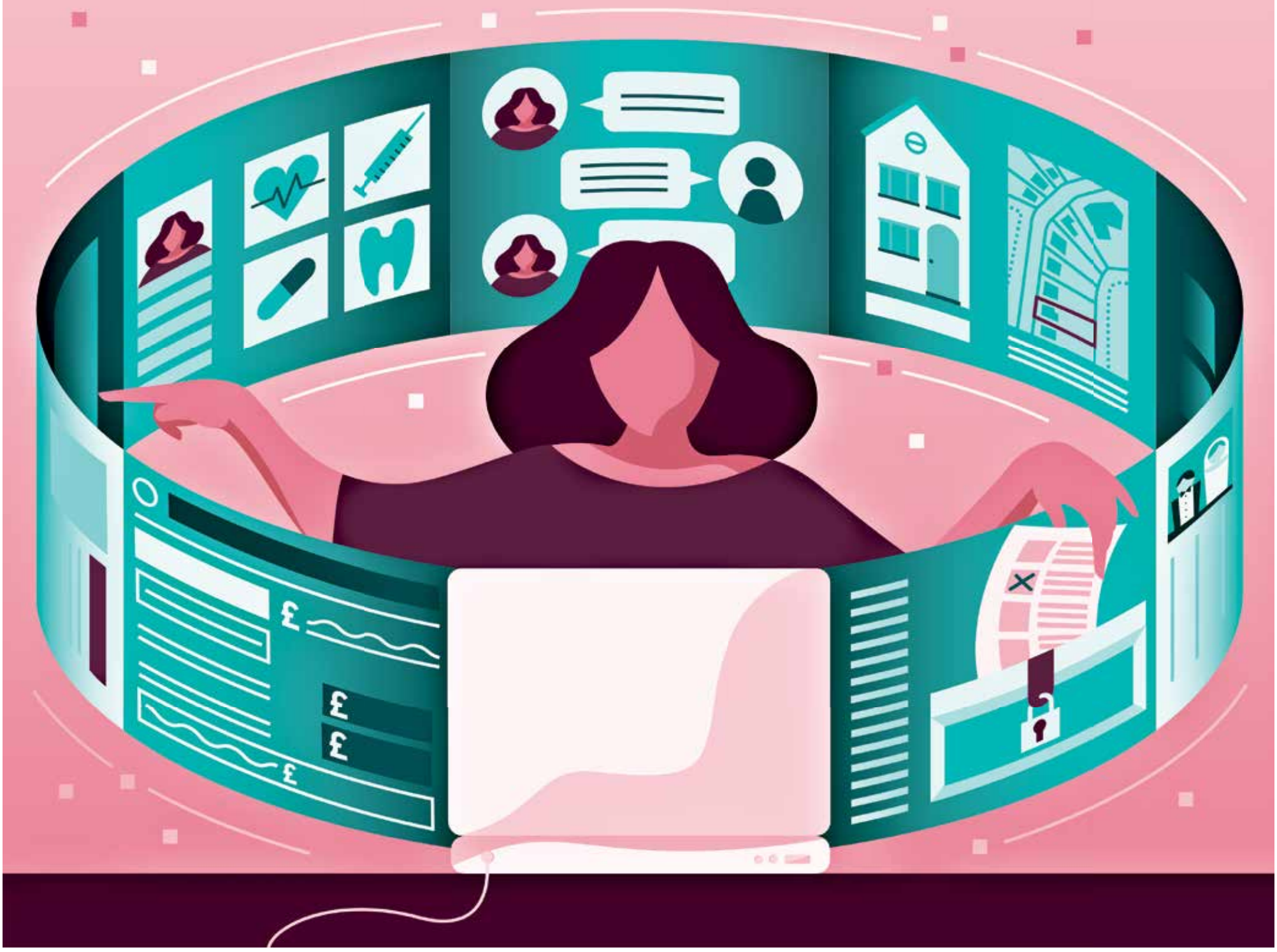
PUBLIC SECTOR TECHNOLOGY



Refero

Disrupt Rather Than Destabilise Citizen and Public-Sector Engagement

It is widely known and accepted, better integration between public sector services is needed to deliver improved outcomes for patients, citizens and students.

Last week the new Secretary of State for Health and Social Care shadowed front-line staff and flagged the lack of national interoperability standards.

Hancock said: "Staff were hindered by IT in a way that we simply wouldn't accept in any other organisation in the 21st century."

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Government must be smarter buying tech

Despite some shining examples of progress, government agencies are lagging behind in take-up of technology which could transform services

CHARLES ORTON-JONES


Fabian Krause / EyeEm / Getty Images

Here's something dumb. When it's time to renew your car tax, the government will post a paper V11 reminder letter with an 16-digit reference number to use on their website. In the era of the internet, the DVLA still can't find a way to eliminate snail mail.

Or take the TV licence agency. Move address and need a refund, and the agency demands citizens print web-forms and post them. Carrier pigeon would be quicker.

These are examples of how backward the public sector can be when it comes to technology. Citizens may use apps to book minicabs and compose shopping lists, and then feel they are transported back to the dark ages when interacting with the government.

"Startups have transformed almost every element of our private sector lives, from banking to leisure, travel to fitness," observes Daniel Korski, who served as then-prime minister David Cameron's deputy head of policy at 10 Downing Street, now founder of Public.io, a consultancy helping startups work with the state. "The public sector, however, remains largely untouched."

At the heart of the challenge is procurement. Vendors are hungry to shake up the public sector. But the processes, institutions and mindset of the civil service throw up hurdles often too high to vault. Mr Korski says: "Government has made positive steps towards becoming a smarter buyer of technology, but until procurement processes work for small, agile players, the public sector will always be behind the cutting edge."

Pressure to improve is now urgent. A deluge of new technologies is arriving - blockchain, artificial intelligence, edge computing, the internet of things and sensors, automated procurement, the list goes on. And suppliers are increasingly frustrated by the lethargic take-up by the state.

Here's a cracking example. A small company called CaseLines supplies the software to manage legal documents for 78 courts, including the UK Supreme Court. CaseLines is now patenting a blockchain solution to ensure evidence is tamper free, which could be a huge advance.

But founder Paul Sachs gives a troubling account of how the public sector buys technology. "In practice, the individual civil servants do not have a full picture of what they need to build, perhaps a 50 per cent picture. The government servants will then describe these wants to a supplier through a request for proposal. The supplier also does not know what is required, so the communication results in only 50 per cent efficiency and therefore a 25 per cent understanding of the real requirement by the supplier. The requirement is then passed on to the system developers who will not have a focus on the business needs and the result is that the delivered system only realises 12.5 per cent of the requirements and is basically a failure."

Reforms have not been good. In 2010, the new Conservative administration created the Crown Commercial Service, a body designed to offer deep expertise in negotiating contracts with private sector suppliers. It was a hit at first, for example, ending 20-year contacts with no escape clause that previously dogged deals. But now the service is seen as stagnating.

"The Crown Commercial Service's recent cancelled procurement of a digital platform, the Crown Marketplace, is a key example of the struggle the government has experienced when trying to move to a platform approach," says Chris Francis, director of government relations at software and cloud services provider SAP. The Crown Marketplace was an strategy to create an Amazon-style procurement platform – long overdue. "It seems that developing point solutions is now taking priority," says a disappointed Mr Francis.

Companies asked for their views on the axing of the Crown Marketplace by procurement website Spend Matters called it "disgraceful", "appalling" and "ridiculous", and words that can't be repeated.

But there are glimmers of hope. The GovTech Catalyst scheme, launched by the Crown Commercial Service, funds radical new technologies for the public sector. A £20-million fund was announced in May. Successful initial schemes included identifying Islamic State military through still images; tracking waste through the supply chain; and traffic management technology.

Another gold star goes to HM Revenue & Customs, for digitising tax returns and allowing third-party platforms to connect. "HMRC's Making Tax Digital legislation is a good example of an initiative driven by the government that is benefiting from the expertise and guidance of software vendors," says Damon Anderson, director of partnerships at Xero, a cloud-accounting platform. "It's making fundamental changes to the way the tax system works, transforming tax administration to become more effective, efficient and to ensure the right amount of tax is being collected with fewer errors."

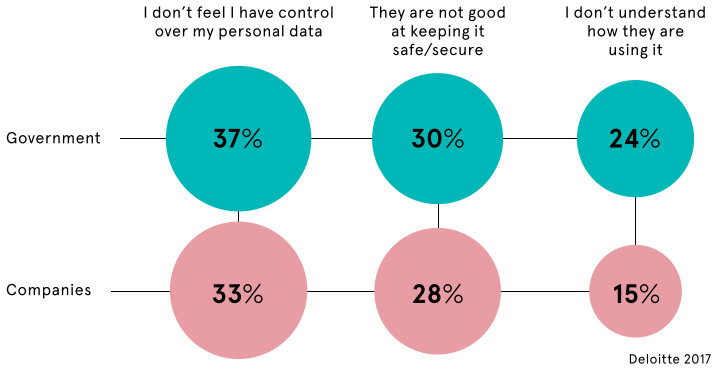
Knowledge-sharing is becoming more common. Councillor John Beesley, leader of Bournemouth Council, serves as deputy of the Key Cities Group, a network of 24 mid-sized cities in England and Wales that collaborate on procurement. He says: "Sharing procurement and expertise across networks such as these, and using them to share learnings such as my own council Bournemouth's bid to become the testbed for 5G networks in the UK, needs to become the norm, not the exception."

The biggest leap? It may be when the government truly embraces the smaller, innovative technology companies. Todd Thibodeaux, president and chief executive of the CompTIA, the trade association for the tech industry, says: "One of the biggest things they can change is their big company mindset. Most of the truly innovative solutions are coming from startups up to mid-size tech firms, not from the large multinational players."

The technology industry, for sure, is aching to supply incredible new tech that will make the state more efficient. As Jonathan Ebsworth, partner in disruptive technologies at Infosys Consulting puts it: "It is time for the government to start pioneering in its own right and showing that we are serious in demonstrating the value of these new technologies. If the benefits are as great as we expect, then we can't afford to wait." ◆

Public mistrust in data security

Reasons why UK adults don't trust government organisations and companies with their personal data



Deloitte 2017

Commercial feature

Q&A Transformation

Paul Solomon, founder of Edenhouse, arguably the UK's most respected SAP consultancy, explains how the public sector can master the tricky art of digital transformation

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Where should the public sector start when developing a digital transformation strategy?
It starts with one question. What does your organisation want to achieve? This is a profound starting point, and makes you look afresh at your users and the way you think about the service you offer. Then move on to a wider stocktake of your strategy to date and where you are headed as an organisation in the next five years. We conduct this through a process we call "discovery". We go into an organisation and get under its skin. Our experts conduct interviews and hold workshops with key users and executives. We build up a report. Something we've learnt is not simply to publish this report, but to do a series of playbacks. We draft, then go back and test our ideas to make sure our understanding is accurate. Then we go back and amend. We call this the "show and tell" approach. By the time we've finished this initial report, we'll have a thorough understanding of the needs of the organisation. Only then are we ready to begin making concrete recommendations.

Is the key to transformation a desire to change the corporate structure?
It's about mindset, not structure. To change an organisation, you need to understand the culture and the people. You need to find the people who are comfortable with change. In any organisation there are people open to change and those who resist. We arrive as an external change agent and find the internal change agents. They might not come from the most obvious of roles. We look across ages too. Millennials tend to have a different view of technology to people in their late-30s and above, so we bring in younger people and listen to their perspective on technology. You also need someone who'll take ownership of digital transformation. They'll own the business case for why you are embarking on the project. The mindset approach is more effective than starting off with a blank piece of paper and focusing on structure. This is because transformation is a life cycle, not a one-off event. You need to be able to sustain change continuously over time.

Paul Solomon
Chief executive, Edenhouse

Why do so many public bodies panic at the mention of digital transformation?
It's natural. The first thing people think is that things are going to change and that's traumatic. The benefits get overlooked. You need to win hearts and minds, and get over that fear of change. At Edenhouse we do this by building trust and credibility. We conduct a session and talk about our experience. We almost man mark the customer's team, one to one, to build personal rapport. Then we have a social event outside of the workplace. This may seem over the top, but believe me, when you begin a transformation without trust and enthusiasm, things will go wrong. Start off on the wrong foot and resistance will emerge. Personalities will start to clash. Fear creeps in and the whole project loses momentum.

Many public bodies will say they have systems in place that work, so why change?
This is so common. We all like to stay in our comfort zone and organisations love to believe that what they have now is good enough. But it never is. In the fast-moving digital world, user expectations are soaring and the potential of what you could be delivering is only increasing. We had a classic case recently, working with Muntons, who supply malt to the brewing industry. Great company, but their SAP infrastructure was outdated. They couldn't see it. To them it worked. But we could see the lack of productivity and the silos. Not only did we transform their company with the latest SAP technology, we used the project as an excuse to drive change. Suddenly people had to rethink the way they did their jobs. And I'll be honest, the mentality of "we've always done it like this" is rife in the public sector. Much like London's Black Cabs, then Uber arrived, or hotels then Airbnb came along. Old ways of working can rapidly be overtaken. You need to continually evolve or risk becoming obsolete.

What are the guarantors of a successful digital transformation project?
Pick the right transformation partner. That means not always the cheapest or the ones you've always had. Go for an external partner with a track record of success and the right ethos. The public sector body needs to reflect on their own attitude too. Are they open to new ideas? Can they think differently? It's essential they can. Strong processes are powerful guarantors. For example, Edenhouse deploys a bimodel IT model. This means being conservative in core areas and more radical in others. For instance, a government department can retain its core system, but reinvent the customer interface. Bimodal means you won't get overwhelmed, trying to change everything at once as you integrate on-premise and line-of-business cloud solutions. Gate reviews are another winner. We break projects into phases. Before we move on to the next phase, we conduct a review to check we've hit objectives. If not, we go back and fix the problem. Only then do we move on. Gate reviews are a terrific guarantor of success.

