

# ComputerWeekly

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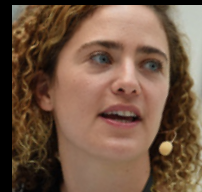
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## The Most Influential Women in UK IT 2021



Computer Weekly recognises 50 inspirational women who are role models for diversity and success in tech



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## Security boost in new Windows operating system limits PC reuse

Although it can be manually installed on any PC, Windows 11 is only certified to run on equipment with processors less than four years old. An automatic upgrade to the new operating system is only possible if the PC is running a supported processor and has the minimum 4GB of required memory. Specifically, to run Windows 11, PCs need a trusted platform module (TPM version 2.0).

## Government announces data strategy for defence

The UK government has announced a strategy where data will be taking centre stage in decision-making and efficiency improvements across defence over the next four years. Goals set out in the Data Strategy for Defence by the Ministry of Defence aim to evolve how data is organised, shared and used. The objective is to ensure data is treated as a "strategic asset, second only to people".

## HMRC confirms compliance checks under way in key sectors

HM Revenue & Customs (HMRC) has confirmed that compliance checks are under way within the financial services and oil and gas sectors, out of concern about how firms in these industries are adhering to the revamped IR35 tax avoidance rules. The government tax collection agency said the action was the result of "changes in engagement models" emerging within these sectors.

## NHS Digital data service struggled with Covid testing demands

A key component of NHS Digital's data processing struggled to cope with demand caused by Covid-19 testing, according to one of its senior technologists. The Master Person Service, which is designed to link records of treatment to individuals through demographic data, received up to one million requests an hour at some periods last year when testing was at its peak.



## Women in fintech welcome Barclays investment initiative

Barclays Bank and US funding platform Anthemis are bringing a US initiative that invests in women in financial technology (fintech) to the UK and Europe. The Female Innovators Lab, which was set up in the US in 2019, funds female-led fintechs from an early stage. In the UK, there will be a \$30m fund and fintechs will receive support from the lab team and access to office space in London.

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## Women and BAME people bear brunt of cyber crime impact

Women, black, Asian and minority ethnic (BAME) people bear a disproportionate burden when it comes to the impact of cyber crime. A study has shown that trends in digitally enabled crime mirror the digital divide in society.

## Government announces industry group to lead digital pound debate

The UK government has given details of discussions over a digital version of the pound. This follows the establishment of a taskforce launched by HM Treasury and the Bank of England in April 2021.

## Uber drivers strike over pay issues and unfair dismissal

UK drivers employed by ride-hailing app Uber went on strike in September over the company's failure to properly implement a Supreme Court decision, ongoing disputes about pay and claims of unfair dismissal.

## Blue Prism deal adds RPA to Tibco software product range

The investment firm behind Tibco has announced the acquisition of robotic process automation (RPA) business Blue Prism. Through the \$1.5bn deal, Tibco will combine automation from Blue Prism with its data platform capabilities.

## Giant Umbrella contractors suffer salary payment delays

Payroll service provider Giant Umbrella moved to assure its contractors they will be paid in due course, after a suspected data breach prompted the firm to "proactively" suspend its entire operations.

## AWS courts local councils with three-month free cloud trial

Amazon Web Services (AWS) is offering a three-month free trial of its infrastructure and software services to local authorities in the UK, Ireland and Spain. Participating councils will be offered access to a bundle of the cloud giant's services. ■

## Scotland sees increase in job opportunities in tech

Tech employment in Scotland's digital sector has been increasing as professionals are increasingly attracted by better cost of living standards compared with the average sector pay in the UK. According to data, IT vacancies represent 13% of all UK job vacancies.



ALEXEY REZVYKH/A DOBE

- › Mitigate AI bias rather than try to remove it, say experts.
- › Former PwC initiative becomes independent charity.
- › NTT Data, Mavenir announce 5G collaboration.
- › UK consumers would spend big for control of their data.

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# The 50 Most Influential Women in IT 2021

*Computer Weekly recognises 50 inspirational women who are role models for diversity and success in technology*

**C**omputer Weekly has announced the 2021 list of the Most Influential Women in UK Technology, including this year's winner, Poppy Gustafsson, CEO of Darktrace.

This year marks the 10th anniversary of the list, which [started out as a list of 25 in 2012](#) to make female role models in the sector more visible and accessible.

Since then it has greatly expanded, [growing in 2015 to include 50 women](#), as well as introducing annual lists of Rising Stars and a [Hall of Fame](#) to ensure as many women in the sector as possible are given recognition for their contribution to the tech sector and the advancement of diversity and inclusion in the IT industry.

In [2017, Computer Weekly began publishing the longlist of nominees](#), which initially showcased just over 160 women - the [2021 longlist featured more than 500 women](#).

To mark the 10th anniversary, 10 names have been added to both the 2021 list of Rising Stars in the women in tech sector and the Hall of Fame dedicated to honouring women who have made a lasting impact on the technology sector.

The 2021 winner of the title of Most Influential Woman in UK Technology is Poppy Gustafsson, CEO of cyber security and artificial intelligence (AI) firm Darktrace, which aims to use AI to prevent firms from suffering cyber attacks.



A passionate mathematician, Gustafsson initially joined Darktrace as chief financial officer (CFO) in 2013, before becoming CEO in 2016. She is a believer that a mixture of skillsets, both technical and otherwise, are needed to make a technology company a success.

## 1 **POPPY GUSTAFSSON, CEO, DARKTRACE**

Gustafsson studied mathematics at Sheffield University, moving on to become an assistant manager at Deloitte, then a fund accountant at Amadeus Capital Partners. She joined Darktrace as chief financial officer (CFO) in 2013, then spent some time as the chief operating officer (COO) before becoming

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CEO in 2016. Gustafsson has been featured in lists such as the Management Today 30 under 35 and was a winner in the Veuve Clicquot Business Woman Awards in 2019.

**2 FLAVILLA FONGANG, MANAGING DIRECTOR, 3 COLOURS RULE; FOUNDER, TLA BLACK WOMEN IN TECH**

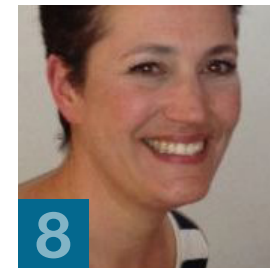
Fongang is the managing director of creative agency 3 Colours Rule, as well as a branding, neuromarketing and social selling course instructor for the agency. In 2019, she founded the Tech London Advocates Black Women in Tech group, which aims to support and accelerate diversity and inclusion in the tech sector. Fongang is a brand advisor at the BBC, a brand specialist for Consilience Ventures and an entrepreneurship expert with the Entrepreneurship Centre at the Saïd Business School at the University of Oxford. She recently released a book, *The voices in the shadow*, which aims to give young people access to the role models they might need to encourage them to pursue a tech career.

**3 NAOMI TIMPERLEY, CO-FOUNDER, TECH NORTH ADVOCATES**

Timperley is a freelance consultant and co-founder of Tech North Advocates, a private sector-led collection of tech experts who champion the [technology sector in the north of England](#). Named a Computer Weekly women in tech rising star in 2017, she is also an honorary industry fellow at the University of Salford Business School, chair of the Salford Business School Industry Advisory Board and, until recently, was a board member of FutureEverything. In the past she co-founded Enterprise Lab.



1. Poppy Gustafsson
2. Flavilla Fongang
3. Naomi Timperley
4. Andrea Palmer
5. Suki Fuller
6. Priya Guha
7. Hayaatun Sillem
8. Sarah Turner
9. Charlene Hunter
10. Sarah Luxford



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## 4 **ANDREA PALMER, CHANGE PROFESSIONAL; BCS FELLOW; CHAIR, BCS WOMEN**

Palmer has led a long career in business change and digital transformation, having held various roles at energy firm BP over a 15-year span. She is currently the chair of BCS Women, sits on the BCS society board and volunteers as a programme manager for iSAW International. In previous years she has served as one of Computer Weekly's expert judges for the Most Influential Women in UK Tech list, dedicating a lot of time to furthering the conversation around getting more women into the tech sector.

## 5 **SUKI FULLER, FOUNDER, MIRIBURE**

Fuller founded Miribure, which uses data gathering and analytics to promote strategic decision-making in firms, in 2015. A founding ambassador of the FiftyFiftyPledge, she is also an advisory board member of Tech London Advocates (TLA) and Tech Global Advocates, and the TLA Women in Tech co-lead. Fuller co-founded, and until 2019 was CEO of, incubator and accelerator Salaam Ventures, which assists ethical startups.

## 6 **PRIYA GUHA, VENTURE PARTNER, MERIAN VENTURES**

In 2019, Guha joined Merian Ventures as a venture partner, having previously been ecosystem general manager for the London campus of Silicon Valley-born co-working space RocketSpace. Guha also acts as an adviser for Tech London Advocates and The Youth Group, as well as being a council member for InnovateUK and a member for the international committee at the Royal Academy of Engineering.

## 7 **HAYAATUN SILLEM, CEO, ROYAL ACADEMY OF ENGINEERING**

Sillem was appointed CEO of the Royal Academy of Engineering in 2018 after 12 years of working at the organisation in various different roles, including deputy CEO and director of strategy, director of programmes and fellowship, and head of international activities. As well as her work for the academy, Sillem is the commissioner and chair for the expert stakeholders panel at Made Smarter UK, chair of judges for the St Andrews Prize for the Environment, a trustee of EngineeringUK and CEO of the Queen Elizabeth Prize for Engineering.

