Brunswick SOCIAL VALUE Review

The Role of Business in Society

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AI IMPACT

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DAMBISA MOYO

AT&T CISO
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OpenAI's
CHRIS LEHANE

The Father of
DIGITAL FORENSICS

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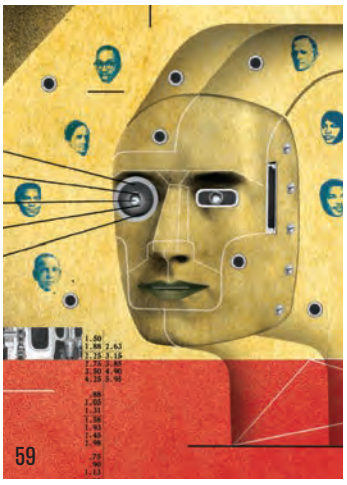

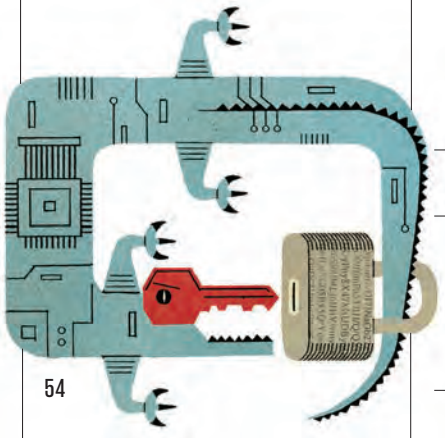

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FORE-

WELCOME TO THE SIXTH EDITION of the *Brunswick Social Value Review*, which was established with a clear mission: to look at what happens when societal issues become critical business issues. This edition examines the impacts of AI on those issues.

There has been much hype and much handwringing over AI. Big claims are made about the commercial opportunities it presents. And there are plenty of anxieties about harmful social and environmental consequences of AI use. But we aim to take a different perspective: How are companies deploying AI to advance sustainability priorities and create social value?

We explore the tension between the challenges and opportunities presented by AI. Nowhere is this more evident than in the climate debate. Concerns about AI's eyewatering thirst for energy are well documented. At the same time, AI can drive a revolution in the energy system, as we see in "Bearing Fruit" on page 10.

We map out the potential applications of AI—transforming the health system, discovering new drugs, advancing economic inclusion and helping to make the circular economy a reality. We hear from the experts and leaders about how AI is making an impact in areas like these.

Disinformation and deepfakes are new risks to consider, and UC Berkeley Professor, author and researcher Hany Farid, dubbed the "father of digital forensics," shares with us his unparalleled experience combatting manipulated media (page 12). "This is going to happen: Somebody's going to create a video of your CEO kicking puppies down the street," he says. "And they're going to release it on Twitter where it will get millions of views."

Global economist and member of the House of Lords, Baroness Dambisa Moyo feels the explosive growth of AI may have hit a plateau (page 20). But that doesn't mean the risks are gone,"I always think about that adage attributed to Mark Twain: 'It's not what you don't know that gets you into trouble, it's what you know for sure that's just not so.'"

AI brings new security risks, and we speak to Rich Baich, AT&T's Chief Information Security Officer, about defending the networks on which so many depend (page 23). "We're power users of AI," he says. Drawing on his more than 20 years as a CISO, he talks to us about using AI to detect and respond to new threats.

LUCY PARKER, Senior Partner, and **JON MILLER,** Partner, founded the firm's Sustainable Business practice.

Chris Lehane, Chief Global Affairs Officer for OpenAI, which created a surge of interest in AI with ChatGPT, gives us his bird's eye view on the rise of the "Intelligence Age" (page 26). And Google Vice President of Engineering Royal Hansen talks about AI's role in global cybersecurity (page 30).

Will this technology worsen economic inequalities? Shamina Singh, the CEO for the Mastercard Center for Inclusive Growth, tells us AI's potential in building an inclusive digital economy (page 43).

Two top leaders at Stanford Medicine talk to us about what may be possible (page 48) in medical research. Advances in quantum computing may cause seismic shifts in AI capabilities. Kohei Itoh, President of Japan's Keio University describes groundbreaking work (page 54).

The CEO of the Ellen MacArthur Foundation, Jonquil Hackenberg, speaks in our Systems Thinking pages on how AI may help make the circular economy a reality (page 70). The Head of AI Strategy at *Reuters*, Jane Barrett, talks about the changes in the media (page 74). And Climate Policy Radar Founder and CEO Dr. Michal Nachmany shares her expectations for using AI to boost the platform and its database of global climate action (page 77).

Throughout its pages, this magazine draws from the deep bench of Brunswick expertise from around the world. Caroline Daniel interviews the CEO of consumer review site Trustpilot (page 40) and describes the swift rise of the executive position Chief Artificial Intelligence Officer (page 59). Pru Bennett and Meaghan Ramsey outline the seven questions corporate boards should be asking about AI usage (page 65); Ben Hirschler interviews experts on AI's promise for drug discovery (page 51); and Stacey Chow interviews Citi's Managing Director and Head of Global Data Insights on using AI to build transparency in fintech (page 38).

This is a fluid subject that touches all aspects of business. The perspectives in this edition show how AI can help build stronger, future-proofed business. And that means becoming resilient in the face of the multiple, interconnected crises the world is facing. ◆

PHOTOGRAPH: VMOTD

WORD

BUSINESS + AI +

HOW MIGHT AI UNLOCK SOLUTIONS TO GLOBAL CHALLENGES?

The public debate is full of coverage around the potential harms that may be caused by AI—both intended and unintended—and rightly so. But how might AI unlock progress on the big intractable problems the world faces? From climate change to health to cybersecurity, from waste to biodiversity to education, businesses are deploying AI solutions that promise to redefine what's possible. We've compiled a snapshot of just some of the implications of AI for business leaders to consider.

AI will have—and is already having—a major impact on global challenges. Here's our perspective on the implications for business across **9 KEY SOCIETAL ISSUES.**

By **JON MILLER.**

AI IS NOTORIOUSLY ENERGY HUNGRY. Data centers are set to drive a 160% increase in power demand, according to Goldman Sachs, and national energy grids are already creaking under the strain. For both companies and nations, AI threatens to derail transition plans.

However, AI is also a potent tool in the fight against climate change and its effects. Amid the recent outbreak of wildfires around Los Angeles for example, a new system was being tested that uses AI analysis of remote camera feeds to identify early warning signs of fires.

AI is also being used to create significant energy efficiency gains in buildings and industrial processes, and to optimize supply chain logistics to reduce emissions. For businesses getting to grips with their own net zero journeys, AI tools can help analyze emissions data.

AI tools offer LA firefighters earlier warnings. While wildfires occur every year, the number and ferocity of the recent LA infernos are unprecedented, caused by conditions tied to climate change.

Tsushima Island, Japan awash with drifted garbage.

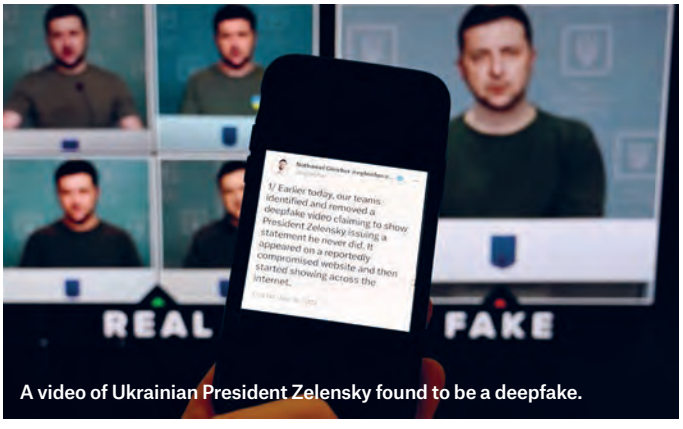
WASTE

The world has a waste problem. Plastic waste, food waste, e-waste, textile waste, construction waste, as well as hazardous and toxic waste—all taking a terrible toll on the environment, on biodiversity and human health. Several applications of AI can help tackle this. For example, businesses can use AI to analyze production processes, identify inefficiencies and reduce resource usage. AI can forecast demand more accurately, meaning less overproduction and fewer wasted goods. Logistics can also be optimized by AI, reducing fuel consumption and packaging waste.

The Amazon rainforest in Leticia, Colombia.

BIODIVERSITY

A fifth of countries are at risk from ecosystem collapse as biodiversity declines, according to Swiss Re, a threat that has significant implications for business. The Taskforce on Nature-related Financial Disclosures describes the risks as: supply chain disruption, loss of operational license, increasing litigation and increasing input costs, resulting in declining credit ratings and market valuations. Already, businesses are using AI tools to enhance environmental impact assessment, biodiversity monitoring and supply chain transparency; and a number of conservation organizations are using AI to analyze ecological data and track habitat changes.



A video of Ukrainian President Zelensky found to be a deepfake.

THREATS to DEMOCRACY

Democracy is in crisis. Many countries are swerving toward autocracy and confidence in democratic institutions is in decline. AI has the potential to reinvigorate democracy, according to Chatham House, by delivering agile and responsive public services and boosting democratic participation. However, rather than alleviating the challenges for democracy, so far AI seems to be exacerbating them—for example, through deepfakes and disinformation campaigns, or through sophisticated AI surveillance tools. In addition, regulators around the world are increasingly concerned about unaccountable corporate control of AI.

AI robots in Jiangsu, China.

SKILLS & EDUCATION

Seventy-four percent of employers report a skills gap, according to a global survey by ManpowerGroup. The rise of AI is a driver of demand for new skills, and AI can also help to close this gap. Businesses can use AI to analyze workforce data to predict skills gaps within the organization, allowing employees to target skill-development areas; AI can also create personalized learning tools and facilitate lifelong learning. It remains to be seen if AI will contribute to broader global education challenges; according to UNICEF, more children were affected by severe crises, and as a result were out of school, in 2024 than ever before.

PHOTOGRAPHS: PREVIOUS SPREAD, BRANDON BELL; TOP CLOCKWISE; ASAHI SHIMBUN, JUANCHO TORRES/ANADOLU AGENCY, ZHAI HUIYONG/VCG, OLIVIER DOULIERY/AFP, ALL GETTY IMAGES

Drones over Kharkiv Oblast, Ukraine.

GEOPOLITICS

We are entering a new era of geopolitical business risk, according to BlackRock's Geopolitical Risk Dashboard. AI is a part of this, with the potential to reshape global power dynamics. Access to AI capability will become fundamental to economic competitiveness and self-reliance, and this will shape national and transnational regulation. The US and China are both pursuing targeted decoupling along the technology value chain, with new controls and tariffs on chips and other AI-enabling tech. Already, AI is transforming surveillance, cybersecurity and military capability.

Elderly residents in Strasbourg, France.

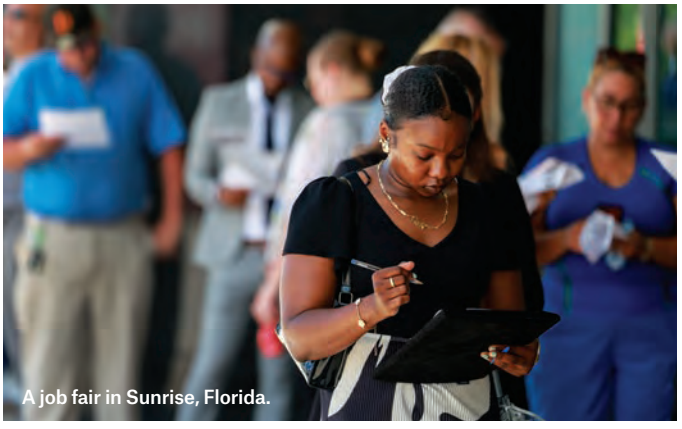
HEALTHCARE

Around the world, health systems are under pressure. Primarily driven by aging populations, the increased demand for healthcare is outstripping resources. Inefficient care is responsible for 15% of deaths in low- and middle-income countries, according to Harvard analysts. AI-driven innovation could improve health systems by accelerating drug discovery and development, predicting patient outcomes and targeting interventions, even creating personalized medicines at the molecular level. AI-powered monitoring and wearable tech can help keep us healthy, while process optimization and patient flow management can lower costs.

A homeless person's tent at Piccadilly Circus, London.

ECONOMIC INEQUALITY

Income and wealth inequalities have risen significantly over the past four decades, according to the Brookings Institute—stoking social discontent and political polarization. Many fear that AI may make this worse, upending the workforce and making obsolete many low-wage and high-income jobs. However, there are initiatives exploring how AI can advance inclusive economic growth, such as facilitating access to financial services, microcredit and insurance for underserved communities. In addition, small businesses and entrepreneurs may leverage AI tools to grow their businesses.



A job fair in Sunrise, Florida.

EQUITY & INCLUSION

A concern about the use of AI is algorithmic bias, where AI decision-making systematically disadvantages certain groups. This has resulted in hiring discriminations, facial recognition errors and inaccurate credit scores. However, some companies are exploring how to use AI to increase equity and inclusion, such as reducing unconscious human bias in the hiring process and ensuring inclusive product design. AI also has a significant role to play in accessibility: Applications such as speech recognition, language processing and computer vision can mean more people with disabilities can access the workplace.

PHOTOGRAPHS: TOP CLOCKWISE, JOSE COLON/ANADOLU, PATRICK LANDMANN, JOE RAEDLE, MIKE KEMP/IN PICTURES, ALL GETTY IMAGES

AI BEARING

STANDS TO BOOST RENEWABLE ENERGY EFFORTS and help achieve the world's climate goals, even as it increases the power consumption levels that threaten those goals.

These benefits are already being explored. In every aspect of energy creation and distribution, from better wind turbines to more efficient energy grids and batteries, AI is poised to make a huge contribution that could help further climate strategies. The speed with which these ideas can be implemented varies, but in almost all cases, researchers are expecting positive results within a few years.

Enhanced Generation

Improving the yield from renewable energy generation is key to unlocking more investment and accelerating rollout. AI is already playing a number of roles here from the design of better site-specific systems to the monitoring of energy through sophisticated data collection at every point in the process. This allows identification of falloffs in efficiency and the diagnosis of issues in real time.

Researchers for companies such as the Denmark-based Ørsted and Shoreline Wind are developing "intelligent modeling" tools for wind farms that can take in all factors related to weather, wind speeds and direction, and wave and tide patterns, as well as constraints on infrastructure and workforce, availability of vessels and ports, and other factors, to create greater efficiency. The goal is to be able to rely more on these robust models, creating systems able to scale energy delivery while reducing the onsite need for costly expertise.

AI has the potential for a cornucopia of energy system benefits.

Energy Grids

Without AI, energy grids struggle to cope with the intermittency of renewable energy supply. The combination of AI and blockchain can enable smart grids that are more reliable, efficient and sustainable. Generative AI can be employed to analyze large amounts of data to calculate energy demand, renewable energy output, prices, storage optimization and more. Blockchain technology can also make them less susceptible to cyberattacks, enhancing resilience.

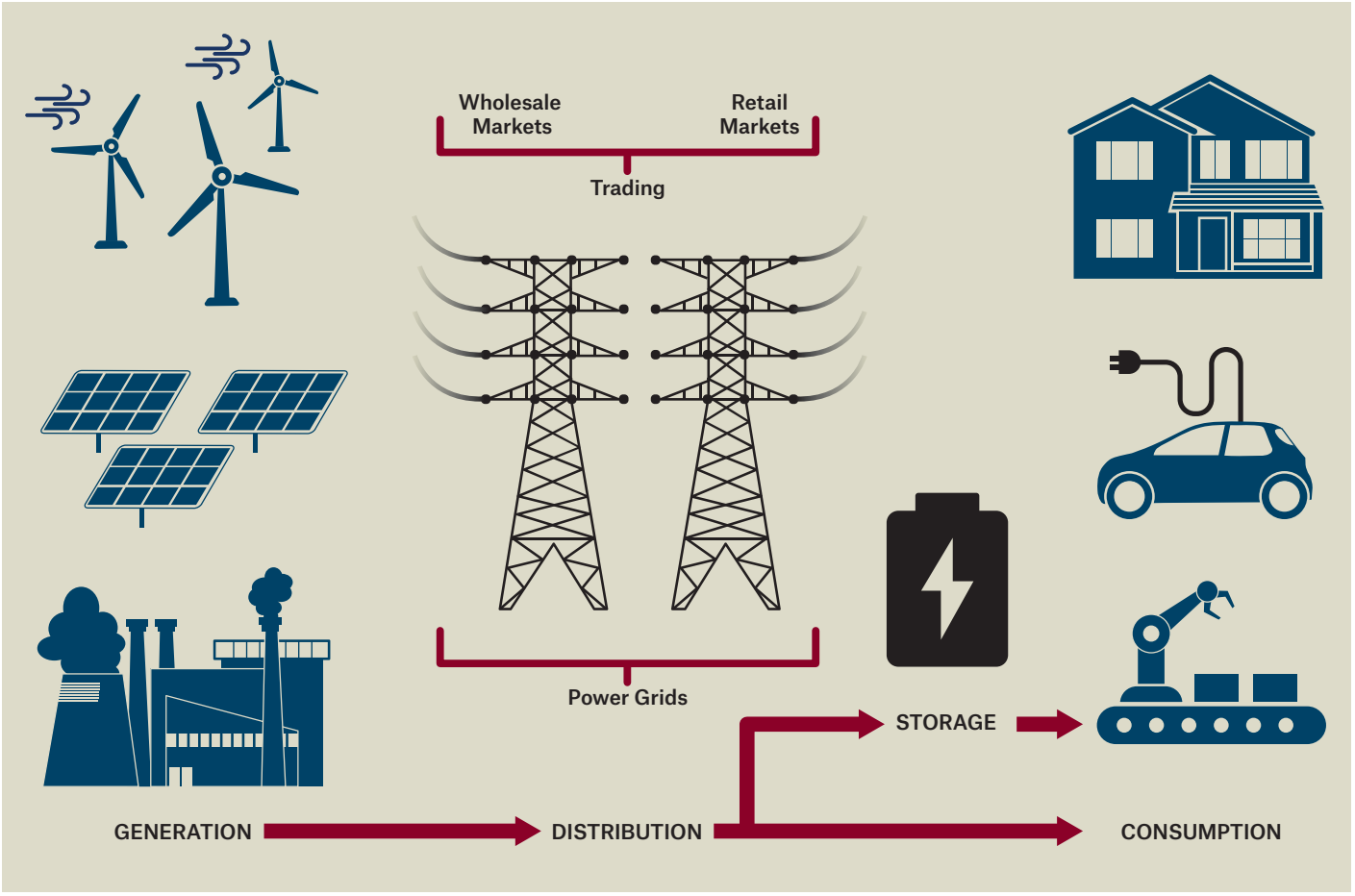
An unavoidable consequence of grid transmission is that some energy gets lost along the way—accounting for electricity losses of 5% in the US between 2018 and 2022. The greater the distance traveled, the higher the transmission loss. Increasing the transmission voltage can help to reduce the loss. AI can make real-time adjustments in power routing and voltage in order to lessen the impact.

From an investor perspective, introducing renewables as energy sources adds risk to energy trading. AI's promise of predictive analytics for demand, supply and price movements, and its ability to strengthen risk management, can help smooth the transition to renewables and could unlock new sources of capital.

Energy Efficiency

Reducing energy demand is a surefire way of tackling emissions—but global population growth and increasing living standards have been driving ever-greater energy use. This puts a premium on energy efficiency—doing more with less energy.

An example is energy efficiency in buildings, which account for 30% of global energy consumption and 26% of global energy-related emissions; in 2022, they consumed about 1% more than the prior



FRUIT

year. AI has a huge role to play here by integrating data such as time of day, weather, air quality, asset type, occupancy, usage and other relevant factors to optimize demand for air conditioning and heating. Trials show that energy savings for buildings could reach around 30%.

Manufacturing Optimization

With one-fifth of the world's carbon emissions coming from manufacturing and production, AI is being employed to reduce energy consumption by 20% by 2025. Manufacturers are combining AI's analytical capabilities with the advanced monitoring of IoT (Internet of Things) sensors, with promising results: It becomes possible to adjust workflow to optimize machine use and resource use, as well as spotting anomalies in energy use and predicting faults. This also reduces material waste in the production process.

Energy Storage

Storage is key to the energy transition—but battery technology development needs to accelerate. AI can use sensors inside the battery to continuously analyze subtle changes occurring in battery cells and infer their status in real time. This promises to increase lifecycles, and decrease discharge rates and re-charge times.

In addition, research into battery development is being boosted by AI assistance. Scientists announced early in 2024 that they had created a working battery prototype from an unusual combination of materials suggested by AI. Even more exciting for future research is the speed with which the new materials were identified and developed into a prototype. It took AI about 80 hours to identify 23 materials worthy of investigation from a candidate list of 32 million; from there, scientists had a working prototype in six months.

As one researcher noted, "That's superfast." ◆

TRIALS SHOW THAT ENERGY SAVINGS FOR BUILDINGS COULD REACH AROUND **30** PERCENT.

GRAPHIC: MARK TYNER

REAL OR FAKE

Called "the father of digital forensics," **HANY FARID** walks us through Generative AI and the spread of maliciously manipulated content—and what business needs to worry about. Brunswick's **CHELSEA MAGNANT** reports.

TRAINED AS AN APPLIED MATHEMATICIAN and computer scientist, Hany Farid stumbled upon a book in the late '90s that would take him not just down an entirely new trail, but into the wilderness of an entirely new field: digital forensics. His story begins in a very old institution, the library. • "That's how you know it was a long time ago," Farid, now a professor at the University of California at Berkeley, tells us. "It seems so quaint now, that I would go and get a book at the library." • Having earned his Ph.D. in Computer Science at the University of Pennsylvania in 1997, he was doing post-doctoral work in brain research about human perception. Standing in line at the library to check out, he absently picked up a book laying nearby, *Federal Rules of Evidence*. • "I knew nothing about law, but I was bored," recalls Farid. "And it literally opened to a page that said, 'Introducing photographs into evidence in a court of law.' I read a little further. It was talking about what types of photographs courts should accept as authentic. And there was this new thing, digital

PHOTOGRAPH: COURTESY OF HANY FARID

photography: 'We will treat digital images as having the same authenticity as a 35mm negative.' And I thought, 'That seems like a bad idea. What happens when digital takes over—which we all knew would happen eventually—and images become easier to manipulate?'"

Two years later, in a break from teaching classes at Dartmouth where he had his first faculty post, he found himself making a goofy photoshopped image, superimposing a friend's face on a photo of Andre Agassi, the famous tennis pro.

"I had to make his head a little bigger to fit the body," Farid says. "And I realized, I've introduced a digital artifact into the image because I had to add some pixels."

Such an artifact, he realized, could be used as proof of manipulation. Together, those two insights propelled him into research later termed digital forensics—analyzing digital media to tell if and how it was manipulated. In the years since, manipulated images, audio and video have exploded into headline threats not only to individuals, business and corporations, but to public safety and fundamental assumptions of democratic society. Dealing with deepfakes in particular—where through video and digital tools, people's likenesses can be turned into realistic puppets—are currently a critical concern in security discussions.

But in the early 2000s, "nothing existed" in the way of tools or research, Farid says. "We just started writing papers and thinking about this. Nobody saw Generative AI coming at that point. Suddenly now, the ability to manipulate and synthesize media looks very different than it did 20 years ago. People say, 'oh you were so prescient!' But it started with me just screwing around in Photoshop."

Farid is now referred to as the "father of digital forensics" and regarded as the world's go-to expert on deepfakes and manipulated images. He regularly helps movie stars and other celebrities, as well as politicians, lawyers, law enforcement, journalists, and even the White House and the United Nations, in efforts to identify where deliberate digital alteration and fabrication have been used to create misinformation.

He is a Fellow of the National Academy of Inventors. *Enterprise* magazine said his first book, *Photo Forensics*, is "likely to become the bible of the field." Farid has also now founded GetReal Labs, a business to help organizations combat these threats.

Brunswick's Chelsea Magnant, a former student of Farid's at UC Berkeley, interviewed him for the *Brunswick Review*, where they discussed the fast-growing threat of misinformation and the arc of his professional life, a scientist ironically launched on his career path by a wink of serendipity—a stray book in the library.

"That's the way the world works," he says. "It's kind of beautiful and terrifying. A moment later, a moment earlier, I didn't look at that page and … I may have done something completely different."

"THE HALF-LIFE OF A SOCIAL MEDIA POST IS MEASURED IN ABOUT **60** SECONDS. … YOU DON'T HAVE HOURS OR DAYS. YOU HAVE MINUTES TO RESPOND."

Could you just describe your work on deepfakes and manipulated media?

The core of what we do, the technical part, is we build computational techniques that will ingest an image, audio or video, and try to determine if it has been manipulated, edited, fully AI synthesized. Our concern is, how do we authenticate media?

The applications for our work are courts of law, media outlets, Fortune 500 companies being attacked, regulatory bodies. In media, I don't think a single day has gone by in the last year where I have not had to talk to a reporter about something that is happening around the world or they're not sure if an image, audio or video has been manipulated or is AI-generated.

Can you talk a little bit about what you're seeing in the evolution of manipulated media?

Almost from the start of Generative AI and deepfakes, we saw the creation of nonconsensual sexual imagery. Taking the likenesses of mostly women, inserting them into explicit material, and then using that for extortion, weaponization, embarrassment, humiliation, whatever. It's not just celebrities; it's anybody with a single image of themselves online. You have an image on LinkedIn? I can take that image and now insert you into a video, using deepfake technology. The creation of child sexual abuse material—taking images of young children and putting them into sexually explicit material—that's also being done. Just awful, awful, awful.

Small-scale fraud, where people are starting to get phone calls from who they think is their loved one, like a phishing scam, but now it's a phone call in the voice of your son, daughter, granddaughter, mother, father. Large-scale fraud, institutions being separated from tens of millions of dollars because they are transferring money to an organization that is fraudulent.

In business hiring: People will interview for jobs on live video calls, only the applicant is not who they think it is, and then they've got a hacker inside their organization who's inserting malware—this has now happened many, many times.

Obviously, too, we are seeing disinformation and election interference on the rise with the Generative AI. I don't see any of these going away. I see them only getting worse.

But the big one is that when you live in a world where anything you read, see or hear can be fake, then nothing has to be real. Just last year, when Biden stepped away from the upcoming presidential election, there was a press conference with Vice President Harris. President Biden had been diagnosed with COVID, so he called in to the conference, spoke for four minutes, introducing the vice president. Some people said, "Oh, that was fake! He's actually dead." And a whole conspiracy emerged, including members of Congress calling for investigations—why? Because it doesn't have to be real.

Where are we, as a society, when you can't believe anything? This builds onto an erosion of trust already in the media, in the government, in scientific experts. It's a really dangerous world, a really weird world we're entering right now. Because of the larger infrastructure that we live in, it's not just that the bad guy can create fake information; they can carpet bomb the internet with it. All that content is now being amplified by the underlying social media algorithms.

Can we talk a little bit about best practices for businesses, keeping people safe in this environment?

If you're in the Fortune 1000, here are the things you need to worry about. This is going to happen: Somebody's going to create a video of your CEO kicking puppies down the street. And they're going to release it on Twitter [X] where it will get millions of views. It's going to be bad for you and really hard to combat. Once people see those videos, nobody unsees them. Or, somebody's going to create a fake earnings call of your CEO, saying your profits are down 5%, and the stock market is going to move billions of dollars before you can figure anything out. People in your organization are going to get phone calls from who they think is their CEO, or CTO, or CFO, saying, "Do this. Tell me this. Give me this information." We're seeing password reset attacks with voice cloning. Social engineering [manipulating people to make security mistakes] is real and deepfakes are going to supercharge those social engineering attacks on your organizations, both internally and externally.

So what do you do about it? Well, everything in this space is mitigation, not elimination strategies. If somebody wants to hurt you, they're going to hurt you. But you can mitigate that and you can minimize the damage.

If I'm the leader in an organization or government, every single piece of content that I release publicly should be digitally signed by me. My earnings calls, images, video interviews, so that when something comes out that purports to be an earnings call or a photo or a speech, if it's not digitally signed by me, it's not real. You immediately have reasonable proof this is probably fake. So that's number one.

Number two is, you need to do tabletop exercises. How are you going to respond? Who's your first call? Who's your second call? How do you get this stuff off Twitter and Facebook as fast as possible? How do you figure out who did it and hold them accountable? Because the one thing we know is that if they get away with it, it's going to happen again. Who in your organization is responsible? Is it the CISO (Chief Information Security Officer)? Is it public relations? As I talk to these organizations, often nobody really knows whose responsibility it is.

A press release has to go out. You've got literally minutes to respond to these things. The half-life of a social media post is measured in about 60 seconds. Half of all views happen in the first minute. You don't have hours or days. You have minutes to respond.

What's the best place for that function within an organization?

It's a great question. What we're seeing is the CISOs are owning this. And that seems about right to me. That's probably the right place for it. But it is not in their wheelhouse. This is not something they know about, most of them. So I spend a lot of time talking to CISOs, and CEOs for that matter.

You and I have discussed manipulated media in terms of the "uncanny valley." Can you talk about that?

The term came from robotics, building humanoid robots that physically interact with us. But it also is used for images, audio and video. Technology that looks like cartoons are funny and pleasurable to watch. But when it starts approaching human-like appearance, but not quite human, we become very uncomfortable with it. It feels weird, uncanny.

