Think:Act

Leading thoughts, shaping vision

Think:Act #34 07|2021 **THE UNKNOWN** PRICE $19.95

EMBRACING THE UNKNOWN

MAKING SENSE OF A BRAVE NEW WORLD

+

Daniel Ek
Spotify's CEO on why innovation is everything

Building back better
Why cities could come back stronger post-Covid

Roland Berger

"Information technology has increased the contagion of narrative – but it has always played a role, from the invention of the printing press by Gutenberg."

ROBERT SHILLER
Nobel laureate economist and bestselling author

→ PAGE 76

PHOTOS: DOMINIK BUTZMANN/LAIF, WESLEY MANN/AUGUST

"Innovation is a continuous process. So I would build an innovation system at your company to see how you can harness ideas from as many places as possible – and then ideate on them."

DANIEL EK
Co-founder and CEO of music streaming service Spotify

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"For a business, it is essential to understand which of its systems are complicated and should be managed for efficiency, and which are both complex and so mission-critical that they should be managed for robustness."

MARGARET HEFFERNAN
Professor of practice at the University of Bath

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THE UNKNOWN

"At odd and unpredictable times, we cling in fright to the past."

ISAAC ASIMOV
Science fiction writer

NOBODY HAS A CRYSTAL BALL. So perhaps it takes a science fiction writer's imagination to articulate the unknown – and in some ways unknowable – futures. Isaac Asimov's words resonate strongly with where we are right now in 2021, in the aftermath of a global pandemic which has helped to rewrite the rules of how we live and work and do business. We can't cling to the past, but now the future is less than certain. Nothing could have prepared us for the end of predictability, but if projections don't work anymore it's hard to know what the future holds – and difficult to plan for it. In this issue we look at what you can do to tackle the uncertainties ahead. Read on to learn what forecasting tools you can use, how others prepare for the unpredictable and what trends you need to look out for to lead your organization into the unknown ...

ILLUSTRATION: ISTOCK

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COVER ILLUSTRATION: GETTY IMAGES | PHOTOS: SABRINA PETERS, BURT GLINN/MAGNUM PHOTOS/ AGENTUR FOCUS | ILLUSTRATIONS: DENIS FREITAS, MATT CHINWORTH, CATHAL DUANE

Wide angle

Think, act and stay informed

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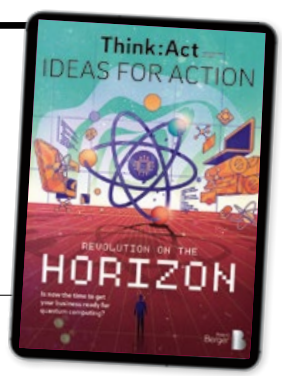
Dear white men
Women still find it hard to establish themselves as equal partners. Will you help to quicken the pace of change?

Deep dives

Think:Act Ideas for Action

Sign up online to download this issue's Ideas for Action with insights on how quantum computing will change the business landscape and why it is time to prepare your organization for it.
rolandberger.com/quantumcomputing



Think in numbers

Putting a figure on ...
THE COVID-19 VACCINE

329
MILLION
The number of of Covid-19 vaccine doses that had been administered worldwide by March 11, 2021, the first anniversary of the WHO declaring the pandemic.

6,156%
INCREASE
The rise in Novavax's stock price between Jan. 1, 2020 and Feb. 4, 2021, one week after the announcement that its vaccine was the first to demonstrate clinical efficacy against Covid-19 and both UK and South Africa variants.

4.9
YEARS
The estimated amount of time it will take to vaccinate 75% of the global population with a two-dose vaccine, based on the vaccination rate at the beginning of March 2021.

$1.9
TRILLION
The estimated losses to wealthy countries as a result of uneven vaccine distribution between advanced and developing economies in 2021.

SOURCE: WHO, NOVAVAX, BLOOMBERG, THE NEW YORK TIMES

PHOTOS: GETTY IMAGES, FREDFIELD.COM

Food for **thought**

"Can a small company really compete against the digital giants like Google and Amazon?"

by Jonathan Byrnes

YES. AMAZON DOES ONE THING VERY WELL: serve small customers at arm's length in an information-rich environment with strong network effects. This leaves a wide-open set of lucrative, defensible, higher-service segments providing customized and semi-customized services, often integrated with customers. The key is not to compete directly with Amazon and others, but instead to do what they did: identify an under-served market and focus tightly on revolutionizing it. For example, tele-medicine and wellness management abound with high-growth opportunities.

Thin

AT A GLANCE

JONATHAN BYRNES is a senior lecturer at MIT and founder and chairman of Profit Isle, an SaaS profit analytics software company. Jonathan is co-author with John Wass of the book *Choose Your Customer: How to Compete Against the Digital Giants and Thrive*.

Thoughts *to live by*

"Vision without action is a daydream. Action without vision is a nightmare."

— Japanese proverb

Re-think*ing* *buzzwords*

Get to grips with new industry lingo in a flash with our stripped-down explanations of the latest jargon.

"Tattleware"

The pandemic's by-product, the WFH boom, has created a new trend: apps to monitor what the workers are doing – regardless of whether they're wearing a suit or sweatpants. The tools have earned the "tattleware" title because they can tell the bosses what is going on remotely. Using digital traces – email use, calendar inputs, time on calls – they build a productivity profile. But some tattleware can be installed without an employee's knowledge to monitor online activity and even take staggered screenshots. That's surely a privacy-infringing issue.

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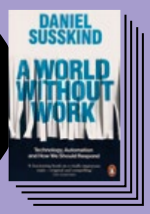


Progress without provoking panic

An Oxford University academic argues that society needs to prepare now for a world where most work is automated.

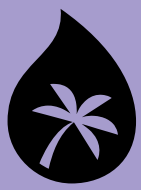
IN THE PAST, most anxieties about the economic harm of automation have proven misplaced. Instead of being out of work permanently, laborers kicked off the farms went to the factories – and more recently, workers abandoned by the assembly line found their way to cubicles. But this round of automation may be different. In the coming years, more and more repetitive tasks will be performed by artificial intelligence. To cope with a world where fewer and fewer people have jobs, society will need to find new ways to deliver the economic value and sense of self-worth that has always been an important part of work. Machine learning is gradually taking over more and more repetitive tasks in every sector. But even before this process goes much further, we should think about how to handle the consequences: Even 15-20% unemployment could still have huge social costs. Educators should focus on teaching students the kinds of skills that computers are bad at doing and the state will need to get bigger to support all the people who won't be needed by the labor market. It's time to think differently and not just about labor policies – today it's as much about leisure policies and that's because as automation continues, we are going to need to build a social security structure that no longer relies on paid work as its foundation.

→ ***A World Without Work. Technology, Automation and How We Should Respond***
by Daniel Susskind. 272 pages. Metropolitan Books, 2020. $14.99.

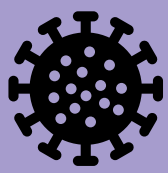
Chain Reaction

FEEDING INTO A CRISIS

If groceries have seemed more expensive recently, it's not the pandemic affecting your memory. In December 2020, the United Nations' Food and Agricultural Organization (FAO) reported a six-year high in its global food price index. Vegetable oils, which rose 51% year-on-year since global lockdowns began in March 2020, saw the largest gains across the index's five categories. Here's how the events of 2020 affected palm oil, an ingredient in about half of all supermarket goods, and helped contribute to higher consumer prices.



2019: Indonesia and Malaysia, which together account for approximately 80% of the world's palm oil, look toward record-breaking production for the third year in a row. Low palm oil prices lead to reports of decreased replanting and fertilizer use on plantations that could affect next year's crops.



APRIL 2020: Lockdowns drive the FAO vegetable oil index down 12%. Indonesia announces health protocols, but no change in hours, for plantation workers. The Malaysian state of Sabah shuts down plantations until April 14 in an attempt to curb the spread of the virus.

JULY 2020: The Malaysian Palm Oil Association announces the country is losing up to 25% of its potential crop yield due to a government freeze on bringing in foreign workers because of the Covid-19 pandemic.

NOVEMBER 2020: Amid speculation that La Niña rains will further disrupt tight supplies, palm oil rallies to reach its highest price in eight years. Market watchers note that the gap between palm and soybean oil prices is the narrowest since 2011, when another La Niña weather event sent food prices soaring – which partly provoked the Arab Spring.

LOOKING AHEAD: With many crops experiencing similar difficulties throughout 2020, droughts and heavy rains caused by the year's La Niña weather patterns continue to drive commodity insecurity into 2021. By early March, the FAO's monthly food price index was up for the ninth month in a row – 16.7% over the same period in 2020. Palm oil prices are expected to continue to rise.

Best practice

How to ... change the office routine post-Covid

THE OFFICE HAS been lying dormant, but as we emerge from the pandemic WFH is about to give way to the workplace. It won't be the same as it was, though: Flexible working is here to stay and post-Covid office life is ready for a reboot. Yet to embrace what we have learned, we will all need to make some shifts in our office routines. So, here are three quick ways to change it and safely be side by side again. First, instate one-way corridors to minimize pausing in one spot – social distancing will still be an issue for some time yet. Second, make sure your office is never at 100% capacity. Establish teams with fixed schedules to help make that work. Third, get some outdoor space. If you can't meet in the corridor or at the water cooler, then a roof terrace is a good idea – or make use of local outdoor space for informal meetups or even walking meetings.

Economic impact

Big screen tests

TELEVISION, VHS, STREAMING: Declaring "the death of cinema" felt like a tired trope until Covid-19 disrupted the story with plot twists for everything from production companies to box office sales. Coming on the heels of the industry's record-breaking 2019 global box office revenues of $42 billion, AMC, the world's largest movie theater chain, reported a 90.9% year-on-year drop in revenue for Q3 2020. But social distancing measures and 2020 blockbusters being held over into 2021 may prove the least of the hard-hit theaters' concerns as they tread the path to recovery. Following *Tenet*'s disappointing $10 million North American opening weekend in September 2020, Warner Bros. announced it wouldn't rely on moviegoers feeling safe in their seats. The studio announced all of its 2021 films would be available for streaming the same day as their US release. While the studio maintains this is a temporary measure, the question is whether a post-pandemic public will still crave the "live" cinema experience, how many theaters will survive to provide it and who will own them. A termination of the 1948 US antitrust decree blocking vertical integration in the film industry began in late 2019. Netflix acquired Hollywood's landmark Egyptian Theater in May 2020.

Think:Act

AT A GLANCE

PHOTO: GETTY IMAGES

PREDICTING THE FUTURE: WHEN SECONDS COUNT*

In focus

In this issue we get to grips with unpredictability and how to flourish when facing the unknown.

*PREDICTING THE FUTURE: WHEN SECONDS COUNT

by Detlef Gürtler

THE UNKNOWN

THERE SIMPLY ISN'T ONE SINGLE FUTURE – and not all futures are uncertain. First, consider the extremes. Look at the very, very far distant future and there's a 100% certainty: The Earth and the sun will collapse. And then observe the very, very near future. That gives us an (almost) 100% certainty too: The next second will be more or less exactly like the one that precedes it. So what about in between? Our cars already tell us when we will reach our destination; the weather reports give a probability of rain for the next 36 hours and apps can tell you whether your house will be swallowed up by a rise in sea level by 2050. Yes, some things will always be an unknown: No one has a crystal ball. But they are becoming *known unknowns*, with better and more reliable predictions. Predictions for the next minutes or seconds are mostly of little use: What could really change during the next few seconds that would be of value? Well, most prediction technologies for this kind of short time frame focus on emergencies. Knowing some seconds in advance that a tire will explode – or that an earth tremor might occur or lightning will strike – could indeed make a difference ...

EARTHQUAKE/ TSUNAMI

Seismic waves are slower than light. The farther away from an epicenter you are, the more time to warn and prepare. And in the wake of a quake, every second counts when it means you can prepare to save lives.

PREDICTIVE TEXT

Your communication software predicts what word, or item, might be missing. Or asks: "Do you REALLY want to send this mail that contains the words 'file attached' without having a file attached?"

TRAFFIC ACCIDENTS

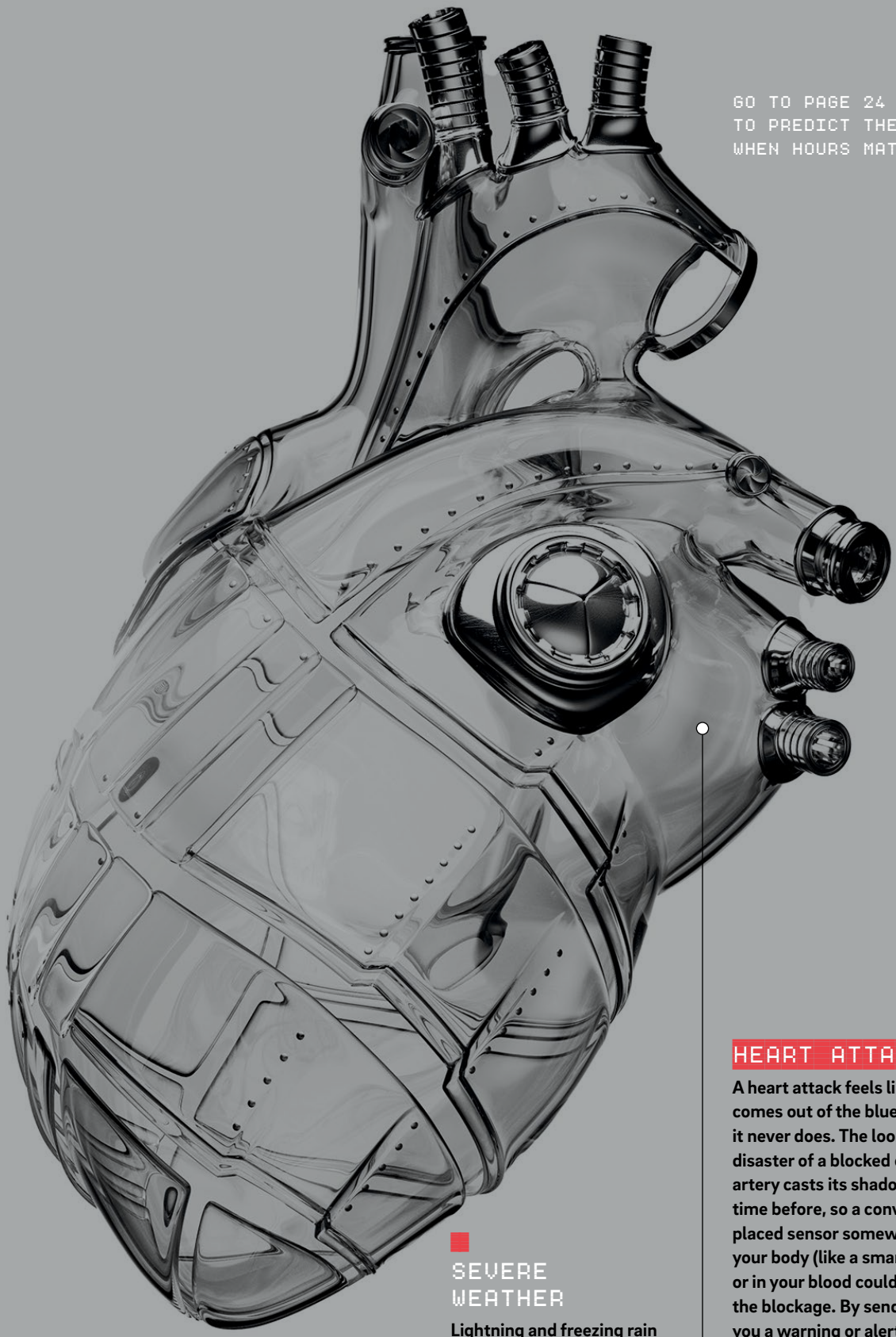
Cars already warn you when you come too close to the car in front or beside you. But there's more to come: Especially since self-driving technology relies on (almost) perfect accident prevention.

PARKING SPACE PREDICTIONS

Your car can know the nearest empty parking space, or where a car is starting up and a space will soon be free. It can also reserve that space for a minute – but that feature may come at a price.

PHOTO: GETTY IMAGES

GO TO PAGE 24
TO PREDICT THE FUTURE
WHEN HOURS MATTER >>>



THE UNKNOWN

HEART ATTACK

A heart attack feels like it comes out of the blue – but it never does. The looming disaster of a blocked coronary artery casts its shadow some time before, so a conveniently placed sensor somewhere on your body (like a smartwatch) or in your blood could foresee the blockage. By sending you a warning or alerting an emergency service such a prediction could prevent many fatal cases. This way, one of the most common causes of death in the world could be practically eliminated.

SEVERE WEATHER

Lightning and freezing rain are sudden weather events that can cause serious damage the moment they strike. The more exact the prediction is for the time and place, the less dangerous they become.

SMALL STEPS AND GIANT LEAPS

WHAT CAN HISTORY TEACH US ABOUT SAILING OFF INTO THE UNKNOWN? THREE VERY DIFFERENT APPROACHES HAD SIGNIFICANT AND SUCCESSFUL RESULTS.

BY Detlef Gürtler
ILLUSTRATIONS BY
Denis Freitas

THE UNKNOWN

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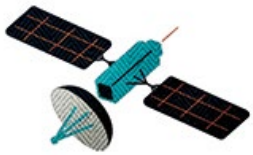


SATELLITES:
EARTH EXPLORATION

YOU KNOW YOUR DESTINATION. But you don't know the way to get there. For land-based problems, the solution is a simple one: use a map. For almost every place in the world, there's a way and it is mapped. All you have to do is put a map in your pocket and set off. No surprises – nasty or otherwise. In business, it's a different story. You can have clear targets – perhaps becoming a CO_2 neutral company, or developing an innovative device no one has used before – but there's no map to show you how to get there. There are lots of possible directions to choose from, and they all lead into the unknown.

Well, that kind of business situation today is exactly the situation which faced Europe's political leaders in the 15th century. They had a clear target: India, the land of gold and spices. But they had no known way to get there by sea. The traditional trade route via Byzantium was destroyed by the Ottoman Empire in 1453. And no one had ever reached India by ship. Whoever wanted to be the first had to cross *terra incognita*, unknown territories – a common expanse seen on 15th century maps. Of course we know from our school history books that these Europeans took the risk to step out into the unknown, and successfully so. Could their strategy to tackle *terra incognita* help us tackle the business unknowns in 2021?

Let's take a look at not just one, but three strategies used by these maritime discoverers. All successful, and all as different as different can be.

THE PORTUGUESE STRATEGY: STEP BY STEP. Prince Henry the Navigator crafted a strategy to sail southward along the African coast early in the 15th century, although it took the whole century to reach the final destination. Portuguese ships made it to Mauritania in 1441, then to Senegal (1444), Cape Verde (1455), Sierra Leone (1462), South Africa (1488) and last but not least, in 1498, to India. Every new trip stepped further into *terra incognita* – but only one step at a time.

All the inventions and innovations accompanying these Portuguese explorations wasn't by chance, but by design: Prince Henry supported research and expertise in all the disciplines that were necessary to boost maritime strength – namely shipbuilding, cartography and navigation. The caravel, engineered in the mid-15th century, was a light and reliable ship made for navigation on the open sea. Henry employed some of the best cartographers to map the new horizons, sponsored new navigation instruments and invested in Africa-bound expeditions. The Algarve region in the southwestern corner of Europe became a maritime cluster of innovation – a bit like the birth and growth of Silicon Valley in the 1960s.

Portugal didn't have to wait until the end to reap what Prince Henry had sown. Long before Vasco da Gama's successful journey to India in 1498, the step strategy bore the first fruits for the Portuguese. The maritime route from West Africa to Europe broke the →

THE WORLD AROUND US: LAND, SEA, SKY

HOW NEW INSTRUMENTS ENABLED THE DISCOVERY OF TERRESTRIAL AND CELESTIAL SPACE

AIRPLANE:
AIR EXPLORATION

TELESCOPE:
SPACE EXPLORATION

SEXTANT:
NAVIGATION
ON OPEN SEA

COMPASS:
ORIENTATION
THROUGH THE
UNKNOWN

dominance of the gold trading routes through the Sahara and promised high profits for Portuguese merchants. An equally profitable trade also emerged: slavery. In 1444 the first slave market opened in the Portuguese harbor town of Lagos. By 1450, 700% profits were documented on trade of Mauritanian slaves. The returns were reinvested in expeditions to Africa. So step by step, the Europeans also started to write one of the darkest chapters of their history.

Prince Henry the Navigator passed away long before the first Portuguese caravels reached India. That's a typical outcome for the step strategy. It takes time – a lot of it. Leaders must follow the footsteps of their predecessors. The good news, though, is that it can be done. The project can be bigger than you are. The challenge can survive for generations, if you build a solid base for long-term sustainable development. In short: Experience helps to grasp the unknown.

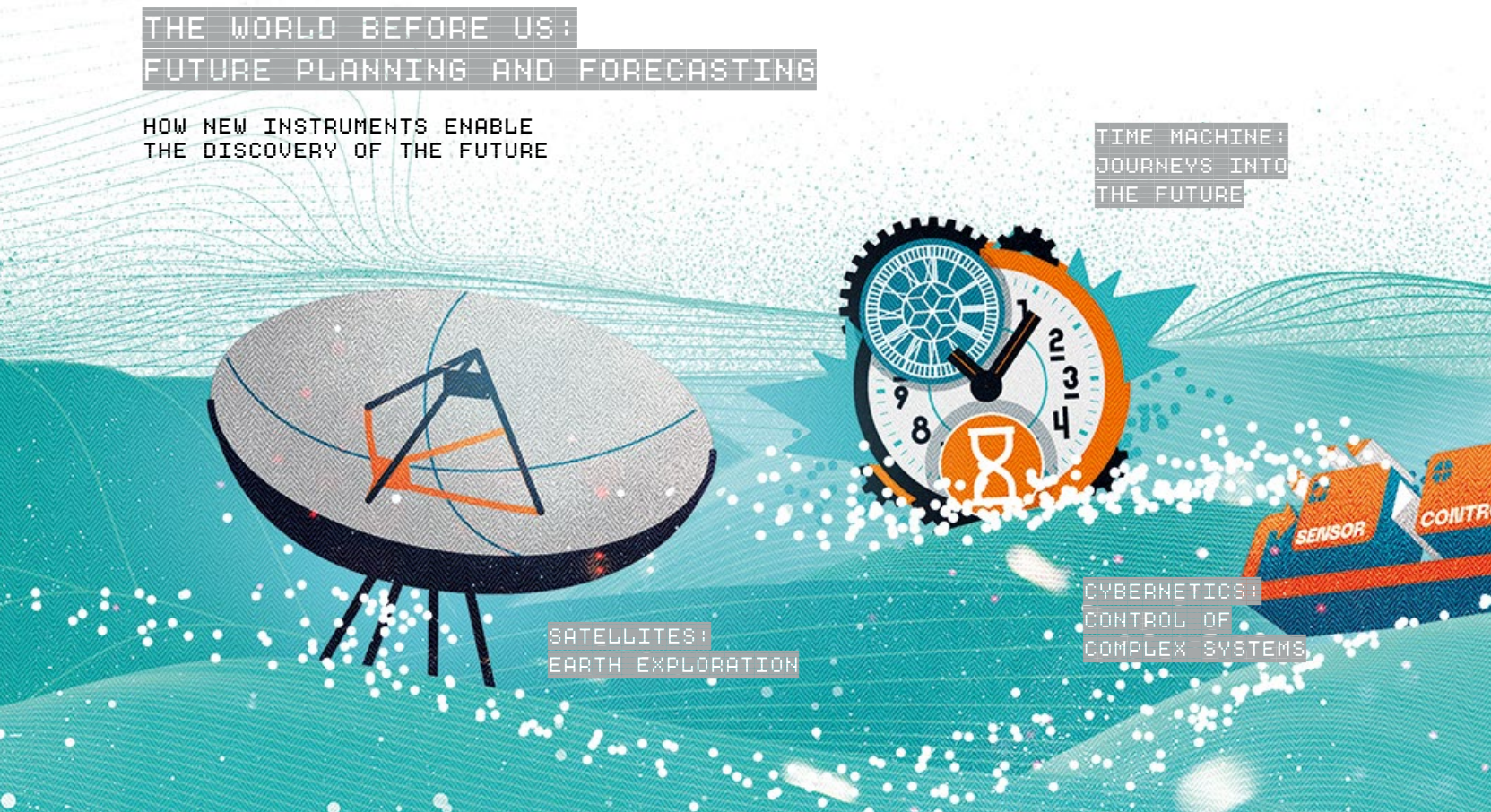
Some leaders, though, don't really cherish a challenge bigger than their ego. They want to be the winners, they want to reap what they sow, they want to make history, not just be part of it – and preferably see it in their lifetimes. That's what the great stories of superheroes like Alexander the Great or Napoleon are made of. And that's what you yourself can aspire to if you dismiss the small steps into the unknown and take instead one giant, daredevil leap.