## 8 **SARAH TURNER, CEO AND CO-FOUNDER, ANGEL ACADEME**

Turner founded Angel Academe, a pro-women and pro-diversity angel investment group focused on technology. She is currently CEO of the group and until 2019 was an external board member and chair of the investment committee for venture capital fund the Low Carbon Innovation Fund. Turner is also a board member of the UK Business Angels Association, the trade association for early-stage investment, and in 2007 co-founded consultancy Turner Hopkins, which helps businesses create digital strategy.

## 9 **CHARLENE HUNTER, CEO AND FOUNDER, CODING BLACK FEMALES**

Hunter founded Coding Black Females in 2017 as a network for black female software developers, and is a software developer herself. As well as acting as an advisory board industry

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representative in the University of Essex Online's computing department, Hunter is the technical director at both SAM Software Solutions and Black Codher Bootcamp. Previously, Hunter was lead software engineer at Made Tech and held roles such as senior software developer, lead Java developer, app developer and technical consultant at various firms. She was named a Computer Weekly Rising Star in 2020.

Read our interview with last year's Most Influential Woman in Tech: Anne-Marie Imafidon

## 10 SARAH LUXFORD, PARTNER, GATENBYSANDERSON; CO-FOUNDER, TLA WOMEN IN TECH

Luxford is co-lead of Tech London Advocates' women in tech group and was co-founder of Croydon Tech City. She is now a partner (digital, data and technology) at advisory firm GatenbySanderson. Before her current role, she was director at recruitment company Global Resourcing, and as director at Nexec Leaders from 2015 to 2017, Luxford worked with founders, investors and business leaders to find the talent they needed. She was named one of Computer Weekly's 2015 Rising Stars.

## 11 SHARON MOORE, CTO FOR PUBLIC SECTOR, IBM UK

Moore is chief technology officer (CTO) for public sector at IBM UK, having previously focused on designing technical solutions for IBM's clients in the travel and transportation industry, incorporating engagement, internet of things (IoT) and analytics technologies, in her role as industry technical leader for travel and transportation. Moore is also deputy chair of BCS Women and is the BCS Women Scotland lead.

## 12 JOANNA DAVINSON, EXECUTIVE DIRECTOR, CDDO, CABINET OFFICE

As executive director of the Cabinet Office's Central Digital and Data Office (CDDO), Davinson is responsible for leading the government's use of digital, data and technology. For three years prior to her current role, she was the chief digital, data and

technology officer at the Home Office, where she was responsible for delivering the department's digital, data and technology solutions, including high-profile projects such as UK border systems. She also spent time working on public sector ICT projects at PricewaterhouseCoopers and IBM.

## 13 TABITHA GOLDSTAUB, CO-FOUNDER, COGNITIONX; CHAIR OF GOVERNMENT'S AI COUNCIL

Goldstaub co-founded CognitionX in 2015, and is also chair of the government's AI Council, which aims to offer advice and guidance to the government in the ongoing use and development of AI. She also acts as marketing counsel for Founders4Schools, adviser for The Prince's Trust and is co-founder of Future Girl Corp, an organisation that runs free events for future female CEOs. She also serves as a judge for Teens in AI and is a TechUK board member.

## 14 JUNE ANGELIDES, INVESTOR, SAMOS INVESTMENTS

Angelides founded, and until 2017 was CEO of, Mums in Tech when on maternity leave from Silicon Valley Bank, where she held roles as an associate for accelerator growth and an associate for entrepreneur banking. She is an investor at Samos

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Investments, a board advisor for Cajigo App and is a founding ambassador of the FiftyFiftyPledge. She is an honorary fellow at the Institute of Engineering and Technology, an Oxford Foundry mentor at Oxford University, an ambassador at Huckletree and a board observer for both Global App Testing and Everpress. Angelides was previously chosen as a Computer Weekly Rising Star.

## 15 JACQUI TAYLOR, CEO, FLYING BINARY

Taylor is an expert advisor for the European Commission and U4SSC, and is a technology advisor for TenureX. She founded and is CEO of web services company FlyingBinary, and also acts as an entrepreneur mentor for Tech Nation.

## 16 DEBORAH OKENLA, FOUNDER AND CEO, YOUR STARTUP, YOUR STORY

Named a Computer Weekly Rising Star in 2020, Okenla is founder and CEO of Your Startup, Your Story (YSYS), a community for startup founders aimed at making the startup ecosystem more diverse. She is an advisory panel member for IT services firm AND Digital, and an advisory board member for not-for-profit Coders of Colour. Okenla is also an advisory board member for The No.10 Innovation Fellowship Programme, is part of the Atomico Angel Programme 2021 and a council member for the Digital Economy Council for DCMS. Prior to her current role, Okenla led engagement and groups for Google for Startups and was previously membership manager at co-working space Huckletree.

More than 500 women were put forward as deserving of a place in this year's top 50. See the full list of nominations here.

## 17 ANNA BRAILSFORD, CEO, CODE FIRST GIRLS

Brailsford joined Code First Girls as CEO in 2019, and is a serial entrepreneur and co-founder. She's also a board member for the Institute of Coding where she focuses specifically on diversity and inclusion, and is a self-employed commercial and strategy consultant. In the past, Brailsford co-founded and was CEO of performance management firm Frisbee, which was part of venture capital fund Founders Factory.

## 18 LIZ WILLIAMS, CEO, FUTUREDOTNOW; CHAIR, GOODTHINGSFOUNDATION

Williams is the CEO of inclusion campaign FutureDotNow, which aims to tackle the inequality often caused by digital adoption. She is the social mobility commissioner at the Social Mobility Commission, a member of the board of trustees for Transport for London and chair of the Good Things Foundation. Prior to her current work, she spent more than 20 years at BT in a number of different roles, including programme director for sustainable business, director of tech literacy and education programmes, and director of digital society.

## 19 NICOLA BLACKWOOD, CHAIR, GENOMICS ENGLAND

Blackwood is chair of the board of Genomics England, chair of Public Policy Projects and board trustee for the Alan Turing Institute. Prior to this she worked in the public sector, originally as the first female MP for Oxford and more recently as



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minister for innovation for the Department of Health and Social Care. She has been a chair of the Human Tissue Authority, a board member for Oxford University Innovation, an advisory board member for Eagle Genomics and sat on the board of directors for the Campaign for Science and Engineering.

## 20 **KRITI SHARMA, VICE-PRESIDENT PRODUCT, GfK; FOUNDER, AI FOR GOOD UK**

Sharma is the vice-president of product at GfK and founded tech company AI for Good in 2018 to provide ethical AI-driven tech. She is an advisor for the United Nations and a board member for the Centre for Data Ethics and Innovation. Previously, Sharma was vice-president for AI at Sage, during which time she founded Messaging Bots London. Before joining Sage, she was vice-president, head of product, real-time big data analytics, at Barclays.



## 21 **TARA DONNELLY, CHIEF DIGITAL OFFICER, NHSX**

Currently chief digital officer at NHSX, Donnelly was one of the founding team to establish the unit responsible for digital transformation of healthcare in the UK. She is also a member of the board of trustees for the Nuffield Trust, president of The Health CEO's Club, and a senior volunteer and vice-president for Macmillan Cancer Support.

## 22 **BEV WHITE, CEO, HARVEY NASH GROUP**

As CEO of Harvey Nash Group, White heads up the global firm which provides IT recruitment, technology solutions and leadership services out of 36 offices across the world. White has a long background in the tech sector, having previously held roles as CIO and director of IT, as well as completing a degree in computer science.

## 23 **MELISSA DI DONATO, CEO, SUSE**

Di Donato is CEO of SUSE and founder of Inner Wings, which aims to give young girls more confidence and work towards worldwide gender equality. Prior to her current roles, she was chief revenue officer, then COO, digital core for SAP, and area vice-president of Wave Analytics Cloud at Salesforce. Before this, Di Donato was the area vice-president of ISV and channel programmes for EMEA and Asia-Pacific, during which she chaired a European ISV Advisory Innovation Board. She is a board member and advisor to various technology companies in the UK and in Silicon Valley. She is a philanthropist, focusing on science, technology, engineering and maths (STEM) initiatives

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and mentoring women in business. She has recently been named as leader of the Tech Working Group of the 30% Club.

## 24 **CARLY KIND, DIRECTOR, ADA LOVELACE INSTITUTE**

As director of the Ada Lovelace Institute, Kind is responsible for leading the institute's strategy to increase the public's understanding on the impact AI has on society. Her background is in human rights law – she currently acts as a consultant for Unicef UK and has previously been a consultant for firms including Ranking Digital Rights and the European Centre for Not-For-Profit Law. She's the acting chair on the board of trustees for charity Glitch, which aims to make the internet a safer space for everyone.

## 25 **INDRA JOSHI, DIRECTOR OF AI, NHSX**

Joshi joined NHSX in 2019 as the head of digital health and AI, before becoming director of AI five months later, overseeing the development of the NHS AI Lab. As a subject matter expert for the World Health Organization (WHO), Joshi is part of a technical advisory group which helps the WHO with advice around digital health. She is also a founding ambassador for volunteer community One HealthTech and the vice-chair for equality, diversity and inclusion (health executive) at the BCS. ■

Computer Weekly would like to thank our diversity and inclusion event partners at tech recruitment firm Spinks for their support.



