

Ethical
CORPORATION
MAGAZINE

TECHNOLOGY FOR GOOD

Can AI put business on a
safer emissions flightpath?

LIGHTER WORK
TACKLING THE
TRANSPORT SECTOR

BLOCKCHAIN DIVIDEND
FOR SMALLHOLDER
FARMERS

MAKING WAY
FOR WOMEN
IN TECH

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WELCOME TO THE JULY 2019 ISSUE

This month in the magazine we are looking at the capacity for tech to do good: how fourth-generation technologies are enabling advances on some of the most difficult sustainability challenges companies face as they try to tackle climate change and the Sustainable Development Goals (SDGs).

In April, a PwC and Microsoft report suggested that AI could enable a cut in global greenhouse gas emissions of between 1.5% and 4% by 2030 across four key sectors, agriculture, energy, transport and water, with its impact greatest in transport and in energy. Challenging the assumption that AI will make swathes of workers redundant, the report said it would be a job-generator, potentially creating between 18.4 million and 38.2 million net jobs globally.

Angeli Mehta highlights how companies like Verv in the UK, Google's DeepMind, Vigilent in California, Canada's Novacab and Barcelona-based Nnergix are using artificial intelligence and machine-learning applications to light the way to smarter energy use.

Mehta also looks at how AI is being used to bring emissions reductions in the even more challenging transport sector. She writes about how artificial intelligence is being used by US cities, including Pittsburgh, to improve traffic flow, delivering an estimated 20% cut in carbon emissions.

In shipping, Nautilus Labs and Stena Line are both achieving efficiencies with systems that continuously monitor vessels. Meanwhile, Explicit has developed sniffer drones that can detect the gases vessels emit. And in the air, Norwegian is using Open Airlines' SkyBreathe system to help its pilots fly more efficiently.

I report on how BanQu, a blockchain platform based on widely accessible SMS technology, is bringing transparency to the "last mile" of global >



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supply chains, helping brands such as AB InBev deliver commitments to improve conditions for millions of smallholder farmers.

In sponsored content, The Nature Conservancy’s chief conservation technology officer explains what the conservation movement can learn from the tech industry about scaling solutions at a much faster pace.

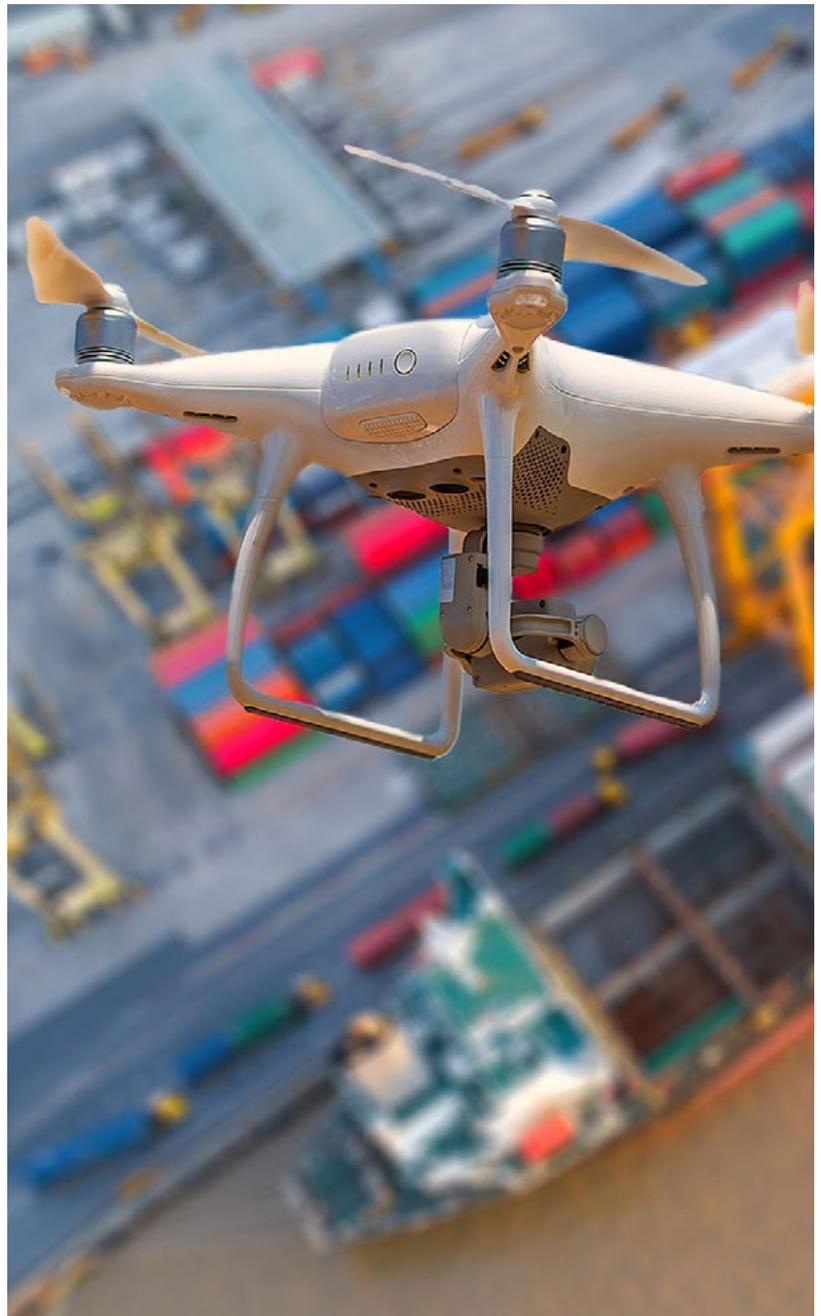
Our second briefing in July is about the drive to increase the number of women working in tech. With women making up just 17% of the tech industry, David Craik reports on initiatives in the UK to attract more female workers and why the sector needs a cultural change.

I write about a new speed-mentoring initiative in the UK to help more women ascend to senior leadership roles.

And Jill Baker speaks to four female founders of early-stage tech companies in Asia who have beaten the odds of women receiving 2% of global venture capital, and have created companies that are addressing social need.

We hope you enjoy your July magazine. Please help spread the word on social media that all our journalism is now free to view, using @Ethical_Corp so that we can retweet.

Next month is another double briefing, looking at companies that are leading on tackling modern slavery, and those that are addressing the global refugee crisis. ■



KITPHONGPH030/SHUTTERSTOCK



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AI could help the UK deliver on its target to be net-zero carbon by 2050.



ANTON BALAZH/SHUTTERSTOCK

Can AI light the way to smarter energy use?

Angeli Mehta looks at the companies that are using machine learning to rise to the climate challenge

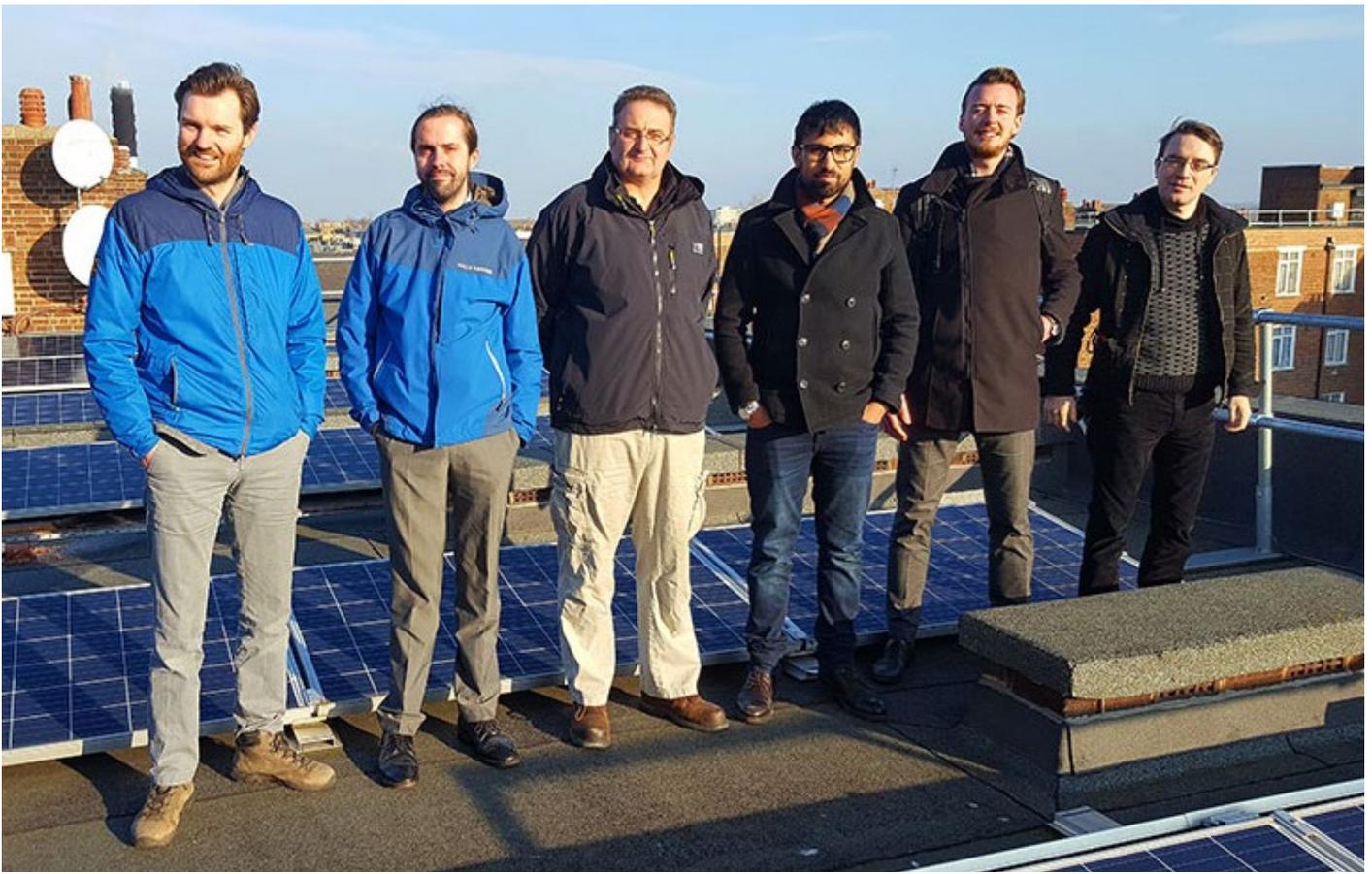
Climate change is our starkest challenge: could artificial intelligence help us meet it?

There's seemingly no aspect of the efforts we need to make that couldn't be accelerated by artificial intelligence. In April, a report by [PwC](#) and [Microsoft](#) suggested that across four key sectors – agriculture, energy, transport and water – AI could enable a cut in global greenhouse gas emissions of between 1.5% and 4% by 2030, with its impact greatest in transport (up to 1.7%) and in energy (up to 2.2%).

AI could also potentially create between 18.4m and 38.2m net jobs across the sectors the report's authors examined.

However, these positive impacts depend on other innovations, such as distributed generation and storage, and an industrial internet of things (IoT). >

 [VIEW ONLINE](#)



VERV

AI itself requires large amounts of computing power, also requiring energy – and adding to the challenge.

AI AS A TOOL

In a recent presentation, Mustafa Suleyman co-founder of Google's DeepMind said: "Many of our most challenging problems are intractably complex. We've got tonnes and tonnes of data, but trying to extract insight from that data and learn the relationship between cause and effect well enough to make meaningful predictions ... is becoming more and more challenging."

Today's AI systems aren't anywhere close to re-creating human intelligence, but they are good at rapidly making sense of vast amounts of data – discerning patterns where we can't. Moreover, machine-learning algorithms can acquire knowledge from the data they analyse, so models become more accurate over time, helping humans to make better decisions. That might be to select the most fuel-efficient route for a ship (see [Appliance of science](#)), or to predict how weather systems will impact the output of a wind farm.