THE SPANISH STRATEGY: A GIANT LEAP. The most famous proponent of the leap strategy is far more famous than the Portuguese prince. Christopher Columbus was convinced that the Promised Land in the East (India) could best be reached by sailing west. Turning right if you want to go left is counterintuitive and against common sense; but it's a sensible move when you are traveling in a circle. The contemporary scientists already knew that the world was round. But they did have two other problems with Columbus' plan. They knew the world was a bigger globe than the adventurer claimed – his science was flawed. And they rightly doubted that the Spanish ships of that time would be able to survive that much, much longer voyage.

As they saw it, Columbus didn't stand a chance of reaching India by sailing westward. And indeed, no one had dared to take the route Columbus proposed – or, at least, no one had yet returned to tell the tale. And the trip couldn't be done in legs. The journey would succeed, or fail.

This all-or-nothing character made it difficult for Columbus to find investors: The risk was simply too high. If he made it, however, the rewards would be as gigantic as the risks he took. In 1492, after many years of working the corridors of power, he persuaded the Spanish monarchs to back him. The three nutshells that finally sailed west were bound to fail: Columbus' science was flawed. He had massively underestimated the distance from Spain to Asia. And indeed, his ships never reached their destination. It was sheer luck for him that a whole continent lay in the way.

The history of geographic, scientific and economic discoveries is littered with stories like this. But usually they are written by persons or institutions that have little to lose. Thus the leap strategy of going full steam into uncharted territory



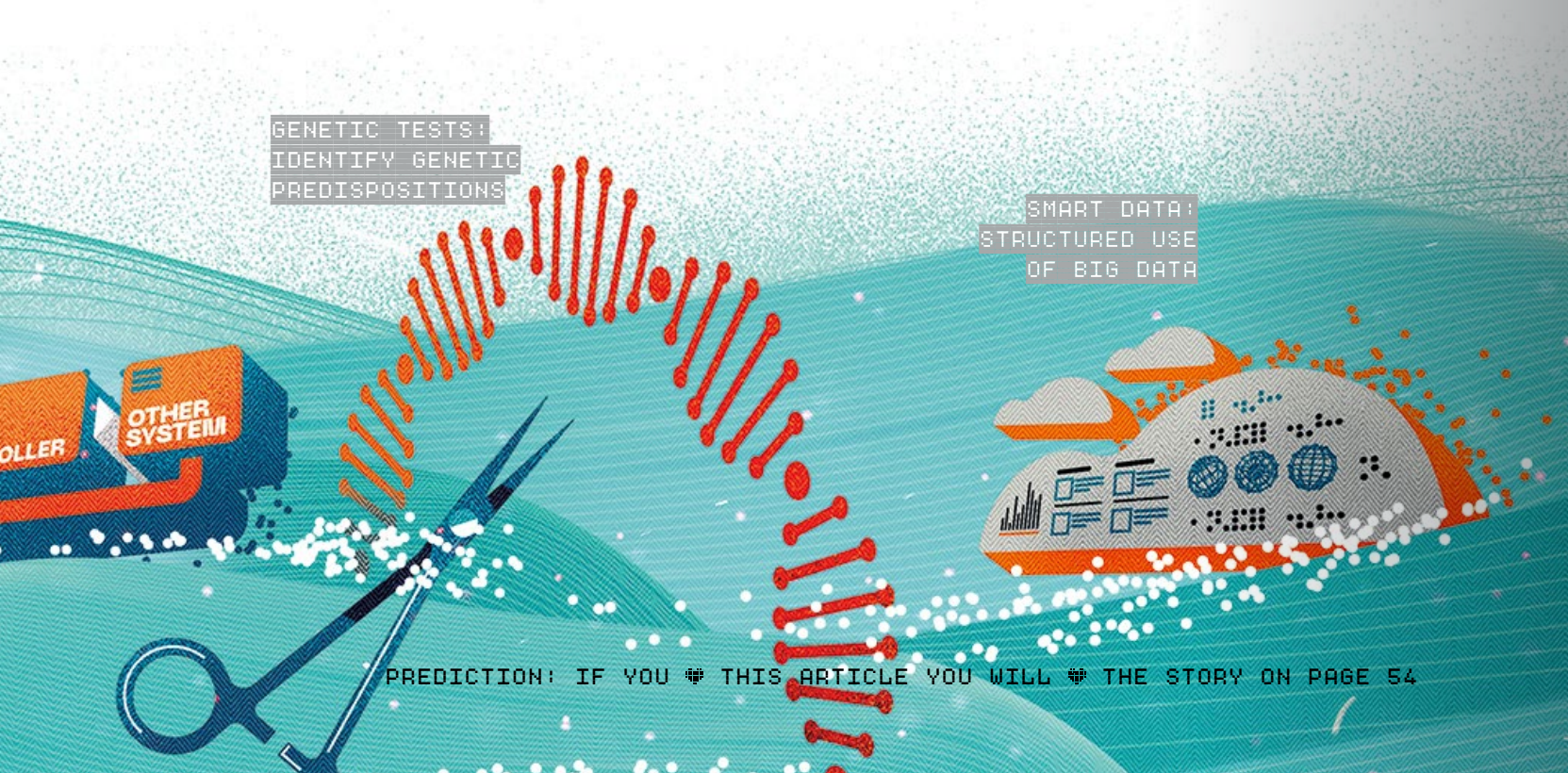
is mostly implemented when all other options are exhausted – or when even the loss of 100% of your investment in the endeavor seems bearable. In today's economy, that's business as usual for venture capital investors: The return on one profitable leap counterbalances the losses of 5, 10, 15 failures.

We have already looked at two ways to break into the unknown. But there was a third way back then, as today – even if it wasn't used. If the step strategy was too tame and the giant leap too risky, the explorers could have combined the best of both strategies for an alternative way to break into the unknown. An expert on the discovery of the unknown, Maria Aubet, professor for archaeology at the University of Barcelona, has expounded this strategy. By taking us some 25 centuries further back in time, right to the end of the Bronze Age, she reveals how the most successful seafaring people of the ancient world sailed into the unknown.

THE PHOENICIAN STRATEGY: PATTERNS. Some 3,000 years ago, a city state at the eastern end of the Mediterranean in today's Lebanon started to explore and dominate the Mediterranean sea – in addition to large chunks of the Atlantic coast from Morocco up to Cornwall in the UK. That city was called Tyre, the most powerful and expansionist of the Phoenician settlements. The discovery trips started during the reign of King Hiram in about 960 BC, and with an amazing speed. As Aubet says: "It is likely that the first expeditions to Huelva in Southern Spain took place in the period of Hiram I or his immediate successors" – within about three or four decades the Phoenicians explored the Mediterranean Sea from the Far East to the Far West, about 4,000 kilometers of *mare incognita* – unknown sea.

Wherever they anchored for the first time, they had no idea of what would await them. But they reduced complexity by sticking to familiar patterns: "The locations of the Phoenician colonies resembled the characteristic features of Tyre," says Aubet. "A harbor on an island close to the shore." This way, the colonies were easy to reach by boat and easy to defend. And they were natural born trading posts: Merchandise arriving via ship could be traded with food and raw materials from the hinterland. The most valuable local products (like metals) could be shipped to other colonies, catering for other regions. Aubet and her team have excavated parts of the first Phoenician settlement in the bay of Malaga in Southern Spain. Today, it's a meadow near Malaga's airport – but 2,800 years ago, the colony of Malaka was a thriving harbor close to the mouth of the Guadalhorce river. The same pattern as in Tyre – and as in the neighboring Phoenician colonies of Gadir (Cadiz) and Sexi (Almuñécar).

The stronger your foothold is in known patterns, the easier it gets to explore into the unknown. You don't need a charismatic leader like Columbus. Any captain of any merchant vessel can identify suitable places for a new colony. You don't need to invest many resources for many years in advance, like Henry the Navigator. You just need some merchandise to start trading. You can stay in your comfort zone and leave it at the same time. There is, however, one slight disadvantage to the Phoenician strategy: No one will give you the credit. Which explains why your old schoolbooks didn't carry the names of any of these brilliant and efficient Phoenician merchant explorers. ■



THE UNKNOWN

WHEN GROUPTHINK WORKS

A NEW BREED OF FORECASTERS CLAIMS IT'S A HUMAN SKILL, ONE YOU CAN LEARN AND QUITE QUICKLY PUT TO WORK TO BEAT YOUR RIVALS. ADD IN A LITTLE BIT OF CROWDSOURCED WISDOM AND YOU COULD SUPERCHARGE YOUR PREDICTING POWERS.

BY Geoff Poulton
ILLUSTRATIONS BY Matt Chinworth

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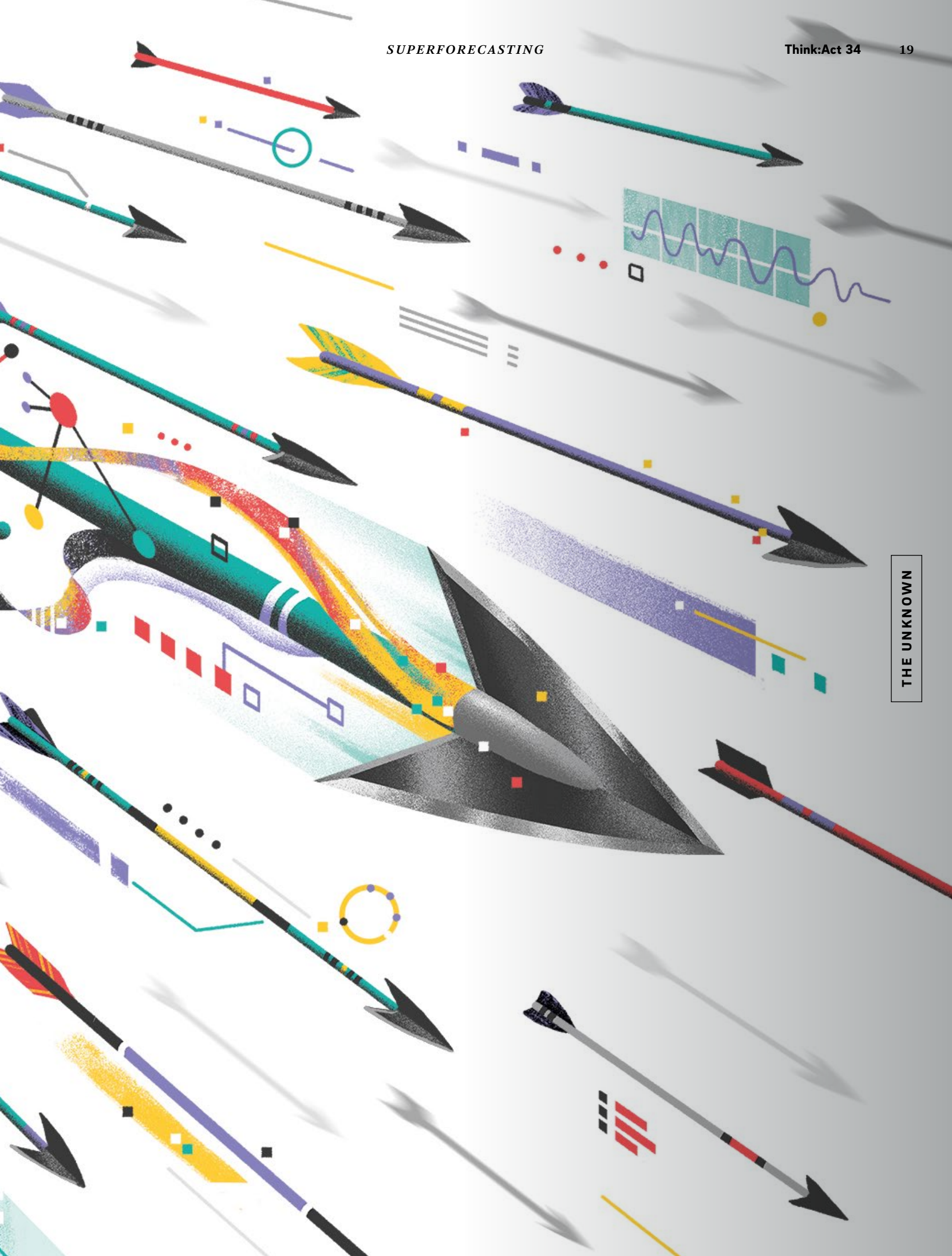
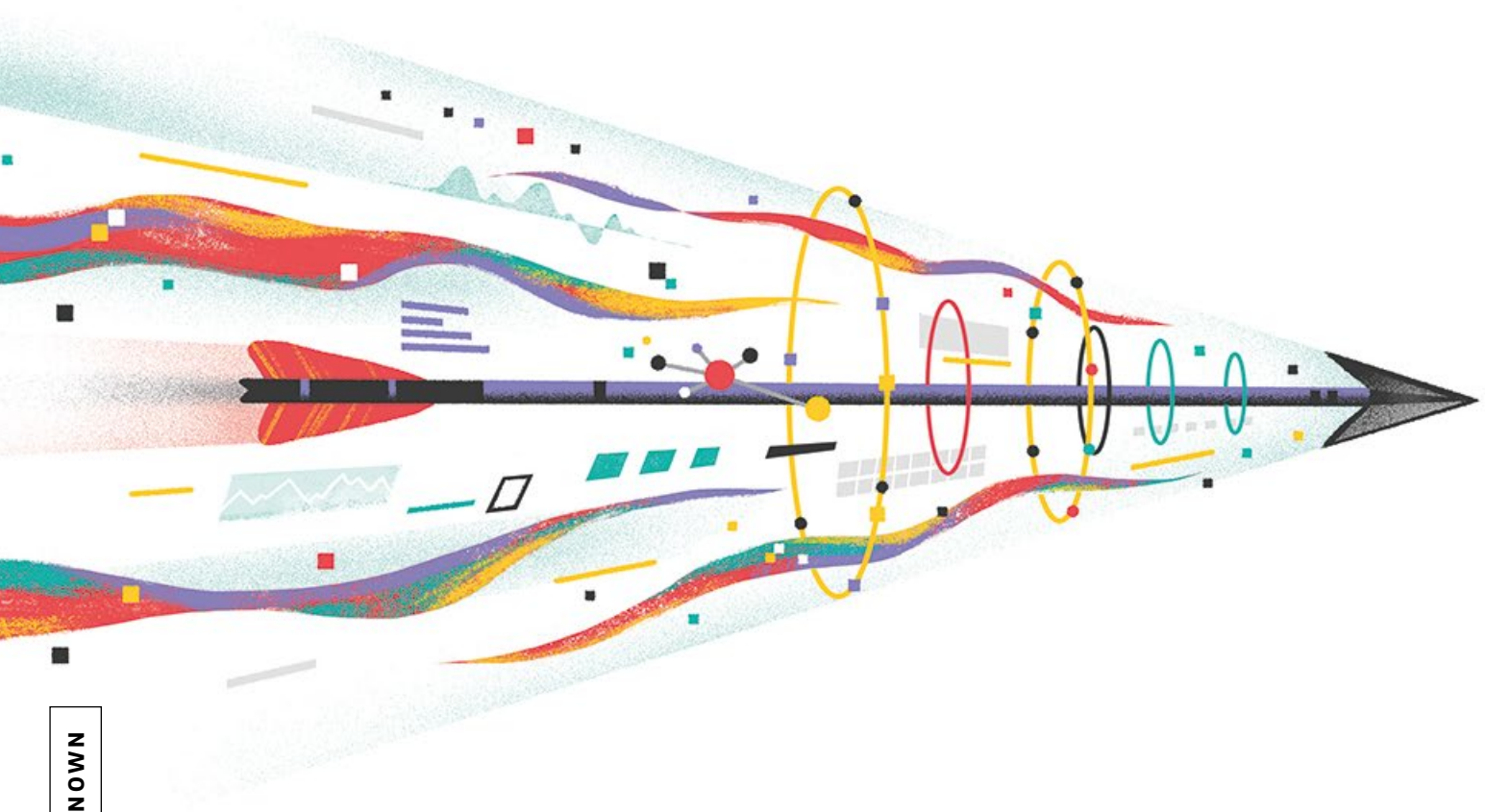


THE UNKNOWN



THE UNKNOWN

DEATH AND TAXES: Everything else in life is uncertain. That's what Benjamin Franklin wrote to the French physicist Jean-Baptiste Le Roy in 1789. More than 200 years later, advances in science and technology mean we can predict some things with near total certainty: when the sun will rise tomorrow; what will happen if you knock a cup of coffee over. More complex events, however, still remain much tougher to forecast. 2020 served up more than its fair share of the unexpected, from Covid-19 and Black Lives Matter to the chaos of US politics and Brexit. It made planning for the future an extremely hard task for governments, businesses and pretty much everyone else.

Hard, but not impossible. Research shows that accurately forecasting the likelihood of future events isn't some sort of mystical gift: It's the product of certain ways of thinking, gathering information and calibrating beliefs. What's more, this is a skill that can be learned and refined by any smart, thoughtful, resolute person – and bring huge benefits to any organization. Few people know this better than Philip Tetlock, psychology professor at the University of Pennsylvania's Wharton School, who has spent decades researching humans' ability to make predictions. As Tetlock points out, we are all forecasters in a way: When we think about doing something – booking a holiday, buying a home or changing jobs – we make decisions based on how we expect the future to unfold. For larger, more complex events such as wars, elections or market crashes, we often rely on a select group of experts for their forecasts.

BUT SHOULD WE? Tetlock first caught the public eye with his 2005 book *Expert Political Judgment*. It summarized a 20-year study into the forecasting accuracy of academics, pundits and analysts, concluding that, for many predictions, the average expert is no better than a random guess. Intrigued, Tetlock set up the Good Judgment Project (GJP) in 2011 to assess whether forecasting skills could be enhanced. He worked with the US Intelligence Advanced Research Projects Activity (IARPA) to create a forecasting tournament in which GJP and four other teams spent four years tackling thousands of economic and geopolitical predictions.

For its forecasts, the Good Judgment Project team aggregated the predictions of thousands of online volunteers. Tetlock found that a combination of the wisdom of crowds and focused training

– including understanding question framing and biases, assessing statistical probability, learning when to apply different viewpoints and becoming familiar with pattern spotting – enabled GJP to outperform even trained intelligence analysts with access to classified data. By tracking the performance of each volunteer and experimenting with different ways of improving, Tetlock was eventually able to identify and prioritize the most successful 2% – he dubbed them "superforecasters." He even took care to trademark the term.

One of these superforecasters was Michael Story, who was working as a think tank researcher based in London. He enjoyed following the news and thinking about the future. "The problem was, I never got any feedback, so I had no idea if I was any good at forecasting," he says. When he came across the Good Judgment Project, he was immediately attracted to the scorekeeping element. "It was totally unambiguous – this is what you got right and what you got wrong. And once I knew what I'd got wrong, I would go away to analyze why and improve."

KEEN ANALYTICAL INTROSPECTION and dedication to betterment are both important attributes that can be seen among the best forecasters. Tetlock's *Superforecasting: The Art and Science of Prediction,* which he wrote in 2015 and is the key text on the subject, describes how forecasters are in a kind of "perpetual beta" mode, always ready to reiterate and improve. Other important characteristics include open-mindedness, as well as being widely read and good with numbers.

But becoming a "super" among forecasters takes months of practice and training. So, where does that leave the rest of us? "Some people look at Good Judgment and think it must be a very complex system. And it is," says Story. "But what most people don't realize is that a lot of the gains are actually made quite early on with some pretty simple measures." In fact, the Good Judgment Project showed that just an hour of training improved forecasting accuracy by 14%.

There are, of course, clear positive applications to being able to peer into the future. In the business world, even incremental gains in a firm's forecasting competence can be hugely beneficial. A company that gets 60% of predictions right will have an ever-growing advantage over one that only nails 50%. To start improving its forecasting, a business must first select the right subjects ⟶

VERY, VERY BAD PREDICTIONS…

"THE SUBSCRIPTION MODEL OF BUYING MUSIC IS BANKRUPT. I THINK YOU COULD MAKE AVAILABLE THE SECOND COMING IN A SUBSCRIPTION MODEL AND IT MIGHT NOT BE SUCCESSFUL."