## Most Influential Women in IT: 26-50

26. Elena Sinel, founder, Acorn Aspirations and Teens in AI
27. Beckie Taylor, CEO and co-founder, TechReturners
28. Sonia Patel, CIO, NHSX
29. Anne Boden, CEO, Starling Bank
30. Janet Coyle, managing director business, London & Partners
31. Abadesi Osunsade, founder and CEO, Hustle Crew
32. Rioch Edwards-Brown, founder, So You Wanna Be In Tech?
33. Jeni Tennison, vice-president, Open Data Institute
34. Zahra Bahrololoumi, CEO, Salesforce UK&I
35. Kerensa Jennings, senior advisor, digital impact, BT Group
36. Tristi Tanaka, BCS Women committee member
37. Sheridan Ash, women in technology leader UK, PwC
38. Anne Marie Neatham, office of the CTO, Ocado Technology
39. Marta Krupinska, head of Google for Startups UK
40. Abbie Morris, CEO and co-founder, Compare Ethics
41. Sheree Atcheson, global director of D&I, Valtech
42. Kike Oniwinde, founder, BYP Network
43. Alice Bentinck, co-founder, Entrepreneur First
44. Zara Nanu, CEO and co-founder, Gapsquare
45. Kate Rosenshine, director, Microsoft
46. Sarah Armstrong-Smith, chief security advisor, Microsoft
47. Check Warner, co-founder, Diversity VC
48. Cynthia Davis, CEO and founder, BAME Recruitment Ltd
49. Catherine Breslin, advisor, Deeptech Labs
50. Emma Taylor, head of digital safety, RazorSecure

[Click here to view full biographies online.](#)

# Ten women with an influential future in IT

*Computer Weekly reveals 10 Rising Stars for 2021 as part of its Most Influential Women in UK Tech awards*

**E**ach year, as Computer Weekly compiles its list of the 50 Most Influential Women in UK Tech, we also search for people who are starting to make an impact on the technology sector and are likely to feature in the top 50 in the near future.

These Rising Stars, suggested by Computer Weekly's judges, are cited as being the next generation of influential women in the UK's technology sector and are already making a notable difference to the industry.

The Rising Stars category was [introduced in 2014](#) as a way to increase the number of women showcased as industry role models. [Launched in 2012](#), this is the 10th year Computer Weekly has published its list of the 50 Most Influential Women in UK Tech. To mark this milestone, there are 10 additions to the list of Rising Stars.

## **BETH PROBERT**

Originally an astrophysicist, Probert is now a software engineer at Capgemini Engineering's High Integrity Software Expertise Centre. She is also the vice-chair of the [WISE Young Professional's Board](#). She is actively involved in trying to encourage more young women to consider technology careers



and, in 2020, was a finalist in the [IET's Young Woman Engineer of the Year awards](#).

## **EMMA SINCLAIR**

A serial entrepreneur, Sinclair is the co-founder of software company EnterpriseAlumni, and is the youngest person in the world to have floated a company on the London Stock Exchange. In 2016, she was awarded an MBE for services to entrepreneurship, and as well as acting as a business mentor for Unicef, helping the charity to launch its first crowdfund in 2017, Sinclair is a columnist for The Telegraph and an advisory council member for the G7.

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**ERIKA BRODNOCK**

Erika Brodnock is a serial entrepreneur, founding two education-focused software companies, Karisma Kidz and Kami. She is also an advisory board member for the All-Party Parliamentary Group (APPG) for Entrepreneurship, a non-executive director of the Good Play Guide, and has won multiple awards.

**HELEN BOOTHMAN**

Boothman is managing director of renewable heating firm Evergreen Energy, which recently acquired smart thermostat firm Homely Energy. Her previous roles have been focused mainly on software-as-a-service (SaaS) products and product management at firms such as Elexon and TMA Data Management.

**JACKIE BELL**

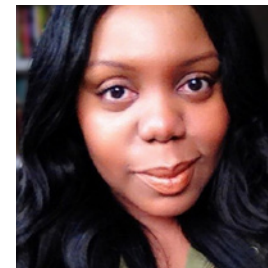
A senior teaching fellow in the Department of Computing at Imperial College London, Dr Jackie Bell is also an advocate for diversity, equality and inclusion in the science, technology, engineering and maths (STEM) sectors. She actively tries to encourage people from under-represented backgrounds into STEM careers. Bell was recently named one of the WISE 20.

**MARIA AXENTE**

Maria Axente is the artificial intelligence (AI) and AI for Good lead at PwC where she is responsible for advising clients on responsible use of AI, and ensuring ethical development of PwC AI operations, products and services. She is also an advisory board member for the APPG for AI, a vice-chair for the data,



Clockwise from top left:  
Beth Probert  
Emma Sinclair  
Erika Brodnock  
Helen Boothman  
Jackie Bell  
Maria Axente  
Nicola Martin  
Olga Kravchenko  
Sandra Wachter  
Wai Foong Ng



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analytics and AI leadership committee at TechUK, and advisor for the PHI Institute for Augmented Intelligence.

### **NICOLA MARTIN**

Currently the head of quality at Adarga, Martin has a history of working as a test consultant at firms such as Barclays, Sony, the UK Home Office, Shazam and Sky. She is currently a committee member and inclusion officer for the BCS Special Interest Group in Software Testing.

### **OLGA KRAVCHENKO**

Olga Kravchenko is the chief executive of virtual reality (VR) learning platform Musemio which allows people to use technology to explore museum collections. She is an advocate for making arts, culture and history more accessible for young people, and was recently named a Forbes 30 under 30 in art and culture.

### **SANDRA WACHTER**

Sandra Wachter is an associate professor and senior research fellow at the Oxford Internet Institute at the University of Oxford focused on researching the legal and ethical applications of AI and robotics. She is also a Turing research fellow in data ethics at the Alan Turing Institute where she considers the legal and ethical implications of data science. Wachter is also a fellow of the World Economic Forum's Global Futures Council on Values, Ethics and Innovation, and a member of the Law Committee of the IEEE.

### **WAI FOONG NG**

Well known in the startup scene, Ng founded tech for good startup Matchable in 2019 to help companies find and match with volunteering projects, not-for-profits and startups. She's a member and pledger of entrepreneur community Founders Pledge, and a co-programme lead for the 2021 cohort of the Startup Leadership Programme London. ■



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# Influential Women in UK Tech: Hall of Fame

*Computer Weekly reveals 10 more women who have earned a place in its Most Influential Women in UK Tech Hall of Fame, which showcases successful female IT leaders for their commitment and contribution to the industry*

Computer Weekly is delighted to announce the 2021 additions to its Most Influential Women in UK Tech Hall of Fame. Each year, Computer Weekly, alongside its group of expert judges, selects women from the [Most Influential Women in UK Tech longlist](#) who have made a lifetime contribution to the technology industry to be recognised in its [Hall of Fame](#).

As the list grew in popularity, the [Hall of Fame was introduced in 2015](#) to recognise the achievements of women who have had a significant impact on the tech sector, while also allowing as many women as possible to be showcased on the top 50 list of the most influential women in UK tech.

As this is the 10th year Computer Weekly has compiled its list of the 50 Most Influential Women in UK tech, we are proud to recognise 10 new additions to the Hall of Fame in 2021:

## **ANNE-MARIE IMAFIDON, CEO, STEMETTES**

Imafidon was originally named one of [Computer Weekly's Rising Stars in 2014](#), going on to win the title of Most Influential Woman in UK Tech in 2020. Imafidon is the CEO of Stemettes, which she founded to encourage young women to consider careers in science technology, engineering and maths (STEM).

Outside of her work with Stemettes, she is a commissioner for the Hamilton Commission, an initiative set up by race driver Lewis Hamilton to address the lack of black people both in UK motorsport and in the STEM sectors.



**ANNE-MARIE IMAFIDON IS CEO OF STEMETTES, WHICH SHE FOUNDED TO ENCOURAGE YOUNG WOMEN TO CONSIDER CAREERS IN STEM**

Imafidon is also a fellow of the RSA, a council member of Research England, a visiting professor at the University of Sunderland, and a Department for Digital, Culture, Media and Sport (DCMS) Digital Skills Partnership Board member.

Before Stemettes, Imafidon held roles at Goldman Sachs, Hewlett-Packard, Deutsche Bank and Lehman Brothers. She now

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hosts a podcast for the *Evening Standard* called Women Tech Charge and is a trustee for the Institute for the Future of Work.

**CARRIE ANNE PHILBIN, DIRECTOR OF EDUCATION, RASPBERRY PI FOUNDATION**

Another alumna of Computer Weekly's [2016 women in tech Rising Stars](#), Philbin has several responsibilities within the Raspberry Pi Foundation, including leading strategy, continuing professional development programmes and learning resources.

As well as her work at Raspberry Pi, she is a fellow of the Python Software Foundation, and her various experiences in board member and chair roles - including her time as a board



**AS WELL AS HER WORK AT RASPBERRY PI, CARRIE ANNE PHILBIN IS A YOUTUBER, WRITER AND SECONDARY-LEVEL COMPUTING TEACHER**

member for Computing at School and her stint as chair of CAS #include - have all been aimed at making computer science more accessible for everyone.

She is also a YouTuber, writer and secondary-level computing and ICT teacher.

**CINDY ROSE, PRESIDENT OF WESTERN EUROPE, MICROSOFT**

Rose was recently appointed as president of Western Europe for Microsoft, having served as the CEO of Microsoft UK since



**CINDY ROSE RECENTLY BECAME PRESIDENT OF WESTERN EUROPE FOR MICROSOFT, HAVING SERVED AS UK CEO SINCE 2016**

2016, where she was responsible for the firm's product, service and support offering across the region.

Previously, Rose worked in senior roles across the technology and digital sectors at firms such as Vodafone, Virgin Media and Disney's Interactive Media Group.

In early 2019, she was awarded an OBE for services to UK technology, and is currently a non-executive director for communications firm WPP.

**ELIZABETH DENHAM, INFORMATION COMMISSIONER, INFORMATION COMMISSIONER'S OFFICE**

In her role as UK information commissioner, which she has held for five years, Denham leads the office that deals with the Data Protection Act 2018 - the UK's implementation of the EU's

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General Data Protection Regulation (GDPR). Her term as information commissioner ends on 31 October 2021.