Suleyman wants AI to do good; to have an impact. The DeepMind team decided to pitch their efforts at two challenges: cutting energy

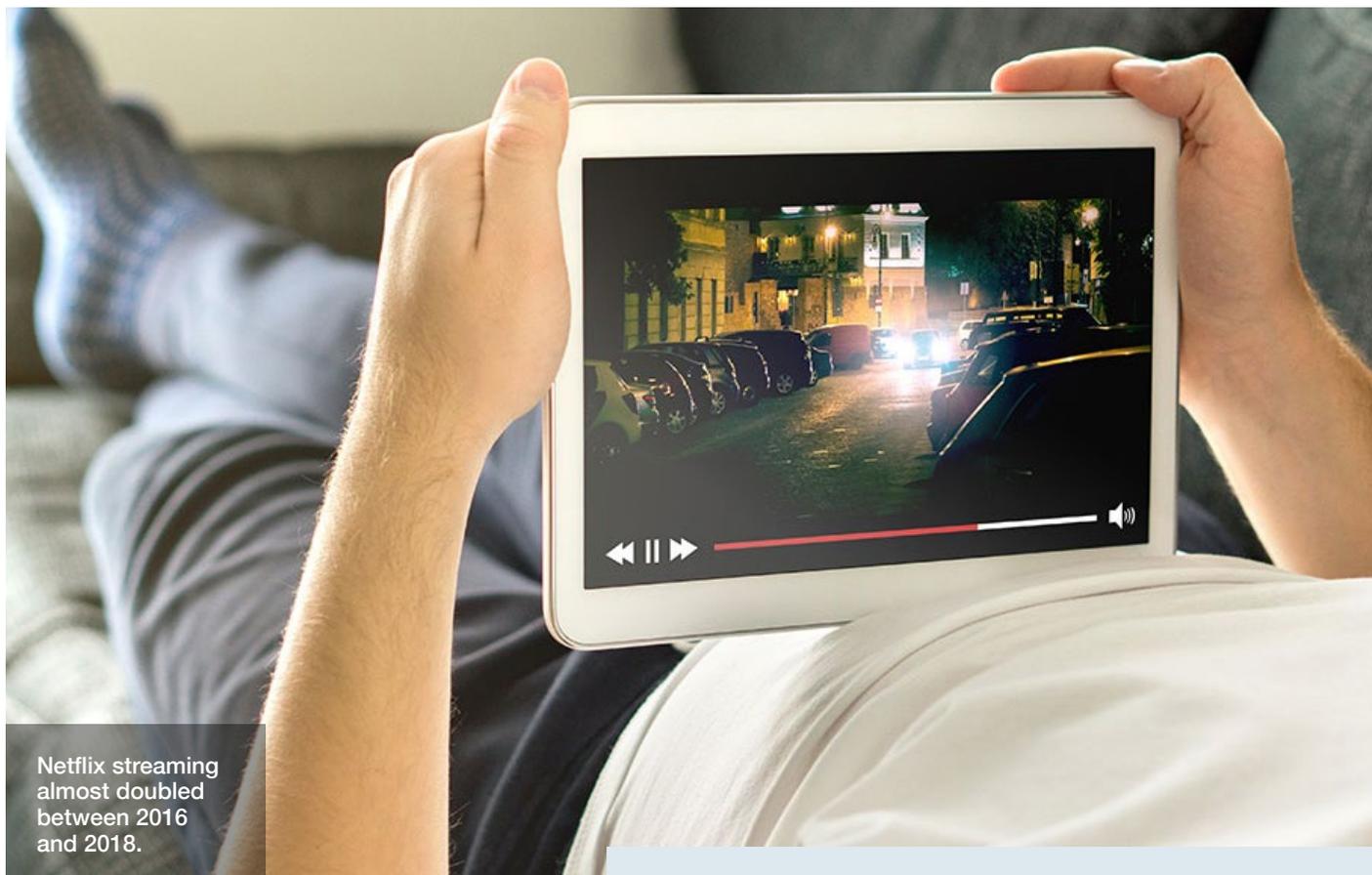
consumption, and getting more renewable energy into the grid. First up was to use AI to extend the life of an android phone battery. A lot of battery power is wasted keeping apps up to date in the background: predicting which apps you're likely to use soon, compared with those you might not look at for hours or even days, saves energy.

What if we could use AI to cut the energy we consume in using all our consumer or business devices? Smart meters are meant to help us do that, but can only show the total amount of electricity being consumed (at approximately 10 second intervals), so it's not easy to work out which are the most energy-consuming devices.

UK firm Verv is changing that by applying machine learning to deduce which appliances are on in a household, and what they're costing. Each electrical device has its own voice – an electronic signature that can be separated out through pattern-recognition technology. Verv's technology can sample data one million times every second. "I liken it to having a microphone in a room and lots of people talking at the same time," says Maria Kavanagh, Verv's chief innovation officer.

She reckons Verv's current system has the potential to cut energy use in the home by about 10%. >

The team behind Verv, whose technology has the potential to cut domestic energy use by 10%.



Netflix streaming almost doubled between 2016 and 2018.

TERO VESALAINEN/SHUTTERSTOCK

Our connectedness is using vast amounts of energy. In 2016, Netflix's indirect energy use (that's you and me watching programmes downloaded from data centres) was 100,000 megawatt hours (MWh); by 2018 it had almost doubled to 194,000 MWh. This use of energy will skyrocket with the advent of 5G applications like autonomous vehicles.

In a recent blog post, Microsoft's president Brad Smith said the company would launch "a new data-driven circular cloud initiative using the Internet of Things, blockchain and artificial intelligence to monitor performance and streamline our reuse, resale and recycling of data centre assets, including servers." Microsoft's AI platform Azure is already offering scientists new tools for monitoring the environment, and climate change mitigation.

Google has made much of its progress in using AI to cut data centre energy consumption, 40% of which goes on cooling. A three-year programme of analysis and learning by DeepMind produced a system that cut by up to 30% the energy used to cool its data centres. Over the course of the first year of deployment the system got better, and learned to take advantage of, for example, cooler winter weather; and to provide levels of certainty that taking specific actions would produce the desired outcome. >

30 SECOND READ

PwC and Microsoft suggest AI could have the greatest impact on transport emissions, cutting them by up to 1.7%, and in energy (2.2%).

AI is good at rapidly making sense of vast amounts of data while machine-learning algorithms can acquire knowledge from data, so models become more accurate.

Google's DeepMind team is aiming at cutting energy consumption, and getting more renewable energy into the grid. UK firm Verv is applying machine learning to deduce which appliances are on in a household, with the potential to cut home energy use by about 10%.

AI is itself energy-hungry as it requires large amounts of computing power. Microsoft is looking at using AI to monitor data centre performance, while Google has used it to cut data centre energy consumption.

AI could help the UK deliver on its target to be net-zero carbon by 2050 by helping maximise the renewable energy fed into the grid and building intelligent energy storage systems.



DEEPMIND/GOOGLE

where they can make more important decisions: for example, where to put IT equipment. AI eliminates those headaches and allows them to make better decisions.”

PREDICTING THE UNPREDICTABLE

AI could also be important in helping the UK deliver on its ambitious target, announced last month, to be net-zero carbon by 2050.

The National Grid had already set a target for Britain’s electricity system to be zero-carbon by 2025. Meeting it will mean maximising the renewable energy fed into the grid from a vast array of producers – from individuals to industrial-scale producers.

One of the challenges is in anticipating how much renewable energy will be available – a problem by no means confined to the UK. Barcelona-based Nnergix is using AI to give grid operators, energy traders and producers around the world highly accurate energy forecasts for solar, wind and hydro production in the hours and days ahead. Its systems can also help investigate sites for their energy generating potential.

“Our data analytics are helping to avoid carbon emissions because the main goal is to enable the grid integration of renewable energy sources,” explains Joan Miquel Anglès, the company’s commercial director and co-founder. More advanced deep learning and better weather forecasting will only improve predictions. However, he adds, with climate change comes more volatile weather patterns: a further challenge for machine learning.

DeepMind, too, has been working on making wind energy more competitive with fossil fuels.

Last year, Google started applying machine-learning algorithms to part of its fleet of renewable energy projects. Using weather forecasts and historical turbine output data, it trained a neural network to predict what wind output would be 36 hours in advance. >

Vigilent, based in Oakland, California, is one of the signatories to the [Step Up Declaration](#), an initiative launched by former UNFCCC head Christiana Figueres at last year’s Global Climate Action Summit in California. The coalition of 22 tech companies, including Salesforce, Autodesk, BT, Cisco, HP, and Uber, pledged to harness technology to help reduce emissions across all economic sectors, starting with their own.

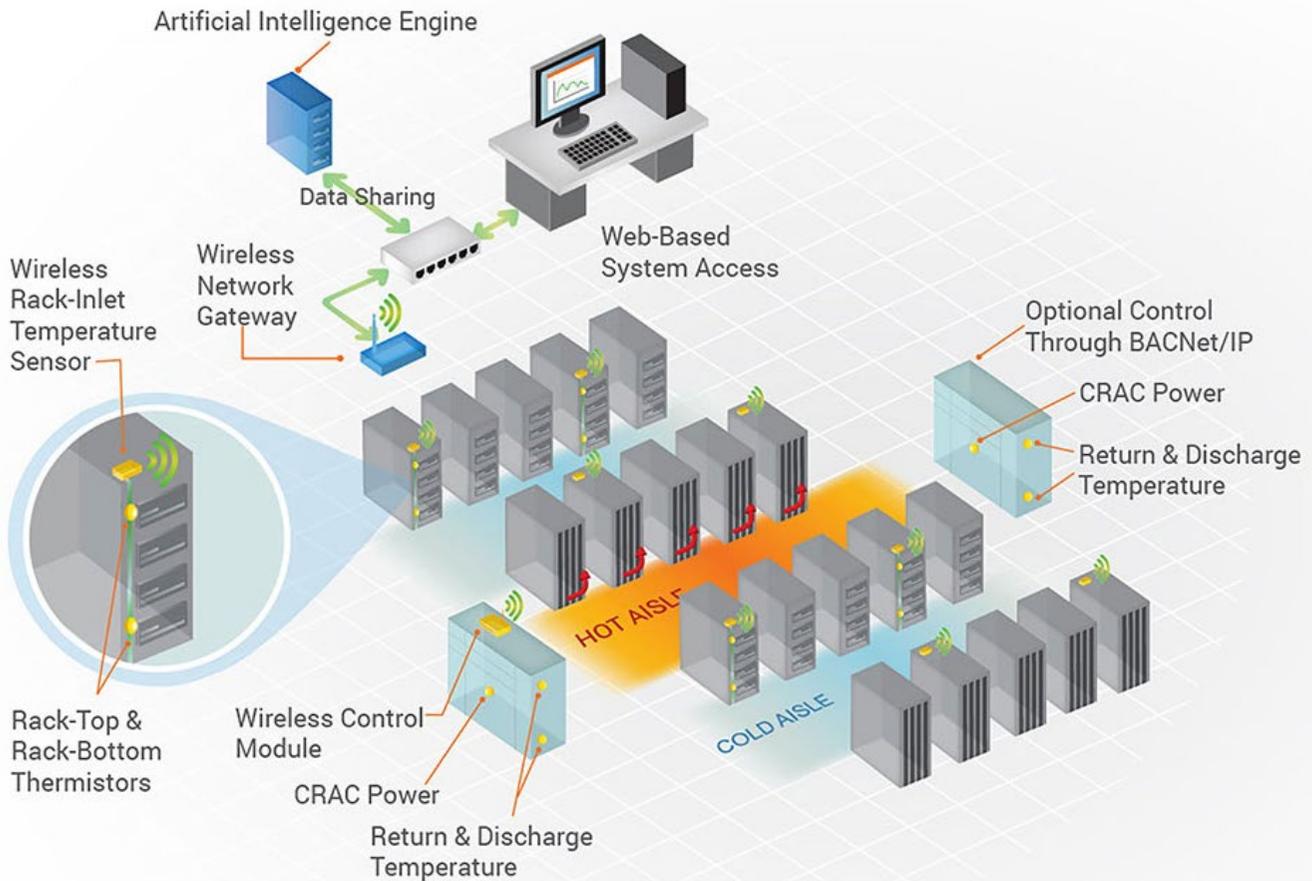
Vigilent has committed that, together with its data centre partners, it will “use AI to eliminate wasteful cooling in data centres and telecom facilities, cutting annual carbon emissions by 50 million metric tons.” By deploying AI globally, it anticipates carbon emissions could be cut by 10 times as much.

