Boldness in Business

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Novel answers to everyday needs

Inventing smarter steels for a better world

Steel connects communities

The new $4.2 billion Samuel-de Champlain Bridge spans the St. Lawrence River, connecting the Island of Montreal with the south shore. The two-mile bridge includes, in each direction, three lanes for vehicular traffic, one for a planned light-rail transit system and one for cyclists and pedestrians. It is the busiest bridge in Canada, carrying more than 50 million vehicles a year.

Plate steel was supplied from ArcelorMittal plants in Burns Harbor and Coatesville in the US, with rebar coming from ArcelorMittal Contrecoeur, just 63 km north along the St Lawrence River. Acting as partners rather than suppliers to Quebec city-based fabricator Canam Bridge, ArcelorMittal was selected due to its ability to make the wide range of grades and sizes required, and to deliver exactly on schedule.

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FOREWORD
LIONEL BARBER

'The winning companies were seen to be making bold and imaginative decisions in exceptionally challenging circumstances'

Launched in the wake of the 2008 crisis, our annual Boldness in Business awards recognise entrepreneurial risk-taking and innovation on a global scale. They highlight inspiring examples of innovation in companies from advanced industrialised countries to emerging markets in Africa, Asia, Latin America and the Middle East.

This year's awards appear in a new global context. The liberal capitalist model — shaken during the financial crisis — is coming under increasing strain. Populism is spreading. Climate change has risen to the top of the political agenda. In response, both the US Business Roundtable and the Financial Times called last year for an end to the exclusive focus on maximising profits and shareholder value.

This year's Boldness winners reflect, to a degree, this new agenda. They range from established companies such as jeans-maker Levi Strauss to start-ups such as Healthy.io (winner of the Technology award), which has turned smartphones into medical mobile testing kits, helping people detect health problems at an earlier stage.

Levi's, founded in 1853, is an old established company adapting to its own new rules. Chip Bergh, chief executive, believes it is possible to be profitable while remaining true to principles such as environmental sustainability. He argues that companies have "almost a moral obligation" to take a stand on politically charged issues such as gun control and immigration. Levi's is the winner of this year's Corporate Responsibility/Environment award.

The quality of submissions overall this year was very high, underlining how the FT/ArcelorMittal Boldness in Business awards rank as best in category. In every case, companies were seen to be making bold and imaginative decisions in exceptionally challenging circumstances.

The judges were particularly impressed with how start-ups have found novel answers to everyday needs in sectors from education to food retailing, but also with how bigger companies with old business models have responded to disrupters.

It remains for me to thank my fellow judges — Brooke Masters, FT comment and analysis editor; Edward Bonham Carter, vice-chairman of Jupiter Fund Management; Leo Johnson, partner at PwC; Robert Armstrong, FT US finance editor; Anne Méaux, president and founder of Image Sept; Brent Hoberman, chairman and co-founder of Founders Factory; Peter Tufano, professor of finance as well as Peter Moores, dean at the University of Oxford's Saïd Business School; and, of course, my co-chair, Lakshmi Mittal, chairman and chief executive of ArcelorMittal.

Lionel Barber
Former FT editor and
co-chair of the judging panel

BOLDNESS IN BUSINESS
AWARDS

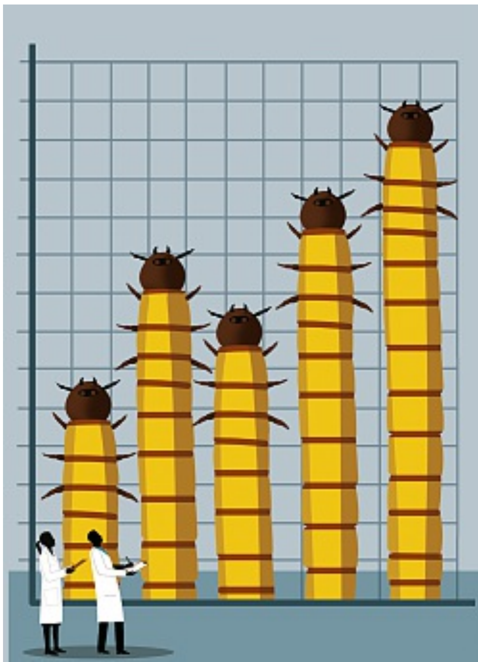
Victorious visionaries

This year's winning people and companies have distinguished themselves with bold business strategies and management

Person of the Year
Dave Lewis
When Dave Lewis took over as chief executive of Tesco in 2014, the UK supermarket chain was in dire straits, with profits tumbling and a criminal investigation into accounting irregularities under way. His first annual results showed a £6.4bn loss. Tesco paid a £129m fine over the accounting scandal and softened its reputation for aggressive dealings with suppliers. He closed more than 40 lossmaking stores, quit unprofitable sectors and revamped Tesco's discount lines to better compete with the likes of Aldi and Lidl. Profits are rising, the £22bn debt pile he inherited has almost halved and £1.6bn of costs have been carved out. *(See page 16)*

Corporate Responsibility/ Environment
Levi Strauss
US jeans-maker Levi Strauss has long adopted progressive social positions, most recently around sustainability and gun control. Chief executive Chip Bergh believes companies have "almost a moral obligation" to address societal issues. Each year Levi's allocates about 2 per cent of earnings to philanthropic efforts. In 2018, the company unveiled a digital process to finish denim designs, reducing the number of chemical formulations used from thousands to a few dozen. *(See page 26)*

Smaller Company
Ÿnsect
The French start-up breeds insects for pet food, fish feed and fertiliser. Insects have been seen as an environmentally-friendly alternative to meat and fish for animal and human consumption and a way to reduce the stress on the food system. With the world population predicted to hit 10bn by 2050, food production needs to rise by 70 per cent; demand for animal protein will place a strain on the environment. Last year Ÿnsect raised $125m, the largest ever agritech investment round outside the US, and is set to scale up production to more than 1,500 tonnes of insect protein a month with a new insect farm in northern France. *(See page 42)*



Entrepreneurship

Nubank

With 20m-plus customers, Brazilian digital bank Nubank is the nation's fifth-largest credit-card issuer and Latin America's most valuable private technology company. It offers credit cards, personal loans and savings accounts through smartphones without requiring physical documents or branch visits and with better rates for customers than traditional banks. Started in 2013 by entrepreneur David Vélez and partners with $2m of seed capital, its latest funding round valued it at more than $10bn. *(See page 30)*

Developing Markets

VkusVill

The Moscow-based grocery chain is one of the first food retailers in Russia to assume control of the output and branding of nearly all its products, ensuring a high level of quality control. Focusing on fresh organic produce, VkusVill works with about 800 suppliers around Russia. More than 90 per cent of its food products are made in the country, insulating it from rouble exchange rate swings. It plans to take the company public in New York to fund expansion into everything from VkusVill-branded coffee shops and office canteens to children's clothes and medical services. *(See page 38)*

Drivers of Change

Byju's

Byju's is India's largest online education company, offering app-based learning programmes to school students. Its founder, Byju Raveendran, got his start in the education business as an in-demand tutor. What marks the Bangalore-based company out from many other glittering Indian tech start-ups is that it has found a path to profitability, thanks to the enduring nature of its academic content, all created in-house. Valued at $8bn, it has 3m subscribers, who pay $170 a year to access maths and science tutorials, and game-based practice tests. *(See page 20)*

Technology

Healthy.io

Healthy.io's innovation comes by using a smartphone camera to analyse urine dipsticks and detect health problems, without visiting a clinic. Home testing provides patients with quicker relief from symptoms, reduces complications from delayed treatment and prevents the overprescription of antibiotics. An added benefit is reducing the workload of medical staff. The urine-analysis kit has received regulatory approval in the US and EU. Healthy.io was founded in 2013 by Yonatan Adiri, who served as chief technology officer to former Israeli president Shimon Peres. *(See page 34)*

PORTRAIT: RICHARD CANNON; ILLUSTRATIONS: NICK LOWNDES

BOLDNESS IN BUSINESS
JUDGES & NOMINEES

Lionel Barber
Former FT editor and chair of the judging panel

Lakshmi Mittal
Chairman and chief executive of ArcelorMittal, the world's largest steelmaker

Anne Méaux
Founder and president of Image Sept, a Paris-based public affairs and media relations company

Robert Armstrong
Financial Times US finance editor and former head of the Lex column

Drivers of Change

Hitachi
The Japanese group has, over the past decade, enacted an aggressive restructuring plan to shed non-core assets while expanding overseas. A corporate governance shake-up has set it apart from other Japanese conglomerates.

Microsoft
The company was at risk of technological irrelevance but its chief executive has presided over an era of rapid wealth creation starting with its focus on cloud computing.

Northvolt
The Swedish start-up is building Europe's first factory for lithium-ion batteries and is open to tie-ups. It raised more money than any other European start-up last year, pulling in €1bn.

Signal
Signal is considered one of the most secure free end-to-end encrypted messaging and voice-calling apps. Despite widespread adoption of its technology, the organisation behind Signal employs fewer than 10 people and relies on grants and donations.

Waterstones
Since almost going out of business nearly a decade ago the UK bookseller has reinvented itself under chief executive James Daunt, proving there is still life and profit to be found in high-street retailing.

Corporate Responsibility/ Environment

Aquafil
The Italian manufacturer of synthetic fibres is best known for Econyl, a recyclable nylon fabric made from nylon waste. The company turns old fishing nets, carpets and the like into new swimsuits, watch straps and outerwear.

IBM
IBM started its P-Tech initiative in the US to create schools that offer mainly low-income students a six-year engineering course and preparation for Stem careers. Completion rates of graduates are five times the US national average. There are now 204 such schools in 18 countries.

Milk & More
Britain's largest doorstep delivery service for bottled milk and other locally sourced premium products, is owned by dairy supplier Müller. About 97 per cent of deliveries come in reusable, recyclable or compostable packaging. Since the start of 2019, Milk & More has gained 85,000 new customers.

SSAB
The Swedish steelmaker has ambitious plans to decarbonise its production process by using hydrogen — an expensive and commercially uncertain proposition. Emissions from "green steel" would be water vapour rather than CO_2. By 2025, the company aims to cut its emissions in Sweden by 25 per cent.

Stella McCartney
The owner of the eponymous label has been a pioneer of sustainable fashion, eschewing animal products such as leather, fur and skins. Last summer, LVMH took a minority stake in the brand.

Technology

Babylon Health
The UK company has developed a chatbot app that checks patients' symptoms. It also offers a service connecting patients in London to doctors by smartphone video call. Babylon plans to bring the *GP at Hand* app to Manchester in 2020.

Brainomix
The medical-technology start-up's AI-powered software analyses CAT scans to improve the diagnosis and treatment of strokes. A score indicates the severity of the stroke, while colour markings on attached images pinpoint the affected areas of the brain. In 2017, Brainomix partnered with drugmaker Boehringer Ingelheim to offer its software in 1,500 stroke clinics across Europe.

Local Motors
The US manufacturer designs collaboratively and produces vehicles in low volumes, largely by 3D printer. It has solicited designs for a low-speed, rugged, electric vehicle intended for island economies. It has announced a 50/50 joint venture with Airbus to build drones and self-driving cars in Munich.

Neuralink
Founded by Elon Musk, the US neurotechnology company is developing neural interfaces to transmit data between human brains and computers. It plans to surgically embed electrodes to turn neural recordings into electrical signals and feed them to a robotic device, which in turn can aid patients' movement or vision.

Verily
Alphabet's life sciences unit is focused on harnessing big data to predict and prevent disease, often through partnerships with healthcare companies and universities. It has developed a machine-learning platform to diagnose causes of preventable blindness in adults, and has opened an opioid addiction treatment centre in Ohio.

Brooke Masters
Financial Times comment and analysis editor and former companies editor

Edward Bonham Carter
Vice-chairman of Jupiter Fund Management

Leo Johnson
PwC disruption lead and co-presenter of BBC Radio 4 series 'FutureProofing'

Brent Hoberman
Chairman and co-founder of Founders Factory, a corporate backed incubator/accelerator

Peter Tufano
Professor of finance and Peter Moores dean, Saïd Business School, University of Oxford

Entrepreneurship

Beyond Meat
The company markets its products, such as imitation burgers, to omnivores. They are available at restaurants and grocery stores in the US, Canada, Europe and Asia. It aims to start production in Asia in 2020, with an eye to selling its products in China.

Ecotricity
Britain's largest green energy company supplies more than 200,000 customers from a growing fleet of wind turbines. It also operates a network of electric vehicle charging points.

EG Group
The UK-based petrol station and convenience store operator bought US supermarket group Kroger's convenience store business for $2.2bn, giving it 800 stores in North America. A listing on a US exchange to raise funds for expansion is being considered.

Richer Sounds
The owner of the UK hi-fi and television retailer, Julian Richer, sold his business to his staff last year. Richer refuses to employ people on zero-hours contracts and donates 15 per cent of operating profit to charity. Staff turnover is less than half the average for UK retailers, according to the company.