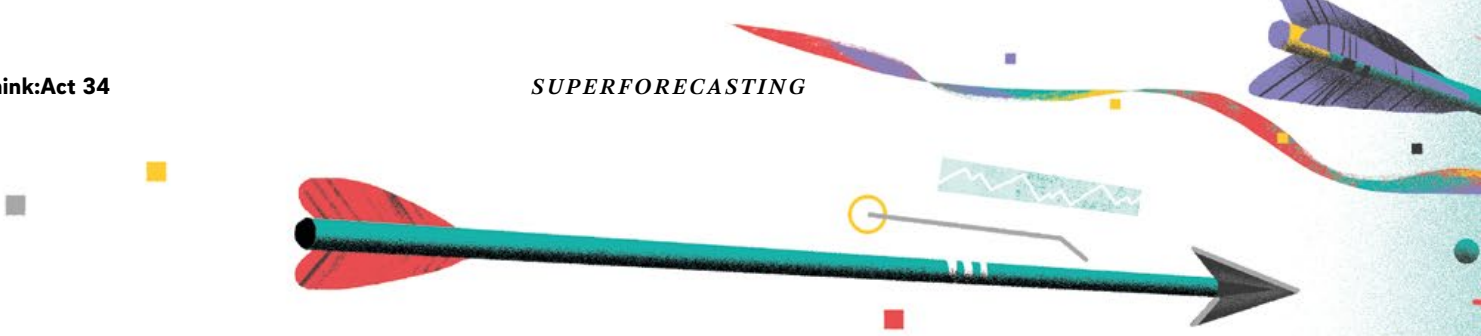
— Steve Jobs in an interview with Rolling Stone, 2003

"THERE'S NO CHANCE THAT THE IPHONE IS GOING TO GET ANY SIGNIFICANT MARKET SHARE."

— Steve Ballmer's prognostication in 2007

"THE BEATLES HAVE NO FUTURE IN SHOW BUSINESS."

A Decca Records executive told the band's manager, Brian Epstein, in 1962



to tackle: a sweet spot that requires some data, logic and analysis, as well as an element of judgment, says Tetlock.

Rather than a group of "experts," companies should engage diverse teams in decision-making. "We know from research into collective intelligence and the wisdom of crowds that diversity is a key factor for success," says Aleks Berditchevskaia of the Centre for Collective Intelligence Design at Nesta, a UK innovation foundation. "People with different experiences and expertise tend to have different assumptions and make errors in slightly different ways. When you have a group with mixed abilities and backgrounds, these errors are canceled out, producing a more accurate forecast."

PLATFORMS THAT ENABLE forms of crowdsourcing can really work to improve the way we forecast, says Gaia Dempsey. She is the CEO of Metaculus, an online community for generating predictions about future events, from elections to technological breakthroughs and financial market performance. Metaculus poses questions to its community, such as "Will the next US recession turn into a depression?" before aggregating the responses into a single, quality estimation of the likelihood that something will occur. Dempsey likens her operation to an encyclopedia of the future: "Wikipedia is where the crowd can bring together our best knowledge about any given topic, but it stops at the present day," she says. "We're aggregating our best knowledge about what could come."

Metaculus' forecasters aren't necessarily subject experts. In fact, anyone can join the community and track their performance, earning points for correct forecasts. Much like the Good Judgment Project, the best forecasters are then given a higher weighting in the final prediction. Interest in Metaculus, which was launched in 2015, has risen fast in the last 12 months and the platform is working with a growing number of governments, businesses and research institutes. Its current highlight is a pandemic dashboard packed with hundreds of detailed forecasts on areas like epidemiology, public policies and the potential impact on societies and economies.

On an individual level, forecasting is all about becoming better calibrated to your own mind, says Tom Liptay. He should know: Liptay is himself a superforecaster and former CFO at Good Judgment Inc, the commercial spinoff of the Good Judgment research project that now provides forecasting for businesses, governments and NGOs. "As humans, we all have cognitive biases that get in the way of accurate forecasting. Anchoring bias, when we rely too heavily on the first information we learn, is a common one. So is confirmation bias – our tendency to favor information that confirms existing beliefs. Once you're aware of the most frequent mistakes, it's easier to adjust for them."

In 2019, Liptay and Michael Story, who also worked at Good Judgment Inc, set up Maby, an app to help businesses benefit from the techniques they had learned. It enables teams to forecast anonymously – reducing bias – and to calculate a median prediction. Maby also follows the golden rule of forecasting: logging predictions versus actual outcomes so forecasters can track their progress. "Nothing beats seeing improvement as a motivator to strive further," says Liptay.

HUMAN INVOLVEMENT IN FORECASTING is, as in many areas of life, rapidly merging with artificial intelligence [see article p. 52]. The Delphi Crowdcast project from Carnegie Mellon University has combined data mining, predictive modeling and crowd prediction to forecast the spread of flu trends – and more recently, Covid-19. But it's important to recognize that every method has its blind spots, says Aleks Berditchevskaia. "Rather than seeing AI or crowd predictions as a panacea, they take the estimates from both of these sources of intelligence into account to arrive at the final answer."

Metaculus, too, wants to combine man and machine more in the future. It is working with an AI researcher to provide insight into how the human brain makes predictions. "We're interested in building a hybrid system that can augment human intelligence where appropriate. This would free up our human creativity and judgment to do its job," says Dempsey.

There's no doubt 2020 was a chastening year for many of us. But this collective experience has an upswing, too: The public has gained a clear insight into the world of statistics and probabilities.

THE WISDOM OF CROWDS

In 1906, British statistician Francis Galton noted one of the earliest examples of "the wisdom of crowds." He visited a country fair, where around 800 people took part in a contest to estimate the weight of an ox when it was butchered. Afterwards, he collected each guess and then calculated the median average – 1,197 lbs. The actual weight of the ox? 1,198 lbs.

ICON: EUCALYP/THE NOUN PROJECT

HOW TO IMPROVE YOUR ORGANIZATION'S FORECASTING IN FIVE STEPS

01

BREAK DOWN THE PROBLEM. IF A QUESTION SEEMS TOO COMPLEX, SPLIT IT INTO SMALLER SUBPROBLEMS.

02

BE PRECISE. SAY YOU'RE "75% CONFIDENT," RATHER THAN "FAIRLY SURE."

03

PRACTICE AND BE SURE TO RECORD YOUR PREDICTIONS.

04

SEEK OUT THE ERRORS BEHIND YOUR MISTAKES – ARE YOU SUSCEPTIBLE TO A PARTICULAR BIAS?

05

LEVERAGE THE WISDOM OF THE CROWD WHEREVER POSSIBLE.

We have a slightly better understanding of just how hard it can be to make accurate predictions. This should motivate us to strive for more reasoned ways of looking ahead. "I hope we've become more cognizant of the need to get better at mobilizing different sources of skills and intelligence to prepare for the future," says Berditchevskaia. Her hope is supported by Tetlock, who sees a continued need to reach into the future to the best of our ability, however flawed. "Debunkers go too far when they dismiss all forecasting as a fool's errand," he writes in *Superforecasting*.

Given the benefits organizations can reap by gaining a more accurate picture of the future, it's hard to argue. And while not everyone needs to be a superforecaster, by simply adopting some of their approaches, you too can deepen your insight and make much better decisions. ■

PREDICTION: IF YOU ♆ THIS ARTICLE YOU WILL ♆ THE STORY ON PAGE 30

PREDICTING THE FUTURE: WHEN HOURS MATTER

by Detlef Gürtler

THE UNKNOWN

THE NEAR-FUTURE TIME FRAME – which is to say, a prediction range from the next hours to the next few days – is mostly about operational efficiency and productivity. The better your knowledge of what people will buy next, the more impact it will have on how smoothly you can organize your store or warehouse logistics. Higher efficiency also means increased sustainability: Better information about the near future leads to less overproduction, less waste, less superfluous trips. And that leads to a drastic overall reduction of resource consumption.

DELIVERY MATCHING

Parcels and the people who will be receiving them have different journeys. Synchronizing their trajectories digitally can drastically improve the chance that they both meet at one place at the same time – and lead to more efficient and sustainable e-commerce logistics.

PREDICTIVE PRICING

Airlines have pioneered dynamic pricing, but that was just the beginning. The more the point of sale shifts from shop to screen, the more room there will be for pricing algorithms that predict what you might be willing to pay. And, of course, for counteralgorithms that try to outsmart the smart pricing.

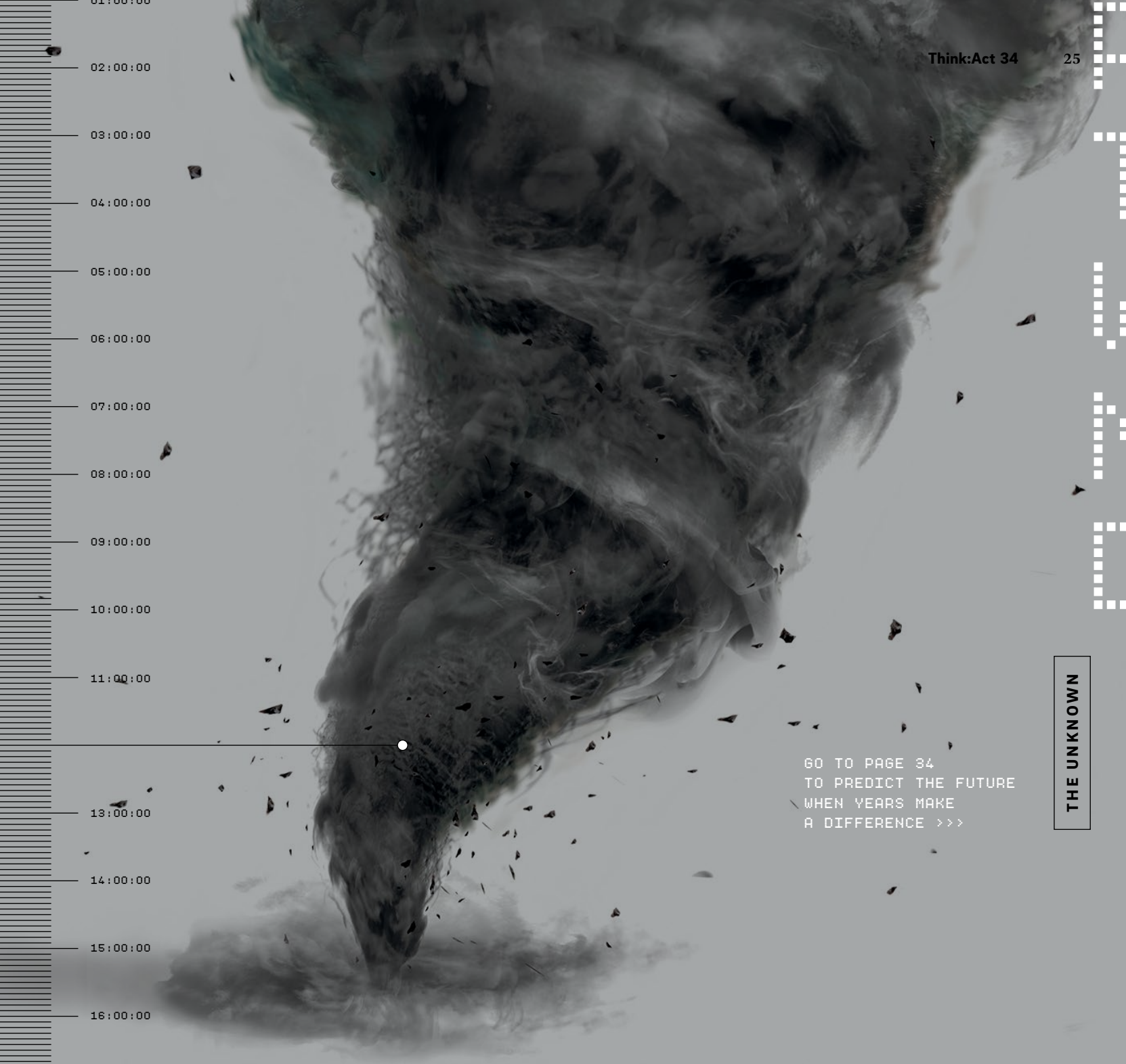
MARKET DATA PREDICTION

Financial markets are famous for trading the future. And that means there's a big economic incentive to improve technologies for the prediction of numbers and events that will move the markets – from company earnings to wheat harvests, from central bank decisions to Elon Musk's tweets.

WEATHER

Knowing in advance how the weather will be for the next few days makes life more convenient, events more reliable and agriculture more productive. From BBQs to hay harvests, from open-air festivals to political campaigns, it's good to know more about the whens of the weather – and whether you'll need a plan B. Satellite data and computing power have already increased the accuracy and longevity of weather predictions, but expect a quantum leap (especially in "granularity") as soon as additional data sources get integrated into the weather computers. One promising candidate: cars. They could act as millions of weather stations, transmitting real-time data about temperature, precipitation and GPS position.

PHOTO: ISTOCKPHOTO



THE UNKNOWN

GO TO PAGE 34
TO PREDICT THE FUTURE
WHEN YEARS MAKE
A DIFFERENCE >>>

PREDICTIVE POLICING

Stopping crime before it starts would be a kind of Holy Grail of law enforcement, but it also poses a threat to personal freedom. Up to now, the results of experiments with surveillance technologies, pattern and facial recognition are mixed at best – but these will improve with data quality and quantity.

SUICIDE PREVENTION

Most suicide attempts cast a shadow ahead – sometimes explicitly said or written, but often subliminal. In hindsight, we can more clearly see and understand those signals we did not process early enough to express our will to help. Technologies could aid in detecting suicidal thoughts before it's too late.

DIGITAL TWIN (MACHINES)

VR glasses for service technicians are becoming state of the art for machine repair and maintenance. Next steps suggest feeding a "digital twin" with real-time data of an analog machine that will detect problems before they become damaging – reducing downtime and increasing machine productivity.

THE UNCHARTED

READING TIME:
00:07:25

FORECASTING AS WE KNOW IT MAY BE REACHING ITS END. BUSINESS THINKER MARGARET HEFFERNAN SPEAKS TO THINK:ACT ABOUT HOW PREPAREDNESS CAN OUTPACE PREDICTION IN TODAY'S INCREASINGLY COMPLEX WORLD.

— —

BY Janet Anderson

IN TIMES OF GREAT UNCERTAINTY our relationship with the future becomes strained. The usual ways we use to navigate tomorrow no longer work. Still in the middle of a pandemic which few were prepared for, we're just starting to grapple with the changes it has wrought and figure out what the new normal will look like – whenever we get there.

How can businesses make good decisions at a time like this? In her book *Uncharted – How to Map the Future Together,* leading business thinker and author Margaret Heffernan offers a way forward. Drawing on examples from science, health care, the arts and politics, she says businesses should not put their faith in technology or forecasting alone, but should rather accept uncertainty and complexity and use their full human potential to explore and build the future together.

Why is the environment of heightened uncertainty created by Covid-19 difficult for business leaders?
Many businesspeople have grown up in a world of so-called scientific management – forecast, plan, execute, measure. Under this model, the aim of business leaders is to achieve maximum efficiency. But efficiency only delivers benefits to the degree that what you're doing is predictable. That doesn't work in an environment of great uncertainty. If you're very efficient, you don't have spare capacity. Then, when something like a pandemic comes along, you can't handle it.

What are the key characteristics of the current environment aside from uncertainty?
The environment most businesses face today is complex, not just complicated. People think complex is just super complicated, but they're very different beasts. Complicated systems tend to be linear, with clear cause and effect, and predictable patterns. These can be managed for efficiency.

Think of when you fly. You check in, check your bag, board the plane, have an in-flight meal. All those processes tend to be provided by different companies and making it profitable for each of them is complicated, but it is pretty much the same every day, so making it efficient is an appropriate goal. But once I board the plane, I'm in a complex environment. We can't completely predict what's going to happen – whether there's a bird strike or a random weather event.

That's why planes are designed to be robust. They have more engines and operating systems than they need so that if there's a flaw in one, ⟶

CHARTING THE UNCHARTED

THE UNKNOWN

MARGARET HEFFERNAN is a former serial entrepreneur and CEO. The author of six acclaimed books on leadership, her exploration of the very human mindsets that can lead organizations and management astray is informed by her experience leading businesses in the highly competitive markets of the early internet as well as her background working in program production at the BBC. She is currently a professor of practice at the University of Bath

the whole thing doesn't fall out of the air. They are designed not just to be resilient – which means they can recover from an accident – but to be robust, which is to say they can keep going through an unpredictable event. For a business, it is essential to understand which of its systems are complicated and should be managed for efficiency, and which are both complex and so mission-critical that they should be managed for robustness.

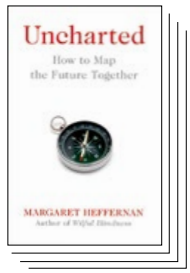
Forecasting is a central plank of business planning. Why is that not the best way forward now?
One of the problems with the way that we think about the future is that we define it by the present, and that constrains our thinking. Look at retail. Since the advent of e-commerce traditional retail has been in a bloodbath. As retailers see revenues dropping, they put more items on sale, cut costs and compete as viciously as ever with their immediate rivals. All this has done is perpetuate the decline. Instead of starting from the present and extrapolating forward, the sector needs to confront the brutal reality of the market that they're in and find other ways of reaching and serving customers.

It's wise not to start from the present, with all the tools that got [you] there, but to think more divergently and more creatively. One way to do this is backcasting – imagine a future triumph, then work out how it might happen and what needs to happen today to create that future.

Businesses today are rich in data. How can they use this resource to navigate the future?
Data is central, but useless without imagination and creativity. Just because you can collect data about everything that your business touches, does not mean you understand your business or your customers any better. We have been sold this myth that humans are just collections of data and that if we analyze all the data, we'll be able to make decisions. Relying on data produces chronic indecision as there's always something missing. There's no such thing as a complete data set – and what gets left out may be the thing that's most important. A better way to understand where you are is to talk to people. It sounds very obvious, but it doesn't happen enough. Customer conferences and employee hackathons are useful tools [and] can yield a lot of reward because you're getting much more diverse input and real-world lived experience about where you are and where you could be going. These exercises also help make sense of the data.

IN COMPLEX SYSTEMS, DATA WON'T HELP. THERE ARE SO MANY POSSIBLE CAUSES AND EFFECTS THAT UNTIL YOU TRY IT OUT, YOU DON'T REALLY KNOW WHAT'S GOING TO HAPPEN.

— MARGARET HEFFERNAN



UNCHARTED
Uncertainty is now a fact of life. Looking at generations-long projects, see how preparedness – doing today what you might need for tomorrow – can provide the antidote to prediction.

How do you make sense of all this input?
In complex systems, data won't help. There are so many possible causes and effects that until you try it out in real life, you don't really know what's going to happen. This often involves accepting risk. With an experiment, you poke the system to see what happens if you do things one way instead of another. Even if it looks like your idea will fail, you still learn something new about the system you're in. In the Netherlands, for example, they had a neighborhood nursing system that allocated work through algorithms based on KPIs and targets. No one was happy with it. Then a nurse called Jos de Blok suggested letting the nurses themselves decide what needed doing for their patients. The experiment succeeded – patients got better in half the time and costs were reduced by a third. De Blok has founded a company based on the idea, called Buurtzorg. The key is that they acknowledged the humanity in the work and focused on the outcome. The data alone would not have fixed the problem.

How do you decide what sort of experiment to run?
It's about identifying different possible futures. We know that we don't know what the future will

PHOTO: MAURITIUS IMAGES/LORENZO DALBERTO/ALAMY

be like, but we think it could be this or that. The question is, if scenario A turns out to be the case, what would we wish we'd have been doing right now? We ask the same question for scenario B. We develop a menu of options. Some will be too risky for an unlikely outcome. Some may turn out to be a good basis on which to experiment. Scenario planning is a fantastic exercise to prime leaders to look more broadly and discursively at what could happen to their organization and to come to terms with uncertainty. It also helps you pick up on weak signals from things that could have a major impact.

What skills and tools do you need to carry this out?
Many senior people struggle because they are too imbued with the current system. Younger people are better at it, as are people who play a lot of computer games. In many ways, every game is a scenario planning exercise – let's see what happens if I turn left ... oh no, I get shot. Okay, back up: Let's see what happens if I turn right. It's about not being afraid of what your imagination might show you. The process involves collecting huge amounts of data and insights. Then you work in teams to craft scenarios. What do we think really matters?

A CHANGING GAME
For Heffernan, learning when to be efficient and when to be robust is the key to playing through complexity.

Then you ask, if this were where we were to find ourselves, what would we want to do? The oil company Shell famously did this in the early 1970s – they asked what would happen if oil prices fell. At the time, nobody thought this could ever happen. But they saw circumstances in which it could happen and said, if it did, what would we want to do and what would we wish we had been doing now? When oil prices did fall in 1973, Shell was ready and weathered the change easily. With scenario planning you might be able to make outside forces work to your advantage. It requires thinking imaginatively, and that is harder than people expect.

How do these approaches help us meet the big challenges we face?
People talk about "the new normal," but I think many just want to go back to an old normal and are likely to be disappointed. We're going to emerge from the pandemic into an economic crisis which we don't [yet] fully understand, an inequality crisis which we can see but don't know how to tackle and a climate crisis which we are already in. However, I think we have come to understand the interdependence between business and society and [the need for] a healthy connection between what an organization does, what it takes from society and what it puts back in. For example, in order to have a useful workforce there need to be educated people in the population with safe places to live, a safe means of getting to and from work and access to solid information. Companies should recognize that they benefit from all these things. This wider view is pushing toward a better integration between organizations and the societies that they serve.

Which companies are succeeding at mastering the current challenges?
I couldn't point to one that has done it perfectly because everybody's still trying to figure this out. But I think the need to deal with hugely complex issues has made people realize that participation is key to decision-making – people who bring lived experience, because the essence of good decision-making is not just the decision itself, but how it is reached. Take citizen assemblies. Even the people who don't like the outcome can accept it because they see the decision-making process has been fair. It isn't carried out by a few ideologically driven individuals; it's transparent, open and informed. We are facing some tough decisions, so there has never been a time when we've needed that more. ■

PREDICTION: IF YOU ❦ THIS ARTICLE YOU WILL ❦ THE STORY ON PAGE 18

CATCHING A BLACK SWAN

THE UNKNOWN

Homo sapiens is, by most accounts, the only species that can "think" about "the future": the unknown next chapter, momentous change and catastrophic turning points. And we've been bad at it, argued financial trader-turned-philosopher Nassim Nicholas Taleb in his 2007 bestseller *The Black Swan*. In it, he postulates that "the world is dominated by the extreme, the unknown, and the very improbable ... all the while we spend our time engaged in small talk, focusing on the known and the repeated." He applied a catchy label to such outlier events, "black swans," inspired by the rare birds the Old World didn't know existed before the discovery of Australia in the early 17th century.

Taleb is speaking of frightful fowl, or events that are characterized by three things: They are rare, have an extreme impact and provide humans with retrospective predictability – meaning experts will, in hindsight, find a way to explain them away. Think disastrous stock market crashes, the attacks of 9/11 or the collapse of the Soviet Union. Taleb's main criticism was aimed at the forecasters who are not only unaware how error-ridden their work is, but live and work in denial.

The Black Swan made Taleb a famous writer and sought-after lecturer as the Great Recession was rattling the world. Yet his book, which grew into a five-part miniseries, is hardly an unexpected outlier in trying to make sense of what seems unpredictable, chaotic and nebulous. In fact, he stands in a long line of forecasters who use more or less scientific approaches – instead of mystical or religious ones – to analyze what the future holds and where the next catastrophe (or big opportunity) might lurk. This type of rigorous future thinking and scenario planning that tries to take external shocks into account goes back at least to the post-World War II era, when the threat of nuclear annihilation and the rise of computers made "futurist" a venerable profession with an urgent brief.

