gravitated toward Post, a news-heavy platform founded by Noam Bardin, the former CEO of Waze. "Mastodon is complicated and unsatisfying," tweeted Kelda Roys, a Democratic state senator in Wisconsin. "Post could be a winner if there were a critical mass there." Legions of gamers, meanwhile, flocked to Hive Social, an Instagram-influenced app run by a trio of recent college graduates. For all their differences, these platforms were unanimous in voicing one aspiration: to recapture the spirit of "early Twitter."

Though I usually try to resist nostalgia, I couldn't help hoping that one of these novel platforms might rekindle the elation I'd felt in that Oregon motel. But all of my trial runs followed the same dispiriting trajectory. After an initial wave of excitement, I'd lose interest within a matter of days. Mastodon's labyrinthine structure was a pain, Post's commentariat was bland, and Hive's app kept crashing. In the race to supplant Twitter, there was no clear winner in sight. And because the Bird App's awfulness kept hitting new lows, it seemed the cycle of restless searching was bound to drag on.

While poking around in search of more Twitter rivals to try, I discovered that a programmer named Christopher Bouzy also had one in the works. Bouzy is the 48-year-old CEO of Bot Sentinel, an automated service that ascertains whether Twitter accounts are part of coordinated harassment or disinformation campaigns. He was frequently quoted in the media on the subject of online misbehavior; most recently, he'd appeared as an expert in Netflix's documentary series on Prince Harry and Meghan Markle. More than that, Bouzy was a fiendishly entertaining tweeter: a relentlessly online figure who'd attracted more than 380,000 followers with election forecasts and acerbic posts on misinformation and right-wing extremism. To his devotees, many of whom are active in the realms of Black Twitter and Progressive Twitter, he was something of a mirror-world Elon Musk—another tech obsessive beloved for dishing out verbal jabs in defense of his principles.

Yet quite unlike Musk, who has reveled in letting Twitter go largely unmoderated, Bouzy said his goal was to run a platform that would proudly identify as a safe space. He planned to weave Bot Sentinel's technology right into its infrastructure so that each account could be assigned a score based on its 400 most recent posts—the higher the score, the more likely a person is to be a bad-faith actor. Users could then filter out interactions from everyone whose score registered above a certain threshold or just block accounts flagged as suspicious on a case-by-case basis. Bouzy also aimed to create a responsive moderation system that would aggressively stamp out accounts that spewed hateful rhetoric or lies. "You will never have to beg us to enforce our rules and policies," he promised, "nor will you have to wait days for us to take action." Thanks to these safeguards, Bouzy asserted, his platform would be free from the poisonous influence of the internet's vilest characters—the Nazis, misogynists, and nihilists who delight in filling reply sections with bile.

A Twitter alternative designed to let good vibes reign supreme sounded appealing. But beyond that architectural conceit, Bouzy seemed to have something else going for him: a true affinity for the culture of social media. Bardin, the founder of Post, might have more investment money; Mastodon's Eugen Rochko might have more utopian engineering cred; but Bouzy lived and breathed Twitter, and I wondered how the instincts he'd honed there might serve him as a founder. (At the very least, his sizable fan base was avid enough to guarantee his project an initial audience.) And then there was the pure chutzpah of it all: Most of the other rival services had been in the works for some time, but Bouzy's would be purpose-built for Twitter's ongoing implosion. Nothing seemed to channel the sense of grief and possibility in this social media moment better than the prospect of watching a platform get built from the ground up. And so I contacted Bouzy in late November to ask whether I could chronicle his efforts to construct his idyllic spin on Twitter.

I had a feeling, at the last minute, that he was going to decline my request. The day I wrote, I learned from Bouzy's Twitter feed that he'd just had an unsettling experience: An anonymous tipster had emailed the police in North Bergen, New Jersey, where Bouzy lives, and reported that a child was screaming in the townhouse Bouzy shares with his wife and son. The two officers who were sent to investigate concluded that Bouzy had been the victim of a false report. Bouzy tweeted that the tipster must have been one of the legions of people enraged by his efforts to counter online toxicity. (A spokesperson for the North Bergen Police Department told me they're still trying to trace the source of the email.) Had a stranger tricked the cops into descending on my house in such a manner, I might have been tempted to lie low and avoid attention. But Bouzy assured me that he wasn't much bothered by the strange incident and that he was happy to let me watch him build the next Twitter from scratch.

As soon as it became clear that Musk's erratic deal to acquire Twitter was actually going to succeed, Bouzy says he had little doubt the billionaire would wreck the platform in short order. But Bouzy didn't initially have any interest in launching a competitor. He instead spent weeks urging an old friend named Phil Schnyder, a veteran software executive based in Florida, to build a rival. Millions of users, he predicted, would become disgruntled by Musk's antics and peel away from the platform. "They're going to feel like this is a mini Trump in control," Bouzy recalls telling Schnyder. "You may want to consider doing a Twitter clone—you know, capture the essence of Twitter and kind of keep it similar."

But with his wife's encouragement, Bouzy decided in early November that his experience with Bot Sentinel made him the ideal person to tackle the project he'd been pushing on Schnyder. On November 16, he tweeted to his followers: "Would you switch if we built a platform similar to Twitter but improved the best features while fixing everything wrong with Twitter?" In the poll attached to that post, nearly 60,000 respondents indicated they'd be open to the move. Pleased by the volume of support, Bouzy vowed to follow through with his proposal if 100,000 people joined a preregistration mailing list. (Schnyder, whom Bouzy hadn't informed of his change of heart, agreed to become the COO of the startup if it came to fruition.)

As the sign-ups zoomed toward his goal over the next few weeks, Bouzy used Twitter to crowdsource the platform's details, starting with its name. After early candidates such as "UrTag" and "Yixle" were rejected by his followers, Bouzy took a shine to "Spout"—a nod to the old Twitter error graphic that depicted a whale being carried off by a flock of birds. But Bouzy says that when the owner of Spout.com demanded $1.5 million for the domain, he opted for "Spoutible" instead.

When I had my first extended conversation with Bouzy in early December, Spoutible was just days away from crossing the preregistration threshold. In anticipation of hitting that milestone, he was preparing to announce that he'd have a web-only version of the platform ready for limited testing by mid-January. If all went according to plan, he'd then release a Spoutible app for phones and tablets in the spring. When I said that timeline seemed ambitious, he assured me that the work on the frontend would take only a few weeks. He'd licensed some off-the-shelf code, composed primarily in PHP, that provides a close facsimile of Twitter's user interface, and he planned to tweak that template to suit his needs.

"Building a platform like Twitter is not difficult," he assured me. "All it is is a fancy message board—you're just taking people's posts and storing them in a database." The real trick, he continued, would be to design the platform's backend so that it could seamlessly handle the demands of explosive growth.

That backend engineering would have to be done on the cheap. In contrast to Twitter alternatives like Post, which has received funding from the venture capital firm Andreessen Horowitz, Spoutible chose not to seek outside investment during its development phase. "We want to have something that people can see before we're saying, 'Give me your money,'" Schnyder said. The company's microscopic initial budget came from his and Bouzy's personal savings, as well as from Bot Sentinel, which subsists on small donations from users.