Rocket Lab
The aerospace company specialises in the launch of small satellites. It was funded initially by government grants. Rocket Lab has reached a $1bn-plus valuation after raising $140m in 2018 to fund increased production of its Electron rockets.

Developing Markets

Bioceres Crop Solutions
The Argentine agricultural biotechnology company develops and sells genetically modified soybean, wheat and alfalfa seeds, as well as crop nutrition products. Its drought-resistant soybean has won regulatory approval in the US and it is awaiting a approval in China.

Farmer's Cheese Making
Cheese, long considered a luxury good in Pakistan, is increasingly popular. Founder Imran Saleh started with a market stall in Lahore and now sells his products at 40 supermarkets.

Koko Networks
The company supplies clean cooking fuel in the form of bioethanol to homes in Nairobi and elsewhere in sub-Saharan Africa. Customers buy a cooker manufactured by Koko, pre-pay for fuel via mobile app, and refill their canisters at vending points.

Lenskart
Unlike other retailers in India's fragmented eyewear market, Lenskart controls its own manufacturing. India's market for vision correction is an estimated $2bn. Indian private equity firm Kedaara Capital has invested $55m in Lenskart.

Twiga
The app-enabled logistics company connects farmers and vendors in Kenya. The platform aggregates orders and cuts out intermediaries. It promises to improve the price farmers receive for crops such as potatoes, bananas and onions, while simultaneously providing urban vendors with a reliable supply of fresh vegetables at a discount.

Smaller Company

Adaptive Biotechnologies
The company has created a platform to make a map of the immune system accessible to researchers and clinicians. It markets two products: immunoSEQ, which sequences immune cell receptors, and clonoSEQ, which measures blood cancer cells that survive therapy in blood marrow.

CMR Surgical
The UK medical robotics company is already a unicorn. Its Versius robots help surgeons carry out keyhole operations and are being launched in Europe and Asia.

Reformation
The women's fast-fashion US retailer has an agile, Zara-like production model that produces 15-20 new styles a week. Most items go from sketch to store in less than four weeks, rather than the six months of a conventional fashion cycle. It uses eco-friendly textiles, including recycled cashmere and nylon.

Solar Foods
The Finnish start-up is developing a protein ingredient that can be made using minimal energy — a resource-light alternative to animal and plant-based protein. In 2018, the company was selected for the European Space Agency's incubator scheme to develop food production techniques in space. It is currently making 1kg of protein per day in pilot production and aims to start commercialising it in 2021.

Timpson
The UK retailer specialises in shoe repairs, key cutting and other domestic services. Chief executive James Timpson has overseen a rapid expansion of the business, which now has 2,000 stores. It has planning permission for a Timpson university in Manchester where it aims to offer degree-level training to 500 staff a year, including ex-offenders. ●

BOLDNESS IN BUSINESS
CONTENTS & CONTRIBUTORS

Many of Nubank's working methods dispense with tradition, page 30

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ArcelorMittal

Inventing smarter steels for a better world

Harnessing potato power to control dust emissions

When iron ore is transported to blast furnaces, conveyor vibration tends to cause local dust emissions. Normally this is handled through water injection, but with the side-effect of increased humidity, leading to sub-optimal blast furnace performance.

ArcelorMittal's R&D centre in Asturias, Spain, was consequently asked for dust reduction proposals. The solution involved a potato-based, biodegradable dust-suppressant foam, applied directly over the conveyors, to minimize the humidifying effect of the water in the foam, yet still suppress the dust. A >80% reduction of inhalable particulate matter, with no significant increase in humidity, was achieved. As a result, the solution was industrialised and applied at ArcelorMittal Gijón nearby, solving their diffuse dust emission problem. The solution is being rolled out to all other relevant operations.

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THE WINNERS

ROBERT ARMSTRONG

Village geniuses

Boldness can be as simple as finding innovative answers to everyday needs

Even the most complex and innovative business succeeds because it serves human needs that are simple and unchanging. This is an easy truth to lose sight of, but this year's Boldness in Business Awards illustrate the point beautifully.

To understand why, let us imagine a very simple, self-contained economy — a village, of the sort that was common all over the world a century or so ago. It is a farm town, though it could as well have grown up beside a little factory or a mine. The town's businesses and professionals are easy enough to add to our picture. Here is the one-room schoolhouse, there the doctor's office and the tailor's shop; the little local bank, a little row of shops.

Depending on the continent and country your family comes from, the details of your imagined village will vary. Whatever the details are, I hope you are now in the grip of a nostalgic feeling for the sort of place where perhaps your great-grandparents spent their lives (or you imagine they did).

Hold on to that warm feeling. I have just described to you this year's winners: schoolhouse, doctor, tailor, bank, a couple of grocers. Does the line-up, so described, strike you as lacking boldness? It should not. Again, all companies serve unchanging needs. Boldness consists in serving them in a way others overlooked, doubted or dismissed.

Let us start with our schoolhouse (and Drivers of Change winner) Byju's. The image of the single-room village school is particularly apt for a business that began as a one-man proprietorship. Byju Raveendran started out as an exam tutor and, less than a decade ago, founded the company that provides video tutorials.

The need for consistent, high-quality education has always been there, especially in the developing world. What is new is seeing that this need can be served at low cost using a combination of technology and pedagogical technique — even in a physically vast, polyglot country such as India, where internet access and financial infrastructure are uneven.

Big-name global venture investors are betting that what has worked in India can work across the world, as Byju's expands to the US, the UK and elsewhere. The little schoolhouse now has 40m students (including 2.8m fee-payers) and, in a recent fundraising, a valuation of close to $8bn.

The schoolteacher in our village has something in common with the local doctor. Both Byju's and the winner of this year's technology award, Healthy.io, are tackling very old needs that have been especially resistant to modern efforts at improving efficiency. The economies of scale found in manufacturing, technology and finance have proven maddeningly elusive in education and healthcare.

Healthy.io is using smartphone technology to move a medical process — urinalysis — out of a high fixed-cost setting such ▶

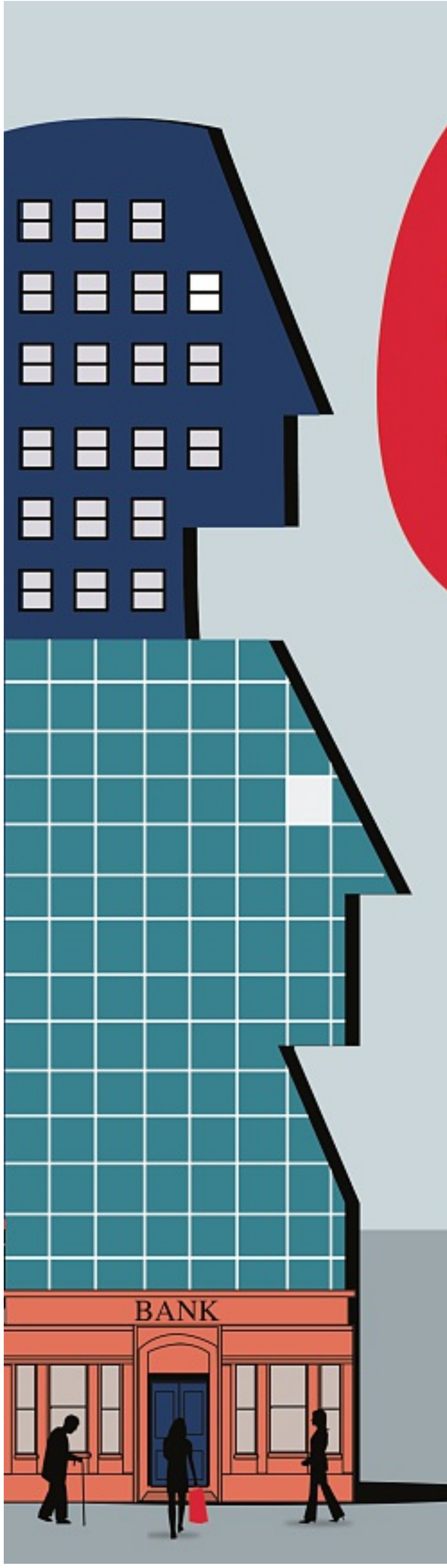


ILLUSTRATION: NICK LOWNDES

PHOTO: GETTY IMAGES

as hospitals and labs into the home. A simple test kit, using a smartphone camera and some diagnostic software, has the potential not just to bring testing costs down but to eliminate millions of visits to medical facilities. The US Food and Drug Administration has approved the product, and the judges were happy to see smartphone technology moving from selfies and social media to solving more fundamental problems.

To compare Levi Strauss as a tailor's shop may seem a reach. Perhaps the most famous clothing brand in the world, it has annual sales of more than $5bn. With its core product broadly unchanged for a century and a half, to call it bold may seem a stretch, too. But it was precisely because Levi's is a big company, steeped in tradition and in an ancient industry, that the changes it has made have impressed the judges, who awarded the company with this year's Corporate Responsibility and Environment award.

Levi's has a long tradition of good corporate citizenship, but under chief executive Chip Bergh the company has faced new pressures, of both public ownership — the family-controlled company listed its shares last year — and a changing industry. But it is not overcoming those challenges by short-changing its employees or the environment.

The standard way to control costs in the garment industry is by outsourcing production to poorly regulated suppliers that externalise human and environmental costs. The dying and "distressing" of jeans present particular hazards, as explained in Dana Thomas's excellent recent book *Fashionopolis*. Thomas singles out Levi's for rejecting unsustainable approaches.

Sometimes it is also bold to stick to an older, better way of doing business: treating your customers and workers as if they were neighbours in your village.

Being bold can mean just treating your customers and workers as if they were neighbours in your village

Nubank, honoured this year for entrepreneurship, has achieved something extraordinary. Start-up online-only banks are common enough, but very few have gained traction. Unlike education and healthcare, banking is an industry where economies of scale are everywhere, putting newcomers at a disadvantage. The costs of complying with banking regulation make it harder still for the upstarts. Nubank, though, is growing fast — it has more than 20m customers — and is doing so in a Brazilian market dominated by a handful of big banks, several of which are controlled by the state.

Nubank's main innovation? Offering a better product: a no-fee credit card with market-leading interest rates. The idea of giving customers a good product at a fair price might have come from a small-town banker — perhaps Jimmy Stewart's character in *It's a Wonderful Life*. But Nubank's simple business idea is paired with the audacity to believe a young company could take on an oligopoly and win.

Sometimes it is bold to stick to an older, better way of doing business

There is no doubt that raising insects for protein is a futuristic-sounding business. But it is a permutation of farming, one of the oldest businesses of all. Ÿnsect took this year's Smaller Company award because if it can do what it says it can — produce cost-effective animal feed that is high in protein with much lower environmental impact than traditional methods — it could change the economics of the way we eat for the better.

Finally, our village shopkeepers. The fight of bricks-and-mortar retailers to thrive and innovate in the age of Amazon is a theme that has interested the judges for several years. VkusVill ("Tasteville") took the Developing Markets award this year for proving that a food-retailing model combining high quality and deep vertical integration can work in the tough Russian market. Its $1.3bn in annual revenue and 1,200 stores are a testament that demand for locally sourced, fresh products is hardly restricted to markets such as the US and the UK. People want to know where their food comes from, and prefer that it comes from nearby.

The idea that the chief executive of Tesco would receive the Boldness in Business Person of the Year award would have been hard to fathom just five years ago. The supermarket group was seen as having expanded too much — both in the UK and globally — just as its business model was being overtaken by discounters and overturned by home delivery. A criminal investigation into the company's accounting practices piled on more pain.

But since taking the helm at Tesco in 2014, Dave Lewis has proved the company is not obsolete yet. Costs have been reined in, unprofitable stores closed, and the product offering changed to bring back customers lost to the big discounters Aldi and Lidl.

Part of being bold is seeing a business in all its simplicity. A food retailer needs to have the right product, sourced at the right cost and sold at the right price. What Lewis demonstrated is that changing technology, new competitors and internal struggles cannot be allowed to distract from that basic equation — an equation village shopkeepers have understood for centuries. ●

COMMENT
BROOKE MASTERS

Weighing the risks

Predicting whether an early-stage company in a sensitive field will succeed demands caution

Every time we at the Financial Times sit down to select the winners of Boldness in Business, I am reminded just how hard it must be to run a venture capital fund.

That is because we find ourselves having to make judgments about companies that are still in the early stages of their development. Often they do not have much of a financial record and their products are still being perfected, so it is hard to predict whether their early promise will pan out.

In fact, research by Shikhar Ghosh, a senior lecturer at Harvard Business School, suggests that three out of four venture-backed companies don't return investors' capital, including about one-third that lose all of it.

At the Boldness awards, we like to reward chutzpah and hustling — in 2015, we named Uber co-founder Travis Kalanick Person of the Year, and stood by that decision even as the ride-hailing company ran into regulatory trouble and drew criticism for its culture. Some of our other early winners have also struggled amid rising competition and changing habits — among them GoPro and Groupon.