You're an SAP consultancy, so what makes you equipped to consult on strategy?
It's true. We are an SAP specialist. That is what makes us so strong. A lot of consultancies dabble. We have 300 staff in Manchester, Birmingham and Farnborough devoted to SAP. Our expertise is unrivalled and the best reputation for customer service. It dates back to the model we built when we founded Edenhouse a decade ago. We wanted customers for life. Our support model was so effective it became the template for other SAP consultancies. We have a powerful record of delivering transformations. Crown Commercial Service, Sanctuary Group and councils including Rochdale, Bradford and Plymouth, to name but a few. I still lead from the front. If a client needs to call me directly, they have my number. We've proven again and again how effective we are at enabling digital transformation. Public sector bodies trust us with their most challenging projects. And we can't wait to work on more.

For more information please visit edenhousesolutions.co.uk

Edenhouse

EDUCATION

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Teaching how to work in 21st century

Applications of technology in classrooms can add great value, but leave room for the human interactions of skilled teachers

DAVID COWAN

At the tender age of 87, Michelangelo said "I am still learning", making him a poster child for lifelong education.

Learning has come a long way since Renaissance Italy, but educators and administrators still face the same concerns in equipping students from school to university for the world of work; except today's world is faster and more automated, with flexible patterns of employment.

Joe Fuller, a Harvard Business School professor who co-leads the school's initiative Managing the Future of Work, explains that future employment is going to be much more variegated than it is today. "People will have lots of different types of working relationships," he says. "Most companies today are made up of full-time and part-time employees. Expect to see a significant increase in gig workers."

Many education stakeholders are calling for a shake-up of organisation and curriculum to meet 21st-century needs. In a recent Australian *Future of Education* survey, undertaken by Real Insurance, 42 per cent of respondents said the current school curriculum is inadequate, 23.2 per cent said basic literacy is lacking and 30 per cent are not confident children are being prepared for future jobs.

The survey concluded that few Australian parents are confident in the school curriculum and worry about how well the education system aligns with the needs of future workplaces.

Those surveyed also indicated discomfort with the adoption of virtual classes or teachers. Garry Falloon, professor of digital learning at Sydney's Macquarie University, says fears of technology taking over classrooms and the increasing role of tech in the workplace highlights the importance of balance. "It's not an either-or scenario," he says. "It's about blending technology with the right curriculum design."

It is also about place. Classrooms today look very similar to the classrooms pupils' parents learnt in, but with some new tech added. Joe Williams, executive director of America's Democrats for Education Reform, says: "With some exciting exceptions, public [state] schools are one of the few institutions in modern life that have not seen radical changes spurred by technology."

Yet, educators are expected to teach skills and problem-solving for jobs that don't exist for 65 per cent of the children starting school this month when they come to seek employment. As times change and market needs evolve, educational subjects come in and out of vogue, while others are threatened with abandonment. The classics are a good example, though Jeremias Prassl, associate professor in the Faculty of Law at Oxford University and author of *Humans as a Service*, reminds us: "Latin is useful, it is a language. Computer programming is also a language."

There are fears and opportunities to be explored, says Professor Prassl. "It's not just the negative of losing jobs. The history of work tells us technology makes work more interesting, more productive. It's not just the destruction and substitution of jobs, but the creation of new types of jobs. It's a question of agency. The future of work is not something that happens to us; we have a say in this, whether it is as individuals or through the agency of groups," he says.

Professor Prassl, whose book examines work in the gig economy, warns of the innovation paradox, in that while innovation in the gig economy is reliant on modern technology, as far as work is concerned, it also uses a business model that is ancient.

He explains: "We need to be quite careful not to confuse the positives of technology with technological exceptionalism. Is it actually true we need separate skills? Many tasks will be automated; we need to understand the processes, how they work." This understanding seems to be accepted in many countries.

In Singapore Ng Chee Meng, minister in the prime minister's office and until recently the minister of education for schools, stresses the need for "21st-century competencies such as critical and inventive thinking, and soft skills such as communication skills and cultural awareness".

Educators in New Zealand are promoting what they call the future-focused principle and the need for educators to be future-oriented and adaptable. Dr David Parsons, associate professor at Massey University in Palmerston North, explains in a New Zealand Ministry of Education presentation: "The curriculum encourages students to look to the future by exploring such significant future-focused issues as sustainability, citizenship, enterprise and globalisation."

Sarah Weir, chief executive at the UK's Design Council, questions who will build the human connections that are at the core of such skill areas: "Can robots teach collaboration, creativity and disruptive thinking? I don't think so."

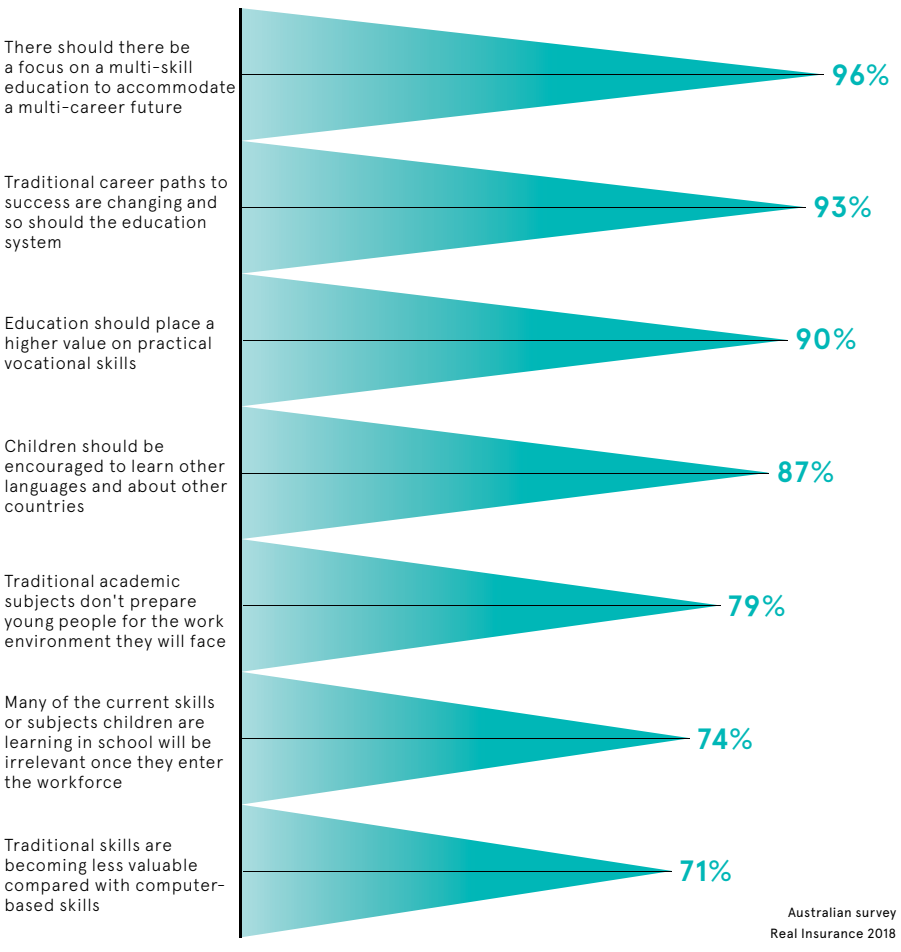
> "It's about blending technology with the right curriculum design

She adds: "Imagine a school class with children fully engaged and immersed in working together to solve real-world issues. They are self-driven, collaborative and coming up with ideas and throwing out the ones that don't work. They think creatively and they apply it across their entire life. Surely it's important for our young people to have the skills they need to design their future, drive the economy and solve the global challenges they face in the future."

Professor Prassl believes forecasting underlying skills is not necessarily a new challenge. In his own discipline of law, he says: "The law always changes and as legal educators we need to focus on transferable skills, such as legal thinking and writing. We need to focus not just on the content, but how we go about teaching it. Do you emphasise the passing on of knowledge or the critical interrogation of the subject? One of the joys of education is that it is never static." ◆

Education strategies for the future workforce

Percentage of public that agree with the following statements



Australian survey
Real Insurance 2018

GEOSPATIAL INFORMATION

Julie Dermansky/Corbis via Getty Images

Mapping a way forward in services

Officials in America are applying the technology sat navs and smartphones use to help us get around to tackle a wide range of issues

ADAM STONE

Homeless headcount

Local officials in Aurora, Colorado last year saw a spike in the number of local homeless people – and they're calling that a win. They say implementing geospatial information systems (GIS) dramatically improved the accuracy of efforts to count the transient population.

The city last year counted 526 homeless individuals, up from 420 the previous year. GIS came into play in the form of a web-based application that allowed field workers to leave behind their traditional clipboards and instead pin the location of homeless individuals to a shared digital map.

The geospatial tool enabled counters to blanket the city, hitting parking lots and other places where the homeless might congregate. "We had all the neighbourhoods gridded out in sections for the teams to cover, so we could cover more ground without duplicating our efforts," says Shelley McKittrick, City of Aurora homelessness programme director.

Looking ahead, the GIS data could drive improved services to the homeless population. "If we have that geographic information on where people tend to cluster, then when housing becomes available, we have a way to find them," Ms McKittrick says.

01

Digital twin

Boston officials have used the ArcGIS Urban tool to develop a 3D model for zoning and land use. Their interactive site offers realistic profiles of more than 129,000 individual structures.

"We have been experiencing so much development here and we needed to figure out the impacts of that," says Carolyn Bennett, geospatial data manager at the Boston Planning and Development Agency.

Officials have used the model to ensure new buildings don't cast shadows over the historic Boston Common green space. They've leveraged the 3D facsimile to consider zoning changes and land-use options. The tool has also proved a boon for citizen engagement.

"We want people to be able to see what the effects of development look like and this allows us to do just that," Ms Bennett says. "Zoning can be very complex and confusing, and this offers a way to visualise that complex information."

02

Climate change

In New Orleans, city officials have gone live with a website that uses geospatial data as a hedge against the rising impacts of climate change. The public-facing tool shows how transportation, rising water levels and civic infrastructure all are interconnected aspects of the global warming phenomenon.

"This is a tool for building awareness and also a tool for making decisions," says Tyler Antrup, urban water programme manager in the Office of Resilience and Sustainability.

"For the public at large, it helps to build an understanding of the particular impacts a given neighbourhood may face," he says. For city planners, a GIS visualisation helps to drive better urban planning. "Suppose we are looking to do a project with a protected bikeway, something that is planted with trees to improve the cooling of the area; this tool allows us to identify parts of the city where the need for that would be greatest."

03

Traffic management

In Georgia's Cobb County, GIS officials have partnered with the Connected Citizens' Programme from traffic app Waze to ease the morning commute. They've combined civic geospatial data with crowdsourced information from the app to produce a real-time traffic dashboard.

"We provide Waze with the information we have – our planned closures or traffic incidents that we find out about. In return we receive all the crowdsourced Waze reports occurring in Cobb County. That's far more eyes on the ground than we could possibly have. They can report things faster than we can see them and they fill in gaps for us," says Lynn Biggs, GIS manager for the Cobb County Department of Transportation.

Operators in the traffic management centre get an at-a-glance view of congestion and can modify signal timing to ease traffic flow. A public-facing element is set to launch soon, to share this same information with drivers.

04

Food availability

In Virginia, the governor's office has launched an innovative effort to bring a geospatial angle to issues of food availability and healthy eating.

The Virginia Food Access Network (VFAN) uses maps to tell "data stories" around such issues as childhood hunger, access to nutrition and availability of local produce. The data comes from government sources, non-profit organisations, academia and elsewhere.

"They had all this information at the county level, but people's eyes would glaze over when they saw it on a spreadsheet," says Rob Rose. As director of the Center for Geospatial Analysis at the College of William and Mary in Williamsburg, Virginia, he helped to develop the GIS component of the government's VFAN site.

"Maps are one of the best ways to tell these stories. People understand how to look at maps and can use them to easily digest information," he says.

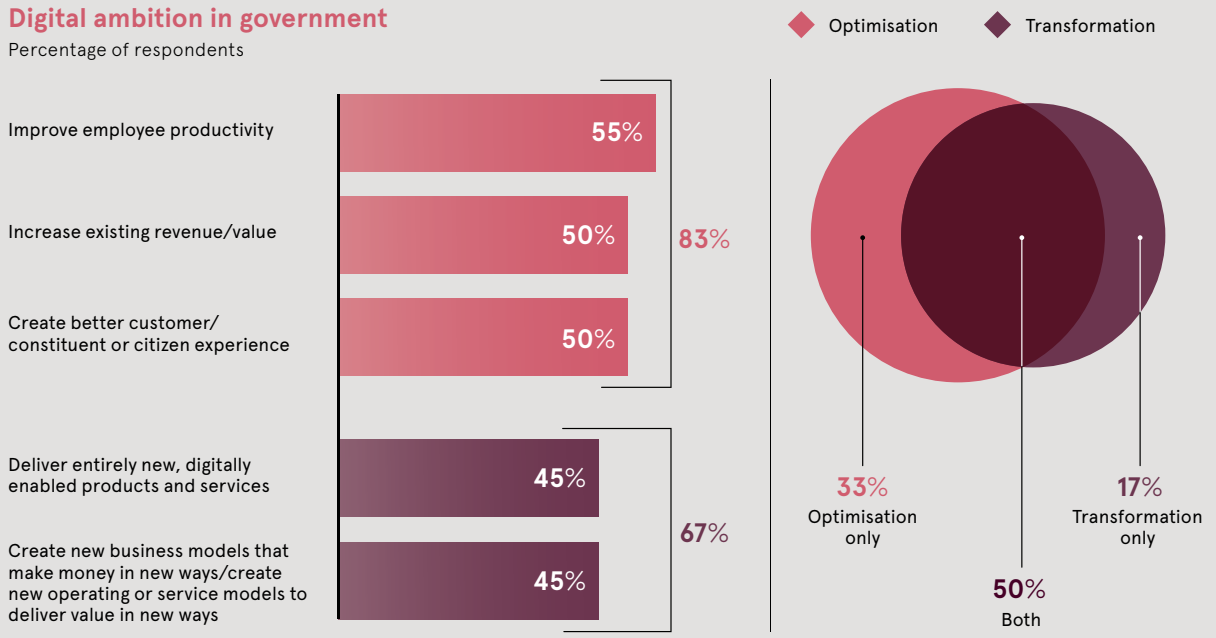
The governor's office has expressed a special interest in health outcomes around childhood nutrition, obesity and diabetes. The GIS approach could help to drive better eating, ultimately leading to quantifiable improvements in public health.