Cliff Federspiel, Vigilent’s president and chief technology officer, says Vigilent is in the process of extending its technology to commercial buildings, where efficiency measures are urgently needed. In the longer term, he says, “I do think the technology can be delivered to other types of process industries – food processing, pharmaceuticals, indoor agriculture by using the same algorithm.” But for now Federspiel believes data centres are where the biggest impact on carbon emissions can be made.

As for the fear that AI and machine learning will replace people, Federspiel thinks the opposite will be the case: “This enhances what people do – they don’t have to deal with minute-to-minute, hour-by-hour decisions on cooling. But they get data on

Google has used AI to cut data centre energy consumption.

AI enhances what people do – they don’t have to deal with minute-to-minute, hour-by-hour decisions on cooling. But they get data on where they can make more important decisions



VIGILENT

This proved to be a complex task because output was so variable. The team is still refining the algorithm, but says the machine learning has boosted the value of Google’s wind energy by 20%, because it can now tell the grid in advance when and how much energy a given wind farm will deliver.

A GRID IN BALANCE

Intelligent energy storage is also going to be critical for building the electricity grids of the future, says Stéphane Bilodeau, chairman of Canadian firm Novacab.

The technology firm has developed hybrid energy storage systems, which generate electricity from heat and store it for when its needed.

Vigilent has committed to use AI to cut wasteful cooling in data centres and telecom facilities.

So in buildings, energy can be stored during off-peak hours, and discharged during peak usage times to lessen the burden on the existing power grid. In a big power plant, instead of energy being lost through the cooling towers it could be stored. In transportation, fleets of delivery vehicles – which might themselves have to refrigerate goods – can maintain electrical power for heating and cooling without having to run the engine or a generator, so reducing fuel consumption and carbon dioxide emissions.

All these applications require analysis and prediction, precisely where machine learning comes into its own. Bilodeau reports that Novacab’s systems cut energy consumption by 14%-40%.

A new manufacturing plant Novacab is building in upstate New York will get 80% of its energy from Novacab’s own hybrid systems. Bilodeau expects it may not have to go to the grid for power at all.

Back in the UK, Verv believes AI could be deployed to better predict electricity demand in order to keep the grid in balance.

“Think of each electricity substation ... and imagine you have a battery there and a community could store its excess energy, and was incentivised >



In buildings, energy can be stored during off-peak hours and discharged during peak usage time to lessen the burden of the power grid



Verv could deliver at least a 30% reduction in carbon emissions, all with consumers completely unaware of the complex sets of decisions being made behind the plug

to do so,” suggests Kavanagh. Add in smart-plugs, and AI could be used to enable the grid to manage sudden surges in energy demand by briefly switching off – say – all the fridges in an area rather than having to call on expensive back-up generation from fossil fuel plants. Where, when and for how long to switch off are the kind of rapid decisions that can be made using AI.

“The technology is not that difficult ... smart products exist, and there are so many grants out there for innovation in this space,” Kavanagh adds, “but it’s about getting policy change.”

She points out that consumers will need to have an incentive to share their data.

But the changing shape of the grid, made possible by AI, may ultimately lead to a fairer energy system.

Verv has been supported by Ofgem to develop peer-to-peer electricity transactions. It made the first, using blockchain, in a pilot in London last year. The experiment centred on a community solar project that is powering the communal areas of blocks of flats in Hackney. Unused energy is exported to the grid at a rate of 5p per kilowatt hour.

Because Verv was monitoring energy consumption, it realised almost 80% of the energy produced was being sent to the grid, rather than the standard assumption of 50%, meaning that community, many of whom were paying 15p/KWh for their electricity through pre-payment meters, was being short-changed.

Phase two of the pilot will allow residents to be fully reimbursed for the energy they sell to energy firm Centrica. Refining Verv’s system could take six to 12 months, so it has full seasonal data to enable optimum decision making on when to store energy by charging up batteries, when to trade, or send energy to the grid.

Kavanagh expects this green energy-sharing platform could deliver at least a 30% reduction in carbon emissions. All this could be done with consumers completely unaware of the complex sets of decisions being made behind the plug.



RENE HARTMAN/SHUTTERSTOCK

Artificial intelligence is being used to monitor how weather patterns affect wind energy.

DeepMind’s Suleyman sees enormous potential to radically improve current systems by working with existing data, hardware, and infrastructure.

Collecting the right data could bring about a step-change, he says: “In the next decade we expect really remarkable breakthroughs to come.” ■



Angeli Mehta is a former BBC current affairs producer, with a research PhD. She now writes about science, and has a particular interest in the environment and sustainability. @AngeliMehta

APPLIANCE OF SCIENCE

Angeli Mehta reports on how fourth-generation technologies are being used to cut CO₂ on roads, the seas and in the air

 VIEW ONLINE

STEVE CORDORY/SHUTTERSTOCK

The use of artificial intelligence will be critical to delivering truly autonomous vehicles and seamlessly integrated transport in cities one day. But we don't have to wait until tomorrow to reap the benefits of fourth-generation technologies such as AI and machine learning.

They are already being used in a host of transport applications, cutting CO₂ emissions on the roads and in even more challenging sectors such as shipping and air transport.

ROAD TRANSPORT

In a handful of US cities, machine learning is being employed to improve vehicle flow. In Pittsburgh

this has reduced engine idling by 40%, delivering an estimated 20% cut in carbon emissions.

The Scalable Urban Traffic Control (Surtrac) system – developed by scientists at Carnegie Mellon University (CMU) – enables each junction to set traffic light sequencing according to real-time information on traffic volumes, collected from cameras and radar. Data is shared with computers at nearby intersections, to predict the flow of vehicles.

The university's scientists are now developing a computer vision system to try to quantify pollution levels.

Pittsburgh has funding to roll the Surtrac system out across 150 intersections over the next year.

“Machine learning means we're always refining, always improving,” says Karen Lightman, executive director of Carnegie Mellon's [Metro21: Smart Cities Institute](#). Each new iteration allows policymakers to give priority to distinct subsets of city users, she explains. >

Shipping accounts for 2.4% of greenhouse gas emissions.

AI could help relieve emissions from vehicles on congested roads by reducing engine idling by 40%.



BRIAN MINKOFF/SHUTTERSTOCK



STAS WALENGA/SHUTTERSTOCK

Left: Linking cross-walk signals with traffic systems helped optimise vehicle flow in Pittsburgh.

Early on they learned that while traffic flowed, pedestrians got stuck waiting to cross busy roads. Now cross-walk signals are tied into the traffic system, and it can even learn that some pedestrians will need longer to cross a road than others. The next steps are to optimise the system for emergency vehicles and buses.

Sharing data is key, as is addressing the privacy challenges thrown up by Pittsburgh's high-resolution camera systems.

IBM's Green Horizons project uses AI to analyse the data from sensors all over a city to produce kilometre-by-kilometre pollution forecasts up to 72 hours in advance so that authorities can take action, such as warning commuters and closing roads.

The system, initially developed in China and now being piloted in Johannesburg, uses weather, temperature, humidity, wind patterns and traffic levels, alongside measurements of harmful pollutants like nitrous oxide, sulphur dioxide and particulates.

SHIPPING INDUSTRY

Shipping emissions account for 2.5% of global greenhouse gas (GHG) emissions and could rise by as much as 250% by 2050 under a business-as-usual scenario, according to the [International Maritime](#) >

Machine learning means we're always refining. Each new iteration allows policymakers to give priority to distinct subsets of city users



Decision-making in shipping is still based on the 200-year-old practice of noon reporting. Such once-a-day reporting masks variations that could impact on a ship's fuel efficiency



Lars Carlsson, head of AI at Stena Line, left, with Senior Master Jan Sjöström, who helped develop Stena's AI system to reduce fuel consumption.

STENA LINE

Organization (IMO) . Last year it announced a target to reduce shipping emissions by **at least 50% by 2050**, initially through efficiency measures.

In tandem, it is also trying to cut air pollution: from next January, vessels will have to use fuel oil with a lower sulphur content of 0.5%, compared with the current 3.5%, or to invest in scrubbers.

“We’re on the IMO’s 2020 doorstep for sulphur emissions; everyone is uncertain and nervous and expecting higher fuel costs – and keen to keep costs down,” according to Matt Heider, founder of Nautilus Labs, a New York company that uses AI to help shipping companies achieve greater efficiencies.

Heider points out that decision-making in shipping is still based on the 200-year-old practice of “noon reporting”, a data sheet prepared each day by the ship’s chief engineer.

Such once-a-day reporting masks variations that could impact on a ship’s fuel efficiency, yet it informs judgements from maintenance to pricing worth hundreds of billions of dollars each year. Continuous monitoring of vessels, and machine learning to provide decision support puts the human in the loop, equipped to take the best course of action,” he adds. >