It is particularly challenging to pick winners among companies seeking to innovate in healthcare, agriculture or food. If a social media app or a new video tool doesn't take off, it is disappointing. But if food or medicine does not work properly, the product can hurt people or even kill. Investors and judging panels like ours have a responsibility not to add to unmerited hype.

Consider the cautionary tale of Theranos, the California-based blood-testing company. Founded by Elizabeth Holmes in 2003, the company claimed its new, tiny machines would revolutionise blood testing with a new automated technique that required only a pinprick of blood. It attracted a superstar board of directors and signed a partnership with US drugstore chain Walgreens.

Theranos's valuation peaked at more than $10bn before questions were raised about the validity of the test results the company provided. The company ceased operations in 2018 and Holmes is awaiting trial on charges of criminal fraud and conspiracy. Prosecutors allege that hundreds of patients, or their medical insurance companies, paid for the blood tests, some of which were "inaccurate, unreliable, and improperly validated". She has pleaded not guilty.

If food or medicine do not work properly, the product can hurt — or even kill

But fraud is far from the only risk. Sectors such as pharmaceuticals and medical devices are — quite rightly — highly regulated, and agencies such as the US Food and Drug Administration insist on careful testing for both safety and efficacy before they are willing to approve a product for human use. Government healthcare providers, such as the UK's National Health Service, also insist on proof that the product provides value for money before agreeing to pay for it.

Many healthcare products fall at the first hurdle, or see their potential returns limited by the second. In February, Alzheimer's drugs made by Eli Lilly and Roche each disappointed in late-stage testing.

This year, the Boldness panel considered some very compelling entries in the healthcare and food sectors for the technology category. The shortlist included Brainomix, which is leading efforts to revamp the diagnosis and treatment of strokes by using artificial intelligence to analyse CAT scans, as well as Neuralink, the Elon Musk-backed start-up seeking to use brain implants to help people communicate with machines.

In the smaller company category, we shortlisted Solar Foods, a Finnish start-up that is trying to develop a resource-light alternative to animal and plant-based protein using greenhouse gas-based fermentation.

In the end, the judges gave the technology prize to Healthy.io, an Israeli health start-up specialising in smartphone-enabled urine analysis. It started by addressing a common but serious problem: urinary tract infections are the most common bacterial infections in humans, causing an estimated 8m physician visits and 2m emergency hospital visits in the US each year. The company's home testing enables patients to obtain treatment faster and reduces unnecessary doctor visits and overprescription of antibiotics. It won approval from the FDA in 2018, making it the only smartphone-based urinalysis cleared as equivalent to lab-based testing.

Last September, Healthy.io raised another $60m and the FDA

ILLUSTRATION: NICK LOWNDES

approved another of its tests; this one is aimed at diagnosing chronic kidney disease.

The winning smaller company was Ÿnsect, a French start-up that is raising insects for pet and fish feed and fertiliser.

Despite our caution when it comes to human health, the judges continue to reward ambitious dreams and efforts to improve society. Last year's winners included Lilium, a German company trying to build electric flying taxis, and this year we picked Byju's, an Indian online education company that is trying to use technology to tackle the problem of poor or uneven quality education with online or tech-based lessons and practice in multiple languages. ●


Plant Based
& Vegetarian

Retail therapist

Turning round a supermarket giant such as Tesco is about dealing in simple concepts and listening to customers and staff, its head tells **Jonathan Eley**

In June 2015, more than 10,000 people poured into an indoor arena in Birmingham, in England's West Midlands. They had not come to see a show or a pop concert — they were there to grill their bosses.

"The scale of it was mind-blowing — it was like [television talent show] *The X Factor*," says Emma Simpson, the BBC business correspondent who moderated the event. "The entire Tesco executive team were perched on bar stools, facing outwards in a circle. I walked round with an iPad, asking questions from the audience. Nothing was off limits."

By that time, the problems facing the UK supermarket group were numerous and well known. The company that had come to dominate its sector to such a degree that some business commentators referred to it as a "Tescopoly" had warned on profits in late 2012.

Early the following year, it emerged that some beefburgers on sale in its stores contained horsemeat. Trading continued to worsen throughout the year as German-owned chains Aldi and Lidl lured customers away with their bargain prices and increasingly mid-market ranges.

By the middle of 2014, investors had heard enough and the board fired chief executive Philip Clarke, who had spent his entire career at the grocer. Dave Lewis, the man chosen to replace him, had never worked in retail before.

Deanna Oppenheimer, Tesco's longest-serving non-executive director, says the decision was not as unexpected as it appeared at the time. Tesco had plenty of strong retail executives already and the new finance director, Alan Stewart, had been poached from clothing and grocery chain Marks and Spencer.

'I got to understand what the problems were by walking into shops and talking to colleagues'

Lewis had spent almost three decades at consumer goods group Unilever and had executive responsibility for Tesco as a client. He had joined the Anglo-Dutch group in 1987 after graduating in business studies from Trent Polytechnic in Nottingham and moved rapidly up its ranks. Stints in Belgium, Indonesia and Latin America fostered a reputation as a troubleshooter and a clever marketer, particularly for his pioneering use of ordinary women rather than supermodels in a 2004 campaign for Dove toiletries.

But the priority at Tesco was not new campaigns or product launches, it was righting a listing ship. The company had been managed to profit targets and as its sales growth faltered, hitting those targets had required it to become increasingly reliant on "back margin" — payments from suppliers for, say, enhanced store presence or inclusion in promotional mailshots.

Billions of pounds were wiped off Tesco's stock market value, while customers increasingly did not trust the brand. Relations with suppliers were, in the words of one former insider, "toxic".

Lewis's first actions were ▶

PERSON OF THE YEAR
DAVE LEWIS

simple: looking and listening. "I got to understand what the problems were by walking into shops and talking to colleagues," he says. "I invited colleagues to write or email me what they thought I should be thinking about and I spent an entire Sunday reading all of their responses."

Others were made to listen too. "In one of his first board meetings he had name badges made up, like the ones the staff in the stores have, and he told us we were all going to the shop floor," says Oppenheimer. "He was not an outsider who came in and said, 'This is how we must do it'. Instead it was more, 'Tell me what I need to know.'"

Then it was time to put ideas into practice. "Early on we had to decide: are we going to grow in food or non-food?" says Lewis. "We decided food played to our scale and reach." That might sound an obvious conclusion for the UK's biggest supermarket. But in practice, it involved unpicking much of the expansion of the previous five years.

Assets such as restaurants, coffee shops and garden centres — acquired either to increase Tesco's reach or to fill space in its increasingly unproductive stores — were sold off. A store expansion programme was halted and 43 branches (out of a UK total of about 4,000) were closed. Savings were ploughed back into improved customer service. One of the things Lewis is proudest of is that Tesco's store headcount is barely changed from 2014, despite the reduction in locations.

Lewis also reset Tesco's relationship with its suppliers, largely by empowering existing teams to make better decisions. "The directive from Dave was that suppliers and Tesco should imagine they were all one company and work out together the most efficient supply chain," says John Shropshire, chairman of fruit and vegetable supplier G's Fresh. One such decision was that Spanish-grown vegetables should be packed on site rather than in the UK, therefore giving produce an extra day of shelf life.

PHOTOS: RICHARD CANNON; SIMON DAWSON/BLOOMBERG; DAN WITWOOD/GETTY IMAGES

Dave Lewis, right, led the purchase of wholesaler Booker, reset Tesco's relationship with its suppliers, and prioritised cutting food waste

Re-engaging staff — the group employs over a third of a million people in the UK alone — was important to getting Tesco back on track.

Here, according to current and former employees, Lewis's ability to strip things back to simple concepts was vital. "In January 2015, he unveiled the turnround plan. He did a presentation to the City and then another one for the staff," says one person who worked with him. "It was just 10 or so really simple slides. The impact was amazing. People came away saying things like, 'Oh my God, I never knew we had so much debt'."

'People want you be straight and honest, and justify the decision you've taken'

The Birmingham assembly was also part of the process. So too was candour about the often-difficult decisions that needed taking on store closures and the pension scheme.

"Quite a lot of these things are rooted in common sense, but sometimes people shy away from the reality to soften things," says Lewis. "I made a promise to colleagues when I started that they would always hear [bad news] from me first. People want you be straight and honest, and justify the decision you've taken. You've got to front up and be there."

His response to an accounting scandal was typical of this approach. Shortly before he joined the company, Tesco admitted it had misstated its profits by prematurely booking back-margin payments in its accounts. It reached a deferred prosecution agreement with the Serious Fraud Office, at a cost of more than £200m. Three executives left Tesco as a result but were acquitted at a

subsequent criminal trial — prompting complaints that the company had hung the men out to dry.

Lewis is unrepentant. “We paid [the fine] because we were guilty,” he says. The acquittal of the executives at trial did not alter the fact that their conduct had fallen short, he adds. “Internal and external counsel reviewed the performance of key individuals,” says Lewis. “That group came to me with a very clear view that those people had not discharged their duties in line with the terms of their employment contracts. Full stop.”

As trading stabilised, Tesco could focus on other priorities. One was sustainability, long an area of interest to Lewis. “Tesco was a pioneer in reporting and measuring food waste,” says Peter Freedman, managing director of the Consumer Goods Forum, a global industry network (Lewis is on the organisation’s board). “It’s embarrassing and painful to do that because it’s a big number in terms of tonnes, even if it is a tiny proportion of what they sell.”

Another priority was the acquisition of Booker, a UK wholesaler that supplied corner shops and the catering industry. Some felt Tesco’s recovery was not yet entrenched enough for it to embark on such corporate activity, but Lewis thought he had “to be able to walk and chew gum”.

“Fixing the business we had today was, of course, very important but me and some others were thinking about the future,” he says. Booker generated cost savings and raised its exposure to the “food on the go” market, even though some think Lewis was fortunate to get the transaction past the UK’s competition regulator.

His key brand innovation at Tesco came in 2016 when the company unveiled its so-called “farm brands” — names for fresh produce lines that borrowed from the discounters’ playbook and invoked a bygone era of locally produced food (Willow Farms chicken, Suntrail Farms fruit, and so on). They replaced Tesco’s bland-looking Value range of low-end products.

“Value had become a synonym for cheap,” says Lewis. “Things had moved on and we needed to make a more relevant and motivating offer. Customers know there is no farm in the world that can supply the whole of Tesco. But brands are a promise of consistency at a price point.” The range generated sales of more than £500m in its first year, and rival Sainsbury’s is now overhauling its Basics range in similar fashion.

Lewis — who is stepping down as chief executive this year — is reluctant to compare his methods or achievements to those of others in the sector. He insists, however, that listening to customers and employees — in many cases they are the same people — is vital.

“I knew when I joined I could never hope to be as good a retailer as the people who already worked there. So I told them, ‘You carry on being best retailers and I’ll try and be a good retail CEO’.” ●

Added value

The Indian edtech company has found a path to profitability by selling its maths and science app directly to consumers. By **Amy Kazmin**

In an improvised sound stage in Bangalore, India, actress Tarana Thakurdas stands under studio lights in front of a green screen as a cameraman frames a shot. A man with a clapperboard leaps in front of the camera. "*Greater Than, Less Than*: scene two, take one," he declares with a snap of the board. Then comes the call from the director: "Action!"

Thakurdas, who has worked as a school drama teacher and commercial actress, launches into an energetic monologue. Her subject: a school sports day, two rival teams who have earned 1,028 and 666 points respectively, and how children can understand which team won by figuring out which number is greater than the other. Dressed in a polo shirt and baseball cap, she points to imaginary scoreboards and an imaginary number line as she cheerfully starts the lesson.

After the filming, the footage will be enhanced with animations of children playing sports in front of a stadium crowd, scoreboards and a number line. The aim is to create an engaging and lucid explanation of a basic maths concept for year-four students (who are about nine years old). For her next role, Thakurdas will swap her baseball cap for gardening gear to give a lesson on the life cycle of plants, using real potted plants, watering cans and shovels as props.

Such elaborate, carefully crafted short educational films — on topics ranging from basic maths concepts to advanced trigonometry, chemistry and physics — are at the heart of Byju's, the fast-growing Indian educational technology company that has built a profitable business by catering to Indians' hunger for high-quality education.

Started in 2011, the company — whose founder Byju Raveendran was a star maths tutor — today has 3m subscribers: students who pay $170 a year to access maths and science tutorials, and game-based practice tests, to help them master the academic curriculum for years four to 12. The company operates on a "freemium" model, where students can download the app and access some limited content on their phone for a brief period before they need to subscribe to gain full access.

'Not needing to change the content very often makes it profitable'

To fund its transition from an offline one-man tutoring business to a big online educational company, Byju's has raised $1.2bn from high-profile global investors, including California-based venture capital firm Sequoia Capital, Chinese technology group Tencent, South African

PORTRAIT: JYOTHY KARAT

ecommerce company Naspers, the Canada Pension Plan Investment Board, and the Chan-Zuckerberg Initiative (set up by Facebook co-founder Mark Zuckerberg and his wife Priscilla Chan).