Before becoming information commissioner, Denham was the information and privacy commissioner for British Columbia,



## ELIZABETH DENHAM LEADS THE OFFICE THAT OVERSEES THE DATA PROTECTION ACT. HER TERM AS INFORMATION COMMISSIONER ENDS ON 31 OCTOBER

Canada, responsible for compliance with public and private sector privacy legislation and access to information law. In 2018, she was awarded a CBE for services to information protection.

### HELEN MILNER, FOUNDER AND CEO, THE GOOD THINGS FOUNDATION

Milner is founder and CEO of not-for-profit the Good Things Foundation (formerly the Tinder Foundation), having founded the charity in 2011 to help the digitally excluded become comfortable using digital and online technologies. Most of her work is focused on building tech inclusion for digitally excluded

## Existing Hall of Fame members (part 1 of 2)

**Amali de Alwis** is on the advisory board of YSYS and the board of trustees for the Raspberry Pi Foundation, among other roles.

**Gillian Arnold** is managing director of IT recruitment firm Tectre, which aims to support women in tech roles.

**Max Benson and Karen Gill** launched Everywoman in 1999 to serve as an online community for women across the UK.

**Maggie Berry** is director of Heart of the City, which helps small businesses promote diversity and support local communities.

**Sue Black** campaigned to stop the historic Bletchley Park from falling into disrepair, following up with a book.

**Eileen Burbidge** is a partner at VC firm Passion Capital and is a non-executive director for many small and growing businesses.

**Sherry Coutu** is a serial entrepreneur, having been a founder of Founders4Schools, Workfinder and others.

**Jacqueline De Rojas** is president of TechUK and Digital Leaders and non-executive director of several more organisations.

**Hannah Dee** is an infosec and databases lecturer at Aberystwyth University and a founding member of *Scientists Are Humans*.

**Sheila Flavell** is COO of FDM Group, deputy president of TechUK and a chair for the Institute of Coding Industry Advisory Board.

**Debbie Forster** is CEO of Tech Talent Charter and a long-standing advocate of diversity and inclusion in the tech sector.



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**HELEN MILNER IS FOUNDER AND CEO OF THE GOOD THINGS FOUNDATION, WHICH WORKS TO BUILD TECH INCLUSION FOR THE DIGITALLY EXCLUDED**

people. Milner is a board member of both FutureDotNow and the DCMS Digital Skills Partnership Board, and is on the Adult Advisory Group for the UK's Money and Pension Service.

Milner was previously a specialist government adviser of digital engagement for the Public Accounts Committee, was named the Digital Leader of the Year in 2017, and was awarded an OBE in 2015 for services to digital inclusion.

**Jo Twist, CEO, UKIE**

Twist is CEO of UKIE, the games industry trade body that aims to make the UK the leader in games and interactive entertainment. As well as being a London Tech Week ambassador, Twist is vice-president of games charity Special Effect, the minister of stories at organisation Ministry of Stories which helps young people connect with writing and storytelling, and is chair of the games committee at Bafta.

**Existing Hall of Fame members (part 2 of 2)**

**Wendy Hall** holds positions at University of Southampton, and has held prominent roles in the STEM sector.

**Martha Lane Fox** is co-founder of Lastminute.com and promotes diversity in the IT industry.

**Nicola Mendelsohn** is vice-president of EMEA at Facebook and a chairperson for the Follicular Lymphoma Foundation.

**Jane Moran** is non-executive director of JP Morgan Europe and an advocate for leadership skills and women in technology.

**Chi Onwurah** is MP for Newcastle upon Tyne Central and shadow minister for digital, science and technology.

**Kathryn Parsons** founded coding school Decoded which teaches people about code, data, AI and cyber security.

**Maggie Philbin** is founder of TeenTech and spent many years reporting on STEM subjects for TV and radio.

**Margaret Ross** is a professor at Southampton Solent University and is involved in the BCS in various roles.

**Kate Russell** is a frequent events speaker and works with organisations to attract young people to roles in tech.

**Joanna Shields** is CEO of BenevolentAI, which aims to train computers to change how medicine is developed.

**Stephanie 'Steve' Shirley** developed a "software house" for female freelance programmers in 1962.

**Sarah Wood** founded global advertising marketplace Unruly and has written a career handbook for the millennial generation.

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Twist was previously commissioning editor for education at Channel 4, and was multi-platform commissioner of entertainment and Switch for the BBC in the early 2000s. In 2016, she received an OBE for her contribution to the creative industries.

**REBECCA GEORGE, PREVIOUS MANAGING PARTNER FOR GOVERNMENT AND PUBLIC SERVICES, DELOITTE**

George is currently on the lookout for non-executive directorship roles in the private and public sector focused around education, climate change or health where she can use her 20 years of tech and public sector experience.

Until spring 2021, she was managing partner for government and public services at Deloitte, leading the firm's public sector practices across Europe. Prior to this role, she was lead public sector partner at Deloitte, where she was responsible for projects such as helping the public sector improve efficiency and develop best practice.

George is a non-executive chair for the Department for Education's T-Level reform programme, and recently stepped down as president of the BCS and as a board member of the City Mental Health Alliance. She was awarded an OBE in 2006 for her work on sustainable communities.

**SARAH BURNETT, FOUNDING PARTNER AND NON-EXECUTIVE DIRECTOR, EMERGENCE PARTNERS**

Burnett is a founding partner and non-executive director at management consultant firm Emergence Partners, where she is head of technology immersion and insights.



**JO TWIST IS CEO OF GAMES INDUSTRY TRADE BODY UKIE AND VICE-PRESIDENT OF GAMES CHARITY SPECIAL EFFECT**



**REBECCA GEORGE IS CURRENTLY SEEKING NON-EXECUTIVE DIRECTORSHIP ROLES AROUND EDUCATION, CLIMATE CHANGE OR HEALTH**



**SARAH BURNETT IS A FOUNDING PARTNER AND NON-EXECUTIVE DIRECTOR AT MANAGEMENT CONSULTANT FIRM EMERGENCE PARTNERS**

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Prior to this, she was an executive vice-president and distinguished analyst at Everest Group, where she used her skills to lead the group on global service delivery automation research and European practice across its global services research areas.

Before joining Everest Group, Burnett was vice-president of research at Nelson Hall, covering areas such as infrastructure, IT outsourcing, cloud and government business process outsourcing. Until recently, Burnett was chair of BCSWomen, and in 2017 launched the BCSWomen AI Accelerator.

She is a contributing analyst, writer and author for online ethical tech publication *Techopian*.

**SUE DALEY, DIRECTOR OF TECH AND INNOVATION, TECHUK** [Daley leads TechUK's work on cloud, data, analytics and AI](#) and has been recognised in the UK Big Data 100 as a key influencer in driving forward the big data agenda.

She is co-chair of the National Data Strategy Forum, which aims to put the UK at the forefront in data, and has acted as a judge for



**SUE DALEY IS RECOGNISED IN THE UK BIG DATA 100 AS A KEY INFLUENCER IN DRIVING FORWARD THE BIG DATA AGENDA**



**TRUDY NORRIS-GREY IS CHAIR OF WOMEN IN SCIENCE, ENGINEERING AND TECHNOLOGY AND OF THE UCAS BOARD OF TRUSTEES**

several awards such as the Loebner Prize in AI, UKtech50 and the Annual UK Cloud Awards.

Before joining TechUK in January 2015, she was responsible for Symantec's government relations in the UK and Ireland.

In 2016, Daley swam the English Channel.

**TRUDY NORRIS-GREY, CHAIRPERSON, WISE**

Norris-Grey's career has been focused on technology and digital transformation across firms such as BT, Sun Microsystems, Oracle and Eastman Kodak, where she held senior executive posts.

She now splits her time between the US and the UK and is chair of Wise (Women in Science, Engineering and Technology), as well as chair of the UCAS board of trustees.

Until 2019, Norris-Grey was global managing director of local regional government, smart cities and connected infrastructure for Microsoft in Seattle, US, followed by a role as deputy CEO of enterprise and global partnerships at AXA. ■

## INTERVIEW

# 'DON'T BE APOLOGETIC FOR DIFFERING SKILLSETS'

*There are many routes into technology, and many different skillsets that contribute to making great tech work, so people need to be 'less apologetic' for a less technical skillset, Poppy Gustafsson, this year's Most Influential Woman in UK Tech, tells **Clare McDonald***



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**A** [mix of skillsets](#) is important within a technology business to achieve its goals, so people should be “less apologetic” when that skillset is of a less technical nature, says Poppy Gustafsson, CEO of artificial intelligence (AI) and cyber security firm [Darktrace](#).

“We’re using AI for cyber security, so there is a whole bunch of really complicated mathematics that underpins all of that,” she explains. “But when you’re trying to talk to a customer about how that can benefit their organisation, you’re not going to be saying, ‘If you integrate this end of Bayesian recursive inference...’, you’re going to be saying, ‘Let me show you how this works, let me show you what it’s doing for your business’, and you need a different skillset to be able to do that.”

Gustafsson adds: “People need to be less apologetic about it and see it as a sign of strength. There are other people that can do that and that’s great and it’s really important useful talent, but that doesn’t preclude you from being part of a technical role. Just because you don’t understand the ones and zeros doesn’t stop you thinking about how you can use that technology to solve different problems.”

This is the 10th year that Computer Weekly has run its list of the most influential women in UK technology, and although there have been a lot of changes to the amount of diversity in the tech sector, in many ways [things are still slow to change](#).

Gustafsson was initially a mathematics graduate, and remembers that it hadn’t been “apparent” to her that there were few women in the field until reaching university and seeing only a small number of other women at lectures.

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But it was at university when she began to realise that complicated subjects such as mathematics can be accessible to everyone if the concepts behind them are articulated in a more creative way, after a professor used a visual representation to explain the Pythagorean Theorem.