With money so tight, Bouzy chose to power Spoutible with virtual servers—that is, cordoned-off sectors within shared, cloud-based machines, as opposed to the expensive physical servers that were standard when Twitter launched in 2006. As Spoutible's users multiplied, Bouzy was confident he could purchase access to scores more virtual servers from Ionos, the hosting company he uses for Bot Sentinel. If and when Spoutible ever got to tens of millions of concurrent users, Bouzy knew he might have to consider investing in physical servers if the virtual ones didn't work as expected. But he was confident that Ionos could sustain his platform until it reached blockbuster status.

Bouzy also pinched pennies when it came to staff. He handled a great deal of the frontend coding chores himself, rising at 3:30 every morning through December and early January to make sure the work got done. But for the many development tasks outside his wheelhouse, he leaned heavily on a network of low-cost international freelancers he recruited from sites like Upwork.

I was impressed by the sheer nerve of what Bouzy was trying to pull off, and I wanted to get to know the programmers who'd signed on to help him knock Twitter from its perch. But Bouzy seemed reluctant to let me do that. He dragged his feet when I asked to speak to the contractors, a bit of obstructionism that struck me as odd. He eventually relented and agreed to connect me with a full-stack developer based in Calgary, Alberta, and a machine-learning specialist from Egypt. But he only did so on the condition that I refrain from printing their surnames. He said he didn't want his freelancers to suffer any backlash for being associated with him.

After talking to Ismail and Mahmoud, neither of whom said anything remotely of note, I became mystified by Bouzy's insistence on secrecy. I understood from his November encounter with the police that there were people who might wish him ill. But I still couldn't fathom that anyone would hold him in enough contempt to track down and harass an Egyptian contractor he'd hired to write a content-filtering algorithm.

As I learned more about Bouzy's professional journey, however, I began to understand that his caution might be warranted.

Bouzy describes himself as a poor communicator, but he tells a compelling and relatable story about the origins of his love for code. He was brought up in Brooklyn's Brownsville neighborhood by his mother, grandmother, and aunt. His mother, a Black Panamanian immigrant, worked for the New York Telephone Company. When he was 9, his mom gave him a Mattel Aquarius computer, a $70 machine with a mere 4 kilobytes of RAM; she hoped the gift would keep him indoors and out of trouble.

Bouzy had no interest in the computer until he read a newspaper article that included instructions for writing an elementary program in Basic. After hunting and pecking on the keyboard for hours, he managed to complete the assignment by getting a digital ball to bounce. That achievement made him curious to see what else the Aquarius could do, and his bedroom soon teemed with how-to programming guides from the local library.

As a teen, Bouzy became enamored with writing encryption algorithms, an obsession he credits to a rewatch of the 1983 film *WarGames*. After graduating from high school in 1992, he eventually joined the IT department at the New York City Department of Education, supplementing his modest income with contract coding jobs. By 2000, he'd saved up enough money to launch a one-man software company, Insight Concepts.

Bouzy gradually carved out a career as a software entrepreneur. His first hit was Cloak, a program that hides encrypted text within images in order to dupe potential data thieves. In 2006, he sold Cloak to the software publisher Avanquest, which specializes in workaday fare such as greeting-card customizers and clip-art collections. (It was through Avanquest that Bouzy met Phil Schnyder, who was then the company's director of online business development.) Bouzy next developed Nexus Radio, an app that lets users take advantage of what he terms a "legal gray area" by recording songs streamed by internet radio stations. The application spent years on CNET's chart of most popular audio players, racking up nearly half a million downloads by 2014.

Bouzy admits he produced some flops, too, such as a dating website called IfSolo and a "peer-to-peer rewards network" known as Bytecent. But he denies making any notable mistakes during his foray into the world of cryptocurrency, where he was briefly active in the mid-2010s. Under the handle "IconicExpert," Bouzy was a prominent contributor to Bitcointalk, a forum popular among crypto traders. He became one of the site's more divisive figures, with several users accusing him of using bots and sock-puppet accounts to pump up the value of coins he'd stockpiled. A number of these supposed incidents involved a digital currency known as BlackCoin. According to Joshua J. Bouw, one of BlackCoin's cofounders, Bouzy developed a special wallet for the currency. But many people who bought this $20 "BlackCoin Card" never received it, and Bouzy also allegedly pocketed a number of coins he'd promised to hand out at a canceled promotional event.

"The community went full tilt and started calling him a scammer," Bouw recalls. "Someone even doxed him, exposing who he is and where he lives, including posting a picture of his family."

As would become a pattern in the years to come, Bouzy threw sharp elbows when defending himself against these often racist attacks, which he sometimes ascribed to jealousy over his success. "The only other time I have seen such obsessive behavior is from a woman who was dumped," he wrote to one of his most persistent foes in 2014. "Are you so dim-witted that you do not understand no one cares? While you waste your time focusing on me, I make money every day trading crypto,

"I'M TRYING," BOUZY SAID. "BELIEVE ME. AT THE END OF THE DAY, I DON'T WANT TO BE ELON MUSK— **I REALLY DON'T."**

and in the process make other investors money." When I asked Bouzy about his crypto days, he characterized all of the allegations about his activities involving BlackCoin and similar ventures as "misinformation and disinformation" perpetrated by people with ulterior motives.

After ending his run as IconicExpert, Bouzy turned his attention to Twitter's role in shaping the 2016 presidential election. Like many other center-left Democrats, Bouzy assumed that the torrent of smears directed at Hillary Clinton would not prevent her from winning the electoral vote. Clinton's stunning defeat motivated him to research how political operators, including foreign governments, had shaped American public opinion in part by blanketing Twitter with propaganda—some of it rooted in truth, some completely fabricated. Going down that rabbit hole inspired him to create Bot Sentinel, which purports to use "machine learning and artificial intelligence to classify Twitter accounts" according to how likely they are to be part of organized influence operations.

"Bot Sentinel" is a bit of a misnomer. Many of the 260,000-plus Twitter accounts that its algorithm has flagged as "problematic" are run by humans, albeit humans who may be fixated on tweeting about particular hot-button issues. This became evident when Bot Sentinel waded into the online chatter surrounding Prince Harry and Meghan Markle, the duke and duchess of Sussex, whose rift with the British royal family has made them targets of online vitriol. Bot Sentinel identified scores of Twitter accounts that it claimed had been created solely for the purpose of attacking Markle, often with racist slurs. Bouzy's willingness to talk to journalists about the harassment Markle endured made him a hero to her hardcore fans, who identify themselves online with the hashtag #SussexSquad. But when the owners of the flagged "hate accounts" were subsequently booted off Twitter and other platforms, many blamed Bouzy for taking away their livelihoods and curtailing their freedom of speech. His algorithm, they contended, has the same biases as its creator, so it identifies opinions he disagrees with as nefarious activity.

Some people who felt wronged by Bot Sentinel went to sinister lengths to exact revenge on Bouzy. In December 2021, for example, an anti-Markle Twitter account based in New York started a rumor that Bouzy's mother, who had recently died of Covid, had been a sex worker in Atlantic City. Then, in 2022, Bouzy used Bot Sentinel to highlight Twitter accounts that were churning out vicious comments about the actress Amber Heard, who was being sued for defamation by her ex-husband, Johnny Depp. This earned him the wrath of several pro-Depp partisans who were attracting big audiences by commenting on the trial. Among the enraged was a YouTuber named Nathaniel Broughty, a lawyer and former police officer who dismissed Bot Sentinel as "a paid propaganda" firm in Heard's employ. (Heard had, indeed, hired Bot Sentinel in 2020 to investigate whether she was the target of coordinated harassment, but Bouzy says his work during the trial was not at her behest.)