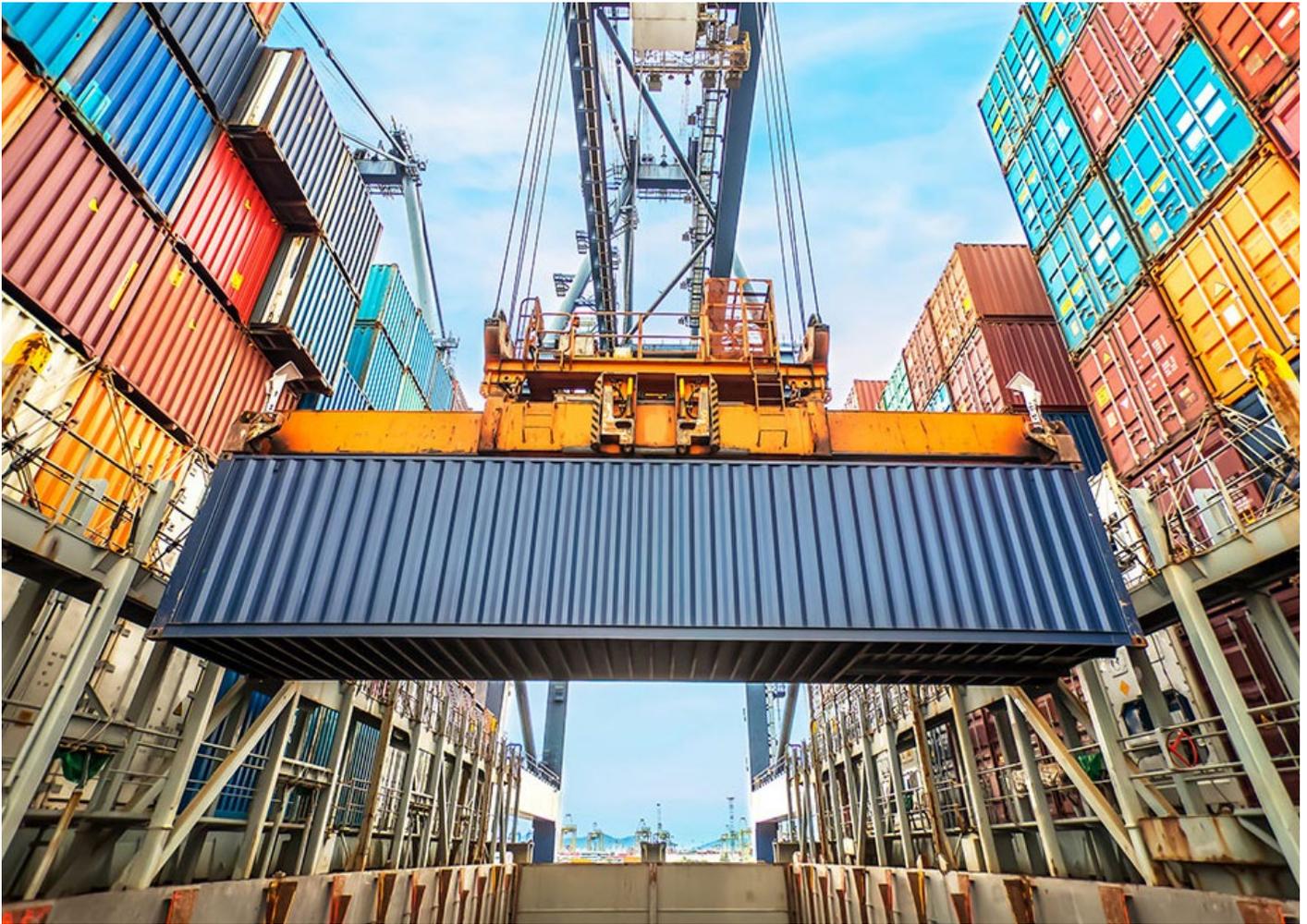
30 SECOND READ

AI and machine learning are already being used in a host of transport applications, cutting CO₂ emissions on the roads and in shipping and air transport.

In Pittsburgh, the Surtrac traffic control system has reduced engine idling by 40%, delivering an estimated 20% cut in emissions. IBM’s Green Horizons project, developed in China, uses AI to produce detailed pollution forecasts up to 72 hours in advance.

Shipping accounts for 2.5% of GHG emissions and has an ambitious reduction target of at least 50% by 2050. Nautilus Labs and Stena Line are both using AI to achieve efficiencies by creating machine-learning systems that continuously monitor vessels. Meanwhile, Explicit has developed sniffer drones that can detect the gases vessels emit.

SkyBreathe, from Open Airlines, uses analytics to combine weather and flight data recorder information to help pilots fly more efficiently. AVTECH Sweden uses Met Office data to help pilots achieve optimum altitudes. A study demonstrated savings of 22kg of fuel per flight.



MOLPIX/SHUTTERSTOCK

Heider estimates his company's system could ultimately deliver a 30% cut in emissions across a fleet.

Today it's achieving somewhere between 5% and 10% just by eliminating operational inefficiencies like stopping at sea, and running at speeds that unnecessarily use extra fuel.

Weather data enables the crew to plot the optimum speed so as to arrive in port when scheduled, saving thousands of tonnes of fuel across a voyage. In turn, that allows a ship owner to advertise the real efficiency of a ship and get a better price in the market. Having accurate fuel-efficiency

AI is also being used to optimise freight flow in ports.

data cuts waste further because better decisions can be made on – for example – vessel placement around the globe to minimise distances travelled without a cargo; and routing and speed instructions.

“In the future there is so much room for improvement – radar, computer vision, vibration sensing, and gyroscopes,” says Heider.

“A lot of improvement can be achieved just by leveraging data from the sensors that already exist, and then even more can be achieved by newer, better, different sensors that are being developed.”

He suggests shipping has been slow to embrace change, partly because the technology hasn't been there to enable ship owners to easily assess whether advances like installing new rotor systems or using anti-fouling paint on the hull are having an impact. Nautilus enables them to do that.

“If we wait for the IMO to regulate carbon neutrality in the industry, there won't be any ocean left to regulate,” Heider says. “Companies need to automate decision-making to drive the scale of reduction that the world needs in the time-frame >

Companies need to automate decision-making to drive the scale of reduction the world needs in the time-frame we need it to happen

that we need it to happen. And they need the business imperative – and the tools – to do it.”

Stena Line, meanwhile, is overseeing the deployment of its own system, supporting officers on the bridge to reduce fuel consumption.

“Sailing efficiently is nothing new. For us it’s been an opportunity because more sensors on ships provide a combination of different data sources,” says Lars Carlsson, head of AI at Stena Line. “[The system] can make more calculations – taking account all the physics around a ship – than a human being can do.”

On top of that data-processing capacity sits machine learning. Carlsson says they’ve already seen a significant impact on fuel consumption since deploying the first vessel last December. The next step is to roll it out across five vessels to assess its wider impact.

Stena Line’s model still has room for improvement, and it’s possible there will be seasonal impacts. But it can be retrofitted on older ships, and payback is relatively quick, suggests Carlsson.

He adds that another application of AI is in optimising freight flow in ports. “Understanding customers – when they show up, for example –



The system can make more calculations, taking account of all the physics around a ship, than a human being can do

impacts on how we load the ship, which in turn impacts on fuel consumption.” Stena Line has an overall goal for the whole company to be assisted by AI in 2021.

There’s been widespread speculation that ship owners will try to cheat the system to cut the costs of emitting seven times less sulphur dioxide than now. At present, little can be done to enforce the IMO regulations on the high seas, but it’s a different story coming into port.

Jon Knudsen, founder of engineering company Explicit, has spent six years developing a system now being tested around Europe. Sniffer drones are guided into the plume of smoke coming from a ship’s funnel, to measure the gases being emitted. The on-board software can analyse the plume more or less in real time and send the data back to port authorities, or directly to a European reporting system that will alert EU ports to have a vessel checked out. The system is limited by the range of the drone or helicopter, but Knudsen anticipates that near-satellite technology of the type deployed last month by SpaceX, and longer range drones could address the challenge.

But for now, the technology can ensure ships comply with even lower limits of 0.1% sulphur dioxide (SO₂) in port.

Knudsen anticipates an improvement in air quality in coastal cities such as his native Copenhagen, where pollution levels can breach EU thresholds. Nitrous oxides are a particular problem, and while there’s no legislation to punish high NO_x production, authorities can use the information to assess the impact of shipping.

If ships don’t use low sulphur fuel, they’ll have to install scrubbers – and that has given rise to concern that crews will simply switch them off at sea. But scrubber usage is meant to be logged during a voyage – a paper print-out can be inspected by port authorities.

Heider suggests that, in time, Nautilus Labs’ technology could be deployed to assess whether the scrubbers provide real value. >

Explicit’s sniffer drones are being used to measure gases emitted by a ship’s funnel.



EXPLICIT

He expects AI to create “deeper accountability and transparency: that’s the transformational change we hope to drive.”

AIR TRANSPORT

Stig Patey is a pilot with Norwegian whose role is to find the technologies that will help the airline cut its fuel emissions. It’s the pilot who controls fuel consumption across a flight, and Patey finds some routinely burn more fuel than others.

Norwegian is using a system called SkyBreathe, from Toulouse-based Open Airlines, which uses big data analytics to combine flight data recorder information with weather information – and uniquely gives the pilot the full picture to enable them to review their flight in 3D and learn to operate future flights more efficiently.

“We can also see if it was a weather or air traffic control issue that prevented them from operating most efficiently,” explains Patey. For example: coming out of one European airport, the system enabled him to see that the fuel burn was consistently greater than expected.

It turned out the airport had a complex set of instructions on when wing flaps – which provide extra lift at take-off – should be retracted, leading to pilots holding off until a much higher altitude than necessary to pull them in.

This insight led to flaps being retracted earlier, cutting drag on the plane so less fuel was burnt. Getting clearer instructions would have had benefits not just for Norwegian, but for all airlines using the airport. Patey is optimistic that SkyBreathe can deliver a 2% reduction in carbon emissions in the first year.

Other airlines have reported larger reductions, he adds, but Norwegian already has a modern fuel-efficient fleet.

Its pilots can also see how they fare compared with each other; and how well and how frequently they apply fuel-saving best practice. The system shows the actual conditions the crew encountered so that if, for example, there was ice on the runway,



NORWEGIAN

Norwegian uses SkyBreathe, which combines flight and weather data to enable more fuel-efficient flights.

the pilot doesn’t get any credit for putting efficiency ahead of safety.

Two years ago, the airline began a research project, part-funded by the Swedish Energy Agency, to use a system that delivers real-time weather forecasting and temperature data in flight.

Developed by AVTECH Sweden, the system uses data from the UK Met Office’s powerful supercomputers, which take over 200 billion weather observations a day. The crew receives high-resolution weather data just eight minutes into the flight, helping pilots achieve optimum cruising altitudes as well as the most favourable point from which to begin the descent. Hitherto, they’d been using forecasts up to 10 hours old.

The study demonstrated savings of 22kg of fuel per flight. Over a year, that could mean a cut in carbon emissions of 16,000 tonnes. Norwegian is still analysing the impact of AVTECH’s system over the longer term: even if the decrease in fuel burn was achieved on just 10% of flights, that would be an improvement, suggests Patey.

The two companies are now working on optimising the climb phase, which presents a different challenge given varying gradients of temperature and wind speeds as the aircraft ascends. ■

“Norwegian’s pilots can see how they fare compared with each other; how well and frequently they apply fuel-saving best practice

How AB InBev is using blockchain to improve the lives of smallholder farmers

Terry Slavin reports on BanQu, a platform based on widely accessible SMS technology that is bringing transparency to the ‘last mile’ of global supply chains

 [VIEW ONLINE](#)

Social entrepreneur Ashish Gadnis got the idea of BanQu, a platform that uses blockchain to help fight poverty among the millions of smallholder farmers in corporate supply chains, while working on USAID’s volunteer CEO programme in the Democratic Republic of the Congo.

Gadnis, who emigrated to the US from India at the age of 26, came from a poor background in Mumbai, but was unprepared for the levels of poverty, inequality and violence he saw in DRC.

The real shock, however, came when he witnessed someone in a local bank tell a female cocoa farmer, who had been working several years in the supply >



BanQu’s blockchain platform is helping farmers like Grace Mokos in Uganda to create an economic identity.

chain of a major brand, that she could not get credit because she didn't have proof of her economic history.

"The guy said [to us both]: 'I can't bank her, but I can bank you.'"

Gadnis tells the story to explain how he came up with both the name and the concept for BanQu, a non-cryptocurrency blockchain platform based on widely accessible SMS technology that aims to bring transparency to what it calls the "last mile" of global supply chains.

"It was like a punch in the gut," he recalls. "I realised that despite the fact that we consume the coffee and cocoa they produce and wear the jeans they make, the people who work very, very hard in global supply chains, [effectively] don't exist," because they lack a verifiable economic identity.