The quality is such that faked images of people have now passed through the uncanny valley. They are highly photorealistic and we don't find them weird or uncomfortable. People can't reliably say, when they look at images, whether it's a real person or not. Audio—just speech—is just about through

"THIS IS GOING TO HAPPEN: SOMEBODY'S GOING TO CREATE A VIDEO OF YOUR CEO KICKING PUPPIES DOWN THE STREET. AND THEY'RE GOING TO RELEASE IT ON TWITTER WHERE IT WILL GET MILLIONS OF VIEWS. ... OR, SOMEBODY'S GOING TO CREATE A FAKE EARNINGS CALL OF YOUR CEO, SAYING YOUR PROFITS ARE DOWN 5 PERCENT AND THE STOCK MARKET IS GOING TO MOVE BILLIONS OF DOLLARS BEFORE YOU CAN FIGURE ANYTHING OUT."

the uncanny valley. Chance yields 50% correct answers in judging which clips are fake and which are not. The results now are around 65%, so still slightly better than chance.

Video is a bit of a mixed bag. Think about the Will Smith eating spaghetti videos from a year ago that were hysterically bizarre—although these have improved quite a bit, these videos are not quite there, yet. Deepfake videos, however, where one person's face is superimposed onto a video character—those are very good, but not yet perfect. But six months, 12 months, 18 months—these things are all going to get better and better, cheaper, more accessible, and they're going to be used more.

Generative AI—and this is within a very short window, within a couple of years—has moved from, "This is terrible," to, "Holy crap. I can't tell the difference." And I think video is going to follow the same suit. It's just going to take, maybe, another year, year and a half.

What does that mean for all of the problems we just talked about?

It's going to get worse. The only hope is that the interventions start to keep up. Spam gets worse, virus gets worse, but the interventions get better. Everything escalates together, that's the hope.

But if you look at how much money is being poured from the venture capitalists here in Silicon Valley into the Generative AI side versus the defense side, the interventions side, it's orders of magnitude different. Generative AI has billions of dollars being poured into it. Companies like mine, millions of dollars are being poured into it.

Defense is hard. And it's less lucrative. So we are a little outgunned, in terms of the VCs, the talent, the academic literature. That's worrisome. I keep waiting for a rebalancing, but it's not rebalancing. So I think things are going to get harder.

But the hope is a combination of awareness, conversations like you and I are having right now, some regulatory pressure, and some good tech will start to mitigate some of the risks.

Where are we with the regulatory end?

In October of last year, President Biden released an executive order on all issues of AI, from Generative AI to predictive AI. There is now something being housed under the National Institute of Standards of Technology called the AI Safety Institute that is being tasked with these issues.

I spend a lot of time talking to folks on the Hill, and there is not a single branch of government that is not thinking about this: FTC, FCC, DOJ, NSA, CIA, FBI, the executive branch, the legislative branch. It's a little incoherent and inefficient, things need to start getting consolidated, but everybody is thinking about the sort of new world that we are entering, both AI and Generative AI.

"WHERE ARE WE, AS A SOCIETY, WHEN YOU CAN'T BELIEVE ANYTHING? ... IT'S A REALLY DANGEROUS WORLD, A REALLY WEIRD WORLD WE'RE ENTERING RIGHT NOW."

The White House has been working internationally, bringing in our allies from Australia, Canada, UK and the EU, to think about this holistically. Some 95% of the problem is outside the US. Tech itself tends to be very US-centric. There are entire parts of the world where nobody on content moderation teams speaks the native language, for instance—the very parts of the world that you need content moderation.

If you ask me, "What country is doing this best," it's Australia, across the board: AI regulation, social media regulation, monopolistic regulation. Julie Inman Grant is their eSafety commissioner, and she is a force of nature. I tell everybody, "Go, look and see what Australia's doing." The EU has been maybe a little overly aggressive on the regulatory side, but I like where they're going. The UK has an online safety bill. President Biden's executive order, which is of course non-binding, I think is all good.

Those are the four that I'm looking at right now as leading. And then, the state of California is doing a pretty good job. If any of the individual states is going to regulate, it should be California, because most of the tech and most of the VC money is here. I do like some of the language that is coming out of there, but it is being met with fierce, fierce opposition from the VC community.

It's scary to hear you talk about it. I'll admit that I can be a bit of a tech optimist.

Yes. I'm out a little bit on the other side of that. There are days where I think, "This was an interesting experiment, the internet. Let's shut it down." But I wouldn't be doing this work if I didn't have some hope. What we do is necessary, but it's not sufficient. We need people to care, people downstream from us, the tech companies—and upstream from us, which is the regulators.

Thank you. This has been a wonderful conversation.

Great seeing you, as always, Chelsea. ◆

CHELSEA MAGNANT is a Director in Brunswick's Washington, DC, office and leads the firm's AI Client Impact Unit. She previously worked with Google on tech policy strategy. She began her career with the CIA helping US senior policymakers navigate complex geopolitical issues.

The Triple Wave

Brunswick's **MEAGHAN RAMSEY** talks with author **EMMANUEL VIVIER,** who sees a convergence of accelerating trends for business.

In today's rapidly evolving business landscape, leaders are facing a convergence of three forces that are accelerating change at an unprecedented pace: artificial intelligence, sustainability initiatives and the future of work. These three phenomena are not only reshaping industries but are also redefining the role of leaders in guiding their organizations through these transformative times.

Emmanuel Vivier is a noted expert on the intersection of technology and business innovation, and founder of the business transformation think tank, The Hub Institute. He suggests we are witnessing these three streams merging into a new paradigm for business leadership. His book *Triple Wave of Acceleration* describes this trend.

"These three themes have become unavoidable," he told us in a recent interview. "They are the essential levers for ensuring the competitiveness, resilience and sustainability of businesses in a world marked by volatility, uncertainty, complexity and ambiguity. AI is revolutionizing business processes and decision making; sustainable development is a strategic requirement in the face of climate and societal challenges; and the future of work is redefining how companies are organized in the digital age and hybrid work.

ILLUSTRATION: LINCOLN AGNEW

REVOLUTIONIZING BUSINESS

From automating routine tasks to providing deep insights that guide strategic decisions, AI is enabling businesses to operate more efficiently and with greater precision. But AI's impact goes beyond operational efficiencies; it is fast becoming a core driver of business strategy.

AI-driven technologies, such as machine learning and natural language processing, are not only enhancing operational processes, but also enabling businesses to offer new products and services that were once considered out of reach. Business leaders that understand this and orient their companies to harness AI effectively are poised to disrupt markets and stay ahead of the competition.

But it would be easy to get carried away. Leaders must balance technological advancements with a clear strategy to ensure that AI investments align with their broader organizational goals. Vivier argues that AI should not be seen merely as a technological tool, but as a crucial element for achieving business competitiveness and long-term resilience.

It helps businesses optimize resources, cut costs and enhance productivity—key advantages in a volatile market. AI can dramatically improve supply chain management, reduce carbon footprints and streamline operations. It can even automate repetitive tasks, freeing employees to focus on higher-value activities, ultimately creating a more innovative workforce.

This implies a kind of partnership with the technology, embracing a cultural shift in how organizations think about data, decision making and automation.

Companies that use AI to enhance the employee experience and foster a culture of inclusivity and responsibility will stand out in the marketplace, helping them attract top talent and improve their organizational culture.

"French companies are taking a proactive approach, integrating strategies aligned with European regulations (the Corporate Sustainability Reporting Directive, for instance) while exploring responsible innovations," he says. "They are investing in relocation, resource circularity and transparency to reinforce legitimacy with consumers and investors."

However, Vivier cautions that AI must be deployed ethically and humanely.

"Artificial intelligence has profound implications for society, business and individuals," Vivier says. "Ethical AI ensures that technology serves humanity rather than causing harm or exacerbating inequalities. It's not just a regulatory necessity—it's a business and reputational imperative. Human oversight that can also curb algorithmic bias, build in transparency and accountability, protect user data and promote sustainability—these measures reflect a responsible use of AI that can build trust, reduce risks and contribute to a more just and equitable society."

AI IS PLAYING AN INCREASING ROLE IN DELIVERING SUSTAINABILITY PLANS TO IMPROVE ENERGY EFFICIENCY, REDUCE WASTE AND OPTIMIZE SUPPLY CHAINS.

THE SUSTAINABILITY IMPERATIVE

Sustainability has become core to business strategy. As climate change accelerates and societal expectations evolve, businesses are under increasing pressure to demonstrate their commitment to sustainable practices. Proactive integration of sustainability measures and transparent reporting have become key factors in building trust with consumers and investors, Vivier notes. Companies that take a holistic, responsible approach are better equipped to address emerging challenges while securing a competitive edge in an increasingly eco-conscious market.

AI is playing an increasing role in delivering sustainability plans to improve energy efficiency, reduce waste and optimize supply chains. For example, AI algorithms can predict energy consumption patterns, helping businesses transition to renewable energy sources or reduce their carbon footprints. AI-powered analytics can also track and manage a company's sustainability goals in real time.

Vivier emphasizes that sustainability is no longer just about reducing environmental impact; it is about integrating sustainability into every facet of business operations, including the people-focused aspects like human resources, talent management and company culture. The future of work, according to Vivier, should be grounded in responsible practices that benefit both people and the planet, helping create a more engaged and productive workforce. According to Vivier, "organizations that embed sustainability into their core strategies are not only reducing their environmental impact—they are also positioning themselves as forward-thinking leaders in their industries, attracting talent and investment in the process."

REDEFINING THE WORKPLACE

The future of work is increasingly digital, decentralized and dynamic—and AI is playing an increasing role. Automation, collaboration tools and virtual environments are transforming how people work, where they work and even the types of roles that exist. Companies need to equip their teams with the tools and resources to adapt to a fast-changing environment.

More and more businesses are investing in upskilling and reskilling programs to ensure their workforce is prepared for the demands of a rapidly changing world. Collaborative approaches with universities and startups are increasingly becoming integral to talent acquisition, helping organizations tap into diverse skill sets while staying ahead of technological advancements.

However, this technological shift also brings fresh questions to the fore, like how best to care for the well-being of employees. Vivier highlights that successful companies will be those that offer human-centered, flexible and inclusive work environments—ones that recognize employee engagement and mental health go hand in hand.

Leadership in this new era requires a commitment to fostering a culture of innovation and agility. Vivier says "Leaders must inspire their teams to embrace change, build cross-functional capabilities, and prioritize lifelong learning." This also means investing in AI-driven tools that enhance collaboration, streamline workflows and improve employee engagement. Most importantly, he says, "it's about understanding that people will always be at the heart of any organization—no matter how much technology is involved."

CONVERGENCE

The growing interdependence of these three accelerations presents a unique opportunity for business leaders to rethink their strategies. Businesses that recognize these shifts as interconnected drivers of innovation and organizational success will be better positioned to lead in the next digital age.

To successfully navigate this triple wave, business leaders must focus on the following key areas:

1. **Adapt quickly and proactively:** As Vivier explains, acceleration means adapting to change at a faster pace, not waiting for it to slow down. Leaders must develop agile strategies that embrace technological and societal shifts in order for their businesses to stay competitive.

2. **Foster adaptability:** The future of work demands a mindset that values agility, continuous learning and collaboration. Business leaders must empower employees with tools, resources and opportunities, and organizations must create flexible, inclusive work environments that leverage AI to enhance productivity, creativity and the overall employee experience.

3. **Sustainability and responsibility:** Integrating sustainability principles into business operations is no longer optional. Leaders must prioritize both environmental and social factors in their decision making to build trust with consumers, employees and investors alike.

4. **Invest in talent:** The intersection of AI, sustainability and the future of work requires a new set of skills. Business leaders must prioritize ongoing learning and development so their teams can thrive in an ever-evolving landscape.

The Triple Wave of Acceleration is not just a trend but a defining moment for businesses, Vivier says. "Leaders who understand the interconnections between these three forces and embrace them strategically will shape the future of their organizations, ensuring long-term success in a rapidly changing world." ◆

MEAGHAN RAMSEY is a Managing Partner in Brunswick's London office. She advises leaders on high stakes issues, particularly those impacting society.

PHOTOGRAPH: COURTESY OF EMMANUEL VIVIER

The global economist **BARONESS DAMBISA MOYO** says the evolution of AI requires a near-constant reassessment of what we thought we knew. By **KEVIN HELLIKER**.

MOYO ON AI

DAMBISA MOYO IS A MEMBER OF THE UNITED Kingdom's House of Lords, a long-time board member at large international companies, and the author of five best-selling books on economics, geopolitics and business management.

Baroness Moyo, a native of Zambia, is also a global economist who lives between the UK and US, and travels extensively. Her preferred method of research is in person.

She has been a vocal advocate for the benefits of AI for society while warning about its potential to widen income inequality. When the *Review* spoke with her during a recent California visit, she told us her research in recent weeks has shifted her outlook on AI.

In a 2023 essay for Project Syndicate, you wrote that "there is no reason to think that AI will not" benefit society in the way that technological achievement traditionally has. You foresaw possible enhancements in trade, global connectivity, education, public health and more. Two years later, are those benefits as likely as ever?

Maybe not. I've had numerous conversations with people recently that have surprised me. Essentially, there is a concern about compute power; they feel the speed and gains of large language models (LLMs) may be stalling. I think if you're not in Silicon Valley, you're assuming there's more money getting pumped in, and that money is going to drive more hyperscaling. But I'm hearing a lot of people talk about hard constraints around chips, data. That there is no more exponential growth in knowledge and speed to be expected than what we've already seen.

There are clearly AI gains to be had for individual consumers. I can search faster and more comprehensively; I can use ChatGPT to get information. But there are still too many errors—hallucinations, as they're called—for AI to be fully rolled out at the enterprise level. It's one thing if AI makes a mistake while you're searching for information—it's another if that mistake affects an airline's entire ticketing system.

From here on out the gains are going to be more incremental?

Correct. Some say the next burst of a big gain could be 50 to 100 years from now. I don't know. Investors I've spoken with have said that

progressive LLMs just cannot defy the laws of physics and produce a faster AI.

I spend a lot of time talking with the top venture capitalists. From an investment standpoint, nobody is generating attractive returns. Somewhere between $60 billion and $130 billion is going into venture capital for AI every year, with massive expectations about what the returns on these investments should look like. Everyone invests believing they are going to see returns like Nvidia's. But the smartest people I speak with in venture capital say there's a very high likelihood that most of these investments are going to zero—that is a lot of misallocated capital.

If the benefits of AI are slower coming than expected, would that be true as well for the real-world risks?

I don't think the risks are gone. Everything I've been hearing has been focused on the US. I certainly believe that there are equally smart people in Russia or China sitting around a conference room debating these issues, but I have a less clear sense of what the risks are like there.

In terms of what I think I do know, in terms of what we as a society think we know, I always think about that adage attributed to Mark Twain: "It's not what you don't know that gets you into trouble, it's what you know for sure that's just not so."

In your July AI column, you wrote that 2023 R&D investment among the "Magnificent Seven" Silicon Valley giants equaled the entire R&D budget of the European Union. Is that worrisome?

What's worrisome is the concentration of power. If it becomes the case that a handful of companies have more data, more information, more influence in an AI age than a region or a country, how are we going to react to that? I think we're going to start asking some really hard questions about centralization of power, ownership of models and data.

Bitcoin, in a way, embodies that. In December you saw it trade at over $100,000. People can dismiss it, but at some point it becomes too big to ignore. All the talk about how governments won't allow bitcoin to exist because governments derive their power from fiat currency—that's going to be challenged. The balance of power is shifting dramatically. And I think governments will struggle to fight back.

It's not just power. It's talent. When asked recently, a president in Europe said their biggest concern is how quickly they're bleeding talent. That talent is going to places like the US, and Silicon Valley more specifically.

"SOMEWHERE BETWEEN **60** BILLION DOLLARS AND $130 BILLION IS GOING INTO VENTURE CAPITAL FOR AI EVERY YEAR, WITH MASSIVE EXPECTATIONS ABOUT WHAT THE RETURNS ON THESE INVESTMENTS SHOULD LOOK LIKE."

KEVIN HELLIKER, a Pulitzer Prize-winning journalist, is Editor of the *Brunswick Review*.

My main point is that there are new avenues of power and influence emerging with AI. These new avenues are further concentrating power, influence and wealth. It's moving so quickly that it's leaving all the other forms of traditional power, the way we've traditionally distributed information, behind.

You've written about the danger of workers getting left behind. Who is responsible for making sure that workers benefit from AI—government, industry, or both?

I'm a believer in market capitalism. I see capitalism as the most innovative, biggest driver of progress. And my response is, it's government's responsibility. Some libertarians may call that government overreach.

But I don't think corporations are going to solve this problem. They may wish to solve this problem. They may make efforts to solve these social problems. But I think when all is said and done, it's government that has a vested interest in seeing a more equitable, more progressive society. I don't think that the nature of corporations makes it possible for them to do that.

How might government act? You've written about the possibility of a universal income.

I think everything's on the table. It's very eye-opening for me to travel around the world and see how other people are living, and how disconnected their expectations are from their realities. And I think governments need to be much more aggressive about trying to close that gap.

Because that's what revolutions are made of. I'm not being a catastrophist; I'm simply saying we're in a period of low economic growth, higher inflation and AI that could potentially continue to displace routinized work. It seems to me that governments need to offer something to stabilize that situation. I just published a paper on the eight economic headwinds facing the globe in 2025.

Right now everybody's betting on the US, and it's the only place where there seems any prospect of growth, enthusiasm or innovation. Everywhere else I've been is feeling grim and I don't understand how a unipolar economic juggernaut survives with the rest of the world in as much chaos as it's in. To be in the US is comforting, but it can make you delusional about the challenges going on in the rest of the world.

You wouldn't know that from the Trump opponents who talk about moving to some better country.

I'd love to know where. ◆

PHOTOGRAPH: PREVIOUS SPREAD COURTESY OF DAMBISA MOYO

DIALING UP the FUTURE

AT&T was around for the horse and buggy; now it's a "power user" of AI, according to Chief Information Security Officer **RICH BAICH.** He talks about building—and defending—the invisible infrastructure so integral to the tech's future.

It's 2:34 AM and a chief information security officer gets a call saying their company's network has been hacked—so opens Rich Baich's 2005 book, *Winning as a CISO*.

In the 20 years since Baich wrote his book, cybersecurity risks have surged—think remote workforces, countless connected devices, AI-fueled hackers—and made the opening scene of Baich's book read more like a prediction than a simulation.

The first question Brunswick Partner Ash Spiegelberg put to Baich: "Do CISOs ever sleep through the night anymore?"

"The older CISOs do," Baich said, laughing. "They recognize there's a lot you can do—get the right people, the right strategies and tools and information—and they don't lose sleep over what you can't."

In addition to writing the book on being a CISO, Baich has served in that role for Wells Fargo, AIG, the Central Intelligence Agency—and now, AT&T.

For most people, leaving the CIA would mean stepping away from national defense. For Baich, it was a kind of continuation. "I took this role at AT&T because of the criticality for our customers and for the country," he said. "Finance, healthcare, education, our military—without telecommunications, they're all at risk."

A 140-year-old telecom giant might not be the first name you think of when it comes to AI, but AT&T's network is critical to the technology's future in America. Every ChatGPT query on a smartphone, every autonomous vehicle navigating traffic and every other AI-powered device that uses real-time data depends upon fast, reliable cellular networks and internet connections.

Baich recently sat down with Spiegelberg, who co-leads Brunswick's technology, media and telecoms practice. The pair talked about how the company is already using AI to defend that network, while also enlisting the technology to help with everything from blocking robocalls to mapping technicians' routes.

AI may be the future, but their conversation frequently returned to the past—it was, in fact, where their conversation started.

When people think of AI, they probably don't think of telecoms companies. Can you give a sense of how you and your teams use AI?

There are two things to say about that. First, AI isn't new to AT&T. Some of the first examples of machine learning took place in AT&T Bell Labs in the 1950s, when a mechanical mouse learned to navigate a maze from experience. In 1956, our researchers helped organize the conference where the term artificial intelligence was born. AT&T was one of the first companies to create a firewall. We've always been innovative in this particular space.

And second, we're power users of AI. We use AI to dispatch and schedule our technicians more effectively. In 2023 we launched "Ask AT&T," an internal GenAI tool that can summarize calls and documents, answer questions, things like that. More than 100,000 employees use it, and it's generating over a billion tokens a day—essentially a billion words.

As for our cyber operations, we're using algorithms to detect and respond to threats. They help us prevent and detect fraud, identify anomalies and deviations from the norm, and shorten the time frame between identifying a threat and being able to act on it.

We also use it in robocalls. So AT&T ActiveArmor, for instance, we use machine learning and the power of the network to help detect and frustrate illegal robocalls in real time—every month, roughly 1.5 billion robocalls are blocked or labeled as spam.

What role do you see AI playing in the future of cybersecurity?

What you're seeing today with AI, you see with any emerging technology. When the internet was built, the director of the CIA said we built something we've yet to know how to protect. We learned to build firewalls, antivirus and so on. Then you move to the world of cloud. The industry didn't build security into the cloud. So we all started asking: Do we know where our cloud is? Do we have a configuration? Do we have access management? Are we protecting the vulnerabilities?

It's the same with AI. We're asking: Where is AI in our environment? How are we making sure that it is secure? Are we scanning for access controls? How do we know that AI from a third party is secure?

There's a long history of having to protect emerging technologies or platforms; AI isn't much different than any other new, important infrastructure you have to protect.

How the bad guys use AI—deepfakes, spreading misinformation—attracts more attention than how people are using it to stop them. Is that imbalance a fair reflection of the landscape?

I'm going to go back to history again, because whenever you look at IT advancements, the same issue always comes into play. It's not the actual technology that creates the risk, it's the application. Bad actors figure out how to use the technology to circumvent existing safeguards and controls. They're at an advantage, because they're purely focused on finding one way around a control that's in place.

Back in the '90s, when firewalls were initially released, all the ports were wide open. They quickly realized that meant the human had to know what to close; it was like Swiss cheese. So about 18 months into the cycle, they switched it—all the ports were closed, and you had to go in there to open one. Fast forward to the cloud and you saw something similar with S3 buckets, which were left open by default until someone manually closed them. Now they ship them closed and allow you to open them.

It's not the exact same thing with AI. But adversaries are using AI, and it helps them move with speed—speed to weaponize, speed to deliver. But AI allows us to move with much greater speed as well.

The area you work in requires such deep technical knowledge. How do you help leaders grasp the risks and investments needed to manage it?

So first off, it's being part of the whole AI team. We work very closely with our Chief Data office, which creates a lot of our AI engines and really drives our AI vision. We're part of our data and AI governance review board. We're talking about these issues and incorporating the controls well in advance of launching any large language models, AI-powered agents, things like that.

That's primarily how we try to do this: get ahead of it in the design cycle, understand and point out the risks, and put the controls in place.

As you look ahead, what most excites you about AI? What most concerns you?

I'm excited about AI helping us do things like data analytics and anomaly detection with much greater speed and granularity. The unique insights that come from those—that's really exciting.

My concern: As quantum computing emerges and the power associated with that, combined with AI practices—those could allow bad actors to perform and deliver executable risks at a whole new speed and volume in power. And attackers always tend to be at an advantage in some respects, because as a defender, you almost have to reengineer their techniques to then be able to guard against it.

I think most people assume cybersecurity is largely a question of technology, yet you often talk about the importance of culture.

I've had 15 people that have worked for me now that have gone out to be CISOs, and whenever they call me, I focus on the culture.

Because the type of leader you are needs to be matched with the cultural appetite of the organization. If your vision, your goals and the discipline that you want to bring to the organization align, then the entire workforce gets behind it.

We talk about tone at the top, but ultimately, to be successful, every person in the organization has to be part of the cybersecurity team, the risk team, whatever you want to call it.

That's such an important piece when you think about AI. We provide guiding principles around AI—and I think every organization should have them so their workforce has something to lean on when they're thinking about using it. We believe AI should be by people, for people; it should be responsible; and it should be secure and ethical.

We've published those guiding principles; we stand behind them. We know no organization is going to do it perfectly, but we're committed to doing it right. ◆

"WE USE MACHINE LEARNING AND THE POWER OF THE NETWORK TO HELP DETECT AND FRUSTRATE ILLEGAL ROBO-CALLS IN REAL TIME—EVERY MONTH, ROUGHLY 1.5 BILLION ROBO CALLS ARE BLOCKED OR LABELED AS SPAM."

RICH BAICH, Chief Information Security Officer, AT&T

ASH SPIEGELBERG, a Partner, is co-head of Brunswick's tech, media and telecoms group. He is based in Dallas.

ILLUSTRATION: LINCOLN AGNEW; PHOTOGRAPHS IN ILLUSTRATION: COURTESY OF AT&T ARCHIVES AND HISTORY CENTER

A RACE for the

Before making his name working in Washington and Silicon Valley, Chris Lehane was a history major at Amherst. In his telling of it, technology took the world from the Stone Age to the Agricultural Age and then to the Industrial Age. Now he thinks artificial intelligence has us poised to enter an entirely new era, the Intelligence Age.

Lehane is the Chief Global Affairs Officer at OpenAI, one of the most critical roles at arguably the most consequential company shaping artificial intelligence. OpenAI's launch of ChatGPT in late 2022 was the starting gun that set the AI race into motion—and as that race intensifies, so does the pressure Lehane feels.

"AI will shape the future of US national security and economic competitiveness, and transform everything from education to healthcare, so the stakes couldn't be higher," he said. "I wouldn't typically quote Vladimir Putin, but he said whoever wins this contest wins the world. And I think he's right."

Washington—which Lehane understands better than most in Silicon Valley—is waking up to the importance of the AI race. In mid-December, the bipartisan House AI Task Force published a report with 89 separate policy recommendations. "I've spent enough time in Washington to know how hard it is to reach bipartisan agreement on any major issue, especially one as complex as AI," Lehane wrote recently. "The fact that this report drew the unanimous support of lawmakers from both parties is a reminder that AI transcends politics."

In a discussion with Brunswick Partner Ash Spiegelberg, who co-leads the firm's tech, media and telecommunications group, Lehane spoke about the need for bold action on AI.

The days between their conversation taking place and being published offered a glimpse of how quickly and profoundly the AI landscape can change. In that time, President Trump announced a $500 billion Stargate Project to build new AI infrastructure for OpenAI in the US—a project whose funders include SoftBank, OpenAI and Oracle, and whose technology partners include Arm and Nvidia.

The second development proved Lehane's prescience: a new AI model launched by DeepSeek, a Chinese tech startup, sent shockwaves not only for its sophistication but also because it appeared to require less expensive chips and fewer resources. Legendary tech investor Marc Andreessen called the model's launch "AI's Sputnik moment"—which Lehane had warned Spiegelberg was coming.

Where are we right now with AI? And what might we expect to see in the not-too-distant future?

When Steve Jobs first explained what a computer was, he talked about it being a bicycle for the brain. What OpenAI released in November 2022 with ChatGPT—which is really ChatGPT 2.5—was like a 10-speed bike for the brain. What we released in September—our o1 model, which has the capacity to do reasoning—you could consider an electric bike. What's coming in the near future will be a motorcycle for the brain. And after that, maybe a fleet of motorcycles. Eventually, a flying fleet of motorcycles.

Another way to think about it is on the scale of electricity. Electricity transformed how we live, work, connect with each other—even how we play. Sam Altman, our CEO and co-founder, talks about AI leading us into a new Intelligence Age. It's going to create enormous growth and, with it, incredible opportunities to share that prosperity.

If you zoom out and think about what AI is, it's giving people tools to help solve really hard problems. But if you want to have an AI that benefits everyone, where people are able to use this as a tool for themselves, then we need to build democratic AI that aligns with core values like individual choice, privacy, respect for the rule of law and a commitment to making the technology accessible to all rather than being centralized in the hands of a powerful few.

The stakes actually are that high, says OpenAI's Chief Global Affairs Officer **CHRIS LEHANE.** His recipe for ensuring the US wins the AI race: **"Think big, act big, build big."**

WORLD

You've said that the world faces a choice: democratic AI or autocratic AI. Is it really that simple and that stark?

Right now, objectively, there are two countries that can build AI at scale: the United States and the People's Republic of China. This is a zero-sum game: there's about $175 billion in global infrastructure funding waiting to be invested, and the only question is whether it ultimately goes to US-backed projects or China-backed ones. I feel very strongly that the US is going to win. Our democratic system, and the democratic values built into it, are inherent superpowers. But right now, the US has somewhere between a six-month and three-year advantage.

The illustration above was created for this article via prompts in OpenAI's image creation tool DALL-E.

How do you measure each country's relative strengths in AI?

We think about this in terms of a "compute gap." The key elements are chips, data and energy—if you put them together and marshal them, they give you compute. It's compute that allows you to build AI and keep innovating it.

If you were imagining a chart of this competition, the US is still ahead, but China is accelerating at a faster rate. Where does the PRC have advantages?

On the data side, because they can scoop up as much data as they want. They have enormous amounts of energy—they've built more nuclear power in the past 10 years than the US has in the last 40.

I'm not a computer scientist or a mathematician or a physicist, so I default to historical analogies as a history major. Sputnik was a major wake-up moment for the US in the '50s; its launch surprised a lot of folks with how advanced the then-Soviet Union was technologically.

We could be heading towards a Sputnik moment for AI, too, because China is working really hard to improve its models. It's really important for people to understand that this is not an abstract concept. This is an incredibly competitive race with enormous consequences.

The US is ahead right now because of our innovators, entrepreneurs, builders and thinkers—an incredible pool of talent. But to stay ahead, we need to ensure they have access to the compute power they need to keep pushing forward.

You say "infrastructure is destiny." Yet there's a perception that democracies have an infrastructure problem—they tend to be slower in planning, approving and building large-scale projects. Can the US overcome this?

Infrastructure is destiny—no infrastructure, no compute. So maintaining our lead comes down to: Can we create a smart, public-private approach to infrastructure?

In the US, big breakthroughs have always involved collaboration between government and the private sector. Take the auto industry—it flourished because the federal and state governments worked together to unleash American innovation. The interstate highway system under Eisenhower was another massive build-out, done for both security and commerce.