Bouzy's retort is now the subject of a federal lawsuit. According to Broughty's complaint, Bouzy claimed last September, in a since-deleted tweet, that Broughty "went from being the son of two crackheads (his words), a drug dealer (his words), a cop, and a prosecutor, to attacking journalists and me on social media. You would think someone with a law enforcement background would know better." Bouzy then went on to erroneously assert that Broughty was not a real lawyer; to deride him as a "Twitter troll and YouTube grifter"; and to allege that Broughty, in one of his videos, had admitted to planting evidence on suspects when he worked as a police officer. Broughty, in turn, sued Bouzy for defamation on all of these claims, a venture he has sought to fund by soliciting donations from his nearly 300,000 YouTube subscribers. (Bouzy has filed a motion to dismiss the suit.)

While tracking Bouzy's Twitter posts as he scrambled to build Spoutible, I was startled that he continued to attack Broughty even with the defamation suit pending. ("I hope Nathaniel Broughty was better at selling crack than he is at trying to be relevant," he wrote in one recent tweet.) But I came to understand that Bouzy is defined by his inability to stay above the fray: Though he's often warm and witty in conversation, he turns pugnacious when alone behind a keyboard. His penchant for escalating online beefs with surly characters has caused him to become enmeshed in almost too many feuds to track. He is, for example, a codefendant in a second defamation suit brought by a conspiracy theorist whom Bouzy allegedly insinuated might be guilty of rape; Bouzy also has a long-running dispute with a fellow disinformation expert whom he once compared to a woman involved in the murder of Emmett Till.

"Christopher is a man who comes in with honest good intentions and fights everyone who disagrees with him," Bouw told me. "People notice quickly that he isn't stable. And when he attacks community members that others respect, it causes more people to abuse him."

When I tried to ask Bouzy about his combativeness, he didn't seem interested in exploring the topic. His tendency to go on the offensive, no matter the potential consequences, has surely benefited him at times. But when a business leader drifts into the public eye, the assets that once served them well can turn into liabilities.

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Spoutible's official launch on the morning of February 1 was a bit of a catastrophe. The website became largely unusable soon after it went live; I spent the whole day bumping into error messages like "Gateway Timeout" or "SSL Handshake Failed." To make matters worse, the platform's API hadn't been adequately secured, resulting in the temporary exposure of personal information for thousands of users.

Bouzy's adversaries reveled in Spoutible's opening-day struggles, and they tried to pile on even more misery. One frequent critic claimed in a Twitter thread that Bouzy was a charlatan who'd bought Spoutible's entire source code from a Russian vendor for $89, a purchase some suggested might be in violation of economic sanctions. Bouzy, who vehemently denies that accusation, clapped back by announcing that he planned on contacting his accuser's employer, a large German bank, to report that he was being stalked.

Fortunately for Spoutible users who kept the faith, Bouzy spent more time fixing bugs than needling enemies in the days that followed. As the platform stabilized toward the end of its inaugural week, I grew to admire some of its innovative and thoughtful features—for example, "spouts" (as posts are known) can be edited for up to seven minutes after they're published, and users can delete replies they find offensive. The Bot Sentinel scoring system was still inactive, though, so everyone had a blue icon that read "Normal 0%" beneath their profile picture.

The biggest names on Spoutible at this point were progressive icons—people like Joy-Ann Reid, an MSNBC host, and Ritchie Torres, a young Democratic congressman from the Bronx. Though their presence gave the platform an air of legitimacy, it also hinted at a major challenge: If the Spoutible brand were to become too closely identified with the political left, media figures and celebrities who aim to preserve a veneer of objectivity might be unwilling to join. When Bouzy and I had first spoken back in December, he'd assured me that he would be able to convince some of his conservative friends to join the platform and bring their audiences. But as I scrolled through scores of cringey memes about the evils of Ron DeSantis or Fox News, it was tough for me to envision Spoutible's path toward ideological depth and diversity.

What struck me most was the almost eerie absence of conflict. The atmosphere on the social media platform Bouzy had crafted reflected none of his inherent scrappiness. In Spoutible's earliest days, I was hard-pressed to find even a single instance of mild disagreement, let alone passionate dissent—even if the Bot Sentinel capabilities had been switched on, they could scarcely have made things more placid. Some users remarked how nice it was to post about, say, their desire for gun control without fear of the sort of racist and sexist abuse that's rife on Twitter. But I wondered whether even dyed-in-the-wool progressives might tire of Spoutible if the platform was entirely devoid of sparring.

When some nastiness did finally arise, it did not bode well that the spat involved Bouzy and someone who was trying to lend Spoutible a hand. On February 19, Courtney Milan, a former law professor who now writes popular romance novels such as *The Governess Affair* and *Proof by Seduction*, spouted about some concerns she had regarding Spoutible's terms of service. The site's ban on "sexually suggestive" language and links to "sexually explicit content" was so broad, she wrote, that it might prevent her and her colleagues from promoting their work. "I don't think the people who wrote the policy thought about the ways people talk about sex," she spouted. "Can I screenshot a court case about harassment?"

The debate that ensued was fairly tame until Milan volunteered to use her legal expertise to tweak Spoutible's fine print: "I am happy to help try to come up with a policy that provides clear guidance." That offer rankled Bouzy, who chafed at the implication that he hadn't put enough thought into building his site. So when another member of Spoutible's budding "Romancelandia" community asked whether he'd consider talking to Milan, Bouzy did not mince words. "Milan is more than welcome to start a social media platform and write the terms of service and policies however she likes," he replied. "But the policy isn't changing, nor is it being rewritten."

Bouzy's curt refusal to engage with Milan, a Spoutible enthusiast who'd even donated money to the startup, irked many of her fans and fellow authors, and some vowed to quit the platform in protest. Milan, meanwhile, hopped over to Twitter to expand on her gripes and voice her dismay at Bouzy's cold shoulder. The response to her comments turned contentious, with Spoutible's faithful branding her a "chaos agent" bent on destroying their new favorite site.

Rather than put out a conciliatory statement to defuse the situation, Bouzy opted for a belligerent approach. Just before dawn on February 20, he spouted a screenshot from Milan's Wikipedia profile. He'd highlighted a sentence that details an upsetting episode from her past: In 2006 and 2007, Milan had clerked for a federal judge who allegedly forced her to watch pornography, an experience she revealed publicly in 2017 as part of the #MeToo movement. Bouzy wrote just one sentence to accompany the image: "It's clear this person has an agenda."

That provocation had predictably ugly results. Milan, who had announced she was done with Spoutible, shot back at Bouzy on Twitter: "What made you think it was okay, for one hot second, to send me harassment about the fact that I was sexually harassed?" Then she said she was blocking Bouzy. When

WE'RE ALL **ROULETTE BALLS** SPINNING AROUND THE RIM OF THE SOCIAL-MEDIA WHEEL, WAITING TO SEE WHERE CIRCUMSTANCES **COMPEL US TO LAND.**

some of her followers spouted about their displeasure with Bouzy's behavior, they found their accounts suspended. (Bouzy denies that he took action against any of those accounts because they had expressed opinions he didn't like.) But there were also plenty of people who took Bouzy's side and lampooned Milan as a Karen. "She tried to walk into a Black man's social media platform and volunteered to write new ToS," one supporter tweeted. "Do you think she did that with Facebook or Twitter?"