She says: "Kids today always say 'I don't understand mathematics' and 'algebra is hard', but they do understand maths because maths is rational, logical thinking, it's just that you're not equipped with the language to interpret the way that it's written down.

"Seeing that possibility that you can convey and articulate these complicated principles but using a different language, I thought it was really interesting, and I think we sort of do a little bit of that today in terms of what we do at Darktrace."

After working as an accountant, and then as part of a venture capital fund, Gustafsson joined Darktrace as chief financial officer (CFO) in 2013, and is now CEO. The firm uses AI technology to help businesses defend against cyber attacks and, according to Gustafsson, the business is 30-40% women.

But this gender split was not something the company originally aimed for - it just hired the best and the brightest for the job, making it clear what it wanted to achieve.

Gustafsson says people have, in the past, thought that to be part of

» Despite most people agreeing that diversity and inclusion initiatives are important, some are still hesitant to speak about it, according to TTC research.

something like Darktrace, you have to be "really awesome at computer science, and maths, and science" - but that's only one part of what achieves a company's goals, even a tech company.

She says innovation is creatively applying the skillset you do have to solve a problem. "Maybe they don't understand the language of the ones and zeros written to create the code, but they absolutely

understand the problem and they absolutely can think of a creative approach to that problem," she says. "Then, paired with those mathematicians, they can write down the answer in that mathematical language. That's what we do as a business. We've got a whole bunch of people within the dev team with a whole different wide range of backgrounds."

Often, women are more drawn to jobs they feel will enable them to [have a positive impact](#) on the world around them, so understanding how a particular role, company or technology works in the real world could be important for encouraging more women to pursue technology careers.

Gustafsson points out how relevant cyber security and AI are to current real-world events, using a recent cyber attack in the US that left many unable to access fuel as an example, and she argues that people need to be helped to understand how different skills can contribute towards solving these problems.

**"WE'VE GOT A WHOLE BUNCH OF PEOPLE WITHIN THE DEV TEAM WITH A WHOLE DIFFERENT WIDE RANGE OF BACKGROUNDS"**  
POPPY GUSTAFSSON, DARKTRACE

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She explains: "It can't just be, 'You're a girl, and despite having studied the wrong skillset, we'll give you a shot anyway', it's them realising that their skills and the knowledge that they've gleaned from whatever it is that they've studied is very relevant to solving problems that have previously not been solved."

[Soft skills](#) are extremely important for tech industry roles, but many other deterrents still remain for groups under-represented in tech, such as [misconceptions about what technology roles involve](#) and the skills required to work in the sector.

There are many reasons why [women end up not joining tech firms](#), and Gustafsson points to [recruitment methods](#) as one of them, saying that businesses and employees should start to "challenge their preconceptions about what it is to deliver a technical role".

She adds: "If you're not weighed down by preconceptions about the way that these problems have been solved in the past, you're much more likely to be open-minded about new and creative ways of solving that problem."

Using Darktrace as an example, Gustafsson says businesses are already using cyber security – it's not a new concept – but the way Darktrace has approached cyber is new, making creative approaches to problem-solving extremely important and, in a way, extensive industry knowledge was almost "irrelevant". She says: "We just wanted bright, capable people to be able to come

into the organisation, which is why we as a business were naturally able to get a really good gender mix."

As far as applying AI to cyber security, these are two technologies that Gustafsson feels go together naturally, because "you're dealing with a whole tonne of data, and you need to be able to make decisions at the same speed as a threat, and the threat is happening at machine speed".

It is also a technology that applies to everyone, so requires the input of lots of different types of people. She adds: "Cyber security is such a relevant problem for everyone and it is completely indiscriminate, and it's not something that's a particular challenge for particular verticals, it's every type of organisation.

"So you get real joy out of being able to meet a whole bunch of different people from a whole bunch of different backgrounds doing a whole bunch of different

things, but they will be brought together with this common idea about how we are going to solve what is an increasingly complicated threat."

Gustafsson summarises by saying there has been some progress when it comes to increased diversity in the technology sector – Darktrace has achieved gender diversity just by hiring "the best people", she says – and that by challenging the misconceptions of what a technology role involves and the type of people that do them, the future may look brighter. ■

**“WE WANTED BRIGHT,  
CAPABLE PEOPLE TO COME INTO  
THE ORGANISATION, WHICH IS  
WHY WE WERE ABLE TO GET A  
REALLY GOOD GENDER MIX”**

**POPPY GUSTAFSSON, DARKTRACE**

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# What is the real role of Windows 11?

**T**he big question about [Windows 11](#) is not necessarily whether it is better or worse than Windows 10, or whether it is worth upgrading – it's about how useful it is. So what is the role of a modern desktop operating system?

In the past, the operating system provided a convenient layer of abstraction above the hardware. This enables software developers to write applications without having to worry about the underlying hardware architecture, while device drivers from hardware manufacturers take care of the low-level programming and interfacing with the operating system.

Microsoft has a track record of bundling more and more features into Windows. With the rise of the internet, despite the anti-competitive pressures, its web browser is now a core part of the operating system, providing web access out-of-the-box. Now, cloud computing blurs the line that separates the desktop environment from systems running as cloud services delivered via the internet. Windows developers not only have an interface to the underlying hardware, but there are also hooks to Microsoft's cloud-based services.

A modern operating system wears at least two hats. Its developer hat gives application developers a feature-rich environment on which to innovate. The user hat is about offering a rich user experience and a strong security framework to protect the user and prevent data breaches and denial-of-service attacks. Some of these things require new hardware, which makes Windows 11 unsuitable for older PCs. In fact, data from Lansweeper, based on about 30 million Windows devices from 60,000 organisations, reveals that less than half of all workstations are capable of receiving an automatic upgrade; the rest would be ineligible. According to Lansweeper, only 44.4% of CPUs for workstations tested met the system requirements for upgrading to Windows 11; 55.6% did not. Even though most had enough installed memory to support Windows 11, Microsoft changed the [minimum processor specification](#), which means it is only [certified to run](#) on PCs with a TPM (trusted platform module).

Microsoft has always bundled more and more features into its operating systems, to provide a full out-of-the-box usable PC experience. But in Windows 11, it has also set a minimum hardware security level, which is, arguably, its main objective. ■

*Cliff Saran, managing editor (technology)*

**SOME OF THESE THINGS  
REQUIRE NEW HARDWARE,  
WHICH MAKES WINDOWS 11  
UNSUITABLE FOR OLDER PCs**

# A RECIPE FOR DEVELOPING CUSTOMER EXPERIENCE



*Covid-19 has led to many people reassessing their priorities so customer experience needs to adapt to meet new expectations. Cliff Saran reports*

© FOTART/ADOBE

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The Covid-19 pandemic forced people to reassess their priorities and what they value most in their lives. While there is a slow recovery to the pre-pandemic norm, there is also a growing sense that there are several things that people experienced during 2020 and 2021 that they hope to continue once the health crisis has passed.

The pandemic has accelerated the shift to online shopping, organisations such as banks and doctors' surgeries have introduced video consultations, and the hospitality sector, hit hard by prolonged national lockdowns, has been forced to adapt.

At activity centre Twinwoods Adventure, for instance, table service app TheFork is used for both the children's soft play area and the bar and grill, says [Twinwoods Adventure managing director Roy Castleman](#). He says the technology enables both smoother restaurant management and greater customer satisfaction, and is ushering in a new, safer era of pub table service in the UK, similar to other parts of the world.

In July, [Accenture published a video on YouTube](#) to tie in with global research it had conducted on how people's attitudes have changed during the pandemic. Based on a survey of 25,000 consumers, Accenture found that just 17% of participants, which it classified as "traditional consumers", said they were unchanged by the pandemic. One-third, classified as "evolving consumers" were unsure or were changing their mindset. But 50%, classified by Accenture as "reimagined consumers", said the pandemic had caused them to rethink their motivations.

While the video only represents a snapshot, "more sincere", "closer bonds", "family", "outdoors" and "nature" were among



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the phrases spoken by people who were interviewed. When the economy was put on hold and shops and workplaces were shut down, consumers adapted, developed new routines to cope with the pandemic, and rediscovered things that had previously been relegated or dismissed entirely because of the priorities of busy pre-pandemic lifestyles.

The findings of the survey, published in Accenture's [Life reimagined](#) report, show that 72% of people who have reimagined their motivations expect the companies they do business with to understand and address how their needs and objectives change during times of disruption. The report notes that although price and quality have long been – and remain – the dominant motivations in consumers' choice rationale, they have lessened in influence among "reimagined consumers".

"Among the reimagined, 66% now expect brands to take more responsibility in motivating them to live by their values and to make them feel more relevant in the world, versus 16% of traditional consumers," it states.

The Accenture study concludes that customers are more open than ever to embracing new experiences and forming new habits. This means every organisation should be looking to reassess

existing business processes to ensure they are aligned with post-pandemic consumer expectations.

Accenture recommends that businesses restructure to create experiences that capture consumers' evolving demands across all aspects of operations. In the report, it urges business leaders to engage marketing, sales, innovation, research and development, and customer service.

"Everyone who is expected to deliver on these experiences must see and understand these new motivations," the authors write.

The report also suggests that organisations emerging from the pandemic may need to evolve or develop new business models with better pricing, different distribution channels or new revenue streams. According to the authors, this will allow them to continuously improve

experiences and give customers exactly what they want without sacrificing profitable growth.