Then there's the internet. Back in 1996, I was in the White House when Democrats, Republicans, President Clinton and Vice President Gore all recognized that the World Wide Web—that's what we called it then—was important. The initial instinct was to regulate it like technology that already existed, TV or radio, but those laws didn't fit. Instead, they focused on ensuring this innovation would be American-led and built by American talent. So you had the 1996 Telecommunications Act. Fast forward to today: Most of the major digital companies in the world are US-based.

That's what it'll take: thinking big, acting big and building big.

OpenAI

PUBLISHED TWO BLUEPRINTS—an Economic Blueprint and an Infrastructure Blueprint—laying out proposals for extending America's global leadership in AI. Both argue that AI's benefits can be shared responsibly and equitably—but not without thoughtful design and bold action.

The good news is that the US has a history of doing that. And today, national security remains an issue that tends to galvanize Democrats and Republicans and produce political action.

National security is also one of the rare areas where the public and private sectors have historically worked together—and one where we believe they can, and should, work together again. We just released a new Economic Blueprint that outlines the specific ways that companies like OpenAI can work with the government to extend America's global leadership in AI innovation, ensure equitable access to AI and drive economic growth across the country.

When it comes to national security, that would include things like developing export policies that would allow the US to share frontier models with allies and partners while ensuring those cutting-edge models don't wind up in the hands of countries that don't share our values or commitment to personal freedom, economic opportunity and the rule of law.

OpenAI also recently released its Infrastructure Blueprint. That calls for creating "AI economic zones" in the US. What does that look like?

Since the beginning of what we would call the Digital Age, say the mid-90s to today, a disproportionate amount of the benefits have flowed to the coasts from that economic expansion, growth and development.

With AI, because it is going to be an infrastructure-type technology—like electricity—how do we think about those benefits reaching the entire country? Take Kansas. It's a place where people are building data centers. Through a blend of natural gas, wind and solar energy, Kansas can handle the energy component, which is crucial. But Kansas also has a ton of data on agriculture—maybe as much data as any place in the world. Now imagine building a one-gigawatt facility in Kansas, where you allocate 250 megawatts to the university system there to specifically stand up an AI agriculture model that would not just serve Kansas, but the entire country—and maybe even the world. Then you attach visas to that project, so you attract high-skilled workers from all over the world to come to Kansas. You can start to see how an entire AI ecosystem takes shape, creating enormous opportunities for people who are from Kansas, born in Kansas and want to stay in Kansas.

A lot of these great states have effectively been greenhouses for the two coasts—these places grow

incredible talent, and the talent goes off to the coasts. I say this as a kid from Maine, which is on the coast but has a similar dynamic. If you think about AI as infrastructure, then it has both a reindustrialization aspect for the US, and the ability to reinvigorate the American Dream.

I've got to ask you about nuclear submarines—that's not a topic that comes up a lot when people talk about AI.

Without energy, none of this works. The United States Navy operates around 100 small modular reactors (SMRs) on its fleet of nuclear submarines. These reactors are roughly 250 to 300 megawatts each. If we can put small nuclear reactors on submarines that travel all over the world, sometimes in pretty volatile places, then we should absolutely be able to build those reactors safely here on stable ground in the US.

Should Washington lead on AI policy, or is there a role for states as well?

It's not just that there's a role for states to play; it's that the US will only keep its lead in the AI race if both Washington and the states help set the rules of the road for the technology.

To be more specific, you could see a scenario where Washington focuses on setting policy for the aspects of AI that impact the entire country, like ensuring the safety of frontier AI systems because of their implications for US national security and economic competitiveness. States could craft targeted policies to protect children, prevent the proliferation of deepfakes, help users know if they're seeing AI-generated content and address other areas where AI impacts daily life.

We've gotten this balance right before. Michigan emerged as the center of the US automobile industry because policymakers in Lansing and Washington passed state and federal laws which helped create thriving ecosystems of automotive manufacturers and suppliers, provided federal funding for highway construction projects and offered support for workforce training programs. Generations of workers were able to enjoy their fair share of the American Dream, and Detroit and its surrounding communities became part of the Arsenal of Democracy that helped to win World War II.

"IF YOU THINK ABOUT AI AS INFRASTRUCTURE, THEN IT HAS BOTH A REINDUSTRIALIZATION ASPECT FOR THE US, AND THE ABILITY TO REINVIGORATE THE AMERICAN DREAM."

CHRIS LEHANE

Another place where AI is in focus—particularly when it comes to regulation—is the EU.

A lot of people look at AI as if it's the next version of social media. And I think many policymakers and businesses in Europe felt social media was an extractive technology. Yes, it helped people connect and engage, but the sense was these companies were able to access data, monetize that data and the flow of capital went from data in Europe to monetization outside of Europe.

Folks have to understand that AI is not social media. It's not an extractive technology, it's actually a productive technology—if it is built, developed, used, deployed and accessible in these countries. That's incredibly important for Europe to understand, because there's a limited window for countries to position themselves and make those necessary investments to get those productive benefits.

Look at the Draghi Report, which found that the EU is grappling with slow growth, aging populations and innovation gaps. Germany and France have energy. They have access to rich, unique data. They have talent. How do you take advantage of that?

You're British, Ash, so I'll use an example from the UK—think of the National Health Service. It's probably sitting on top of as much healthcare data as any entity in the world. The UK has some of the leading talent already in the world. They have the gold of the AI era—data and talent. If the UK created the leading healthcare model in the world, not only would that serve NHS, but it would also obviously help people in the UK—they'd enjoy better care, and maybe solve diseases we'd never thought were solvable.

But even more, that model could become a global, commercial entity for the UK, which both has soft power components to it and real direct economic benefits.

I know these things are easy to talk through and talk about, but let's not lose sight of the fact that these are genuine possibilities. The question is whether you act boldly enough to take advantage of them. ◆

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ILLUSTRATION: NIGEL BUCHANAN

GOOGLE'S

Royal Hansen

On security, digital hygiene & the cobbler's children

In seeking an interview with Google's Vice President of Engineering, Brunswick's Chelsea Magnant held an advantage: She used to work hand in hand with Royal Hansen's team at Google and frequently staffed Hansen in his meetings with DC policymakers. In fact, this article is based on a video interview that began with all the cheer of a reunion between friends.

Yet the guidance Hansen offers below isn't just between friends. He begins from the standpoint of his history in cybersecurity, but broadens into more general thinking about AI, the digital ecosystem and the safety of networks. His thoughts, of greatest interest to cybersecurity experts, warrant the attention of anyone with a keyboard. His goal is to put "into the water," for use by everyone, security practices and information that can help keep digital thieves at bay.

A graduate of Yale with a degree in computer science, Hansen has served as a Managing Director at Goldman Sachs, an Executive Vice President at American Express and a Senior Vice President at Fidelity Investments. In those and other roles, his concern was digital integrity.

Could you tell us about the road that led you to Google and your role today?

I started professionally as a software developer, having studied computer science. Yet I'd also studied Arabic and the Middle East, and I always had a deep interest in world affairs and events. So for me it was a kind of natural evolution from software development to software security or the cybersecurity space.

There was a Robert Redford movie called *Sneakers* (1992), where they tried to break into a bank on behalf of the bank, to test their controls. We tried at a little company called @stake to sell the services of

ILLUSTRATION: LINCOLN AGNEW

basement hackers to break into banks as they were building new websites, transferring money, et cetera.

That was my introduction to security. That thread led to working in banking for most of my career, because bankers were the people who cared. The first place that cybersecurity mattered was the banks.

Going on seven years ago I joined Google. It wasn't just the banks anymore. Every industry, every sector, all kinds of technology, whether it was mobile, whether it was AI, whether it was banking or healthcare, whether it was undersea cables or data centers, Google was a place where I could contribute to security that would get into the water. Everybody could benefit from it if we did it well.

What are the biggest security risks today, particularly given the evolution of Generative AI and just AI more broadly?

At Google, we've been using AI in our products for 15 years. We had a team in security doing AI kind of in its current state in 2011, 2012. Last year, as you know, two of our scientists won the Nobel Prize in Chemistry for their AI-related work.

AI got baked into Gmail in terms of defending against spam and phishing. It got baked into the Play Store to detect malware in applications. It got baked into the browsers so that the browsers defended against malicious sites. To me, the beauty is we knew how to use AI.

What most worries me is that, throughout industry, cybersecurity professionals might not use the technology to defend. We'll be busy being worried about all kinds of newfangled AI-related threats—which, to be sure, must be addressed. But if we don't use AI for productivity, for insights, for sharing and for automation to make defenses faster, better, we'll fall behind, we'll fail to anticipate the attackers.

The cobbler's children having no shoes—that's my analogy. Let's not be a bunch of security people who are busy worried about artificial general intelligence yet not using it to do our jobs more efficiently and effectively. That, I think, is the first big risk.

The second involves the boom around AI. In that rush—and you've seen this with a few of the other providers of AI or models—people are not doing the basics well because they're so busy worrying about building out a new AI stack or a new chatbot or whatever it is. We can't throw out 25 years of foundational security in the infrastructure, in the data center, in the software, in the databases. This is the second risk: In the rush to follow the shiny new object, we forget about all the hygiene and maintenance and quality that needs to be baked into these stacks.

DeepMind

The power of AI was on display recently for its role in medicine. Two Google DeepMind researchers in the UK won the Nobel Prize for Chemistry in 2024 for creating an AI-driven model, AlphaFold, that can accurately predict protein structures. Demis Hassabis and John Jumper shared the prize with David Baker, at the University of Washington. AlphaFold has been cited in scientific papers more than 20,000 times. The Nobel Prize notes the enormous potential for drug discovery from their work.

DEMIS HASSABIS
DeepMind Co-founder and CEO

JOHN M. JUMPER
DeepMind Director

In navigating those societal or security or safety questions with policymakers, the private sector is currently playing the leading role. This leads to my third concern: We need the public sector to lead and be willing to think about and accept some tradeoffs. If we don't have a good dialogue on policies and tradeoffs, we will underachieve as a society. Literally there will be fewer people that get new medications for chronic illnesses. There will be fewer innovations in power generation and fusion.

There are going to be enormous benefits in health, in science, in transportation. Think about any sector, and there will be benefits. Just as there was with the Web, however, there will be tradeoffs. Let's not shut down the innovations because we're afraid of the tradeoffs. To me that's just risk management. Security plays an important role in discussing and managing those tradeoffs.

Earlier you mentioned using AI to protect products and services. To the extent that you can lift the hood and let us have a look, how are you thinking about protecting the models themselves?

Google's Secure AI Framework (SAIF) became the basis for an industry consortium called CoSAI. It's an industry group working on standards around the idea of secure by design, secure by default. The idea is that the components of all these AI-enabled processes or systems will be baked with security so that the user isn't responsible for it.

That means a lot of work we've done on open-source security to make sure that, as people are consuming these packages of software, they know where it comes from, what's in it, whether it has vulnerabilities and how to use it correctly in their own systems.

SAIF does the same thing but for AI. Think of things like model and data cards, which tell you what's in the model, what data was used, what are the risks, what sort of benchmarking it has against safety or security benchmarks. The first thing is just to make sure we bake security into our AI infrastructure.

Much of it's the same, but there are new elements we're baking it in. Whether those are the filters that help look for prompt injections or poisoning of data, that's all part of SAIF.

Last thing I'd mention is red teaming. Back to the Robert Redford example: For years we have run a very skilled red team internally to test our controls. And we're doing that now more holistically, not just security, privacy, safety. We're doing it in different domains: Red teaming for healthcare is very different

PHOTOGRAPHS: DAN KITWOOD/GETTY IMAGES

than red teaming for financial services. So this is cross-functional red teaming, including building little agentic AI models that auto red team the other models. Once again: Use the models to be better and better at red teaming against the new versions of our models that are used for general purpose.

How are you using AI for other Google operations?

I've talked a bit about how it's been baked in in the definition of narrow AI. If you think of narrow AI being like Gmail phishing or spam filtering, there's a lot of that scattered across the Google properties. But the way I think of it now with Generative AI is in four tiers.

First is what I just talked about with SAIF and CoSAI. Make sure the foundations are secure and safe, so we've got teams very active in developing that and deploying it. It's not just a standard. It's what we do internally.

The second is, we don't want to be the cobbler's children, so our teams are just literally using it to summarize emails, to summarize incidents, to automate the generation of a ticket, stuff that's relatively basic but saves a lot of time. Make sure we're first-class users of the more general-purpose capabilities that come out of an AI model.

The third is where we start to use the specific applications, and I'll take coding as an example to extend the more general purpose functions into security. Rather than thinking of security as different from coding, just think of it as secure coding. One example is Gemini (a Google GenAI chatbot), where we're busy working with the teams developing the coding agent such that it does secure coding.

The fourth is the frontier. Finding vulnerabilities, "zero days," as the industry would talk about them, finding vulnerabilities that no one's seen before. We've long deployed very high-end skilled hackers in specific technologies. Now we're using AI to extend their capabilities to find vulnerabilities before anyone else does. Find and fix.

Like Google's AlphaFold found the protein physics (a reference to that Nobel-winning research), we find ways to defend against ransomware using AI.

How are you thinking about using AI to advance cybersecurity across the digital ecosystem?

First, we're being transparent. We had a threat intelligence report, which showed the way some of these nation-state groups or other criminal groups are using Gemini or Generative AI generally, although for the moment they're not using it for any novel form of attacks. We were transparent with that report and we need others to be transparent with the attacks they're seeing. We are creating a community of threat-intelligence sharing.

Second, think through sectors. The controls needed to protect those risks in healthcare will be very different than they are in transportation. There may be different tolerances for risk. That is not going to happen because a software developer working on an AI model knows those specific nuances. Each industry is going to have to be great at protecting against bad outcomes, not protecting against AI per se, but AI as part of a process in automation. Anytime you automate something there are risks. This is technology anybody can use—doctors, air traffic controllers. To be clear, everybody ought to use this. Doing security work at that level takes context that the developer doesn't always have.

Third, be agile. The technology is changing not even month to month but week to week. We need to keep updating and iterating. This will be a very dynamic space for many years, so the security people, the risk management people, need to stay current. Again, that's the other side of being conversant and fluent in using the tech. You're also better at anticipating and knowing where things are going.

If you're just waiting to read about it, and one of your customers is using it, you're inevitably going to be behind. Use it in your job. Anticipate the way your users are going to use it in their sector. You can end up with a world where the defense is largely done by agents informed by experts, rather than experts using software to protect against agents. The agents will actually be the defense as well, and we're starting to see that already.

What advice would you give to ordinary people who are concerned about digital hygiene but lack the resources of a Google?

Two things. One, use AI. I think you're not going to be a good decision-maker without an intuitive appreciation for what AI is. And the beauty of this tech is it's very easy for anyone to use. My son said everybody's got these things open at college. That's what they live on. So everybody needs to be like that. Everyone needs to be more that way.

Second, be careful whom you pick to work with, because this is a little bit of a gold rush moment. There are people who are going to be trying to make money on the boom. They may not be doing the basics. Be careful that you're not baking in a fly-by-night capability. Avoiding that mistake will be easier if people are fluent in working with the technology. ◆

"IF YOU'RE JUST WAITING TO READ ABOUT IT, AND ONE OF YOUR CUSTOMERS IS USING IT, YOU'RE INEVITABLY GOING TO BE BEHIND."

CHELSEA MAGNANT is a Director in Brunswick's Washington, DC office and leads the firm's AI Client Impact Unit. She previously worked with Google on tech policy strategy. She began her career with the CIA helping US senior policymakers navigate complex geopolitical issues.

SUPER-CHARGER

Big tech firms and the Pentagon need more power. They're counting on Dominion Energy CEO **BOB BLUE** to deliver it. By Brunswick's **STEPHEN POWER** and **MICHAEL O'LOONEY.**

Richmond, Virginia is an improbable place to go looking for the future of artificial intelligence. It's a city steeped in history and historic sites: the wooden pews of St. John's Church, where Patrick Henry helped ignite the American Revolution; the Roman-style columns of the state Capitol, designed by Thomas Jefferson to represent America's break with colonial England; the rolling hills of Hollywood Cemetery, final resting place of two presidents.

But on the 20th floor of a skyscraper overlooking the James River, executives at Virginia's biggest electric utility, Dominion Energy, are wrestling with a conundrum central to America's future: how to feed growing demand for electricity from data centers dedicated to artificial intelligence while also keeping that energy reliable, affordable and clean.

Few companies have as big a role to play in feeding AI's energy appetite. That's because Dominion's territory of Northern Virginia is home not only to big energy-using national-security installations like the Pentagon and the CIA, but also the world's largest data center hub, larger than the next four largest markets combined. Data centers in Dominion's territory used more electricity in 2023 than all of the US government's civilian agencies combined used in 2020, and just short of what the US Department of Defense used worldwide in 2020. Over the next 14 years, demand for power in Dominion's territory is set to double—the most rapid growth Virginia has seen since the years following World War II.

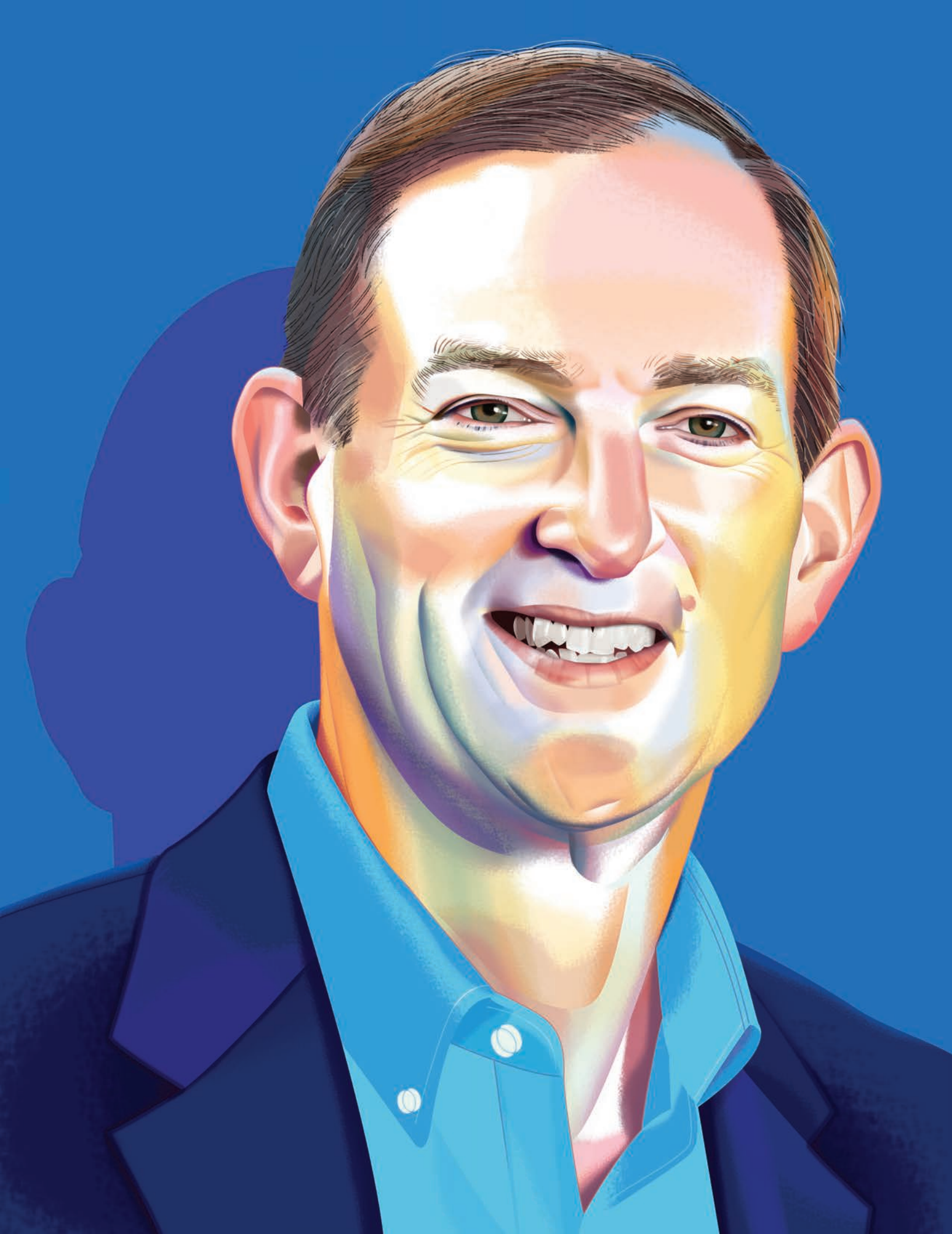
Keeping up with growth isn't Dominion's only challenge. Extreme weather is testing the company, too. In mid-January, record cold temperatures caused electric demand in Virginia to hit a new all-time record, only to be broken the next day. And the day after that.

Leading Dominion's response to these pressures is its Chairman and Chief Executive Officer Robert M. Blue. A native of nearby Albemarle County known to sometimes kayak to work on the James River, Blue has spent much of his life navigating other Virginia landmarks: the University of Virginia, where he studied government and foreign affairs and business in the 1980s and 2000s; the Virginia Capitol, where he served as a senior policy advisor to Virginia's then-governor Mark Warner in the early 2000s; and Dominion, where he held a variety of executive roles before rising to the top job in 2020.

As Chairman and CEO, Blue is pushing an all-of-the-above approach to energy, with investments in small modular nuclear reactors, new battery storage facilities, 12,000 megawatts of new solar (enough to power 3 million homes), the largest offshore wind project in the country currently being built off the coast of Virginia Beach and the world's most powerful pumped storage hydroelectric plant, located in Virginia's rugged Allegheny Mountains.

Dominion is also investing in natural gas—an energy source that adds to the company's emissions but which Blue says is critical to keeping Virginians' lights on when wind and solar aren't available.

ILLUSTRATION: NIGEL BUCHANAN



In a recent interview, Blue discussed how Dominion is balancing its obligation for affordable, clean energy with the need to help the US protect its technological advantage in artificial intelligence.

In an op-ed last fall, you said natural gas will be necessary "to keep the power on when renewables aren't available and battery storage cannot fill the gap." Why did you feel the need to make the case for natural gas?

Our mission statement is quite intentional and carefully thought through. It is to provide reliable, affordable and increasingly clean energy. All three of those pieces of our mission are critical. We start with reliability for a reason. We wanted to make clear to stakeholders who pay attention that reliability in the world we're living in is going to require energy that is dispatchable, that comes on when we want it on. We've got a mandate to keep the lights on for all of our customers and we're not going to be able to do that without more of this particularly reliable form of generation.

How is that message being received?

Some people focus on one piece of our mission to the exclusion of the others. There are some who care only about reliability and don't focus as much on the increasingly clean part. There are other people who are so focused on the clean part that they lose sight of reliability. We thought it was important to make sure that stakeholders understood that we were focused on all three parts of that mission, and this is what it's going to take in order for us to carry it out.

A Chinese startup claimed to have matched the abilities of cutting-edge chatbots with a fraction of the specialized chips. Does that call into question how energy intensive AI will be?

Much of our demand growth for the next decade is locked in by contracts that we've already signed. I can promise you, no one has shown up in the last few weeks and said, "we're not interested in executing on that." They are all saying, "we're going to need more generation and we're going to need it as fast as you can get it to us."

The wait time for data centers in Virginia to connect to the grid was reported to be as long as seven years. Why is that?

We have historically said that a request for a new delivery point by a new big energy user would be anywhere from one to four years. Given the size loads that are being requested today, and given the demand growth, it can now be anywhere from four to seven years. So that was reported as seven years. We're not saying it's going to take seven years, but it is going to take potentially a little bit longer, given the size of the requests and the overall demand growth.

What are your conversations with the big tech companies like?

What they tell us is what you would expect to hear: "Go faster." That's the kind of companies they are. They've become successful because they move quickly. We have to think about the reliability of a large system. We have to adapt a grid that's been built over the course of the last century. And that doesn't always move as fast as our largest customers would like.

But we get high marks from them for being adaptable and trying to address their concerns. And we consistently do that. We have a lot of experience with these companies, so we have a pretty good understanding now of what they want. We're moving rapidly, and we're happy to move as fast as we can as long as we're maintaining reliable, affordable and increasingly clean energy.

Are those things at odds?

There is a tension between serving rapid demand growth and being able to reduce your carbon emissions. People talk about demand growth being driven by data centers, but it's really being driven by people using a data center product. It's not that a data center is deciding they need a bunch of electricity so that we can all live our lives more productively and innovate. The demand is coming because our society is relying more on technology. Serving all that growth just by adding renewables is much more challenging.

How do your customers expect you to do this?

Our customers' view is, "We don't need to know how you generate and transmit and distribute electricity. That's not our problem. That's your problem. We want it to be cheap, we want it to be reliable and we want it to be clean. You figure it out." And that's fine. That's what we should be doing. But as with, I'm sure, many industries, there's not a lot of understanding of how any of that gets done.

Dominion has committed to achieving net zero emissions by 2050. Is that still possible?

Yes, but anyone who's ever run a race knows the first mile feels a lot easier than the last mile does. And that's going to be true of decarbonizing the power sector in this country. We've reduced carbon emissions by 53% since 2005 by switching from coal to gas because gas was cheaper and equally reliable. Now, renewables are going to continue to drive down carbon emissions. We said when we announced our net-zero goal that we could see our way to the first 80%, but that the last 20% was going to require some technological innovations and policy help. That hasn't changed.

How do you define the term "energy transition?"

In our view, there are really three transitions all going on at once. One of them is reducing carbon emissions and becoming cleaner. But the second one is the datafication and electrification of everything—that's driving demand growth. And the third is, as people are more reliant on electricity, there's an increasing need for reliability and the resiliency of the grid. And in my view, our company sits squarely at the intersection of all three of those.

We have in Virginia state policy goals to create a carbon-free grid by 2050, with off ramps for reliability. We serve the largest data center market in the world, larger than the next four combined. Our regional transmission operator projected last year that demand growth in Virginia would be 5.5% per year for the next decade and demand would double in the next 15 years. They've revised that forecast recently to up it a little bit. So we're seeing that effect of datafication and electrification, driving demand growth.

We also serve some of the most critical facilities in the world, the Pentagon, the largest naval base in the world, a host of homeland security and national security agencies. That's the resiliency piece. They need us to be increasingly reliable for them to carry out their critical mission. So, we're really squarely at the intersection of all three of these trends, all three of these transitions, which is a little more complicated than just any one of them.

What needs to change to enable companies like yours to meet all this demand?

We've been saying for some time that a rational permitting process is critical. If there is a change in ideology and a permit that was valid with one set of government leaders becomes invalid with another set of government leaders, then it makes it impossible for us to build infrastructure because we've committed capital at that point. That's true regardless of the type of infrastructure we're building, whether it's generation that is renewable or generation that is natural gas or electric transmission—any of these things.

We have a transmission line project near Williamsburg, across the James River. We're retiring an old coal plant that began operating in 1957. As a result, we needed to get more electricity to that part of Virginia through additional transmission. We started the permitting for the new line in 2013. We got the permit from the US Army Corps of Engineers in 2017 and put it into service in 2019. Then, a federal appellate court invalidated the permit. They allowed us to continue operating the line, which is good because it's critical to maintain reliability, but remanded the permit back to the agencies for an environmental impact study. That study still hasn't been done, and it's now 2025. It's an example of how lengthy and at times uncertain the permitting process is.

What would a rational permitting process have?

Having some certainty in the permitting process and the rules of the road is absolutely critical. We're building assets that are designed to last for decades. The permitting process should be very thorough. It should be extremely demanding. And it should have a beginning and an end that aren't too far apart from each other.

In nuclear power, there's a lot of excitement about small modular reactors. Others argue that big nuclear plants offer unbeatable economies of scale and are essential. What's your view?

As a general matter, scale in our industry is really valuable, but the recent experience with large reactors in this country hasn't been very positive. The costs have in some cases ended up being triple what the original estimates were. We're not that big compared to the amount that's required to invest in a large reactor. So the theory with small modular reactors is you're biting off a smaller amount and you will drive out customization, which has been a problem. Every plant is sort of custom built. And so if small modular reactors drive out that customization, it could be really valuable from a cost perspective.

What is something about being a CEO that has been a surprise for you?

I don't know that I'd say that there's anything that's been a particular surprise, but I would say that the importance of all the different constituencies that influence everything that we do, is something that's really been driven home.

What do you mean?

I have a board of directors; our board of directors has shareholders. Policymakers are very invested in everything we do and provide input. Our employees are quite candid about what they think we ought to be doing. And that's good. We're always going to be better with the collective judgment of a group of very talented people and not just one person thinking that he or she knows everything.

What do you say to those who are skeptical about the ability of regulated utilities to move at a pace that's needed to scale up energy infrastructure?

What I would say is that we've done it before. In the years after World War II, there was incredible growth in electricity demand in this country as people electrified appliances, put in air conditioning and heat pumps, and the industry responded. Now, it's more complicated because you have to think about a rate of growth off a much larger base; the grid was a smaller machine after World War II than it is today. So, applying that growth rate to something that starts at a bigger place is harder. The country is much more populated and building infrastructure is harder today than it was then. But the basic focus of our industry on providing this critical service to our customers hasn't changed one bit. If anything, our focus has gotten greater, or certainly a lot safer; the technology that we use in operating the grid has advanced an enormous amount. What hasn't changed is our commitment to reliability. And that's what gives me great confidence that we're going to be able to do this. ◆

"WE'RE MOVING RAPIDLY, AND WE'RE HAPPY TO MOVE AS FAST AS WE CAN AS LONG AS WE'RE MAINTAINING RELIABLE, AFFORDABLE AND INCREASINGLY CLEAN ENERGY."

STEPHEN POWER is a Partner and Global Lead of Brunswick's Energy and Resources practice.
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The Scope of AI in Finance

HELEN KRAUSE, Managing Director, Head of Global Data Insights at Citi, talks to Brunswick's **STACEY CHOW** about fintech collaborations and using AI to foster transparency.