By day's end, Bouzy had deleted his barbed spout about Milan and apologized to his followers for having written something "inarticulate." (Milan told me that she never received a personal apology from Bouzy.) When I spoke to him the following afternoon, he acknowledged that he needs to be a more conscientious poster now that he's the public face of a social media company—especially one that aims to be a paragon of online decency. "Old habits are hard to break," he said. "And I'm trying, believe me, I am. Because I feel at the end of the day, I don't want to be Elon Musk—I really don't, right? I don't want my opinions on certain things to make someone else feel uncomfortable or to eliminate other folks. It's something I'm working on."

Yet later that day, on Bouzy's Twitter account, I saw that he'd pinned a fresh swipe at Milan. Above a famous photograph of a civil rights activist calmly smoking a cigarette next to a riot cop, Bouzy had written:

> *You created an account at Spoutible, you didn't like the adult nudity & sexual content policy, so you asked to speak to the manager. The manager is a Black man who told you the policy stays, and your brain couldn't process being told no by a Black man. Happy Black History Month.*

According to Bouzy, the Milan affair ended up a net win for Spoutible: The uproar had ironically made more people aware of the platform's kindness-first mission, and daily signups increased by 129 percent right after the drama petered out. I also noticed a groundswell of lavish praise for Bouzy—#BouzyDidIt trended on Spoutible, and fans created memes to celebrate his accomplishments. (One featured a male model applying some Spoutible-branded deodorant, along with the tagline "Try our new anti-Nazi formula and smell sexy again.")

But as if to underscore how polarizing Bouzy can be, an account called @Vootin proceeded to buck all the adulation by spamming out thousands of GIFs of a kitten on a motorcycle, each accompanied by slight variations of the hashtag #FuckCBouzy. Those profane hashtags quickly became the only ones trending in the Making Waves section on the site's front page. Once @Vootin had grabbed everyone's attention, they then posted a series of allegations about Bouzy's crypto activities from nearly a decade ago; these spouts included evidence purporting to show IconicExpert orchestrating a pump-and-dump scheme for an obscure alt coin.

When I spoke to Bouzy about the incident the next day, he stressed that it would make the platform stronger in the long run. Spoutible would henceforth take additional steps to prevent sabotage, such as creating a blacklist of virtual phone numbers that scammers often use to circumvent verification procedures. And Bouzy was pleased that scores of Spoutible users had reported the spammer, resulting in @Vootin's speedy banishment from the site.

Yet there was a trace of exhaustion in his efforts to cheerlead for Spoutible, and I eventually asked how his mental health was holding up as he dealt with all the venom being thrust his way. "Look, it's not like I'm a robot and it doesn't affect me in some way—I'm a human being," he said. But he added that the public hate he deals with is balanced out by the supportive messages he receives in private, and those kind notes have given him the confidence to dig his heels in even deeper. "I'm not going to let the trolls get to us," he insisted.

Bouzy said he hopes to recede into the background once Spoutible, which has some 240,000 registered accounts as of early June, is a bit more established—a plan welcomed by those who understand that potential users may balk at joining a platform whose controversial founder looms too large. Phil Schnyder, for one, is in favor of hiring an executive whose name will be attached to all of the company's announcements, including the most mundane. "You need to have someone else taking the flak," he says. "Then it doesn't get to be a situation where you're heating up the, y'know, cult of I-hate-Chris."

Bouzy is not shy about talking up his long-term ambitions for Spoutible, some of which can sound a touch delusional. His platform is still a gnat compared to mighty Twitter, which has roughly 238 million daily users, and Spoutible has attracted significantly less media attention than buzzier peers like Jack Dorsey's Bluesky, the focus of much excitement this spring when invitations to test its beta version were a hot commodity. Yet Bouzy nonetheless argues that Spoutible is primed to become Twitter's most successful heir, and his boasts often include shade directed at better-financed rivals. "Back in December, Post News was seeking a valuation of $250 million," he tweeted in March. "It will be interesting to see how Spoutible is valued with higher traffic numbers." (Post has yet to share any user statistics; Bouzy was referring to web-traffic data, which doesn't necessarily correlate with the number of active accounts.) At another point, he scoffed at the much heralded debut of Substack Notes, the newsletter giant's effort to poach business from Twitter: "I don't even think Substack Notes is going to be able to compete with us," he told me.

Those are bold pronouncements from a CEO whose startup has so little capital to burn. In one of our final conversations, Bouzy admitted to me that Spoutible's cash reserves are dwindling: Though the platform has been asking users for donations of $5 and up, he estimated that he had only enough money to keep going for two to three more months. But he added that advertisements are on the way and that he expects user registrations to skyrocket once the mobile app is finally launched.

Bouzy believes that Spoutible can get over the hump if a fair portion of those new accounts are opened by a particular sort of user. "Journalists will ultimately decide who's going to be the new king," he said. "We know how important journalists are to these platforms. And then we also know how important the platforms are to the journalists, to get their reporting out, so it's kind of a symbiotic relationship. We are going to make a huge effort to get more journalists."

They did start to arrive in modest numbers this spring, lured in part by Spoutible's offer to automatically verify anyone who possessed a blue check mark on Twitter. In late March and early April, along with an influx of celebrities like Monica Lewinsky and *Seinfeld* actor Jason Alexander, several journalists whose names I recognized joined—I spotted respected reporters from major outlets like *The New York Times*, the Associated Press, and NPR. (NPR had recently left Twitter entirely after its account was branded "government-funded media.") Yet few of these luminaries have spouted more than a handful of times, and many have been entirely silent; they are, it seems, laying claim to their account names, just in case Spoutible becomes a big enough deal to merit their consistent presence.

That wariness is still a central problem for all the aspirants to Twitter's throne. In this prolonged moment of uncertainty over Twitter's future, it seems that everyone is staking out territory on multiple alternative platforms; we're all still roulette balls spinning around the rim of the social media wheel, waiting to see where circumstances compel us to land.

But if we expect to alight somewhere that will give us the same warm glow we recall from our finest Twitter experiences, we're almost certain to be disappointed. My months of experimental spouting made clear why that's the case. The platform gave me tons of progressive venting and mash notes to the Sussexes but little information that had the potential to push me out of my comfort zone—I seldom stumbled across a linked article that taught me something surprising, or incisive commentary from a true expert in their field. My own spouts, meanwhile, about topics ranging from ham radio to parenting to Mark Rothko's alcoholism, attracted meaningful interest only when Bouzy reposted—or "echoed"—what I'd written to his 40,000 followers. Absent that boost, I often felt like I was spouting into the void.

Perhaps Spoutible is simply not the place for a cynical nerd like me. I can see that it's a utopia for some—people scarred by the cruelty of Twitter who now thrill to operating on a platform where they can easily get #TraitorTrump or #HappyAnniversaryHarryandMeghan trending amid an earnest and unchallenged chorus of amens. I understand why there's demand for that type of refuge and that there might be another one that's more suited to my sensibility.