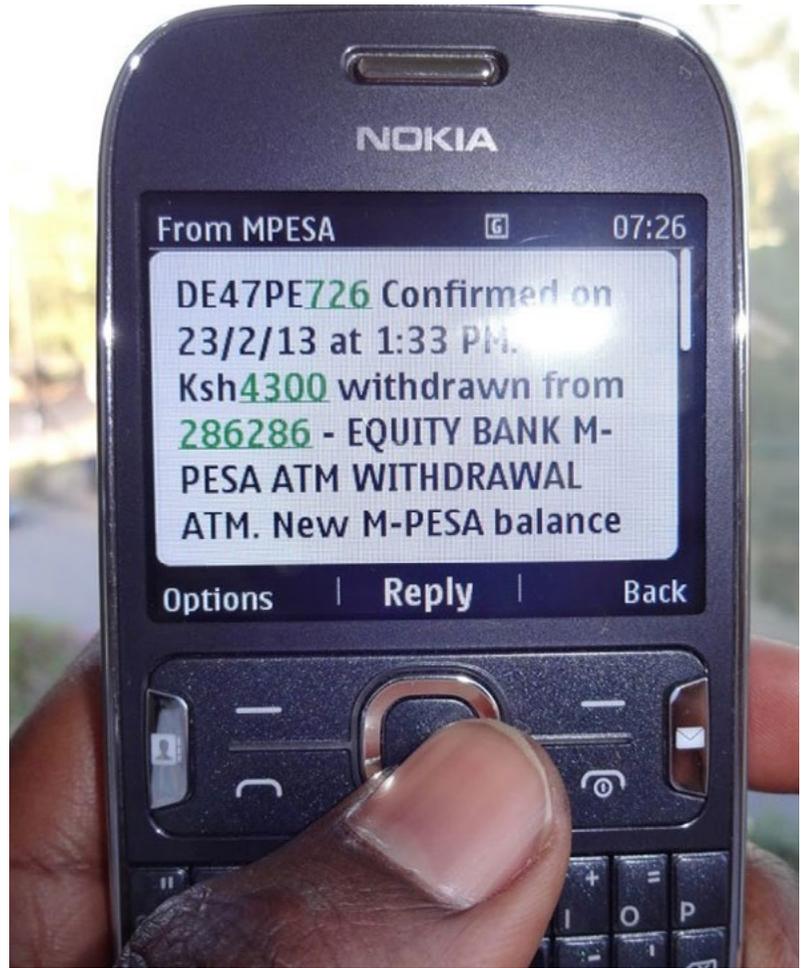
Gadnis quit the USAID programme to go back to the US, where he developed BanQu with two other partners in 2016. One of them, Hamse Warfa, had spent three years in the Dadaab Refugee Camp in Kenya and was aware that many of the people he left behind in the camp would languish there because they can't prove a single thing about their past histories.

With nearly 2.7 billion people worldwide lacking access to credit and services due to a lack of an economic identity, Gadnis sees great potential for the technology to be used by NGOs and governments.

The technology is being used to give [Syrian refugees in Jordan](#) economic identities, and by the Inter-American Development Bank in Costa Rica to help young people verify their academic qualifications.

But the biggest take-up of the technology, which is now in 13 countries, has been by brands, including Anheuser-Busch InBev and Mars Inc, which want to help improve conditions for the smallholder farmers in their supply chains.

Katie Hoard, global director of agricultural innovation and sustainability at AB InBev, said they turned to BanQu last year, after the company



The BanQu platform utilises widely available SMS technology.

set a goal to have 100% of the estimated 20,000 smallholder farmers in its direct supply chain "skilled, connected and financially empowered" by 2025.

"First we needed to know who those farmers are," Hoard says. That necessitated a level of transparency we didn't then have in our supply chain."

She points to problems this has caused in Uganda, where AB InBev had been sourcing local crops like cassava and sorghum for its locally produced beers for years. While the brewing giant would set a price for aggregators to pay farmers, it discovered that farmers were often not getting the full price.

Under the BanQu system, which AB InBev piloted in Zambia last year, the 2,000 cassava farmers registered on the platform have to produce an ID card and a basic SMS phone. Then when they sell a bag of cassava to the aggregator, they get a SMS message confirming the price, weight and pay-out – data that is also shared with AB InBev.

"Before the farmers had no way of proving they were farming in the AB InBev supply chain. Now they have this digital ledger and banks can now provide them financial services," Hoard said. >



I realised that the people who work very hard in global supply chains, effectively don't exist because they lack a verifiable economic identity



Now farmers can pay for a solar home system or their kids' school fees. That's an ecosystem they have never been able to participate in before

AB INBEV

As part of the Zambia pilot, AB InBev partnered with mobile phone company Airtel Africa and mobile money service MTN, which provided discounted phones and free Sim cards to farmers, and boosters to network connections in buying locations.

Farmers can now have payments put straight into bank accounts instead of having to be paid out in cash – something that was particularly dangerous for women, who were most vulnerable to attack when travelling home with their earnings.

Gadnis remembers when the first woman farmer saw the credit in her mobile money account. “She started laughing and said ‘Now I have mobile money I can pay for a solar home system and the kids’ school fees.’ ... That’s an ecosystem that she’s never been able to participate in before.”

Hoard said BanQu has only been operating for a year in Zambia, so it is too early to fully quantify its impact, but the company has already started rolling out the system with 2,000 barley growers in Uganda, after BanQu joined its 100+ Sustainability Accelerator programme, and it will be extended to 4,000 farmers in its Indian supply chain by the end of this year. Hoard said further expansion, to 8,000 farmers in its Ugandan sorghum supply chain, is in prospect.

BanQu co-founder Ashish Gadnis with smallholder farmers working for AB InBev.

Not only is the transparency BanQu offers beneficial to farmers, it is driving operational gains for AB InBev, she says.

“We now have full visibility of when the crop is moving through our system until it arrives at our facility,” says Hoard. “I can log into the system from anywhere in the world and see who is selling to us and the price they are receiving when they deliver their crop.”

But she emphasises that blockchain technology is not a cure-all for supply chains. “Just by implementing blockchain you don’t get transparency and all the benefits. It’s not the blockchain [that’s transformative], but the partnerships it allows.” ■



Terry Slavin
is editor of Ethical Corporation

TNC scientists have created algorithms that value global treasures such as coral reefs.



BIGGER, FASTER, SMARTER

WELCOMIA/SHUTTERSTOCK

What the conservation movement can learn from the tech Industry

By [Sherri Hammons](#), chief conservation technology officer of The Nature Conservancy

 [VIEW ONLINE](#)

FROM  The Nature Conservancy

W

e need a little disruption in the conservation world. And we can learn a lot from the tech industry about how to do that. The startup mentality offers a model for how to change the way we approach conservation so we are able to scale our solutions at a much faster pace.

Consider: the world's population is expected to grow to 10 billion by 2050, and [recent reports](#) show the [world has just 10 years](#) to make the significant changes required to [put us on a more sustainable path](#).

Business as usual won't lead to a sustainable future, but neither will our usual solutions. We need to get bigger, faster and smarter with our conservation efforts.

In fact, the conservation world can learn a lot from the tech sector about experimenting, innovating, and scaling at a rapid pace. Tech companies move quickly and take risks, learning from their mistakes and iterating until they find a marketable solution. And there is certainly a market for sustainable solutions.

This is the motivation behind the [Techstars Sustainability Accelerator](#). In partnership with The Nature Conservancy (TNC), Techstars works with for-profit entrepreneurs with commercially viable technologies that can rapidly scale to help sustainably provide food and water, and address global issues like climate change.

Each year, the programme accepts a new group of innovative, technical minds who are focused on addressing the most intractable problems facing our



THE NATURE CONSERVANCY

A conservationist deploys an acoustic recorder in the forest. The recorder collects sound data, which scientists can use to measure biodiversity.

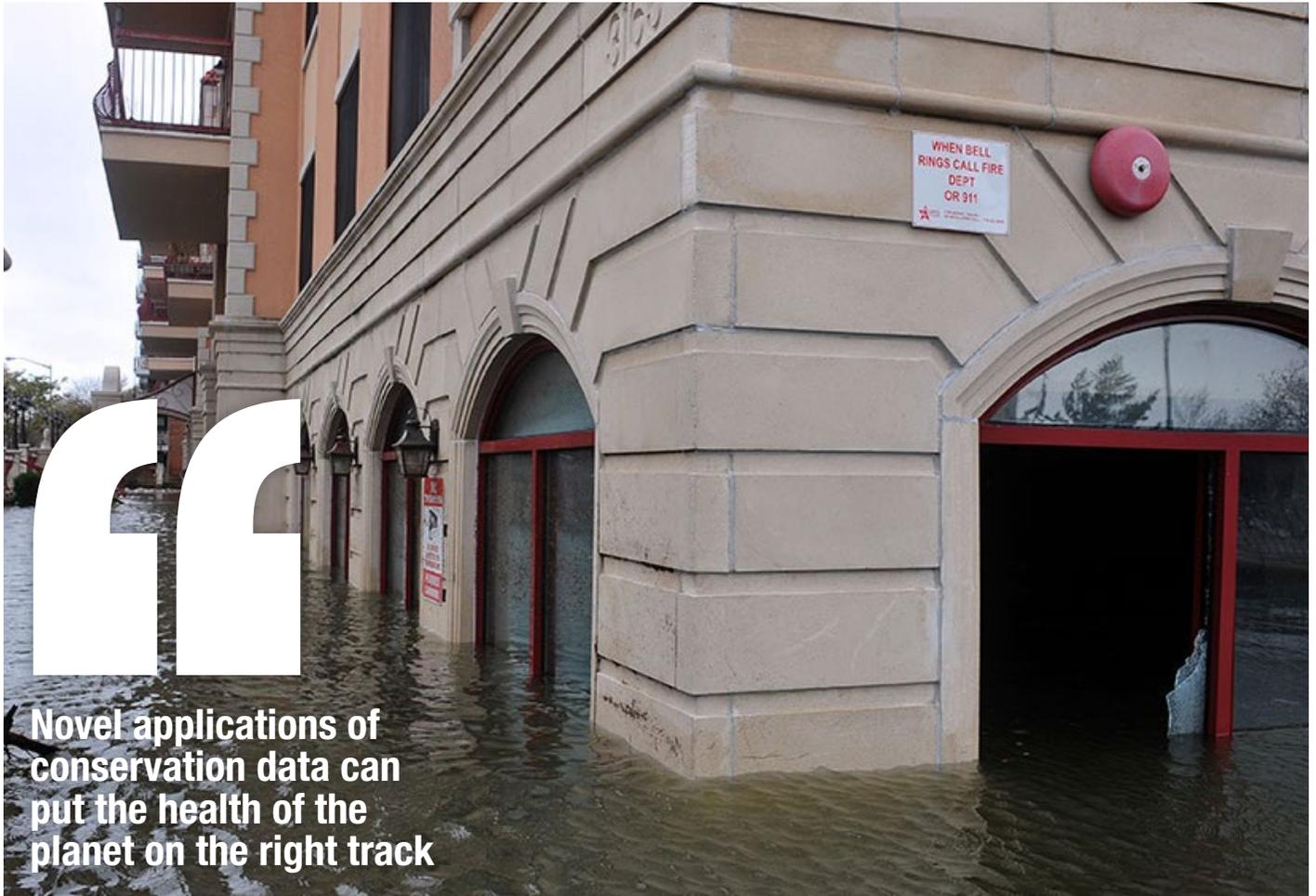
planet today. These innovators receive mentorship and support for their efforts during a three-month intensive accelerator.

TNC's expert mentors bring years of on-the-ground experience and a wealth of scientific data from their work on conservation and sustainability challenges. The Techstars entrepreneurs, meanwhile, bring fresh ideas about how to apply all this science and data to create smart solutions for solving the growing challenges facing our planet.

Data-sharing has long been key to innovation: what better example is there than the evolution of navigation systems? It requires a lot of data to route you from home to office in the most efficient way – there's the actual map, but also live traffic information, pins to flag your favourite coffee shops and calendar information to ensure you make your next meeting on time. As they've migrated from >

“

Tech companies move quickly and take risks, learning from their mistakes and iterating until they find a marketable solution

FROM  The Nature Conservancy

Novel applications of conservation data can put the health of the planet on the right track

dashboards to palms, each iteration of these tools has made it easier for the navigator to apply more data to the trip-planning experience.

Novel applications of conservation data can do more than change our day-to-day for the better; they can put the health of the planet on the right track. TNC has already initiated projects with several of the startups from the first class of the Techstars Sustainability Accelerator, such as a collaboration with StormSensor to create smart urban watersheds, using its sensors to establish baseline flow conditions and measure the impact of green infrastructure. StormSensor provides the data needed to track, predict and prevent stormwater pollution and flooding in real time, allowing cities to better manage water resources.