ILLUSTRATION: DAVID PLUNKERT

Advanced algorithms and machine learning have long been important tools in the global financial network. With the sudden advent of ChatGPT and large language models, AI's impact on finance suddenly seems almost limitless.

Side by side with optimism, however, are concerns over how the new technology could be used in "greenwashing," that is, representing climate goals and actions that mask a lack of commitment. An outgrowth of those concerns is the threat of "techwashing," misleading stakeholders with claims about the ability of technology to address specific problems in an organization.

We spoke with Helen Krause, Managing Director and Head of Global Data Insights at Citi, a bank with over 10,000 employees, about her perspective on these trends, their future in a fast-changing industry and the implications for society. Krause has 25 years of experience in finance. Prior to her current role, she was a Senior Quant Researcher in Citi Research.

How is AI being used in financial services and what is the outlook for the future?

In a recent AI in Finance report, we highlighted six categories of AI applications in financial services—coding and software, transaction monitoring and compliance, customer services and chatbot 2.0, credit risk and underwriting, investment research, and asset and portfolio management.

Broadly speaking, current use cases center around operational efficiency and productivity gains, such as filling out RFPs (request for proposals) or due diligence questionnaires. Some have been cautiously exploring investment research summarization, while future-use cases focus on searching for investment signals.

What are the potential risks and guardrails that protect users and employees?

It is widely acknowledged that AI or GenAI outputs could have inherent biases present in the data used to train the models. These need to be tackled before one can trust and use the AI tools. Additionally, there might be legal issues associated with the data, involving copyright infringement and consent. This is why so far the use cases tend to be internal and quite restricted as compliance, risk and legal teams grapple with instigating appropriate controls.

Our AI Regulations report shows AI regulatory developments across major markets over the last six years, with the EU AI Act being the latest addition. It is clear that many initiatives are taking shape across the globe. As regulations continue to evolve, financial institutions need to stay vigilant and make sure they are aligned with the requirements.

How are digital finance and technology, like AI, blockchain and fintech, being used to address sustainability and social challenges? Do you see these playing a role to enhance transparency?

Data availability has long been cited as the major issue when it comes to ascertaining companies' performance in terms of sustainability. It is true that the percentage of companies that disclose is still far from ideal; there are alternative sources, technologies and providers that can help to address the data gap.

For example, remote sensing allows us to gather more frequent reading of carbon emissions or deterioration of soil health of certain sites. There are also providers in the fintech space who use blockchains to lock in records of impact observations as the "ground truths." This applies to the social side also—for example, using GIS [Geographic Information System] combined with facilities data, we can see whether companies and their suppliers operate

in areas that are prone to child labor or forced labor risks. These can help to provide external validations to companies' claims.

As we try to solve greenwashing through technology, how do we avoid "techwashing," that is, viewing AI as a panacea and ignoring any risks?
My role involves a lot of exploratory conversations with fintech providers. We perform thorough due diligence on the technology they offer. It is easy to gloss over the details or fall for marketing tactics around the hype. Ultimately, we need to have a clear objective as to what we are looking for from the tech solutions and whether realistically AI could solve the issues at hand. The best practice we have learned from our conversations with C-suites on the asset management side is to start small: conduct a well-defined proof of concept and investigate the pros and cons of AI solutions.

Are you concerned about the expectations of stakeholder groups for these new technologies?
Many of our reports touch on the expectations. While there is undoubtedly a lot of enthusiasm about how GenAI could revolutionize the way we work, views on the technology are not universal, with many questioning how to quantify the return on investment. Productivity gains and operational efficiency are about money or time saved, but how to show results—that is a key question to answer.

Also, the talent aspect is a major challenge. We need to have highly skilled data scientists or AI specialists who can mitigate the biases and deliver credible outcomes. Currently there is a real battle for talent out there, seeking people with these skills.

We are tackling two dynamic changes—spearheading innovation and tackling sustainability. Both require significant change management and culture change within organizations. What are some challenges in this process?
Change management was highlighted as one of the key challenges when we interviewed the C-suite for our AI report last year, especially cultural change. Some of the best practices we heard on the culture side were: 1) create upskilling and educational programs; 2) increase awareness and accountability; 3) encourage responsible use of AI; and 4) cultivate friendly environments for people and AI collaboration. Starting with a small use case, build nimble tech stacks to test out capabilities while navigating the governance, compliance and risk aspects to set appropriate guardrails.

"As regulations continue to evolve, financial institutions need to stay vigilant and make sure they are aligned with the requirements."

Helen Krause

STACEY CHOW, based in Hong Kong, is a Partner in Brunswick's Sustainable Business Practice. She was previously at the World Economic Forum and the World Bank, with nearly 20 years of experience in sustainable development and stakeholder engagement.

What are the emerging tech solutions, globally and locally, that we should be aware of?
A key consideration for investors as well as corporates has been an increased focus on supply chain resilience due to geopolitical tensions and extreme climate events. More geospatial solutions have been made available in the market to facilitate location-specific analytics to assist in impact assessments.

In terms of other AI trends, we recently published a report on AI in Robots—robots that can now see, learn, move, talk, turn instructions into code and then act. All these elements are able to fit together as a result of the multimodal AI.

Agentic AI is also regarded as the next wave of AI advancement where the "agent" is autonomous, whereas GenAI needs to be prompted to receive a response. Potentially, these autonomous agents could become virtual employees, working alongside the human workforce.

What are some of the collaboration opportunities that you see? What are the lessons learned from your partnerships and initiatives?
In our AI in Investment Management report, there is a section where we discuss buy versus build in length. Companies need to weigh carefully their strengths versus time and cost to build something in-house. Partnerships might come at a cost of lack of transparency, as vendors tend to have proprietary models, the details of which would understandably be guarded carefully.

A collaboration my team has done is with EarthBlox, which provides the compute power we need in order to process geospatial data for our nature impact analysis. The project won a grant from the UK Space Agency as we look to develop a market-leading geospatial data tool. Once the satellite data is analyzed and transformed, it is taken in-house where we can overlay our proprietary data to derive further insights.

What is the one myth that you want to bust around fintech/sustainability?
That myth would be that we don't have enough data. While it is true that company disclosures still need to improve, there are other sources of data available to help with assessments. They are not necessarily in a readily usable format, but technological advancements have made it possible to obtain information required or come up with good proxies. Oftentimes we just need to find the right datasets and combine those with the help of AI tools and technology. ◆

TRUST in an Era of MISTRUST

Trustpilot CEO **ADRIAN BLAIR** sees AI as vital to fostering trust in every aspect of enterprise. He talks to Brunswick's **CAROLINE DANIEL.**

Disembodied personalities interact online as they would in a physical marketplace—sharing posts, selling goods, transacting business. But the lack of face-to-face connection means it is fundamentally harder to trust any of the platforms and people we encounter—making the experience feel more problematic and possibly even dangerous.

Online reviews are a simple, organic means to cultivate trust in this digital landscape and have proven essential, letting the tally of detailed personal experiences inform future potential visitors and customers. Adrian Blair is the CEO of Trustpilot, a business created to facilitate trust through user reviews of companies around the world.

Founded in 2007 in Denmark, Trustpilot had offices in New York and London by 2013. Today, it employs over 1,000 people and millions of reviews are published each month. The company operates on a "freemium" model, with revenue from business subscriptions to their software services. Businesses can't create or edit reviews of themselves, but can respond to reviews, fostering communication and accountability between consumers and businesses.

Blair joined Trustpilot as CEO in September 2023, leaving a post as Chief Business Officer of Cera, the digital-first healthcare-at-home company. From 2019 to 2022, he was CEO of Dext, the leading SaaS accounting automation platform. From 2011 to 2018, he was Global Chief Operating Officer of Just Eat, where he played a key role in its successful growth and transition from a loss-making startup to a FTSE 100 company.

He spoke to us about the work of Trustpilot and the growing role of AI in building trust online.

Why does Trustpilot need to exist?

Trustpilot is an open platform for feedback on businesses. Anybody who's had a genuine experience with a company can go on to Trustpilot and leave their honest opinion. We combine that openness with a global audience and breadth across verticals.

Our reviews aren't just about travel or coffee shops—utility companies, software companies, cybersecurity, telecoms. Our software helps businesses engage and learn from what people are saying about them. We're independent, so we're not linked into a closed ecosystem like Amazon reviews.

What attracted you to joining Trustpilot?

Trustpilot's vision, since it was founded in 2007, is to be the universal symbol of trust. I found that inspiring and something the world clearly needs. Trust has a huge impact on economic growth, across industries and countries. Today, 89% of global consumers check online reviews before making a purchase, according to a UK survey. Nearly half trust them as much as personal recommendations. There is rich evidence of the importance of what we're doing.

The second reason was huge excitement about the commercial potential. Trustpilot has been around for a long time but is still a very early-stage opportunity. We've got over 64 million unique users, and more than a million businesses with reviews, but the need for what we do is far, far greater. There is clear potential to make Trustpilot one of the most successful of all European technology businesses.

Why does trust matter for economic growth? Why is it a foundational value?

The author Rachel Botsman describes trust as "a confident relationship with the unknown." It's what gets you to part with your money for goods or services. Without trust, transactions get delayed, or they don't happen, or they happen with the wrong people. All of that friction gums up economies and holds back productivity.

Our software helps businesses. If you've got a large volume of feedback, we help distill the key learnings. For example, a logistics business found out from reading Trustpilot reviews that a lot of people were complaining about parcels being chucked into their gardens. That meant they could take action.

PHOTOGRAPH: COURTESY OF TRUSTPILOT

How do users' voices get heard on the platform?
Everybody has an equal voice. We don't have the concept of "followers" that exists on social media, where algorithms amplify the best-known voices at the expense of the lesser-known majority. On Trustpilot, everybody's opinion counts. If Elon Musk and my mum each leave a review, as far as Trustpilot is concerned, they are both equally valid accounts, which the business should pay attention to.

How do you calibrate what is an honest, genuinely authentic opinion and get the right balance of content moderation?
Consumers can review any business. This openness and inclusivity is the reason people trust us. We need to stay true to our principles: being impartial between businesses and consumers. We don't edit somebody's feedback. We do screen out reviews that contain hateful content or illegal content. But the only person who can edit your review is you. The company itself can't do it, and we at Trustpilot don't do it as a matter of policy.

We've all heard about rising consumer concern about AI's ability to generate fake reviews and fake consumers at an unprecedented scale. How do you manage that risk with your platform to maintain its integrity?
We've continually invested in advanced fraud detection systems to identify and remove fake reviews. We don't disclose all the details of how we do that, but we do publish a Transparency Report every year on the volume of fake reviews removed. In 2024 we removed 4.5 million reviews, the vast majority of which never made it to the public-facing platform.

AI has helped us get better at this than ever. We have more than 300 million reviews, with over 100 new reviews being submitted to Trustpilot every minute. That gives us a very good sense of what is normal, expected and what looks suspicious. We're always training our systems and improving our ability to spot suspicious patterns in the data to remove reviews before they are published.

Do you think the whole issue of trust has become more existential in an AI era?
It's one of the things that really motivates people here. We're collecting more feedback than ever from users. The CEO of a major bank told me recently he's personally reading the bank's Trustpilot reviews. I start most days by reading our own. They're not always good, but that's kind of the point. As a senior executive it's a great way to cut through the jargon and the layers of management to hear raw customer voices. The noise and chaos of fake content elsewhere just makes what we're doing even more important.

Do you feel online platforms have a responsibility for free speech?
We're dealing with two extremes. On the one hand, "free speech" platforms, like X and TikTok, are a cacophony of voices. Yes, everybody has a voice, but some voices count a lot more than others. It's hard for companies to actually engage or know what to believe. At the other end, you've got platforms for feedback that companies completely control. We call those closed platforms. Companies display reviews, but are very much in control of what is said and revealed to the public. If reviews are completely controlled by businesses, they're not trusted by buyers.

Trustpilot occupies a very important middle ground. Anyone can leave a review of any experience they've had with a business. Businesses can't stop them. In that sense, we are a free speech platform. But there are tram lines around that free speech: The subject matter needs to be "your experience with the business"—not your cat or your political views. We also of course filter out defamation and hate speech. But you do have total freedom of opinion about your experiences with businesses.

We then make it easy for companies to engage with the feedback. It's free for them to reply to everything. A lot of our product innovation helps companies understand more deeply the key issues their customers are raising. We essentially say to

"IF ELON MUSK AND MY MUM EACH LEAVE A REVIEW, AS FAR AS TRUSTPILOT IS CONCERNED, THEY ARE BOTH EQUALLY VALID ACCOUNTS."

businesses, "people are talking about you, come and engage with it. Listen, learn and invite more people to leave feedback." Doing this across countries and industries is a very special position to occupy, and as we become better and better known we start to build a universal symbol of trust.

AI is shifting the boundaries of e-commerce and creating new recommendations and new players. What's the AI opportunity for you?

One area is making sure that the feedback on companies on Trustpilot is valid and reliable—so utilizing AI to spot the fake reviews and make our platform more useful.

Secondly, AI is bringing our audiences to new places. Our Trustpilot brand reviews are already on Google search results pages. On Google, Trustpilot reviews receive 3.5 billion impressions a month, up 91% year on year. AI is now transforming e-commerce, redefining how consumers discover, evaluate and buy products. Commerce is moving towards new recommendations from LLMs. AI tools must get those recommendations right. If they don't, consumer trust will be eroded and AI systems undermined. A trusted source of authentic data is critical for that. Trusted reviews are even more necessary on these emerging AI platforms. Everybody with a voice on Trustpilot will be listened to in new ways and that will shape even more buying decisions.

It's another reason for businesses to listen to their feedback and build their "trust score." The more impact Trustpilot has, the more benefit there is from engaging with the platform. We're determined to help more businesses build trust, grow and improve by listening to their customers.

AI has recalibrated the value of historic datasets. Could Trustpilot have a role in embedding trust in other people's processes or platforms?

Historically, our innovation has been focused on helping a business get more feedback and understanding that feedback. But in addition to that, we have opinions about more than a million businesses around the world on our platform, across industries. Around 150,000 reviews get submitted to Trustpilot every day—and that number is growing all the time. It's a rich, unique dataset about millions of experiences across the world.

We've recently created and launched a new tool called TrustLayer™ [March 2025] making it possible for the first time for businesses to really engage with our collective insights and get value from it. We're early on this journey, but looking at interesting use cases and collaborations that different kinds of businesses can find with all this data. For example, a private equity firm can get rich insights into the performance of its portfolio of businesses through the lens of their customer feedback.

So how will your trust insights be embedded into the new ecosystems of business?

We believe Trustpilot's unique platform and insights are now at the core of consumer behavior, helping businesses build trust. We hope TrustLayer™ will be a way for others to plug into this huge database of opinions about businesses, including those who have not typically been our customers.

Our unique capability has wide potential—ranging from due diligence insights on companies, vetting suppliers or providing broader market-level insights in different markets, and sentiment analysis. Or our insights can help as part of an early warning system for companies concerned about financial fraud. We're open to exploring lots of different ways people can work with us to embed trust using TrustLayer™. We recently announced, for example, that Advent International, a global private equity investor, and Felix Capital, a venture capital firm, have signed on as flagship partners for TrustLayer™, to provide insights and support strategic decisions.

Regulators are starting to do more around fake reviews and authenticity, amid concerns about rising fraud. How is that having an impact?

In August 2024, the Federal Trade Commission created the rule "Banning Fake Reviews and Testimonials" that allows the agency to strengthen enforcement, seek civil penalties against violators and deter AI-generated fake reviews. The FTC's decision isn't just a one-off, it's a signal to the market that trust is now a fundamental business requirement. For businesses that have operated with integrity, and for consumers, this is a win—it means genuine experiences can stand out. This is a great example of where regulators are promoting healthy capitalism, helping good companies to thrive and bad ones to go out of business. We've always believed that at Trustpilot. It's great to have regulators as an ally in that fight.

In five years' time, what do you want Trustpilot to be known for?

I want Trustpilot to be known for our innovation to amplify real customer voices, and helping companies thrive by engaging with their customers. In an AI era, Trustpilot's vision is more important than ever: to be the universal symbol of trust. ◆

"WE'RE DETERMINED TO HELP MORE BUSINESSES BUILD TRUST, GROW AND IMPROVE BY LISTENING TO THEIR CUSTOMERS."

CAROLINE DANIEL is a Partner based in London and part of Brunswick's AI Client Impact Hub. Previously, she was a senior editor with the *Financial Times* and former Editor of *FTWeekend*.

An ENGINE for PROSPERITY

SHAMINA SINGH, President of Mastercard Center for Inclusive Growth, talks to Brunswick's **JON MILLER** about using data and AI to build an inclusive digital economy.

PHOTOGRAPH: COURTESY OF MASTERCARD

THE WORKPLACE IS TRANSFORMING BEFORE our eyes as AI drives fundamental shifts in labor markets. Many worry that this shift will worsen economic imbalances and social divisions. But for Shamina Singh, the other side of the coin is more compelling: AI as an engine for prosperity for all.

Singh is the Founder and President of Mastercard Center for Inclusive Growth, Mastercard's social impact hub. She also serves as Executive Vice President of Sustainability for Mastercard. Under her leadership, the efforts out of the Mastercard Center for Inclusive Growth contributed to Mastercard being named one of *Fast Company*'s Most Innovative Companies of 2024.

She has held senior positions in the White House and most recently served on President Biden's Export Council. Currently, Singh sits on the board of The Asian American Foundation, is a Henry Crown Fellow with the Aspen Institute and serves on the advisory boards of Okta for Good and data.org. She is also a contributor to *MIT Sloan Management Review* on the topic of Responsible AI.

In a recent interview, Singh shares how the Center for Inclusive Growth is using AI tools and leveraging data to support individuals, entrepreneurs, small and mid-size businesses, and communities around the world. Her goal, she says, is to make sure that the opportunities AI can offer extend to everyone, everywhere.

Why does driving economic opportunity for everyone matter to Mastercard? And what are some of the key challenges?

Mastercard is a technology company that specializes in payments. For more than a decade, Mastercard has prioritized financial inclusion and economic opportunity as a way for more people to transact in the digital economy safely and simply. The more that they engage, the more resilient and prosperous our communities and businesses become.

When we started this work, 2 billion people could not access secure payment methods. Their only choice was to transact in cash, which meant that they were limited in their abilities to conduct day-to-day activities and were much more vulnerable to theft. Things that we may take for granted, like buying a train ticket on our phone, were beyond the reach of too many people. Today, about 75% of adults have accounts. So although many still use cash, the optionality and safety of a digital account will support their growth over time, and at some point, that may help Mastercard.

This commercially sustainable social impact strategy has paid dividends, both for our business and for our impact in the world. We know that by combining philanthropy with business assets, we can extend the life and impact of our work. This approach supports our efforts in bringing 1 billion people into the digital economy by 2025 and why we were able to already bring more than 50 million small businesses into the digital economy.

There's been a lot of discussion about risks that AI might exacerbate economic inequalities and exclusion. What do you think the upsides are? How can it be potentially a force for economic inclusion?

I agree there are risks with AI, but we are optimistic and believe that AI—and tech more broadly—can unlock productivity for workers and small business owners. The risks aren't unlike those aligned to any technology—the technology isn't what makes it risky, it's how that technology is used.

Mastercard has been helping our partners get ahead of the curve for years. For example, our long-standing work in fraud detection is underpinned by our data capabilities, which means customers can trust and be protected by our network.

But, for everyone to benefit from modern technologies, there need to be guardrails around its access and use.

One of the biggest opportunities we saw at the Center was to help build data capacity for social sector organizations, academic institutions, the public sector and even individuals—so everyone can benefit. For example, through Mastercard Strive, we're helping small businesses understand and navigate the digital and data economy by providing digital support, tools and training through our partnerships with universities like Washington University, Howard University and the University of Chicago. These support education, skilling and training for the next generation of data scientists focused on social impact. We also created data.org, a new fit-for-purpose social sector organization designed to meet the demands of the AI and data economy by building the capacity of nonprofit organizations to realize the power of their own data.

"THIS APPROACH SUPPORTS OUR EFFORTS IN BRINGING 1 BILLION PEOPLE INTO THE DIGITAL ECONOMY BY 2025 AND WHY WE WERE ABLE TO ALREADY BRING MORE THAN 50 MILLION SMALL BUSINESSES INTO THE DIGITAL ECONOMY."

How do you make sure that the benefits of AI are accessible to everyone?

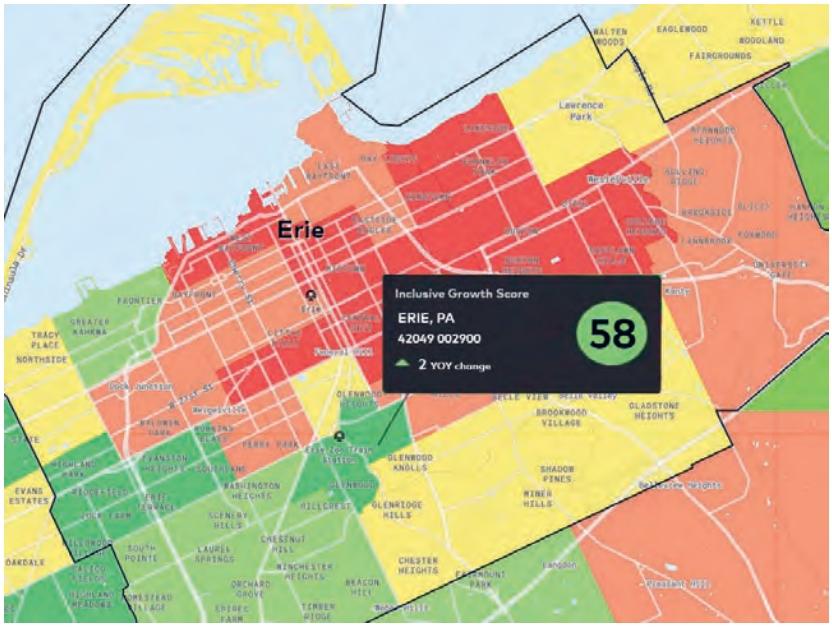
AI has been here for a while. In fact, Mastercard has been using it for a long time. The difference is that today, AI adoption has accelerated across all industries. What I find interesting is that we have a unique opportunity to build incentives into the business model and the technology that creates a competitive race to the top—a race that values data sovereignty and privacy.

One way we are actioning that is by finding and supporting AI solutions from around the world. In June, we announced our first AI challenge, called the AI to Accelerate Impact (AI2AI) Challenge. We targeted organizations, companies and fintechs using AI in positive ways. In December, we announced our cohort of five winners, who will be receiving capital and access to Mastercard resources and expertise. It may not help them achieve hockey stick growth, but our hope is that it could accelerate their ability to grow and scale.

At Mastercard, we are bringing the company's assets and resources to bear in our efforts. We are working with other companies and governments to replicate the model, using their assets in a way that says, "We have an opportunity here to do something differently that not only helps our bottom line, but also helps the global construct of our work for long-term investment."

How does it play out more broadly for smaller businesses, which you mentioned earlier?

AI and data can also be a gamechanger for small businesses. From helping business owners automate their inventory systems, to financial analysis and forecasting, AI can be the tool that gives them the time they need to plan and grow.



Erie, PA is shown in the Inclusive Growth Score Tool, with lower-scoring census tracts in red, and higher-scoring census tracts in green. The score includes 18 different metrics over six years to show hyper-local changes in neighborhoods across the US.

However, these technologies also create risks. Fraud and scams are jeopardizing the safety of individuals and growth opportunities of small businesses. For example, according to BlackFog research, 61% of small businesses were the target of a cyberattack in 2022. That's why it is so important to create solutions that protect individuals and small businesses against these bad actors. In Indonesia, the Center worked with the Global Cyber Alliance (GCA) to translate a Cybersecurity Toolkit to help Indonesian small businesses deal with cybersecurity threats.

Through our Mastercard Strive program, we also provide digital resources and tools to help them build resilience and growth sustainably. When coupled with Mastercard's AI-enabled card fraud detection technology, which doubles the speed at which it can detect potentially compromised cards, we are providing greater resources that can be applied to protect the entire small business ecosystem.

What are the opportunities to bring value to your customers and partners?

The opportunities are incredible if we have a principled approach. Mastercard operates in over 210 markets, reaching around 100 million businesses and 3.5 billion cardholders. Our network allows us to help move people all over the world from the basics of financial inclusion through to financial security and health. All within a safe and secure system that prioritizes privacy and protection.

All this starts with foundational practices that respect and protect individual rights and society. That is why we developed and continually evolve our Data and Tech Responsibility Principles.

Our baseline belief is that you should own and benefit from your data—and that it's our job to protect it. We hold ourselves to the highest standards of data and tech responsibility, and these principles inform a broader framework for responsible data-driven innovation.

I've heard you speak about the Inclusive Growth Score and the potential around the use of AI for decision-making. Can you talk about that?

Yes, and thanks for making the connection there, Jon. We created the Inclusive Growth Score in connection with the Opportunity Zone incentive established by Congress in the Tax Cuts and Jobs Act of 2017, which sought to encourage long-term investment in various communities across the US.

Anyone can access the tool, it's free to use and the goal is to help anyone looking to better understand and serve their communities.

The Inclusive Growth Score provides local planners, policymakers, community leaders and impact investors with a clear, simple view of social and economic indicators at the neighborhood level. You could go on InclusiveGrowthScore.com, type in your location and the tool offers an interactive way to visualize the relative economic and social health of every census tract in the US. It looks at things like spend, average income, real estate value, housing affordability, broadband access and more at a census-tract level.

The tool is enormously beneficial for cities that want to attract investment to build out their downtowns, or want to increase shopping rates in a particular market. They can leverage the data to show investors that it's a good bet.

Anecdotally, we've seen impact investors use the tool as an initial assessment of an investment opportunity to determine the economic potential of a place, regardless of whether the overall score is high or low. An example is Erie, Pennsylvania [shown in the image at left], where the data is helping pull down investor funding, supporting the case for investment.

AI gives us the ability to ask, "How are we accelerating our decision-making? How are we maximizing the value of every tax dollar of every citizen in the world?" Those kinds of things, to me, are something that, if incentivized correctly, AI has the power to solve. ◆

JON MILLER is a Partner based in London and co-lead of Brunswick's Sustainable Business practice. He is also founder of the Open for Business coalition and co-author with Lucy Parker of *The Activist Leader.*

Fintech Insider

JAMES DA COSTA, a Partner at Andreessen Horowitz and the author of *Fintech Wars*, talks about AI, fintech and venture capital's role in the shifting future of banking. Brunswick's **KIRSTY CAMERON** reports.

James da Costa is a Forbes 30 under 30, MIT Innovator under 35, Gates Foundation Goalkeeper and Alibaba eFounder, among other accolades.

A co-founder of digital bank Fingo, da Costa is a Partner at Andreessen Horowitz (a16z), and a researcher at Stanford University's Institute for Human-Centered AI. His 2024 book *Fintech Wars: Tech Titans, Complex Crypto and the Future of Money*, became a *Sunday Times* bestseller, offering what one prominent reviewer called "the inside scoop on billion-dollar companies."

How did you go from consulting to where you are today?

I began my career at McKinsey in London, working primarily with large banks and industrial companies, helping them innovate and build startups. The common thread throughout my career has been startups. During my university years, I was inspired by the rise of digital banks like Monzo and Starling in the UK and I thought, I'd like to have a crack at doing that myself. That led me to Y Combinator, and ultimately to co-founding Fingo, a digital bank in Kenya. We scaled to around 200,000 users.

After stepping back from Fingo, I spent time at Stanford and wrote *Fintech Wars*. I interviewed industry leaders including the founders of LinkedIn, PayPal and Capital One. It was a deep dive into the intricacies and motivations behind building billion-dollar disruptors.

I have always had a passion for helping others build and invest in startups, which led me to Andreessen Horowitz. Now, I'm a partner in our AI Apps fund, focusing on AI in financial services and B2B software.

Digital banks transformed the UK market. How do fintech innovations compare across regions?

The UK has seen significant fintech adoption with companies like Monzo and Starling gaining real traction. In places like Kenya, mobile-first financial solutions are thriving, allowing non-banked populations to access financial services easily.

Over the past decade we've seen promising fintech innovations in areas like public markets—apps like Robinhood democratizing investing for example—and banking solutions, like Mercury and Chime. The next frontier is how AI will transform traditional banking.

Where do you see AI making the biggest impact in financial services?

It's fascinating. It's clear that AI is poised to make banking far more efficient.

Compliance is a great example—banks have grown huge compliance teams due to regulatory complexity. The fourth fastest-growing job in the US over the last 20 years has been compliance officers in banks. AI could streamline these processes.

AI can handle repetitive compliance reviews, reducing costly backlogs. We've seen banks fined billions due to inefficient compliance systems. AI copilots and voice-based AI can also enhance customer support, making transactions smoother and more intelligent.

Do you think voice AI will be a growing market in financial services? How do you see it evolving?

Voice AI is going to be game-changing. OpenAI is rolling out advanced voice models, and startups like ElevenLabs are developing AI-generated voices. In financial services, AI-powered customer support agents will replace traditional call centers. Instead of dealing with frustrating bots, AI will offer seamless and efficient support—whether it's upgrading accounts or reversing transactions.

The goal is for AI to surpass human efficiency in routine banking tasks while freeing up human agents to focus on more complex issues.

What do you look for when investing in startups?

At Andreessen Horowitz, we back the best founder in every credible market and put the full weight of our firm behind them—talent, capital, networks and marketing.

The best founders share two key traits. First, and the most important, is a deep, encyclopedic knowledge of their space. They know the history of their industry, what worked, what didn't and why. The second is unwavering motivation. Many great founders are driven by personal reasons—sometimes even revenge—they refuse to quit because they're determined to solve a problem they've experienced firsthand.

What makes Silicon Valley special compared to other startup hubs?