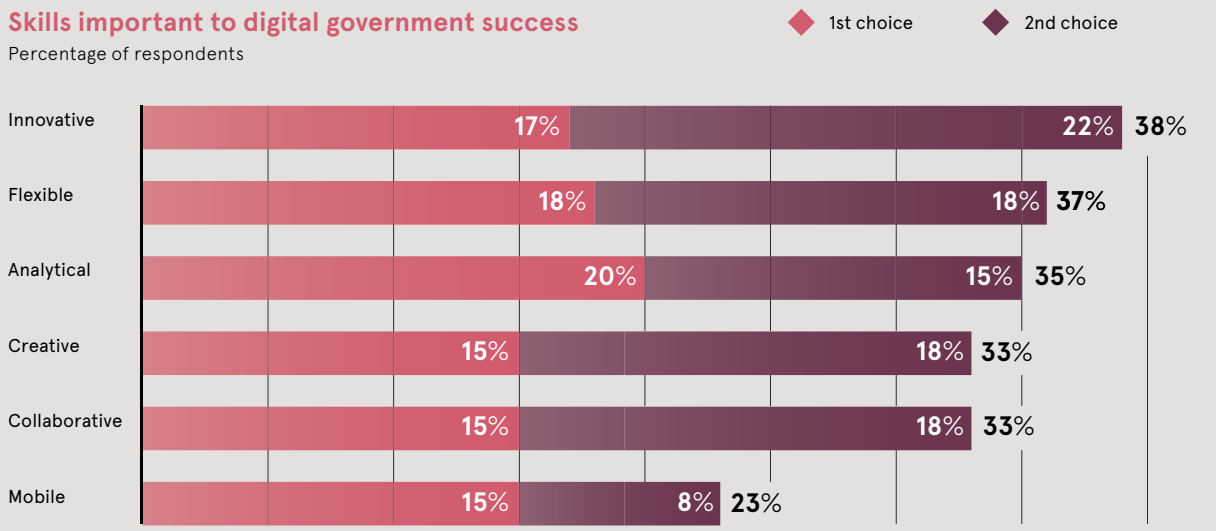
"We're talking about providing school lunches and having fewer hungry kids," Mr Rose says. "So the number of meals served and the levels of school performance all could become measurable outcomes." ◆

05

Government CIOs should shift focus

Chief information officers are under immense pressure to deliver organisational transformation – the reality is success comes from well-supported, steady change





Gartner, 2018

In any public sector organisation, chief information officers (CIOs) are appointed with significant expectation. They come under pressure to effect wide transformation, but this is nearly impossible when government operational models are typically inflexible.

"Any newly appointed CIO needs to quickly demonstrate high effectiveness and influence," says Neville Cannon, research director at Gartner. "To succeed they must resist and manage transformation hype before they can effect successful change."

CIOs can then concentrate on delivering a steady stream of obvious improvement towards agreed goals, rather than introducing big change for change's sake. "Continuously delivering solutions that optimise government services, with regular small improvements, adds up to significant change over time," says Mr Cannon.

The need is urgent for CIOs to shift to the optimisation method as some 67 per cent of government organisations are pursuing transformation, yet only 5 per cent are achieving their goals. Part of the problem is many optimisation projects are branded as transformation, confusing aims, undermining efforts and leading to expectations that are unrealistic.

Other common barriers to transformation that government CIOs face are inflexible business models, weak competitive pressure to motivate improvement and inconsistent practices around data. Instead, digital optimisation can succeed with persistent vision and execution, sustained support from leadership and staff, and sufficient time and resources.

"Transformation programmes often lose momentum or fall short of intended goals. They incur costs that can far exceed any value extracted," says Mr Cannon. "These costs are immediate and tangible, as well as intangible drags such as troubled projects, loss of morale, damaged credibility and lower public confidence."

There are several steps that CIOs leading the transition to digitally optimised government can take. First of all, they should promote an understanding of the differences between digital government optimisation and transformation. Mr Cannon says: "As part of this, it is essential CIOs evaluate their technology and service providers to ensure they accurately use these terms, so they are approaching their work in the right way and in the context of the government organisation."

Gartner's ITScore for Strategy and Execution document helps organisations measure their readiness for the desired change. By going through a detailed assessment of their capabilities, they can determine in clear terms whether the transformation envisioned by leadership is possible at their organisation's level of technological maturity and what needs to change for success.

For those organisations that check their score and find they are lacking, it is essential to make sustainable optimisation the primary focus of change plans, both in terms of daily operations and strategic goals.

Given that any change requires executive support and funding, the organisation's leaders need to be able to see clear near-term benefits congruent with their planned objectives. Mr Cannon explains: "By connecting gradual, but more quickly achievable benefits to the organisation's strategic performance indicators, CIOs will show their chief executives how they are delivering the planned benefits and will win continued backing."

It is the responsibility of the entire organisation to harvest the benefits "as these should accrue to the mission departments in the form of efficiency gains that positively impact outcomes and, of course, savings", he says.

To achieve this the organisation should create a clear plan that is accessible, and incrementally and continuously delivers tangible value, while increasing digital capabilities and technological maturity.

When this support is garnered, CIOs can deliver optimisation in a number of key areas. First, there is the opportunity to maximise organisational revenue by reducing fraud, waste and abuse, and enhancing revenue management. This can include tax bodies using predictive data analytics and machine-learning to assess default risk or councils setting demand-responsive pricing for local street parking.

There is also the opportunity to improve operating margin, by reducing the cost of services. Truly paper-free processes cannot involve citizens printing out and scanning forms; instead they consist of end-to-end digital workflows that include online input and payment options. This is applicable across the board from business reporting to licence renewals and routine services. Equally, operating and administrative costs can be steadily cut through broader digital optimisation.

Third, CIOs can harness digital change to increase workforce efficiency and effectiveness. "Implementing a digital workplace programme increases employee productivity, creates growth opportunities for individuals, and improves employee recruitment and retention," says Mr Cannon. "Equally, improving the relevance and usefulness of data to individuals, through analytics and machine-learning, can help increase people's effectiveness."

Improving constituent experience and engagement is another achievable change. Experience can be improved by maintaining a catalogue of well-designed application programming interfaces, so CIOs can build systems to support new apps and equally to allow third-party developers to create relevant tools. Engagement can be improved by harnessing social media, mobile apps, participatory budget development and citizen polling to connect fully with citizens and businesses.

Fifth, government CIOs can increase asset usage by optimising inventory, physical assets and financial assets. Analytics help improve performance in the supply chain and control in finance, while the internet of things can improve physical asset monitoring and introduce predictive maintenance.

Finally, overall organisational performance can be greatly improved by transparent measuring of strategic outcomes, and then clear demonstration of changes on dashboards available to citizens and businesses. "Dashboards by Bradford Council in the UK, and Kansas City in the US, as well as France's administrative simplification display, show citizens how objectives are being achieved and this encourages further steady improvement," Mr Cannon notes.

Overall, in spite of the challenges government CIOs face with transformation, real change is achievable when it is gradual, well planned and properly supported. A focus on delivering consistent optimisation is CIOs' best route to building success.

Neville Cannon
Research director, Gartner

> **Digital optimisation can succeed with persistent vision and execution, sustained support from leadership and staff, and sufficient time and resources**

To find out more about successful digital optimisation in government please visit gartner.com/en/industries/government-public-sector

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Icelandic HPC-on-demand set to accelerate breakthrough research in the UK

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Based on Freedom of Information data in early-2018

High-performance computing (HPC) is the engine room of scientific research in the UK. What started 30 years ago as a couple of researchers putting together some computers to accelerate their capabilities evolved into the establishment of numerous pioneering research institutions that focus on specific areas of science, such as the Earlham Institute and the Wellcome Sanger Institute for genomics and genetics research.

The importance of supercomputers in life sciences has been highlighted by a growing number of use cases where massive amounts of data must be processed. Public Health England, for example, recently upgraded its HPC system to enable faster and more effective analysis of genome sequences, with the eventual goal of facilitating more personalised medicine in the NHS.

HPC has also spread beyond scientific research into the commercial sector, particularly among large car manufacturers that utilise supercomputers in design and production. BMW has used HPC for the production of its i3 and i8 hybrid cars, while Formula 1 teams have also deployed the technology for wind-tunnel modelling, saving on the significant cost of physically putting their vehicles in a wind tunnel.

Spencer Lamb
Director of research
Verne Global

While the use of HPC has evolved significantly in this country, its true benefits are not being realised due to the way in which funding councils finance and manage access to ARCHER, the UK's national HPC system. All publicly funded scientists in the UK can use the system for free, but limited capacity means they must wait in a queue.

"The research community is at a pivotal point where if they carry on doing what they're doing, they're going to struggle to keep up with research entities in other countries," says Spencer Lamb, director of research at Verne Global. "The UK government needs to look at providing a far more flexible approach to financing the use of HPC for the research scientists in this country to ensure we keep ahead of the game.

"Ultimately our skills within this country are down to the research scientists and their ability, intelligence and creativity. What they need to hand is the most advanced, bleeding-edge tool and I don't believe they're being given that today."

In recent years, drastic developments in cloud technology have enabled mass access to powerful computing capabilities through nimble, on-demand services. ARCHER, however, remains built on inflexible, on-premise architecture that is complex and expensive to run. Every three to five years, the system is redesigned and implemented again at a large cost to the taxpayer, and then it is unable to take advantage of any further advancements in innovation until the next time that refresh occurs.

These are very power-hungry systems, yet often they have to reside in a below-standard datacentre, located somewhere within a university or research institution and often without uninterruptable power supplies. Such facilities aren't really built or fit for purpose," says Mr Lamb.

"Technology is evolving every day and UK researchers look across to their equivalents in the US and Germany who have access to far greater supercomputers on a far more regular basis. They want to pick and choose what they'd like to have, but they don't have that option.

"If you talk to the scientists, they just want to access something that works without getting into the day-to-day nitty gritty of making it work, which seems to happen an awful lot in this country. In some cases, it's almost like we are providing a garden shed HPC for our scientists rather than something that's slick, efficient and of the latest technology."

Forward-thinking heads of scientific HPC are now looking to the cloud to fulfil their need for supercomputers that are flexible and easy to access. Hyperscale cloud platforms such as Microsoft Azure and Amazon Web Services, however, don't provide the full control of an on-premise system, or an HPC-optimised environment, which has prevented the UK research community from being able to embrace high-performance cloud computing.

Very often UK scientists are also limited in their ability to buy an HPC instance or more cores through the websites of these vendors and when they can it's typically expensive.

The solution is a hybrid option. hpcDIRECT, an offering from Iceland-based Verne Global, provides researchers with the equivalent of what they enjoy about on-premise systems, but without the inflexible, ailing architecture. They can choose what they want, when they want and ensure they're getting the best value with the most appropriate HPC-attuned technology. According to Verne Global, this allows the research community to access "TrueHPC".

The ARCHER supercomputer's annual power bill is £1.9 million. If the same-sized supercomputer was provided through hpcDIRECT, the bill for powering it, using 100% sustainable Icelandic geothermal and hydro-electric power, would be just over £500,000. Savings like these will also enable smaller research programmes, with limited funding, to reach greater heights.

"Smaller universities with ambitions to use HPC to further their research are limited at the moment because they can't afford it or because they're queuing for the ARCHER supercomputer and they're not as important as the big research institutions, which dominate that platform," says Mr Lamb. "With hpcDIRECT, they can finally access those capabilities and the impact of that is huge."

On-demand services that offer TrueHPC are set to accelerate the research process across the country, with potentially massive results for UK science. Just as the creation of HPC did 30 years ago, the hybrid architecture model, powered by Iceland, will now signal a new generation of research pioneers and cement the UK's leadership position in this critical area.

For more information about hpcDIRECT, which is available via the G-Cloud 10 framework, please visit verneglobal.com/solutions/hpcdirect

VERNE GLOBAL

LEADERS IN HIGH PERFORMANCE COMPUTING

UK ice-cloud research powered by low-carbon energy

A UK-based company specialising in digital environmental intelligence for the aviation industry will utilise hpcDIRECT to extend its compute-intensive research into the environmental factors that disrupt the efficiency of aircrafts.

Cambridge-based, Satavia intends to map the prevalence of high-altitude ice clouds, which can cause engines to flame out during flight. Organisations around the world will rely on this mission-critical information to develop and implement innovative solutions to boost efficiency, improve safety, and reduce costs and aircraft emissions.

"Not only will it allow us to create greater volumes of environmental data at scale and therefore provide more valuable intelligence to the aviation industry, it offers us a low-carbon source of HPC powered by geothermal energy, which helps to reduce our impact on the environment," says Adam Durant, chief executive at Satavia.

www.satavia.com

ELECTRONIC VOTING


LUIS ROBAYO/AFP/Getty Images

Clicks not crosses can count most

Voting online can increase turnout and, with adequate cybersecurity, defend democracy

ADAM FORREST

Almost every aspect of our lives is shaped by digital technology and its immense efficiency. Yet in one vital area - the election of our political leaders - we still use pencil and paper, and count each cross by hand.

Delivery of electoral democracy in the UK is now in danger of falling out of step with the rest of the world. Many countries have turned to various forms of e-voting, either by adopting electronic voting machines or offering people the chance to cast their vote online.