Following its most recent funding round, Byju's was valued at $8bn, making it the most valuable educational technology company in the world. Yet what distinguishes the Bangalore-based business from many other glittering Indian tech start-ups is that it has found a path to profitability. That is thanks to the enduring nature of its academic content, all created in house by diverse teams, including subject specialists, graphic artists, animators and writers, who together brainstorm how best to teach complicated topics.

One recent afternoon, for example, engineers and a former maths teacher with a masters in applied maths sat down to discuss how to illustrate complicated concepts of trigonometry to make them understandable to high-school students, trying out various illustrations on a computer. "We spent a lot of time creating the content correctly and, once it's done, we don't need to change it very often," says Anita Kishore, Byju's chief strategy officer. "That is what makes it possible to generate a profit.

"For an entertainment company like, say, Netflix, you need to keep churning out new content. But maths or science ▶

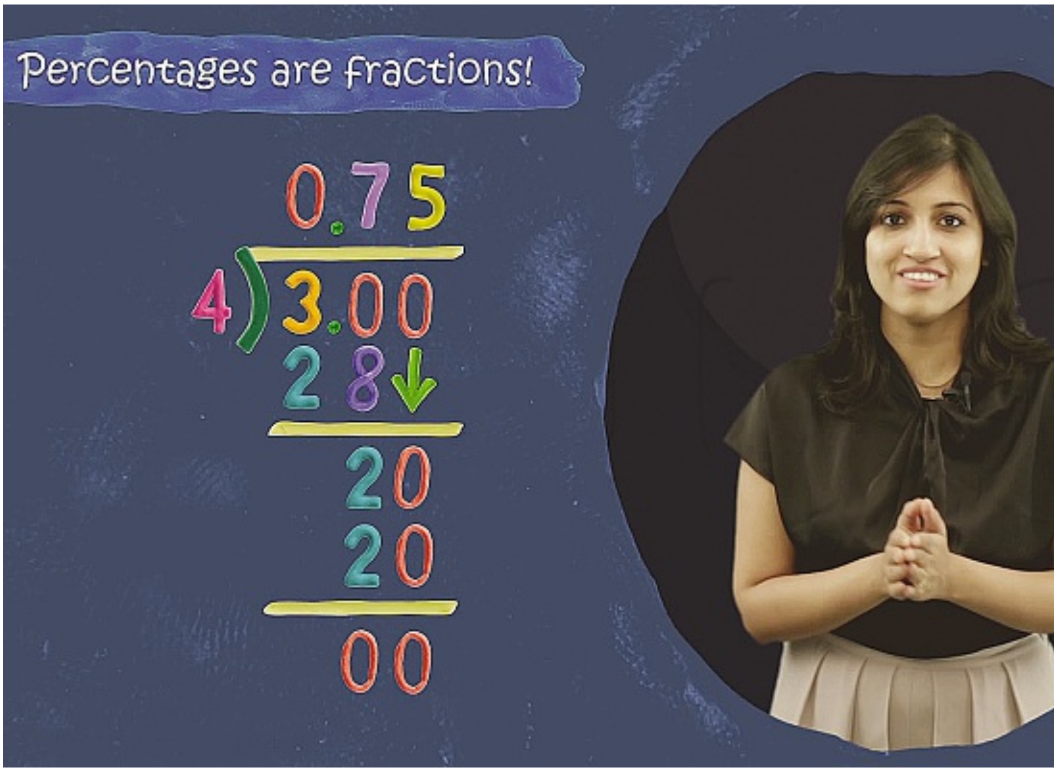
Former maths coach Byju Raveendran says Indians' awareness of the importance of learning was a springboard for his business is not changing fundamentally each year. Once we [have a format to] teach Pythagoras' theorem, it's not like you will have to change it."

For the financial year ending March 31 2019, Byju's made a profit of $2.8m on revenues of $210m. This year, revenues are set to come in at about $422m. By 2024, Raveendran estimates Byjus's will have between 14m and 15m subscribers, generating at least $3bn in revenues, with profits of $1bn-$1.2bn.

"There is a large percentage of the population that is very aspirational and hungry to learn," says Raveendran. "People know education is the only way to make it big. They all understand the importance of learning. We don't need to create awareness of that — it is already there."

From big cities to small towns, most Indians indeed see education as the key to economic progress and a better life. But the quality of education available to the country's estimated 267m school-age children varies tremendously, depending on their location and family income. Most government schools suffer from a high ratio of students to teachers, weak teaching quality and poor teacher attendance. Private schools are mushrooming but are often little better than their state counterparts.

In recent years, various Indian and international companies have tried to promote tech-based answers to help such schools improve quality and teach more effectively. But they have foundered because of the difficulties of dealing with educational bureaucracies in both the public and private sectors. Byju's, by contrast, has found success by selling services directly to parents and students — a far easier proposition. The company's engaging videos and tests — which are delivered exclusively by app — are promoted as a supplement to classroom teaching, and a useful tool that allows children to study and practise when they choose.



"Right from the beginning, Raveendran understood the power of B2C [business to consumer]," says TV Mohandas Pai, a partner at Bangalore-based Aarin Capital, the company's first outside investor, and a former director at Indian IT giant Infosys. "He knew the formula was to meet parents and students, and wow them with technology and direct communication.

"When they see how Byju's teaches, the children get excited. Parents get excited because they feel it will give their children a competitive edge."

The son of two small-town schoolteachers from southern India, Raveendran began his foray into the education business as an offline, flesh-and-blood maths coach, helping college students prepare for the ultra-competitive entrance exams for business school. As his reputation grew, he travelled constantly, lecturing in ever larger venues, from 500-seat auditoriums to a 24,000-seat sports stadium.

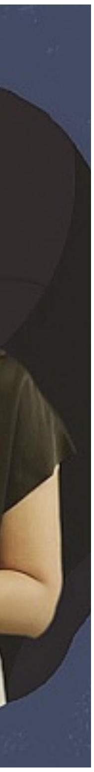
'The formula was to wow parents and students with tech'

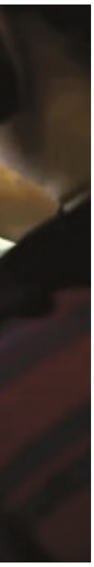
Later, Raveendran, an engineer by training, turned to technology to expand his reach. He set up satellite networks that allowed him to transmit his lectures live and reach tens of thousands of

Byju's videos, top, are exclusively app-based and its engineers, above, work with teachers to design material

students in multiple locations across India. Eventually, Raveendran and his team realised they could improve their service by stopping live lectures in favour of pre-recorded presentations, enhanced with extra graphics and made accessible to students at any time and place. "We realised that live was not really necessary," says Kishore.

When the Byju's app launched in 2015 it already had an extensive video library, featuring engaging presenters and sometimes Raveendran himself. Kishore says about 85 per cent of subscribers renew each year, and the average user





is active for 71 minutes a day. Just a quarter of subscribers are in India's six biggest cities; while nearly 30 per cent live outside India's 100 biggest cities. Many access the content on smartphones that cost less than $150. "We are democratising education," says Kishore.

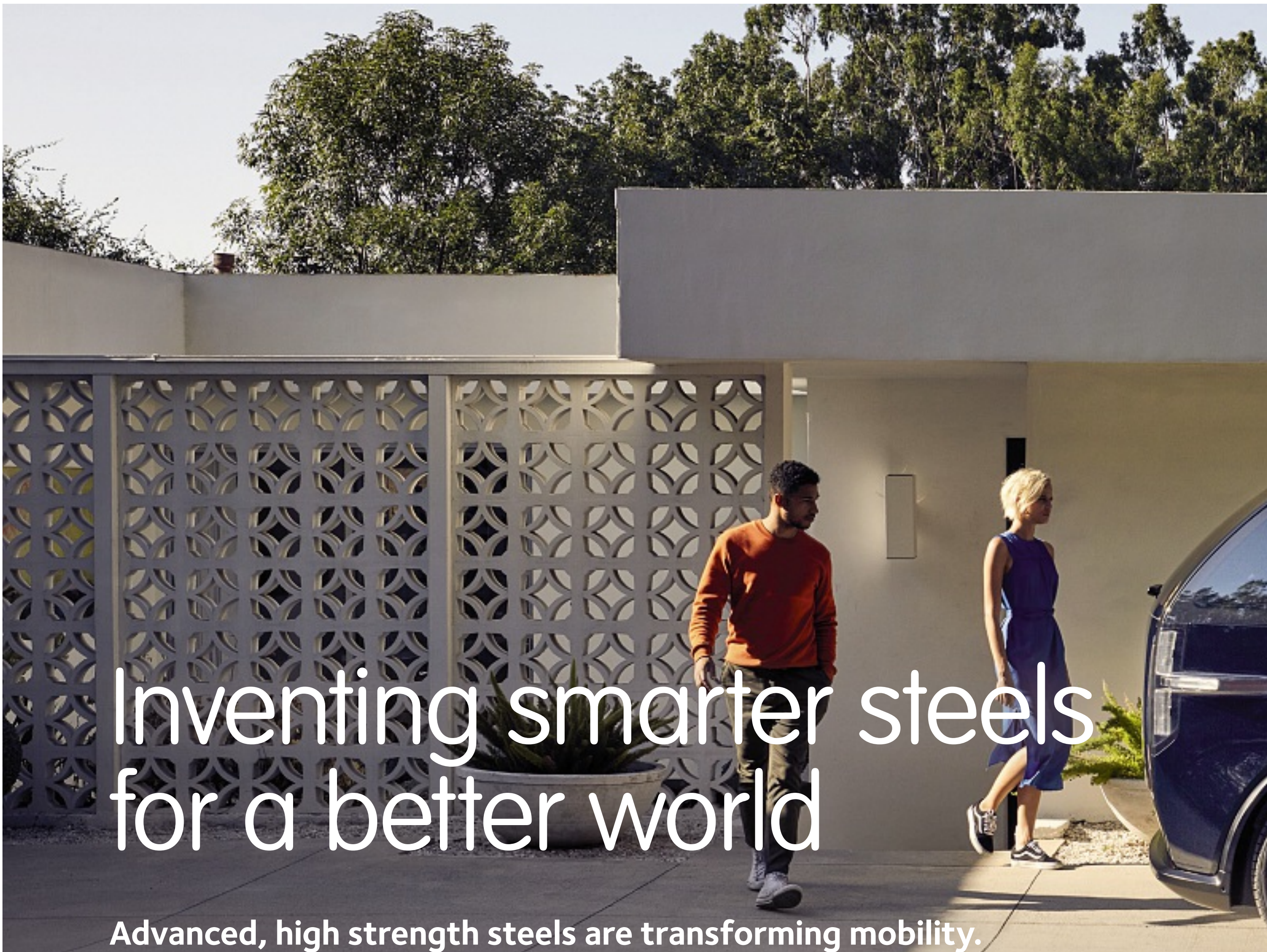
The company sees plenty of scope to expand in India. At present, all its content is in English, but it hopes to make its maths and science curriculum available soon in an array of Indian languages, increasing accessibility for those who do not attend English-medium schools.

Byju's is also looking to go beyond maths and science to offer online courses in parallel with the Indian education system's social science curriculum, and courses in English for those struggling to master the language. The company may also offer some human tutoring for subscribers who need extra, face-to-face help.

Byju's tutorials, above, are promoted as a supplement to classroom teaching. Strategy chief Anita Kishore, left, says content does not need to be changed often

But Raveendran is looking at opportunities further afield, too. So far, Byju's has spent only about $300m of its $1.2bn primary capital, leaving it with a significant war chest to fund forays into foreign markets, where it hopes to replicate its successful Indian formula. Small pilot projects have already begun in a couple of other English-speaking markets, though Raveendran declines to identify where, saying only that the company will have to develop content appropriate to those markets.

"The business in India doesn't require cash, but there is an opportunity to do this in multiple markets," he says. "What we need to figure out is the willingness to pay for education elsewhere. Here, parental involvement in kids' education is very strong. Is there such a big need elsewhere the way we have it in India? These are the questions we have to find answers for." ●



Inventing smarter steels for a better world

Advanced, high strength steels are transforming mobility.

Los Angeles based Battery Electric Vehicle (BEV) start-up Canoo is set to challenge traditional automotive shapes and functionality. Designed for a world in which electric, shared and autonomous transportation will be the norm, Canoo capitalises on the flatter chassis structure possible in a BEV to provide significantly more interior space – more like a living room than a car cockpit. Canoo further breaks the mould by offering commitment-free, month-to-month subscription usage rather than ownership.

Around 90% of the vehicle is made from steel, more than 70% of it either advanced or ultra-high strength. With collaboration from inception with ArcelorMittal global R&D, using such steels enabled achievement of cost, weight, safety, and recyclability targets that would otherwise not have been possible.

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CORPORATE RESPONSIBILITY / ENVIRONMENT
LEVI STRAUSS

On a moral mission

The denim brand believes it can rise above stock market short-termism and achieve sustained profitability with a principled approach. By **Andrew Edgecliffe-Johnson**

The smoke is imperceptible at first. Soon, though, a wisp points the eye to where a laser is etching faded creases on to the pristine pair of jeans in front of it. Just as the pattern seems complete comes the *coup de théâtre*: flames flash across the knees, creating rips in the denim that conform precisely to the design on a nearby computer.