The optimism here is unparalleled. Elsewhere, the default mindset is skepticism—people assume your startup won't work. In Silicon Valley, the question is: What if it does? That shift in perspective fuels ambition and innovation.

"THE COMBINATION OF AI AND FINTECH IS UNLOCKING NEW POSSIBILITIES... WE'RE ON THE BRINK OF A MAJOR TRANSFORMATION."

The density of top talent also plays a huge role. With AI leaders like OpenAI, Anthropic and Google based here, the future is literally being built in the Bay Area. Founders see startups scale rapidly, making them more willing to take the leap themselves.

What common mistakes do founders make?

The number one reason startups fail is that founders give up. Most companies don't die because of market issues—they die from internal struggles. If you keep iterating, you can usually find a path forward. That said, market selection matters. If a founder lacks deep knowledge or genuine motivation, it's tough to sustain momentum. In B2B startups, strong sales execution is also critical—you can build an amazing product, but if you can't sell it, it won't succeed.

Some say AI is overhyped. What's your take?

AI is far from overhyped. The velocity of AI startups is unlike anything we've seen before.

Companies that used to take years to reach key revenue milestones are now hitting them in months. AI is making workers more efficient by automating administrative tasks, allowing them to focus on higher-value work.

Startups that apply AI to specific business problems—compliance automation, AI-powered customer service, AI-driven sales, for example—will drive massive change. 2025 will be a defining year for AI adoption.

How does working in VC compare to your time at McKinsey?

I really appreciated my time at McKinsey, I had great mentors and consulting was a great foundation—I learned professional skills and gained exposure to large industries. But venture capital is more exciting because you're closer to the action.

Consultants advise from the outside; investors support founders from the inside. The learning curve is steeper, but the impact is greater.

What excites you most about the year ahead?

The combination of AI and fintech is unlocking new possibilities. Whether it's AI-driven compliance, voice-powered customer service or embedded finance in social platforms, we're on the brink of a major transformation. It's a great time to be building in this space. ◆

KIRSTY CAMERON is an Associate and Digital Specialist in Brunswick's San Francisco office.

PHOTOGRAPH: COURTESY OF JAMES DA COSTA

Leading AI's Biomedical Revolution

Two **STANFORD MEDICINE** leaders on AI's potential, and what realizing it will require.

Roughly a half century before the launch of ChatGPT, artificial intelligence was being applied to healthcare. That groundbreaking work took place at Stanford University, where a computer program called MYCIN was developed in the early 1970s to aid in prescribing an appropriate antibiotic. It guided doctors through a series of questions, analyzed their responses and then ranked the most likely diagnoses and suggested antibiotic treatments—rudimentary by today's standards, perhaps, but revolutionary in a time when VCRs and floppy disks represented cutting-edge tech.

It somehow seems fitting to understand AI's future in healthcare by going to the place where that conversation started. Which is what Brunswick did recently, interviewing two Stanford Medicine leaders: Dr. Lloyd Minor, a scientist and surgeon who is Dean of the Stanford School of Medicine and Vice President for Medical Affairs at Stanford University; and Priya Singh, Executive Vice President, Senior Associate Dean, and Chief Strategy Officer for Stanford Medicine.

Located in the heart of Silicon Valley, Stanford Medicine includes a medical school, adult and children's hospitals, a healthcare system with more than 60 clinics and centers across the Bay Area, and dozens of research labs. That gives the organization important roles in shaping how AI is studied, taught—and how it is applied in hospitals and clinics.

Both Minor and Singh were optimistic about the technology's potential and frank about the

Dr. LLOYD MINOR is the Carl and Elizabeth Naumann Dean of the Stanford University School of Medicine, and Vice President for Medical Affairs at Stanford University.

PRIYA SINGH
is Chief Strategy Officer and Senior Associate Dean for Stanford Medicine.

challenges to realizing it. And both broadened the conversation beyond the technology. As Singh told us, "AI's impact on medicine won't be determined by technology alone—it will be shaped by strategy."

AI'S PROMISE: Extraordinary, but Not Guaranteed

In late 2023, Dean Minor wrote that AI would transform biomedicine in the 21st century as profoundly as antibiotics did in the 20th century. He told Brunswick he remains "just as optimistic" about the technology's potential today.

"AI isn't just an incremental advancement," he said. "It has the potential to fundamentally reshape our understanding of disease, accelerate discovery and revolutionize how we deliver care."

Minor was quick to highlight how the technology is already delivering on its promise. "Just last year, the Nobel Prize in Chemistry recognized breakthroughs in computational protein design and protein structure prediction—both areas where AI has played a transformative role," he said. "What once took years of painstaking experimentation can now be achieved in mere months."

Minor explained how AI-driven protein modeling is paving the way for novel, highly targeted treatments, "such as custom-designed enzymes that could break down plaques in neurodegenerative diseases like Alzheimer's, or AI-engineered proteins that neutralize drug-resistant bacteria," which has the potential to address some of medicine's most pressing challenges.

> "AI'S IMPACT ON MEDICINE WON'T BE DETERMINED BY TECHNOLOGY ALONE— IT WILL BE SHAPED BY STRATEGY."
> PRIYA SINGH

Compared with such groundbreaking work, AI's role in reducing paperwork may seem mundane. But, as Minor has written, the effects could be significant for both patients and care providers. A 2024 survey found that more than 90% of physicians regularly feel burned out, while separate research concluded that clinicians spend almost twice the amount of time on clerical work as they do face to face with patients.

AI's potential spans industries, but the stakes are arguably the highest in healthcare. The consequences can be life or death. The data that trains and powers AI in healthcare is incredibly personal and sensitive.

"The real impact of AI in biomedicine will depend on how effectively we build the systems and strategies to harness it," said Minor, who explained that AI is being deployed in ways that reflect—and sometimes exacerbate—existing systemic tensions.

PHOTOGRAPHS: COURTESY OF STANFORD MEDICINE

"For example, it's public knowledge that insurance companies are already using AI to accelerate claims denials, while providers are leveraging AI to contest those denials and justify care. When AI fuels administrative battles rather than improving patient outcomes, it highlights the risk of allowing technology to evolve without thoughtful oversight."

Dean Minor is clear that AI is merely a tool, reflective of the structures and incentives that shape its use and says that "fundamental changes in policy, payment models and care delivery will be necessary to ensure AI serves as a true enabler of better health, rather than just another layer of complexity in an already strained system."

Setting a High Bar for RESPONSIBLE AI

How does Stanford Medicine address those challenges? Most obviously and immediately: on its own campus, and in its own hospitals and clinics, which annually see more than 1.2 million outpatient visits.

"We recognize that the speed and effectiveness of AI adoption depend on how well we integrate it into our system—not just in research and clinical care, but in the way we train, support and empower our people," Singh told Brunswick. "The organizations that successfully harness AI won't just adopt new tools; they will rethink workflows, align incentives and prepare their workforce to engage with these advancements in meaningful ways."

One step Singh highlighted was Stanford Medicine's FURM assessment—"fair, useful, reliable models"—which it developed to evaluate AI models intended for healthcare applications. The assessment involves conducting an ethical review and running simulations to gauge the model's practical efficacy. It also uses financial projections to assess the model's sustainability.

The goal, says Singh, is to ensure that the "AI used within our system continuously adds value for patients, care providers and the broader community." But Singh notes that responsible AI can't be achieved in isolation, which is why Stanford Medicine's work extends far beyond its own campus and facilities.

"While individual organizations can set internal standards, AI's impact on health requires shared guidelines, clear accountability and collaboration across health care, academia and industry," she said, which is why Stanford Medicine is working with experts across Stanford University and beyond to facilitate these conversations. "We want to help set a high bar for responsible AI and lead efforts to create shared standards."

> "AI HAS THE POTENTIAL TO FUNDAMENTALLY RESHAPE OUR UNDERSTANDING OF DISEASE, ACCELERATE DISCOVERY AND REVOLUTIONIZE HOW WE DELIVER CARE."
>
> **DR. LLOYD MINOR**

One of those efforts debuted in 2023, when Stanford Medicine partnered with the Stanford Institute for HAI (Human-Centered Artificial Intelligence) to launch RAISE Health (Responsible AI for Safe and Equitable Health).

The initiative, according to Singh, is helping shape the future of biomedicine by guiding the ethical use of AI across research, education and patient care. Helping launch those efforts alongside Dean Minor are HAI Co-Directors James Landay and Fei-Fei Li, who is often called the "Godmother of AI" for her pioneering work in computer vision.

Stanford Medicine's work in AI extends beyond the Bay Area. It's also a founding member of CHAI (Coalition for Health AI) a national consortium of health systems, government agencies and private sector partners working to develop best practices and guardrails for AI adoption.

Additionally, earlier this year, Stanford Medicine partnered with the Alice L. Walton School of Medicine to host a conference in Bentonville, Arkansas, called, "Think Health: AI for Healthy Communities." The event explored how AI can transform community and rural healthcare—a keenly relevant subject to discuss in Arkansas, a state which has one of the 10-lowest life expectancies in the country.

If convening is one of Stanford Medicine's priorities, then another is engaging workforces in AI adoption. "One of the key steps we've taken is launching a workforce survey on artificial intelligence across our health delivery system," Singh said. "AI is changing the way we work, and we need to understand how our people interact with these tools—what excites them, what challenges they face and what support they need to fully leverage AI in their roles."

That kind of work bridges the gap between technological progress and real-world impact—a gap MYCIN never quite managed to cross. In the 1970s and '80s, it performed on par with human experts but remained more of a novelty than a revolution, never reaching clinical practice.

Fifty years later, the lesson remains: The real breakthrough won't just be in what AI can do, but in how thoughtfully we choose to use it. ◆

COURTNEY CHIANG DORMAN, Managing Partner of the Americas, and **KATE LARSEN**, a Director in Brunswick's Healthcare & Life Sciences group, are both based in San Francisco.

Unlocking the AI MEDICINE CHEST

Will AI drive a revolution in drug discovery? **BEN HIRSCHLER** examines how it is being used to sift through a mountain of health-related data—including his own biomedical records.

At UK Biobank, samples from 500,000 people are a rich resource for computer-driven biomedical research.

PHOTOGRAPH: COURTESY OF UK BIOBANK

In a nondescript building 40 miles west of London, half a dozen gray-haired folk are sitting around in scrubs waiting for their MRI scans. But this is not a hospital. Instead, we are all here to donate our data—specifically, detailed scans of our brains, hearts, abdomens and bones that will add to gigabytes of information already collected about our bodies over the past two decades.

It is all stored away by UK Biobank, which is funded by the Wellcome Trust and Medical Research Council, among others. It is held in de-identified

files, alongside frozen blood samples and genome sequences, for interrogation by scientists and—increasingly—analysis by artificial intelligence.

By mapping all these data signals against our health records, researchers using the resource are gaining new insights into diseases from Parkinson's and Alzheimer's to cancer, diabetes and eye disorders.

And this is just the start. The data gathered by UK Biobank—which recruited 500,000 middle-aged Britons back in 2006 to 2010 and has been tracking their health ever since—is only a small part of the mountain of biomedical information generated every day around the world by healthcare systems, academic teams and pharmaceutical companies.

Combining AI and machine learning with these rich troves of biological and health data could herald a new era of medical discoveries, treatments and potential cures for intractable diseases. It could also transform prospects for the pharmaceutical industry by accelerating drug development and increasing R&D efficiency.

Professor Naomi Allen, Chief Scientist at UK Biobank, says researchers now have the data and computing power to unravel why some people develop diseases that don't affect others, providing an opportunity to develop new therapies and catch diseases much earlier.

"AI plays an increasingly crucial role in modern drug discovery because it gives researchers an opportunity to accelerate the identification of new insights that wouldn't be easily discovered through more traditional methods. So, for example, AI models can be used to predict which proteins, genes or molecular pathways are involved in disease processes, and then that will help researchers prioritize promising drug targets," she explains.

"This type of modeling can really have traction when you're trying to predict which drugs are more likely to work and also how to repurpose existing drugs for other conditions. And I think it will drive the whole idea of precision medicine by allowing us to work out who is likely to respond to a certain drug based on their genetic makeup."

However, it won't be plain sailing. Medicine development is inherently difficult, and AI will never do away with the need for time-consuming and expensive clinical trials. Running those trials, including the ones that fail, accounts for most of the approximately $2.5 billion cost of bringing a new medicine to market.

So, what exactly are the opportunities and challenges ahead?

EARLY STAGE DRUG DEVELOPMENT SUCCESS RATES DRIVEN BY AI COULD LEAD TO AN ADDITIONAL **50** NOVEL THERAPIES OVER A 10-YEAR PERIOD, TRANSLATING TO A MORE THAN $50 BILLION OPPORTUNITY.

Experts believe it is best to think of AI as a new tool in the hunt for medicines, rather than a panacea. Applying it at scale will be complicated and sometimes frustrating. While many pharmaceutical companies have made significant investments in AI in recent years, those efforts have yet to produce a noticeable improvement in productivity. There has also been a sharp rise in the number of AI-focused biotech companies, some of which have had distinctly bumpy rides after failing to deliver hoped-for early wins.

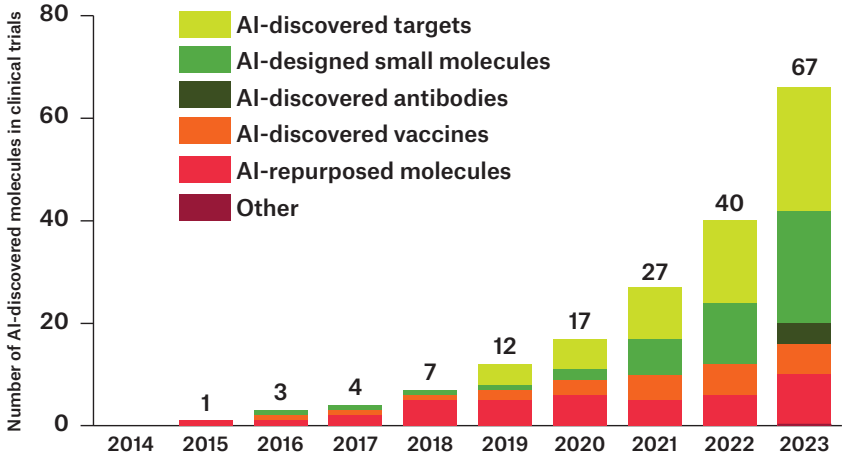
But while AI may not turn around industry prospects overnight, its medium-term impact could still be very significant. Morgan Stanley calculates that even modest improvements in early-stage drug development success rates driven by AI could lead to an additional 50 novel therapies over a 10-year period, translating to a more than $50 billion opportunity.

In an era of geopolitical rivalry, in which both AI and biotechnology are viewed as strategically important sectors by governments around the world, policymakers are paying close attention. Expectations have been fueled by high-profile successes such as the Nobel Prize-winning development of an AI model that can predict the way in which proteins fold—the key factor in determining how they function.

A number of obstacles remain to optimizing AI use. A lack of high-quality datasets is one bottleneck holding things back, since insights generated by AI are only as good as the data used to train the machine learning models. The availability of good data also

AI DISCOVERIES

The road ahead for AI in drug development involves challenges, but progress in research is accelerating.



SOURCE: Jayatunga, et al., in Drug Discovery Today (2024).

CHART: MARK TYNER

varies widely between therapeutic areas and population groups, which may mean people with conditions in less commercially attractive fields, such as infectious diseases in low-income countries, are less likely to benefit.

Ensuring equitable benefits from AI will require datasets that are both reliable and broadly representative. That is one reason why the All of Us research program in the US, which aims to collect genetic and health data from 1 million volunteers, is deliberately targeting communities that have been historically underrepresented in past biomedical research.

Another key element in building authoritative datasets is trust. Worries about cybersecurity and privacy have made trust more of a challenge in recent years, which Allen believes highlights the case for showing the benefits of pooled information. "Data saves lives. If we can harness it, with the appropriate safeguards in place, then scientific discoveries will just accelerate for the good of everyone."

Within the organizations now pioneering AI drug development, there are other hurdles—not least the cultural one of getting biologists and computational scientists to work seamlessly together.

California-based biotech insitro—its name is a combination of in silico and in vitro—is tackling this challenge head-on by fostering a "bilingual" culture, where scientists and technologists learn the language of each other's expertise.

"What we really need if AI is going to help us build better medicines is the right data in the hands of the right people who can build the right machine learning models," says Mary Rozenman, the company's CFO/CBO. "That is why once a year we have a week where we bring everybody in the company together and we focus on building community. So, we do hackathons for our biology team and lab experimentation for our computational team. We really try and enable that cross-pollination that helps them work better together."

The company is training its machine learning models on cellular data from its own laboratories and human cohort data from large third-party data providers, including UK Biobank.

"By relying on multimodal data at scale from humans and cellular systems we can uncover novel genetic intervention points in disease. We can then develop therapeutics against them, rapidly move them into the clinic, and hopefully they will be safe and effective for patients," says Rozenman.

At the moment, most experimental medicines fail in the clinic—the most expensive part of the drug development process—because they hit the wrong biological targets in the wrong patients. In the future, Rozenman thinks the insitro team will be able to increase the probability of success at least threefold by using AI to better understand the complexities of specific diseases.

But she cautions it won't happen overnight. "There has to be a commitment to pull through. It takes a long time to do this well, and significant capital. It's not for the faint-hearted, and we are fortunate to have investors who have the vision and the stamina to make the most of this opportunity."

The coming years will show whether AI can improve productivity in a pharmaceutical industry where developing new products is notoriously difficult and risky—but UK Biobank's Allen is optimistic. "We are only just getting started. I think it's likely there will be breakthroughs in the next couple of years that will really be game changers." ◆

Naomi Allen, Chief Scientist at UK Biobank, sees a crucial role for AI in understanding disease processes.

"DATA SAVES LIVES. IF WE CAN HARNESS IT, WITH THE APPROPRIATE SAFEGUARDS IN PLACE, THEN SCIENTIFIC DISCOVERIES WILL JUST ACCELERATE FOR THE GOOD OF EVERYONE."

BEN HIRSCHLER is a Senior Advisor for Brunswick and a former global pharmaceuticals correspondent for Reuters.

PHOTOGRAPHS: COURTESY OF UK BIOBANK

QUANTUM VISIONARY

KOHEI ITOH, President of Japan's Keio University, describes the potential and the challenge ahead.

Quantum computing promises a transformative future where geopolitics, industry collaborations and technological innovation converge.

In 1935, trying to discuss problems in quantum mechanics with Albert Einstein, Erwin Schrödinger first posed his now-famous thought experiment: Suppose a cat is trapped in box, its fate governed by a random quantum trigger. Before we open the box, he asked, is the cat alive or dead? A strange question, but the answer is even stranger: It is both. In that strangeness lies explosive potential for the world of computer science.

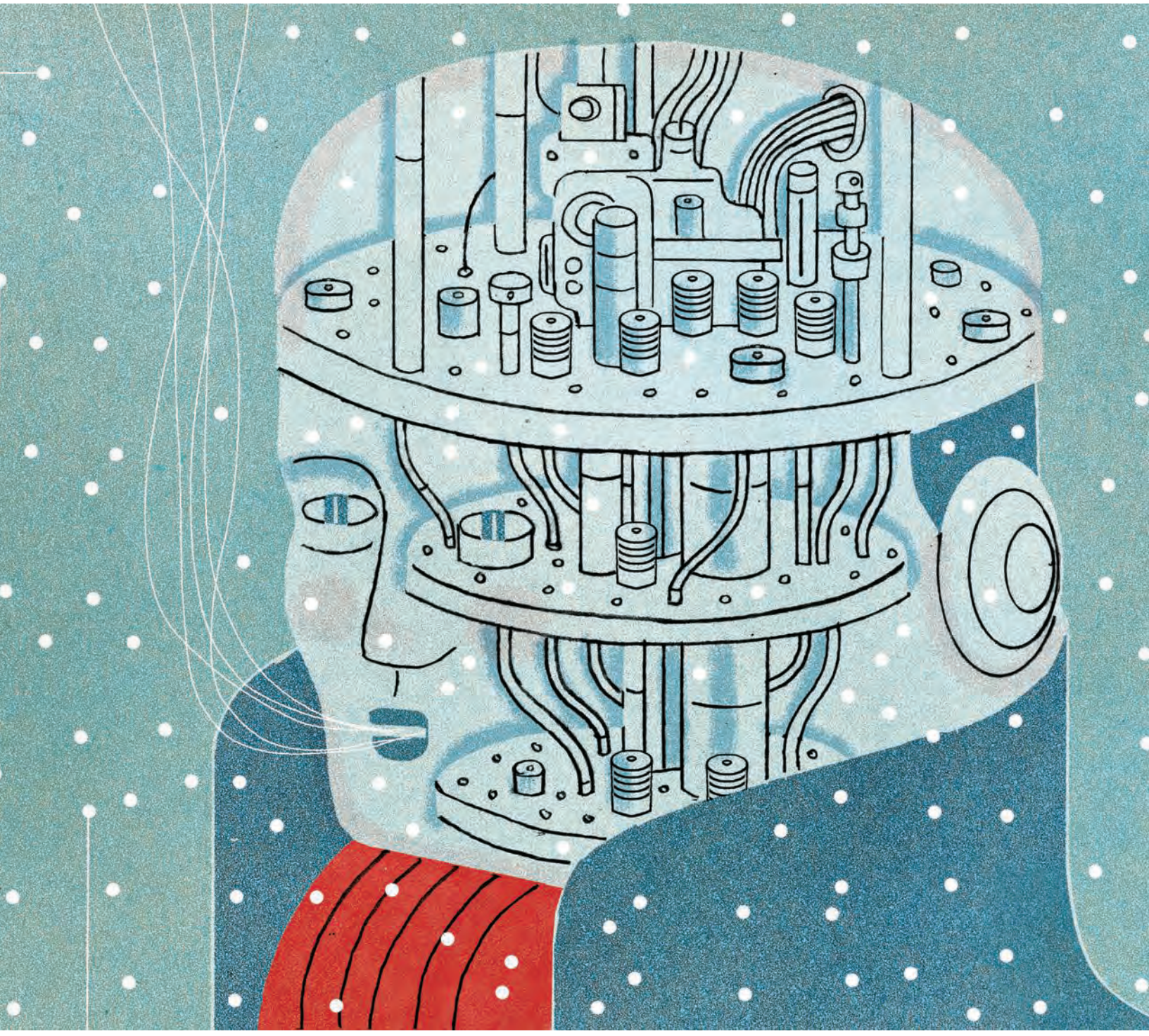
A traditional computer bit consists of either a 0 or a 1. Our most elaborate programming is built on that simple foundation. But a quantum bit, or "qubit," can be both 0 and 1 at the same time. The number of calculations that can be done in real time is vastly increased compared to traditional computing, requiring rewriting the most basic rules of programming.

Professor Kohei Itoh is on the front lines of the challenge of harnessing that concept toward constructive real-world goals. As President of Keio University and Founder of Keio Quantum Computing Center, he collaborates with numerous leading enterprises and researchers to solve problems in the emerging field of quantum computing. He envisions a profound impact, not only in terms of technological advancements but also in shaping industrial and geopolitical strategies.

"Especially at this stage—what I refer to as the 'open innovation stage'—we are collaborating with a diverse range of partners, including three mega-banks, two chemical companies—JSR and Mitsubishi Chemical—as well as major corporations like Sony, Toyota and SoftBank," he told us in a recent interview. "These companies are sending us their top scientists, and the caliber of talent we receive is remarkable. These outstanding scientists work alongside our postdoctoral researchers, faculty members and students, fostering an environment of dynamic collaboration and cutting-edge innovation."

The rise of quantum computing has been a global journey of discovery and transformation. Reflecting on his early work 25 years ago, the professor recalls that quantum computing was widely dismissed as little more than "pseudoscience." However, as some of the world's brightest minds began to take the field seriously, the momentum shifted and breakthroughs followed rapidly.

Today, with the computer processing demands of AI looming, quantum computing has moved from the fringes to the forefront of global technological innovation, with rising expectations for industrial applications. Companies like IBM and Google are developing functional quantum computers and industries are investing heavily.



ILLUSTRATIONS: DAVID PLUNKERT

Professor Itoh founded the IBM Quantum Network Hub at Keio. In the following conversation, he shares his insights with us into the evolving landscape of quantum computing and its broad geopolitical implications.

He also highlights the unique role private institutions like Keio University can play in fostering industrial collaboration with private companies, a factor that could prove pivotal in the competitive race for quantum computing development and real-world application.

Could you share your background in quantum computing? What initially sparked your interest in pursuing this field of research?

My Ph.D. research was in astrophysics, searching for dark matter—missing particles in the universe. I was responsible for building a detector using

By **AKIKO KARAKI, SHUDAI KOMORIYA & KEN WEINSTEIN.**

germanium semiconductor materials, which tied into my expertise in materials science.

When I joined Keio University in 1995, I started looking for a new project for myself and came across "quantum computing." It seemed very exciting, so by 1998, I decided to dive into it. I was following this silicon semiconductor trend called Moore's Law and realized that the size of transistors—the bit's dimensions—would shrink to the size of an atom by around 2030.

When things get that small, they have to operate under the laws of quantum mechanics. I saw this as the future of transistors, leading inevitably to quantum computing.

Getting right to the point, what do you think are the main benefits of quantum computing? What's your vision for the ideal future it could help shape?

Quantum computing excels at solving problems that require testing an enormous number of variations—tasks that would take classical computers or even supercomputers thousands of years to complete, which in reality means unsolvable.

Consider finding correlations between stock prices, such as those of United Airlines and American Airlines, where a relationship might be somewhat intuitive. Quantum computing could also reveal unexpected correlations, like one between United Airlines and Coca-Cola.

Once the data is loaded into the quantum computer, the system can analyze correlations that would be impossible to explore using classical computers due to the sheer number of combinations. This approach could uncover new patterns that were previously unsuspected and unattainable, enabling transformative applications in fields such as finance, logistics, and more.

But when we input stock market price histories from various companies into a quantum computer for analysis, the process of transferring classical data into a quantum system is not only computationally costly but also becomes exponentially more complex as the data size increases. If this data transfer takes exponential time, any computational speed-up achieved with quantum computing is canceled out. This highlights two key challenges in quantum computing: developing faster, more efficient methods to transfer data into quantum systems and creating algorithms that deliver computational speed-ups.

"QUANTUM COMPUTING IS AT A PIVOTAL STAGE, AND IT'S CRUCIAL FOR CORPORATIONS, BOTH IN JAPAN AND GLOBALLY, TO START ENGAGING WITH THIS TECHNOLOGY NOW."

KOHEI ITOH

Given those challenges, what kinds of techniques used in quantum computing can help address the difficulties of transferring and analyzing such vast amounts of data?

Transferring data into a quantum computer is itself a complex mathematical algorithm. The idea is to assess how much "cheating" we can do to still achieve, for instance, the correct answer 50% of the time.

Consider problems that involve countless trials, like Monte Carlo simulations. These methods predict future dynamics, such as stock price movements, by creating mathematical models that include numerous parameters. You run the models filling in the variables with many different values. The combinations of these parameters can be infinitely large and require testing each variation.

For example, banks like Mitsubishi UFJ and Mizuho spend around eight hours overnight calculating prices for financial items they'll use the next day. Banks are eager to shorten this calculation period to make faster, more accurate predictions about stock market dynamics and other financial movements.

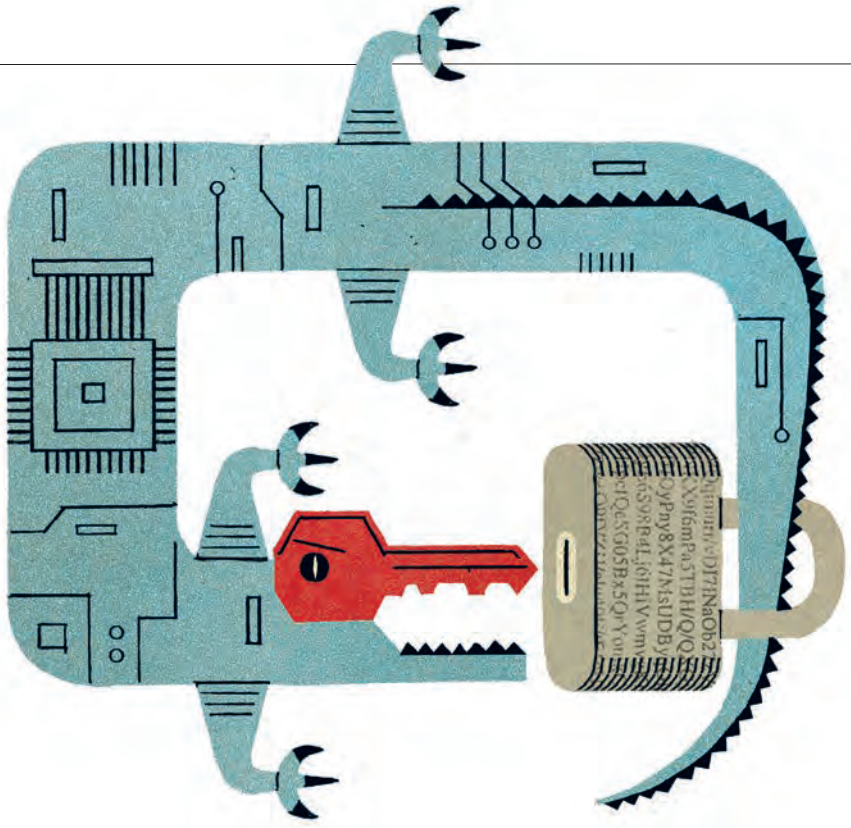
This potential is why three major banks—MUFG, Mizuho and Sumitomo Mitsui Trust—are collaborating with us alongside six other companies, at our Quantum Computing Center at Keio University.

Is it common for companies, including competitors, to collaborate in the field of quantum computing?