## CUSTOMERS ARE MORE OPEN THAN EVER TO EMBRACING NEW EXPERIENCES AND FORMING NEW HABITS SO ORGANISATIONS SHOULD BE LOOKING TO REASSESS EXISTING BUSINESS PROCESSES TO ENSURE THEY ARE ALIGNED WITH POST- PANDEMIC CONSUMER EXPECTATIONS

### UNDERSTANDING THE FULL CUSTOMER JOURNEY

Putting the pandemic to one side, [in February 2021, McKinsey published an article](#) exploring the nature of customer experience (CX), specifically focusing on the shortcomings of traditional

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measurement techniques. While a survey can help organisations to gather customer insights, McKinsey notes that these are historical in nature, reflecting a customer's previous experience.

For organisations to lead from a customer-centric position, McKinsey urges CX professionals to develop a more comprehensive view of the full customer journey, combined with a deep, granular insight into what is driving customer experience.

McKinsey says companies have access to internal data on customer interactions, transactions and profiles. Third-party datasets cover customer attitudes, purchase behaviours and preferences, and social media activity. It adds that internet of things (IoT) sensors provide additional data sources for customer health, sentiment and location, such as when the customer is in-store.

These various data sources, including financial and operational data, form the foundation of a multi-stage customer experience strategy. The first phase involves the aggregation of various data sources into a cloud-based data store. Using such a data store

provides what McKinsey regards as comprehensive, connected and dynamic customer-level datasets, which enable the organisation to map and track customer behaviour across interactions, transactions and operations. According to McKinsey, this data lake provides a foundation for developing a rigorous understanding of customer experiences.

The next stage set out by McKinsey is the use of [machine learning](#) (ML) algorithms, which are used to understand and track what is influencing customer satisfaction and business performance, and to detect specific events in customer journeys.

In McKinsey's model, the algorithms generate predictive scores for each customer based on journey features. These scores enable the company to predict individual customer satisfaction and value outcomes, such as revenue, loyalty and cost to serve.

Customer experience can often fail to meet expectations because of poorly thought-out handovers and a lack of integration between IT systems. For instance, a customer may be asked



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to verify their details more than once. McKinsey urges organisations to ensure that information, insights and suggestions are shared with a broad set of employees, including front-line agents. An [application programming interface](#) (API) layer should also be used to make this data available in the [customer relationship management](#) (CRM) platform.

For many organisations, it was their digital channel that enabled them to continue to [engage with customers](#) during lockdown. Although things are slowly returning to the ways they were before the pandemic, there is a general consensus that many people will continue to make use of the digital channel. In fact, the pandemic has accelerated the shift to digital. As a result, the way the customer perceives the digital channel is key to a good overall customer experience.

## CAPTURE THE CUSTOMER VOICE

In the Forrester report [Gear up for experience design](#), the analyst firm recommends that businesses capture the voice of the customer (VoC). This will enable them to understand how customers feel about the design of a website or app and can help them gauge whether the design they have created is effective and identify what needs improving. But this feedback is hard to measure at scale, says Forrester.

Voice of the customer tools aim to collect data across multiple channels. The [Gartner Magic Quadrant report for VoC tools](#) identifies four categories of data collection and analysis: direct feedback; indirect feedback, such as from a review site or social media; inferred feedback gleaned from the organisation's transactional and operational systems, which show the customer journey; and insight, which translates the data into alerts. These alerts

are then presented on a dashboard to enable customer experience professionals to flag up actions that the organisation needs to take.

Interface experience analytics and journey analytics provide further insights to help CX professionals streamline the digital journey the customer takes through the organisation's online experience. Once a digital experience moves from a prototype into a wider roll-out or full production, it is possible to start collecting real user data on how well

it works. This is the goal of interface experience analytics tools.

According to Forrester, although these tools have traditionally been used by [data scientists](#), IT specialists and marketing analysts for short-term business goals, they are increasingly being used by product managers and designers to support customer goals. In fact, several providers it spoke to said that between 10% and 30% of their users have titles other than "marketing" or "analytics".

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So, as people start returning to a pre-pandemic normal, there are going to be some changes they made that will not simply be reset. The pandemic has forced people to think differently about how and where they work. It has also changed shopping habits and there are now multiple ways for prospective customers to connect with organisations.

In its *Gear up for experience design* report, Forrester notes that it is hard to understand how customer interactions across

touchpoints connect, overlap and influence each other to support an ongoing relationship. This, it says, means many organisations struggle to address customers' expectations where experiences can be individualised, continuous, emotionally engaging and controllable.

It is this idea of individualised and emotionally engaging experiences that is likely to resonate with customers in the post-pandemic age. ■



# BUILDING WATERBORNE DATACENTRES IN THE NAME OF SUSTAINABILITY



*Nautilus Data Technologies' CEO tells **Caroline Donnelly** why he's convinced that water-cooled facilities are the answer to the tech industry's sustainability woes*

**W**aterborne datacentre operator Nautilus Data Technologies has a simple, yet ambitious, mission: to build the world's most sustainable server farms.

Unlike many other datacentre operators, the firm's definition of [sustainability](#) is not limited to the energy consumption habits of its facilities or the volume of carbon emissions they generate. Its take on sustainability extends to [minimising the amount of water](#) its sites use to keep their facilities cool and the amount of physical space they take up.

"The goal here is to reconceive the datacentre off a white piece of paper to meet the new requirements for [high-performance computing](#) [HPC], to be able to deliver the most energy-efficient outcome, and to be fully sustainable – not just on power, but where the consumption of water, chemicals and refrigerants are concerned too," says James Connaughton, CEO of Nautilus Data Technologies.

Nautilus was founded in 2013 and is staffed by a mix of datacentre industry veterans and individuals with backgrounds in working with large-scale, industrial systems that generate large amounts of heat. They are collectively intent on challenging the status quo about how server farms are run.

"We really are datacentre 2.0 in that we are going to move the datacentre industry from [relying on] forced chilled air systems to water cooling," says Connaughton. "What we've done is figure out how to engineer, architect and adapt into the datacentre environment really well [with] proven methods of cooling that are used by all other sectors that generate heat."

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The fact that these methods are widely used by other sectors, and have been for many years, should help to overcome the risk-aversion that datacentre industry types often have about tapping into technology providers that favour different approaches to dealing with common [server farm](#) issues.

"The chip designers and the server manufacturers want to create faster, hotter machines, and infrastructure people are still grossly limited in their ability to service that," says Connaughton. "The datacentre infrastructure people have to deliver five nines of reliability, and they want to stick to what they know and what works [to achieve that], but what they don't know is that every other sector, like the power generation sector, also has equally high standards of reliability and they've been water cooling for a century."

The shipping, industrial manufacturing and petrochemical production industries have also relied on water-based cooling methods within their operations for years, and it is time the datacentre industry grew to appreciate that, he adds.

"All these sectors depend on very high-performing, super-resilient, ultra-reliable water cooling systems, but this very conservative tech sector is not aware that even more resilient, durable, and easily maintainable systems are available to undergird their conservatism," says Connaughton.

"We are bringing the skillset of the other sectors into the datacentre space, and we are bringing the skillset of the datacentre providers into the industrial cooling space."

## LIQUID COOLING IN HPC ENVIRONMENTS

The way Connaughton tells it, the most energy-efficient way to run an HPC datacentre is to use liquid-based [cooling methods](#), such as the one Nautilus is championing.

"Our theory is that in five to 10 years, high-performance computing is just going to be computing, if we can get it all water cooled," he says.

Nautilus's take on liquid-based cooling relies on a closed-loop system containing cold water, which is used to moderate the temperature of the server racks running inside its facilities.

"As servers become more powerful, they consume more energy and run hotter. There is a ceiling right

now on how effective air chilling is, and that ceiling is around 17-20kW per rack," says Connaughton. "But there are new servers emerging, like the new Nvidia servers - they run at 30-35kW a rack and ultimately 60kW per rack, and air-conditioning is terrible in that setup, whereas water cooling can handle up to over 100kW [of compute power]. This makes the computing itself dramatically more efficient, so we can enable dramatically more energy-efficient computing."

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This is important, because these types of HPC servers are going to be the ones responsible for hosting the [artificial intelligence \(AI\) and machine learning](#) workloads needed to inform decisions about sustainability across the globe, says Connaughton.

"By supporting high-performance computing along with software, that will inform all other industrial and governmental processes globally and drive them to even larger levels of efficiency and sustainability," he adds. "This is a virtuous circle that we have not had access to before as a global society. And all of it depends on a naturally cold water molecule withdrawing heat from these very important and valuable machines."

## FLOATING SERVER FARMS

The first and only datacentre the firm currently has in operation is a 7MW facility that went live in April 2021, which is

sited on a barge in the US, within a Homeland Security port in Stockton, California.

Nautilus's barge-based datacentres are "mega modular" and capable of being transported all around the world, which could help hyperscale cloud and internet firms struggling to meet the demand for compute capacity in developing countries, says Connaughton. "There is very limited datacentre development in all the emerging markets because it's tough to put up these big, complicated water- and energy-consuming datacentres in emerging markets. It's just hard to do and we are going to make it easy," he adds.

Water is channelled into the barge and travels around the hardware contained within it, through the closed-loop system, before being ejected back into the water surrounding the vessel.

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It is a novel design, says Connaughton, with the water on which the datacentre is floating also providing a natural heat sink for the facility, which helps the Stockton site maintain a consistent [power usage effectiveness](#) (PUE) score of 1.15 throughout the year, whatever the weather.

To put this figure into context, Google – [which, similarly, claims to run some of the greenest datacentres in the world](#) – currently reports to have an average trailing 12-month PUE score of 1.10 across its entire server farm portfolio.

With respect to other operators' PUE scores, the amount of energy used to bring water into their datacentres for cooling purposes is not commonly factored into these calculations, says Connaughton.