The show at Levi Strauss's innovation lab in San Francisco lasts just 90 seconds but offers an insight into a company focused on the long term. Before it devised the laser process, workers had to scrub jeans with sandpaper for 20 minutes before finishing them with thousands of chemical brews to achieve the same distressed look.

The investment in the laser process, which has helped Levi cut out most of those chemicals, stemmed from an effort to enhance a reputation for social responsibility that dates back to the 19th century. The ambition has acquired new resonance as companies search for a future in which society holds them and the capitalist system they represent in higher regard.

The man from whom Levi Strauss takes its name was a gold rush-era merchant who, having commercialised a fellow immigrant's idea for riveted denim overalls, gave away much of his fortune to fund local orphanages and university scholarships. His heirs burnished the reputation of Levi's for paternalism, continuing to pay workers after the 1906 San Francisco earthquake destroyed the company's factory, offering generous severance packages as America's garment industry moved overseas and speaking of the company as having a mission of "profits through principles".

Heirs burnished the reputation of Levi's for paternalism

Such language has become more commonplace in corporate America in recent years since its largest investors began asking boards to explain what social purpose their companies serve and Washington's Business Roundtable group adopted a stakeholder-friendly creed that challenged Milton Friedman's notion that directors' only social responsibility was the legal pursuit of profit.

But Levi's offers an unusual example of a company that has grappled for generations with a related challenge consuming its peers: how to stay focused on long-term value creation, even in the face of the fashion industry's short-term pressures.

For most of the company's history, the answer was family ownership, but in 1971 the need for capital and a desire to offer shares to employees persuaded the controlling Haas family to float a minority stake on the New York Stock Exchange. Just 14 years later, though, the family bought other investors out, explaining that being private again "would allow management to focus its attention on the long term, rather than being concerned with the short term as a public company must be".

The view that public markets are too trigger-happy has only ▶

Levi Strauss's innovation lab in San Francisco

gained in currency since then, with Warren Buffett among chief executives warning investors' desire for quarterly earnings guidance has led to an unhealthy obsession with short-term profits at the expense of sustainable growth. Prominent Silicon Valley investors are even backing a new Long Term Stock Exchange that would give more voting power to the most patient investors.

Yet, in March 2019, Levi's decided to go back to Wall Street, offering a test case of whether other investors will share its founding family's focus on a horizon that stretches far beyond the next quarter.

With more than 100 family shareholders, some wanting to cash out, there was "a certain amount of inevitability" to a listing, said Chip Bergh, who is only the third chief executive Levi's has had from outside the family. If Levi's had stayed private as the family tree grew more branches, "you [would] get to a point where you've got 250 shareholders and nobody holds more than 2 per cent. And how do you govern a company like that? It's impossible."

To address concern in the company that its principles would be compromised by the public market's demands, the board first ensured the family's shares would have 10 times the voting rights of others. Dual-class shares have come under fire and the Council of Institutional Investors said the Levi's arrangement "severely" limited accountability. But Bergh defended them as giving "air cover" to manage for the long term.

'Investors have an appetite for companies that have a strong moral purpose'

Levi's also made an unusual pitch to investors, telling them it would manage its business for the long term and not provide quarterly earnings forecasts. Shareholders after a quick win need not apply. The offer was nonetheless oversubscribed, and denim-decked NYSE traders marked the shares up 30 per cent from the $17 listing price on day one. They have since swung between a high of $24.50 and a low, as of the end of February, of just over $16 as markets reacted to US-China trade tensions and upheavals in US malls, but Bergh maintained most of his new investors planned to stick around. "I think what [the IPO's reception] said is investors have an appetite for companies that have a strong moral purpose and are committed to running the business for the long term," he said.

According to a study by FCLTGlobal, a non-profit dedicated to encouraging long-term capitalism, companies that invest more than average, avoid excessive distributions to shareholders and steer clear of scandals perform best over the long run. A McKinsey Global Institute analysis similarly found that companies with a long-term view generate higher profits and shareholder returns.

Levi's scores well on both studies' metrics, but Bergh is adamant he is not just ticking boxes. When he became chief in 2011 after 28 years at Procter & Gamble, he recalled: "I wanted Levi Strauss to be, and be seen as, the world's best apparel company, and among the best companies in any industry. That was the noble cause." But Levi's had lost the lustre it enjoyed in the 1980s when Bergh had a pair of 501s swiped from a youth hostel. By 1999, having seen competitors erode its market lead, Fortune called the company a "failed utopian management experiment".

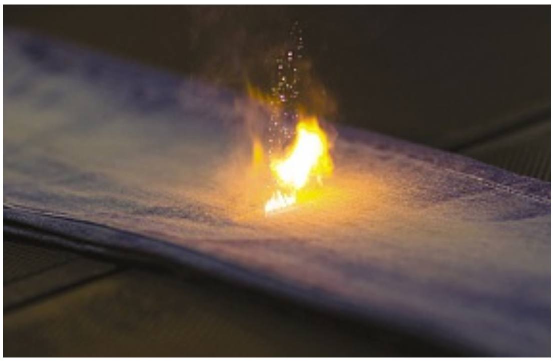
Bergh realised day-to-day discipline had to accompany a focus on the long term, telling his team "profits through principles doesn't mean we're a non-profit organisation". Its annual net income has almost tripled on his watch, from $135m to $395m and in January he announced plans to increase its dividend by 14 per cent.

That performance has provided the platform from which it could clean up its supply chain, improve conditions in third-party factories and advocate causes ranging from refugees to gun control. "The more profits we earn, the more we can reinvest in the things that will make the biggest difference from a social and economic benefit standpoint in the places where we do business," said Bergh.

Some of that reinvestment is in the form of philanthropy: in a typical year the board allocates about 2 per cent of earnings before interest and tax to the Levi Strauss Foundation.

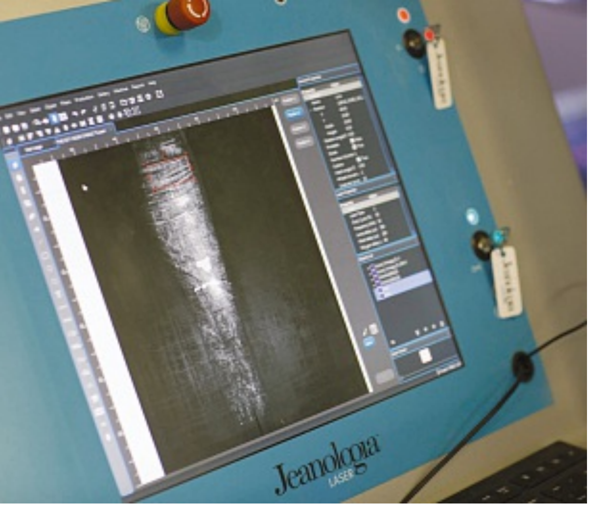
Most of the company's broader efforts revolve around its global supply chain, however, and the reputational damage apparel companies have faced in recent decades from the offshoring of US jobs. Revelations about inhumane conditions in far-flung factories suggest defensive motivations accompany its social conscience.

In 1991, Levi's introduced its Terms of Engagement, a pioneering code of conduct for suppliers and has added requirements since then to



A laser is used to rip and fade a pair of jeans, above, avoiding chemicals that could harm the environment

PHOTOS: MARK MAHANEY, LUCAS JACKSON/REUTERS



CORPORATE RESPONSIBILITY / ENVIRONMENT
LEVI STRAUSS

Chip Bergh, centre in black, rings the opening bell at Levi Strauss's IPO in March last year

improve workers' health, financial literacy and opportunities. In this, as in its support for sustainable cotton farming or its development of technology to cut water use in its manufacturing by almost 90 per cent, it has worked with NGOs and shared its insights with rivals for free.

Such efforts have not left it immune to criticism. Elizabeth Warren, the former Massachusetts senator and then candidate for the 2020 Democratic US presidential nomination, derided Levi's last summer for marketing an all-American brand while making most of its products abroad. It has also attracted controversy by intervening in some of America's most bitter political debates.

Its decisions to speak up on immigration and gun violence and to join other chief executives in urging the Trump administration to stay in the Paris Agreement on climate change have required little financial sacrifice. Still, Bergh defines such moves similarly as choosing "the harder right over the easier wrong" — with the long view in mind.

> 'Profits through principles doesn't mean we're a non-profit organisation'

Last September, he corralled other chief executives to urge Congress to require gun buyers pass background checks. As a former army officer who has fired assault rifles, he said "the average American does not need to own one". Many of his customers ardently disagree, exposing Levi's to the risk of boycotts, but he expects the company to be vindicated in time. Levi's has also rallied other companies to back a bipartisan voter turnout initiative called Time to Vote.

Even in the short term, Bergh argues, "this higher calling of business" is a source of competitive advantage, both in attracting talent with many other options in San Francisco and in catching the eye of shoppers who reward brands that share their values. "In today's environment, profits through principles is another thing keeping us at the centre of culture," he told investors in January.

But can Levi's offer a model for other boards feeling pressure to show they are considering the long term in their decision-making? "I hope I don't live to regret these words, but I think we have an opportunity to show that you can run a company with profits through principles, and be thinking about not just shareholder returns, but stakeholder returns more broadly," Bergh answered.

More than that, he argued, companies had "almost a moral obligation" to address social issues. "If you sit on the sidelines on some of these things, you're not really doing what companies have the potential to do," he said.

The 62-year-old admitted to a personal long-term ambition, too: "I said to myself, I'm only going to do one more job. So make it count, and make it be the stuff of legacies." ●

This is an updated version of an article first published as part of the FT's Company of the Future series in October 2019

Tradition disrupted

Having shaken up Brazil's bureaucratic banking industry, a financial tech start-up has now set its sights on the rest of Latin America. By **Andres Schipani**

Colombian financial entrepreneur David Vélez never found it much fun to visit a bank in Brazil.

When he was first posted to São Paulo in 2012, he found himself stuck in the bulletproof transparent rotating doors that banks use to screen customers for weapons on the way in.

It was after this experience that the Stanford-educated Vélez, then an executive at California-based venture capital group Sequoia Capital, hit on the idea of launching financial technology company Nubank in a country with one of the world's most bureaucratic banking sectors, and one concentrated in a small number of institutions.

"I remember getting locked in those bulletproof doors a couple of times because I had my cell phone in my pocket and had guards looking suspiciously at me with guns," he says about what is a regular occurrence for those who fail to fully empty their pockets before entering a Brazilian bank.

"People were paying 450 per cent in annual percentage rates of interest to get such a horrible customer experience," Vélez says from Nubank's office in a leafy area of São Paulo.

In 2013 and with seed capital of $2m, the Medellín-born Vélez started Nubank with Edward Wible, who is now the chief technology officer, and Cristina Junqueira, Vélez's Brazilian business partner and a former executive at São Paolo-based bank Itaú.

"Nubank was born with the purpose of fighting the bureaucracy and complexity of the financial system, reinventing what banking means for Brazilians," says Junqueira. With more than 20m customers, Nubank is now one of the world's largest digital banks.

Nubank offers credit cards, personal loans and savings accounts by smartphone without the need for physical documents or branch visits, at more competitive rates than traditional banks and with zero fees. The company has so far raised $820m in seven funding rounds, including from Chinese tech giant Tencent. Nubank was last year estimated to be worth more ▶

David Vélez and Cristina Junqueira, who with Edward Wible set up Nubank to fight the complexity of Brazil's banking system

than $10bn, making it the most valuable digital bank start-up globally, according to tech research company CB Insights.

"It was a very high-risk opportunity, but we had a lot of confidence in the team and we were attracted to the potential of the market," says Nicolás Szekasy, co-founder and managing partner of Buenos Aires-based Kaszek Ventures, which alongside Sequoia contributed to Nubank's initial seed investment.

Szekasy's early bet paid off as the rise of Nubank — which also has an engineering hub in Germany — has spurred investor interest in the potential for disruptive financial technology start-ups in Latin America's largest economy.

Last year, Brazilian fintech companies raised some $18bn in funding, according to Roberto Campos Neto, president of the country's central bank. Compared with other emerging markets in Latin America, Brazil is in first place, he says. In the last three months of 2019, the central bank approved 13 new fintechs, with another 20 waiting in the wings.

That is no small feat in a country where the banking system remains concentrated into five big banks: three listed groups, Itaú Unibanco, Banco Santander and Bradesco, plus state-controlled Banco do Brasil and Caixa Econômica Federal. While most analysts do not see the fintechs toppling the big banks, the latter are scaling down their brick-and-mortar operations as technology advances. Itaú, for example, shut more than 370 branches last year because of an "increase in digitalisation" as customers look for alternative channels, the bank's chief executive, Cándido Bracher has said.