Our center began in 2018, and initially, these banks didn't know how to collaborate. They had never worked closely together before. At first, they thought they would need separate rooms, but soon they were sitting side by side, collaborating closely on shared problems—issues that cannot be solved with the extension of today's classical computing.

About a year and a half after we started, these banks brought us the problem of optimizing Monte Carlo calculations, like the eight-hour calculations I mentioned earlier. Together, we developed a

PHOTOGRAPH: COURTESY OF KEIO UNIVERSITY



HYPERSAFETY

THE QUEST for the quantum computer has been compared to efforts to generate sustainable fusion energy—possible in theory, but always seemingly just out of reach.

Similarly, recent breakthroughs have brought quantum processing to reality and closer to practical use. While still experimental, researchers say even current, relatively simple quantum computers are hundreds of millions of times faster than classical computers, literally solving in minutes what would theoretically take a classical computer longer than the age of the universe. Obstacles remain, but practical quantum computers could give areas like drug discovery or materials science an unimaginable boost—any area in fact where the fast calculation of large numbers can make a difference. In the field of artificial intelligence, it could hasten the dawn of a sentient superintelligent AI.

All of this power naturally requires new approaches to things like cybersecurity. Today's defenses, built to thwart standard computers, would be close to useless in the face of a brute force quantum computing attack, exposing the world's stores of data—including financial systems, energy grids and transport networks. Similarly, the prospect of a truly post-human intelligence lends the discussion of AI guardrails a greater urgency.

Quantum computing itself will evolve its own defensive structures, just as classical computing did. But in the meantime, preparations are under way for what is assumed will be a revolution in computing power. The European Union Agency for Cybersecurity is working on Post-Quantum Cryptography, and the International Organization for Standardization is developing a global standard for this. The World Economic Forum has partnered with the UK Financial Conduct Authority to study risks, while the Canadian Government has published a Quantum Readiness Guide. The G7 Cyber Expert Group has been advising finance ministers and central banks on cybersecurity for many years, including a "continuous learning" component, that reads in part, "cybersecurity strategies and frameworks need periodic review and update to adapt to changes in the threat and control environment, enhance user awareness, and to effectively deploy resources." And it has recently published a report on the opportunities and risks of quantum computing.

The G7 expects that working quantum processors will be available within a decade. In 2022, the Pentagon's Chief Data Officer, David Spirk, suggested that military applications could be just five years away. Human progress may be about to take another giant leap.

quantum-based solution and published papers as a team—Keio, Mizuho and MUFG. It was a landmark moment. The CEOs of these banks were astonished, in a good way, as they never imagined publishing joint research papers with their competitors.

When they joined, I asked the CEOs of MUFG and Mizuho to send their best scientists to Keio full time. This approach benefits both sides: It creates true open innovation, where the scientists bring critical, real-world problems from their companies, and at the same time, they remain accountable to their companies.

This accountability pushes everyone to stay on the edge of innovation. University researchers often don't face strict deadlines, but these company scientists do, which drives results. They are exceptionally bright and enthusiastic, and their presence inspires our postdoctoral researchers, who are funded by the companies.

This collaborative structure has been incredibly effective. It's one of the reasons IBM in the US views our center as one of the best and most successful hubs for developing practical applications in quantum computing.

Do you see a similar trend happening among countries? Japan, the US, Europe and China all have strong interests in quantum computing. Do you foresee greater international collaboration, or do you think national and economic security concerns might create more tension instead?
By contract, we cannot hire scientists from certain countries. This is due to trade policies and regulations related to quantum computing. These restrictions are largely influenced by US government regulations, as we are accessing IBM's best quantum computers in Yorktown Heights. There are strict regulatory frameworks we must adhere to.

But we strive to maintain an international perspective as much as possible by collaborating with multiple nations.

Do you think having more people from diverse countries involved would accelerate innovation and deepen research in quantum computing?
Yes, due to COVID-19 and border closures, as well as the slow response from Japanese universities in adapting to remote hiring systems, we haven't had many participants from abroad. Factors like the weak Japanese yen have also contributed to this. But we're now seeing an increasing number of applications from overseas, and we're working to move forward with that.

Is there potential for Japan, the US and other countries to collaborate on national security issues in quantum computing? For example, how could quantum cryptography or communication contribute to these efforts, and what about concerns over its impact on current cryptographic methods?

Quantum cryptography and quantum communication are certainly promising for security. Quantum communication, for instance, is theoretically secure but still faces challenges like slow throughput. It's something we need to improve.

As for cryptography, cryptographers are always working ahead of us. They know quantum computers are coming, so they're already developing more secure, unbreakable encryption methods. But the issue lies in the data we're encrypting today using current methods. If someone stores encrypted data now, quantum computers could potentially break it in the future once they become powerful enough. That's a genuine concern.

Given your role at Keio University, how is the Keio Center for Strategy addressing critical technologies and defense issues, especially since defense research is not typically popular at Japanese universities?

In Japan, universities are broadly divided into public and private institutions. Public universities like the University of Tokyo, Kyoto University and Osaka University focus predominantly on science, engineering and medicine—about 70%—with only 30% dedicated to social sciences and humanities. Keio, on the other hand, has 70% on humanities and social sciences.

This gives us greater flexibility to explore critical topics, such as national security and quantum computing, from a broader range of perspectives. It allows us to host and encourage a wide spectrum of opinions. For example, we can accommodate both critics of defense-related research and proponents of national security strategies.

This diversity fosters an environment where contrasting views are debated professionally and academically, which has helped us establish initiatives like the Keio Center for Strategy, which addresses critical issues.

This breadth of perspectives combined with our openness to dialogue is one of Keio's strengths. Universities should be places where differing viewpoints are encouraged and debated, and we take pride in upholding that balance within our academic framework.

"UNIVERSITIES SHOULD BE PLACES WHERE DIFFERING VIEWPOINTS ARE ENCOURAGED AND DEBATED, AND WE TAKE PRIDE IN UPHOLDING THAT BALANCE WITHIN OUR ACADEMIC FRAMEWORK."

AKIKO KARAKI is a Partner, Head of Brunswick's Tokyo office and a former Partner with PwC and Booz & Company.
KEN WEINSTEIN is a Senior Advisor for Brunswick and the Global Japan team, based in Washington, DC.
SHUDAI KOMORIYA is an intern for the firm in Tokyo.

Why do you think it is essential for us to engage with quantum computing now, and how do you see collaboration—both across industries and with fields like AI and semiconductors—driving the future of this technology?

Quantum computing is at a pivotal stage, and it's crucial for corporations, both in Japan and globally, to start engaging with this technology now.

The world is facing a shortage of computational resources due to the rapid expansion of artificial intelligence and other technologies. Companies like Nvidia are increasing chip production, but this also increases energy use, worsening global warming.

Quantum computing, on the other hand, is not only energy-efficient, but is also capable of solving specific types of problems that are unsolvable with classical computing alone.

These challenges, if addressed, can significantly accelerate business innovation while contributing to sustainability.

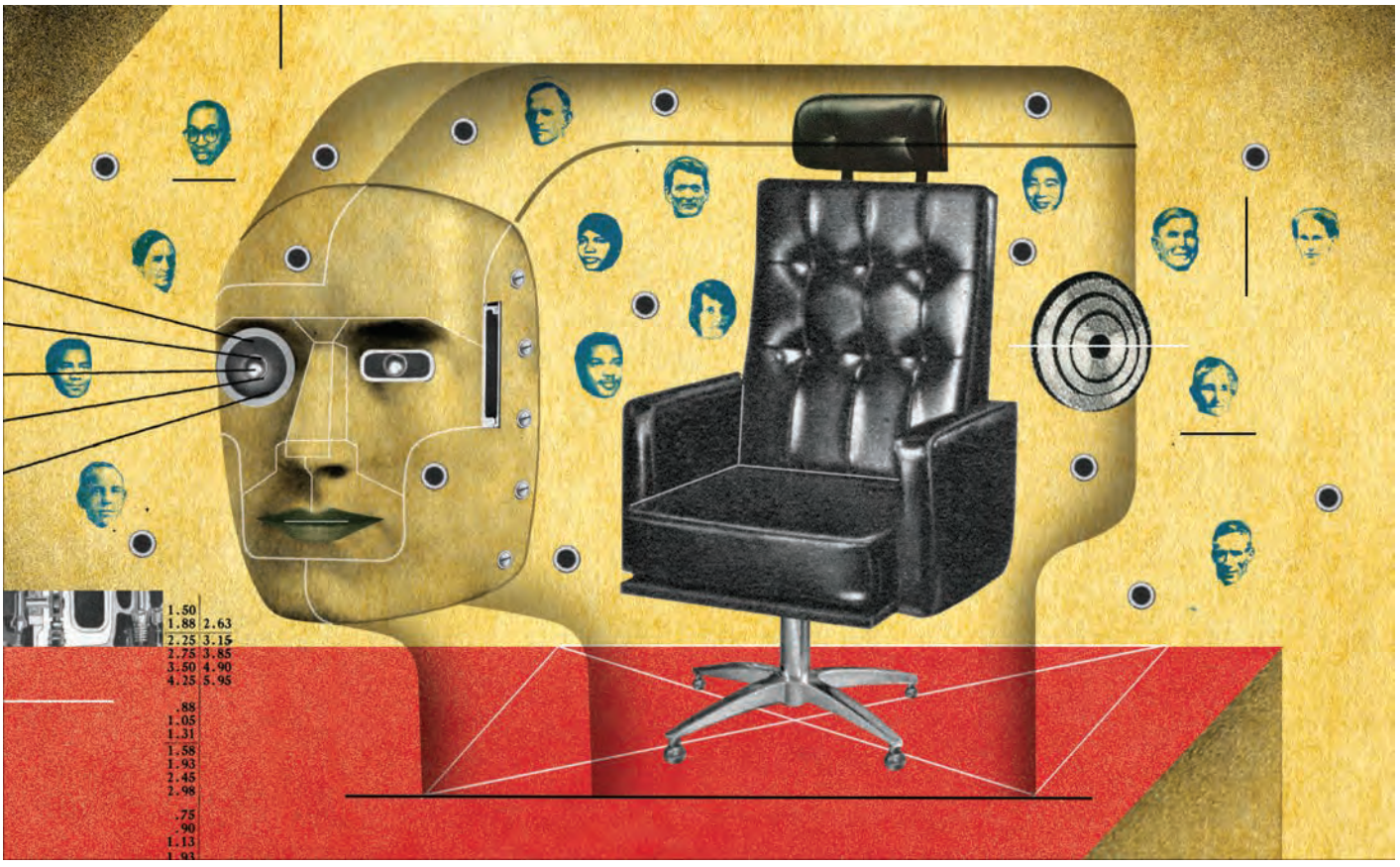
Right now, we're in what I call the "open innovation stage." This collaborative approach has produced remarkable results, leveraging the diverse expertise of these teams. While we are still in the exploratory phase, this kind of open innovation allows companies to prepare for the future.

In five or 10 years, some companies may choose to work independently once certain problems are proven solvable and quantum computing demonstrates clear advantages. But there will always be a need for collaborative forums to tackle emerging challenges, discover new scientific insights and develop innovative problem-solving methods. The diversity of industries and perspectives involved in these collaborations accelerates progress and ensures a steady flow of groundbreaking ideas.

And speaking of AI and semiconductors, keep in mind that quantum computing doesn't exist by itself—it must work alongside other technologies. We are actively developing interfaces between AI and quantum systems, as well as between classical and quantum computers.

This integrative, problem-driven approach ensures that all relevant technologies are combined to address specific challenges effectively. The future of computing is hybrid, with classical computers remaining the foundation and quantum systems helping them in high-impact areas.

By taking a collaborative, forward-looking approach, corporations can not only address today's challenges, but also position themselves to lead in the era of quantum-driven innovation. ◆



The RISE of the CHIEF AI OFFICER

Brunswick's **CAROLINE DANIEL** talks to leading CAIOs about growing demand and expectations for the new senior executive role.

Type in a basic search for "Chief AI Officer" into LinkedIn and you get 1,800 results, a number that rises by the day. From NASA to L'Oréal, from national oil companies to nation states, the new executive position to have is "Chief AI Officer." Companies like Accenture and Microsoft have multiple CAIOs. Last June, Dubai announced plans for 22 Chief AI Officers across its government, and the US previously mandated that every federal agency and military service had to hire chief AI officers.

This explosive growth underscores the rising demand for AI leadership across industries. Notably, 2024 marked a key milestone, with the number of CAIOs surpassing 1,000 (up from 250 in 2022)—a tipping point that mirrors the trajectory of Chief Digital Officers (CDOs) and Chief Data Officers (CDOs) before them and signaling the mainstream adoption of AI leadership as a critical priority for organizations worldwide.

The rise of the role has been swift. The first media reference was in 2016, but interest pretty much flatlined until the launch of ChatGPT in early 2023.

By the end of that year, Forbes was setting out "The Case for the Chief AI Officer—A Role whose Time has Come." A few months later, the CDO Club held the first CAIO Summit at Northeastern University in Boston hosted by the Institute for Experiential AI and the D'Amore-McKim School of Business;

ILLUSTRATION: DAVID PLUNKERT

500 CAIOs attended, most clustered around technology companies.

So, what's driving this shift? I asked David Mathison, Chairman, CEO and Co-founder of the CDO Club and CAIO Summit, and a leading authority on Chief AI, Analytics, Data, and Digital Officers. Some of this, he says, is title inflation: "Fully half of the 1,800 CAIO profiles on LinkedIn are unqualified people at mom-and-pop shops, startups, at AI companies, or people who are no longer in the role using the title as clickbait to attract investors, headhunters, analysts or the media."

A second, and in some ways equally misleading, driver is an enthusiasm for Generative AI. At his recent conference, Mathison showed a job description to his audience of chief data and AI officers. "It said they wanted a 'chief AI officer.' But what they really wanted was a GenAI person. People are confused, even at the highest levels of companies."

The skills needed in the role are challenging and varied. What companies should be asking, Mathison says, is: "Where have they deployed AI? What have they learned from their mistakes. What teams can you bring to the table, because being able to attract talent to the organization is critical. You want to be able to parachute someone into a company and bring in a dozen of your top AI leaders."

On the technical side, many of the best CAIOs have a Ph.D. or a master's degree. "Like Chief Data Officers," Mathison says, "CAIOs have the most Ph.D.s of any other job title on Earth." Absent those degrees, the best have strong mathematics, statistics, AI, a good grounding in data science and a minimum of 10 to 15 years of experience in deploying machine learning models, leading data science and AI teams and using cloud technologies.

Also marking exceptional CAIOs are their softer skills like culture change management and the ability to deploy AI responsibly, he says.

"You also need to be able to talk to the C-suite, to business managers, and find out where this drives business value, and have the soft skills of delivering responsible, ethical and trustworthy AI. Some people might be really good at GenAI, but terrible at delivering it across the enterprise. That's why it's important to get people who understand both the business implications of AI and then understand responsible, trustworthy, ethical AI.

"AI is an exponential technology, evolving at a pace that human skills simply can't keep up with. The toothpaste is out of the tube, and this could lead to serious reputational harm for companies. We're in uncharted territory."

DAVID MATHISON
Chairman, CEO and Co-founder, the CDO Club & CAIO Summit

"AI IS AN EXPONENTIAL TECHNOLOGY, EVOLVING AT A PACE THAT HUMAN SKILLS SIMPLY CAN'T KEEP UP WITH. ... THIS COULD LEAD TO SERIOUS REPUTATIONAL HARM FOR COMPANIES. WE'RE IN UNCHARTED TERRITORY."

These "softer skills" are no longer that soft. Getting real value out of AI is increasingly dependent on the ability to create the right AI culture, along with the right understanding of the real impact of AI on their organization.

There is a significant trust gap between CEOs and their workers. CEOs are excited. They trust AI's potential: around half consider it a top priority, in typical surveys. Employees, however, trust AI far less. The World Economic Forum reported last year that only 55% of employees are confident their organization would ensure AI is implemented in a responsible and trustworthy way.

How CAIOs help to build that trust is essential. Part of it is addressing the jobs concerns head on and ensuring employees have access to the best tools, technology and training, allowing them to start to experiment and understand how it can be useful in their work.

Daniel Hulme is one of the early Chief AI Officers. He joined WPP in 2021 when it bought his AI company, Satalia. He was recognized by *AI Magazine* as one of the Top 10 CAIOs globally in 2023. "Part of my job is to give people an understanding about what these technologies are, what they can and can't do, and what they might be able to do," he says. "Once empowered with that understanding, people feel better about how they can direct their own destiny."

Beyond his own technological credentials—with a Master's and Doctorate in AI at London-based international university UCL—Hulme recognized that responsible use of AI is fundamental to any successful deployment. "My job is to figure out what's our AI strategy over the next three years, make sure that we're tracking the trajectory of the technology and placing the right bets in terms of governance. I'm very interested in how we deploy these technologies safely and responsibly within our organizations."

There are three questions he advises organizations to ask when implementing AI. "First, is the intent appropriate? Many people have rebranded themselves as AI ethicists. I would controversially argue there's no such thing as AI ethics. The difference between AI and humans is that humans have intent. AIs don't. There are well-established frameworks set up to scrutinize intent—you don't need a new AI ethics committee."

His second question is: "Are my algorithms explainable? The difference between software and AI is that AIs tend to be opaque in terms of how they make their decisions. So when we build systems, particularly those that have a material impact on

people's lives, we try to make sure they are explainable, to mitigate any risks."

Even so, there are real challenges in ensuring that the outputs of the current large language models (LLMs) can ever be truly explainable, given they are trained on billions of data sources.

One solution is to use AI itself to help. WPP doesn't want to remove humans from the loop altogether, Hulme stresses. But he offers an example that could help address the challenge of a world in which people can create ads in seconds, together with a mechanism to test whether those ads are safe and responsible.

"We can actually build LLMs that represent different corners of society. I can build an agent that represents a political party or a newspaper, or a culture or minority group, or even a food compliance framework, or ad compliance framework, or sustainability framework. We can show these rapidly created ads to thousands of 'experts', and see if we're going to trigger any communities, break any laws or cause any harm. We're trialing issues of greenwashing to identify if ads might be greenwashing, for example."

The third question Hulme suggests organizations ask is a strange one, he admits. "What happens if my AI goes very right? As engineers, when we build systems, we try to identify and mitigate failure points, but now what we have to ask ourselves is, what happens if we overachieve our goal and it starts to cause harm elsewhere? There are lots of examples where an AI has massively achieved the KPI that we've given it, but caused harm in other KPIs."

One example Hulme provides is personalized marketing and the risk of it reinforcing the human bias that people have to engage with those who look and sound like us. "If we let AI loose to optimize marketing content, you might end up with a world of ads selling just to you. That might enforce bias, bigotry and social bubbles. What happens if we create a post-truth world? What happens in terms of the impact on jobs and how to retrain?"

Hulme's thinking on these subjects recently led him to found Conscium, an AI research lab, separate from WPP, that brings together leaders in neuroscience, evolutionary computation and deep learning, to explore how to build safe AI that benefits humanity. At the end of 2024, Conscium launched a new app, Moral Me, to learn more about human morality and how people feel about having AI even more integrated into their lives and the ethical questions that arise as it starts to take on more human-like roles—a growing topic as we enter an era of AI-agents—or start to create "digital twins of ourselves" acting on our behalf.

"I WOULD CONTROVERSIALLY ARGUE THERE'S NO SUCH THING AS AI ETHICS … YOU DON'T NEED A NEW AI ETHICS COMMITTEE."

DANIEL HULME
CAIO, WPP

A more immediate concern is getting access to the right CAIO talent right now. "There are very few true chief AI officers out there, like Daniel," says Mathison. "Folks that have 10 or 15 years of experience, seasoned veterans, with successes and failures, in delivering enterprise-wide AI. I call them unicorns. Salaries for them are through the roof. I've been tracking them since 2020 when there were 250. Now there are 1,000."

Demand for CAIO's is also shifting geographically fast. "There were no chief AI officers in the Middle East. There's none in South America, there's practically none in Canada. Across Europe, there's just a few. Then suddenly the Middle East has moved—Dubai is now second or third as a region, given the 2024 mandate to hire CAIOs across Dubai's government agencies," he says.

One consequence of that: There is likely to be even more of a coming disparity emerging between the companies with the best AI talent and CAIOs and those who are catching up. Small- to medium-sized businesses, nonprofits, regulators and government agencies all risk falling further behind as they struggle to attract the best talent.

Or, as Hulme warns, they end up hiring the wrong people. "A lot of people get excited about emerging technologies—currently, that's Generative AI. What is happening is that people are rebranding themselves and saying, 'I'm going to now build a team and a career around this.' But would you hire somebody that's just passed the Bar and had a few years of experience to be your general counsel and dictate business strategy? People end up focusing on one sort of exciting set of technologies. They then apply those technologies to solving the wrong problems and blame the technologies rather than themselves."

As the race for talent tightens, unconventional approaches are on the rise, says Mathison. "Traditional executive search for this title is completely broken, which is why the CDO Club has now launched a new service on fractional chief AI officers. Companies need to get somebody in … today."

Hulme agrees that the fractional approach may be the best route for many companies in the short term. "It all depends on how disruptive you think AI is going to be to your organization. For the most part, the CIO, the CTO, can get knowledgeable enough to make sure that they're placing the right technology bets. But if your industry is reliant heavily on AI, you're going to need to have a spokesperson." ◆

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An AI-First

EURO BEINAT, Head of AI at tech investor **PROSUS,** speaks with Brunswick's **CAROLINE DANIEL** and **YOUSEF SHARIF** about making AI "uncool" again.

PHOTOGRAPH: COURTESY OF PROSUS

Not only is AI transformative for business, but it is transformative for consumer culture, a radical shift happening in this moment. Within business, it is increasing productivity, creativity and efficiency, allowing greater emphasis on more important tasks.

These are the observations of Euro Beinat, the Global Head of AI & Data Policy at Prosus, an international technology investor and operator based in Amsterdam. Beinat comes to his view through close experience. He has 25 years of experience with technology companies working in data science, machine learning and AI. Joining Prosus in 2018, he oversaw the training of its internal agentic AI assistant, Toqan, and deployed it throughout the company, with significant results.

Prosus invests in more than 100 companies around the world that collectively create products for billions of people in more than 90 countries around the world. The group works with technology startups in online classifieds, payments and fintech, food delivery and education.

Beinat holds a Ph.D. in economics. Currently, he is on the Board of Directors of three companies and is co-founder of nonprofit Data Science for Social Good. He lectures on AI Governance at INSEAD Business School and previously taught as a Visiting Professor at the University of Salzburg.

Brunswick's Caroline Daniel and Yousef Sharif spoke with him in London about the application of AI at Prosus and the outlook for AI's impact.

How did Prosus get started with AI?

Our AI journey began in 2018 when we recognized that AI could transform not only product features, but entire business models.

We launched the "AI4Growth" program to upskill our workforce and established a dedicated AI function across our portfolio companies. Early collaborations with some of the leading AI developers, including a 2019 partnership with OpenAI, enabled us to run large-scale field tests. We had the belief that to make the most of AI, you need to do it by design. We were in a good position because of our data and engineering capabilities, but we also knew that it would only work if all the leaders of the company understood what this is.

One of our first initiatives in 2018 was to ensure sufficient education, training and coaching for all the leaders of the organization. While you need engineers to understand how to create and deploy the next model, the question is: How do you get the talent in the organization to make sure that you can leverage it? So we created "AI4Growth," it's a three-day program and everybody in the group management teams attended.

Our goal was to make AI "uncool again"—to eliminate all the hype and commit to implementation. We focused on the levers we actually control; we thought about things like talent intensity, the structure of innovation teams, experimentation practices and our approach to data.

Between 2020 and 2021, we experimented a lot with large language models—this was pre-ChatGPT, when this was very early—with use cases ranging from creating educational materials and Q&As, to document synthesis, code automation and bug fixing.

These early models, although rudimentary, marked a significant leap in handling unstructured data and set the stage for our first large-scale Generative AI product: Toqan, our flagship, agent-based AI assistant for our employees, built with robust security, privacy and analytics capabilities. We launched Toqan in 2022 and it is now used by over 15,000

employees every month. We estimate that it saves employees roughly an hour a day, but more importantly, it gives all our workforce full command of Generative AI and agents, ensuring that our entire organization is prepared for an AI-first world!

What lessons can you share with other businesses who didn't come to AI as early as Prosus?

One of the most important steps we took was to democratize access to AI by making our tools, including Toqan, accessible to everyone in the organization. We then accelerated that use and really built widespread understanding and engagement through initiatives like frequent hands-on workshops, hackathons and even informal pizza parties, where our associates curate data that is used to train LLMs.

We created a culture of collective discovery. We truly believe that the best way to discover use cases and applications with technologies that are so new is bottom-up, with colleagues applying these tools to their problems. They are in the best position to figure out how AI can help, to test and experiment, and to solve problems that matter. We can learn from them, generalize and then scale. This bottom-up approach empowered every employee, from technical experts to non-technical users, transforming AI from a niche function into a core part of our day-to-day operations.

How did that work as you scaled AI across the portfolio?

The success of our AI scale-up rested on three pillars. The first is robust infrastructure and talent. We invested heavily in technology, data strategies and the continuous upskilling of our staff, eventually building an ecosystem of around 1,000 AI specialists and deploying hundreds of models.

The second pillar is clear strategy and governance. We aligned every AI initiative with our business goals and implemented ethical, risk-based frameworks, ensuring that innovations were both impactful and responsibly governed (with oversight informed by regulations like the EU's AI Act).

And third, rigorous experimentation. We piloted hundreds of use cases and developed internal benchmarking tools based on real-world workflows. This iterative process meant that only the most effective solutions—validated by actual data and user feedback—were scaled.

How did you scale best practice?

First, it helps to build a process of rapid testing, and Toqan helps with that. Every organization will have faced lots of requests from across the company to identify AI opportunities, and pilot use cases with AI. With Toqan, users can test early on if an idea works and share their learnings across the entire group because we all use the same tool. Of course, we set the guardrails for users, to protect data, IP and privacy, which in fact has been a key advantage—people use Toqan a lot, four-to-five times a day, because they trust it.

Second, we built a network connecting over 100 companies across our portfolio. By standardizing best practices through tailored internal benchmarking tools and regular cross-company reviews, we enabled even small teams to leverage the collective intelligence of our entire AI community. We ran a number of informal forums across the group, where successes, failures and ideas were shared openly, ensuring we could rapidly replicate the strategies which worked. Every year, we gather everyone at Prosus online for three days specifically for learning and sharing. This way, we level up the entire community. For small companies in the group, those that cannot afford large AI teams, it is like being part of a much larger organization.

What's the role of the Board and executive team around governance?

Our Board and executive leadership are deeply involved in setting our strategic vision and ensuring responsible AI deployment. For instance, our CEO, Fabricio Bloisi, who transformed iFood using AI, is very committed to AI. His message is that AI isn't optional, it's a core driver of success. The executive team develops strategy and plans, sets guidelines and allocates resources that balance innovation with accountability. The Board reviews strategy, sets ethical guidelines and oversees risks. Their active involvement guarantees that all AI initiatives are aligned with long-term business objectives and comply with evolving governance standards.

I also have the privilege of meeting senior executives and board members as part of my INSEAD lectures. I get the same questions

all the time: How real is this? Is it really changing the foundation of our business? How do we handle the uncertainty and fast pace of AI, where do we start? Do we have the right competence, talent and knowledge?

It must start with strategy. Strategy trumps AI all the time.

What's the best evidence that the AI initiatives are working?

The results speak for themselves. We now have more than 700 AI and machine learning models in production, generating hundreds of millions of dollars in impact. For example, iFood, our food delivery company in Brazil that Fabricio used to run, has dramatically scaled its operations, with orders up 100 times in 10 years, to more than a billion orders in 2024, all while maintaining the same quality of delivery which would not have been possible without AI. And we've calculated at the same time that AI-led efficiency gains have improved EBITDA by 30% at iFood. These measurable outcomes validate that AI is not only core to our growth strategy but also a key differentiator among leading technology investors.

Let me give a different example. One of our bigger spends is often marketing, but the problem is that you never know exactly what the return is. So, we captured data about past marketing campaigns and their impact and modeled it. And now, you can see the next campaign's forecasted impact before you make the marketing investment, and you can find out which campaign is going to deliver more. By doing this, you get about 15% more bang for every buck spent in marketing.

You mention frequently that benchmarking AI is something that you need to do in-house. What do you mean by that?

We moved beyond traditional academic benchmarks by developing our own evaluation tests based on real-world use cases drawn from our diverse portfolio.

This practical benchmarking process means we are sure that the AI we use is not just designed to do well in tests but performs well in the scenarios that matter most to our business. For this we ask our employees to help, we organize many informal sessions, the goal of which is to create tests with complex questions and their correct answers. Then, when new models are released—for instance when DeepSeek was released—we use these tests to check how they perform for tasks we care about. And yes, DeepSeek is really good!

What do you wish you knew now from what's worked or didn't work in deploying AI at Prosus?

If we could start over, we would place an even greater emphasis on early quality controls and agile feedback loops. For instance, early on we implemented a feedback system in Toqan with positive (thumbs up, heart) and negative (thumbs down, "Pinocchio") signals. Initially, about 10% of responses were flagged as "Pinocchios", meaning that the tool was making things up, making it hard for users to trust the outputs. Over time, through improvements in the underlying models, better prompting techniques and enhanced user proficiency, this rate dropped to below 3% and now stabilizes around 1%. While it's impossible to eliminate all errors, a more iterative "fail fast" approach from the start would have smoothed our journey from experimentation to scalable production.

What's made the biggest difference to you in using AI?

To me, Toqan has been transformative. Not only has it automated routine tasks and provided quick access to complex data, but it has also fundamentally changed how I work. By enabling fast, data driven decision-making and even eliminating writer's block, it has expanded my creative capacity and allowed me to focus on strategic initiatives. Whatever I do, I start by asking Toqan: how to start, how Toqan would do it, what new angle could I explore, things like that. The tool has made me, and our teams, more independent and willing to work outside our comfort zones, effectively making everyone in the organization a bit more senior in their capabilities.