While some privacy and security concerns remain, advocates say e-voting helps uphold the accuracy and integrity of the result by preventing miscounts or any other mix-ups. As well as cutting election costs, internet voting offers the chance to boost turnout by engaging parts of the electorate not usually interested, or able, to get out to their polling station.

The Scottish government is considering replacing paper ballots with electronic readers and piloting a form of online voting. While leaders at Westminster have been more cautious, a parliamentary commission set up by House of Commons Speaker John Bercow recommended secure online voting should be an option for all voters by 2020.

Estonia led the way by introducing i-voting for all political elections in 2005. Since then participation has risen in tandem with the number of people choosing to vote using their computer of smartphone.

For the country's parliamentary election of 2007, only 5.5 per cent of Estonians voted online, with turnout at 61.9 per cent. By the 2015 parliamentary election, 31.7 per cent of the electorate opted to vote online and turnout increased to 64.2 per cent.

"It's about convenience; it's about giving people choice," explains Arne Koitmäe, deputy head of Estonia's state electoral office. "Once people have been able to vote on the internet, people are more likely to vote again at the next election; it encourages more regular participation."

Areeq Chowdhury, chief executive of the youth-focused think tank WebRoots Democracy, believes internet voting could help boost the number of young people taking part in elections and modernise the way we run them.

"It could also be a good way of getting a more informed kind of voting," he says. "The option to vote online is the ideal chance to present people with clear information about what a particular election is all about and who exactly the local candidates are."

So just how safe is digital voting? Thankfully, the latest cryptographic tools enable the companies running electronic voting systems to maintain the privacy of voters' choices by "shuffling" the votes and anonymising them before a final tally is made.

India, Brazil, Venezuela, Belgium, the Philippines and many US states have been using electronic machines in polling stations successfully for several years. Many systems print a paper receipt to assure voters their vote has been counted and is part of an audit trail.

Despite concerns about Russian meddling in the 2016 US election, and there are intelligence reports of attempts to hack some states' registration rolls, there is no evidence any voters were removed from rolls or any votes cast on electronic machines were tampered with.

Indeed some US states, despite the current concerns, are taking tentative steps towards online voting. West Virginia is allowing military personnel to vote using an online app in the upcoming midterms. In Alabama, participation among troops from the state stationed overseas increased by more than 70 per cent when they were able to vote online in 2016.

Voting booths in a sporting arena in Cali for the presidential elections last year in Colombia, where polling is still done using ballot papers

> **E-voting helps uphold the accuracy and integrity of the result by preventing miscounts or any other mix-ups**

Moving more elections online might raise the stakes when it comes to the risk of hacking, but experts believe investment in cybersecurity offers reassurance for all forms of e-voting.

"There is potential for disruption - a denial of service attack online or malware on an electronic voting device - as with any digital system," says Professor Steve Schneider, director of Surrey Centre of Cyber Security at the University of Surrey. "But there are ways of monitoring and detecting attacks."

Many countries, remember, are accustomed to much more old-fashioned kinds of manipulation and corruption, such as stuffing ballot boxes with phoney votes and bribery of officials. It's why the adoption of electronic voting systems has helped strengthen public confidence in the legitimacy of elections in many places.

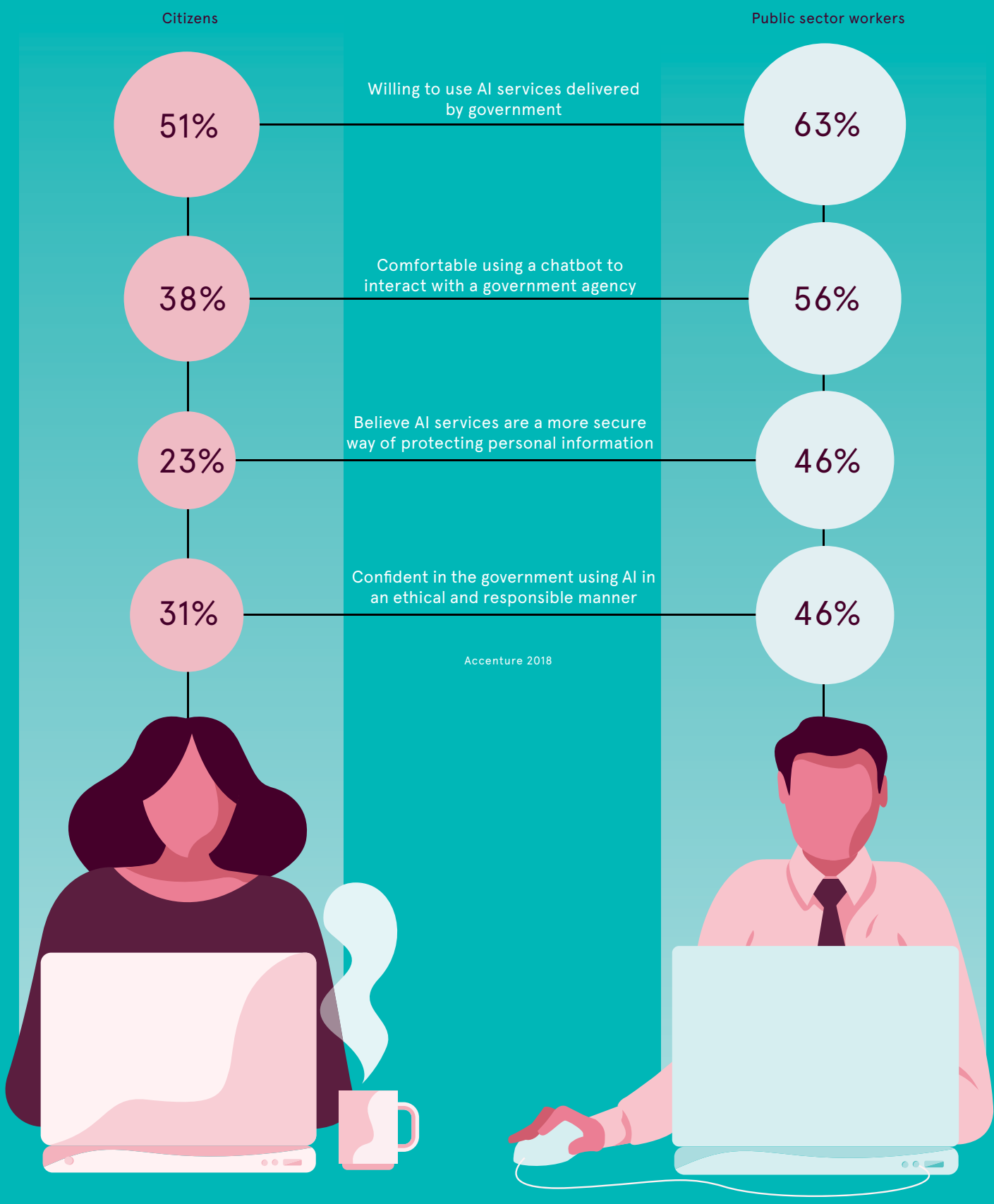
In an era when trust in government feels increasingly fragile, few countries will be able to take the electorate's faith in human officials for granted forever. Despite the risks, the cold impartiality of digital technology offers the promise of a respected set of results. ◆

PUBLIC SECTOR AI

Artificial intelligence (AI) and automation technologies have the potential to transform government processes and public services, freeing up employee time spent on manual, repetitive tasks. But what does the ordinary citizen make of it?

Citizen/government opinion on AI usage

Survey of people in the UK, United States, Australia, Singapore, France and Germany



Accenture 2018

54%

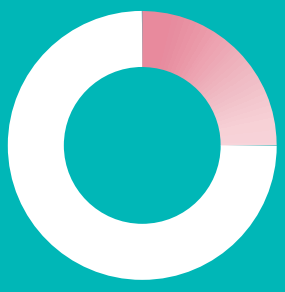
of people say they are willing to use AI services delivered by government*

Accenture 2018

26%

of UK consumers believe robots and intelligent automation technologies would make better decisions than elected government representatives

OpenText 2018

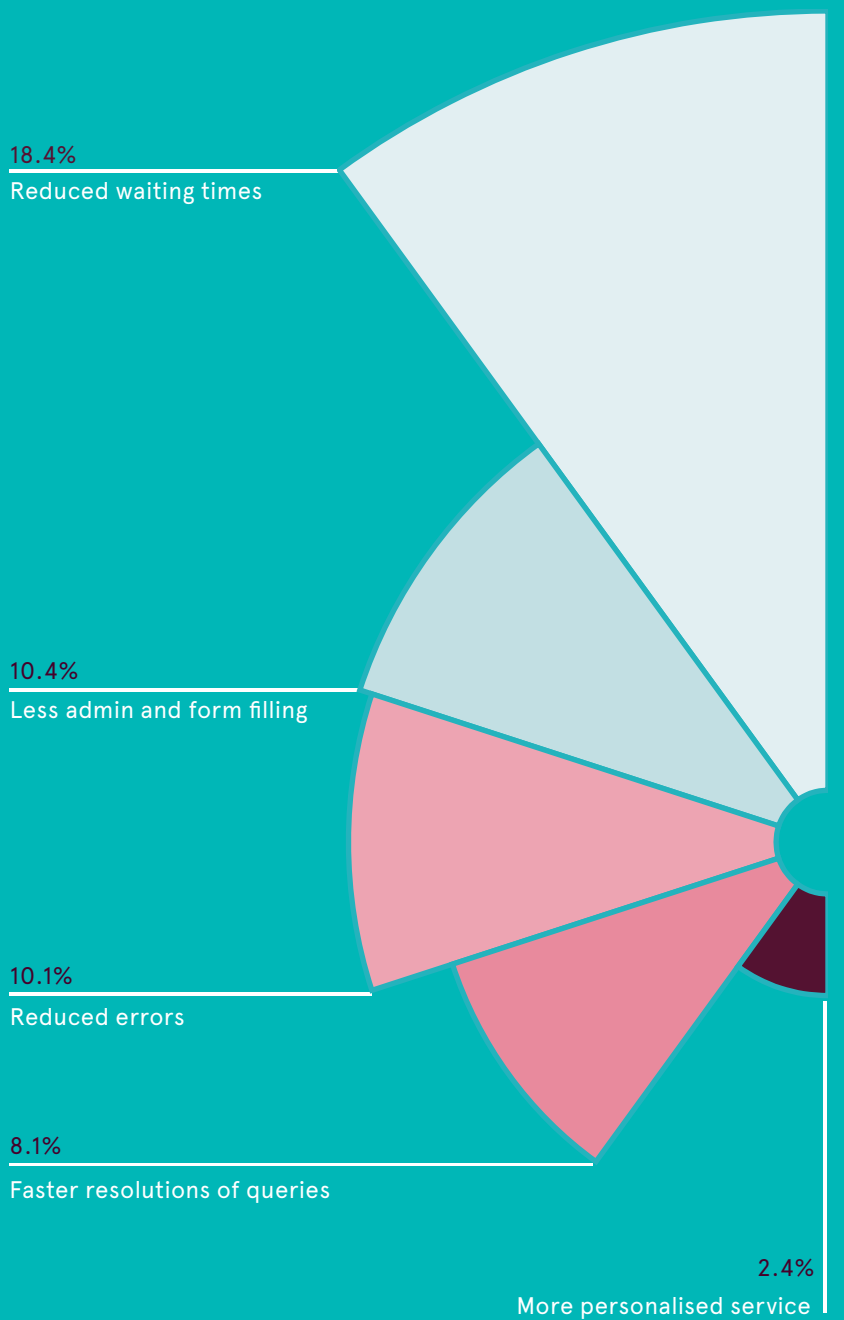


25%

of labour hours could be freed up for more complex tasks as a result of cognitive technologies in the public sector

Deloitte 2017

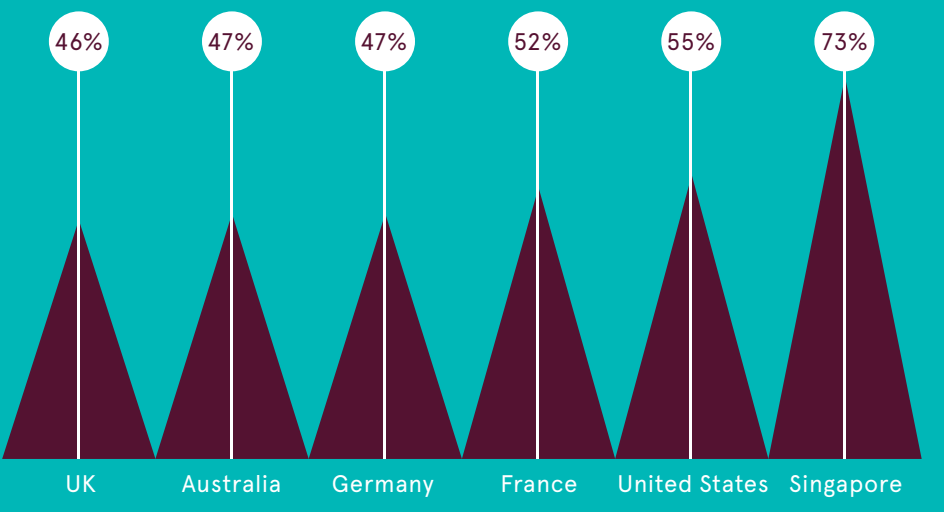
Citizen opinion on the biggest potential benefits of robots and intelligent automation technologies within government