"There are people who exaggerate, saying that the [traditional] banks will end," says Carolina da Costa, founder of the Center for Leadership and Innovation at Insper business school in São Paulo. "They will undergo transformations, they will have a greater demand for the use of technology to become more efficient and they will have to rethink their branches model. And I see the customers having more than one bank."

Velez recalls that as competition from Nubank threatened the fat margins of the traditional banks, some at first did not allow customers to auto-pay their Nubank credit card bills from their bank accounts. "These days, they are cutting costs because they have to lower or cancel fees. So we are forcing these banks to shake up. They have changed the way they talk to their clients. They have got better — we like that — it is excellent to see that change in the incumbents," says Vélez.

'Our culture makes us hungrier to challenge the status quo'

Bradesco and Banco do Brasil have since launched their own online credit card, Digio, in 2016. Itaú and Bradesco have also started their own fintech accelerators to nurture fintechs and benefit from their innovation.

Nubank's attempts to shake up the banking sector extend to the look of its headquarters. Devoid of the expensive art usually found on the walls of traditional banks, the building has more of a university campus feel. Graffiti-style works adorn the walls, employees wear jeans and trainers, and buy lunch from a food truck parked outside. Business outfits for women and ties for men are nowhere to be seen. "This culture is our most significant competitive advantage," says Vélez. "It also makes us hungrier to challenge the status quo. Nubank is based on four pillars: technology, design, user experience and data science. The combination of these enables us to grow."

Nubank has placed the smartphone, whose penetration has grown in Brazil to roughly half of all mobiles sold, at the centre of its strategy, according

The laid-back atmosphere at Nubank's offices, above, sets it apart from traditional banks. It also offers lower rates on credit cards, right

Nubank's headquarters are more like a university campus than a corporate office in design

PHOTOS: RODRIGO CAPOTE/BLOOMBERG; NELSON KON/DAL PIAN ARQUITETOS

to Statista, the German data provider, up from about a third in 2014 when Nubank was in its infancy. New customers apply for a card through their mobiles, with Nubank checking creditworthiness online using its own algorithms. Nubank charges no fees — it estimates this has saved $1.5bn in fees clients would have otherwise paid to traditional banks — and its consumer rates for credit cards, at 2.75-11.1 per cent a month, are well below the Brazilian average reported by the central bank, of 14.6-26.5 per cent a month.

Giovanna Castro, a 24-year-old who works in advertising, was among Nubank's first clients. "I had an account at Bradesco and I hated it, because there was too much bureaucracy. I had to go to [a branch] every time I had a problem and there was always a huge queue," she says. "I was an intern and had no money to pay the bank fees."

'The Brazilian unbanked are a huge opportunity for fintechs'

While millennials such as Castro were Nubank's original target clientele, these days about 10 per cent of its customers earn less than the minimum wage and another 7 per cent are over 60 years old. This has become a financial revolution in Brazil, a country of 210m people where the potential for growth is massive but where 45m adults are still outside the banking system, according to Brazilian consultancy Locomotiva.

"The Brazilian unbanked represent a huge opportunity for fintechs," says Insper's da Costa. "These are people who do not have a bank account and who need access to credit and means of payment. And they are customers that traditional banks do not absorb because they do not pass their more complex credit checks. So, I see fintechs playing a very important role in this sector."

There are similar opportunities in other parts of Latin America. Nubank is venturing into Mexico, whose banking sector is dominated by foreign-owned groups such as Citibanamex, BBVA Bancomer and Santander, and has not had a new retail bank since Walmart of the US opened up there a dozen years ago.

Nubank has also made forays into financially troubled Argentina, which is wrestling with stubbornly high inflation and a deep recession. "We are a Latin American company that wants to free the banking industry for Latin Americans. There are 250m unbanked in Latin America, and we have a long-term vision," says Vélez. ●

TECHNOLOGY
HEALTHY.IO

Smart thinking

The Israeli start-up's app-based urine tests point to wider diagnostic potential and savings for health services. By **Hannah Kuchler**

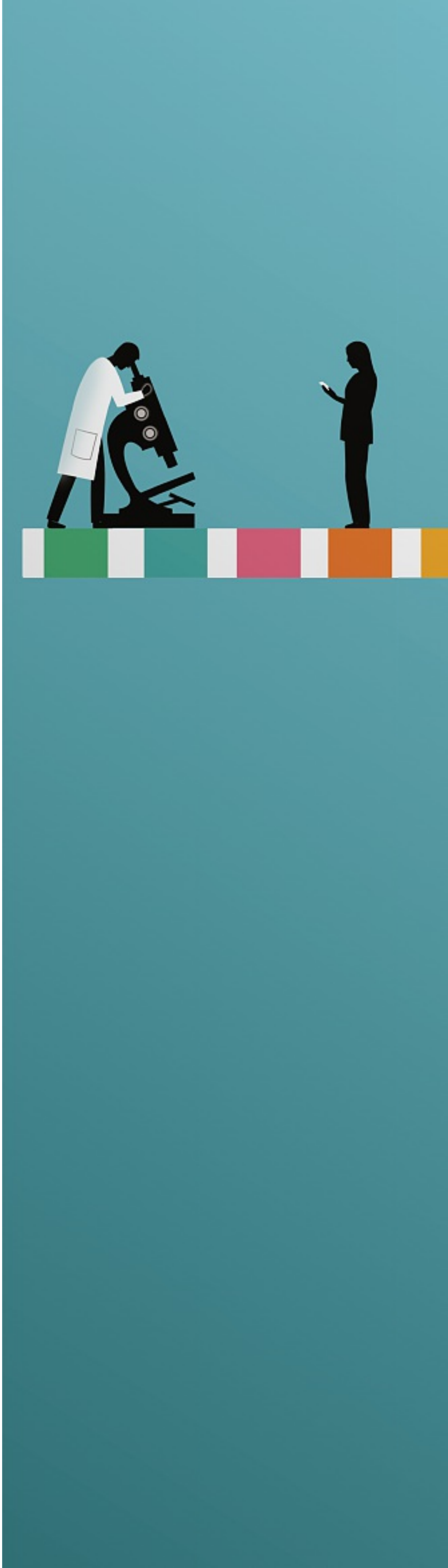


ILLUSTRATION: NICK LOWNDES

Healthy.io styles itself as the "anti-Theranos", the collapsed Silicon Valley blood-testing company headed up by the young, turtleneck-wearing Elizabeth Holmes.

The Israeli start-up aims to marry machine learning with medicine. But instead of raising hundreds of millions of dollars from high-profile investors, the company only wants to be paid if enough patients take its tests.

Yonatan Adiri, Healthy.io's chief executive, shies away from making grand claims about transformation or the company's technology, which uses software and algorithms to allow anyone to analyse their own urine at home. "You've never heard me promise disruption or an era after Healthy.io where healthcare would look completely different and be solved," the 38-year-old says in a vegan café in New York.

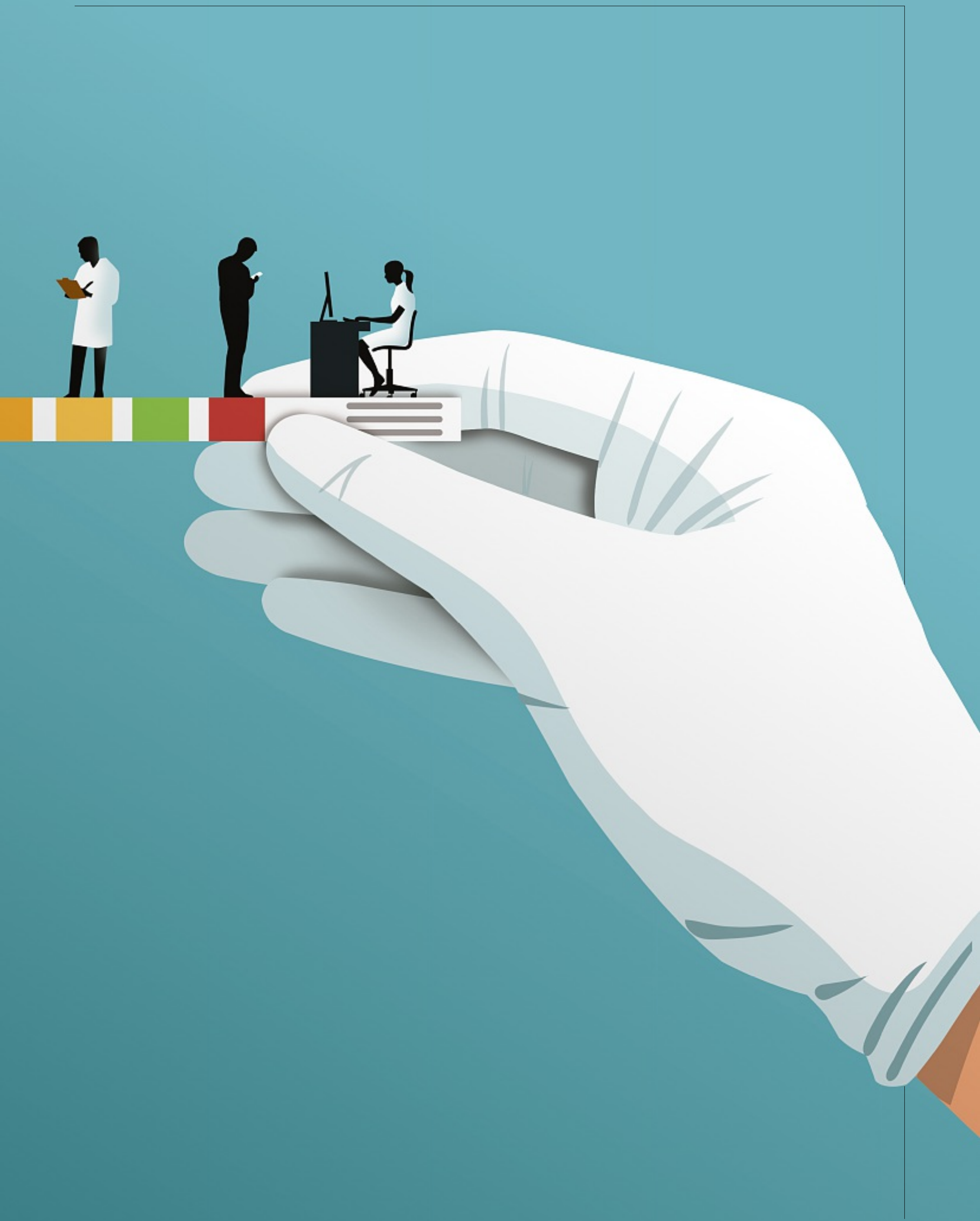
But the market Healthy.io is addressing is vast: it estimates urine tests are done 250m times a year in the US, for everything from urinary tract infections to monitoring during pregnancy and kidney disease. Millions who should take a test — for example, diabetics whose kidneys are at risk of failing — skip them because they are too much hassle, storing up health problems.

In the UK, the National Health Service has recognised the potentially huge savings from the product, and patients in 11 NHS areas are already using the kits.

The "smartest decision" the company ever made, says Adiri, was to not reinvent the dipstick, which has been around for 50 years and changes colour when exposed to urine.

The company's 'smartest decision' was to not reinvent the dipstick

Healthy.io's innovation is to use a smartphone's camera to detect problems such as bacteria in urine, or elevated protein levels, which could indicate kidney trouble. Users are guided by an app to dip the stick and take a photo of it on a panel that looks like a paint swatch. Image-focused machine learning — known as computer vision ▶



— does the rest. The kit has since gained approval from regulators, and convinced various health services to pay for the tests.

"It's not so much magic as very, very strong, rigorous computer vision that knows how to turn this into a scanner," says Adiri, pointing to the camera on his smartphone. By using a phone, which everyone has in their pocket, he says, people can do the test as part of their everyday routine, rather than having to go to a clinic for a test.

Adiri became interested in the potential of the smartphone when his parents were travelling in China. They had reached a small town when his mother became ill. She was about to be flown to Hong Kong when he asked his father to send him a photo of her CAT scan. Adiri forwarded this to a doctor, who advised his mother not to fly: she had punctured her lung and air travel could have been deadly.

Despite being neither a clinician nor a software engineer, Adiri decided to search for new ways to use smartphones in healthcare.

He had been Israel's chief technology officer, meeting renowned scientists and global technology companies on behalf of then president Shimon Peres. As part of his role, he spent time in Silicon Valley, and co-founded Getaround, an app that helps users rent cars from people in their neighbourhood.

While searching for the right application for the "medical selfie", Adiri landed on urine testing, which is based on colours, sometimes read visually by nurses or doctors, or else by devices using photometry. Healthy.io's smartphone test matched the accuracy of these devices by using computer vision to address the problem shown most vividly by the "blue dress/gold dress" internet meme, where colours change depending on lighting conditions.

Josef Coresh, a professor at Johns Hopkins school of public health in Baltimore who specialises in kidney disease, is an adviser to the company. He says Adiri had also tapped into a major medical problem: more than 10 per cent of people in the US suffer from kidney disease. If caught early through regular testing, kidney damage can be reversed, he adds.