Another successful example is FlyWire, a company that is addressing seafood traceability by working with fishers and seafood suppliers to provide at-sea verification of sustainable fishing efforts. FlyWire has developed a low-cost electronic monitoring system that can record HD video, is linked to GPS, and has the ability to obtain quality data where none is currently collected.

StormSensor tracks flooding in urban watersheds, such as occurred in Brooklyn during Superstorm Sandy.

THIS ARTICLE IS SPONSORED BY THE NATURE CONSERVANCY, WHICH RETAINS EDITORIAL RESPONSIBILITY FOR ITS CONTENT

The Nature Conservancy 

Meanwhile, TNC is launching its own technical initiatives in-house. One top priority is the creation of an open-data platform for the sharing of public conservation data. But data is just the beginning. With the advent of artificial intelligence, environmentalists can leverage data along a time continuum to begin to measure impact and start to simulate the future in real time. Machines can be trained to proactively communicate when natural areas are declining around the world. Or better yet, communicate when conservation interventions are improving a natural habitat or fishery.

TNC scientists have created a variety of algorithms that, for example, value carbon sequestration or global treasures such as our coral reefs. The next step is to put these algorithms to work across the world at scale – and that will likely require partners in the private sector.

It's time that action for the planet moved at the pace of Silicon Valley. And as two sectors where problem-solvers thrive, tech and conservation may just be a natural partnership that's uniquely suited for today's greatest challenge: building a world where nature and people thrive. ■

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Hugh Welsh

President & General Counsel



Satya Tripathi

Assistant Secretary -General



Kristina Kloberdanz

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A woman with long brown hair, wearing a red textured sweater, is seen from behind with her right hand raised. She is in a room with other people, some of whom are blurred in the background. A man in a dark suit is visible in the upper right background. The overall scene suggests a professional or educational setting.

Making way for
WOMEN IN TECH

TECH'S MISSING WOMEN PROBLEM

With females making up just 17% of the tech industry, [David Craik](#) reports on initiatives in the UK to become more inclusive and why the sector needs a cultural change

 [VIEW ONLINE](#)





FIZKES/SHUTTERSTOCK

When you think of the world's most prominent tech boffins which images come to mind? The t-shirt-clad Mark Zuckerberg, the bespectacled Bill Gates or the wild stare of Elon Musk?

Apart from their genius and great wealth the most obvious trait the three share is that they are all male. Indeed, the tech sector is failing badly when it comes to gender equality.

According to a report from Inclusive Tech Alliance, women make up just 12.6% of board members and 16.6% of senior executives in the UK's top 500 tech firms. This compares with 30% amongst FTSE 100 firms.

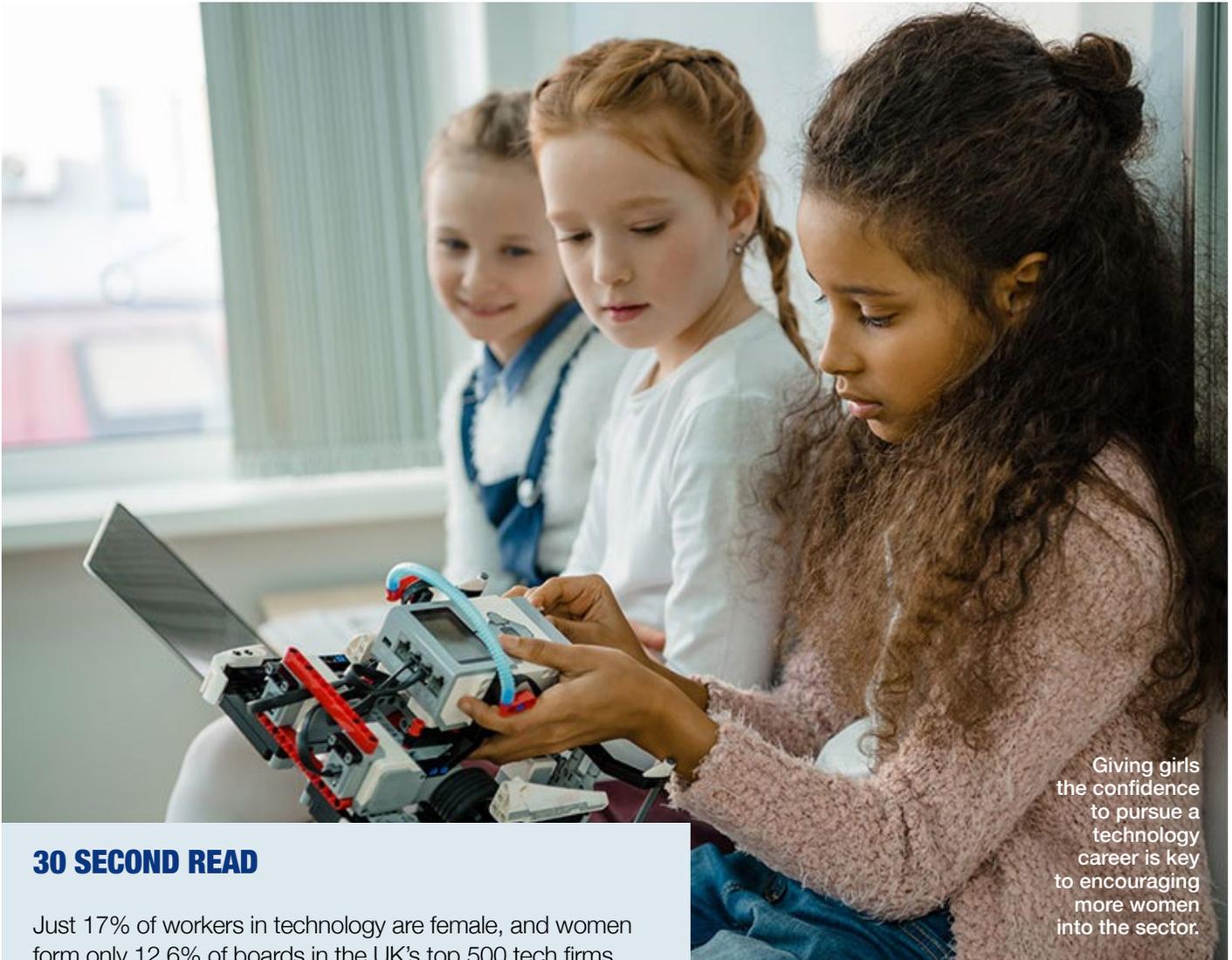
Another recent study from Women in Tech revealed that only 17% of workers in technology are female, with just 7% of girl students taking computer science A-levels.

Firms are being encouraged to redress this balance not just on a moral level, but because it makes business sense. A Credit Suisse report from 2016 stated that firms with at least 15% of female senior managers were 50% more profitable than those with fewer than 10%.

“One of the benefits of diversity is you get a wider range of views around the boardroom table,” says Rina Goldenberg Lynch, founder of gender inclusion consultants Voice At The Table. “In the technology sector you must have this diversity to innovate. If you are under-representing the needs of half the population then it will narrow what you create, how you design and market your products. You need to reflect society.”

Diversity will also help firms recruit the extra 1 million digitally skilled workers needed in the >

Under-representing women narrows what tech can create.



Giving girls the confidence to pursue a technology career is key to encouraging more women into the sector.

LIGHTFIELD STUDIOS/SHUTTERSTOCK

30 SECOND READ

Just 17% of workers in technology are female, and women form only 12.6% of boards in the UK's top 500 tech firms. Only 7% of girl students take computer science A-levels.

To encourage women, and help recruit the extra 1 million tech workers needed in the UK by 2020, cultural change is vital. The Tech Talent Charter encourages companies to deliver greater diversity in their technology workforce and has over 330 signatories. Policies include having women on job shortlists and re-thinking wording on job descriptions.

At SysGroup, 50% of the management and 40% of the workforce are female. SysGroup works with InnovateHer, which encourages girls aged between 12 and 16 to pursue a technology career.

Attracting investment is difficult for female startups; in 2018, 93% of venture capital funds went into all-male founders in the European tech sector. Redressing the balance is Angel Academe, which has invested in 25 tech startups with at least one woman in the founding team.

UK by 2020. “If you continue to fish for skills in the same small pond you will struggle. To attract more female talent you need to show that they will be treated equally and get every opportunity to contribute,” says Goldenberg Lynch.

CULTURAL CHANGE

So, what is and can be done to increase female representation?

Voice At The Table says cultural change is vital. “You need to create an environment which is friendly to women,” says Goldenberg Lynch. “We work with companies to make them more cognisant of what inclusive behaviours are. Part of that could be through reverse mentoring, so women working with men and showing them what they encounter in their role. Unconscious bias, where people may favour someone who looks like them or shares their values when hiring, setting tasks or promoting, must also be tackled.” >



We need more women in tech firms but also in any company using tech, such as banks or broadcasters

The cultural change must be led from the top – at present mainly males. “Yes, there is the business case behind diversity but it is also about fairness and leaving a better world for your daughters or nieces,” she says.

The **Tech Talent Charter (TTC)** has, since 2017, been at the forefront of fostering leadership and cultural change. It encourages companies from corporates such as Deloitte and BT to small to medium-size enterprises to sign up to its charter and deliver greater diversity in their technology workforce.

To date, over 330 signatories have agreed to a series of pledges, including having women on job shortlists, actively encouraging women to apply and having employment policies to aid retention. They must also work collectively to share and implement best practice such as engaging with schools or training mums.

“Five years ago, you had to work hard to show companies that there was a diversity issue in technology. There is now increased buy-in from the top table. They see that it is not just the right thing to do, it is smart business,” says Debbie Forster, chief executive of the TTC. “We need more women in tech firms but also in any company using tech, such as banks or broadcasters.”

She says the process is working, with its member firms typically 9% ahead of average female representation in tech.

“There is no single bullet, but it is getting the inclusive culture right, offering more flexible working hours and part-time roles to retain and recruit,” she states. “It is about re-thinking how you word your job descriptions, your recruitment channels and retraining people from other sectors.”

One TTC member is insurance firm Aviva. It has created Women in Tech under the guidance of programme director Freya MacLachlan to improve the number of women in its IT department.

“We want to get new female talent in and drive further innovation,” she states. “We already have



Cerys Johnson, chief executive of REPL Group, winning a tech award last year.

a great flexible working system and provide equal paid parental leave for males and females. On unconscious bias we have rolled out a mandatory balanced selection process requiring all new hires to meet with a man and woman at some point during their recruitment process. We also have a number of other initiatives, such as stretch assignments – where an employee tries out a role at the grade above to see if it suits them, before being formally appointed – mentoring and job shadowing opportunities.”

When hiring, it uses tools such as Textio to support gender-neutral job adverts and is currently working on developing a Women in Technology landing page for its careers website.

“We are also launching a Women in Technology internship scheme this year and will have seven women in their second year of university joining us,” says MacLachlan. >

REPL GROUP

Further down the road on tech diversity is managed service provider SysGroup. It has a 50% female management team and 40% female workforce. “It is an unusual ratio in our industry,” says group marketing director Emmy Lippold. “We have a very inclusive culture where decisions are based on talent and work ethic. We want to get the best person for the job no matter if they are male or female. We’ve found that our diverse culture has driven our growth and innovation in solutions and marketing.”

WOMEN IN THE TECH PIPELINE

She acknowledges that finding female talent isn’t always easy in the tech sector so is also encouraging the next generation to consider it as a career.

SysGroup works closely with organisations such as InnovateHer, which aims to give girls aged between 12 and 16 the “self-belief, confidence and skills” to pursue a technology career. It includes an eight-week after-school programme where girls can work with and learn from industry role models.