BY
Steffan Heuer
PORTRAITS
BY MUTI

ONE SUCH FORECASTER of the early days is Theodore Gordon. The 90-year-old futurist developed a concept called Trend Impact Analysis (TIA) back in the 1970s that explicitly deals with the unexpected Taleb popularized. Today, he is a senior fellow at the Millennium Project, a think tank affiliated with the United Nations University that does scenario planning for current events such as the Covid-19 pandemic. "There's no such thing as a perfect model," Gordon says. "What makes a difference are non-causal surprises, the flashes and bright novas in the evolutionary chain." Gordon's crucial contribution was an approach that infuses quantitative methods with expert opinions about ⟶

READING TIME:
00:07:44

THINKING ABOUT THE FUTURE HAS ALWAYS BEEN ENTICING, BUT THE ADVENT OF NUCLEAR WEAPONS AND COMPUTERS TURNED A PASSION INTO A PROFESSION TO TRY TO SEE AND GET AHEAD OF OUTLIER EVENTS.

A BRIEF HISTORY OF FUTURIST THOUGHT:

THESE THINKERS FOUND DIFFERENT WAYS OF SEEING WHAT LIES AHEAD – AND PREDICTING THE BEYOND.

VANNEVAR BUSH
AS WE MAY THINK (1945)

One of the earliest works forecasters will bring up is *As We May Think* by the American engineer and science administrator Vannevar Bush. His 1945 essay ran in *The Atlantic* and predicted the PC, the web and speech recognition. He envisioned a "memex desk" that stored loads of interlinked information, similar to how the brain works.

Bush set the stage for many of the heady tech predictions to come in the following decades — and darkly pondered the downsides: "The applications of science have built man a well-supplied house ... They may yet allow him truly to encompass the great record and to grow in the wisdom of race experience. He may perish in conflict before he learns to wield that record for his true good."

HERMAN KAHN
THINKING ABOUT THE UNTHINKABLE (1962)

The very real possibility of nuclear war led to the establishment of think tanks like the RAND Corporation and "thinking about the unthinkable" – also the title of the 1962 book by Herman Kahn, who left RAND to start The Hudson Institute. The peace movement resented him for his chilling "what-if" scenarios – say, if the Soviets were to drop a nuclear bomb on New York – and director Stanley Kubrick modeled his deranged film villain Dr. Strangelove on him.

Nevertheless, Kahn's cool approach of employing systems and game theory when dealing with outliers was influential in focusing generations on thinking through the wildest disruption out there: man-made annihilation.

PHOTO: ISTOCKPHOTO

"WHAT MAKES A DIFFERENCE ARE NON-CAUSAL SURPRISES, THE FLASHES AND BRIGHT MOMENTS IN THE EVOLUTIONARY CHAIN."

— THEODORE GORDON
FUTURIST AND SENIOR FELLOW AT THE MILLENNIUM PROJECT

ALVIN AND HEIDI TOFFLER
THE FUTURE AS A WAY OF LIFE / FUTURE SHOCK (1965/1970)

No one better gave words to the growing sense of disorientation than journalist Alvin Toffler. In 1965, he penned *The Future as a Way of Life* and by 1970 had spun it with his wife and (unmentioned) co-author Heidi into *Future Shock*, a classic read on why and how we ought to think about the unknown. "Future shock" is "the premature arrival of the future … culture shock in one's own society. " The book predicted big disruptions that seem ordinary in 2021, like the redefinition of work and hunting for life on exoplanets.

The book's lasting impact, argues Silicon Valley forecaster Paul Saffo, is its call "to create a culture in which anticipating the future becomes the everyday concern of everyone, not just experts."

BUCKMINSTER FULLER
UTOPIA OR OBLIVION: THE PROSPECTS FOR HUMANITY (1969)

As future thinking oscillated between being the domain of highly paid experts often associated with government and large corporations and evolving into more of a popular science playground, the tone became ever more urgent.

Architect and designer Buckminster Fuller's 1969 tome *Utopia or Oblivion: The Prospects for Humanity* put a stark choice in front of his readers: "The future is a choice between Utopia and Oblivion. [It] will be a touch-and-go relay race right up to the final moment … Humanity is 'in final exam' as to whether or not it qualifies for continuance in the Universe." Important here was the insight that black swans will hit us, but humans do have the agency to shape the future.

JOHN NAISBITT
MEGATRENDS: TEN NEW DIRECTIONS TRANSFORMING OUR LIVES (1982)

Trend scouts could take heart from another seminal work that appeared in 1982: Former marine and self-taught writer John Naisbitt's *Megatrends: Ten New Directions Transforming Our Lives*. The bestseller predicted disruptions that seem commonplace today: globalization, hierarchies making way for networks, China's rise and the knowledge economy.

He was explicit that if one keeps an ear to the ground, it's possible to master – and potentially profit – from momentous change. This more optimistic mindset came into its own with the 1993 launch of *Wired* magazine, each issue acting as an ongoing exercise in future-telling where the next big thing is always on the horizon. And it's mostly good.

PHOTO: ISTOCKPHOTO

what crazy stuff the world might have in store for us. "*The Black Swan* was an important book because it made people pay attention and understand how crucial discontinuities are. TIA didn't have that impact on the field," Gordon admits.

Dig a little deeper, and Gordon, too, stands on the shoulders of other thinkers who have tried to sensitize citizens, government and the corporate world to the impact of outlier events [see panel pgs. 31-32]. What hasn't changed as you look through the decades of trying to count black swans is the cast of characters: mostly white males with connections to, or in the employ of, the powers that be. That lack of diversity has seriously impeded how we think about outliers and options, says Swiss futurist Gerd Leonhard. "All of these works are undoubtedly important and build on each other, but you have to ask who ultimately pays for research. We have to get rid of purely academic and military-industrial future thinking," Leonhard argues.

He sees encouraging signs that the field is becoming more diverse but thinks that broader input is urgently needed for another reason: The future is coming at us at an increasingly faster clip. Still, the notion of a "black swan" nobody can see coming is a misnomer, according to Leonhard. He prefers to call game-changing events "gray swans" since we already know momentous disruptions are approaching: catastrophic climate change; powerful and unregulated technologies such as AI; the ongoing merging of man and machine and genetic engineering; and the reckoning of an economic system obsessed with growth. "We create the future with everything we do and don't do," he says. "Outside of that, there are things we truly can't know, like comets crashing and aliens visiting."

GAMES WITH A DIVERSE SET of participants are one of the most intriguing and inclusive ways to think about outliers. Add empowerment to it, and you arrive at a card game that puts a strong emphasis on inequality and social justice: Afro-Rithms from the Future. It was developed by Lonny Brooks, a communication and media studies professor at California State University in Hayward, southeast of San Francisco. The card deck is a tool to envision multiple futures with "more black storytelling and less white supremacy," as Brooks describes it. "Black people always had to innovate, be futurists – envision a place free of slavery, find their redemption. This was scenario making we can draw upon today." Players work with a deck of 90 individual cards divided between tensions, inspirations and system states. This kind of freewheeling exploration can yield serendipitous results. In one round set in 2030, a participant suggested a tattoo that can be scanned to find out one's heritage and receive slavery reparation funds.

Brooks has honed the game over the past three years and has run it with more than a thousand participants so far, in person and virtually, and is now working on a version that can be played online and potentially with VR headsets. Early interest came from Google, the US health insurance company Blue Shield and UNESCO's Futures Literacy Summit. Inclusion makes for better forecasting and future thinking, the professor is convinced. "The game can help in schools and communities. What if we created a network of the imagination where marginalized groups can present their visions that can be transformed into new cultural activities and policy agendas for legislation so communities come armed with scenarios of the future they can articulate?"

This crowdsourced approach alongside today's unheard-of reams of data and arsenal of analytical tools might turn out to be the best preparation for dealing with future pandemics and the ravages of climate change. Scouting for black and gray swans has already spawned a new kind of proactive science fiction, such as Kim Stanley Robinson's late-2020 book *Ministry for the Future*. The fictitious agency's mission is as simple as daunting: "Established in 2025, the purpose of the new organization was simple: to advocate for the world's future generations and to protect all living creatures, present and future. It soon became known as the Ministry for the Future." ■

78%

of the value of the NASDAQ composite was lost in the dotcom crash in the early 2000s.

$2
trillion

vanished from the value of global markets following the UK's 'Brexit' vote in 2016.

ONLINE EXCLUSIVE
Hear what Gerd Leonhard has to say on ourwebsite: rolandberger.com/en/leonhard

PREDICTION: IF YOU ♥ THIS ARTICLE YOU WILL ♥ THE STORY ON PAGE 50

PREDICTING THE FUTURE: WHEN YEARS MAKE A DIFFERENCE

THE UNKNOWN

THIS LONGER-TERM TIME FRAME should be seen as less about operations, and more about strategy; less about sales and distribution, and more about research and investment. This is where the background of the prediction-makers shifts from tech to humans. You have to know how people, cities and societies think and act – and this needs more than sensors, software and algorithms. Predicting what will change in the coming years means being part of that development: either by fostering change or by slowing it down.

— —

BY Detlef Gürtler

DIGITAL HUMAN TWIN

Imagine people sharing their individual biodata with an equally individual avatar – and health issues being diagnosed with the aid of your digital twin. No infection risk in a doctor's practice, no waiting rooms, you don't even have to leave your bed. And it's not just for diagnostics, but also for testing medication or surgery.

MULTI-YEAR GOVERNMENT PLANNING

In the Soviet communism of the 20th century, five-year-plans crippled the economy and, in the end, the whole system. Today's mid-range planning cycles (like China's five-year plans or the EU's seven-year budgets) are more a frame than a corset – they give directions, not directives.

TREND SPOTTING

Fashion, games, gadgets, music – whole industries are based on short-term trend cycles. But it's more fun – and more profitable – to set the trends than follow them. Karl Lagerfeld or Steve Jobs did it with their guru-style genius; but data-based sensing of wishes is rapidly becoming serious guru competition.

MIGRATION PREDICTION

Migration is here to stay. Forced by catastrophes or fostered by the dream of a better life elsewhere, it is rarely planned and always happening. How to manage migrant flows is a political issue – but the more is known in advance about migration dynamics, the more options there are for decision-makers.

PHOTO: GETTY IMAGES

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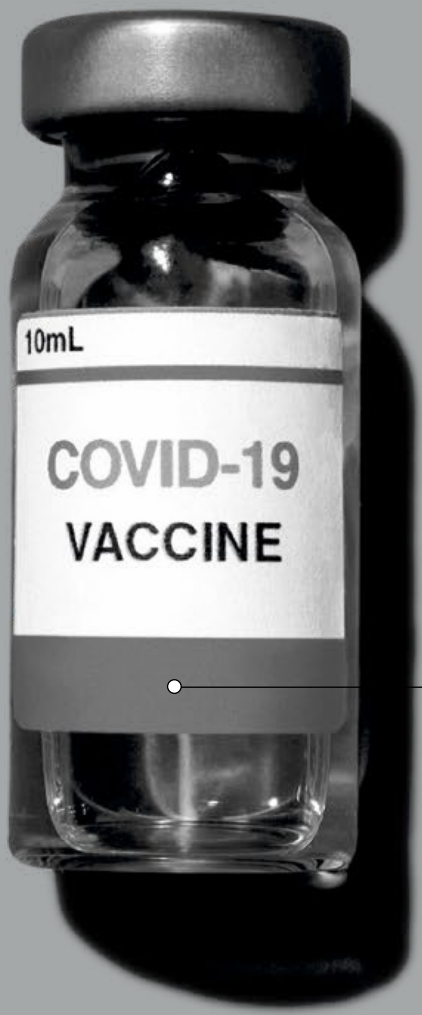
GO TO PAGE 48
TO PREDICT THE FUTURE
WHEN DECADES/
GENERATIONS MATTER >>>



PANDEMIC PREPARATION

If we only had known at the beginning of the pandemic what we have learned during its course … Sure – but why didn't we know? The Western world in particular showed blatant deficiencies in handling the seemingly never-ending Covid-19 story. What worked quite fine at the beginning of the emergency mode showed fatigue cracks as the second and third wave rolled in. Preparing society for long-haul resilience could be one of the learnings for the crises to come. Another one could be taught by the only real global success story of the pandemic: vaccine development. Multiple approaches and technologies competed (and collaborated) globally to reach the common goal as well and as fast as possible.

INVESTMENT SIMULATION

Investment has always been a bet on the future. The calculation behind it is based on a bunch of assumptions about cost, customers, competition and so on. Technologies that back (or rebut) guesstimates and gut feelings can reduce investment risk and misallocation of resources.

REBELLION MOOD-MAPPING

When riots break out, they often seem to come out of the blue. The rebels, however, are never without a cause – and with hindsight, the causes will become clearly visible. Mood-mapping could help to realize in foresight where discontent becomes despair – and how that turns into rage and rebellion.

HOW [redacted] COULD SAVE US

READING TIME:
00:05:52

VISIONARY SCIENTIST REZA ABHARI SHOWS HOW COMPUTER SIMULATIONS COULD MAKE A HUGE DIFFERENCE IN THE BUSINESS OF PREDICTION.

by Detlef Gürtler
ILLUSTRATIONS BY Cathal Duane

IT IS AMAZING how predictable the behavior of most human beings is," Reza Abhari says. The director of ETH Zurich's Laboratory for Energy Conversion knows what he's talking about: He's predicted again and again how we'll behave in future scenarios. What started as a model to measure possible impacts of energy investments is becoming a window into the future of society. Or better: a million windows.

When the 58-year-old professor at Switzerland's most prestigious university changes one of the scenario components – fuel prices, migration laws, birth rate, education preferences – in his computer simulation, the software recalculates life-changing decisions by every single person in the respective region and time frame. How many people move, and to where? How many resources are used, and how? What kind of shortages occur and how do we react? Our main driver is the fear of loss, Abhari says. "At least that's what we found in the mature societies of Europe, Japan or North America. The people there have a lot to lose – that makes it rather predictable how they react in a situation where their status is at risk."

You may think differently. You may even object to the assumptions a professor of energy technologies is making about human behavior. Fine. If insights of behavioral psychology can improve the outcomes of his agent-based modeling, Abhari will happily use them to recalibrate his simulations. But until then, his simulations will deliver decent results – without being overly concerned with human individuality.

SIMULATING WHAT MIGHT HAPPEN in the future is familiar for many of us who play computer games. Sim City, the Sims or the Civilization series all showed how people, cities and countries develop. And this indeed comes close to what Abhari does. There is just one, albeit significant, difference – Abhari's simulations are for real. "Our approach was to create a digital twin of the society where we gather up actual data – where people are, where the buildings are, the infrastructure, the transportation systems – and build it up layer by layer, the entire complexity of a society, but on a continental scale."

In 1987, then British Prime Minister Margaret Thatcher said: "There's no such thing as society. There are individual men and women and there are families." That's rather close to the algorithms of the simulation software. A slight difference is that the digital twin of the society is not formed by men and women, but by "agents": anonymized models of single human beings based on datasets from very diverse sources. These agents can decide what they do with their life; and their decisions determine, from the bottom up, how the society – or rather its twin – changes.

One classic example for the interdependence between individual decisions and societal ⟶

outcome is demography. You don't have children or move to another place simply because your government orders you to do so – but political decisions can increase or reduce birth rates and migration. Those demographical changes will lead to opportunities or challenges for society and the economy. Agent-based simulations can give more reliable and detailed predictions than the usual trend extrapolation, says Abhari: "Recently we ran a simulation where we compared different scenarios of immigration policies on urban growth, transportation systems and social security within Switzerland. There we modeled 10 million agents that come in and then choose what they do." One outcome was blunt: If annual immigration rates were reduced by 50%, Switzerland's social security system would be insolvent by 2027.

And these outcomes can be broken down to the local level, as the Swiss migration simulation showed in its example of the city of Lausanne. In the business-as-usual scenario, single agents and smaller households started to move to the periphery in the second half of the 2020s, while larger families reentered the city center. With those simulation outcomes, the local administration is better equipped to provide the infrastructure and services for the shifting demographics – or initiate policy shifts to alter the real-life outcome.

BETTER, MORE DETAILED INFORMATION to improve the prediction- and decision-making process? Isn't this the kind of digital twin that politicians and administrations dream of, Professor Abhari? If they want to build a new city-to-city connection, the software agents can compare the long-term results for different technologies and for different tracks. And for controversial projects – a new pipeline or refinery – agent-based modeling can offer insights before investing, not when it's too late. In theory, yes, Abhari answers. But it often seems to be less of a dream and more of a nightmare for real-world politicians: "We have encountered on certain occasions that the incumbent would question the application of a better decision-making tool – because it could make themselves redundant."

The Covid-19 pandemic has been an especially sobering experience for Abhari. It should have been the right crisis for the simulation software: knowing what people do, what they need, how different scenarios alter the outcome for a society and how to minimize damage for society and/or economy – that's great stuff in a big crisis. And Abhari's digital agents were prepared: "It took us nine days to update a virus model, to calibrate it and to run a number of varying scenarios. We generated amazingly accurate solutions of the first wave and had detailed local projections at our fingertips, where to ramp up which kind of critical infrastructure for the following days and weeks." The governments they talked to, however, were not interested at all. "They were interested in setting up a committee, in conferences and in claiming victory. This was about power distribution, not about problem-solving."

So Covid-19 became crucial for the simulation technology in a rather surprising way. "One of our learnings from Covid: We basically scaled back our offer of support to governments. They are simply not the right audience." But if they weren't, then who was? At this point, Abhari hands over to Anna Gawlikowska, co-founder of Swiss AI, a spin-off of

43%

How much of the Swiss population would catch Covid-19 by May 2020 without restrictions in place, as predicted by Abhari's software in March 2020.

1%

Abhari's simulated prediction for the infection rate in the same time frame with strict restrictions in place, a close match to the real-life scenario.

"SOCIETIES WHERE THE MAIN DRIVER IS TO MAKE GAINS MAY HAVE LESS PREDICTABLE BEHAVIOR – OR BEHAVIOR THAT IS DIFFERENT TO PREDICT."

— REZA ABHARI,
DIRECTOR OF ETH ZURICH'S
LABORATORY FOR ENERGY CONVERSION

ETH University that actively markets the simulation software. Her answer: "The right audience is companies. They are much more interested in foresight for various business models, especially in segments where long-term investments are needed." She names industries like energy production and distribution, mobility and logistics.

Isn't a digital twin of a society more of a "nice-to-have" gadget than an urgent need? "Absolutely not. Do you remember our Lausanne example?" Gawlikowska asks, indicating how overall migration affects one special city in Switzerland. "That's very similar to what we have done for a multinational company in Japan. We are simulating the outcome of different decarbonization scenarios for the whole country – and then we can break these outcomes down to the level of a city." And not just for one city, but for every city in Japan. The Tokyos, Beijings, Berlins of this world could afford to do these kinds of studies on their own – the small- and medium-sized cities can't.

BRINGING THE BIG GLOBAL FUTURE to your local town hall or grocery chain would be a business case not only for energy issues, but for a lot of other questions, too. Gawlikowska names the fate of cars with combustion engines. Sooner or later they will face extinction – and cities and their infrastructure should be prepared for this inevitability. Availability of granular prediction data can significantly raise the preparation level. And this of course not only in Japan – but everywhere.

In the end, could this become a digital twin not just of a society, but of the whole world? "That's still far off," Reza Abhari says. Right now the simulations are covering the whole of Europe and North America, plus parts of Asia, so about 1.5 billion of the world's 8 billion people. But he can't simply add new regions in Africa or South America to the already covered countries – he would have to recalibrate the agents. "Societies where the main driver is not to avoid losses, but to make gains, may have less predictable behavior – or behavior that is different to predict." Scientifically, this would be interesting, he admits, and it would be a challenge, but doable: "All we need is a decade of time, and a business case." ■

PREDICTION: IF YOU ♥ THIS ARTICLE YOU WILL ♥ THE STORY ON PAGE 26

DEVIL'S THROAT
(Garganta del Diablo), San Pedro, Atacama Desert, Chile.

"As you pass through the Devil's Throat – as the locals call the desert's sand gorges where you can ride your bike through – you get this glimpse from darkness into bright light that I wanted to open my series on dark matter."

DARKNESS MADE VISIBLE

CHILE'S ATACAMA DESERT IS THE PERFECT ENVIRONMENT FOR ASTRONOMERS. THERE IN THE HUMIDITY-FREE AIR, TELESCOPES PEER INTO THE FAR REACHES OF THE UNIVERSE. THEIR SEARCH FOR ELUSIVE DARK MATTER INSPIRED PHOTOGRAPHER SABRINA PETERS IN A PROJECT THAT REFLECTS ON WHAT WE SEE AND WHAT WE UNDERSTAND – AND HOW WE ARE ALWAYS REACHING TO GRASP THE UNKNOWN.

***FISHERMEN'S MARKET**, Valdivia, Chile. "Strolling through the market, I captured the birds' shadows on the roof. The mysterious dark figure, his huge wings stretched out, was peering over the edge. Pictures like this contain for me some sort of personification of dark matter – it is the indirect slippery image of something that is only momentarily visible through light."*

ABOUT THE PHOTOGRAPHER AND THIS PROJECT

SABRINA PETERS has always been fascinated by the unknown and the mysterious, but her encounter with astrophysics professor Carlos Martins led her on a truly cosmic journey of discovery. He explained how the search for dark matter – invisible matter that is believed to make up some 90% of the universe – is being carried out in Chile. She saw a parallel between their quest and the central subject of her art, which is to make darkness visible. Astronomers and photographers both use lenses to see and make discoveries, so she took hers to the desert where the telescopes are trying to learn about the future universe and its origin. Her *Dark Matter* project reflects an emotional mission to explore the unknown.

COAST OF CURIÑANCO
(Area Costera Protegida Curiñanco), near Valdivia, Chile

"Looking down from a viewpoint at the coast I spotted a specific type of algae on the surface moving with the waves like hair in the wind. In my series I used the inverted picture of these algae which reminded me of a bunch of cables. Our eyes play a crucial role in what we believe is real. But the reality and what we think we see are sometimes far apart."

THE UNKNOWN

***NEAR CERRO PARANAL**, Atacama Desert, Chile. "Not far from the Cerro Paranal, where researchers are using some of the biggest ground-based telescopes to solve some of the universe's mysteries. Strange patterns of salt deposits on the ground leave me puzzled, reminding me of traces, effects and influences that makes it possible to investigate dark matter."*

MOON VALLEY
(Valle de la Luna), San Pedro, Atacama Desert, Chile, March 2020

"Salt stones and sand. Near San Pedro is this famous moon valley where you can see the desert shift to very different shapes. Some places really make you think you've left the earth."