OpenText 2018

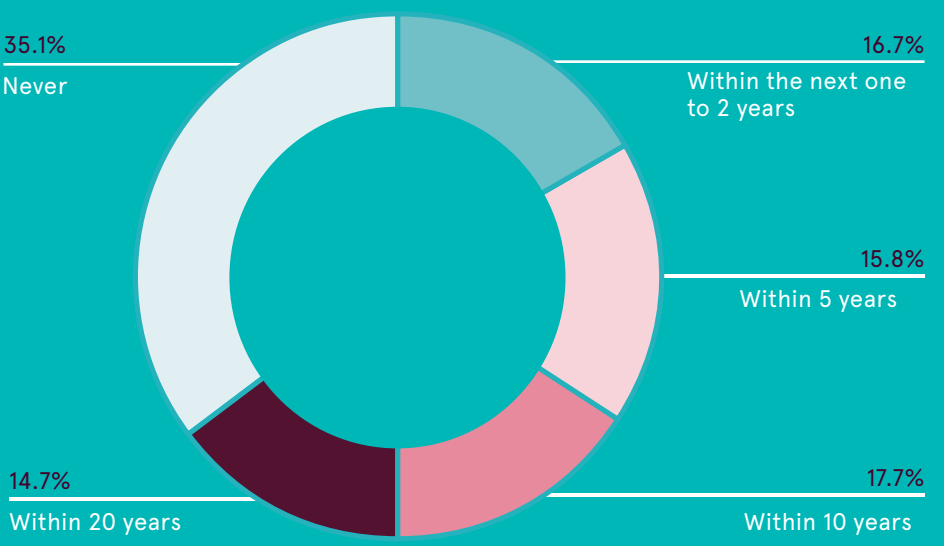
Willingness to use government AI services

Percentage of 6,000 citizens across six countries who support the use of AI by government if it can be used to deliver new or improved services more efficiently



Accenture 2018

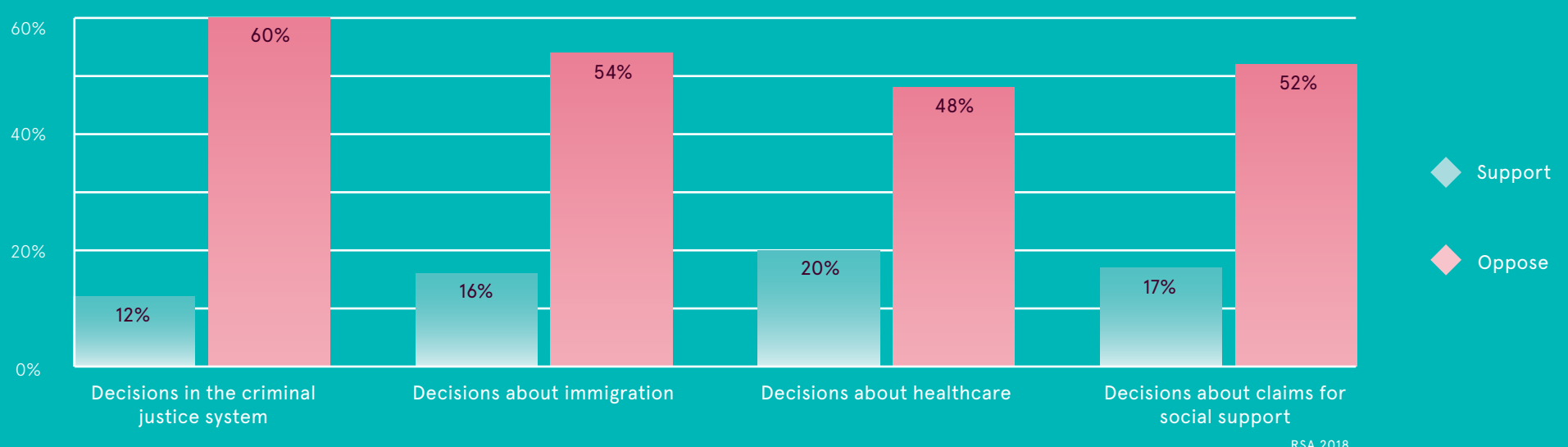
When consumers predict robots and intelligent automation technologies will be working within government



OpenText 2018

AI's role in the public sector

Whether citizens would support or oppose the use of automated decision systems to aid the following



RSA 2018

Survey of people in the UK, United States, Australia, Singapore, France and Germany

FIVE DIGITAL PROJECTS

Digital tech is force for good as it changes lives around the world

Digital transformation within the public sector is opening up services and improving delivery in a wide range of areas worldwide

EMMA WOOLLACOTT

Vancouver

The first city in Canada to develop and implement a digital strategy, Vancouver aims to continually improve the ways in which residents can access city services and information.

"Our digital transformation initiatives across the organisation have delivered value and benefits to residents, staff, businesses and visitors," says Jessie Adcock, City of Vancouver chief technology officer.

One of the most popular projects is VanConnect, a mobile app that enables users to view and access information about various city programmes and services anywhere, at any time. City dwellers can perform almost all their city-related transactions online through the app.

They can report graffiti, broken street lights and more, sharing the location and uploading a picture; they can get local, real-time information and community events, watch council meetings and connect with the mayor and council; and they get updates delivered to their phones.

Since its launch in 2015, the app has been downloaded more than 40,000 times with over 100,000 service requests submitted.

Also launched in 2015, #VanWiFi provides free public wifi at around 600 locations citywide, making it one of the largest free public wifi networks in North America. It was accessed by more than 280,000 users in 2017 alone.

Christin Marit/Oneworld Picture/UIG via Getty Images

Citizens in Vancouver can perform almost all their city-related transactions online through a government app and can access free public wifi at around 600 locations citywide

Moscow

By the end of this year, all Moscow schoolchildren will have access to an online school, a cloud-based education platform holding 800,000 assignments, textbooks, tests, educational presentations and videos.

As classrooms are now equipped with individual wifi hotspots, laptops and multi-touch interactive 4K whiteboards, teachers can create customised lessons, assigning individual homework and additional lessons. They can also use the platform to create their own educational materials and share them with colleagues.

Within the classroom, children automatically join a lesson when it is launched on a teacher's device and any who are at home sick can do the same. Pupils who have failed to understand something can also study the material independently at home.

The platform is available via any device, anywhere in the city. Teachers can manage marking and set assignments, pupils can see their schedule and homework, and parents can monitor their child's performance. It also covers administrative functions such as after-school activities, the canteen and attendance registers.

The platform has been in use in six pilot schools since 2016. Since then their academic performance has improved by 15 per cent, while simplifying the administrative process has cut costs by more than 80 per cent. Meanwhile, according to the Moscow government, the weight of pupils' school bags has halved.

United States

Following introduction of the Affordable Care Act, the number of people relying on Medicaid for essential healthcare services rose to one in five US citizens.

Clearly, this has increased the pressure on the system, prompting a transformation programme focused on some of the key challenges, including behavioural health, women and infant care, so-called substance use disorder and avoidable emergency department visits.

Involving digital health firm Avia and 17 health systems running 280 hospitals, the aim is to meet their communities' needs more effectively by adopting and sharing new digital solutions and innovative care models. Much of the work is preventative, simultaneously improving patient outcomes and cutting long-term costs.

"We've seen exciting and positive momentum with digitally enabled solutions that engage our physicians, caregivers, patients and consumers," says Dr Rod Hochman, Providence St Joseph Health president and chief executive.

A core team will be created at each health organisation, sharing best practice; for example, Geisinger Health System's Fresh Food Farmacy, which allows doctors to prescribe fresh fruit and vegetables to patients who have diabetes and who are deemed "food insecure". Other likely future projects include improving access to mental health services and dialysis treatment.

Moray

Award-winning efforts by Moray Council in Scotland to become a paperless organisation have helped slash annual costs by millions.

By dramatically cutting the use of paper files and documents, the council has improved efficiency, reduced the amount of storage space required and made it possible to search files in a fraction of the time.

The system enables staff to create, share, file and store all documents electronically using Microsoft SharePoint, which is integrated with the council's existing applications.

One of the key benefits, says the council, is the improved management of documents after they are no longer in use and become records, which can then be securely managed and easily accessed by staff. The length of time they need to be retained is automated, so no manual tracking, shredding or deleting is required.

The project was recently rated as the best digital document management system at the Public Sector Paperless Awards and the council says it has helped to reduce its running costs by £3 million a year.

"Moving to paperless working helps reduce cost, make systems more efficient and is far better for the environment," says council leader Graham Leadbitter.

Estonia

In Estonia, virtually all government services are delivered digitally, with the exceptions of marriage, divorce and property purchases.

All Estonians are given an ID code at birth, with an ID card using 2048-bit public key encryption functioning as a legal travel document within the European Union, a national health insurance card, banking ID, for digital signatures and more.

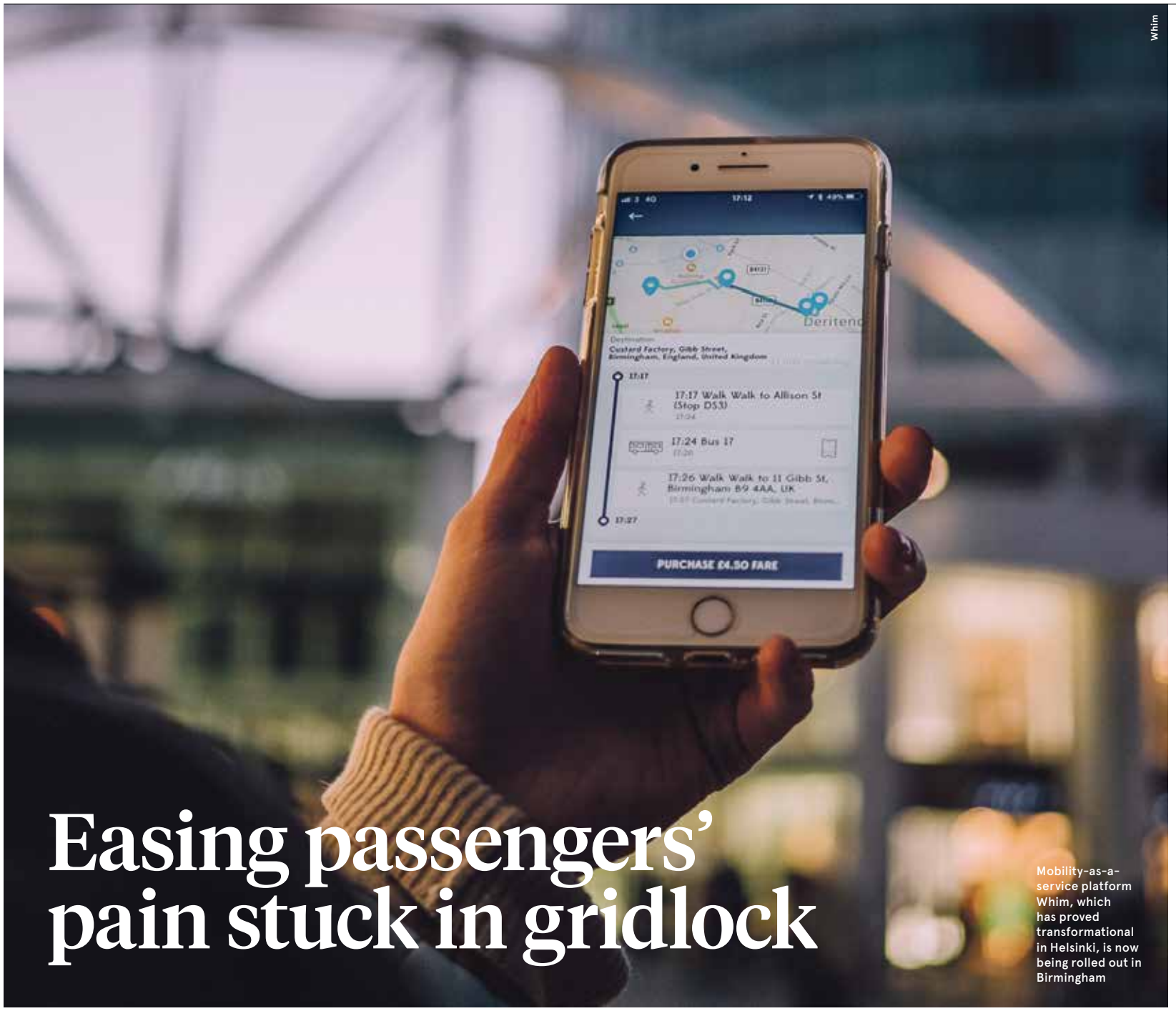
The main principle of Estonia's e-government is that citizens should have to provide information only once. Thus, completing a tax return takes just three minutes, as the government already has most of the information required.

Indeed, it's now working towards full automation, where information on salaries is automatically gathered without human intervention from the Statistics Office, Tax and Customs Board and Estonian banks.

Almost all health data and prescriptions are digitised, offering opportunities for personalised medicine, particularly as the country is now mapping the genome of a large proportion of the population.

It's possible to open a business in just 18 minutes and, since 2014, foreign nationals have been able to benefit. The country's e-residency scheme allows applicants to establish and manage a company online, gaining access to the EU market.

See page 18 for more on Estonia's e-state. ◆



Mobility-as-a-service platform Whim, which has proved transformational in Helsinki, is now being rolled out in Birmingham

Easing passengers' pain stuck in gridlock

Integrated and digitised public transport systems have the potential to ease traffic gridlock and cut journey times

FINBARR TOESLAND

Public transport authorities are increasingly looking to embrace innovative technology to meet user expectations and enable travellers to personalise their journeys.

Since the Oyster travel card was launched in 2003 by Transport for London, contactless bank cards, smartphones and smartwatches are now allowed to be used to pay for travel on London's transport network, and countless hours have been saved as passengers no longer have to physically purchase tickets.

But the potential for authorities up and down the country to modernise the public transport network beyond multi-model ticketing systems is tremendous. For the last two years, getting around in Finland's capital Helsinki has become much easier thanks to the introduction of mobility-as-a-service (MaaS) platform Whim.

Created as a practical alternative to car ownership, Whim offers customers a single smartphone app where they can arrange travel on buses, public bikes, trains, taxis and hire cars, on either a pay-as-you-go or subscription basis. Convenient payment options, e-ticketing, journey planning and booking are central to MaaS platforms like Whim, with this novel solution giving travellers unrestrained flexibility to choose the most suitable mode of transport for their journey, all on one intuitive platform.

Andy Taylor, director of strategy at Cubic Transportation Systems, the company that provides the technology behind London's Oyster card, believes the inception of MaaS is set to change the future of transport, as long as public and private players can co-operate efficiently.