What's your prediction on what happens next?

We're on the brink of a transition which is going to create innovation at exponential speed. It's not going to be in a generation, it's going to be in a few years. This transition will change almost everything and is predicated on machines that can reason. E-commerce is going to fundamentally change. The first thing you will see is that when you visit a website, you don't search for something, you're going to be personally advised, an interaction similar to a very informed store clerk. Or even more: you're going to work with a technology that will do things for you, end-to-end, like outsourcing to a senior, skilled assistant. We polled our team of 1,000 data scientists recently and they predicted that AI agents will carry out upwards of 10% of the customer interactions in e-commerce within a year. Perhaps more challenging is that they also predicted 50% of new online content will be AI generated, up from 14%.

Second, we're now in an era when AI will shift from being a set of isolated use-case-based applications to forming fully integrated, intelligent ecosystems. Future developments will likely see AI agents interacting seamlessly with each other and with human teams to manage end-to-end tasks. We expect greater convergence between large, generic models and smaller, specialized ones leading to highly personalized and adaptive tools that will fundamentally change how we work.

How do you keep up?

Staying ahead in AI requires relentless learning, constant testing and iteration, a fundamental interest in novelty and a high degree of comfort with change. We invest continuously in training programs, participate in and foster global AI communities, and maintain open dialogues with VC firms, accelerators, university labs and the like. It is a game won by openness.

One of the best parts is when our colleagues that work in fields far from AI come along and share things they have seen, ideas for use cases or news they've read. Everyone is part of this journey, no one has a real edge, the best we can do is to make this learning wheel spin as fast as possible for as many of our colleagues. ◆

CAROLINE DANIEL, Partner, and **YOUSEF SHARIF**, Account Director, are both part of Brunswick's AI Client Impact Hub and based in London.

BUILDING the PLANE while FLYING it

7 QUESTIONS every BOARD should answer about AI

By Brunswick's **MEAGHAN RAMSEY** and **PRU BENNETT.**

As artificial intelligence continues to transform industries, board members are rushing to understand its implications on business strategy, governance and operations. While AI introduces risks that must be carefully managed, it also offers significant opportunities. Both need to be carefully considered by board directors in the context of their company's operations.

A recent article posted by Harvard Law School Forum on Corporate Governance spells out this mandate: "The board's oversight obligations extend to the company's use of AI, and the same fiduciary mindset and attention to internal controls and policies are necessary. Directors must understand how AI impacts the company and its obligations, opportunities and risks, and apply the same general oversight approach as they apply to other management, compliance, risk and disclosure topics."

In short, AI is not just the latest piece of helpful office technology, but a critical component of the board's responsibilities. But these waters are largely uncharted. Where to begin? In the race to harness the promise of AI, what should boards be asking themselves right now? We've compiled a list of seven questions designed to introduce clarity and rigor into boards' initial thinking about AI use.

1 Is the board equipped to oversee AI today?

AI is a complex and fast-evolving technology that demands continuous learning and continuous oversight. It's crucial for the board to maintain a balance in AI expertise. While the senior leadership team may have deep technical knowledge, the board must ensure it retains independent oversight by being well-versed in AI issues themselves—those of today, and those that may come tomorrow. Relying on management alone risks sacrificing that independent perspective.

Boards must ensure they have a foundational understanding of AI and its potential impact on the business. Then the board must have a plan to stay informed on AI developments. Relying on once-a-year compliance updates is not enough. Does the board have a continuous education program, perhaps through regular updates or bringing in external experts to explain the latest AI trends?

2 Are AI initiatives aligned with the company's long-term goals?

AI has the potential to transform business operations. Boards must ensure that AI strategies align with the company's core mission, values and long-term objectives. How do AI initiatives support the company's broader goals? Are AI-driven decisions helping the business remain true to its core, or could they lead the organization down a path misaligned with its mission?

Boards that succeed in this will ensure AI initiatives are not just reactive or opportunistic, but rather crafted with long-term strategic alignment in mind.

3 How often are we reviewing our strategic plan in the age of AI?

In a world where AI can disrupt entire industries in a matter of months, the traditional "set and forget"

ILLUSTRATION: NATE KITCH

approach of setting a five-year strategic plan and reviewing it annually is no longer sufficient. The timing won't necessarily be the same for every organization, but each board needs to consider how often it is revisiting and revising the company's strategic plans, at a pace that works best for its business.

The rapid development of AI means that boards must be more agile, regularly reviewing and adjusting the business strategy to account for the new opportunities and challenges AI brings. More frequent strategic planning sessions could be useful.

4 How are we addressing ethical and risk considerations related to AI?

AI raises unique ethical concerns, from bias in decision-making algorithms to the protection of sensitive data. What measures have we put in place to ensure AI is used ethically within the organization? Does our AI policy reflect our commitment to business ethics, and how frequently are we reviewing the AI policy? What are the most sensitive areas within our organization, where AI could potentially create a breach of our ethical guidelines?

AI can also perpetuate biases, especially in areas like product innovation, HR and supply chain management. How are we addressing this risk? Are we confident that our AI systems are being designed and used fairly and transparently? What protocols will need to be followed if a case of algorithmic bias emerges despite our best efforts?

5 How are we ensuring employees understand AI's risks and responsibilities?

AI doesn't only impact leadership or technical teams; its implications are organization-wide. Boards must ask whether employees are equipped with the knowledge to use AI responsibly. This question involves ensuring that AI policies are communicated effectively across all levels of the organization, backed by comprehensive training programs. Employees should understand both the opportunities and the risks of AI, and how they are expected to use the technology within the company's ethical framework.

What steps have we taken to communicate AI policies, and how are we ensuring these policies are being followed? For large companies, a whistleblower or feedback process may need to be established at all levels, to ensure that concerns are brought forward as quickly as they arise. Employees should be encouraged to use such a process and feedback should be fed independently to the board.

"Boards can help ensure that AI is not only used effectively and ethically but is also aligned with the organization's long-term strategy and values."

MEAGHAN RAMSEY is a Managing Partner for Brunswick in London, advising leaders on high stakes issues, particularly those impacting society.
PRU BENNETT is a Partner based in Sydney and Chair of the National Foundation for Australia China Relations.

6 Are we overseeing AI on audit processes?

AI has great potential to enhance the audit process by processing vast amounts of data quickly, identifying anomalies and helping auditors focus on high-risk areas. The Audit Committee should have a comprehensive understanding of how AI can be used in the external audit process as well as the risks and opportunities that the use of AI can present.

Those risks may include an over-reliance on technology, abdicating the importance of human judgment, and the possibility of AI introducing biases and hallucinations. The Audit Committee must ensure that AI is being used as a tool to support auditors, not replace their professional discretion. What measures are in place to mitigate risks associated with AI in both external and internal audits? How can human oversight be integrated and how will privacy be safeguarded?

7 How are we managing the risk of AI bias and data privacy?

With AI systems relying on vast datasets, the risk of data bias and privacy violations is ever-present. Are we sufficiently managing the privacy implications of AI, particularly as it relates to employee and customer data? This question again points back to knowing which are the most sensitive areas of the business with exposure to AI.

Boards should ensure that AI systems are regularly evaluated for biases, particularly in high-stakes areas like hiring or customer interaction. And of course, AI systems must comply with data privacy regulations. Does the board have confidence that AI policies align with data protection laws, and are we adequately managing the risks of AI in data processing?

AI is rapidly reshaping industries, and boards must find renewed adaptability. By answering these seven questions, boards can help ensure that AI is not only used effectively and ethically but is also aligned with the organization's long-term strategy and values. In this fast-evolving technological landscape, regular review, education and oversight are essential for boards to take a proactive, informed approach to governance and oversight, and remain effective in their roles.

The levels of AI integration between organizations and across systems are becoming reality, affecting the company in ways the board and executive leadership may not have imagined. This scenario hints at an even larger question: Where do board members' responsibilities start and end? How can we ready ourselves today to be ready for that tomorrow? ◆

Will AI CEOs Replace Humans?

WE ARE ON A LONG MARCH TOWARD human obsolescence—that is, if you believe the debate around AI. The disruption of the workforce is only just beginning—and now, the focus is moving to the boardroom. How long, people are asking, before AI CEOs are the new normal? • There are already a few AI CEOs out there. China-based games company NetDragon Websoft has been run by an AI program named Tang Yu since 2023. The Polish rum company Dictador has an AI CEO called Mika. Surprisingly, many CEOs themselves think that AI could do their jobs better. In a survey of 500 CEOs conducted by EdX, 49% agreed that most—if not all—of their roles could be completely replaced by AI. **So, are they right?**

In our excitement about AI, we may be undervaluing what is distinctly human about leadership.
BY JON MILLER.

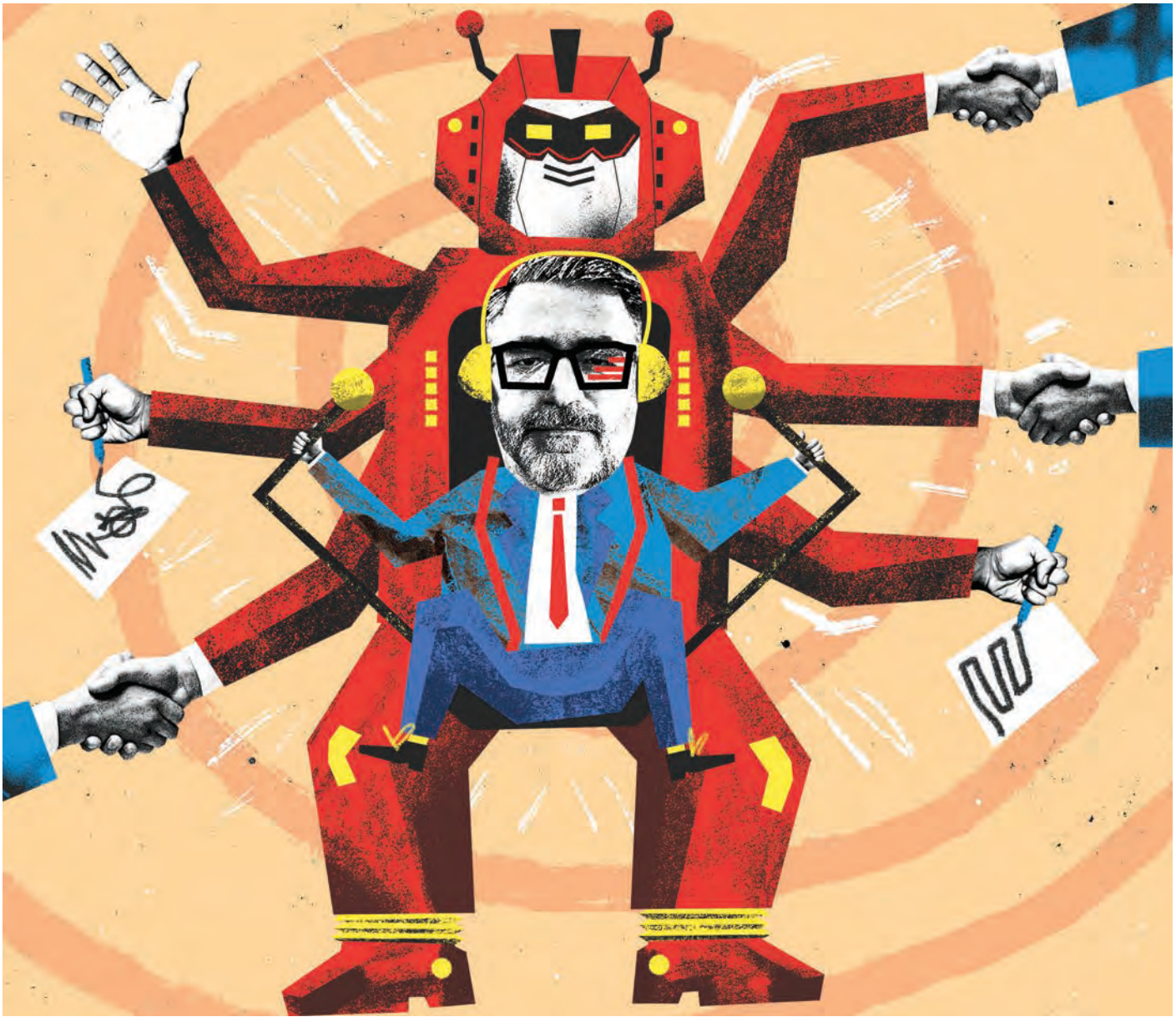

ILLUSTRATION: NATE KITCH

5 REASONS why there will always be a role for human leadership in business.

1 FORGET AI CEOS, THINK INTELLIGENT COMPANIES

The idea of an AI CEO—complete with a name and an avatar—has its roots in a 1950s view of a future filled with robots and humanoids. That's not how it's going to happen. A real AI-led company wouldn't actually need a CEO: The company itself would be an intelligent, self-optimizing network of algorithms, a system of systems. It would become, in effect, a corporate mind.

Human intelligence consists of multiple specialized systems, adapted for basic tasks like throwing, catching, avoiding predators and recognizing friendly faces, as well as advanced skills like language processing. Neuroscientists and psychologists mostly agree that what we perceive as a single mind is actually a kind of coalition of semi-independent agencies. With no clear central decider, coordination emerges from interrelated operations. As long ago as 1986, AI pioneer Marvin Minsky called this view "the society of mind."

We may find that AI makes it possible for a company to act like such a society of mind, to manage itself as a network of intelligent inter-operational systems, negating the need for an AI CEO. But what then is the role of humans? In a word: leadership.

2 "CRAZY WISDOM" IN LEADERSHIP

In 1994, Jeff Bezos quit his Wall Street job, packed up his car and set off for Seattle. Of course, everyone told him he was nuts, but it was on this road trip that he had the idea to set up an online bookshop.

From a purely rational standpoint, Bezos may have made different decisions—but life isn't purely rational and neither are entrepreneurs. As Carl Jung put it, "Show me a sane man and I will cure him for you."

In his classic 1998 *Harvard Business Review* article, "What Makes a Leader," psychologist Daniel Goleman describes how those with the greatest leadership potential are motivated by tough creative challenges—doing something different, not just administering business as usual. These people are distinctly human: They are driven by a restless energy to fulfill their personal human potential.

It takes a human to follow a dream, to act on a hunch and set upon a paradigm-busting venture. This is "crazy wisdom" in action—a phrase used by the Buddhist teacher Chögyam Trungpa—and it's evident in the biographies of many great leaders, from Winston Churchill to Steve Jobs, from Emmeline Pankhurst to Abraham Lincoln.

This is something AI will find hard to replicate, in part because it lacks the most basic requirement: physiology.

3 WHY LEADERS NEED BODIES

Humans are social animals, so Aristotle told us, and modern science agrees. Our bodies rely on and thrive in the presence of other bodies. Without a meaningful connection to others, our mental and physical health declines. That connection is strongest when we are together in person, in the same physical space.

Over millions of years of evolution, our nervous systems have acquired a sophisticated early-warning system, called *neuroception*, which subconsciously scans our environment for subtle signals of threat or safety.

When we are with others, without even knowing we're doing it, we constantly track tiny changes in vocal tone, blink rate, body temperature and other physiological factors. This tells us whether we're safe or not—and if we can't fully do this, we can't have a fully engaged social connection.

In leadership, neuroception has been called a "sixth sense." It's the gut feeling, the instinct about whether to do the deal, the sense that something's not right, or the feeling that someone can be trusted. AI can be better at detecting some threats, but this interpersonal instinct requires an embodied nervous system. To be a leader you need a body.

4 ESPRIT DE CORP(ORATION)

On the eve of the Battle of Agincourt, things were looking grim for Henry V and his army. Tired and hungry, they were outnumbered by well-equipped French forces. In Shakespeare's version of events, Henry donned a disguise and spent the night listening to the hopes and fears of his soldiers. His speech the next morning fired up his people. "We few, we happy few," he says, in the rain and mud, "we band of brothers; / For he today that sheds his blood with me / Shall be my brother."

Of course, Henry's army wins the battle and the war. This is the kind of leadership it takes to make the impossible possible, to achieve greatness. So why do surveys show almost two-thirds of workers worldwide would trust a "robot boss" more than a human? Certainly, it would probably be more consistent and reliable, never have an off day. Here we are probably talking about the difference between being a good manager and being a leader. A robot boss may give you clear instructions and a fair appraisal—but it isn't likely to inspire you to stretch yourself beyond your limits, to reach for your highest potential. It can't be your brother on the battlefield.

5 THE POWER OF HUMOR

A robo-boss is unlikely to make us laugh. That's a weakness, as studies show that humor can strengthen team spirit and boost performance, reduce divisions and increase creativity.

In fact, thinking about humor can help us grasp the strengths and weaknesses of AI. Generative AI has become great at writing jokes. Researchers have found that AI can be better than your closest family at predicting what you will find funny and what you won't. But experiments show that people find jokes funnier when shared human-to-human. This has a simple explanation: The psychological function of humor is about facilitating connection, about enabling us to bond over a shared view of the world. In the last few years, neuroscientists have proposed that the evolutionary function of laughter is to release endogenous opioids that help build long-term human relationships.

Humor is core to our social engagement systems, and thus core to leadership. This includes our ability to put things in perspective—recontextualizing or "mental shifting"—as well as our sense of fairness and our moral agility. According to neuroscientists, humor engages a network of cortical and subcortical structures that are involved in detecting and resolving incongruity. It helps us find coherence; it's how we know the difference between a fact and a truth. And it's related to our ability to ascribe value to things. A humorless leader, to borrow from Oscar Wilde, is a person "who knows the price of everything and the value of nothing."

A ROBOT BOSS MAY GIVE YOU CLEAR INSTRUCTIONS AND A FAIR APPRAISAL—BUT IT ISN'T LIKELY TO INSPIRE YOU TO STRETCH YOURSELF BEYOND YOUR LIMITS.

JON MILLER is a Partner based in London and co-lead of Brunswick's Sustainable Business practice. He is also founder of the Open for Business coalition.

CONCLUSION

Back in the 1980s, Marvin Minsky saw that the key to unlocking the power of AI would be to think in terms of agents—perhaps the key to the future of AI in leadership. Already multiple applications assist CEOs with strategic decision support, information flow, task prioritization, risk monitoring and other critical functions. And there is an emerging layer of "super-agents" that can work across these functions to create coherent CEO support—not unlike a chief of staff. In their *HBR* article from last year, Jeremy Heimans and Henry Timms (now Brunswick's CEO) describe these as autosapient agents—able to learn autonomously and make complex judgments. The challenge for today's leaders, they say, is to understand how to work with these powerful tools.

It's easy to see why people might think these agents could replace human leaders altogether. They will probably make faster, better decisions. They will be better able to make sense of vast amounts of data, in conditions of uncertainty, in real time, and determine the optimum possible outcomes.

In September, an empirical study reported in *HBR* found advantages and disadvantages to replacing corporate leadership roles with AI and concluded: "The findings suggest that AI is more suited to augmenting human leadership rather than replacing it entirely. AI can process massive datasets and optimize short-term gains, but it lacks the human capacity for judgment, empathy and ethical decision making—qualities essential for a CEO."

We need more research and, in the meantime, AI is evolving apace. But it's clear that leadership is more than datasets, more even than some kind of multidimensional game of chess. It's also about relationships—with consumers and customers, business partners and employees. It's about inspiration—the crazy idea that makes no sense but disrupts an entire industry. It's about the aspiration to fulfill our human potential, to do something that matters.

When leadership shines with brilliance, it is not in spite of our human limitations, but because of them. This is our one wild and precious life, and we want to make it count. ◆


AI &the

Circular ECONOMY

The Ellen MacArthur Foundation's new CEO **JONQUIL HACKENBERG** sees huge potential for AI to help businesses and policymakers accelerate the transition to a circular economy. She speaks to Brunswick's **LUCY PARKER** and **ANNA SHEEHAN.**

THE ELLEN MACARTHUR FOUNDATION has long been recognized as a champion of the circular economy, well known for putting the issue of plastic waste on the map globally. Making the shift from today's linear economy—where we take, use and throw away materials—to a circular economy, where we aim to reduce waste and keep materials, is a massive systems transformation. Appointed CEO in November 2024, Jonquil Hackenberg is well equipped to lead EMF into the future, with more than two decades of experience spearheading major transformation programs in businesses.

She speaks with Brunswick's Lucy Parker and Anna Sheehan about how artificial intelligence can accelerate the transition to a circular economy, highlighting some innovative startups helping to make that a reality.

Everybody's excited about how AI can trigger innovation. What's the opportunity you see connecting AI to the circular economy?

AI has quite a bad rep right now. It always seems to be portrayed as this evil specter, doesn't it?

But working towards a circular economy involves systems thinking which is very complex. And AI is really helpful in complex problem solving. It allows us to pull information from different places across a system to draw out new possibilities. It can help us accelerate exploration of alternative materials, for example, or glean insights from across a range of policy areas about the barriers we need to overcome. Progress will not come from treating circularity, or climate, or innovation separately: We need a multidisciplinary approach. So, I think the opportunity that AI offers is huge.

What kinds of materials innovation are you thinking of?

If we look at plastics and packaging—specifically, single-use plastic and how to solve for pollution and waste from sachets—the great challenge is finding the right material which can replace those sachets. And obviously human consumption requires a higher grade than other uses might, so we need more than one solution.

Using the power of AI to understand in-depth information about different material types allows us to pull data from different industries and different material applications to identify whether a particular material would be suitable for human consumption. It accelerates innovation—and cuts years off the process of researching into material development.

Have you any examples of innovative companies using AI for circularity today?

I've come across a startup called CleanHub which uses agentic AI and AI data from a range of waste management sources to analyze what types of materials are in the waste. It separates the waste into different categories, which allows the waste collectors to sort it much more efficiently. So, we're seeing clever innovations like that emerge, which allow humans and technology to play together in very interesting ways.

There's an interesting AI-powered waste analytics provider called Greyparrot, which basically enables deep understanding of discarded resources and waste, which is then used to improve recycling facilities. Another great one is Winnow, a company using AI tools to help chefs run more profitable and sustainable kitchens by cutting food waste, through reuse rather than throwing it away.

And what about the emergence of circular business models?

It's beginning. There's a startup called Rheaply, for example, which has created a platform to facilitate the reuse of building assets at scale. It leverages AI to figure out how assets could be reused and repurposed, then matchmakes between organizations. From my understanding, it's almost like a dating site for assets—supply and demand get matched up using AI.

And GenAI can open up visions of what circular business models could look like—for example, how could I imagine what circular fashion looks like? The application of AI in that space is generating consumer insights into buying patterns that can influence how you could create circular business models based on reuse.

It sounds like the greatest amount of activity today is in the management and reduction of waste. What do you see coming through next in this area?

I think that's right; lots of it is around waste at the moment and the part that is really on the rise is digitalization around blockchain traceability, with digital product passports linked into that traceability of the supply chain. Coupled with Extended Producer Responsibility, this allows materials to be recovered at as high a quality as possible to make the reuse most effective.

What will it take for us to see even further progress?

This almost sounds like a cliché maybe, but it's about connecting every element of the value chain together. Microsoft, for example, is focusing on its unique ability to measure, predict and optimize complex systems.

So, in terms of the opportunity for circularity, it's applying that capability to the reuse of materials and then bringing every player in the system around the table to develop new solutions. So rather than treating AI in a separate sphere, it's harnessing AI to full value chain solutions to help us go faster.

"Rather than homing in on pure innovation to do something small, we should think about what can be scaled. We need businesses to think more ambitiously."

In 2018, EMF produced a report on AI and the circular economy, most of which was imagining into the future. Do you think there has been much progress since then?

It's all now started to get under way and AI is beginning to solve more complex problems. Earlier this year the Rocky Mountain Institute released a paper about the circularity of an EV battery. It looked at how much of a battery could be reused if the materials were kept in circulation as well as if there were sufficient facilities for reuse of specific components—lithium for example—but also the critical raw materials required. This allows us to start figuring out how to manage the materials that are needed, so that we can go beyond just extracting them and move towards reuse and recycling. The critical materials needed for the future economy will be a major area of focus for us at EMF.

What do you think the connection with policy is? What's the ask from policymakers?

Recently, we've been seeing more and more potential for AI in policy insight. There are now 75 countries that have circular economy road maps. Using GenAI can help us to quickly analyze what policies and actions are already out there that could be applied in another country to tackle common opportunities and problems much faster.

The ask from policymakers is to look at a critical whole system solution. For example, at EMF, what we're now trying to do is go deep on three specific areas: plastics and packaging, the production and consumption of consumer products, and the use and reuse of raw materials through the lens of material security and the energy transition.

The reason I mention those three areas is because they are multidisciplinary; they cut across different policy experts and different government departments. So our ask is that we have all the different policymakers in a room to think about these issues as a whole system solution, rather than only from one point of view.

If you take the EV car scenario, that was and has been a classic example of still thinking in a very linear fashion rather than a circular fashion, because we haven't solved for the infrastructure, the use of charging points, or the design for where people actually need to charge, and at what point, as one whole system. It's all been considered through a very narrow lens. So, the ask for policy makers is to think of the end problem and then put the value chain around it so that the policy is much more holistic.

PHOTOGRAPH: COURTESY OF EMF

Do you think the businesses you work with have begun to find applications for AI in their circularity efforts yet?

Some advanced organizations have—Microsoft, for example. Unilever, Philips or IKEA are definitely all thinking this way. These are leaders in many different aspects of their industries and they're thinking about how the system links together in the whole.

Generally—and I'm describing it in broad-brush terms here—we're at the stage where digital and sustainability were 20 years ago. We used to hear people say, 'we've got to make everything sustainable' and 'we've got to digitize everything'. But to achieve making 'everything circular', we've got to get more nuanced on what that really means and how to do it. It is a major transformation.

For businesses that are looking to accelerate their circular AI efforts, how can they get started?

Well, talking to EMF would be a good place to start! Because what we're trying to do is focus on specific challenges that will then result in time-bound outcomes within the next three to five years.

At EMF we're looking at real solutions that can be scaled up in the real world, whether that's waste collection at scale, or the design of materials that are going to replace single-use plastics, or the solutions needed for EV batteries or the wind industry, or looking at consumer insights and new business models for fashion, or food, or even health and beauty.

Come and talk to us, because we can plug in those connections to the use of AI, searching for the right application for circularity, married together with the people and organizations who are trying to accelerate and demonstrate action.

Thinking about the future of AI and circular economy, what would be your call to action for businesses?

I would simply say: "think in systems."

We need businesses to convene around a single problem—so that we can understand and demonstrate where infrastructure plays, where AI plays, where physical innovation plays, where business models play, where the supply chain plays and where policy plays. We need to have all of those ingredients to effect change.

Rather than homing in on pure innovation to do something small, we should think about what can be scaled. We need businesses to think more ambitiously.

STARTUPS FOR CIRCULARITY

CLEANHUB is on a mission to end plastic pollution and clean our oceans. They've collected over 13 million kgs of waste to date and partnered with 400+ brands to help reduce plastic use and collect more than they produce.

Their AI-powered track-and-trace system analyzes waste, predicting its composition, volume and density. Recyclable materials are processed locally, while non-recyclable plastic—80% of ocean pollution—is turned into fuel through a partnership with Geocycle. Every step of the process is tracked via the app, giving brands real-time data to showcase their impact.

GREYPARROT uses its AI-powered technology, Greyparrot Analyzer, to analyze waste in sorting facilities. Mounted above conveyor belts, the Analyzer uses cameras to capture images, identifying seven key data points: composition, mass, financial value, food-grade status, function, size, brand, SKU and emissions estimate. It provides a live dashboard with real-time insights, offering 100% visibility into waste composition—what they call "waste intelligence."

WINNOW helps the food service industry cut waste and save money with its AI-powered system, Winnow Vision. Trained to recognize over 1,000 food items, it analyzes discarded food, tracks waste patterns, and provides actionable insights. Winnow's reporting suite delivers daily and weekly summaries to highlight costly waste and offer solutions. The platform has saved $85 million, prevented 60 million meals from being wasted, and reduced 106,000 tonnes of CO2 across 3,000 kitchens in 90+ countries.

RHEAPLY offers an AI-powered inventory management system and digital marketplace that helps companies reduce waste, save money and meet sustainability goals. It tracks assets to optimize reuse and prevent over-purchasing. Through its Circular Cities initiative, Rheaply connects businesses to local reuse communities, reducing waste and carbon emissions by facilitating material exchange, selling excess resources and supporting donations.

Is there anything else that you want to mention?

It's encouraging to know that it's not the responsibility of any one actor to change the whole system alone. In reality, in any system, it takes just 5-10% of truly committed people to create a tipping point that can lead to the bigger change. So, we need that 10% for circularity. And if we apply AI to the systems solutions needed, we can go faster and I'm sure there is a promising road ahead. ◆

LUCY PARKER is a Senior Partner and Global Lead of Brunswick's Sustainable Business practice. **ANNA SHEEHAN** is an Account Director in Brunswick's Sustainable Business practice. Both are based in London.

The Reporter's

In July of 2024, Jane Barrett was appointed the Head of *Reuters* AI Strategy, leading the 174-year-old company's implementation and oversight of AI systems. *Reuters*, one of the world's largest and most trusted news agencies, is part of the larger Thomson Reuters, a multinational company based in Canada that provides data and information to the Legal, Finance and News & Media industries.

Barrett graduated from Oxford University before joining *Reuters* as a correspondent in 1999. She later attended the Sulzberger Executive Leadership Program at Columbia University Graduate School of Journalism, becoming Global Editor of Media News Strategy in 2019.

She spoke with Brunswick's Wolfgang Blau about the growing role of AI in newsrooms.

Let's start with a positive: What excites you most about AI at *Reuters*?