***LAGO GENERAL CARRERA**, Chile, February 2020*

This is where I started my journey into the north of Chile. A journey into the unknown often throws one back to the question of the destination – and sometimes directions and destinations change unexpectedly along the way. The inversion of the picture highlights this ambivalence. It isn't about solving the particular problem of access to water, but addressing our relationship with the planet.

PREDICTING THE FUTURE: WHEN IT'S ABOUT GENERATIONS

THE UNKNOWN

SHIFT THE FUTURE TIME FRAME from long-term to super long-term, and there's a shift in who makes the predictions too. Social scientists have reached the limits of their understanding of how people who are children right now – or not even yet born – will behave as grown-ups. Sadly, our abundance of natural, tech and social sciences means we often target our decisions at this year's elections or next quarter's earnings – but they have repercussions for decades to come. Here we can see what we need to think about with a generational time scale in mind.

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BY Detlef Gürtler

CLIMATE CHANGE

Climate change poses a double challenge: How to quantify long-term consequences of human behavior? And then the economic and social change needed to limit them? Even supercomputers can only master these challenges by using very simplified models – but every passing day produces better data.

INFRASTRUCTURE SIMULATION

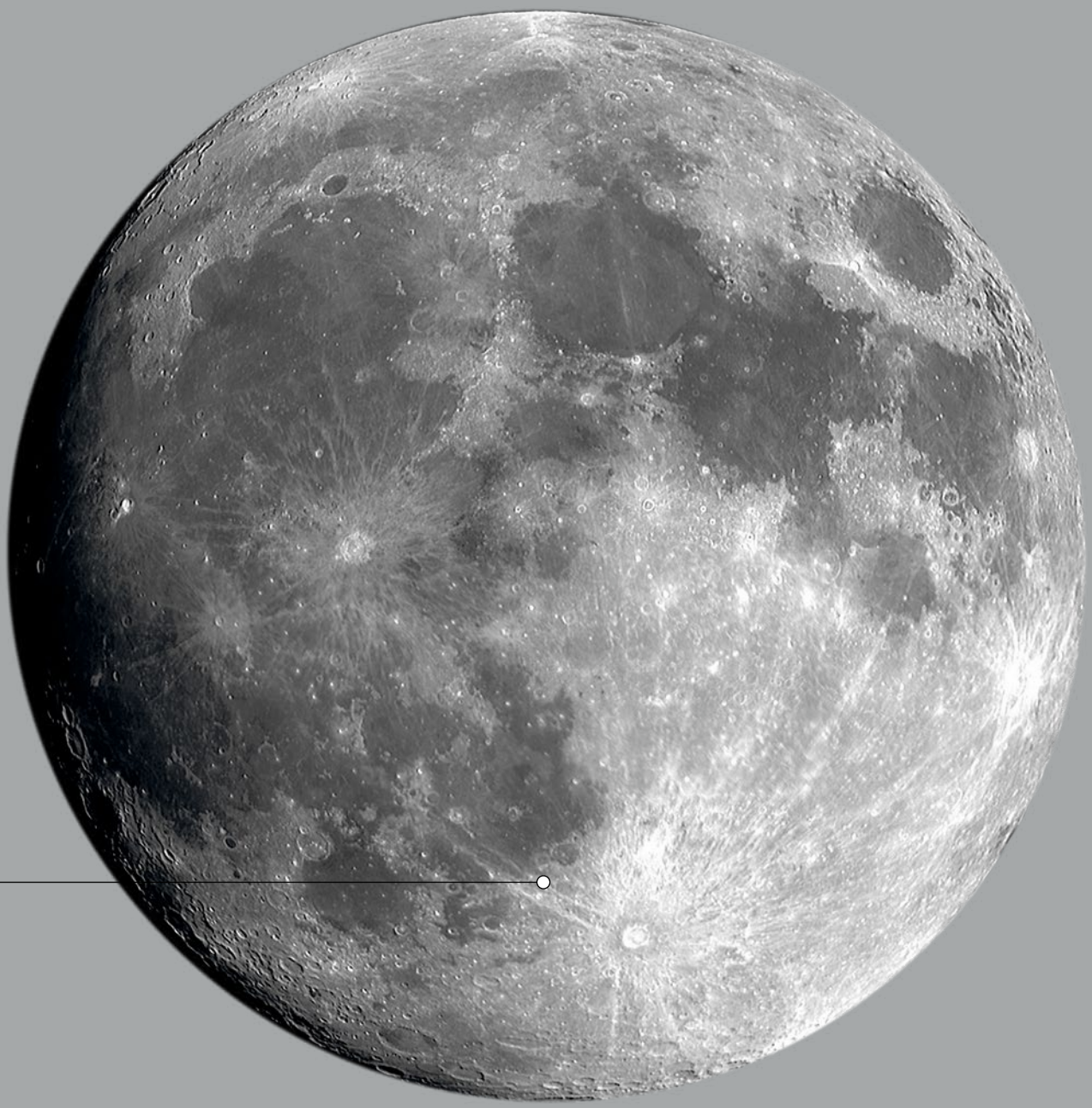
Every new road, port, dam or other infrastructure element is based on assumptions about long-term development – and that development is influenced by exactly these infrastructure decisions. Simulations of the future with or without these investments could positively optimize decision-making.

CHANGING GEOPOLITICS

When the global balance changes, big shifts are possible. Many nations are trying to look to the future, while the Chinese are engaging in long-haul, large infrastructure projects with grand time scales and far-reaching vision. They aren't working to predict the future, they're creating it.

MOONSHOTS

The most important features in a distant future may seem unimaginable today. Exobrains for example, or dream design. But as soon as we can imagine them, we can work on making them a reality. The most prolific moonshots of that kind were Jules Verne's 19th century books and Gene Roddenberry's 20th century *Star Trek* movies. Now we're into the 21st century – and our boldest adventurers still dream of that old stuff, of flying to Mars and beaming with warp speed. To get a more realistic view on where our world might head to, we would need a seemingly unrealistic sci-fi dream world. Probably neither a book (yawn) nor a movie (ditto) – more likely a game.



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GEO-ENGINEERING

Keeping the world a livable place will become an ever bigger challenge. And rebuilding the world an ever more tempting solution. Cooling Greenland, irrigating the Sahara, resuscitating the Dead Sea ... stuff like that. Knowing (and being able to manage) the side effects would be key.

PENSION PLANNING

Arguably the most demanding challenge in financial markets. Protecting the income stream of people for the rest of their lives needs a vision of how the world will look like decades from now. And vice versa: The bigger the funds you manage, the more your portfolio decisions shape our way into the future.

DNA LIFE/HEALTH PREDICTION

No, our DNA does not determine our life. At least not completely. And we're still far away from knowing exactly how our genetic predispositions may influence our health – or what this could potentially mean for our lifestyle, or what adjustments we should make to it. But we are getting closer.

PHOTO: PIXABAY

THE UNKNOWN

DATA FROM THE 21ST CENTURY

CAN ALGORITHMS PREDICT THE FUTURE FOR US? YOUR BUSINESS COULD BENEFIT FROM EVER CHEAPER DATA-DRIVEN SOFTWARE FORECASTING TOOLS, BUT BEWARE, THEY ARE ONLY AS GOOD AS THE DATA DRIVING THEM AND, OF COURSE, AS THE PEOPLE READING THEIR OUTPUT.

— —

BY Steffan Heuer
DATAVIZ BY NetBase Quid

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PICTURE THIS: You're a real estate company and want to know what urban life will look like in five years. Or a car manufacturer is curious whether or not shared mobility solutions post-Covid are worth really big bucks. Or you are a global brand and want to prepare for the three biggest risks to your reputation, even if they have little to do with your business.

Marketing, resource allocation or long-term strategic choices, companies and government organizations face the same fundamental problem. Generally, they know what they don't know. But there are many cases where they also don't know what they don't know. To rise to the challenge, they increasingly rely on algorithms. It's no small feat to identify the events, people, products and places that matter and then make extrapolations. This effort is often compared to drinking from a firehose, albeit with a straw, because humans can only take in so much information and often miss things that – in hindsight – turn out to be crucial.

TECHNOLOGY HAS LONG PROMISED to help, surfacing the important details or tying separate data points together to find emerging clusters. San Francisco-based Quid was one of the pioneers to let corporate clients ask big. Its co-founder and president Bob Goodson had the vision early on to sift through huge amounts of both human- and machine-generated text to spot trends and present a landscape of possibilities. As the company puts it: "Quid powers human intuition with machine intelligence, enabling organizations to make decisions that matter." Its clients are big companies such as Walmart, Hyundai, Pepsi and Sony. In early 2020, it merged with social media analytics company NetBase Solutions, expanding its data trawling to social media and images, changing its name to NetBase Quid.

The combined offering hit a nerve. "I've seen the growing need for companies to be agile given the incredibly fast pace of change," says Goodson. "CEOs are most concerned about reading signals from the world around them and how their company needs to adapt if it doesn't want to die." He provides an expanding circle of users with tools to ask questions and see a visually compelling answer. Studying the landscape made up of color-coded clusters of topics and trends, they can zoom in and rerun the exploration with follow-up questions. "Getting to know what you don't know involves helping people learn how they can ask better questions." To be sure, spotting trends is not the same as "predicting the future." It's more like getting the timely data to supercharge your intuition and then applying human expertise to make a truly educated guess on the future.

Datascaping for the 21st century stretches from product development and marketing to more strategic decisions. Take Walmart, a brand with $559 billion in revenues and over 2 million employees. It posed an ambitious question back in March 2017: Which topics will pose the biggest reputation risk to the company? "Our reputation risk forecasting model told them that racial inequity would be the biggest thing in the coming one to two years out of 20 other reputation risks," Goodson says. "The model correctly foresaw rising frustration and tension building that spilled over in 2020." As a result, Walmart in 2018 launched two major programs to create more workforce opportunity and reduce exposure. Aaron Bernstein, the company's senior director of ⟶

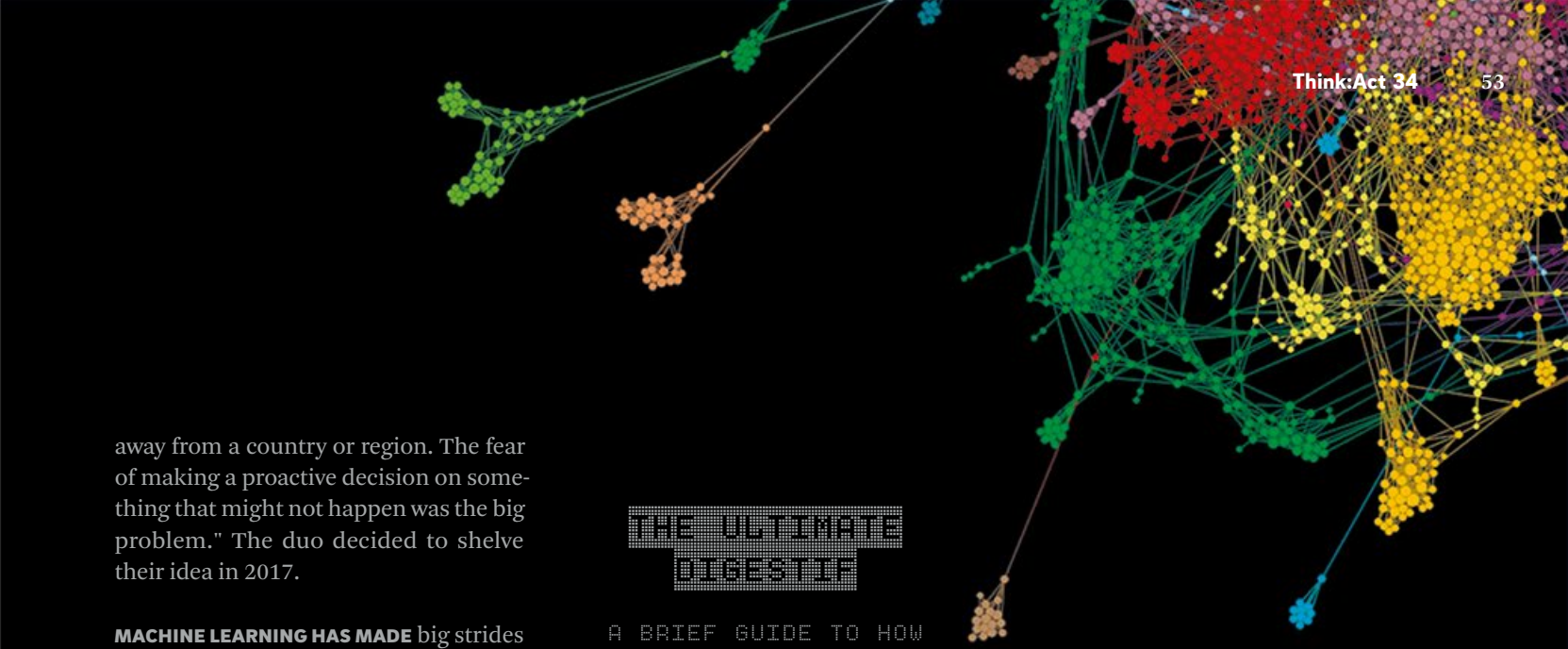
> "THE MODEL CORRECTLY FORESAW TENSION THAT SPILLED OVER IN 2020."
>
> — BOB GOODSON PRESIDENT AND CO-FOUNDER OF NETBASE QUID

insights, says: "We've found that there are important signals in news, social media and other forms of open-source data that help us to face the unknown. Having been utilizing technologies such as Quid for several years, we've seen this field of technology come on in leaps and bounds. The March 2017 reputation risk analysis was a good example."

PREDICTIONS THAT ARE RIGHT tend to be remembered and amplified, of course, while the ones that didn't come true are quickly forgotten. Software doesn't care much for this human predicament. Executives, however, have to look at a landscape of possible futures and eventually pick one that they can explain to stakeholders and shareholders.

An AI researcher and entrepreneur, Travis Dirks ran into that problem with his now-defunct startup Seldn, named as a play on sci-fi legend Isaac Asimov's *Foundation* series. The story tells how math professor Hari Seldon comes up with "psychohistory," a probabilistic method to predict the future in order to reduce human suffering. That idea spoke to Dirks and his wife and co-founder Radhika after backpacking through strife-torn Central America in 2014. "We decided to build technology to predict black swans and picked supply chain management as a market to go after."

They developed a product to demo to companies. Seldn's algorithms would apply lessons from complexity theory, specifically looking for areas where data points that were previously unrelated suddenly showed a strong correlation. Customers would see those predictions of "unfortunate events" on a monthly basis, albeit with a probability of 66%. "They were blown away until the moment I typed in their own company name and gave them a labor strike prediction," the data scientist recalls. "They went pale when they realized they'd have to shoulder the responsibility to move business



away from a country or region. The fear of making a proactive decision on something that might not happen was the big problem." The duo decided to shelve their idea in 2017.

MACHINE LEARNING HAS MADE big strides since the 1950s. Access to data and tools is no longer the domain of top scientists or decision-makers. Yet, as professors Moritz Hardt and Benjamin Recht lay out in their book *Patterns, Predictions and Actions*, machine learning as it's sold and told today still relies on an old idea the astronomer Edmond Halley came up with when he composed his "life tables" to document death in the 17th century. "Halley had stumbled upon the fact that prediction requires no physics. Unknown outcomes, be they future or unobserved, often follow patterns found in past observations," the two computer scientists write. "This empirical law would become the basis of consequential decision-making for centuries to come. But going from patterns and predictions to successful actions is a delicate task."

That balancing act still describes the state of affairs for trying to look over the horizon. "Across AI, there is a notion of models built on inferences vs. those that reason and use expert systems. The first has had explosive growth, but inference-based systems bring perils with their promise," warns Margaret Holen, a lecturer in operations research and financial engineering at Princeton who has advised investment banks to make sense of an uncertain future.

There's a lot to learn from past data, she adds, but we don't record – or have access to – everything that may be relevant and even large samples may be biased statistically, sociologically and politically. Experts like to refer to those blind spots as "dark data." It's another way of saying that we try to get out of "not knowing what we don't know" by choosing or being forced to leave aside information we don't even know exists.

THE ULTIMATE DIGEST:

A BRIEF GUIDE TO HOW MACHINE-POWERED TRENDSPOTTING WORKS:

01

DATA DEFINITION & ACQUISITION:

Ingest fast and slow data sources – immediately available information and that which takes time to accumulate – as well as social media text and images. This includes defining queries early on with a desired topic and then pointing it at the relevant datasets.

02

ANALYTICS, NATURAL LANGUAGE PROCESSING, MODELING:

This can sometimes include pre-built or "out-of-the-box" analytics, as well as the ability to opt for more customizable models that take longer or require human intervention.

03

VISUALIZATION AND EXPLORATION:

Build landscapes that users can explore to find insights and use to drill down and ask follow-up questions.

04

MONITORING/CONTINUOUS INTELLIGENCE:

Use dashboards, reports and alerts that take into account and keep an overview of updates and changes.

THE REAL CHALLENGE LIES less in building more powerful technology than in recognizing the human effort required. Some of that human factor can be prepackaged. Quid, for example, has built 20 standard – or "productized" – types of questions, according to Goodson. Another 20 questions can be answered with existing technology, plus varying levels of human effort. But involving experts for several weeks can be costly. It begs the question: what comes next?

Goodson points to more powerful AI such as an algorithm rolled out by the OpenAI research lab. It's called GPT-3 (Generative Pre-trained Transformer 3) and it's a powerful piece of code. GPT-3 has read most of the written word on the internet, hate speech included, and used it to develop 175 billion parameters that define its language. The thing is so smart that it will pass as human content – and quickly go off on entirely non-PC rants as well. "Internet-trained models have internet-scale biases," its developers wrote in explaining why access to GPT-3 is limited.

Nobody knows what those eloquent algorithms will be used for, but it's safe to say they will wind up in some crystal ball applications. Just type "In five years, our competitors will ..." and watch your software finish the thought. But beware: It learned from humans, with all their liabilities and limitations. ■

PREDICTION: IF YOU ♆ THIS ARTICLE YOU WILL ♆ THE STORY ON PAGE 36

GRACE UNDER PRESSURE

AT THE SHARP END OF A LIFE-AND-DEATH DECISION, YOU MIGHT HAVE TO ACT VERY QUICKLY. HOW DO YOU PREPARE? FOUR PROFESSIONALS AT THE CUTTING EDGE SHARE HOW THEY LEARNED TO HANDLE THE UNKNOWN AND UNPREDICTABLE LYING AHEAD.

by Bennett Voyles

A PANDEMIC WAS ALWAYS A POSSIBILITY, but when it became a reality last year, it presented many executives and entrepreneurs with extraordinarily difficult choices about how to take care of their staff, their customers and their business. It wasn't a case of dealing with the unknowable or the unknown, but it was unpredictable and it did require rapid reaction to a changing environment.

For some professionals, this kind of quick decision-making under extreme conditions is all in a day's work. So what can you learn from them? We talk to a brain surgeon, an astronaut, a spymaster and a mountaineer about what it takes to operate with grace under pressure when a steady stream of life-and-death decisions is just part of the job.

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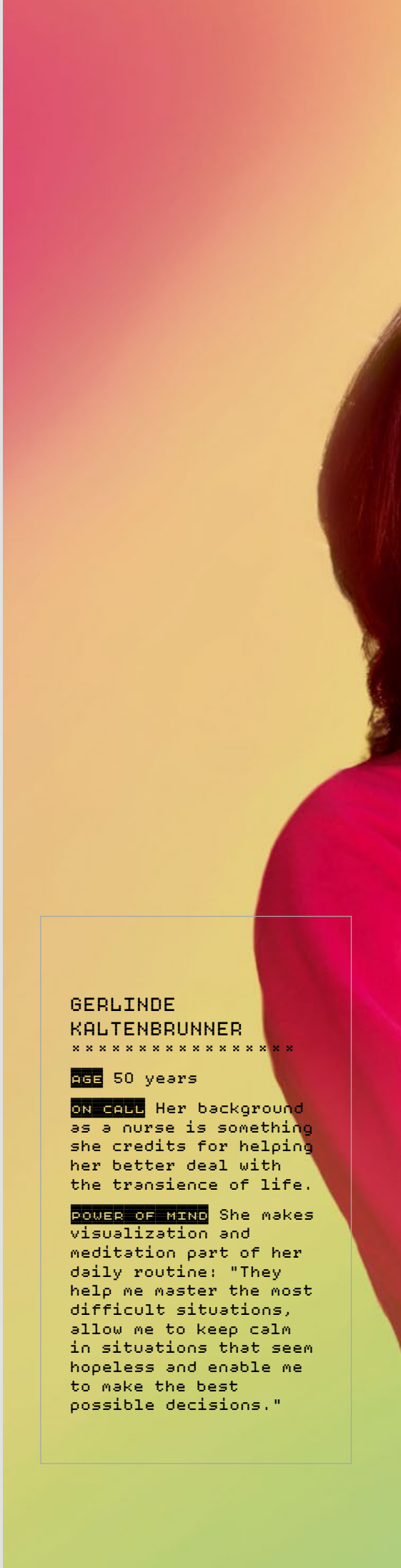


PHOTO: WOLF HEIDER-SAWALL/LAIF

GERLINDE KALTENBRUNNER

AGE 50 years

ON CALL Her background as a nurse is something she credits for helping her better deal with the transience of life.

POWER OF MIND She makes visualization and meditation part of her daily routine: "They help me master the most difficult situations, allow me to keep calm in situations that seem hopeless and enable me to make the best possible decisions."

GERLINDE KALTENBRUNNER
MOUNTAIN CLIMBER

The first woman to scale all 14 Himalayan and Karakoram 8,000-plus-meter peaks without using oxygen, the Austrian climber prepares for tough decisions long before she takes her first step up the mountain.

PLAN, BUT BE PREPARED TO TRUST YOUR GUT INSTINCT

"I think it is extremely important to talk about certain scenarios that may occur during the climb before the expedition," she says. But although Kaltenbrunner invests a lot of time and energy in detailed planning ahead, she is quick to adjust her plan if conditions change. "On such occasions, I have always trusted my gut feeling, which has become more pronounced and stronger over the years. I know I can rely on it."

BE PATIENT

"If there is a lot of snow and high winds, the avalanche danger is often too great to climb, which means we have to change plans and wait for the conditions to improve," Kaltenbrunner says. "Sometimes we have to wait for days or even weeks, but most of the time our patience gets rewarded and we can climb in good conditions and fine weather. High-altitude mountaineering certainly teaches us to slow down and be patient, as this is the only way to have a successful expedition."

HAVE FAITH

Even after major reversals, such as the death of teammate Fredrik Ericsson on their first attempt to scale K2 in 2010, Kaltenbrunner later decided to try again. "Basically, I am convinced that life is for us and not against us, and we should look forward and not back," she says. "I consciously decided to trust in life again." ⟶

"ASKING FOR HELP IS A SIGN OF STRENGTH. NOT OF WEAKNESS."