Computer group Lenovo has also improved its gender ratio through its global Women in Lenovo Leadership (WILL) development programme. Of its executives, 18.7% are women – up by a third in the last four years. Overall, it has a 35% female workforce.

On recruitment its managers are encouraged to seek out diverse candidates and it is also using AI tools to analyse job descriptions and suggest changes to help them appeal to female candidates.

“There are two ways to impact representation of female executives namely the internal talent pipeline and hiring externally,” explains Seth Smiley-Humphries, director of global diversity & inclusion at Lenovo. “We focused on advancing high-potential females working internally and overcoming workplace biases such as lack of visibility or being given key assignments. It also includes mentoring, coaching, working with senior leaders and improving communication skills.”

On external hires it began by analysing its recruitment data such as who had applied for roles and who had been interviewed. “We trained our talent acquisition team on unconscious bias and having conversations with managers on diversity inclusion,” he states. “We also focus on diverse slates because if you never interview women how are you ever going to hire one? One area we are looking to do more in is hiring women from other sectors, so based on competency rather than direct experience.”



We want to get the best person for the job, no matter if they are male or female

Women changing the face of tech. (clockwise from top) Freya MacLachlan, Debbie Forster, Emmy Lippold.

Cerys Johnson, chief executive of the REPL Group, made such a shift moving from an early career in accountancy to the tech world. “My degree was in physics, where I was the only woman on my course, and I then spent 15 years in finance. I moved into project management and became more aware of technology,” she recalls. “I came to REPL as a project manager and worked through the roles to chief executive. People here have been incredibly supportive. That includes being offered flexible working when I became a parent.”

This experience has given her the passion to encourage more women into the sector. “If a company nurtures you in the right way then the possibilities are limitless,” she states. “Being a company with a female chief executive makes you more interesting to potential female candidates. I can engage with them and tell my story.”

REPL makes online female tech communities aware of new roles a week or so before they are advertised more generally, and has taken away aggressive recruitment wording such as “assertive and analytical” and replaced it with “creative and responsible”. >



SFIO CRACHO/SHUTTERSTOCK

“

Tech builds and affects everything. With AI and machine learning we have to make sure as women that the creators of devices reflect all our lives

REPL has also hired women with no tech experience or qualifications and through a buddying scheme, and on-the-job training has helped them to build lengthy careers. In the last 12 months, female representation has risen from 25% to 34%.

INVESTING IN WOMEN

One alternative is to launch your own business, but even here females appear to be treated differently. According to a recent report into the European tech sector by Atomico, 93% of venture capital funds went into all-male founder teams in 2018.

One person trying to address this is Sarah Turner, co-founder of investment network Angel Academe, which invests in tech startups with at least one woman in the founding team.

“I have seen female tech entrepreneurs in front of male investors and it can be distinctly uncomfortable,” she says. “They just aren’t taken as seriously as their male counterparts. There are perceptions that women set up beauty firms not tech.”

Angel has, to date, invested in 25 firms, including stress-reducing wristband Doppel. “This is about

Angel Academe invests in startups that have at least one woman in the founding team.

proving that women can build tech businesses, are ambitious and confident,” Turner says.

It is a positive message taken up by Forster of TTC. “Tech builds and affects everything. With AI and machine learning we have to make sure as women that the creators of devices reflect all our lives,” she says. “We can’t just sit back and see what comes off the conveyor belt. We have to go in and shape these ideas.” ■



David Craik has been a freelance journalist for 15 years. He writes business news and feature articles for a variety of national newspapers and magazines.

Speed-mentoring initiative Rebus will help tech women get a hand up the ladder

By Terry Slavin

 [VIEW ONLINE](#)

Opening up mentoring opportunities to help women ascend to senior positions in tech is the idea behind the Rebus programme, which will be launched in the autumn by BT, Avanade and global executive search firm Odgers Berndtson.

This initiative will mirror another female leadership mentoring scheme that has been running since last October in the hospitality industry. Plan B, supported by UK Hospitality, Odgers Berndtson, BT Sport and catering industry consultants Elliotts, provides a series of speed-mentoring events to introduce mentors to mentees. The schemes provide a framework for them to connect on a regular basis in ways that work for them, such as through a monthly coffee or Skype call.

Holly Addison, head of consumer digital and telecoms at Odgers Berndtson, said the goal of the programme is to provide women who want to be considered for top executive and board roles with high-quality mentoring, advice and motivation by matching them up with objective mentors.



FIZES/SHUTTERSTOCK

This is particularly valuable for women working in smaller companies, she said, where formal support may not otherwise be available.

Addison said speed-mentoring events would be held every month. Like the Plan B events, 15 potential mentors and the same number of mentees will be invited to attend. They will then whizz through a series of 15-minute meetings to see who is best able to strike up a connection.

In the Plan B events held so far, Addison said, only two mentees were unable to find a suitable mentor.

Addison said about 200 potential mentors have been lined up, their gender split roughly evenly between men and women. All have been asked to nominate a woman they believe would benefit from mentoring, to build up a bank of potential mentees.

The idea for the mentoring programme came out of a recognition “that all the women we met who have broken through [to senior leadership roles] have at some point had either formal or informal mentoring,” Addison said. “We want to help facilitate that.” ■

The Rebus scheme matches women looking for executive roles with high quality mentors.



HOW ASIA'S FEMALE ENTREPRENEURS ARE RESHAPING TECH FOR GOOD

KAKOLI DEY/SHUTTERSTOCK

Jill Baker speaks to four female founders of early-stage tech companies who have beaten the odds of women receiving 2% of global venture capital

 [VIEW ONLINE](#)

The tech industry has a gender problem, with the World Economic Forum finding that women comprise only 22% of workers in artificial intelligence. The AI skills gender gap may hinder women’s preparedness for the workforce in the future, since AI skills are in high demand.

And given AI’s potential to fundamentally disrupt societies, there is an acute need to ensure that those tasked with its development reflect humanity, rather than an elite bunch of “brogrammers” in Silicon Valley or China’s Greater Bay Area.

Female leadership of tech companies could also be critical to delivering the Sustainable Development Goals. The Business and Sustainable Development Commission’s [WomenRising2030](#) report suggested that businesses run by women are more likely to offer goods and services to communities with limited access to financial products and to prioritise the tackling of environmental issues. (See [Why women can lead the way on achieving the Global Goals](#))

Yet with women currently receiving only 2% of global venture capital, female entrepreneurs are up against huge odds. Ethical Corporation spoke to four Asian female founders of early-stage companies who have beaten those odds to develop businesses that use technology to address problems of inequity across a range of areas; in access to capital and healthcare, or in redressing the power imbalance between banks and consumers. Each is, in her own way, a resounding success.



MONKEY BUSINESS IMAGES/SHUTTERSTOCK

Businesses run by women are more likely to prioritise tackling of environmental issues.

Pocket Sun is co-founder of [SoGal Ventures](#), a global next-generation venture capital firm that invests only in companies founded by women.

Sun, who was born in China but lives in Singapore, got the idea for a venture capital firm focused on funding women early in her career. “Working in venture capital, I found I was often the only woman in the room,” she said, “and that did not feel good. So, I started to get women together to talk about it. I soon found women needed more than a community; they desperately needed access to capital.”

Sun and her business partner Elizabeth Galbut, who met at Stanford University in a venture capital programme, both saw women-run businesses as an under-served and potentially highly profitable niche. “We thought, ‘this is not just a feel-good >

“Working in venture capital I found I was often the only woman in the room. But women need more than a community. They need access to capital



Doctory, founded by Maliha Khalid, provides access to health workers in Pakistan.

DAVID TALUKDAR/SHUTTERSTOCK

opportunity, but a super-lucrative blue ocean for us to dive into.” Sun references a 2018 study from BCG showing that female-run startups, though initially only able to raise less than half the venture funding as male-run startups studied, were found to earn 2.5 times more per dollar invested.

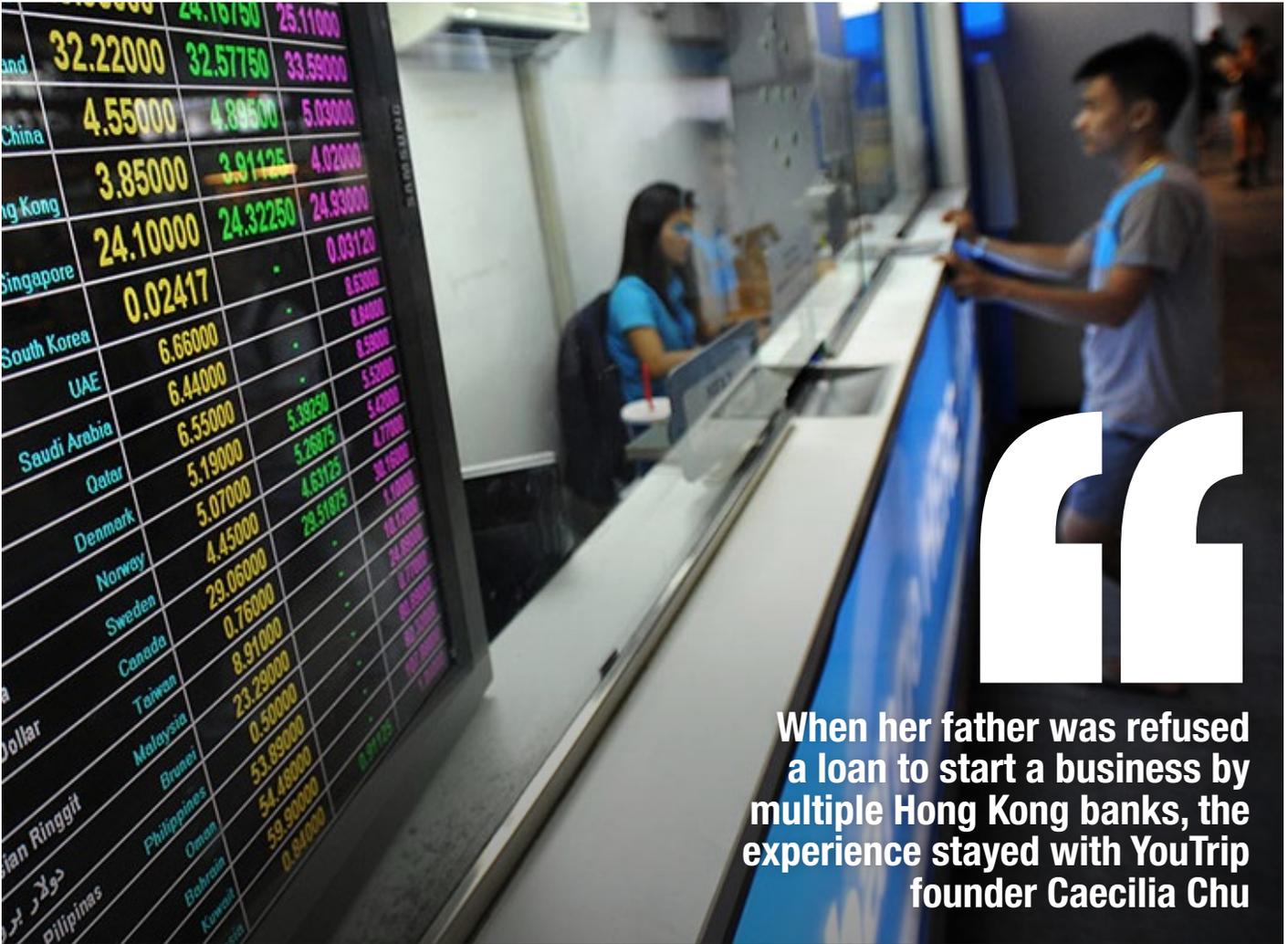
By cherry-picking investments in their \$15m fund from what Sun calls “the 2% pool” Sun’s “female arbitrage”, as she refers to it, is beating industry averages. In venture capital, she explains, typically about 30% of seed-stage funded portfolio companies survive and are able to get to the point of raising outside capital. SoGal’s fund is doing much better. “In just two years, 80% of our companies have raised additional capital and garnered higher valuations ... It is a much better venture model.”