"PUE is an incomplete measure because it does not account for the energy that is used to pull the water in from a freshwater source or the energy used to treat that freshwater to drinking water standard, or the energy used to deliver that water to the datacentre, as well as the energy used to take the wastewater [generated by this activity] and pump it back out into a water body," he says. "So there's a big block of energy that's unaccounted for in PUE, but all the water consumed is unaccounted for. The dirty little secret of datacentres is that most of them consume water to accomplish mechanical chilling, which is nuts."

Particularly as many of the countries where these energy- and water-hungry datacentres are sited are experiencing droughts and drinking water shortages, he points out.

"California is going through a horrific drought, and in Chennai in India they're rationing drinking water to their people," he says. "It makes absolutely no sense, given what we now know, for any datacentre to ever take another sip of drinking water again."

### TAKING A GLOBAL STANCE ON DATACENTRE SUSTAINABILITY

The barge-based datacentre Nautilus has built in Stockton is far from a one-off, as the company has also secured planning and investment for another in Limerick, Ireland, which – when live – will be the first server farm of its kind in Europe.

The project has secured support from the Irish Sovereign Wealth Fund, says Connaughton, because that organisation can see the potential for a barge-based server farm to help operators in Ireland's increasingly crowded datacentre market find the space they need to grow.

"The Irish Sovereign Wealth Fund invested in us because they want to transform the datacentre to that 2.0 model in the country, because they can see the [struggles Ireland is now having with space and power](#). We're the answer to that," he adds.

Apart from providing Irish datacentre operators with a waterborne alternative to land-based facilities,

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there are a couple of other reasons why Nautilus has set its sights on building its presence in Ireland.

These include Connaughton's conviction that [Ireland could be on course to become the next big global datacentre hub](#). He likens the west of Ireland to Ashburn, Virginia, which is often described as being the datacentre capital of the world.

While the company's barge-based datacentre design is an important point of competitive difference for Nautilus, it also has the expertise to build land-based server farms. "Being on land is great and being right on the water is a little bit greater [in cooling terms], but it's not a big delta," says Connaughton.

The company announced details of its second datacentre on 5 June 2021. It will be land-based and located in the US town of Millinocket, Maine, on the site of what was once one of the world's largest paper mills, and where much of the US's newsprint used to be created.

The site will have a projected capacity of 60MW of IT load once completed, and Connaughton hopes this will pave the way for further regeneration in that area.

"Today, almost all datacentres are built in commercial real estate locations and are actually competing with urban centres for space," he says. "That makes no sense because on the working side of every population centre in the world is an industrial zone, and that is where the datacentre should go. There's a lot of available power on the working side of these cities, and it's where all the fibre runs before it hits these cities. So we're all about converting brownfields into greenfields, which makes us an ESG [environmental, social and governance] machine."



The proximity of the Millinocket data campus site to a lake means it can use gravity to draw water through the datacentre

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There are a few others reasons why Nautilus selected Millinocket as the site of its first land-based datacentre, and one is because of how well it complements the company's Irish growth plans.

["Ireland is one of the epicentres of digital"](#) because it's one of the furthest points west in Europe before you hop across to North America," says Connaughton. "This location in Maine is the other side of the Ireland story. Maine is to Europe what Ireland is to America, and our goal is to establish - on the west of Ireland and on the east of America - large computer exchange regions to facilitate all the [data] exchange, right across the continent, and have it be within the sovereign control of the US, and have it be within the sovereign control of the EU."

The proximity of both locations to large bodies of water is another plus point, not just in the context of how the company regulates the temperature of its datacentres, but because it also supports Nautilus in achieving another of its goals - to make supercomputing resources more readily available to enterprises.

"In Ireland, the one thing that it has an abundance, beyond its very clever people, is an endless supply of naturally cold water," says Connaughton. "And in Maine the same is true, which means you can make supercomputing available to everyone in

the world, rather than the provinces of national laboratories, or university centres like Cambridge or Oxford."

Connaughton claims the company's Stockton facility is the greenest datacentre in the world, but it will lose that title once the server farm in Maine is completed because [water will be drawn into the facility by gravity, rather than being pumped](#). This unique feature is made possible by its location, with the Maine

datacentre sited close to a hydro-power plant which will be feeding the server farm with electricity.

"There's a reservoir for the hydro-power plant, and there's a big lake [attached to that] and we're going to be below the lake," says Connaughton. "So we'll take water - gravity-fed from the lake - through the datacentre and then the water will come out warm at the other end and, initially, we'll just put that back into the hydropower plant's

discharge with no significant ecological change in temperature."

At least that is the plan for the time being, although Connaughton says Nautilus is in discussions with several parties that have expressed an interest in putting the slightly warmed water that will be dispelled from the datacentre to use.

"There's a company interested in setting up greenhouses in Maine that could use the warm water, and we are looking at district heating," he says. "We're really going to experiment

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in Maine on this idea of creating a 100% emission-free, ultra-efficient datacentre with warm water as a by-product."

Since the completion of its barge-based facility in Stockton, California, Nautilus now has verified proof that its approach to building datacentres is a goer, and with its other sites due to come online in due course, it is now courting clients to populate them.

"We are targeting both the hyperscale players and the large enterprises - especially those that want to future-proof their deployments for high-performance workloads - and those are the ones who are turning up to talk to us," says Connaughton.

At the same time, however, Nautilus is keen to make space for smaller, "digitally dependent" businesses that are operating locally to where its datacentres are located to ensure it is doing its bit to aid the redevelopment of the surrounding areas.

"The next two [Limerick and Maine] projects will really perfect our design and deployment, but after that, the key will be to partner with local developers that want to develop datacentre sites with a [water-cooled approach](#) because it gives them greater optionality and a wider range of land areas that they can develop on," says Connaughton. ■



Nautilus claims its land-based datacentre in Maine is set to be the "greenest in the world"

# AI LIKELY TO COMPLEMENT PREDICTIVE ANALYTICS

*The discipline of predictive analytics is likely to increase in importance as it is complemented by artificial intelligence. NHS and National Express case studies prove the point, writes **Cath Everett***

**W**hile in data analytics terms, tools for activities such as data extraction and exploration are quite mature and well adopted, the situation for predictive and prescriptive analytics is quite another story. Predictive capabilities make it possible to forecast future events based on past and present performance, while prescriptive, or instructive, analytics offerings examine data to enable organisations to answer questions such as “what should we do?”. But as David Semach, partner and head of artificial intelligence (AI) and automation for Infosys Consulting in Europe, the Middle East and Africa (EMEA), points out: “The adoption of predictive analytics is still relatively low and the technology is maturing, while the take-up of prescriptive tools, which is the next stage on, is almost non-existent.”

Semach believes this situation results from three key factors. First, he says, in a [predictive analytics](#) context, there is “no one silver bullet” tools-wise. Instead, implementing such technology is a complex and expensive undertaking, requiring a “multi-tool solution”, large amounts of data and a solid business case.

Second, it takes time and effort not only to build the predictive models themselves, but also to aggregate the necessary external and internal data from across the business to feed into the system. Third, there is often resistance from business leaders who are used to undertaking forecasting themselves and do not necessarily trust the findings of machines.

“A survey we did in early 2020 found that 91% of business decisions are made with a lack of supporting data but are based on human experience and gut feeling,” says Semach. “Nonetheless,

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data quality is becoming less of an argument now as the digitisation brought about by Covid means people are getting their data into a better state and are moving it to the cloud."

Early adopter industries include fast-moving consumer goods and retail, life science and pharmaceuticals, and energy and oil and gas, with uptake having increased considerably over the past 18 months.

Business functions that are particularly keen on the technology include finance, sales, HR to a certain extent and [supply chain in a demand forecasting context](#). Popular use cases, meanwhile, range from forecasting late payments to predicting customer purchasing activity and prioritising the most likely sales prospects.

Mike Gualtieri, a vice-president and principal analyst at Forrester Research, says: "A major corporation may be working with six to 12 use cases today, but there could be hundreds, so we're just at the beginning of this. Sometimes organisations do their own custom work, but most software vendors are starting to put predictive models into their applications, so as you upgrade, there'll probably be a few use cases in there, too."

Interestingly, though, it appears that in many instances, the statistics-based predictive analytics tools of the past are now being subsumed into broader machine learning-based platforms.

"We'll probably drop 'predictive analytics' as a term next year as you're not going to find any of the 50 or so vendors that market

products using it – they're increasingly calling it a 'data science' or 'machine learning' platform," says Gualtieri. "The reality is that these platforms often have lots of older statistical methods in them as well as [machine learning](#), but machine learning is seen as the hot, leading-edge technology."

As for suppliers that sell traditional extraction and exploration products and offer predictive offerings as part of their portfolio,

Semach says that unless they "drastically evolve" and adopt a machine learning approach sooner rather than later, they will "die eventually".

The same is not true of the overall market for predictive capabilities, however, which Semach is confident will continue its steady growth. "It won't happen tomorrow – it'll be more

like three to five years – but it will happen," he says.

In the meantime, here are two organisations that are ahead of the curve and already deploying such technology to great effect.

## CASE STUDY: UNIVERSITY HOSPITALS OF MORECAMBE BAY NHS FOUNDATION TRUST

"If you take the view that there needs to be transformative change in healthcare to optimise services, make them more affordable and deliver better outcomes, then embedding AI and predictive analytics is the way to do it," says Rob O'Neill, head of analytics at the [University Hospitals of Morecambe Bay NHS Foundation Trust](#).

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MIKE GUALTIERI, FORRESTER RESEARCH

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ANATOLY STOJKO/ADOBE

O'Neill first implemented the organisation's analytics and data science strategy about three years ago after being selected to become a member of the NHS Digital Academy's first cohort, which was set up to train digital leaders.

"The big driver was that healthcare isn't sustainable in the way it's delivered now," he says. "There are significant population-wide health challenges, delivering services is expensive and there's a gap in funding, so we're always financially challenged."