HENRY MARSH
NEUROSURGEON

Henry Marsh has seen thousands of brains and made hundreds of difficult decisions about what to cut and what not to touch, knowing that his next move could mute, paralyze or even kill his patient.

WATCH FOR COGNITIVE BIASES

"If you are too self-confident, you may well fail in estimating risk and benefit between operating and not operating. It is all too easy to underestimate the risks of operating and overestimate the risks of not operating. The best way of overcoming your cognitive biases – which you can never do completely – is to make decisions slowly and thoughtfully and afterwards discuss them with critical but sympathetic colleagues."

One kind of bias in particular, confirmation bias – interpreting the data based on what you already expect the answer to be – is the biggest risk for a neurosurgeon, according to Marsh. "If you make the wrong decision, it is remarkably difficult to realize it until it is too late because of the confirmation bias. You will misinterpret the evidence that things are going wrong and try to understand them in terms of your initial mistake."

STAY "FROSTY"

Mistakes, Marsh says, don't happen very often during surgery – but when they do, it's important to stay calm. "Most mistakes are in pre-operative or post-operative decision-making. But if it does happen, the important points are that the patient and family have been warned that this might happen and to keep cool. Keeping calm – or 'frosty' as a jet fighter pilot friend of mine says – is partly a question of your personality, training and experience."

IF SOMETHING STARTS TO GO WRONG, KEEP YOUR EGO OUT OF IT

"With experience, you know that usually you will be able to sort the problem out. If you are inexperienced, you need to be able to call for the help of a more experienced colleague. Sometimes this involves overcoming your ego and pride. Asking for help, I tell my trainees, is a sign of strength, not of weakness."

HENRY MARSH

AGE 71 years

AUTHOR OF DO NO HARM, ADMISSIONS

FEEDBACK MATTERS He pioneered techniques for operating under local anesthetic so patients are conscious and able to talk during their procedure.

WELL DOCUMENTED He is the subject of two BBC documentaries: YOUR LIFE IN THEIR HANDS and THE ENGLISH SURGEON.

SCOTT KELLY
ASTRONAUT

Now retired from NASA, Kelly once held the record for more time in space than any other US astronaut – 520 days in total including a one-year tour of duty on the International Space Station (ISS).

THINK LIKE AN ASTRONAUT ON A CRITICAL MISSION: TAKE CARE OF YOUR TEAM

"I think part of leadership and teamwork is taking care of each other ... checking in on each other: How are you doing? How are you feeling? How are things at home? How's your family?"

FOCUS ON THINGS YOU CAN CONTROL

Kelly credits his ability to focus under pressure in part to a tough childhood. "When I grew up, my parents didn't get along very well and there was a lot of stress and conflict in our house, so I think that prepared me well for dealing with stress and conflict," Kelly says. Later, the military trained him further in what he calls a "philosophy of compartmentalization," the basic idea of which is "there are things we have control over and things that we don't have control over – and better to focus your efforts and attention on the stuff you can control and ignore everything else," Kelly continues. "I think that kind of helps in dealing with stressful situations in a calm way."

IF YOU HAVE A ROCKET SCIENCE PROBLEM, LISTEN TO THE ROCKET SCIENTIST

"Sometimes it makes sense to be the dictator – when there is a fire and you are in space and you need to make split-second decisions," Kelly says. "But oftentimes, I've found, it makes more sense to seek out the person of your team who may know more about what you're trying to do than you do or what the situation is than you do and let them decide or get their opinion." ⟶

SCOTT KELLY

AGE 57 years

AUTHOR OF ENDURANCE, MY JOURNEY TO THE STARS

FLIGHT RECORD He holds the USA's No. 1 spot for the longest single flight in space: 340 days on the ISS.

TWIN PURPOSE His record ISS flight measured the effects of extended stays in space against his twin brother, fellow former astronaut and current US Senator for the state of Arizona Mark Kelly, who stayed on the ground.

THE UNKNOWN

"OFTENTIMES, I'VE FOUND, IT MAKES MORE SENSE TO SEEK OUT WHO MAY KNOW MORE ABOUT WHAT YOU'RE TRYING TO DO THAN YOU DO."

PHOTOS: FRANCESCO GUIDICINI, THE SUNDAY TIMES/ROBERT MARKOWITZ

"THE ART OF CRISIS MANAGEMENT IS TO SEE THIS COMING BEFORE IT ARRIVES."

SIR DAVID OMAND

FORMER DIRECTOR OF GOVERNMENT COMMUNICATIONS HEADQUARTERS (UK)

From Margaret Thatcher to Tony Blair, Sir David Omand spent a lot of time "in the room where it happened" when some of the United Kingdom's most important military decisions were made.

FORESIGHT CAN USUALLY MITIGATE THE DAMAGE OF A SLOW-TO-DEVELOP CRISIS

There are two kinds of crises, Omand says: the sudden impact crisis and the slow burn. Of the two, the slow burn is the most difficult. "If you are faced with a sudden impact crisis, you have no alternative but to react. But if it's a slow burn crisis, this is much more difficult, because at some point a developing situation reaches a tipping point. The art of crisis management is to see this coming before it arrives ... You may not be able to avoid it, but you can start to mitigate it. You can prepare."

NEVER LET FACTS SPEAK FOR THEMSELVES

"Having a lot of information coming in isn't of itself that useful. You need to take the time to build some model of whatever the potential hazard is that you're looking at, so you've thought in advance about what information is going to be most useful and you can fit it into some framework ... You have to be prepared to interrogate the data, question the data, because by itself [data] often can be extremely misleading."

SIR DAVID OMAND

AGE 73 years

AUTHOR OF PRINCIPLED SPYING, HOW SPIES THINK

SOCIAL INTELLIGENCE He co-wrote the first study on "SOCMINT" looking at the use of social media for intelligence purposes.

JUST ETHICS PRINCIPLED SPYING lays out an "ethical code for secret intelligence" that follows the "just war" theory criteria.

APPOINT A DEVIL'S ADVOCATE

It's important to remember that anyone making an important decision brings two kinds of thinking: emotional and rational. Complicating matters, says Omand, is the fact that "these days, you can also find emotional stuff in the supposedly rational analysis ... the basic information you're working with is not as reliable as you think it is," he explains. "The other problem is simply the cognitive biases that we are all susceptible to. So even if you've got really, really good information, you can still deceive yourself because of unconscious biases." One method he advocates for making a good decision: "Appoint a devil's advocate. Say, 'your job for the next hour is to pick holes in the argument.'" ■

PHOTO: TINA KROHN

There are known knowns. There are things we know we know. There are known unknowns. That is to say there are things that we now know we don't know. But there are also unknown unknowns. There are things we do not know we don't know.

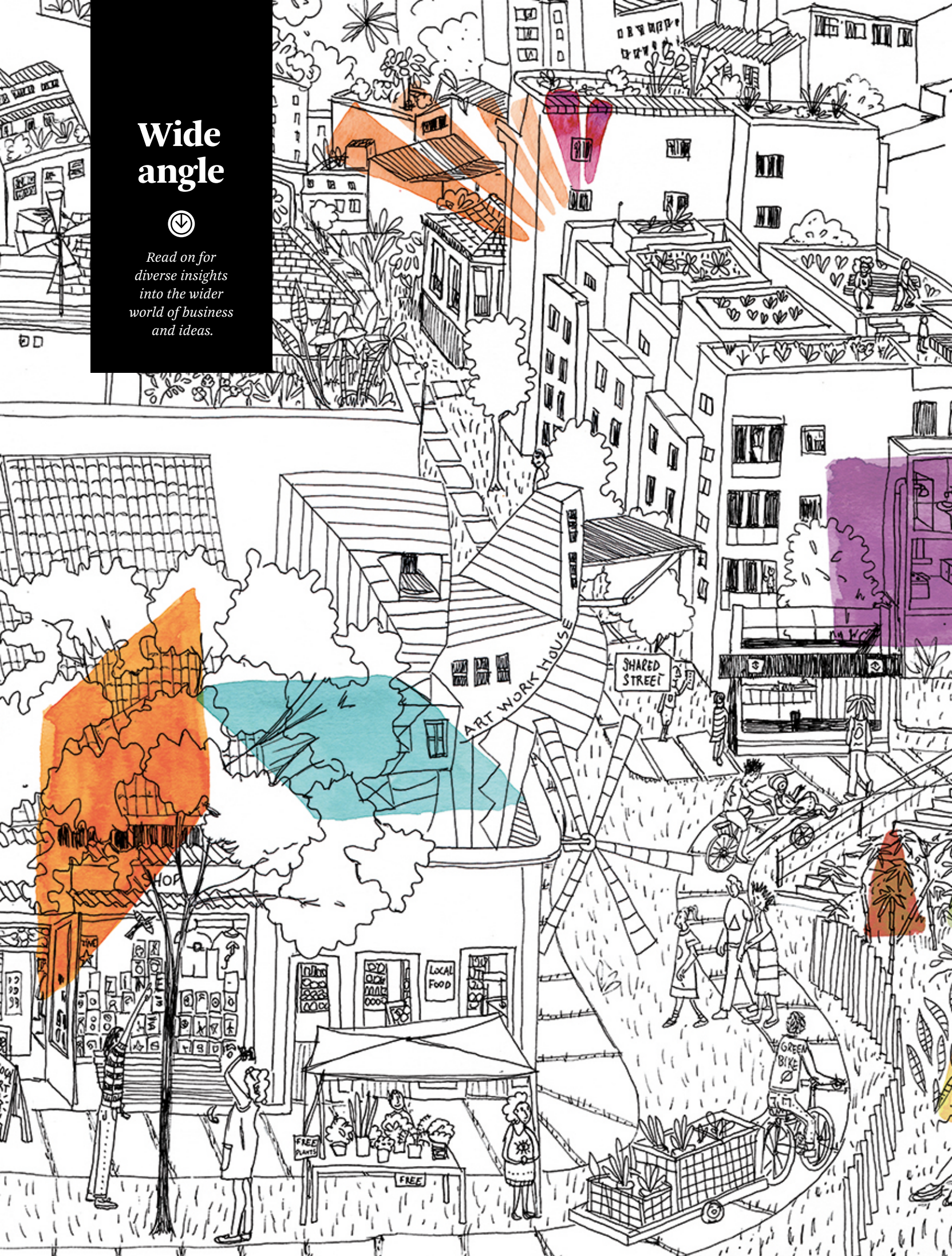
— DONALD RUMSFELD
FORMER US SECRETARY OF DEFENSE

CLOSING THOUGHTS ON
THE UNKNOWN

There are known knowns. There are known unknowns. That is to say there are things that we now know we don't know. But there are also unknown unknowns. There are things we do not know we don't know.

Wide angle

Read on for diverse insights into the wider world of business and ideas.



Building back better

The pandemic has shaken many of our certainties about city life. But far from predicting dystopia, urbanists suggest that any perceived losses brought by Covid-19 are counterbalanced by huge potential gains. We just need to be daring enough to embrace them.

BY **Belinda Smart**
ILLUSTRATIONS BY **Juliana Russo**

UNTIL MARCH 2020, it seemed to stand as a universal truth: "Whenever and wherever societies have flourished and prospered rather than stagnated and decayed, creative and workable cities have been at the core of the phenomenon." It might once have seemed unthinkable to counter the wisdom of Jane Jacobs, author of *The Death and Life of Great American Cities* and one of the most respected urban and social theorists. For millennia, cities have undeniably been the focal point of culture, commerce, education, work and recreation.

Enter Covid-19 and suddenly these clusters of human endeavor had a problem: A disease spreads rapidly through person-to-person contact, rendering human proximity potentially fatal. Urban centers emptied, the safety of vital amenities such as public transport was compromised, working practices changed radically overnight and lifestyle and leisure pursuits such as retail and the arts were shut down. Now, over a year since Covid-19's global spread began, fear and uncertainty are tempered by optimism – new vaccines offer the hope to tackle the virus and its variants. Yet many agree that it could be some time before people everywhere – and city dwellers in particular – feel that a return to pre-Covid practice is possible.

WHERE DOES THAT LEAVE THE URBAN LIVING? Is the seemingly unassailable city in decline? For those at the center of thinking about cities and how they work, news of "the death of the city" is greatly exaggerated. A retreat to rural life might be seductive for some, but urban thinkers still hold fast to the belief that the city is humanity's best hope for community, commerce, innovation and creativity. For a few, the virus actually offers an opportunity for accelerated change.

Addressing social injustice is one key area of change that is long overdue. And for some specialists, urban planning is a central plank for tackling social equity and inclusion. "The social injustice that's been highlighted in North America, particularly in the United States, and then all over the world, has shown that principles and strategies around equity and inclusion aren't nice-to-haves; they're must-haves," says Richard Florida. "In fact, without them, cities are not going to be as competitive going forward." Florida has been a pioneer in thinking about the role of the city and for him the Covid-19 crisis represents an opportunity for a radical rethink. He is now applying ideas he has been developing for many years as to how urban planning could foster better social equity and inclusion, in terms of housing that reduces crowding, for example, or equal access to vital services such as health care.

LAYERS OF LIVING ***Cities are about access to work, home, leisure and industrial spaces, but this density needn't be dreary.***

Florida's hope is that more cities will begin to roll out plans around equitable development and affordable housing. And his plans could indeed be helped along by looking at what's left in the wake of the pandemic. "I do think that with the rampant amount of commercial real estate available, there probably will be a glut of [it] – and it might be important for us to address some of those affordability issues and utilize opportunities in commercial real estate. That happened in the industrial economy, where we saw industrial areas being turned into residential schemes."

What's clear to Florida is that the factors that underpin urban planning must change. "For a long time the practice of development in our cities was about maximizing innovation, growth and efficiency. Those were the values by which we evaluated

"For a long time the practice of development in our cities was about maximizing innovation, growth and efficiency ... Now we're saying the principles by which we evaluate economies are inclusion, equity and resilience."

— Richard Florida, Urbanist and professor at the University of Toronto

economies. Now we're saying the principles by which we evaluate economies are inclusion, equity and resilience."

TO BEGIN TO ACT ON THESE PRINCIPLES, cities need to lose their standing as overcentralized engines of growth. Instead, a new model might comprise smaller hubs, all joined together, that play host to greater diversity, thereby fostering sustainability and resilience. "One of the things I think that we could automatically say that Covid-19 has taught us is that a lot of economies across the world are highly dependent upon local services and small business," says Florida. "What we'll be thinking about is: What are those goods and services that we're selling to other economies? Are we enabling diversification of skills?"

So maybe going local – or at least putting more emphasis on the local – is a better way forward. That's what urban development advisor Rogier van den Berg thinks. He says: "Many global cities that position themselves as 'economic powerhouses' lack essential services and attractive places where people can spend time ... It's shown us how important it is to have local amenity; to have that pleasant walk around the corner."

6.7 billion

The UN's projection for how many people will be living in urban areas by 2050, more than double the estimated 3.1 billion people that will be living in rural settings.

A major factor in the argument against cities is the idea that "density" is negative. It's a thought that has become sharpened in the pandemic. But according to van den Berg, it's not the right way to look at the debate. "Cities aren't just about density; they're about access to services." For decades "density" has been seen as towers, gray infrastructure and pollution. But you can build dense cities with four-story buildings, good transport and beautiful streets. "European cities such as Barcelona are a great example of this," he concludes.

Density isn't at the top of the other peoples' lists of responsibility for the Covid-19 crisis, either. Architects Bruno Moser and Paula Petkova from the esteemed Foster + Partners practice in London cite poor planning and social inequality as bigger players than density in the pandemic's spread. "Ensuring access to adequate housing and →

space to self-isolate, the ability to take paid leave or work remotely is more important than tackling density when it comes to controlling contagion."

DENSITY CAN, IN FACT, BE A POSITIVE – again, if it works on a local level. An idea that was gaining traction before Covid-19 was the "15-minute city" – work, home, entertainment, shops, education and health care all within reach on foot or bike, within a quarter of an hour. Visionary mayors such as Paris' Anne Hidalgo and Milan's Giuseppe Sala have been among its key proponents. The idea has gained further ground during the pandemic, says Petkova. "The global lockdown forced people to narrow their physical horizons and rediscover their proverbial backyards. In fact, *CityLab* crowd-sourced neighborhood maps from people around the world. What is striking in the hand-drawn maps is the sense of a treasure map linking local parks and gardens, delis and street-side cafes."

That doesn't mean to say that neighborhoods are the be-all and end-all for urban life. Far from it. Neighborhoods do not undermine the necessity and importance of hubs of cultural or commercial activity. A vibrant shopping street does not negate the need for grand retail; neither does a local community center negate the importance of cathedrals of culture. The two poles complement each other, creating a choice for citizens and visitors to engage in the smallness of everyday life and the largeness of collective life, argues Petkova.

But the question on many minds during the pandemic circled around the workplace: Can we live without it? Urban thinker Carlo Ratti thinks not. He sees working life and social contact as vital for serendipity. "As sociologist Mark Granovetter argued a few decades ago," says Ratti, "functioning societies are underpinned not only by the 'strong ties' of close relationships, but also by the 'weak ties' of casual acquaintances." By bridging social circles, weak ties are more likely to connect us with new perspectives, challenging our preconceptions and fostering both innovation and its diffusion.

How we use workplaces, though, is certainly now a subject that is up for grabs. The pandemic has taught us how to work from home – and also what we miss. Is there a middle ground? Moser's solution is an innovative one. "We foresee the creation of more flexible office typologies, such as a Neighborhood Office that will sit somewhere between the Head Office and the Home Office," he says. Much like the convenience of a neighborhood

"The archetypal head office might come to mimic the Greek agora, becoming a gathering place for the exchange of ideas and to reinforce a shared culture."

— Bruno Moser,
Head of urban design at Foster + Partners

shop stocked with the everyday essentials, it would be a place to access robust IT infrastructure, ergonomic furniture, meet with colleagues and simply create a divide between home life and work life.

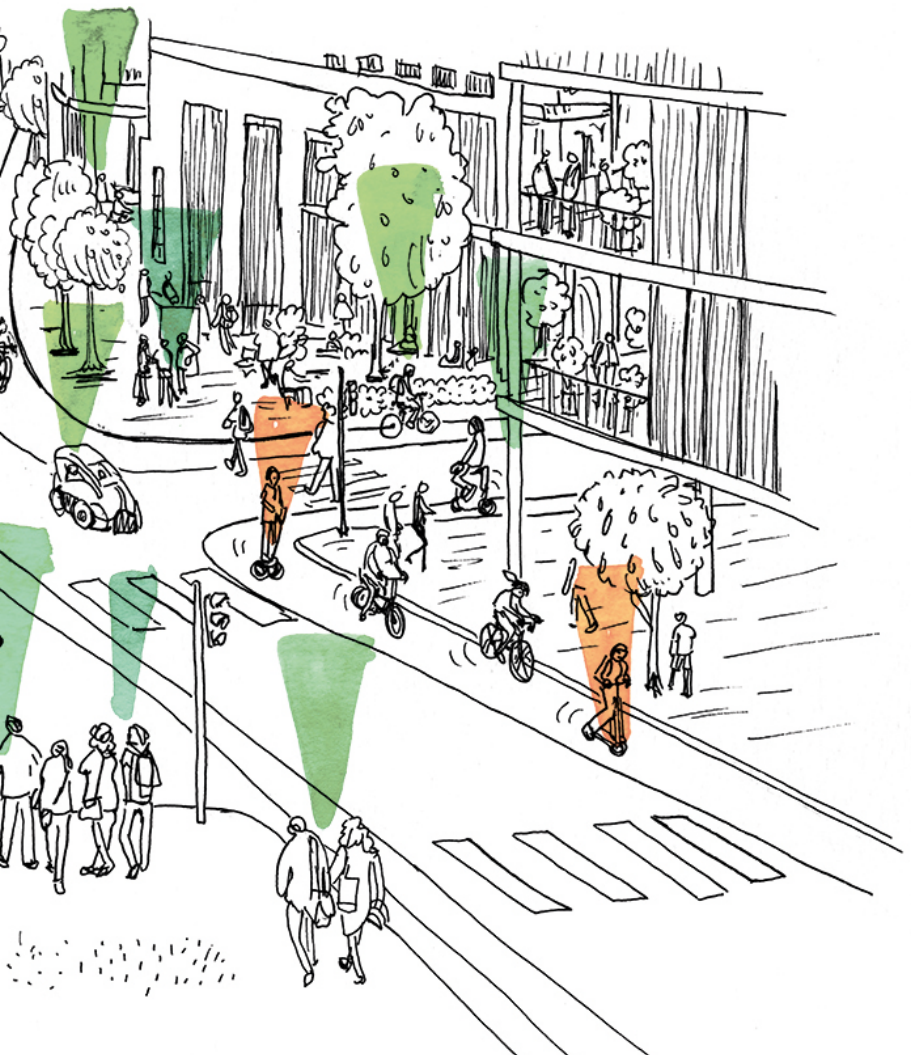
The benefits of a neighborhood office are many. It would be more easily accessible by walking and cycling; it would bring more workplaces back into our local neighborhoods, enlivening them and – in a future scenario of flexible working – enabling employees to adjust their work-life balance with a dose of home working alongside other locations. "The archetypal head office might thus come to mimic the Greek agora," says Moser, "becoming a gathering place for the exchange of ideas and [to] reinforce a shared culture."

WHETHER THEY BECOME AGORAS OR NOT, what about moving between these spaces? An almost endless quest in urban planning is mobility and transportation, and that was sorely tested in the pandemic. While many pre-pandemic felt we were moving toward less reliance on automobiles, the debate is now more nuanced. "One thing the pandemic [has] shown us is that if we're going to think about transportation infrastructure, we need to broaden that conversation into more active mobility and micromobility," Florida says, adding that it also includes bike and scooter shares, as well as other responses for more flexible active transportation. He cautions against dreams of utopian city makeovers, balancing them with a dose of pragmatism. "We talk about bike lanes and active mobility and it sounds wonderful," says Florida, "but for a policymaker, that sounds really expensive as well. So, one of the things I would suggest to cities is figuring out what is that reality. Where do you spend? Are you going in on an active mobility transit system? And if so, what are the investments you need?"

$17.8 billion

The estimated annual cost of São Paulo's traffic jams in terms of productivity loss, wasted fuel and the health impact of vehicle emissions, almost 1% of Brazil's GDP.

FROM A TO B
Shifting to a new vision of urban life will also mean a radical rethink of transportation.



For megacities like São Paulo, Brazil, mobility is a whole other question. Such massive urban sprawls, where commutes can last several hours, are almost unnavigable. It isn't a single mobility plan that's needed, but a radical rethink: build more cities. That's what Saskia Sassen, a professor of sociology at Columbia University who's studied the impacts of globalization and and economic restructuring, suggests. "The world needs more medium-sized cities. We exist in a setting where we assume the making of cities has been done and we can move on. That is correct regarding many well-functioning medium-sized cities. But we must stop enabling urban sprawl by continually extending the world's biggest cities outward."