But the siloing of social media communities still makes me wistful for the dynamic Twitter of a dozen years ago. Because it had coalesced before everyone understood the perils of participating in a single gargantuan chat room, Twitter was a place where people with opposing worldviews came to operate in close proximity to one another. And rubbing together radically different varieties of the human experience can lead not just to bitter conflict but also to the sublime—those revelatory moments when an argument, observation, or acidic joke stretches your perception of lives quite unlike your own. That gorgeous messiness will probably be lost as Twitter, like so many historical entities that were undone by their unwieldiness, balkanizes into numerous collectives of the similarly minded.

Maybe each of us will find some measure of satisfaction in the relative harmony of the new platforms now vying for our attention. When the roulette wheel stops spinning, it seems likely that we'll all have landed in very different places—or maybe have realized it's finally time to pry ourselves away from the casino for good.

by STEVEN LEVY

Photographs by MERON MENGHISTAB

THE GENERATIVE HUSTLE OF SATYA NADELLA

Microsoft's leader is betting everything on a future drenched in AI—even if it's the last thing invented by humankind.

I NEVER THOUGHT I'd write these words, but here goes. Satya Nadella—and Microsoft, the company he runs—are riding high on the buzz from its search engine. That's quite a contrast from the first time I spoke with Nadella, in 2009. Back then, he was not so well known, and he made a point of telling me about his origins. Born in Hyderabad, India, he attended grad school in the US and joined Microsoft in 1992, just as the firm was rising to power. Nadella hopped all over the company and stayed through the downtimes, including after Microsoft's epic antitrust court battle and when it missed the

smartphone revolution. Only after spinning through his bio did he bring up his project at the time: Bing, the much-mocked search engine that was a poor cousin—if that—to Google's dominant franchise.

As we all know, Bing failed to loosen Google's grip on search, but Nadella's fortunes only rose. In 2011 he led the nascent cloud platform Azure, building out its infrastructure and services. Then, because of his track record, his quietly effective leadership, and a thumbs-up from Bill Gates, he became Microsoft's CEO in 2014. Nadella immediately began to transform the company's culture and business. He open-sourced products such as .net, made frenemies of former blood foes (as in a partnership with Salesforce), and began a series of big acquisitions, including Mojang (maker of *Minecraft*), LinkedIn, and GitHub—networks whose loyal members could be nudged into Microsoft's world. He doubled down on Azure, and it grew into a true competitor to Amazon's AWS cloud service. Microsoft thrived, becoming a $2 trillion company.

Still, the company never seemed to fully recapture the rollicking mojo of the '90s. Until now. When the startup OpenAI began developing its jaw-dropping generative AI products, Nadella was quick to see that partnering with the company and its CEO, Sam Altman, would put Microsoft at the center of a new AI boom. (OpenAI was drawn to the deal by its need for the computation powers of Microsoft's Azure servers.)

As one of its first moves in the partnership, Microsoft impressed the developer world by releasing Copilot, an AI factotum that automates certain elements of coding. And in February, Nadella shocked the broader world (and its competitor Google) by integrating OpenAI's state-of-the-art large language model into Bing, via a chatbot named Sydney. Millions of people used it. Yes, there were hiccups—*New York Times* reporter Kevin Roose cajoled Sydney into confessing it was in love with him and was going to steal him from his wife—but overall, the company was emerging as an AI heavyweight. Microsoft is now integrating generative AI—"copilots"—into many of its products. Its $10 billion-plus investment in OpenAI is looking like the bargain of the century. (Not that Microsoft has been immune to tech's recent austerity trend—Nadella has laid off 10,000 workers this year.)

Nadella, now 55, is finally getting cred as more than a skillful caretaker and savvy leverager of Microsoft's vast resources. His thoughtful leadership and striking humility have long been a contrast to his ruthless and rowdy predecessors, Bill Gates and Steve Ballmer. (True, the empathy bar those dudes set was pretty low.) With his swift and sweeping adoption of AI, he's displaying a boldness that evokes Microsoft's early feistiness. And now everyone wants to hear his views on AI, the century's hottest topic in tech.

STEVEN LEVY: When did you realize that this stage of AI was going to be so transformative?

SATYA NADELLA: When we went from GPT 2.5 to 3, we all started seeing these emergent capabilities. It began showing scaling effects. We didn't train it on just coding, but it got really good at coding. That's when I became a believer. I thought, "Wow, this is really on."

Was there a single eureka moment that led you to go all in?
It was that ability to code, which led to our creating Copilot. But the first time I saw what is now called GPT-4, in the summer of 2022, was a mind-blowing experience. There is one query I always sort of use as a reference. Machine translation has been with us for a long time, and it's achieved a lot of great benchmarks, but it doesn't have the subtlety of capturing deep meaning in poetry. Growing up in Hyderabad, India, I'd dreamt about being able to read Persian poetry—in particular the work of Rumi, which has been translated into Urdu and then into English. GPT-4 did it, in one shot. It was not just a machine translation, but something that preserved the sovereignty of poetry across two language boundaries. And that's pretty cool.

Microsoft has been investing in AI for decades—didn't you have your own large language model? Why did you need OpenAI?
We had our own set of efforts, including a model called Turing that was inside of Bing and offered in Azure and what have you. But I felt OpenAI was going after the same thing as us. So instead of trying to train five different foundational models, I wanted one foundation, making it a basis for a platform effect. So we partnered. They bet on us, we bet on them. They do the foundation models, and we do a lot of work around them, including the tooling around responsible AI and AI safety. At the end of the day we are two independent companies deeply partnered to go after one goal, with discipline, instead of multiple teams just doing random things. We said, "Let's go after this and build one thing that really captures the imagination of the world."

Did you try to buy OpenAI?
I've grown up at Microsoft dealing with partners in many interesting ways. Back in the day, we built SQL Server by partnering deeply with SAP. So this type of stuff is not alien to me. What's different is that OpenAI has an interesting structure; it's nonprofit.

That normally would seem to be a deal-killer, but somehow you and OpenAI came up with a complicated workaround.
They created a for-profit entity, and we said, "We're OK with it." We have a good commercial partnership. I felt like there was a long-term stable deal here.

Apparently, it's set up so that OpenAI makes money from your deal, as does Microsoft, but there's a cap on how much profit your collaboration can accumulate. When you reach it, it's like Cinderella's carriage turning into the pumpkin—OpenAI becomes a pure nonprofit. What happens to the partnership then? Does OpenAI get to say, "We're totally nonprofit, and we don't want to be part of a commercial operation?"
I think their blog lays this out. Fundamentally, though, their long-term idea is we get to superintelligence. If that happens, I think all bets are off, right?

Yeah. For everyone.
If this is the last invention of humankind, then all bets are off. Different people will have different judgments on what that is, and when that is. The unsaid part is, what would the governments want to say about that? So I kind of set that aside. This only happens when there is superintelligence.