What I've seen is that a world of possibility has opened up. I've been a journalist for 25 years and so often you wish that you could do something, but you've got to get on your company's product roadmap first. With Generative AI, it is exciting to see journalists solving their own problems and getting things moving much, much faster.

In the early days of online journalism, we were happy about the barriers of entry to the industry getting lower. At the same time, many newspapers did not survive the disruption of their business models. What effect will AI have on today's business models?

This is a very interesting moment. There are the obvious problems of "hallucination," of AI conflating different stories that have nothing to do with each other, or of pretending that there's somebody behind a piece of journalism when there isn't. As AI news experiences satisfy people enough that they don't come to publisher sites, that could also widen the gap between publishers and users, making it harder to know what their readers need and creating a financial impact. My concern is exactly what we saw with the barrier to entry going down through social media, which is that the more non-factual content is out there, the less trust there is, the less cohesion there will be in society.

One of the things we've said at *Reuters* is that the more we invest in AI, the more we'll free up the resources to invest in our news gathering.

We're big. Thomson Reuters has 26,000 people around the world, with 2,600-plus people in the newsroom. But you can never have enough reporters. The hard core of journalism consists of going out there, knocking on doors, building sources and becoming an expert in your beat. That is something that AI can assist you with, but it can't replace you.

Can you describe how AI will help your journalists free up time?

When we look at what we're seeing in the newsroom, we have broadly three areas to apply AI: "reduce," "augment" and "transform." A lot of what we're currently doing is focused on the themes of "reduce" and "augment." In a newsroom as large as ours, there's a lot of rote work, pattern-based work that people are doing every single day. Going through press releases, going through videos to find the exact moments you need. Adding meta-data to stories—a time-consuming but important job that journalists themselves are notoriously not the best at. That is all quite stressful work.

You can reduce that stress and reduce the work by getting AI to do the majority, and for the human to be in control and check the AI output before it goes out. That is the "reduce" bucket.

Then you have the "augment" bucket, which has all the stuff that we wish that we could do but we just don't have time. Translation into different languages is one example of that. We publish in 13 languages and with Generative AI we can empower our teams to do more—both languages and formats. For instance, we can take our English-language videos, translate them, voice the new versions with a synthetic voice and create new content. Of course with our human experts checking the translations and voicing. This use of AI allows you to get your content out to a much broader audience, and to satisfy the needs of many more clients around the world.

"THERE'S NO DOUBT THAT AI COULD CREATE MANY EXCITING NEW AND MORE PERSONALIZED WAYS OF INTERACTING WITH NEWS."

At the moment, we are mostly focusing on solving today's problems. That approach helps getting people comfortable with AI. We've already about 400 people using AI tools every day. But there's no doubt that AI could create many exciting new and more personalized ways of interacting with news. That's the "transform" bucket.

We are asking ourselves: What is the news experience of the future? What would a much more

PHOTOGRAPH: COURTESY OF REUTERS

Notebook

JANE BARRETT, Head of AI at Reuters, tells Brunswick's **WOLFGANG BLAU** how AI is changing the media landscape.

personalized, trustworthy news product look like that caters to your specific needs? And is the audience ready for that yet? I don't know. I'm sure that in 2025 we're going to see a lot of the big tech companies coming out with more AI-enhanced, AI-curated news experiences. We just don't want them to be only companies doing this.

What advice can you give AI leads in other industries when it comes to responding to any cultural resistance against using AI at work?

Reuters is part of Thomson Reuters, which has been investing a huge amount into AI. Our largest group of customers are lawyers, our second largest are tax and accounting professionals, and the third largest are corporates. We share a lot of information between different parts of *Reuters*. And the concern we have all come up against is, "Well, what if it gets it wrong? What if it misses something or just 'hallucinates'?"

One of the pieces of advice that I always give to people is that they should start using AI tools on a project, or on a workflow, that they know well. This approach will give you a very realistic view of both the potential and the risks and shortcomings of AI tools. You've got to use the tools yourself. You've got to test them yourself.

Second, try and solve a real problem that you've got, one that is actually going to impact quite a few people if you can solve it. And what I find really interesting is that when people start to use the tools, they realize both the power of the tool, but also that it is not going to take away their job, certainly not yet. It's going to help them do their job better. The tools allow you to put your energy where being a human really matters.

What does good AI governance look like in this case?

We have the Reuters Trust Principles, which hold us to reliable and unbiased news. That's the critical gold standard. Alongside that, we put in some AI principles back in May 2023. The core ones are accountability and responsibility. As a journalist, you are accountable and responsible for what you put out there, whether that's because you've got your byline on it, or because your fingerprint was on it throughout the process. You can't say, "Oh, the AI got it wrong." You're responsible for it.

In practice, the way we start is by matching a very experienced journalist, who is a real expert in a particular field, together with a data scientist. Then they start to jam together. The data scientist brings a very different way of looking at a problem. And together, they start to build a prompt, essentially.

At this stage, the main governance issue is making sure we are keeping to our responsible data policies. Then we test the prompt, and we see if it works or not. And then we go through a rigorous evaluation process.

Once we're through the proof-of-concept phase, we then have a governance committee that meets on a monthly basis, and we look at the tools that are in development. Are there red flags that should be raised before we take it any further? That committee

includes some very senior editors, our editor-in-chief and our executive editor, our general counsel, a senior Thomson Reuters strategy colleague, me as the Head of AI, and others as needed. And we really kick the tires on the tools to determine whether we should move forward or not.

If ever we're going to turn anything on that's just going to be AI direct to the clients, we will have oversight of all the models and maintain human-in-the-loop testing behind the scenes. We'll regularly test them for accuracy and freedom from bias, and we disclose that that piece of content has been AI-generated. It is a matter of being very transparent with your users.

Do you sometimes feel like you're trying to outrun the enemy when it comes to the growing amount of near real-time, personalized, credible-looking disinformation available from other sources?

That's not just AI. That has been a problem for a long time. It gets amplified by AI. In the world of echo chambers and bubbles, we've seen this so much. The algorithm just keeps on feeding you exactly what's going to get your engagement and your likes and all your dislikes for whatever it happens to be.

In the recent US elections, our verification team was seeing a large volume of misinformation about supposed election fraud. This went on until the first two swing states were called for Trump, and then it suddenly stopped. It just went silent.

As journalists we need to be keeping our focus on fact-based reporting, correcting when we're wrong, continuing to challenge things and question things even if it's considered a sacred cow. You've got to challenge the sacred cow as a journalist.

We have seen the World Wide Web and then social media arrive as the great democratizers, enabling everyone to be a journalist, at least in theory. The business of journalism, however, has only seen a few global winners and many more losers. Will AI accelerate that trend?

It's an excellent question. We run a series of events called the "Future of News" where we gather publishers to talk about how we're using AI, not just ourselves, but also as an industry, and to tackle these big questions. We see it very much as a role that *Reuters* can play with the backing of Thomson Reuters.

In terms of size, we have 174 years of data. We have a big archive that's digitized and that's continuing to grow exponentially. That allows us both to do deals with AI companies, but also to train our own models. We produce between 3,000 and 5,000 stories a day. We also have the financial strength to be able to hire data scientists who are like gold dust out there at the moment, to really help us to create our own models and solutions.

That said, if you're a small company, the barrier to entry on Generative AI is quite low. Even the enterprise version of ChatGPT is just a few hundred dollars a month, nothing like the expense of a new hire. The opportunity is there. And I find that some of my colleagues at smaller companies can be quite nimble. They can try things that aren't encumbered by systems and processes and the stuff that big companies have to do. There are advantages and disadvantages to both. The thing is to move. Don't stand still.

"COULD GENERATIVE AI TAKE AN UNSTRUCTURED PRESS RELEASE ... AND DETERMINE [ITS USEFULNESS] FOR REUTERS' CLIENTS? OUR VERY FIRST PROMPT SCORED 95 PERCENT."

A lot of us have had that one moment we will remember, that moment where you used an AI tool and were just floored by what it can do. Let's call it the "holy shit" moment. For me, it was using the image generator DALL-E for the first time. I asked it to carve a Tesla out of a lump of coal; the result was stunning. What was your moment?

For me, it was in the middle of 2023 when two of us started to think, "OK, well, how could we use this in the newsroom?" And we just did a first proof-of-concept: Could Generative AI take an unstructured press release and get the key facts from it and determine how they would be useful for *Reuters*' clients?

Our very first prompt scored 95%. That was my "holy shit" moment. I realized then, "OK, we've got to really start running on this."

For AI's impact in the longer term, there's still the hurdle of the common consumer. My mum—a bright woman, highly intelligent, very digitally minded—she hasn't found a use for AI yet. So there is still a tipping point to come of people finding AI relevant in their daily lives.

We are underestimating that long-term impact of AI at the moment. I do expect that there's going to be something that happens, probably in 2025, maybe 2026. Those of us who have understood this very specialized value of AI will then see AI go mainstream and find use cases we can't even imagine yet. I think we're underestimating the impact this will have. ◆

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Clarity on CLIMATE

DR. MICHAL NACHMANY is the founder of the nonprofit Climate Policy Radar, a global AI-and-human driven database and open-source platform. She talks with Brunswick's **CARLTON WILKINSON** about building better decision-making tools for political and business leaders.

AI AND GLOBAL CLIMATE POLICY OFTEN seem at odds. The crisis that climate policy is trying to address is driven by greenhouse gases, a problem potentially made worse by the sheer amount of energy and resources demanded by the explosive growth of AI infrastructure. But Michal Nachmany is convinced AI can be deployed for the benefit of society, business and earth's climate.

Nachmany, who holds a Ph.D. from the London School of Economics, is the Founder and CEO of Climate Policy Radar (CPR), which has built the world's largest open database of climate laws and policies covering all countries. CPR uses AI to augment its database, and to serve its more than 300,000 users who often work in parliaments, government agencies, the United Nations and NGOs, as well as financial markets and multinational companies.

Nachmany has always been interested in designing systems for the public good. Completing a degree in law and an MBA specializing in finance, she then earned another graduate degree in energy and environmental management. While working on a project to reduce greenhouse gas emissions, she found herself needing to know which laws and policies other countries were developing to manage this crisis. "I decided to write a Ph.D. about the dynamics of the diffusion of such policies," she says.

Coincidentally, leaders at the 2009 Copenhagen Climate Summit COP15 had run into that same problem: an acute lack of information on existing climate policies. And they had asked the London School of Economics (LSE)—where Nachmany was studying for her doctorate—to collect and compare climate laws of the world's governments.

"First, I stepped into that as a research assistant at LSE's Grantham Research Institute, and then I managed that project a year later," Nachmany says. During and after completing her degree, she managed this growing database, called Climate Change Laws of the World, out of LSE's Grantham Research

PHOTOGRAPH: COURTESY OF CLIMATE POLICY RADAR

Institute. But to make the most of that data, she realized she needed better technology.

"When I go online, I can find vegan ice cream shops near me that are open right now," she recalls thinking. "But I can't find policy incentives for renewable energy that are in force in Southeast Asia. That makes no sense. Why not apply these same technologies to the world's climate laws?"

That led her to found Climate Policy Radar in 2021. The first version of their search tool was released the following year. It has now grown to include more than 11,000 climate laws, policies, climate finance projects and international climate commitments from around the world, with plans to integrate ever more relevant documents, including corporate climate transition plans.

We spoke with Nachmany about her background, the future of CPR and the role she sees open algorithms playing in the world's climate conversation. "We're in the business of helping everyone get the data they need to make better and more informed decisions," she says.

The primary goals of CPR are around providing access to better climate information. Is that right?

Yes, with a focus on the pathways to action—the policies, the corporate transitions, the sustainable investment enablers. And while "climate" is in our name, we now always find ourselves adding "and nature." Health, human rights, peace and security are all interconnected with policies on climate and nature. Policymakers are looking for information on how to better include these different dimensions in their policy development.

While good information doesn't necessarily lead to good decisions, bad or absent information, almost by definition, leads to bad decisions. This is why we focus on enabling the two core levers that are needed in addressing climate change: better policies and moving money from the old carbon-intensive economy to the new low-carbon and zero-carbon economy. Our users span the entire ecosystem—from governments and civil society to researchers, journalists, corporations and financial institutions—because everyone is either making, challenging or being impacted by policy.

One of the things I'm proudest of is our work to unlock more climate finance for developing countries. We recently partnered with all four of the major multilateral Climate Funds, which are tasked with funneling climate finance from the rich countries to the developing countries. For developing countries, the process of applying for these funds is extremely complex and often results in long delays, or in the poorest countries not being able to apply at all. Government agencies in developing countries often aren't sure which fund they should even apply for and how.

"WHILE GOOD INFORMATION DOESN'T NECESSARILY LEAD TO GOOD DECISIONS, BAD OR ABSENT INFORMATION, ALMOST BY DEFINITION, LEADS TO BAD DECISIONS."

To solve this problem, we partnered with the funds to create a single clearing house for all of the projects that they finance and the detailed guidance for application. We did this by creating a single source of machine-readable, searchable documents. This will allow funds to be deployed faster, build clean energy projects sooner, and be more prepared for the growing frequency and intensity of extreme weather events. That is the impact we seek and AI plays a central role in that.

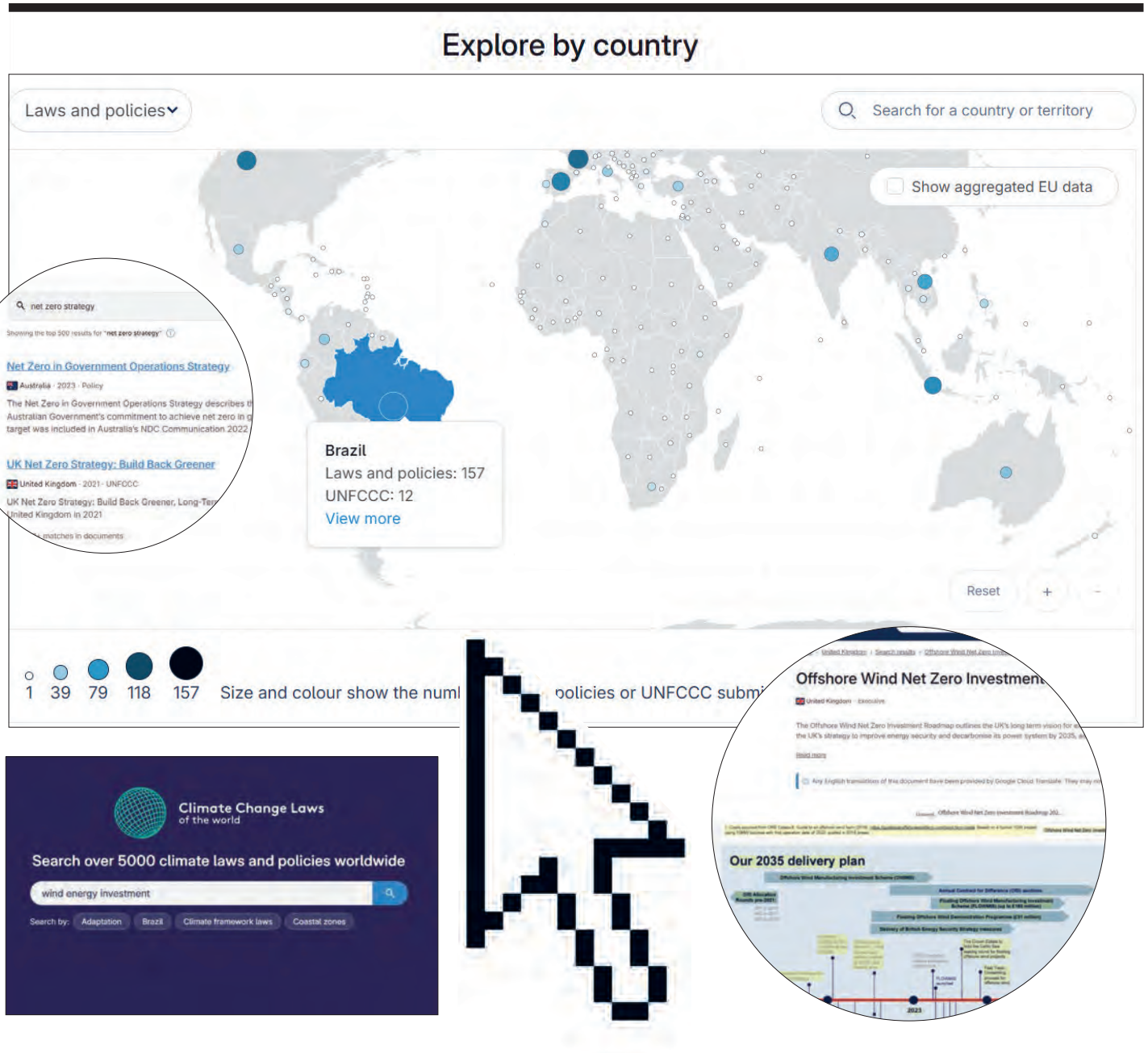
How does your platform serve business and corporates?

We can look at this through a lens of different types of risk. There are three types of risks related to climate and nature: physical risks, transition risks and the risks of liability.

Let's look at physical risk: Assume you are a beer producer and need to assess the impact of droughts on hops harvest. How do you plan for this? Of course, there are climate models for predicting droughts, but it is also important to take the policies into account that can mitigate or exacerbate supply chain risks. These can be water allocation laws or subsidies for water-efficient crops that determine the availability and price of your raw materials. Or let's assume you are a manufacturing company: Extreme weather events can disrupt your energy supply. To fully calculate that risk, you also need to factor in the policies that support your regional power grid's resilience, incentivize your onsite renewables or battery capacity, or exacerbate your company's reliance on price-volatile fossil fuels.

Then there are transition risks. A manufacturer of auto parts or fast fashion must ask: Will my products still be marketable? If production of new petrol and diesel cars are banned in Europe after 2035, what happens to a business built around supplying their components? If the climate-related regulation of fast fashion is changing, how will that affect my business model? Being able to quickly map this shifting policy landscape is essential to understanding the business's long-term viability and strategy.

The third risk is liability—the legal and reputational challenges that come with evolving regulations. Could a company or its investors face increased scrutiny for greenwashing, certain supply



GRAPHICS: COURTESY OF CLIMATE POLICY RADAR. ARROW POP_JOP GETTY IMAGES

chain practices or its environmental impact? As regulatory frameworks tighten, understanding disclosure requirements and compliance obligations is essential to mitigating risk and maintaining trust.

And finally, there is the opportunity for companies to engage with policy design, which requires staying on top of regulatory developments. An emerging criterion of credible climate transition plans is how engaged the disclosing company is in also advocating for the public policies that support the decarbonization of their suppliers and clients. To develop such a corporate climate policy agenda, companies need timely and easily accessible information about emerging policies in their key markets.

The interactive map at Climate Change Laws of the World, a site operated by Grantham Research Institute at London School of Economics, is powered by Climate Policy Radar's technology and database. It offers the ability to search the data for information on countries' climate-related policy documents, allowing decision makers around the world access to the best information.

In the coming weeks, Climate Policy Radar will expand its open datasets to include climate-related disclosures from hundreds of major companies. Enabling easy access to corporate disclosures together with data on laws and policies, national commitments, climate litigation and project financing, provides a clearer picture of emerging risks and opportunities—helping businesses, investors and policymakers make better decisions.

Does the growth of misinformation and disinformation have any impact on your work?

Absolutely—but I would add a third and fourth issue to those two: bias and omission. Together, these make up what are called information disorders, and

they distort decision making at every level.

We aggregate public documents—laws, policies, regulations, corporate reports and litigation cases—and take great care in authenticating them. Bias, usually a result of training AI models on limited or unrepresentative datasets, as well as algorithmic omission, are major issues, especially in climate. If an algorithm doesn't give you the full picture, key policies or legal rulings can be missing from the analysis—and you don't know what you don't know. And that's not just an academic problem, it affects how we vote—through the media we consume—how regulations are shaped and how businesses plan for the future.

When it comes to our own use of AI, it is important to mention that Climate Policy Radar's data and models are open for everyone to examine. That's like cooking in front of the guests in a restaurant. They see what you put in the food and how you made it. In our Generative AI features, which will be available soon, users can trace every sentence in the generated answer to the source on which it was based. By exposing our inner workings this way, we are able to build trust, reduce bias and reduce misinformation, disinformation and omission.

It all comes back to this notion of a public good—in our case the transparency in our data and algorithms—and speaks to the importance of guarding the truth in any political system.

Your website mentions the importance to your strategy of "radical collaboration." Can you talk about that?

Radical collaboration means rethinking how we work as an industry. We see other organizations as allies, not rivals. Climate progress is too urgent for duplicate efforts, secrecy or inefficiency.

We focus on open science, shared standards and interoperability, ensuring that our work and our learnings can be used by others to drive impact faster. That includes running a community of practice on natural language processing for climate, organizing conference workshops and being good allies to other organizations in the space.

No single organization can do it all—nor should they. Collaboration works best when each of us plays our part in the value chain. Each organization does what they're great at so others don't have to. Some collect data, some build tools, some model and analyze, and others drive advocacy and policy change. We provide high-quality, structured climate data, so others can generate insights and take action. It's an ecosystem approach of interdependence.

"BY EXPOSING OUR INNER WORKINGS, WE ARE ABLE TO BUILD TRUST, REDUCE BIAS AND REDUCE MISINFORMATION, DISINFORMATION AND OMISSION."

How are you funded?

Most of our income comes from philanthropy. Some of our biggest contributors are the Quadrature Climate Foundation, the Sequoia Climate Foundation, Google.org and the Patrick J. McGovern Foundation.

Funding tech nonprofits is still new to many foundations, as it is so different from classic NGO funding. We have been fortunate to work with our supporters on shaping that practice, for the benefit not just of ourselves but also of others.

In the future, we'll offer paid API access for those who need scalable, high-volume integration, while ensuring the underlying data remains open and freely accessible. This model supports our financial sustainability without compromising our commitment to open knowledge.

How do you see CPR growing?

First, by expanding our data coverage. For example, we already have national policies but haven't yet tackled state or city-level policies.

Second, by enhancing our analytical tools. We're improving structured data analysis and advancing our Generative AI capabilities—from prototype to robust tools for question-answering, synthesis and summarization, all tailored for the climate domain.

Third, by evolving the platform for different types of users, from policymakers needing quick comparisons to researchers analyzing long-term trends.

Fourth, by building new alliances to include other types of data. Climate Policy Radar specializes in text analysis, but decision makers need more. They also need Earth observation data and supply chain data. Instead of sending them elsewhere, we're leading a multimodal decision-support collaboration, bringing these data sources together. Expect more on this by London Climate Action Week in June.

Fifth, by continuing to foster responsible AI. We don't just apply AI—we shape best practices for its responsible use in public good applications. This means improving accuracy, governance and oversight mechanisms while sharing our learnings with the wider community. Ensuring that AI serves climate action in a way that is transparent, ethical and impactful is core to our mission.

And, of course, the most important growth target we are working toward is to see ever more organizations, governments, members of parliaments, NGOs, corporations, UN agencies and scientists worldwide use our tools to accelerate climate action. ◆

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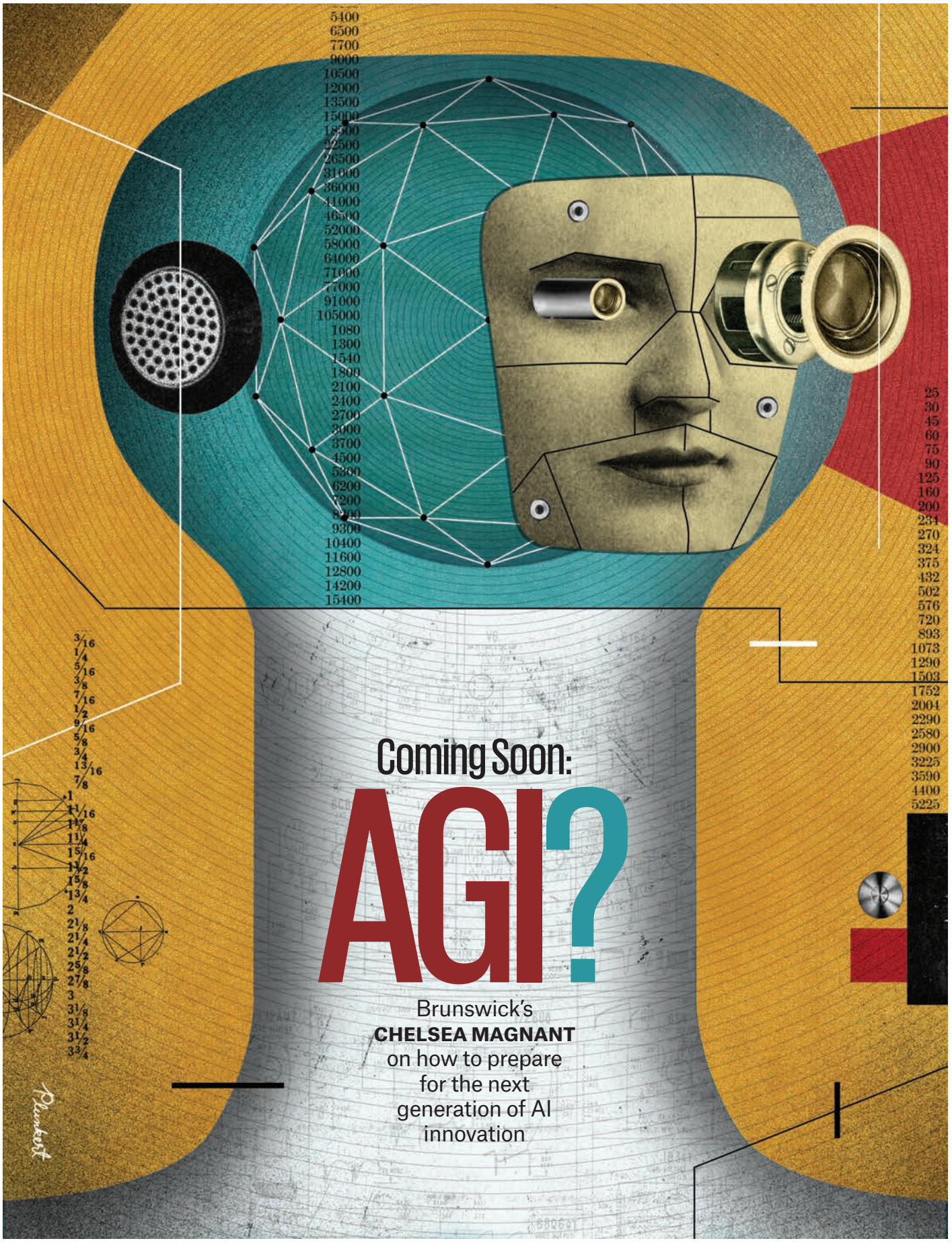

Coming Soon: AGI?

Brunswick's **CHELSEA MAGNANT** on how to prepare for the next generation of AI innovation

ILLUSTRATION: DAVID PLUNKERT

Most of today's artificial intelligence models focus on specific tasks and problem domains. But imagine a world where AI can think about a variety of issues and reason like a human. That's the goal of artificial general intelligence. AGI—when developed—reportedly will have the ability to understand, learn, and apply knowledge across a wide range of domains. The ultimate goal is to create models that are able to perform tasks they're not necessarily trained for, allowing the technology to unlock discoveries without human direction and the constraints of our imaginations.

AGI is expected to unlock immense possibilities, transforming our businesses and daily lives. Experts anticipate particularly transformative effects in education, finance, healthcare and manufacturing, given AGI's theoretical ability to improve productivity, accelerate research and development, enhance decision-making across topics, and personalize results for consumers, students and patients. In theory, AGI will eventually outperform humans in ways we can't even conceptualize yet.

With this technology, however, will also come serious risks. Achieving AGI will require an immense amount of computational power, contributing to increasing energy demands. The rise of AGI will exacerbate ongoing concerns about the future of the workforce, especially unemployment rates and income inequality. Outsourcing decisions to AI models will also exacerbate ethical dilemmas around issues like data privacy and security, bias and accountability.

So how far we are from an AGI-enabled future? Many top researchers agree that AGI is close but disagree on how close, in part because there's no agreed-upon definition of what AGI *is* precisely. OpenAI CEO Sam Altman has said he's excited about AGI's arrival in 2025, while DeepMind CEO Demis Hassabis has said that AGI is a decade away. Others argue that true AGI is not actually possible given that machines will never be able to replicate the complexity of human emotion and cognition.

Regardless of how you choose to define AGI and when exactly it will arrive, more advanced AI systems are definitely coming. Here are four steps businesses should take now to prepare.

1 **Invest in AI Literacy and Talent Development** AI can already help automate routine tasks, allowing employees to focus on more creative and complex problems. As AI evolves, businesses should invest in training to ensure that employees can effectively leverage new developments and work alongside increasingly sophisticated AI systems. Companies should also recruit talent with AI and machine learning expertise to stay ahead of the curve.

2 **Focus on Ethical Implementation** To mitigate ethical concerns about AI, companies should establish clear policies for its development and use, focusing on transparency, impartiality and accountability. Companies should also proactively communicate about these policies—internally and externally—to avoid the reputational risks that come with real or perceived ethical concerns, especially as models become more advanced and take on more complex tasks.

3 **Adopt Flexible Technologies** Advanced AI will bring about rapid changes in business practices. Companies should prioritize adaptable, scalable technologies that can easily integrate with evolving AI systems. Cloud computing and data analytics platforms can help ease the transition.

4 **Maintain Strong Cybersecurity Defenses** Cybercriminals are already leveraging AI, creating more believable phishing emails, malware that can adapt its behavior to evade detection, and deepfakes and other synthetic media that can help spread misinformation or conduct social engineering attacks. At the same time, cyber defenders are using AI to improve their defenses, enabling faster and more effective threat detection and response. It's important that companies ensure they're following best practices and staying up to date with security trends, especially as offensive and defensive practices become more sophisticated. ◆

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