'It's a huge opportunity for the NHS to make massive savings'

"The sad thing is, despite the universal recommendation to measure all diabetics' urine, only about 50 per cent are [having it done] nationally," Coresh says.

Katherine Ward, UK chief at Healthy.io, says cost benefits are more apparent to NHS leaders than individual doctors

PHOTO: CHARLIE BIBBY/FT

"The neat thing about the dipstick-type products is they allow for valid lab testing in the home," he explains. "This changes the dynamic of something that has been completely stuck."

Healthy.io is committed to being clinical grade — with regulatory approval for tests in the US and EU — and collecting scientific evidence to back up its claims. When an early trial failed because patients — mainly middle-aged men — failed to read the instructions and left the sticks in the pot for too long, the

Healthy.io technology, left, can be used to analyse urine for infections and other problems. Below: Yonatan Adiri, chief executive

team created a chatbot that helps patients through the process step by step.

A study with Geisinger, one of the US's largest private health groups, published in the journal of The Renal Association in the US, showed that 71 per cent of patients used the test they received, and 98 per cent rated it easy or very easy to use.

Healthy.io charges a fee only if at least 30 per cent of the people who are sent tests use them. So far, with projects in Israel, the Netherlands, the UK and the US, the lowest utilisation rate has been just over 60 per cent.

The strategy seems to be paying off. The number of tests done has soared from 10,000 in the first 13 months of the company's life to 10,000 a month today. By the end of the year, as Healthy.io rolls out across the US, it expects to reach 25,000 a month. To fuel its expansion, the company raised $60m after a funding round last September.

Marissa Schlueter, a healthcare analyst at research firm CB Insights, says Healthy.io is "leading the pack" in a nascent category of smartphone diagnostics which includes Scanwell, a competitor in urine-testing, and companies that offer at-home fertility tests. The category has raised about $400m, she estimates, of which Healthy.io has garnered $86m.

Like many digital health companies, Healthy.io hopes to make money by taking a slice of cost savings. The NHS studied whether the at-home tests could cut costs and found that if kits were sent to diabetics, they could save the health service £660m over five years, by catching conditions before they required more expensive treatment.

In addition to NHS trials of the kits, Healthy.io is selling them through Boots, the UK pharmacy chain, in an unusual partnership that helps patients with urinary tract infections obtain antibiotics directly from a pharmacist, rather than waiting for a doctor's appointment.

The next step is to persuade the NHS to adopt the kits more widely, when doctors will not necessarily feel the cost savings immediately. "On a macro level, it's a huge opportunity for the NHS to make massive savings," says Katherine Ward, Healthy.io's chief commercial officer and head of the UK business. "But as an individual general practitioner [family doctor], would you pay [for the kits] in order to have extra time in your day?"

The NHS has already helped Healthy.io recognise the potential for its algorithms to move beyond urine. Simon Stevens, chief executive of the NHS, wrote to Adiri to explain a problem the service had in the care of chronic wounds, which have to be measured regularly to track progress. Nurses were relying on paper rulers, and measurements often varied so much they were inaccurate. Now, nurses in three clinics are experimenting with smartphone pictures of wounds Healthy.io's algorithms measure and analyse.

For Adiri, Healthy.io's technologies are about the decentralisation of healthcare, evolving from a top-down system designed to control communicable diseases to one where patients play a bigger role in managing chronic conditions.

"I think we're going to create the best company in the world that transforms the smartphone camera into a clinical-grade device," he says. "We're not going to do anything beyond that." ●

Organic grower

The Russian grocer expanded rapidly by tapping demand for healthy eating, and was one of the winners from western sanctions. By **Max Seddon**

In just over 10 years, upstart Russian organic food retailer VkusVill has gone from selling dairy products in a dingy market on Moscow's outskirts to aiming for omnipresence.

Andrei Krivenko started the company in 2009 with Rbs1m (then about $30,000) of his savings and has grown it to the point where it competes with Russia's oligarch-owned supermarket leaders — all without resorting to debt finance.

The chain's main innovation has been its wide assortment of cheap organic food. VkusVill works with more than 800 suppliers — Krivenko describes his company as a "platform for local producers" — to stock own-brand food without additives.

"On Friday we place our orders for Monday. On Monday the producers make it — they don't store it anywhere — and take it to our cross-docking centre," Krivenko says. "Overnight the goods are moved from one truck to another, on Tuesday morning they're in the shop, and we sell 60 per cent on the first day. It's good for everyone: the customer gets fresh produce, and neither we nor the supplier have to store it anywhere."

Today, VkusVill operates more than 1,200 stores in 36 cities — all in European Russia — and sells its goods through nearly all of its competitors. Last year, it opened an average of two new stores a day. VkusVill says it has been profitable since its inception and generated revenues of $1.3bn in 2019, a fourfold rise on the 2016 total.

Krivenko is planning to take the company public on the New York Stock Exchange to fund expansion into everything from VkusVill-branded coffee shops and office canteens to children's ▶

ILLUSTRATION: NICK LOWNDES

clothes and medical services. Early efforts to launch sales in Amsterdam and Paris are already under way.

"VkusVill is a disruptive food brand," says the 44-year-old Krivenko. "We're better set up than the other retailers because their model is sales-focused, and ours is brand-focused. And people associate the brand with healthy eating."

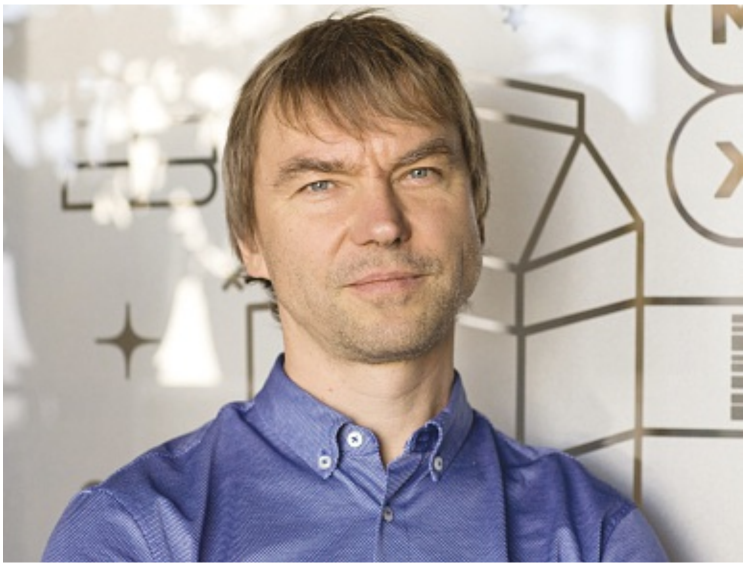
Krivenko set up VkusVill's predecessor, Izbyonka ("log cabin"), in 2009 after quitting his job at a seafood distributor. He posted his CV online in the hope of being offered a post as chief executive but found no takers. He decided to set up his own business and considered starting a dental clinic, a craft brewery and a car wash before settling on dairy products.

Supermarkets in Strogino, the neighbourhood on Moscow's sleepy western outskirts where Krivenko lived, mostly stocked double-pasteurised dairy products with expiration dates a month ahead, while farmers' markets were notorious for poor hygiene and unreliable quality. "We'd have fights with our [milk-selling] neighbours once a week. It was awful," Krivenko says of Izbyonka's first stall at a Strogino market, half a kilometre down the street from VkusVill's current headquarters. "When we started making money, we were completely taken by surprise."

Krivenko expanded Izbyonka's dairy offering to 600 stalls in supermarkets and butchers' shops through trial and error; by 2011, 300 profitable stalls remained. But when the company ordered a market research survey, Krivenko was horrified to discover that his customers associated Izbyonka with the poor-quality farm stalls he had set out to displace and largely shopped there out of necessity.

That pushed Krivenko to develop the two principles that would drive VkusVill's success: a

Andrei Krivenko is considering opening up VkusVill stores in European cities



relentless focus on quality control and extended customer feedback. Izbyonka dropped its rustic branding for a renewed focus on additive-free food that Krivenko, inspired by a book about US grocery chain Trader Joe's, decided could work more broadly.

The newly launched VkusVill chain struggled to get off the ground: with little word-of-mouth publicity, its first eight stores made losses that were covered by Izbyonka's profits. Potential suppliers were reluctant to work with such a small network.

Things took a turn for the better in 2014 when Russia banned most western food imports in response to US and EU sanctions and the rouble halved in value against the dollar amid plunging oil prices. VkusVill's focus on local producers meant it was much better placed to handle the financial crisis than its larger competitors. As supermarkets raised prices to cope with the weakened rouble, VkusVill offered discounts on staples such as milk, eggs and bread. Smaller shops and bank branches closed down, creating cheap retail space for the chain to expand.

'We're not just drinking cabbage soup out of boots, like lots of people seem to think'

By the end of 2014, VkusVill was operating 100 stores, most of them on the outskirts of Moscow.

At the same time, VkusVill's fortunes rose on the back of middle-class Russians' growing health awareness. Life expectancy rose last year to a record of 73, five more years than in 2008; alcohol consumption halved over the same period. Fifty-eight per cent of Russians take health factors into account when buying groceries, according to market researcher GfK.

Many VkusVill customers appear to associate its brand with healthy eating in general, regardless of whether they are buying kale or sugary lemonade. Krivenko points to the chain's sugar-free *syrniki*, a version of the Russian breakfast staple of cottage cheese fritters. "There's really no demand for them," he says. "We only keep them for the tiny number of people who want them — about 5 per cent [of customers]. We just keep them in stock to stop us getting swamped with negative comments on social media."

Customer feedback can determine whether VkusVill

PHOTOS: ANDREY RUDAKOV/BLOOMBERG; ANOURINA/DREAMSTIME

VkusVill provides self-service outlets inside office buildings, top. Middle-class Russians, above, are becoming more health conscious

orders more of an item or removes it from stores entirely. Its customers write 5m product reviews a month on VkusVill's website and app. If an item scores lower than four stars out of five, VkusVill drops it from sale; a hotline answers all customer requests within 24 hours.

Krivenko says VkusVill's constant communication with its customers helps it stay ahead of demand. This year, VkusVill plans to increase the number of self-service chiller cabinets in office centres from 200 to 900, and to launch separate shops selling frozen goods or steamed takeaway food. VkusVill also sells its private-label goods on most of Russia's main ecommerce sites, as well as the Perekrestok supermarket chain. Though supermarkets still account for 98 per cent of VkusVill's revenue, Krivenko says the experiments "will show how ready people are to see us in other places".

"If it's as successful as offline sales, then there will be tens of thousands of shops where a VkusVill fridge will appear, where people will come for the brand," he says. "We'll be competing with [French food group] Danone in the fridge next to it."

Krivenko insists VkusVill's growth is all sustainable and self-funded. He claims never to have taken a loan because they "make a company vulnerable" by "forcing them to always support the balance sheet" rather than focusing on growth. "We don't even have a budget," he adds.

VkusVill's only disclosed investor is leading Russian private equity fund Baring Vostok, which bought a 12 per cent share in 2017. Krivenko is planning an initial public offering this year that would see the fund divest its stake. According to corporate records, Krivenko only owns 1.8 per cent of VkusVill directly, and transferred the ownership of Proekt Izbyonka, which owns the remaining 86 per cent, to a shell company. He declined to say who controls that company or whether VkusVill has investors beyond Baring Vostok before it goes public.

Krivenko wants to use its funds to expand into Europe, and has made preliminary examinations of the markets in Amsterdam and Paris. Krivenko says expansion abroad is necessary to continue VkusVill's rapid growth without abandoning the short-shelf-life approach that helped it stand out.

Lower incomes in Russia's regions, the difficulties of sending goods across the country from its suppliers near Moscow, and the lack of quality suppliers further afield mean VkusVill is unlikely to conquer Siberia.

"We could open in the Urals and Novosibirsk [in Siberia] or open in Paris. We think Paris is simpler: there are even more planes flying there [from Moscow]," Krivenko says.

Doing so would make VkusVill one of the first Russian retailers to find success in Europe. Krivenko is undaunted. "Everyone knows we're piping gas. But Russian companies really have a huge chance to work with the world, rather than sit in a trench. We're not just drinking cabbage soup out of boots, like lots of people seem to think." ●

SMALLER COMPANY
ŸNSECT

Catching the sustainability bug

The French agritech start-up's innovative insect protein production is helping ease the strain on food chains and the environment. By **Emiko Terazono**

When Antoine Hubert was growing up in the French Alps, he loved collecting butterflies and taking pictures of insects. Later, he took a degree in agronomy and studied the importance of insects and earthworms to soil biodiversity.

Hubert combined his fascination for insects with environmental activism: in 2007 he formed Worgamic, a non-profit organisation that focused on food sustainability, urban agriculture and organic waste recycling.

But, frustrated at failing to make an impact with his educational talks on these topics and the importance of insects in the food chain, in 2011 he set up Ÿnsect. The company, based in Evry near Paris, was co-founded with Jean-Gabriel Levon, Alexis Angot and Fabrice Berro, and turns mealworm larvae into fish feed, pet food and fertiliser.