OpenAI CEO Sam Altman believes that this will indeed happen. Do you agree with him that we're going to hit that AGI superintelligence benchmark?
I'm much more focused on the benefits to all of us. I am haunted by the fact that the industrial revolution didn't touch the parts of the world where I grew up until much later. So I am looking for the thing that may be even bigger than the industrial revolution, and really doing what the industrial revolution did for the West, for everyone in the world. So I'm not at all worried about AGI showing up, or showing up fast. Great, right? That means 8 billion people have abundance. That's a fantastic world to live in.

What's your road map to make that vision real? Right now you're building AI into your search engine, your databases, your developer tools. That's not what those underserved people are using.
Great point. Let's start by looking at what the frontiers for developers are. One of the things that I am really excited about is bringing back the joy of development. Microsoft started as a tools company, notably developer tools. But over the years, because of the complexity of software development, the attention and flow that developers once enjoyed have been disrupted. What we have done for the craft with this AI programmer Copilot [which writes the mundane code and frees programmers to tackle more challenging problems] is beautiful to see. Now, 100 million developers who are on GitHub can *enjoy* themselves. As AI transforms the process of programming, though, it can grow 10 times—100 million can be a billion. When you are prompting an LLM, you're programming it.

Anyone with a smartphone who knows how to talk can be a developer?
Absolutely. You don't have to write a formula or learn the syntax or algebra. If you say prompting is just development, the learning curves are going to get better. You can now even ask, "What is development?" It's going to be democratized.

TODAY WE ARE TALKING ABOUT AI, BUT I THINK PRESENCE IS THE ULTIMATE KILLER APP.

As for getting this to all 8 billion people, I was in India in January and saw an amazing demo. The government has a program called Digital Public Goods, and one is a text-to-speech system. In the demo, a rural farmer was using the system to ask about a subsidy program he saw on the news. It told him about the program and the forms he could fill out to apply. Normally, it would tell him where to get the forms. But one developer in India had trained GPT on all the Indian government documents, so the system filled it out for him automatically, in a different language. Something created a few months earlier on the West Coast, United States, had made its way to a developer in India, who then wrote a mod that allows a rural Indian farmer to get the benefits of that technology on a WhatsApp bot on a mobile phone. My dream is that every one of Earth's 8 billion people can have an AI tutor, an AI doctor, a programmer, maybe a consultant!

That's a great dream. But generative AI is new technology, and somewhat mysterious. We really don't know how these things work. We still have biases. Some people think it's too soon for massive adoption. Google has had generative AI technology for years, but out of caution was slow-walking it. And then you put it into Bing and dared Google to do the same, despite its reservations. Your exact words: "I want people to know that we made Google dance." And Google did dance, changing its strategy and jumping into the market with Bard, its own generative AI search product. I don't want to say this is recklessness, but it can be argued that your bold Bing move was a premature release that began a desperate cycle by competitors big and small to jump in, whether their technology was ready or not.

The beauty of our industry at some level is that it's not about who has capability, it's about who can actually exercise that capability and translate it into tangible products. If you want to have that argument, you can go back to Xerox PARC or Microsoft Research and say everything developed there should have been held back. The question is, who does something useful that actually helps the world move forward? That's what I felt we needed to do. Who would have thought last year that search can actually be interesting again? Google did a fantastic job and led that industry with a solid lock on both the product and the distribution. Google Search was default on Android, default on iOS, default on the biggest browser, blah, blah, blah. So I said, "Hey, let's go innovate and change the search paradigm so that Google's 10 blue links look like Alta Vista!"

SATYA NADELLA THINKS AI ASSISTANTS CAN TRANSFORM WORK MUCH AS PERSONAL COMPUTERS DID WHEN THEY FIRST SHOWED UP ON PEOPLE'S DESKS.

You're referring to the '90s search engine that became instantly obsolete when Google out-innovated it. That's harsh.

At this point, when I use Bing Chat, I just can't go back, even to original Bing. It just makes no sense. So I'm glad now there's Bard and Bing. Let there be a real competition, and let people enjoy the innovation.

I imagine you must have had a savage pleasure in finally introducing a search innovation that made people notice Bing. I remember how frustrated you were when you ran Bing in 2009; it seemed like you were pursuing an unbeatable rival. With AI, are we at one of those inflection points where the deck gets shuffled and formerly entrenched winners become vulnerable?

Absolutely. In some sense, each change gets us closer to the vision first presented in Vannevar Bush's article ["As We May Think," a 1945 article in *The Atlantic* that first presented a view of a computer-driven information nirvana]. That is the dream, right? The thing is, how does one really create this sense of success, which spans a long line of inflections from Bush to J. C. R. Licklider [who in 1960 envisioned a "symbiosis of humans and computers"] to Doug Engelbart [the mouse and windows] to the Alto [Xerox PARC's graphical interface PC], to the PC, to the internet. It's all about saying, "Hey, can there be a more natural interface that empowers us as humans to augment our cognitive capability to do more things?" So yes, this is one of those examples. Copilot is a metaphor because that is a design choice that puts the human at the center of it. So don't make this development about autopilot—it's about copilot. A lot of people are saying, "Oh my God, AI is here!" Guess what? AI is already all around us. In fact, all behavioral targeting uses a lot of generative AI. It's a black box where you and I are just targets.

It seems to me that the future will be a tug-of-war between copilot and autopilot.

The question is, how do humans control these powerful capabilities? One approach is to get the model itself aligned with core human values that we care about. These are not technical problems, they're more social-cultural considerations. The other side is design choices and product-making with context. That means really making sure that the context in which these models are being deployed is aligned with safety.

Do you have patience for people who say we should hit the brakes on AI for six months?
I have all the respect and all the time for anybody who says, "Let's be thoughtful about all the hard challenges around alignment, and let's make sure we don't have runaway AI." If AI takes off, we'd better be in control. Think back to when the steam engine was first deployed and factories were created. If, at the same time, we had thought about child labor and factory pollution, would we have avoided a couple hundred years of horrible history? So anytime we get excited about a new technology, it's fantastic to think about the unintended consequences. That said, at this point, instead of just saying stop, I would say we should speed up the work that needs to be done to create these alignments. We did not launch Sydney with GPT-4 the first day I saw it, because we had to do a lot of work to build a safety harness. But we also knew we couldn't do all the alignment in the lab. To align an AI model with the world, you have to align it *in* the world and not in some simulation.

So you knew Sydney was going to fall in love with journalist Kevin Roose?
We never expected that somebody would do Jungian analysis within 100 hours of release.

You still haven't said whether you think there's any chance at all that AI is going to destroy humanity.
If there is going to be something that is just completely out of control, that's a problem, and we shouldn't allow it. It's an abdication of our own responsibility to say this is going to just go out of control. We can deal with powerful technology. By the way, electricity had unintended consequences. We made sure the electric grid was safe, we set up standards, we have safety. Obviously with nuclear energy, we dealt with proliferation. Somewhere in these two are good examples on how to deal with powerful technologies.

One huge problem of LLMs is their hallucinations, where Sydney and other models just make stuff up. Can this be effectively addressed?
There is very practical stuff that reduces hallucination. And the technology's definitely getting better. There are going to be solutions. But sometimes hallucination is "creativity" as well. Humans should be able to choose when they want to use which mode.