"Intelligent mobility has the potential to improve transport systems throughout the world, and we're seeing a growing awareness of its potential in Europe with a number of pilots and deployments. The MaaS Alliance is doing a great job of co-ordinating and promoting MaaS, and operators within the region are looking at implementing MaaS programmes," says Mr Taylor.

At a time when data is one of the most valuable assets that both public authorities and private companies possess, a single platform for all travel purchases and journey planning can unlock powerful insights into passenger behaviour to perfect the demand and supply levels of transport networks.

Few public authorities around the world currently make transit data openly available in a standard format to the public, with transportation website City-Go-Round finding that less than 30 per cent of the more than 1,000 transit agencies in the United States have an open data policy.

By bringing the best elements of public and private transportation providers together, a truly integrated and on-demand service can be achieved for passengers, which would be a major improvement on many of the current disparate transport networks. There are presently only limited real-world demonstrations of MaaS solutions, but these trials have already proved to be a strong step towards a more user-centric transportation ecosystem.

> **Intelligent mobility has the potential to improve transport systems throughout the world**

"This will set a precedent for other regions across the world to take notice and adopt similar models. Cities such as Melbourne, Brisbane and Sydney have their long-term strategic plans for the transport network management in cities well defined, and MaaS is included," explains Mr Taylor.

Connecting separate transport methods will let travellers plan trips with full insight into potential delays and quickly select the most appropriate route, while also allowing futuristic transport concepts, including the likes of self-driving cars, to be easily integrated into an end-to-end transport system and go some way to future-proofing this service.

But it takes more than just a joined-up transport network to make MaaS a practical success. Strong 4G coverage, widespread smartphone usage and cashless payment processors will need to form the base of any comprehensive MaaS system, alongside the ability of passengers to interchange seamlessly between transport nodes, with this vision requiring the collaboration of diverse stakeholders, which may prove difficult to accomplish.

The UK is also seeing the beginnings of MaaS innovation as Helsinki's Whim mobility app was launched in the West Midlands last year. Whim subscribers in Birmingham can pay £99 a month for unlimited travel on public transport or £349 for unlimited use of public transport, taxis, bikes and car hire, with the company currently looking for the their first 500 users to sign up.

It's clear the user base of MaaS solutions is still small compared with traditional transport services, but the growing number of pilot MaaS projects indicates that the sector is coming closer towards an inflection point, with advisory firm ABI Research expecting global MaaS revenues to reach $1 trillion by 2030.

From the German-based Qixxit app that shows travellers the best flight, bus and train routes, and lets them purchase in-app, to Singapore's Beeline app offering a crowdsourced transportation service where travellers can create new bus routes by demanding them, exciting innovations in public sector transport are now happening.

Smart cities require an equally smart transport infrastructure and with the United Nations estimating that 66 per cent of the global population will live in cities by 2015, MaaS promises to meet the challenges of rapid urbanisation.

"There's still some way to go to see the full rollout of MaaS, but the idea of a more streamlined and cost-effective way of travelling around cities will be the catalyst for its faster adoption," Mr Taylor concludes. ◆

OPINION COLUMN

‘Case for the positive role of the public entrepreneur in our economy and society’

The concept of the public entrepreneur as a force for good in our economy and society is increasingly gaining traction as a powerful model of enterprise innovation.

The case for it was persuasively set out in a recent report by the RSA that my organisation, Innovate UK, sponsored. Over a six-month period a research team from the RSA applied its model of change – “think like a system, act like an entrepreneur” –

to the challenges of pro-curing and scaling innovation through government.

The RSA’s team investigated approaches to public procurement of innovation such as the Small Business Research Initiative (SBRI). In January the programme reached a significant milestone having awarded more than £0.5 billion in research and development contracts since its inception.

These awards, from public sector bodies to companies, stimulate the development of new innovative solutions to improve services within the public sector. A study by Manchester Institute of Innovation with the Enterprise Research Centre and OMB Research, estimated that for every £1 awarded through SBRI at least £2.40 was returned to the UK economy, meaning that conservatively SBRI has delivered more than £1 billion to the UK.

More than 66 per cent of the contracts are awarded to small and medium-sized enterprises (SMEs) that, for example, have solved challenges to enable nurses to spend 10 per cent more time with patients, developed new materials for advanced protection in helmets and clothing, improved the ability for collection of uncollected rates in Belfast, and developed new chemical sensors for earlier disease diagnosis in patients.

Public procurers can drive innovation from the demand side by acting as technologically demanding customers who buy the development and testing of new solutions. This enables public bodies to modernise public services faster and to create opportunities for companies to take international leadership in new markets, creating jobs and growth in our economy.

Last year an independent review of SBRI was conducted to consider how government can increase the impact of the scheme and give more innovators their first break. Informed by this review and recognising the value of the programme, the UK government will refocus the SBRI to increase its impact for innovative businesses, aligning it with grand challenges and building capability in the public sector to drive productivity by adopting SBRI solutions.

As a first step, the government announced a new GovTech Catalyst with a GovTech Fund of up to £20 million over three years, which will use SBRI, backed by Innovate UK, to support tech firms to provide innovative solutions for more efficient public services.

In May, Oliver Dowden, minister for implementation, announced the first five GovTech Catalyst challenges that were to be run as competitions, which tech-sector SMEs have been able to bid on.

They were for the Home Office to identify online still image propaganda created by Daesh; for the Department for Environment, Food and Rural Affairs to develop new digital solutions for tracking waste from its source to treatment or destination; for Monmouthshire County Council to combat rural isolation through better use of technology; for the Department for Transport and Royal Borough of Greenwich to tackle road traffic congestion; and for Durham and Blaenau Gwent councils to make use of smart sensors on council vehicles to improve services.

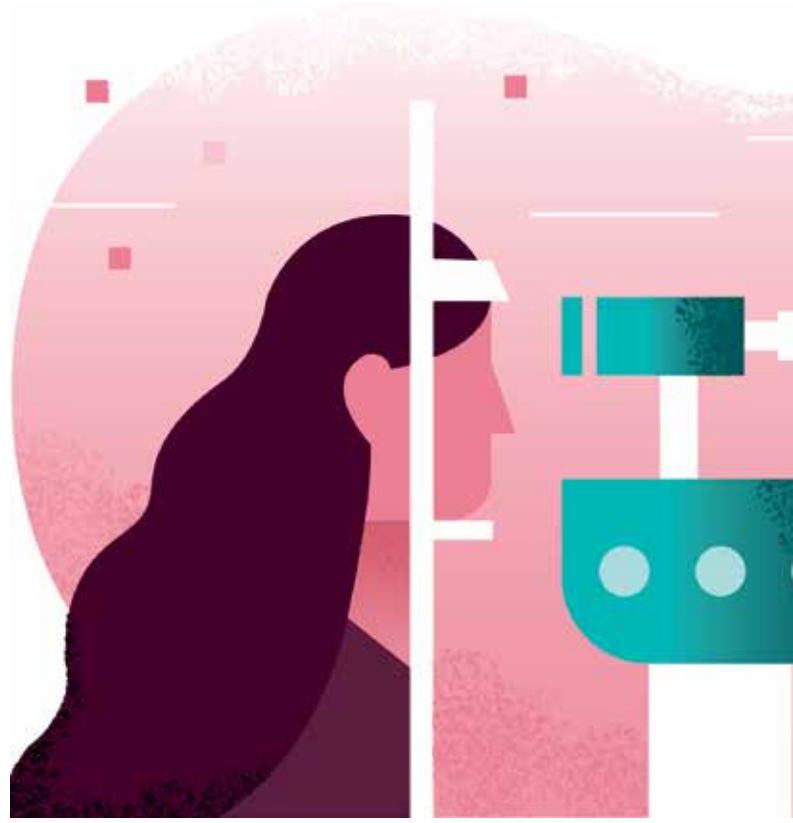
These five challenges show the breadth of needs across central and local government that could be met through the innovative use of technology. Their impact could help further make the case for the positive role of the public entrepreneur in our economy and society.

Dr Ian Campbell
Interim executive chair
Innovate UK

HEALTHCARE

Tech giants see remedy

Technology has the potential to speed up critical diagnoses and enable large-scale analysis of patient data, saving lives and improving outcomes



EMMA WOOLLACOTT

Technology in healthcare is increasingly becoming big business. According to a recent report from Markets and Markets, the global healthcare IT market is projected to reach $280.25 billion by 2021, up from $134.25 billion in 2016, representing a compound annual growth rate of 15.9 per cent.

It’s not surprising that some of the world’s biggest IT players are turning their attention to this rapidly expanding field. Big data, artificial intelligence (AI) and the internet of things all have clear applications in the world of healthcare, and the major players are getting in on the act.

Owned by Google’s parent company Alphabet, DeepMind Technologies has recently been in the news for a pioneering partnership with Moorfields Eye Hospital in London. Machine-learning has been applied to thousands of anonymised eye scans to identify signs of eye disease and recommend how patients should be referred for care.

And, says Moorfields, the system can make the right referral for more than 50 different eye diseases with 94 per cent accuracy, making it just as good as the top experts in the world. Perhaps more importantly, it can make its decisions extremely quickly, which is vital in a field where scans are now being generated at a faster rate than experts can analyse them.

“The results of this pioneering research with DeepMind are very exciting and demonstrate the potential sight-saving impact AI could have for patients,” says Professor Sir Peng Tee Khaw, director of the National Institute for Health Research (NIHR) Biomedical Research Centre at Moorfields Eye Hospital NHS Foundation Trust and UCL Institute of Ophthalmology.

“I am in no doubt that AI has a vital role to play in the future of healthcare, particularly when it comes to training and helping medical professionals so that patients benefit from vital treatment earlier than might previously have been possible. This shows the transformative research that can be carried out in the UK, combining world-leading industry and NIHR/NHS hospital/university partnerships.”

It’s not hard to see how similar techniques could be applied to other diagnostic and referral challenges. Indeed, DeepMind is already working with the NHS and Cancer Research UK on the early detection of breast cancer, as well as exploring the use of AI to improve radiotherapy mapping for head and neck cancers.

> **AI has the potential to increase a clinician’s understanding of a patient’s unique care requirements to such an extent that personalised patient care could one day be possible**

As Matthew Howard, director of artificial intelligence at Deloitte, points out, big tech companies are in a far better position to collect and process this data than cash-strapped NHS trusts.

“They have scale and they know how to manage big data in a way other people don’t,” he says. “These are people who are better than anyone else because they can manage data and make it accessible in a way that will be useful. They can provide the technology that you need to mine, and slice and dice this data.”

Microsoft, too, is making big strides in using AI and big data in healthcare through its intelligent cloud service Azure, and last year set up a new healthcare department at its Cambridge research facility.

“Most healthcare organisations record only episodes of care, blind to the full journey of health that connected technologies and smarter models of personal health could reveal,” says Iain Buchan, the lab’s director of healthcare research.

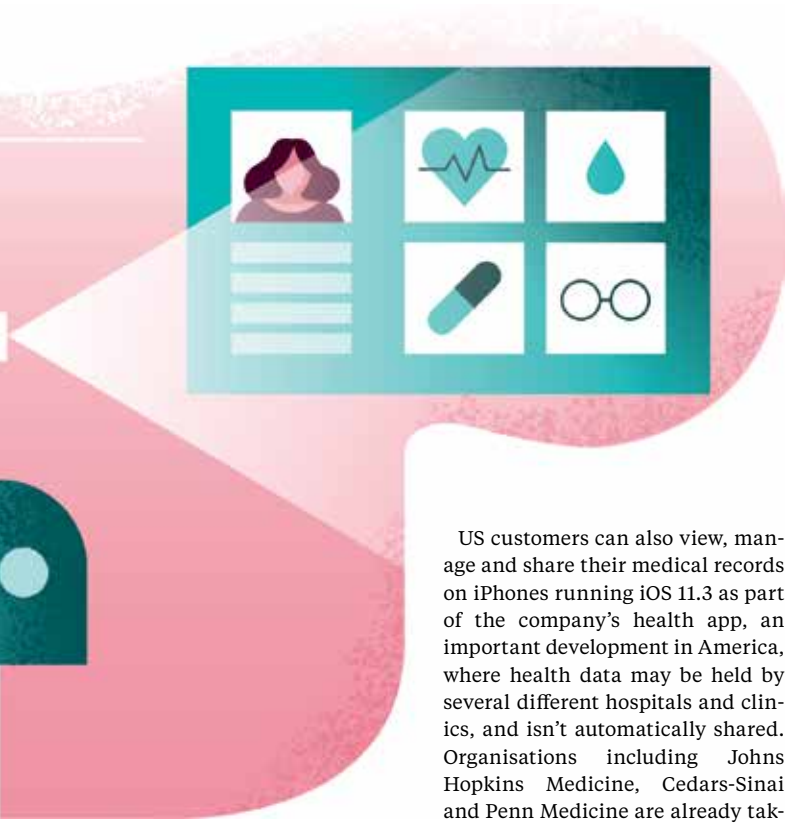
“By providing a fuller picture of patient journeys, Microsoft can help patients to self-care and communities to self-organise for better health. This high-resolution approach could provide more timely, personalised care and help target scarce clinical resources to the neediest patients – key to better value healthcare.”

The company is already using machine-learning and computer vision in a project aimed at increasing the reliability of cancer scans, as well as improving understanding of cancer development and identifying optimal treatments, including personalised medicine.

And other big tech companies are looking for their own ways into the health market. While Amazon, for example, has invested in a cancer-detection startup called Grail, its main efforts, as you would expect, concern selling medicines. The company recently announced the acquisition of online pharmacy PillPack, having already won approval in some US states to distribute drugs.

Despite recent controversy over the accuracy of treatment recommendations by its Watson AI, IBM continues to develop the platform through collaboration with,

for healthcare malaise



for example, US cancer institutes including Memorial Sloan Kettering and Mayo Clinic.