From its beginnings in a small research lab, Ÿnsect now supplies protein produced from insects bred in a vertical farm in Dole, eastern France. Last year the company raised $125m, the largest ever agritech investment round outside the US. It is also preparing to scale up production to more than 25,000 tonnes of insect protein a year with a new insect farm to be built near Amiens, northern France. With that, Hubert feels he is starting to make a difference. "It has been our ambition to make an impact," he says.

The sustainability case for insects as sources of protein is a compelling one. To serve a global population that is expected to reach almost 10bn by 2050, food production needs to increase by about 70 per cent, according to UN forecasts, with demand for animal protein in particular increasing the strain on the environment. Analysts at Barclays, the UK bank, estimate the insect protein market could be worth about $8bn by 2030, up from less than $1bn today.

One tonne of insect protein could mean five tonnes of fish are protected

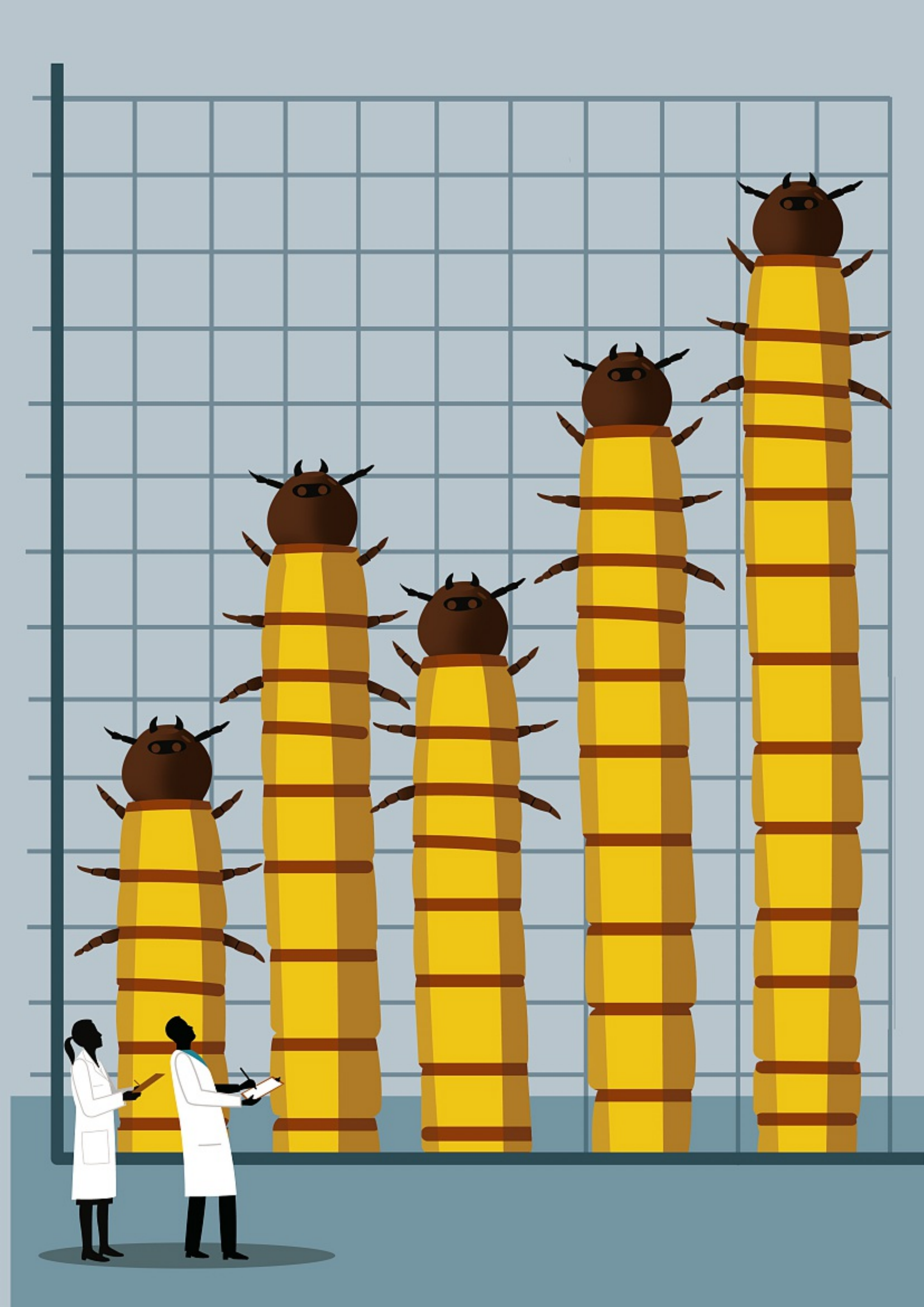
For now, Ÿnsect is focusing on producing feed for animal and fish consumption, rather than food for humans. Premium protein in feed, especially for fish, traditionally has come from grains and fish caught in the wild — principally off the coast of South America — at a time when fish stocks have been falling. One tonne of insect protein, however, could mean five tonnes of fish in the ocean are protected.

Soyabeans and corn are also important feed ingredients, but large-scale farming of them has been blamed for soil degradation. Meanwhile, overuse of chemical fertilisers has caused dead zones in coastal waters, threatening fish stocks.

Containing high levels of protein, vitamins and minerals, insects are also seen as an environmentally friendly alternative to meat and fish for animal and human consumption, reducing the stress on the food system.

The appeal of insects as feed is that they are a natural part of the diet of chicken and fish, says Beyhan de Jong, an analyst in animal protein at Dutch bank Rabobank. Insects could also help solve the problem of food ▶

ILLUSTRATION: NICK LOWNDES



waste, she says, as they feed on by-products such as bran, distillers' grains, and unsold fruit and vegetables, as well as peel. "They are part of a circular economy," says de Jong.

Hubert says the use of insect protein in feed, especially for fish, finds favour with environmentally conscious consumers. "The sustainability and natural angle, it's key for consumers and they really appreciate it," he says. He adds that using insects as part of the protein mix for feed is "not the sole solution — it's part of the sustainable supply of food".

Nevertheless, it could play a big role if research confirms some of the anecdotal evidence from customers, such as fish feed companies, that insects help animals and fish grow faster and make them healthier and less prone to disease, compared with other types of feed. "We are discovering the benefits of insects, although more research needs to be done," says Hubert.

As with many other agritech start-ups, Ÿnsect has been backed by investors that believe sustainability makes good business sense. The latest funding round, led by Brussels-based venture capital firm Astanor Ventures, brought the total raised to $200m.

'The natural and sustainability angle is key for consumers: they appreciate it'

London-based Talis Capital, an early-stage technology venture capital firm that generally invests €2m-€10m in companies, has put €14m into Ÿnsect, making the French company its largest investment.

Apart from the size of the animal and fish feed market — worth about $490bn a year, according to Talis — the venture capital firm was attracted to Ÿnsect's industry-facing model, which contrasts with consumer-focused plant-based protein companies such as Beyond Meat and Impossible Foods, says Matus Maar, Talis's co-founder and managing partner. "It's really difficult to find a company that has a really great business model but also is sustainable," he adds.

Above: the company's premium insect-based fertiliser
Right: Ÿnsect mealworm at different stages of growth

In this nascent sector, about 50 insect-farming companies have raised a total of $480m to date, according to Sifted, an FT-backed service that covers European start-ups. Since the European Commission approved the use of insects in fish feed in 2017, more than 5,000 tonnes of insects have been sold in Europe, according to the International Platform of Insects for Food and Feed, an industry association in the EU with more than 40 members.

Cargill, the leading US agricultural trader, last year added its stamp of approval to the sector when it announced a strategic partnership with

PHOTOS: MICHEL EULER & SEBASTIEN BOZON/AFP

another French insect company, InnovaFeed, to supply the animal feed market. Besides InnovaFeed, Ÿnsect's competition includes start-ups such as Protix of the Netherlands, Enterra Feed in Canada and AgriProtein of South Africa. "Competition is welcome. There is room for everyone," says Hubert.

He is confident Ÿnsect has an edge. The start-up has taken ideas from vertical farms that produce leafy greens and herbs. Mealworm larvae are stacked in a tower, while robots move them round the factory. But, like vertical farming, scaling production capacity and high costs present challenges for insect companies. Hubert says the use of robotics can bring costs down, and Ÿnsect has patented more

Ÿnsect has patented more than 20 of its manufacturing technologies

SMALLER COMPANY
ŸNSECT

Far left: French president Emmanuel Macron meets Antoine Hubert at a trade show last year
Left: checks on the mealworm prior to protein production

than 20 of the technologies used in the manufacturing process.

Ÿnsect's mealworm powder goes into fish feed and premium hypoallergenic pet food, while the manure is turned into fertiliser. Customers include international fish feed company Skretting and Spanish winery Torres.

After the BSE (or "mad cow disease") crisis in the late 1990s, Europe clamped down on the feeding back of processed animal proteins to livestock; now only fishmeal may be used. Lobbying led to the relaxation of rules preventing insect-based protein being fed to fish, and many of the insect feed makers are hoping their products will gain approval to be given to chickens and pigs.

Ÿnsect says it has signed a total of $100m worth of contracts with feed, pet food and fertiliser companies, and is in talks with other potential customers. The company is looking to build 15 factories around the world by 2030, in North America and south-east Asia as well as Europe, producing 1m tonnes of insect protein a year in total.

Although, according to the UN Food and Agriculture Organization, about 2bn people in more than 130 countries already regularly eat insects, Hubert does not see insects becoming a big part of the food supply for humans in western countries. "There will be some technical applications, such as sports nutrition and health supplements for people who need to take in extra protein," he says.

The appeal of insects is limited for the western consumer, agrees de Jong at Rabobank. "It's much easier for people to eat salmon that has consumed insects than to consume insects directly," she says. ●

COMMENT
LEO JOHNSON

Rewiring capitalism

The rising pressure on companies to factor social and environmental costs into their performance offers hope of a sustainable future for us all

Back in June 2000, a group of economics students from the Sorbonne marched down the streets of Paris under a banner that read "We wish to escape from imaginary worlds". The classes, they explained, were fixated on mathematical models and dismissed critical real world issues — like inequality or the cost of environmental pollution — as "externalities" that were irrelevant to the national or corporate balance sheet.

Twenty years later, the real world seems to be getting its revenge. The accelerating climate change crisis and rage at inequality aren't just showing up in the balance sheet — they're starting to threaten the legitimacy of shareholder capitalism. "Many realise this form of capitalism is no longer sustainable," Klaus Schwab told this year's World Economic Forum. "The defining question of our era," added Schwab, WEF's founder, "is what comes next."

For Extinction Rebellion activists, the answer is clear: rip it up. It is time for a post-capitalist economy. Head to Silicon Valley and another response is emerging. Want food to feed the 9bn global population we are heading for? Want technology that sucks out surplus gigatonnes of carbon from the atmosphere? Capitalism, they argue, is the only mechanism that can unlock the ingenuity we need to respond at speed and scale. The answer isn't to ditch capitalism — it's to turbocharge it with the tools of the fourth industrial revolution that digitise, dematerialise and decarbonise.

So is shareholder capitalism the problem or the solution? Does business need to ditch it or double down?

The Paris protest never went viral, with fewer than 1,000 people signing up to the online petition. But the Sorbonne students' critique of the economics textbooks may be critical to the future of capitalism. What matters is what gets valued.

Technology is not the answer to everything but simply the amplifier of intent. The critical question is whether the organising principle of the fourth industrial revolution is going to shift from short-term profit maximisation to an economic model that operates, as German economist EF Schumacher put it, "as if people and planet mattered"? Without that shift in intent, capitalism is like a car with the wrong destination in the satnav, programmed to take us over the cliff — the more powerful the technology, the greater the speed at impact.

Is there any real hope of those values being reflected in the market? If governments can't price externalities into their budgets, the prospects might look bleak. But weak signals are emerging of an innovation — social not technological — that could rewire the market.

In January, BlackRock chief executive Larry Fink galvanised the impact-investing community by committing to divest its $7tn of assets from coal. Some 36 per cent of global insurers now refuse insurance to the coal sector. What has changed? Confronted with the failure of both market mechanisms and government regulation to deal with the problems confronting us, a new set of economic agents are starting to identify and put pressure on the sensitive points that mobilise corporations to intervene and to align their performance.

And it is a network that has started to broaden in range and leverage, from the Bank of England mandating disclosure of climate risk in the financial sector, to employee activists staging mass staff walkouts at Google and Amazon; from "toxic companies" blacklisted from university campus recruiting rounds, to retail consumers using apps to rate product performance on the shelf.

> **What is emerging is a set of substitute regulators**

What is emerging is a set of substitute regulators that are starting to rewire risk and reward, factoring environmental and social costs back into the balance sheets of companies. It is early days, but there is a glimmer of hope for a model of capitalism where the next endangered species becomes the externality, where capital starts to flow at scale into the estimated $26tn opportunity for sustainable investments, and where it is neither the imaginary nor the real world that any of us needs to escape from. ●