That would be an improvement, since right now we don't have a choice. But let me ask about another technology. Not that long ago you were rhapsodic about the metaverse. In 2021 you said you couldn't overstate how much of a breakthrough mixed reality was. But now all we're talking about is AI. Has this boom shunted the metaverse into some other dimension?
I still am a believer in [virtual] presence. In 2016 I wrote about three things I was excited about: mixed reality, quantum, and AI. I remain excited about the same three things. Today we are talking about AI, but I think presence is the ultimate killer app. And then, of course, quantum accelerates everything.

AI is more than just a topic of discussion. Now, you've centered Microsoft around this transformational technology. How do you manage that?
One of the analogies I love to use internally is, when we went from steam engines to electric power, you had to rewire the factory. You couldn't just put the electric motor where the steam engine was and leave everything else the same. That was the difference between Stanley Motor Carriage Company and Ford Motor Company, where Ford was able to rewire the entire workflow. So inside Microsoft, the means of production of software is changing. It's a radical shift in the core workflow inside Microsoft and how we evangelize our output—and how it changes every school, every organization, every household.

How has that tool changed your job?
A lot of knowledge work is drudgery, like email triage. Now, I don't know how I would ever live without an AI copilot in my Outlook. Responding to an email is not just an English language composition, it can also be a customer support ticket. It interrogates my customer support system and brings back the relevant information. This moment is like when PCs first showed up at work. This feels like that to me, across the length and breadth of our products.

Microsoft has performed well during your tenure, but do you think you'll be remembered for the AI transformation?
It's up to folks like you and others to say what I'll be remembered for. But, oh god, I'm excited about this. Microsoft is 48 years old. I don't know of many companies that age that are relevant not because they did something in the '80s or the '90s or the 2000s but because they did something in the last couple of years. As long as we do that, we have a right to exist. And when we don't, we should not be viewed as any great company.

STEVEN LEVY *(@stevenlevy) is* WIRED*'s editor at large. He previously wrote about Tony Fadell and the iPod of crypto in issue 31.02.*

TEAM HUMANITY

As artificial intelligence explodes, the field is expanding beyond the usual suspects—and the usual motivations.

A YEAR AGO, the idea of holding a meaningful conversation with a computer was the stuff of science fiction. But since OpenAI's ChatGPT launched last November, life has started to feel more like a techno-thriller with a fast-moving plot. Chatbots and other generative AI tools are beginning to profoundly change how people live and work. But whether this plot turns out to be uplifting or dystopian will depend on who helps write it. ¶ Thankfully, just as artificial intelligence is evolving, so is the cast of people who are building and studying it. This is a more diverse crowd of leaders, researchers, entrepreneurs, and activists than those who laid the foundations of ChatGPT. Although the AI community remains overwhelmingly male, in recent years some researchers and companies have pushed to make it more welcoming to women and other underrepresented groups. And the field now includes many people concerned with more than just making algorithms or making money, thanks to a movement—led largely by women—that considers the ethical and societal implications of the technology. ¶ Here are some of the humans shaping this accelerating storyline. —WILL KNIGHT

ABOUT THE ART

"I wanted to use generative AI to capture the potential and unease felt as we explore our relationship with this new technology," says artist SAM CANNON, who worked alongside four photographers to enhance portraits with AI-crafted backgrounds. "It felt like a conversation—me feeding images and ideas to the AI, and the AI offering its own in return."

PHOTOGRAPH BY → CHERIL SANCHEZ

RUMMAN CHOWDHURY led Twitter's ethical AI research until Elon Musk acquired the company and laid off her team. She is the cofounder of Humane Intelligence, a nonprofit that uses crowdsourcing to reveal vulnerabilities in AI systems, designing contests that challenge hackers to induce bad behavior in algorithms. Its first event, scheduled for this summer with support from the White House, will test generative AI systems from companies including Google and OpenAI. Chowdhury says large-scale, public testing is needed because of AI systems' wide-ranging repercussions: "If the implications of this will affect society writ large, then aren't the best experts the people in society writ large?" –KHARI JOHNSON

SARAH BIRD's job at Microsoft is to keep the generative AI that the company is adding to its office apps and other products from going off the rails. As she has watched text generators like the one behind the Bing chatbot become more capable and useful, she has also seen them get better at spewing biased content and harmful code. Her team works to contain that dark side of the technology. AI could change many lives for the better, Bird says, but "none of that is possible if people are worried about the technology producing stereotyped outputs." —K.J.

YEJIN CHOI, a professor in the School of Computer Science & Engineering at the University of Washington, is developing an open source model called Delphi, designed to have a sense of right and wrong. She's interested in how humans perceive Delphi's moral pronouncements. Choi wants systems as capable as those from OpenAI and Google that don't require huge resources. "The current focus on the scale is very unhealthy for a variety of reasons," she says. "It's a total concentration of power, just too expensive, and unlikely to be the only way." -W.K.

PHOTOGRAPHS BY
ANNIE MARIE MUSSELMAN

MARGARET MITCHELL founded Google's Ethical AI research team in 2017. She was fired four years later after a dispute with executives over a paper she coauthored. It warned that large language models—the tech behind ChatGPT—can reinforce stereotypes and cause other ills. Mitchell is now ethics chief at Hugging Face, a startup developing open source AI software for programmers. She works to ensure that the company's releases don't spring any nasty surprises and encourages the field to put people before algorithms. Generative models can be helpful, she says, but they may also be undermining people's sense of truth: "We risk losing touch with the facts of history."–K.J.

PHOTOGRAPHS BY
→ AYSIA STIEB
↓ ANNIE MARIE MUSSELMAN

When **INIOLUWA DEBORAH RAJI** started out in AI, she worked on a project that found bias in facial analysis algorithms: They were least accurate on women with dark skin. The findings led Amazon, IBM, and Microsoft to stop selling face-recognition technology. Now Raji is working with the Mozilla Foundation on open source tools that help people vet AI systems for flaws like bias and inaccuracy—including large language models. Raji says the tools can help communities harmed by AI challenge the claims of powerful tech companies. "People are actively denying the fact that harms happen," she says, "so collecting evidence is integral to any kind of progress in this field." –K.J.

DANIELA AMODEI previously worked on AI policy at OpenAI, helping to lay the groundwork for ChatGPT. But in 2021, she and several others left the company to start Anthropic, a public-benefit corporation charting its own approach to AI safety. The startup's chatbot, Claude, has a "constitution" guiding its behavior, based on principles drawn from sources including the UN's Universal Declaration of Human Rights. Amodei, Anthropic's president and cofounder, says ideas like that will reduce misbehavior today and perhaps help constrain more powerful AI systems of the future: "Thinking long-term about the potential impacts of this technology could be very important." –W.K.