Another key issue is that the specific population the Trust serves is dispersed over a wide geographical area, with varying levels of deprivation. As a result, because of the scale of the challenge involved, the organisation began undertaking a significant change programme to "redesign how care is delivered".

The aim is to replace the traditional hospital-with-GP-led-care

approach with a more holistic "system" to ensure services are provided in the safest and most cost-effective way while enhancing the patient experience at the same time. Predictive analytics and data science are considered vital tools in enabling this shift.

"I'd argue that the only way to solve these challenges is by using data, and data science, machine learning and other predictive techniques in particular, to shake up how we model and understand what is happening," says O'Neill. "It's not about predicting the future, but changing it through well-thought-through and clinically bought-into strategies - that's the ambition."

To this end, the Trust has implemented [Snowflake's cloud-based data warehouse](#), [DataRobot's](#) tools to create predictive analytics models and Qlik's data analytics tools to support clinicians' decision-making in a range of care settings.

Machine learning and predictive analytics work better together.

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For instance, the system is currently used to accurately predict the number of patients attending A&E on any given day and to assess how acute their requirements are likely to be, to ensure enough resources are available. It is also employed to predict the likely length of a patient's stay in hospital and their risk of re-admittance following discharge in order to undertake unscheduled demand forecasting.

A third predictive model uses volatile pandemic-related data to forecast patients' personal risk levels when waiting for elective operations that have had to be deferred because of the pandemic. A fourth model, which is currently going through clinical review, is focusing on identifying hypertensive patients before they are even admitted to hospital.

"There's an ageing population in the West as people are living longer with an increasingly complex range of chronic conditions," says O'Neill. "So if we can intervene earlier, great - and if we can understand the patterns of demand associated with that, we can also better align our resources internally."

As part of the process of making the Trust a more data-driven organisation, it has now embedded members of its analytics team in each of the transformational work streams and into its clinical business units. "Having clinical engagement and being clinically led is very important to ensure the technology is accepted and

embedded," says O'Neill. "But it's such a busy, complex environment that clinicians work in, and they're so focused on delivering safe and appropriate patient care that any solution which can help in supporting decision-making tends to be really welcomed."

While he acknowledges that the Trust is one of only a "fairly small handful" in the UK that have got as far as Morecambe in terms of predictive analytics, he believes this situation is likely to change quite rapidly with the work of [NHSX](#), a UK government unit responsible for setting national policy and developing best practice for NHS technology, digital tech and data.

"If we're looking at a national and global strategy for health, it really needs AI and predictive analytics to deliver," says O'Neill. "Different organisations are currently at different points on the maturity curve, but it is the future."

## "IF WE'RE LOOKING AT A NATIONAL AND GLOBAL STRATEGY FOR HEALTH, IT REALLY NEEDS AI AND PREDICTIVE ANALYTICS TO DELIVER"

ROB O'NEILL, UNIVERSITY HOSPITALS OF MORECAMBE BAY NHS FOUNDATION TRUST

### CASE STUDY: NATIONAL EXPRESS

During the UK's various Covid-related lockdowns, predictive analytics models were key in enabling National Express West Midlands (NEWM) to ensure that the supply of vehicles on its bus network aligned with socially distanced customer demand.

The company had started its predictive analytics journey pre-pandemic when it implemented CitySwift's cloud-based platform, which was developed specifically to forecast journey times

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and passenger demand for urban bus networks. The use of big data and machine learning techniques made it possible to optimise timetables by taking traffic levels and other external events into account.

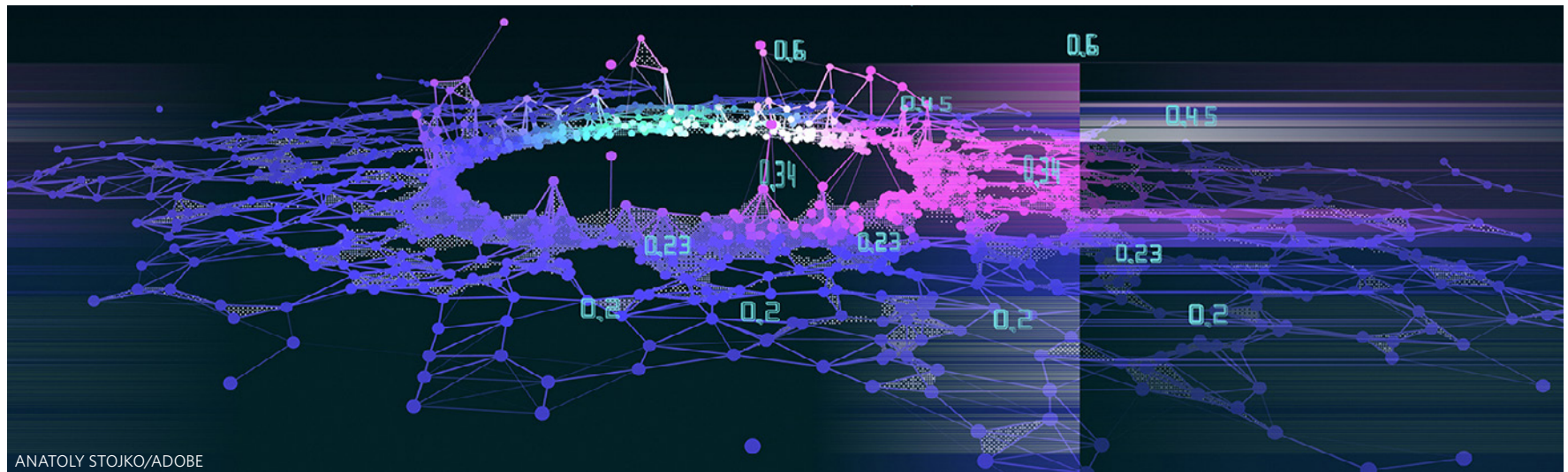
The decision to adopt this approach was taken when it had become clear that ageing demand analytics software had "maxed out" in terms of boosting operational efficiency and optimising profitability, says Andy Foster, deputy commercial director at National Express. "The big challenge we face is congestion, which is a double whammy for us - if services are slowed down by congestion, we need to put more buses on to offer the same service, but each bus costs £100,000-£150,000 to operate, so it's not a decision you take lightly," he says.

A key conundrum here is that if services are slow, they become less attractive to passengers, who therefore start using them less. This situation "pushes costs up and revenues down, so you end up being caught in a horrible pincer movement", says Foster.

Another problem for NEWM was that it had no way of analysing the impact of changing schedules, adding extra buses or altering the frequency of a service.

"So we could go to the bosses and say 'route 97 has a problem', but we couldn't quantify how successful any particular action would be," says Foster. "We could only say it may improve it, but we couldn't quantify the benefits."

As a result, in November 2019, route 97, which provides services to 80,000 passengers a week, became the first to benefit





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from SwiftSchedule scheduling technology. The software was used to analyse the time it took for buses to get from one stop to another, the number of stops they made and how many passengers got on and off. External historical data, such as weather and traffic patterns, was also added to the mix to better understand real-world impacts.

This information, in the shape of about 750,000 data points each day, was then used to make changes to bus times, which increased their punctuality from an average of 89% to 92.5% and saved 2.4% in operational costs.

But when the Covid-19 pandemic struck the UK in March 2020, the impact was profound. Overnight, congestion issues ceased to be a problem, while continually changing lockdown-related demand and social distancing took over.

To address these challenges, NEWM started using CitySwift's SwiftMetric software to better understand the impact of the situation on bus reliability, efficiency and demand in order to inform its decision-making.

"We could see how demand and the speed of operations were changing and we could do so very quickly as we were getting fully analysed data in less than 24 hours," says Foster. "By Tuesday afternoon, we could analyse what had happened on Monday - this enabled us to get buses into the right place and ensure there

was enough capacity to take essential workers to work without them becoming overcrowded."

The company also created a website page for anxious travellers to check how busy any given journey was likely to be, so they could adjust their plans accordingly.

Now that lockdown is over and congestion has returned, the use of the technology has returned to route optimisation, identifying savings and reinvesting them in improved bus frequency.

On route 16, for example, time-keeping has been improved by 4%, which has led to a 2% increase in passenger usage and a 4.6% rise in the number of journeys undertaken.

The technology will also be rolled out in September to cover 40% of NEWM's operations. A further aim is to share congestion information with the local highway authority in the hope that it will reallocate road space to reduce the problem.

Data will also be provided to Transport for West Midlands, which is responsible for coordinating services in the region, to make the case for increased funding under the government's "Bus back better" national bus strategy.

"We were always fairly good at data use, but predictive analytics is taking it to a higher level and enabling us to make better decisions on where and how we move resources around," says Foster. "It's a powerful tool." ■

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## Another one bites the dust

It feels like a new tablet slapped on a set of wheels is being marketed every week at the moment, but here we are again, peak-*Big Brother* Davina, asking you, the leering punter: "Do you want another one?!"

This time it's Amazon's turn, as it launches [Astro](#), which apparently checks up on our pets. We wonder what our pets could be doing? Probably either eating, drinking, pooing, weeing, or licking themselves clean. Where would we be without you, Astro, to keep track of all that? It's really hard to understand how any of the companies releasing these fail to at least fit Roombas to their undercarriages, when in an ideal world they'd boast some kind of HEPA-certified air purifier status, too. In summary, unless home robots are cleaning the place, they can shut up and keep still. ■

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**“Astro is terrible and will almost certainly throw itself down a flight of stairs if presented the opportunity. The person detection is unreliable at best, making the in-home security proposition laughable ... The device feels fragile for something with an absurd cost”**

One reported source  
who worked on  
Astro's development

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➤ [Read more on the Downtime blog.](#)