As for Apple, its healthcare plans are largely shrouded in secrecy. A hint of its ambition is the company recently opened a series of primary care clinics for its employees, offering what it calls "a unique concierge-like healthcare experience... enabled by technology".

The tech giant, of course, already offers health-tracking through the Apple Watch, and provides its HealthKit and ResearchKit platform to researchers and doctors to help track patient health.

US customers can also view, manage and share their medical records on iPhones running iOS 11.3 as part of the company's health app, an important development in America, where health data may be held by several different hospitals and clinics, and isn't automatically shared. Organisations including Johns Hopkins Medicine, Cedars-Sinai and Penn Medicine are already taking part in the initiative.

There are rumours that the company may be considering producing a specialist healthcare wearable that, presumably, would be aimed at improving the quantity and quality of health data on individuals.

"We are increasingly now walking data streams," says Deloitte's Dr Howard. "Making use of this is as much a big computing problem as anything else."

In years to come, and in principle, such individual health monitoring could lead to truly personalised medicine.

According to DeepMind: "Over the long term, AI has the potential to increase a clinician's understanding of a patient's unique care requirements to such an extent that personalised patient care could one day be possible.

"However, this will require close integration with new, innovative medical disciplines, such as biopharmaceuticals and medical genetics, that are themselves a long way from achieving their full potential. As a result, we believe that we are still many years away from these developments."

And there are other problems that need to be overcome. It's notable that the successful projects in the UK so far have been tightly focused. There's no serious talk as yet about introducing any universal health monitoring programmes that could exploit individuals' full suite of health data.

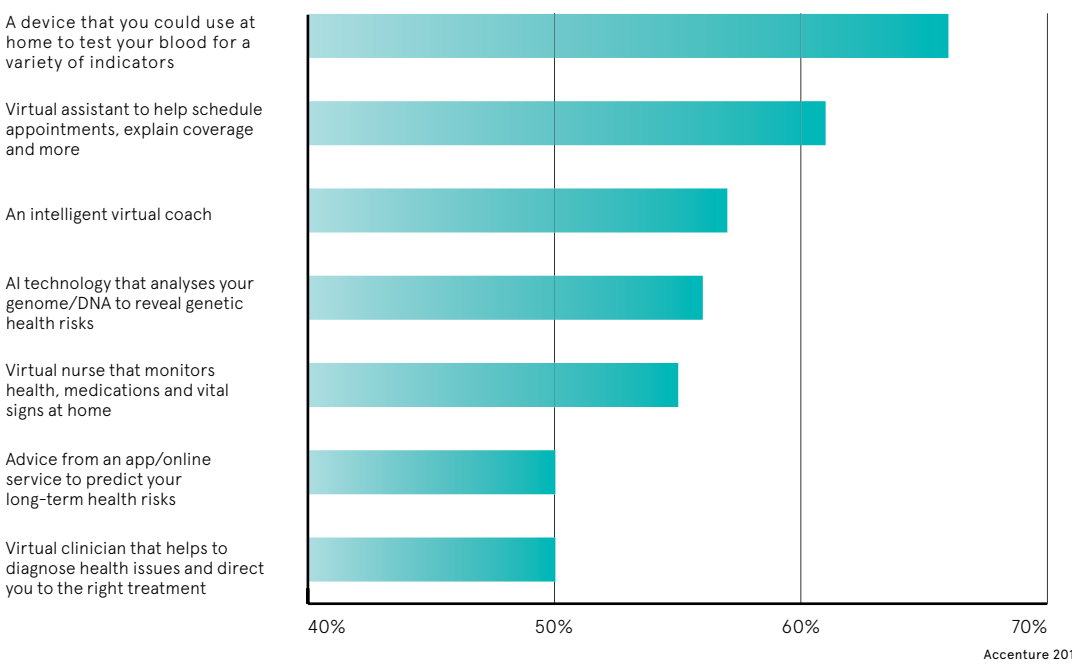
"I think the NHS is very interested in furthering itself in terms of technology and the big companies have a lot to offer," says Sara Siegel, head of healthcare at Deloitte. "But the NHS is hundreds of different organisations and that can be a challenge. You have to start with an individual trust. Things can seem to take a bit longer with the NHS, but that's the way it's structured."

Meanwhile, issues of privacy and security are liable to plague any organisation that is gathering and processing personal data, and such national health databases would contain more information, and of a more personal nature, than others.

"What we haven't got yet is a consent framework and data ownership model that everybody is happy with," says Dr Howard. "I think there is still an extant conversation about who is the owner of that data. We haven't yet as a society in any geography worked out quite how this model is going to land." ◆

Consumer interest in intelligent health technologies

Percentage of consumers willing to use the following



Accenture 2018

AUTOMATION AND REDISTRIBUTION

Facing automation and the impact on jobs

Automating some public sector jobs may be inevitable, but it presents opportunities to rethink priorities and create new roles


KarAMeR / Shutterstock

DAVID COWAN

Redistribution of resources and roles in the public sector demands that organisations increase productivity, meet key performance indicators and be more connected to the consumers while delivering higher-quality services.

Digital transformation is driving change from digitisation bolting new technology on to old processes towards a comprehensive revision of policies, processes and services to create simpler user experiences for citizens and frontline workers alike.

If you have a mess and automate it you have an automated mess, so what is required is a rethink, and to achieve this requires leadership.

Paul Hayes, policy manager at Wakefield Council, explains: "The big problem is when the technology is bolted on to existing systems. We need to rethink and repurpose, and challenge things we don't need to do anymore."

Orchestrating change, Mr Hayes says, needs to be done step by step. "A lot of the big change is coming about through communication, getting to know the user needs, so we see a lot of survey monkey use and social media interaction for instance," he says.

Such transformation demands investment and leadership at the highest levels, and the price of failure is likewise easy to see and grabs headlines. Horror stories globally are easy to find, from the $2.1-billion US Affordable Care Act website debacle to the UK's National Health Service electronic health records disaster resulting in a £12.7-billion loss. These losses are not so much technological as thinking failures in a sector famous for being risk averse.

Research conducted by iGov in 2017 evaluated progress of digital transformation in UK central and local government, concluding that a major "digital gap" still exists between how services are currently delivered and how they should be delivered in a modern, digital public sector, highlighting major barriers to overcome before an estimated £2 billion savings in online service delivery can be achieved.

After many delays, the UK government finally unveiled both its Government Transformation Strategy for 2017 to 2020 and its UK Digital Strategy to move pubic services into the digital economy. The announcement positioned the two strategies as a "means to restore trust in the way that government works with people, even in democracy itself" and to "create a digital economy that works for everyone".

Translating this into reality will not be easily achieved, but Mr Hayes argues there is a fundamental principle to moving forward. He says: "Digital transformation aims to redesign and re-engineer government services, and this needs to be done from the ground up if we are to fulfil changing user needs.

"The problem is no one want to be first, they want to be second, to learn from somebody else. The public sector is risk averse, understandably so, because we're messing with people's lives if we take risks. It's very much about social care, victims, vulnerable people."

Change can be triggered by partnering with private initiatives. Ben Howlett, managing director at Public Policy Projects, has been working on an impact assessment on new technology being introduced into the health service.

He says: "Instead of looking at the short, sharp fix of selling a product, the private sector could offer training and other relationship benefits to workers and patients alike. This means changing the way the public sector thinks not just strategically but operationally, which will produce better outcomes, higher productivity and other benefits."

> **If you have a mess and automate it you have an automated mess, so what is required is a rethink**

A telling illustration is private sector providers offering medical apps. Babylon provides instant online contact with doctors for a £5 monthly fee, while VisitHealth offers on-demand healthcare by coming to patients wherever they may be with a sophisticated set of tools and tests, including ECGs and ultrasound.

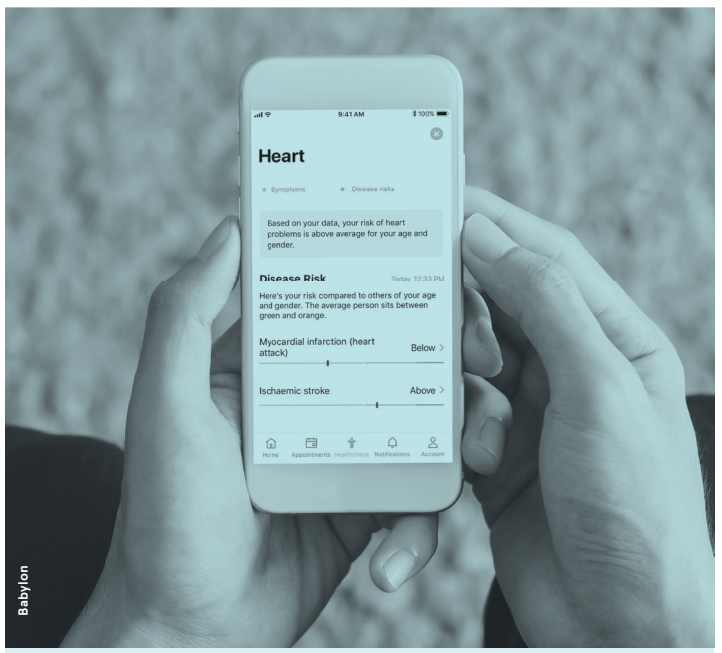
Yulia Smal, VisitHealth chief executive, says: "We use our mobiles for immediate solutions, from ordering a cab to getting a spa service or a handyman. VisitHealth offers the same immediacy with healthcare answers, all without the anxiety that comes with turning to 'Dr Google' or getting only a fraction of the story in another phone or web-based service."

Apart from fear of failure and meeting user expectations, there is anxiety about the impact on public sector employment. Reform, a think tank dedicated to improving public service efficiency, calculates that almost 132,000 workers could be replaced by machines in the next ten to

5.36m
people employed in the public sector
Office for National Statistics, March 2018

861k
jobs could be lost to automation by 2030
Deloitte/Oxford University 2017

£17bn
estimated cost-savings by 2030 from automation compared with 2015



Babylon

Case study

NHS apps

A third of UK residents want to book a doctor's appointment online, but fewer than 7 per cent do because the service is inconvenient or unavailable. A Scottish survey revealed 67 per cent of GP practices have websites, but only 10 per cent supported web-based appointments.

The NHS has spent a large sums to lag behind since the advent of apps a decade ago. The NHS Apps Library, launched in April 2017, still only offers trials and beta versions.

While digital transformation redistributes roles, staff worry scheduling via apps lacks flexibility, cannot automatically identify emergency conditions, raises safety concerns and patients may abuse the scheduling system. However, apps do free staff to support vulnerable patients who may lack awareness of services, distrust the internet and need verbal communications.

Juliet Bauer, chief digital officer at NHS England, hopes the NHS Apps Library will help the public navigate the confusing array of health apps, advising them which apps have met NHS standards. She says: "Together with putting free NHS wifi in GP surgeries and hospitals, and developing an NHS App, the library will help empower citizens to take control of their own healthcare."

Apps can improve delivery and alleviate mundane tasks, but Public Policy Projects managing director Ben Howlett questions gimmicky offerings like free wifi. "We need to get past automation and look at the process of change itself," he adds. "People are digitising themselves; the healthcare services should be learning from this."

If the NHS can better utilise apps, the workforce will have more time to interact with and care for the most vulnerable citizens.

fifteen years, based on currently known automation methods.

Researchers suggest only 20 per cent of government employees do strategic, cognitive work that requires human thinking. Most of the rest are what Reform calls the "frozen middle", levels of hierarchy where bureaucrats won't act without approval from above.

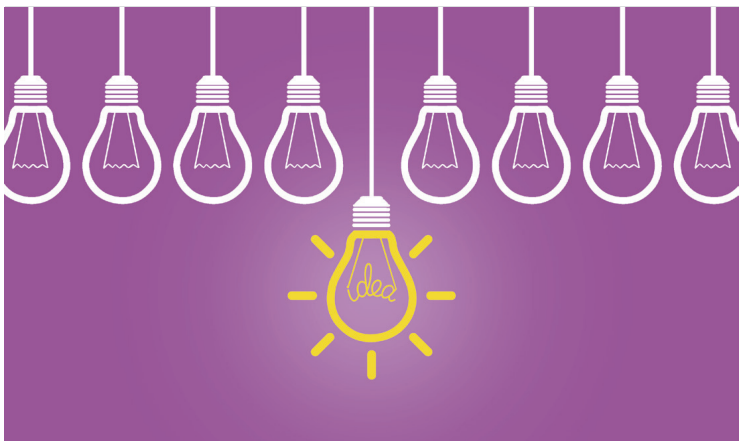
Since 2013, Oxford University academics Carl Frey and Michael Osborne have been undertaking seminal work on automation risks for jobs, quoted by most other studies. In their 2016 report, in collaboration with Deloitte UK, they estimated about a quarter of public sector workers are employed in administrative and operative roles, which have a high probability of automation. They estimated some 861,000 such jobs could be eliminated by 2030, saving £17 billion for the taxpayer. These jobs would include Underground train operators, but mainly local government administrators.

Mike Turley, global head of public sector at Deloitte, explains: "The public sector has a high number of public-facing roles, particularly those in areas such as education and caring. These will be relatively safe from automation and could see the public sector impacted less than other sectors. However, automation still has significant potential to support cost-reduction, meet citizens' expectations of public services, free up real estate, save staff time and improve productivity."

Ever since the Luddites, in the early-19th century, fear of job losses has been a commonplace reaction to automation, but it can work positively. Mr Howlett concludes with the example of two people who have been making plaster molds in facial reconstructive surgery for the past 30 years. "They can now be retrained to use 3D printers to make measurements," he says. "They make more accurate measurements, save time and can do the 3D printing themselves, using that experience and training for succession planning. They keep their jobs, but the job is different." ◆

Reinvention is the key to accelerating digital transformation

A Low-code digital platform can help public sector organisations cut costs and improve services



For a few years, public sector organisations have been keen to embark on a journey of digital transformation. It's clear that new digital technologies and processes need to be adopted to meet citizen demands, offering them flexible and responsive services.