There is a "crisis-opportunity" also created by Covid-19 which could spur a renaissance for urbanism. Citing both the cholera and tuberculosis epidemics in Victorian-era London, which paved the way for a host of urban improvements including the introduction of public parks, the sewage system and housing reform, Moser feels optimistic that cities have a bright future. "There is an opportunity to use this crisis as a catalyst for positive – and crucially long-term – change."

Richard Florida agrees. "What we know is that urbanization is stronger than historic health crises," he says. "In fact, many of the world's larger cities came back with a vengeance after the Spanish flu from 1918 until 1920. Think about New York, Philadelphia or London. They all came back in the roaring 1920s and burgeoned post-pandemic." The city, then, isn't dead or dying. But some bold thinking will be required and, as Jane Jacobs recognized back in 1961, the city needs to change. Her prescription included more diversity and more dynamism – and that might be just the solution going into the 2020s too. ■

AN 'UNREASONABLE' MAN
Daniel Ek made his name with his focused ambition, something he wants to see more of in Europe.

I have a stream

Pioneering music streaming mogul Daniel Ek has transformed the music business. Now he is focusing on changing how people consume audio. Spotify's CEO unpacks his idea of "the European dream," how creatives might benefit more from the platform and why innovation is everything.

BY ***David Rowan***
PHOTOS BY ***Wesley Mann***

SPOTIFY FOUNDER DANIEL EK isn't fazed by a tough challenge. Back in 2006, the Swedish entrepreneur was repeatedly rebuffed when he told the record labels that they should stop selling expensive plastic discs at huge margins and instead give away their music for frictionless digital streaming. Eventually Ek persuaded almost all the main labels to work with Spotify – which ended its first day as a public company in April 2018, valued at $26.5 billion.

Since then, Spotify has become the world's largest music streaming service, with 155 million subscribers and 345 million users in 170 markets. And it's still growing at 30% a year. But Ek, who is now 38, isn't ready to stop pursuing his own agenda. No wonder he hung a George Bernard Shaw quotation on the wall above his desk in his Stockholm office, alongside a Fender Stratocaster, the iconic archetypal electric guitar: "The reasonable man adapts himself to the world; the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man."

Daniel Ek

is the co-founder and CEO of Spotify. Before starting the company in 2006 at the age of 22, he had already created a web development empire out of his parents' house, starting at just 13 years old. At one point he was reportedly earning $50,000 a month through the enterprise and had hired a team of 25 by the time he was 18.

Today, Ek's unreasonable side is focused on raising European companies' ambitions. He's famous in tech circles for railing at Europe's entrepreneurs for selling out too early or, worse, relocating to the United States. Now he's putting his own hard cash to work by fighting what he sees as the continent's lack of drive to build the world-class companies of tomorrow. He recently committed $1.2 billion of his personal wealth to funding "moonshot" projects in Europe that use deep technologies such as artificial intelligence to build the next "supercompanies." These businesses will work with governments, scientists, universities and investors to make a significant positive dent in solving "the infinitely complex problems" that confront us, whether in health or in climate.

Could Spotify have become the success it is had you been born in the United States?

You know, I don't think so. And for two reasons. First, back in 1997 I already had access to fiber-optic internet, 100 megabits downstream and 100 megabits upstream, funded by the Swedish government. They wanted everyone to have a PC in →

their home with broadband access, and for me that was a glimpse at the future. It was just the Nordics and South Korea then. There was no Netflix, no YouTube – nothing where you could consume content. The only thing that existed besides text and images was Napster and piracy, which the internet used to distribute almost everything you can imagine. It was kind of awesome.

And that links to the second reason – because of that shift, piracy had eradicated the Swedish music industry completely. No one bought CDs, and buying downloads from iTunes was just not something that a lot of consumers did. So the music industry really didn't have a lot to lose when Spotify came around, because the alternative was to pack up and go home. Not only did we offer a solution to what would eventually become a bigger and bigger problem in the rest of the world, but we also did it at a time when the music industry had nothing to lose. I don't think we would have succeeded if we had first launched in the US – that market had more than 10 times the number of competitors and the music industry had a lot more to lose, so they'd stifle innovation.

Your $1.2 billion commitment to investing in European "moonshots" is hugely ambitious. How, apart from in financial returns, will you judge whether you've succeeded a decade from now?

The real success for me will be a whole lot more supercompanies in Europe – and ideally ones that make a positive dent in the world by tackling some of the big challenges. Whether it's climate change or educational access or a better health care system, there are many areas where we need to move fast, to invest, and do it with great urgency.

Do you think that Europe is changing in terms of entrepreneurial ambition?

Yeah, I think it is. In Sweden in particular, we have this word *lagom*, which means "just about right": you don't want to achieve too much, nor too little. But that's shifting. When I started, entrepreneurship wasn't something that you did. I remember when I started the company – I was 22 – explaining to people at parties and a lot of people said: "OK, great, but what's your day job?" It was just not thought of that you could launch your own company. But there's been a big shift in the last decade in Europe. It's become not only socially acceptable to become an entrepreneur, but it's become maybe the thing to try. So we have more people than ever trying their hand at entrepreneurship, which is fantastic. But we still need to do more to get the snowball to move even faster, because with more supercompanies we can provide more inspiration to talent and investors. We're two decades behind mature ecosystems like Silicon Valley and Seattle. A lot of catching up is about daring to go for the long haul.

Spotify

IN NUMBERS

62

The number of languages Spotify announced it will soon operate in as part of its expansion into 80+ new markets.

$25+ billion

How much revenue Spotify has paid to rights holders since its launch in 2008.

19

How many companies Spotify has acquired in total since its first acquisition, music discovery app Tunigo, in May 2013.

$235 million

The price Spotify paid to acquire podcast advertising and publishing platform Megaphone in November 2020.

You talk a lot about innovation – and a global pandemic that's hit all sorts of business models is forcing leaders to rethink how they do things. What advice would you give leaders on innovating their way out of today's challenges?

Innovation is a continuous process. So I would build an innovation system at your company to see how you can harness ideas from as many places as possible – and then ideate on them. Take one very concrete example here at Spotify. We have something called 'hack weeks.' It's a very simple notion: We put some time aside for people to work on a product they want to exist. We see a lot of bottom-up innovation as a result. Truthfully, many of the greatest innovations at Spotify in the last few years have come from the hack week. Discover Weekly [the personalized music recommendation algorithm] was one. I actually wanted to kill the idea because I didn't like it – and ironically enough it's one of our most successful things. So provide many paths to having ideas circulated, and [for ideas] to bubble up – with more paths to "YES."

After 14 years of Spotify's journey, I get a sense that you see yourself still at the relatively early stages. When I started using Spotify, I thought it was a music service, but now you're talking about an "audio-first" strategy. You're buying podcast companies, and now I can get access to audiobooks, and a Daily Drive playlist with news. What is Spotify long-term?

Well, the amazing thing is, I'm not even sure I know. If you take audio as an example, we learned by accident that in Germany a lot of record labels were uploading other forms of audio content [such as audiobooks] on Spotify. It was a pretty terrible user experience, yet people were still consuming it. And then we studied why people in the US weren't using Spotify more in the car. One of the big reasons was that they wanted more news, weather and traffic that they get from local radio. And so, if you put those two things together, you start realizing that, even with our vision of music, by adding audio we're going to be better for even the music listeners. So one plus one equals three or four.

DIGITAL THINKER Daniel Ek looks to philosophy as a guide for answers to today's issues.

You're absolutely right – we're early in our journey and at least half the world's population will be listening to some sort of audio service via the internet. That's almost four billion people – and Spotify is only reaching 300 million so far. We're talking about billions of consumers to reach over the next decade.

Let me ask about the original clientele, the music industry. How well are you getting on with them these days?

A lot in the industry worried whether streaming could replace and even compensate for any shortfall in download revenue. Now we have the answer: Yes, and it keeps on growing by healthy numbers each year. That changed the tone [of the conversation]. It's the classical hype cycle. At the beginning you're met with skepticism, then you start seeing some optimism and then, at the end of that curve, they're like: "Well, yeah, I always believed in this and of course it was going to work." We're at that point now, with everyone streaming, and that's incredibly gratifying for someone like myself who's been working on this problem for 14 years.

"A lot in the industry worried whether streaming could replace download revenue. Now we have the answer: Yes."

You seem to have educated the record companies, but are still meeting resistance from creatives who say your streaming fees make it hard to earn a living wage. How do you respond to concerns that you're now the big company that determines how much or how little they should be earning?

We're still talking about incredibly fast-growing markets. Streaming will continue to grow, which means that there will be even more revenue out there for all creators. Plus, this is an evolving platform. There's going to be more and more offerings, more ways to engage with consumers. Five years ago, we were a music platform. Now we're an audio platform. And we'll evolve to become an even more creator-centric platform over the next decade, when I believe a lot more creators will be able to live off their art than today.

One last question. I know you spend a lot of time reading, thinking, going for conversational walks with people. What ideas are percolating that you haven't quite formed into products?

Oh, wow. Well, it's really eclectic at the moment. I'm really into philosophy and thinking a lot about whether or not we're in a path-dependent world. If you think about society at large, you have this idea of liberalism and democracy and our current iteration of it for the past few hundred years. And obviously now we have fantastic platforms, as well as a lot of things that we, as a society, need to address. Philosophy as a whole is an understated art that is not getting as much attention as it should. I'm thinking about how we can bring it more to the forefront and raise philosophy's stature. ■

Dear white men,

Despite a broad consensus on gender equality, women still find it hard to establish their place as equal partners. You shaped our modern world of work and have enjoyed the advantages of your position – even if you're unaware of your privilege. Will you help to quicken the pace of change?

BY ***Janet Anderson***
PHOTOS BY ***Burt Glinn***

A DIVERSE WORKFORCE is surely a force for good. It makes simple, common, commercial sense to imagine that a company that produces goods for both men and women would achieve more with a diverse workforce that reflects whom it serves. But despite this glaringly obvious point, the majority of companies are managed solely – or predominantly – by men. Women's participation in the workforce might have increased over the past decades, but they are still underrepresented. And the higher you go up an organization, the more obvious the discrepancy becomes.

If you want proof, just look at the figures. They show what common sense suggests and →

PHOTO: BURT GLINN/MAGNUM PHOTOS/AGENTUR FOCUS

RIGHT UNDER YOUR NOSE
Gender bias in the workplace is often so ingrained in culture that it may be hard to see.

many studies have proven: Diverse teams make better decisions, are more innovative and provide a healthier work climate for all. Companies with gender-diverse leadership also outperform their less diverse peers in terms of revenues and returns on investment. But there is also an ethical dimension: It's about fairness and progress for all. As Leena Nair, Unilever's chief HR officer, poignantly states: "If half the population are being held back, how are we all going to move forward?"

Diversity and gender balance is not only good for business – it is the right thing to do. So how do we make change happen faster? A major problem is bias. "We know bias contributes to women being less likely to be hired and promoted. That affects organizations top to bottom," says Rachel Thomas, CEO of Lean In, a global community co-founded with Facebook COO Sheryl Sandberg dedicated to helping women achieve their ambitions. "Three-fourths of women in the workplace experience bias every day and it's even more acute if you are a woman of color, an LGQBT+ woman or a woman with disabilities. Yet only one in three employees, including managers, challenge bias when they see it."

THOSE WHO HAVE BEEN AT THE HELM traditionally – white men – really need to be part of the solution: as leaders, advocates and partners. Why are they not stepping forward and what can be done to encourage them to play a part in making change happen? Part of the problem is down to a lack of awareness. Many in leadership positions are less mindful of the privileges they enjoy. Some see their own career and life as a template for success and cannot see that their view may be skewed. Then there are those who might be committed to change but are unclear about how to bring it about.

Add in that change can be daunting, and then sticking to conventional male norms may simply be the easier option. "In order to get organizations to the next level we need to get to the root causes. We need to identify the problems, but also why the problems are what they are," says Alixandra Pollack, vice president at Catalyst, a global non-profit organization working for gender equity. Pollack leads the program Men Advocating Real Change (MARC), which runs workshops that engage groups of men and women in dialogue with the aim of inspiring the men to become advocates for equity.

GIVE US A SIGN
Engaging with how cultural conditioning and bias influences success can be a difficult process, but it is long overdue.

The workshops have uncovered one of the root causes that Pollack was keen to expose: gender conditioning. Ideas of what it means to be a girl or a boy in childhood translate into perceptions of gender in adulthood and these learned patterns overlap with our established leadership norms. The pervasiveness of white male privilege forms another powerful discussion in the workshops and recognizing how evident it is in everyday life, she says, is an eye opener.

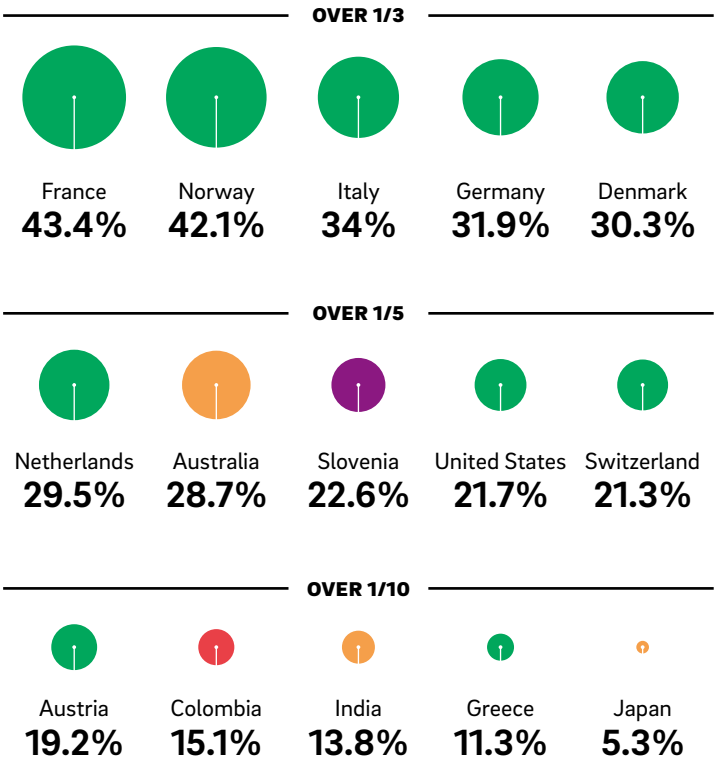
Many men who have worked hard to get to where they are consider their success to be down to what they have earned rather than any privilege. The MARC workshops help them to understand that privilege is most often about all the issues they

ONLINE EXCLUSIVE
See the Short Takes interview video with Lean In's Rachel Thomas online: rolandberger.com/en/thomas

PHOTO: BURT GLINN/MAGNUM PHOTOS/AGENTUR FOCUS

Women on (the) board

The average percentage of women on companies' boards of directors still varies considerably between countries.



SOURCE: THE GLOBAL GENDER GAP REPORT 2020

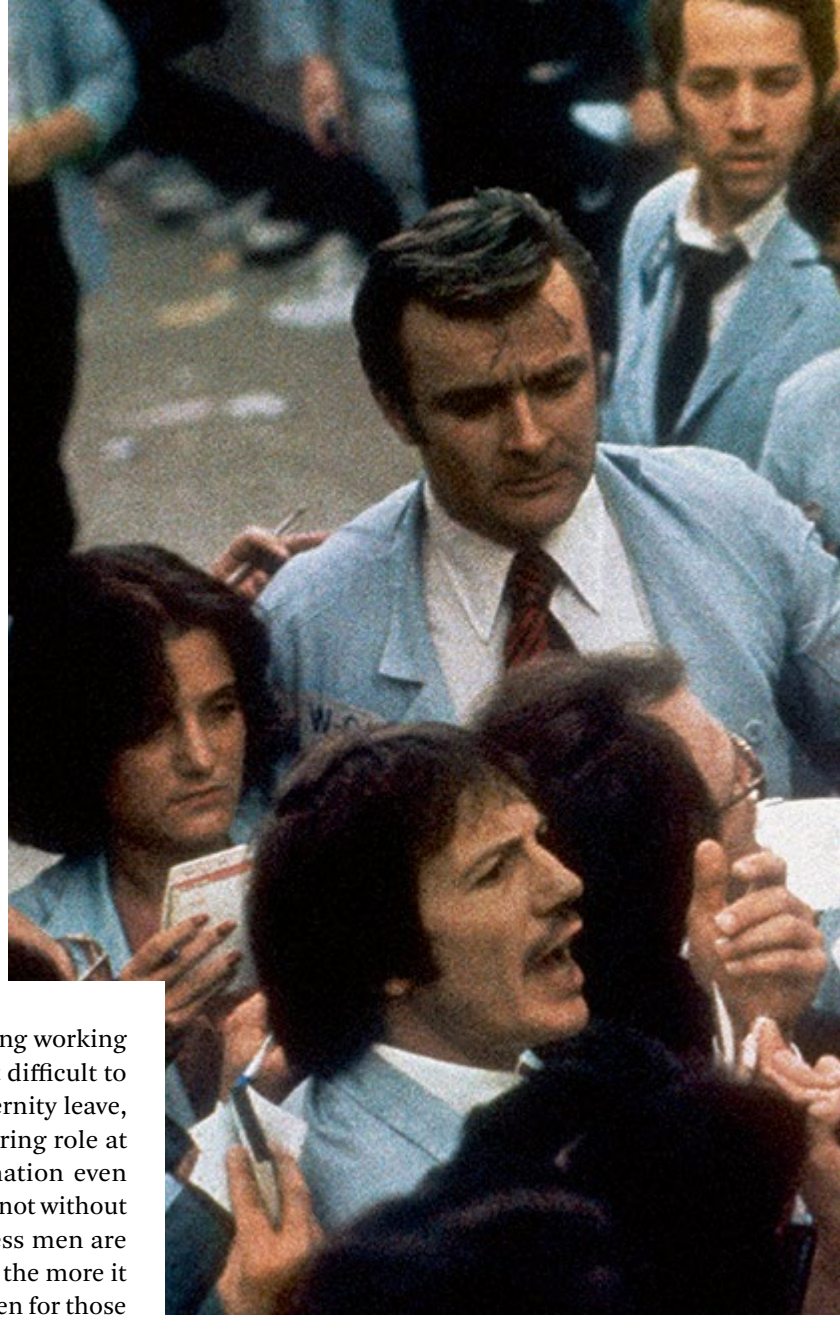
don't have to navigate at all in their working lives. Not having to worry about family or money problems, disability and prejudice, or responsibility for children and household chores puts a person at an advantage. The programs show that gaining a good understanding of one's own situation is vital in developing the empathy necessary for change. "Dissent is a critical part of the learning process," says Pollack. "We need to get these thoughts and questions to the surface. We can be sure that one person's thought is in fact shared by many others."

ONE ISSUE HARDLY EVER SPOKEN out loud is the fear that women's gain will be men's loss. According to Catalyst's research, such zero-sum thinking is a major barrier. Men may also fear that they will lose face among peers – or in the eyes of a superior – if they address sexism or other inequalities in the workplace or themselves deviate from the well-established male norms and behaviors. These can never be easy conversations, but they need to take place in a safe and open space to make the next steps. "We equip people with the tools they need to act confidently. These tools are much needed: 80% of men are committed to interrupting sexism but only 31% report being confident in their ability to do so," says Pollack.

- Western Europe and North America
- Eastern Europe and Central Asia
- East Asia and the Pacific
- South America

According to Elena Essig, co-author of the 2019 paper *Re-thinking gender inequality in the workplace – a framework from the male perspective*, understanding men's perspectives is the foundation for a solution. Her research revealed that there are very few studies examining the male perspective. "There seems to be a problem, but no one is talking about it," she says. She and co-author Richard Soparnot set out to shed light on this side of the equation as a means of pushing the argument further.

Essig and Soparnot discovered that the system, as it stands, does not work all that well for men either. In traditional male-dominated indus- →



"Gender bias isn't a conversation of men versus women – all people of all genders fall into gender traps."

– Rachel Thomas, CEO of Lean In

$1.8 trillion

How much more firms with female CFOs generated in gross profit than their sector average, based on a 17-year study of 4.5 million professionals internationally.

73%

The increase in the ability of gender-diverse teams to make better business decisions.

tries men suffer from competition, long working hours and burnout. They often find it difficult to get approval for parental leave or paternity leave, for example. Men who take on the caring role at home can also experience discrimination even from within their own families. This is not without consequences for women too – the less men are encouraged to take on the caring role, the more it falls to women, creating a double burden for those who also work outside the home and reinforcing the status quo of inequality.

The situation in female-dominated working areas emphasizes the problem. Men who want to become nurses might fear judgment by peers, parents and society and therefore choose other professions. It all helps cause the gender segregation in the professional world. "When we talk about gender equality most people think about women, after all women have been fighting for their rights for centuries, but gender equality also involves men. It should be seen as an entirety, not as different parts," says Essig. "Our study proved that when we take men into account when we talk about gender equity and equality, it actually helps women as well. If a father can work part time it opens more opportunities for his spouse."

It comes down to sharing both responsibilities and opportunities within families and creating the policies and cultures within organizations so that women and men feel equally addressed, whether the topic is fast-track promotion or parental leave. "It's not only women who have to work on themselves to gain the self-esteem to ask for that raise, men also have to work on themselves to ask for leave to look after children," says Essig. "Many think they don't have the right. You can start to change this by creating a safe space where there is no need to self-censor."

EVEN IF WE'RE FULLY AWARE, how can we be sure decades of male domination haven't left their mark on our judgment, preferences and fears? "None of us think that we're racist, sexist or homophobic, and yet our black, indigenous and people of color colleagues, our female colleagues and our LGBT colleagues are feeling the least included. So, at some point, some of us must be unconsciously doing this," says Annabel Coxon, diversity and inclusion programme advisor at government agency New Zealand Trade and Enterprise.

PHOTO: BURT GLINN/MAGNUM PHOTOS/AGENTUR FOCUS

ON THE SIDELINE
The male-centric work paradigm continues to push women to the side, even if unconsciously.

Calls for equality in society and the workplace are getting louder, but what lingers below remains problematic. Men who think they make unbiased hiring decisions still choose men over women with identical skills. "A male colleague told me that he thought of himself as someone without gender bias. Yet he realized that he nearly chose a man over a woman for a role simply because the man felt like a 'better fit'," says Coxon. They had simply bonded over rugby during the interview.

Gender bias is a reality. And those who think themselves immune may well be the first to fall prey to it – also entire organizations. As Emilio J. Castilla and Stephen Bernard state in their 2010 article *The Paradox of Meritocracy in Organizations*, managers with explicitly meritocratic values tend to consider themselves impartial and are less likely to self-scrutinize. For Coxon, it's important to make clear that we are all susceptible. Avoiding blame takes some of the sting out of it so people are willing to open up, reflect and talk. "Bias affects all of us," says Thomas. "We have all been on the receiving end of a biased response to something that we have done or said, or a biased response given our identity. When we talk about gender bias, this isn't a conversation of men versus women – all people of all genders fall into gender bias traps."