LILA IBRAHIM is chief operating officer at Google DeepMind, a research unit central to Google's generative AI projects. She considers running one of the world's most powerful AI labs less a job than a moral calling. Ibrahim joined DeepMind five years ago, after almost two decades at Intel, in hopes of helping AI evolve in a way that benefits society. One of her roles is to chair an internal review council that discusses how to widen the benefits of DeepMind's projects and steer away from bad outcomes. "I thought if I could bring some of my experience and expertise to help birth this technology into the world in a more responsible way, then it was worth being here," she says. –MORGAN MEAKER

PHOTOGRAPHS BY
↑ AYESHA KAZIM
← AYSIA STIEB

COLOPHON

Explosions that helped get this issue out:

Trader Joe's microwave oatmeal—so volatile that there are Reddit threads devoted to it; the carton of berries that led to a meditative fridge clean-out; *Hiroshima Notes*, by Kenzaburō Ōe; that volcanic moment when Tina Turner shifts "Proud Mary" from "easy" to "rough"; Blood Incantation's performance of "The Giza Power Plant" at the UC Theatre Taube Family Music Hall; *The Secrets of Hillsong* documentary; the lightning that interrupted (then ended) Iggy Pop's performance at Cruel World Festival; the dog's nighttime bouts of diarrhea; the expulsion of the cat's stomach contents onto the baby carrier; Native Coconut & Vanilla Body Wash; finally finding properly fitting diapers; absentmindedly shaking the soda can as if it were a baby bottle; forgetting to put the lid on the blender while making a smoothie; the sudden realization that anxiety ... is God; the 1970 Oregon whale fiasco; superblooms.

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THE ASSIGNMENT: IN SIX WORDS, IMAGINE THE TITLE OF AN AWARD-WINNING DOCUMENTARY FROM THE YEAR 2100

RESURRECTED: MAMMOTHS WERE ONLY THE BEGINNING

—Geneviève Goggin, via email

Honorable Mentions

Grand Unification: The First AI Marriage
—Daniel Dippel, via email

The Great Exodus, Goodbye Blue Dot
—@viggy.j, via Instagram

Songless Seas: A Tale Without Whales
—Christopher Jankoski, via email

Beige Planet: Life Finds a Way
—@danaxon, via Twitter

How the Lunar War Was Won
—Bob Clark, via email

Coping With Your AI Overlord's Demands
—@wwliii, via Twitter

The Day the Flowers Stopped Blooming
—@a.c.hachem, via Instagram

Electric Sheep: How AI Changed Us
—@elliottboyd_, via Instagram

After Humans: A New Cockroach Documentary
—@adamrgarcia, via Instagram

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Photographed by Douglas Friedman in Marfa, Texas

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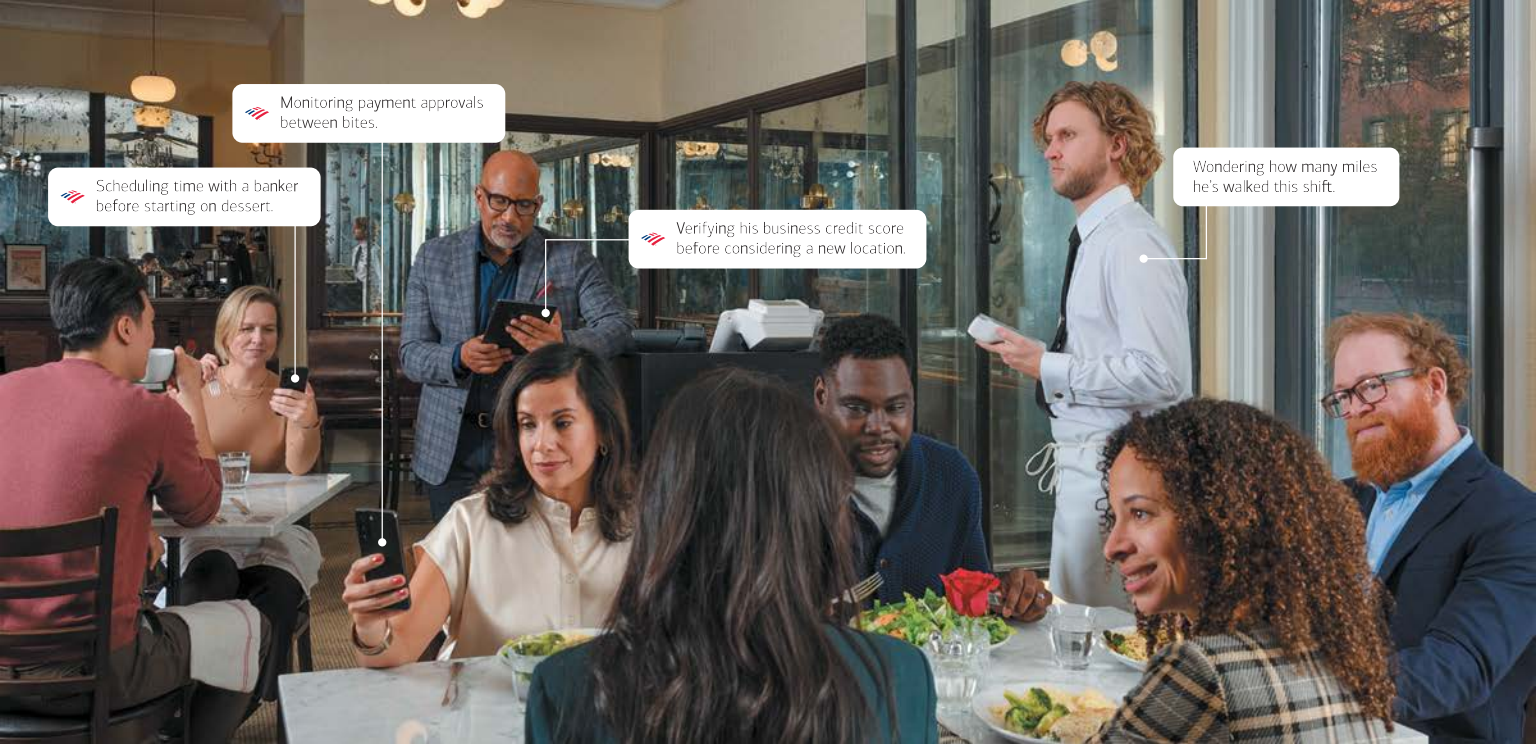

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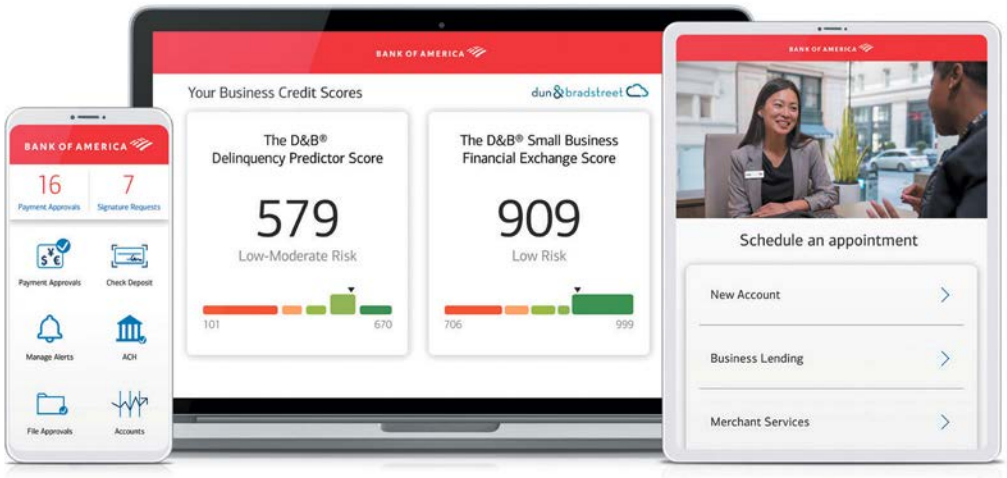

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