What does Sun think is driving this better performance? “Women are the largest minority in the world. When you are a minority you have to be so much better, you have to work so much harder to get to the same place, to gain the same level of respect. So, for women, they have to prove themselves with solid metrics, and numbers, and traction to even get to an investor meeting.”

Maliha Khalid, founder and CEO of Doctory, started the company to provide better healthcare information and access in her home country of Pakistan. When she was young, she experienced fainting spells, and was anguished by her own mother’s struggle to find her the right doctor. She recounts a bad joke currently circulating: “A patient walks into a hospital in Kashmir, and finds it deserted, with only a recording playing that says: ‘If you need to see a doctor, go to Islamabad.’” >



Women are the largest minority in the world. When you are a minority you have to be so much better to get to the same place



When her father was refused a loan to start a business by multiple Hong Kong banks, the experience stayed with YouTrip founder Caecilia Chu

1000 WORDS/SHUTTERSTOCK

Despite having the sixth-largest population in the world, Pakistan ranks 154, behind Ghana and just ahead of Laos, in the Lancet’s [Healthcare Quality and Access Index for 195 Countries](#), and at 52 out of 60 countries in the Economist Intelligence Unit’s [Global Access to Healthcare Index](#). Successive IMF bailouts have resulted in healthcare cutbacks in all but major cities. Compounding matters, recent high-profile cases of [medical malfeasance](#) and fraud have reduced trust in doctors.

Khalid’s initial research showed that “one patient has to go through five different doctors before getting the right diagnosis. Seventy percent of the population is rural and has to travel five to six hours to get to a doctor. Many have lost touch with the primary healthcare system,” she said.

Through Doctory, Khalid wants to improve healthcare access in Pakistan, and iron out the kinks of long wait times to see a specialist. Available online and through mobile phones, Doctory connects users with its network of high-quality physicians. During an initial consultation, which

YouTrip helps travellers avoid foreign exchange fees.

is free, users speak with a qualified Doctory physician. Based on the person’s health needs, the patient will then be referred to a specialist, and their appointment is scheduled in the same call. Doctors, vetted using peer review and client feedback, pay a subscription fee for referrals. The system works well for both sides, as the process of triage and referral is streamlined by the initial consult.

In 2017, Khalid travelled to Berlin to attend Vodafone Institution’s [F Lane](#), a seven-week “accelerator” programme for high-potential digital impact ventures focusing on female empowerment. “Pakistan is at a place where India was 20 years ago in terms of tech and innovation,” Khalid says. “We don’t yet have mentors who have had the experience of building a billion-dollar company.” Khalid says her two months spent in Berlin helped her fill that knowledge gap.

Officially available in December 2018, Doctory has already taken more than 5,000 calls and scored an average 4.5 out of 5 in customer satisfaction surveys. On its first day in business, one of Khalid’s >

colleagues went on a local radio call-in show. By the end of the day, five more doctors had joined the single original doctor doing customer care. Recently, the colleague went on the radio again. “Users kept calling in and praising the service, they said, ‘for the very first time, the doctor gives me respect and does not hurry the conversation.’”

That is the entire thing. We wanted to bring that element of respect and trust back to healthcare,” she said.

Caecilia Chu is CEO and co-founder of YouTrip, a Singapore-based multi-currency travel wallet that helps travellers to avoid foreign exchange fees. She grew up in Hong Kong in public housing, and attended Wharton and Harvard on academic scholarships. “When I was young, my Dad was a postman, and my Mom was a kindergarten teacher. We used to live month to month.” When her father was refused a loan to start his own business by multiple Hong Kong banks, the experience stayed with her.

Years later, when she was working at Citigroup overseeing technology and consumer growth investments in Southeast Asia and China, she decided to quit her job to start YouTrip, a next-generation product that would give people more control over their money.

With YouTrip, users create their travel wallet by prepaying up to \$3,000 onto a Singapore-dollar-denominated Mastercard, co-branded with EZ Link, the Singaporean contactless payment system. As part of the Mastercard network, the card is accepted at over 30 million merchants worldwide. The card is paired with an app for a no-fee currency exchange service for 10 currencies, and overseas payment service for over 150 currencies.

The traveller avoids foreign exchange transaction and currency conversion fees, and YouTrip gets paid a small piece of every transaction by the merchant. After the trip, users can convert unused currencies back to Singapore dollars, also at no cost, alleviating the problem of unused foreign currency left to moulder in a travel wallet.

In May, YouTrip raised \$25.5m in a pre-series A funding round, the largest raise for a fintech company in Southeast Asia, according to Reuters. It will use the funds to enter one or two new markets in Southeast Asia in the next 12 months.

Asked whether being a woman helps or hinders her, Chu says: “Actually, I do not feel that gender plays a role at all, and that women stand exactly the same opportunity. I literally don’t feel any



Using tech for good (clockwise from left): Pocket Sun, Sogal Ventures; Maliha Khalid, Doctory; Caecilia Chu, YouTrip; Dorothea “Dot” Koh, Bot MD.

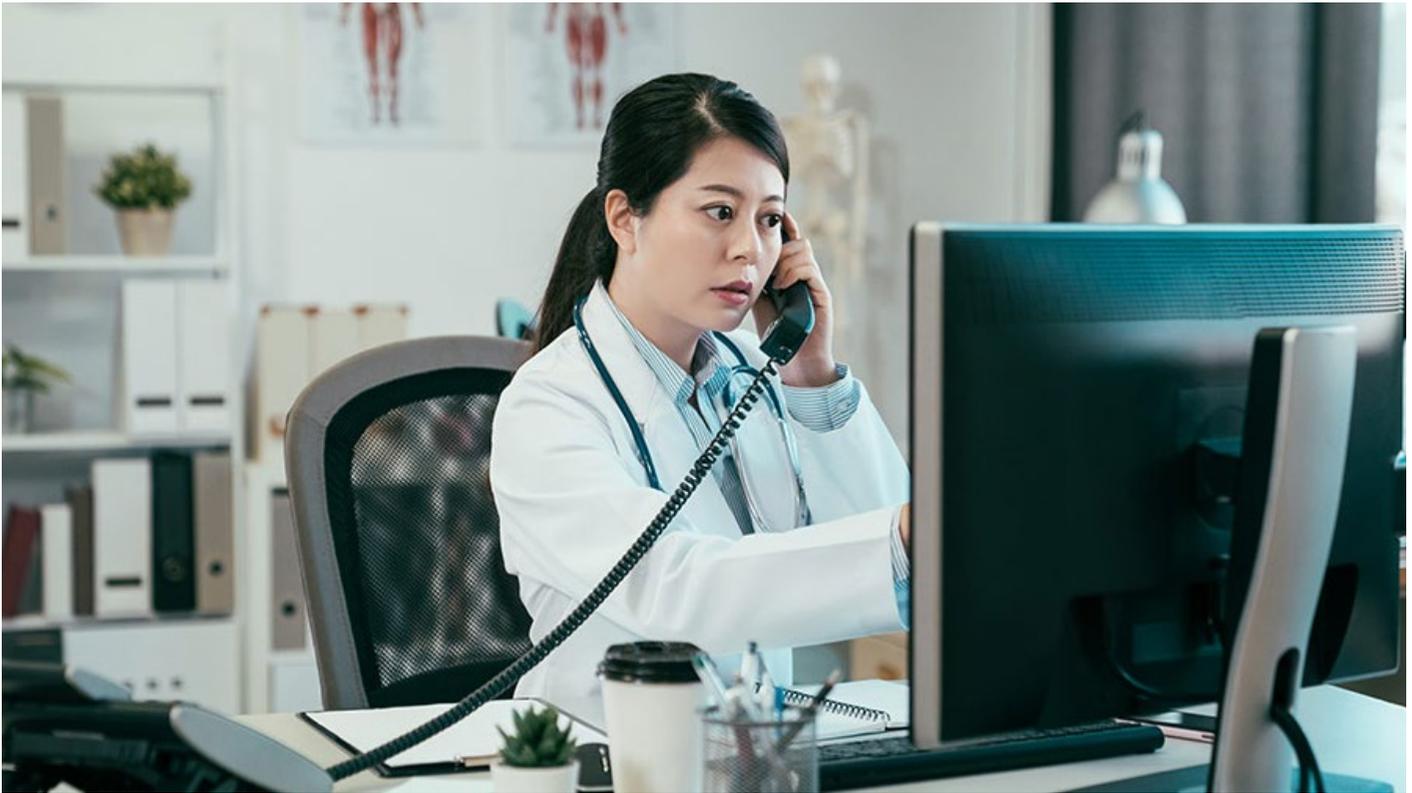
difference, in business, in technology, in discussions or negotiations.”

The gender lens notwithstanding, Chu talks honestly about the demands she faces daily. “Work-life balance? I can’t do it. But I’m at peace,” she laughs. “I am a mother of two children, my son is five years old and my daughter is three. I am a daughter, an in-law, a wife. That already takes up 150% of my time. I work very hard to keep myself sane. I’ve come to the realisation that I just can’t have it all – there are plenty of trade-offs that I have to make.”

Dorothea (“Dot”) Koh is founder and CEO of Bot MD, an AI assistant for doctors that helps them access medical information quickly and accurately. “I feel bad when I see poorly designed technology for doctors,” says Koh, a native of Singapore who studied bioengineering at Stanford. “I think about the amplification effect. By helping a single doctor, >



By helping a single doctor we reach potentially hundreds and thousands more people



PR IMAGE FACTORY

we reach potentially hundreds and thousands more people.”

BotMD solves a problem Koh witnessed while working for Medtronic, and then Baxter, in different countries in Asia. “Healthcare knowledge is disparate. The information doctors need is not easily searched online, thus the need for a medical AI, especially for doctors in under-resourced areas,” Koh says.

She and co-founder Yanchuan Sim built a low-tech prototype of the app while Koh was still working full time. Based on a strong response from doctors, she quit her job in 2018 and Bot MD has been on a fast track since then. Koh and Sim participated in a three-month intensive programme for startups run by [Y Combinator \(YC\)](#), a San Francisco Bay area seed company incubator, which has funded more than 2000 startups with a total value of over \$100bn since it started in 2005. The

Bot MD helps doctors access medical information globally.

Bot MD app launched on Play Store in July of 2018 and has since been downloaded by doctors from more than 60 countries. Bot MD has raised \$1.6m from Y Combinator and Floodgate.

Koh has never had a problem speaking her mind, but she is aware that this can be an issue for women. She says women often tell her how they admire her confidence.

“Think about it,” she laughs. “Have you ever heard a guy go up to another guy and say that?” Koh adds that many of her male colleagues had played a positive role, “especially if they themselves have daughters,” but she emphasises: “The more women who are encouraged to speak up, the better.” ■



Jill Baker is an independent analyst, writer and editor whose current focus is on ESG investing. She has significant expertise in Asia, especially Hong Kong and China.



The information doctors need is not easily searched online, thus the need for a medical AI

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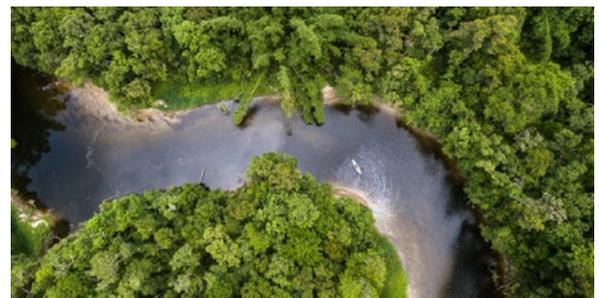
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