Talk is at the center of change, yet this is what typical male behavior prohibits. From early childhood on, males are told to tough it out. Men are trapped in a "man box," as Gary Barker, founder of Promundo, calls it. His organization promotes gender equality by engaging men and boys around the world. In a joint UK study with Unilever, it found that 47% of respondents had encountered the "tough it out" message. Many carry this into adulthood to meet expectations and fit into the system.

SO, WE NEED TO TALK: Substantially higher salaries and better representation in leadership positions suggest that men do not really have any motivation to engage in change. And the sluggish progress confirms it. But are men really happy with their assigned role in the workplace, family and society – or are they trapped too? Despite enjoying undeniable privilege and being equipped with everything that should make the average middle-class, middle-aged, white male situation a comfortable place to be, it appears that men are even unhappier than their female counterparts. The World Health Organization reported suicide rates of males in high income countries are three times higher than females'. In the US, white males accounted for 70% of suicides in 2019.

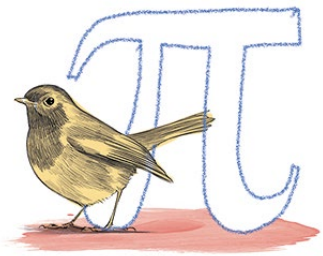
Most men today regard women as their equals. With a new generation entering the workforce and moving into managerial positions, improvement will continue – but men need to assess their attitudes toward themselves, for their own well-being. For women to achieve equality, men need to be liberated too. To break out of the "man box" and a world of work founded on masculine traits means reimagining a workplace that caters to the needs of all. "Bias holds back women, but it holds back men sometimes too," says Thomas. "We need to change the conversation when we're talking about gender bias and make sure it's clear that this is something that we're all impacted by. We all need to work together to be part of the solution." ■

Robert Shiller

is the Sterling Professor of Economics at Yale and the author of *The New York Times* bestseller *Irrational Exuberance*. He was joint recipient of the 2013 Nobel Prize in Economic Sciences and the 2015 recipient of the Visionary Award of the US Council for Economic Education.

What's the story?

When looking to understand what drives economies and business, it's ultimately all about the numbers, right? Wrong. Or so says ROBERT SHILLER*. The Yale economist and Nobel laureate who predicted the housing crisis of the late 2000s argues that people's actions more often depend on "stories" than hard data and complex formulas.*



BY ***Fred Schulenburg***
ILLUSTRATIONS BY ***Sören Kunz***

ROBERT SHILLER read a book while a student in the 1960s that planted a seed in his mind. First published in 1931, *Only Yesterday* recounts the events of the previous decade which led to the Great Depression. The penny dropped: How people at the time saw the world was a window on collective decision-making processes that no mathematical model could capture.

Now, over 50 years later, Shiller's celebrated book *Narrative Economics* has taken a detailed and analytical look at the stories we tell ourselves about the world, many drawing on deep-rooted collective memories, or interpretations, of past events. One example is the Great Depression and how stories about what caused it and how it played out would later inform policymakers during the global financial crisis of 2008-09. He also looks at narratives that reemerge – such as the "plague" stories during Covid-19. Indeed, narratives also have viral qualities, says Shiller. Social media has only accelerated this process.

But economics has been slow to recognize the importance and value of narratives. Shiller thinks that needs to change. Rather than assumptions that decision-making is all self-interested processes like maximizing the "utility function" – or what's best for me – there are other powerful forces in play.

Let's start by defining what you mean by narrative economics?
Narrative economics would be the study of popular narratives that spread →

via a contagion [and are] similar to diseases in their transmission. I call them "economic narratives" – narratives that change people's economic decisions, their sense of how the world works or what's important or what the dangers are that ultimately affects people's thinking. It studies the stories that people tell that spread at certain times. Really traditional economics looks at people as rational optimizers who respond correctly to new information.

Can you give an example?
I was impressed that [Frederick Lewis Allen's book *Only Yesterday,* about the Depression], described a lot of undignified talk and fads and fashion changes that affected the economy, rather than exclusively central bank policy and tax policy. I thought: "This is more down-to-earth, I believe this as the story of the Depression." For example, people were disturbed when the dial telephone came in [rather than going through a switchboard operator]. This was striking people as typical of the Great Depression, where jobs were lost to machines. They thought: "Sooner or later, I am going to lose my job." That's only one of many narratives that were afloat, and I wanted to think that narrative economics would classify the narratives the way ornithologists classify birds.

Does technology play a role in helping narratives spread?
Information technology has increased the contagion of narrative – but it has [always] played a role, [from] the invention of the printing press by Gutenberg. Then we had the tulip mania [of the 17th century] and other events that I think were helped along by newspapers and speeding communication. The effects of the technology are again limited by the fact that people can only have so many stories on their mind at a particular time. But it has increased the spread of good storytelling, good writers. So, the creativity of narratives [has increased] – and the tendency for narratives to mutate like diseases.

A few kinds of economic narratives

1

The innovation threat: Machines taking away jobs was a topic in the 19th and 20th centuries with automation – and again today with artificial intelligence.

2

The appeal of frugality: Conspicuous spending can be seen as bad taste during economic downturns: think of the Great Depression or Japan in the 1990s.

3

The gold standard: Bimetallism in the late 1800s or Bitcoin today, questions of the value backing currency return again and again.

Don't forget what's nearly forgotten

Viral narratives have a rise *and* a fall – and both need to be taken into account. Just because a topic is less fashionable than it once was shouldn't exclude it from analysis. It may still exert an influence.

Can you give us an example of something that changed people's behavior and had a meaningful impact on the economy?
The labor movement – which I think is narrative-driven and changes the power structure within the economy. The idea that workers should bind together and form a union, and then the union has spokespeople who interpret the events. There were stories of strikes that started to develop and polarize society. In the 1890s, there was a labor event called the Haymarket Riot where they ended up battling the police. And that event was in the memory of the people in the Great Depression, even though it was almost a half a century earlier.

Actions in the 1930s about whether to strike or not were informed by shared stories about an earlier conflict?
People [ask] when they approach a topic like the Haymarket Riot: "Is that something that we should teach our economics students?" Well, it's not core. The story of the Great Depression itself is a powerful story today. The Haymarket Riot has been forgotten by most people but the Great Depression itself is on the minds of everyone. The story mutated a bit and then suddenly it becomes viral again. So, we have a lot of talk of the Great Depression during the so-called Great Recession of 2007 to 2009.

Ben Bernanke – the head of the Federal Reserve in 2008 – was famously a student of the Great Depression. Do you think it guided his actions?
He wasn't [really] a narrative economist, but he immersed himself enough in that literature to capture some of the narratives. One thing that happened in 2007 and 2008 was the old admonition that's attributed to Franklin Roosevelt, "The only thing we have to fear is fear itself," was on their minds – even if it wasn't the emphasis of their research.

To prevent fear sparking panic ...
The idea that they had to stop the panic led to the Northern Rock [bank] bailout in the UK and similar bailouts in the

"Narratives change people's economic decisions, their sense of how the world works."

United States. The importance of doing that quickly was not so much a result of graduate training and economic theory as it is a reading of history – in the sense that people will think this is the Great Depression again. The fact that there were bank failures and lines outside of banks ... it's the visual image that many people still have of bank runs. They didn't want that visual image. They wanted to make sure that people weren't panicking, and I think that shows the good sense of policymakers. It could've been worse. We can study these things.

How do you get a grip on all of these different narratives?

We have to be realistic about what starts things [and] we have to start thinking about collecting better data. One thing that we do have is digitized texts of acts of Congress, speeches, newspapers, legal briefs, magazines, even personal diaries and church sermons. It's all part of the narrative process. We can start quantifying. We could [also] start collecting data that is more attuned to understanding what people are thinking through time.

You even argue that the great economist John Maynard Keynes was, at heart, a narrative economist.

One thing I emphasize is that the data set matters. In response to the Great Depression, they started a systematic study of national income and product accounts and they invented the GDP. So, the data set changed then. That's "Keynesian economics" – it focuses on things like GDP and unemployment rate. But if you read Keynes, he would not have been entirely happy with the way "Keynesian economics" has gone. He sounds more like a narrative economist. In his 1919 book *The Economic Consequences of the Peace*, he talked about the narrative that would develop if we punished Germany too much and he kind of predicted World War II without actually saying that.

But if everyone else has already been engaging with this, why has economics taken so long to catch up?

Narratives can be long-lived and there's a narrative in the economic department that we are mathematicians – we have computer models – and there's a source of pride. It's the "queen of the social sciences," somebody said. I don't mean to say there isn't a role for mathematical economics. There is. And it's okay, I think we just need a little bit more tilt towards narrative economics.

You mean that economists need to think more out of the faculty?

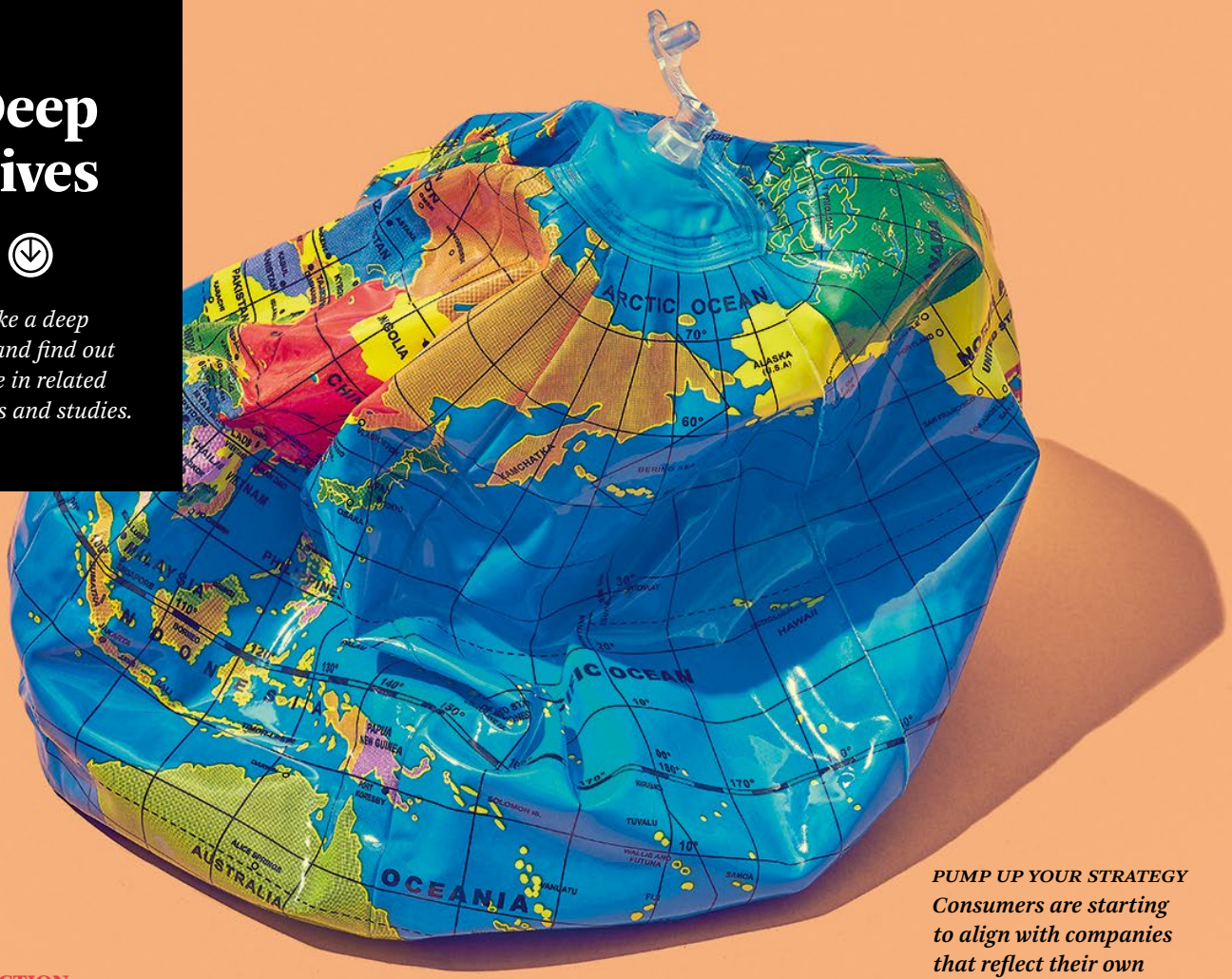
Yeah, so in the US, the economists think of Donald J. Trump as a "not our department" [chuckles]. But he so occupies people's talk and thinking. It's just amazing: the omnipresence of Donald J. Trump in our thinking. How can that not matter for the economy?

But if Trump becomes less of a presence, what other big popular narratives do you see out there?

Well, the Trump narrative is not just a US narrative – it's a world phenomenon. But there are other narratives that are also very important, just like the global warming narrative. It's currently in remission a little bit because there isn't enough time to worry about Covid-19 and politics. Another narrative that's very important is the deep state narrative. And that the news media are taking orders to distort and lie to the public and cannot be trusted. That is a very important development. We've lost our trust in news and respect for all news media. That is a view of the world that is dangerous, I think. We've lost our adherence to reality. ■

Deep dives

Take a deep dive and find out more in related articles and studies.



PUMP UP YOUR STRATEGY
Consumers are starting to align with companies that reflect their own environmental views.

CLIMATE ACTION

The carbon competitive advantage

THE MESSAGE IS CLEAR: Climate change is having a catastrophic effect on our planet. The consensus is that if we are to have any hope of limiting global warming, we only have a decade to halve the greenhouse gas emissions that are causing the problem.

Governments have seen the need to act and the Paris Agreement's goal of limiting global warming by 2°C has led to a sharp focus in cutting carbon emissions. Stricter policies and regulations could be on their way to back up the various governments' pledges and good intentions. But it isn't only policy that promotes change. Individual action is likely to have an effect too. Consumers increasingly pursue green products and some are switching brands to match their values. Investors, supported by shareholders, are following sustainability agendas. Taken together, such measures and actions are changing the parameters for business – and their impact on a company's success should not be underestimated. But can we consider what we are all doing to be the change we need? It's possible that it might not be just a case of reducing emissions that is required, but a major rethink.

The introduction of carbon pricing systems could encourage companies to reduce their carbon footprints and those specific mechanisms will increase carbon prices and put profits at risk. Yet decarbonization need not be a threat. By embracing the idea that carbon emissions are not a cost but a new currency, firms can transform climate-related risks into opportunities. In this new competitive model, explained in a fresh study from Roland Berger, a company's value is reflected in its climate action – and avoiding carbon emissions becomes one of its profit pools.

The study looks at companies that are already ahead while offering strategic recommendations to avoid being left behind in a world tackling this change.

ADAPT TO A NEW BUSINESS CLIMATE

Discover the advantages of keeping your approach in step with a changing world: https://rb.digital/2QG6Gaq

Are you interested in studies conducted by Roland Berger? Then please email us at: **david.born@rolandberger.com**

NEXT-GEN PRODUCTION

Digital factories for the future

INDUSTRY 4.0 MIGHT BE HERE as an idea, but has it arrived in practice? The term for the new industrial revolution driven by digitalization was coined in 2011, but it hasn't yet led to the full realization of digital factories. While the will might be there, it appears that we are still waiting for the real breakthrough in development. What is causing the holdup? One of the main barriers to implementation is having a clear vision. Roland Berger's survey of medium-sized companies isolated the challenges and the technologies available to break into the new industrial world. It found that the will was certainly there – with 64% citing improving processes as a main objective and a perhaps surprising 44% stating cost reduction as a main driver. Despite that, though, a well-thought-out blueprint is largely the exception – not the rule. One hurdle is being able to see how digital action could disrupt the future production ecosystem. Evaluating which steps in the production process would best benefit from digitalization is hard enough and that's before the tricky issue of selecting the right technology to fit the task. While the coronavirus pandemic and a difficult trade climate have thrown a spanner in the works for now, if companies go ahead with digitalization, there is a big prize to be won not least in terms of time and cost reductions. There are additional benefits to those key wins too, such as improved carbon emissions. See the full results of the survey via the link below along with four clear guidelines for successful digital production.

FIND YOUR OWN INDIVIDUAL SOLUTION

Learn about the importance of building an overarching digital strategy: https://rb.digital/3tMqiIZ

PHOTOS: GETTY IMAGES | ILLUSTRATION: GETTY IMAGES

TREND COMPENDIUM

Megatrendspotting to combat crisis

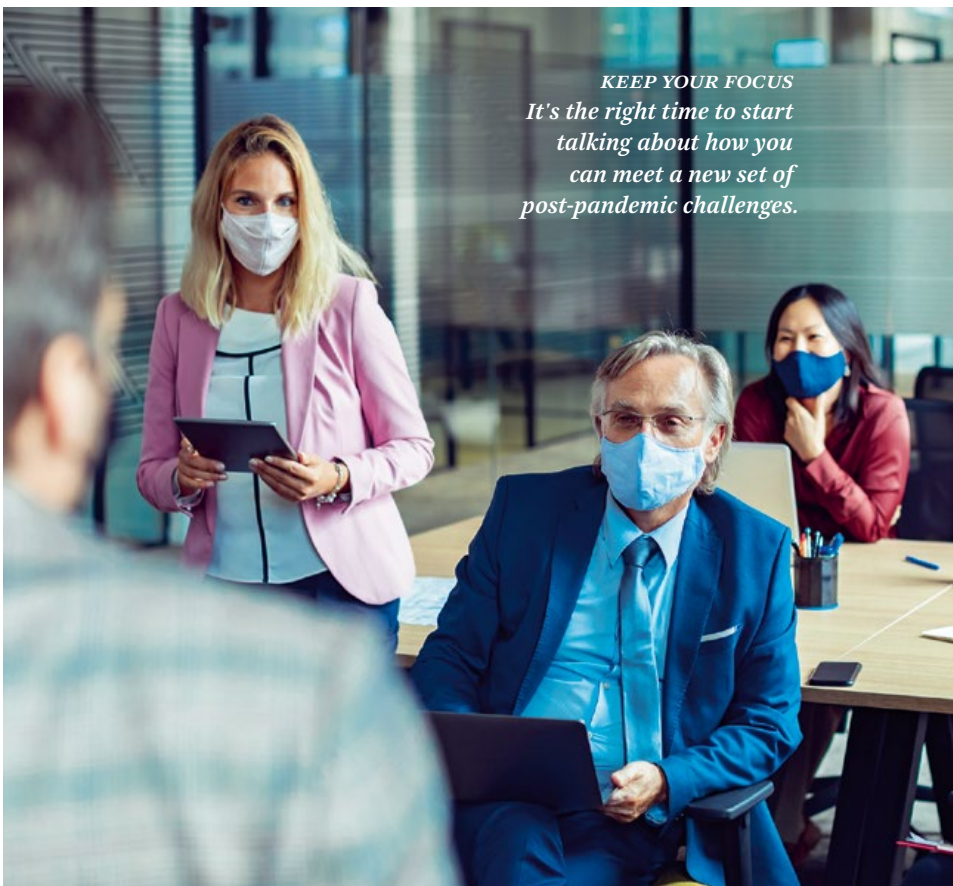
YOU DON'T NEED A FORTUNE TELLER to see into the future. There's plenty of evidence and supporting information to help you forecast and identify the important patterns set to emerge over the next few years. But how can you use that knowledge to your best advantage and to counter the uncertainty that is part of the post-corona landscape?

There are many emerging trends in the world, but Roland Berger's Trend Compendium has identified and focused on the most important ones, or what it calls the six megatrends in the areas of society, health, the environment, business, technology and politics. The fourth Trend Compendium builds on earlier editions from Roland Berger, which only looked as far as 2030, whereas this latest view extends its scope with 2050 as its date horizon. Looking at what the megatrends mean might go some way to answering that question of how to best counter tomorrow's uncertainty [for more details see the link below].

The broad response is that foreknowledge of the issues around climate change, the implications of an aging society and the rapid innovations in tech will provide you with a view to mastering the opportunities ahead and an ability to come up with sustainable answers to the problems that lie beyond.

GET THE BIGGER PICTURE

Sharpen your insight and look ahead to what really matters: rolandberger.com/en/trend-compendium-2050



KEEP YOUR FOCUS
It's the right time to start talking about how you can meet a new set of post-pandemic challenges.

HOW TO WIN IN THE POST-COVID WORLD

Strategy and marketing guru SCOTT GALLOWAY *doesn't mince words when it comes to how trends and events can shape the future of business. Here he answers three questions concerning the post-pandemic landscape.*

Scott Galloway
is a professor at the NYU Stern School of Business as well as *The New York Times* bestselling author of *Post Corona: From Crisis to Opportunity*.

1 Which companies have come out well from the corona crisis in your opinion and why?

In forcing many interactions to go remote, Covid-19 has accelerated the Great Dispersion by a decade or more. Industries which used to operate in centralized locations – health care, fitness, office work – are moving into the home and onto our devices. The winners are companies that already operated under this new model, the beneficiaries of our radical dispersion during the pandemic: Amazon, Netflix, Slack, Peloton.

2 Who stands to gain the most in the post-corona landscape?

Platforms. They are horizontal networks that bypass the traditional gatekeepers to connect buyers and sellers, speakers and listeners and creators and consumers to one another. They are the infrastructure of dispersion. The internet itself is a platform, of course, as well as serving as the host to many others: Twitter and Facebook, YouTube, Etsy, Substack, eBay, Roblox, and Airbnb. Cloud suppliers (Amazon Web Services, Microsoft Azure, Google Cloud) are then platforms for platforms. They are the connective tissue for billions of people. They are subeconomies that have become nation-states.

3 What can firms do to make the most of the "new normal"?

Take a hard look at your value proposition – specifically what you can and cannot deliver remotely. There will be a rebound from our year of living alone, but in the long term, we will be traveling less and spending more time online. This does not mean that all firms should go fully remote, as face-to-face interactions still possess a certain magic. If your business offers in-person experiences that benefit from physical presence, invest in that element and feature it. But anything that relies on in-person presence because that's the way it was done in the past? Make it remote, or your competition will. ■

PHOTOS: JIM BLOCK, MARC ZIEGERT | ILLUSTRATION: SASAN SAIDI

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→ *PAGE 40*

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→ *PAGE 60*

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"ONE OF THE PROBLEMS WITH THE WAY THAT WE THINK ABOUT THE FUTURE IS THAT WE DEFINE IT BY THE PRESENT, AND THAT CONSTRAINS OUR THINKING."

MARGARET HEFFERNAN

SERIAL ENTREPRENEUR AND AUTHOR
OF UNCHARTED – HOW TO MAP THE FUTURE TOGETHER
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