There is a growing understanding that to achieve this, data, services and solutions cannot be siloed, but need to be joined together and easily available to citizens on many channels. However, there are increasing budgetary constraints.

But digital transformation is not just about implementing new technologies, such as chatbots or artificial intelligence, says Dr Andrew Larner, chief executive of public sector transformation partner iESE.

"There is a danger of fossilising your old processes and being trapped with past inefficiencies when you merely move your current model of service delivery online. This may bring marginal cost-saving and efficiency improvements. What is actually needed is not a redesign of old processes, but a re-evaluation of everything organisations are doing and this is why we started working with Netcall," he says.

Paul Brewer
Director for digital and resource
Adur and Worthing Councils

5–10x
less development resource needed (Forrester)

>200K
savings delivered to Adur and Worthing annually

90%
of councils need to reinvent services over the next five years (iESE)

70%
service time improvement with 46 per cent cost-saving (LGSS)

Netcall provides organisations with a Low-code platform (MATS). Low-code is a cloud-based digital platform, used by IT and business users to build digital applications rapidly, without coding. It is an alternative to bulky and complicated traditional systems, which for years have dictated how services operate.

Kat Sexton, lead digital architect at LGSS, an organisation supporting shared public sector services, explains that Low-code is an integral part of the way her organisation is able to transform services.

"The goal is to create simple, easy-to-use, end-to-end services to get the job done, first time. Low-code that integrates with multiple systems helps us do this. We simplify, automate and use great tools to get the right process in place," she says.

"Tech companies have traditionally promised outcomes which are not actually what the customers need. Good user-centred design and Low-code supports digital transformation in that it gives councils the opportunity to design for their users' specific needs. Solutions are released quickly with early functionality, then using feedback they are iterated until all user needs are met."

This means LGSS can deliver new services within a matter of months. For example, LGSS used Low-code to create a new bus pass solution for Cambridgeshire, which is already used by more than 100,000 people.

Paul Brewer, director for digital and resource at Adur and Worthing Councils, adds that Low-code isn't just being used to plug gaps in services and digitise processes, but it is also used to replace core IT systems.

"The benefits of Low-code are you can control what your digital services look like and within that the ability to implement new ideas about how to operate," he says.

"We now have flexibility of what happens and can do it at pace. Additionally, when you find that something that you've built needs to be changed or improved, then the cost of changing is low. So you are not tied to a large investment; you can move along with it."

The councils were able to avoid buying a housing repairs system by designing and building their own platform. The cost of a new system would have been more than the entire enterprise Netcall platform licence, which is also running several other major apps, so using Low-code is also cost effective.

Another saving is being able to train existing employees with relevant skills to use Low-code, rather than recruiting or paying a premium for specialist developers. "This keeps costs down as it creates more interesting roles, enabling us to flexibly upskill people from other less-needed roles," adds Mr Brewer.

Digital transformation requires new ways of working, including the development process. Improving or introducing exceptional customer services means organisations must reinvent processes. When you do this, you gain a positive win-win cycle.

Ms Sexton at LGSS concludes: "Making things easier for the customer reduces costs for the councils, then you reinvent the next service."

Netcall's Release your Innovation workshop is on September 27, at Camden Council, London NW1 1BD. For the full agenda and to register please visit engage.netcall.com/release

Netcall

EMPOWERING CITIZENS

Tech beacon gives 'power to the people'

Technology has been put to work in the public sector to empower a small Baltic state and its citizens

OLIVER PICKUP

When it comes to empowering citizens through public sector technology, Estonia is leading the way by a distance. The tiny former Soviet republic, with a population of 1.3 million, located to the north of Latvia and across the Baltic Sea from Finland, is arguably the most advanced digital society in the world.

Some 94 per cent of applicants gain e-residency, currently in exchange for €100, a photograph and their fingerprints. They are issued with an identity card, a cryptographic key and a PIN code to access Estonia's national systems.

E-residency aims to create a digital nation for all, built on inclusion, transparency and legitimacy to empower citizens globally, and achieve worldwide digital and financial inclusion, as outlined on e-estonia.com. Introduced in 2014, it is the latest of Estonia's progressive public sector developments towards an "information society", all of which have been fuelled by nascent technologies.

Non-Estonians can apply for e-residency, also known as virtual residency, which gives some business benefits, including company formation, but not tax exemption.

In 1997, six years after Estonia gained independence and the collapse of the Soviet Union, electronic-governance (e-governance) was launched; e-tax came in 2000, a year before digital ID. "Some 370 million digital signatures have been provided, saving Estonia the equivalent of 2 per cent of gross domestic product every year," says Kaspar Korjus, managing director of e-residency, speaking from the capital Tallinn.

In 2005 i-voting was introduced; Estonia started using blockchain technology in 2008, a year before it was used as a decentralised, distributed ledger for bitcoin, and began its e-health programme in the same year.

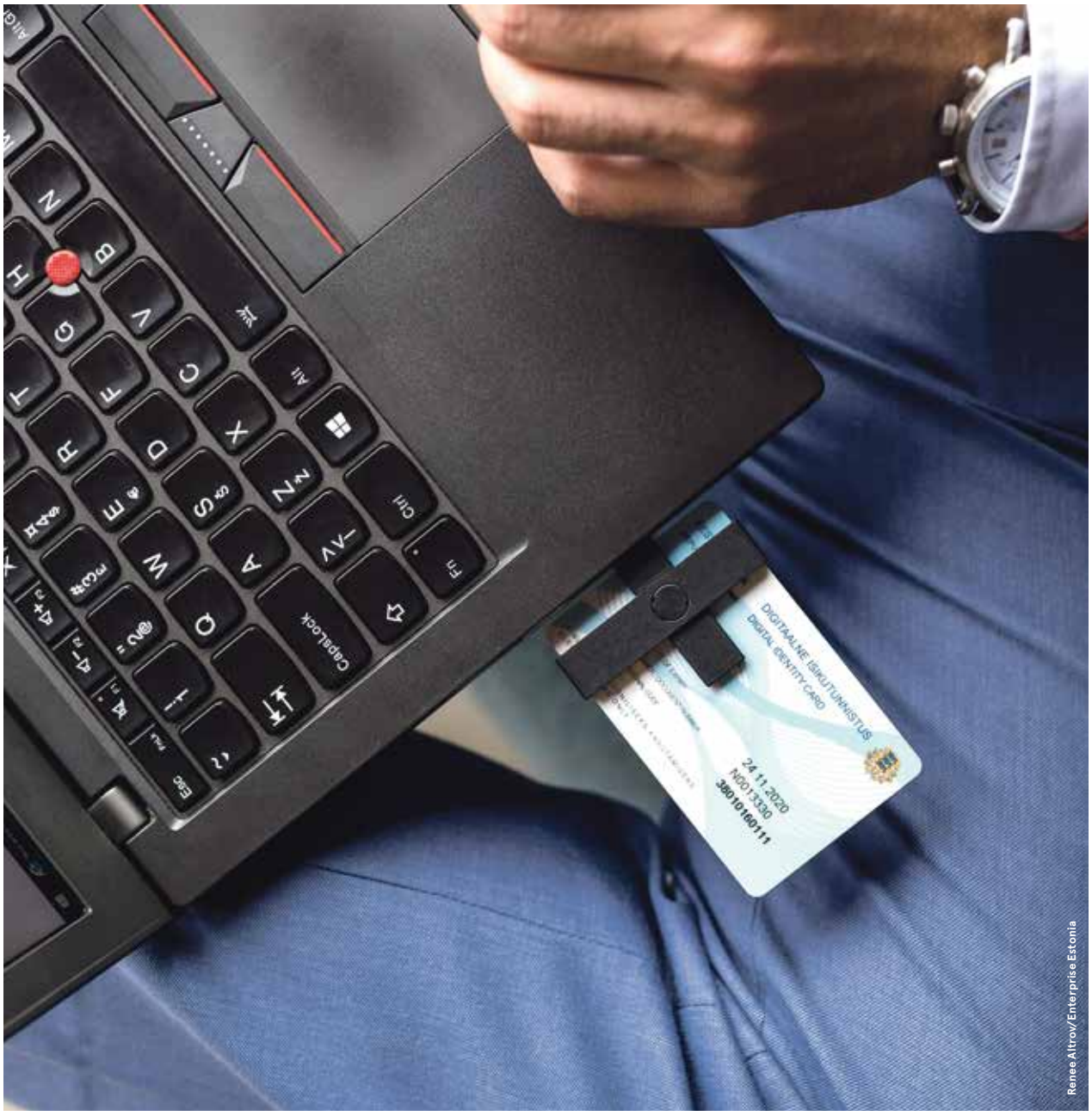
Furthermore, powered by citizens, there are plans to blaze a trail in cybersecurity, cross-border data exchange, intelligent transportation and more. However, as future focused as Estonia's pioneering trajectory is, the path hitherto was not straightforward.

Two decades ago, when this ambitious project began, there was no digital data being collected about Estonia's citizens. Worse, most denizens had neither access to the internet nor the devices to use it. It took a leap of faith, backed by funding, to take the information technology route and invest wholesale in digital technologies, according to Mr Korjus.

"E-governance is a strategic choice for Estonia to improve the competitiveness of the state and increase the wellbeing of its people, while implementing hassle-free governance," the Bradford University School of Management graduate explains. "To reach where we are now took great courage initially to invest in IT solutions.

"Starting from scratch allowed us to design solutions based on our core principles: decentralisation – there is no central database and every stakeholder, whether a government department, ministry or business, gets to choose its own system – interconnectivity and integrity."

The first big step in digitisation was taken in 1995, when all Estonian schools were wired up to the internet. After the school bell, new computer laboratories remained open to encourage free public use. "Now almost everything can be done digitally in Estonia, apart from getting married, divorced or buying property," says Mr Korjus.



Renee Altrov/Enterprise Estonia

Digital ID cards allow residents access to all secure e-services

> **E-governance is a strategic choice for Estonia to improve the competitiveness of the state and increase the wellbeing of its people, while implementing hassle-free governance**

"An Estonian identity card serves as a key to access 99 per cent of services online; one can pay taxes, vote, check medical records and so on, 24 hours a day."

Estonia's society is flourishing because of the commitment to digital technology. Moreover, it has emboldened the country's identity and culture, and become its defining feature. Consequently, it has sparked record levels of creativity and entrepreneurialism; Estonia boasts 31 startups per 100,000 inhabitants, six times higher than the European average, according to trading platform Funderbeam.

Mr Korjus says: "A small country like Estonia only has one natural resource and it is located between our ears. We must be innovative and find unique ways to attract talents, resources, revenues and develop our soft power.

"Our digital society couldn't work without trust between the people, state authorities and private enterprises. Building trust has very little to do with technical solutions, but has a great deal to do with mindsets and culture. And changing this mindset is much more difficult and time consuming than creating technical solutions.

"The fact that in Estonia each citizen – resident or e-resident – knows exactly which administration has checked their personal data undoubtedly helps to build this trust because the administration needs to be accountable and transparent."

In these times of fake news and political uncertainty, Estonia's refreshing approach to governance, with the consent of its residents, is an exemplar of how public sector technology can be revolutionary, in a good way. ◆

Timeline

Milestones of Estonia becoming the world's most developed digital society

1997
E-GOVERNANCE
E-services are launched; 99 per cent of public services are now available as e-services

2002
DIGITAL ID
Rollout of a mandatory national ID card that provides digital access to all secure e-services

2005
I-VOTING
Estonia becomes first nation in history to offer internet voting in a national election

2008
E-HEALTH
Patient health data made available online; 95 per cent of data generated by hospitals/ doctors is now digitised

2014
E-RESIDENCY
Transnational digital ID for access to public e-services; e-residents can establish/manage an EU business remotely

OPINION COLUMN

‘New technologies require a new mindset – public sector leaders must be ready to adapt’

Being a public sector leader has never been an easy brief, but the last decade has surely tested even the toughest in the industry.

With spiralling demand for services, rising expectations and significantly diminished budgets, leaders have faced a constant battle to deliver more and better with less.

Many have recognised that technology can be part of the solution. Yet, until recently, few have gone much beyond using it for good record-keeping, improving their websites and making a few public-facing transactions available online.

That is changing and changing fast. The latest generation of digital technologies, such as cloud, mobile, artificial intelligence, the internet of things and blockchain, promise to deliver efficiencies, but also to support entirely new ways of working and to alter radically the relationship between citizen and state.

Consider just a few examples. For as long as governments have existed, their ability to process information has been limited by the number of administrators at their disposal. Today, any organisation can access unlimited processing power with cloud computing. Thanks to artificial intelligence, that processing power increasingly includes the ability to automate complex analysis of virtually limitless amounts of data to offer useful insights.

In place of the default mode of public services addressing failure after it happens, predictive data analytics can help identify buildings at risk of fire, children at risk of harms and road networks at risk of serious accidents before the fact, leading to earlier intervention and prevention.

Where once frontline staff had to go about their work with paper records, software-as-a-service makes it possible for everyone from police officers to social workers to have real-time data on the case they are handling, in the field, to improve their decision-making.

And while technology in the form of social media has often been blamed for undermining democracy, a new generation of digital tools is being used to re-engage communities by enabling citizens to crowdsource ideas, co-draft legislation, propose how local budgets are spent and vote on the best ideas.

Collectively, these new technologies have the potential to be genuinely game-changing. Yet realising that potential will require a new approach from public sector leaders.

If they only use these tools to optimise their existing ways of working, the best they can hope for in return are incremental improvements.

Instead, their challenge is to match the level of innovation seen in the technology with equal innovation in the structures and ways of working to which those technologies are applied in their organisations. They must explore whether they can use these tools to enable fundamentally better ways of addressing the social challenges they are tasked to address.

To achieve this, leaders need to shift their organisations to more agile ways of working to experiment with new tools and see what works. They must ensure their organisations have the right skills to do so effectively. They must be willing not just to adopt new technologies, but also to open up their inner workings to public involvement in way that may push them well out of their comfort zones.

If all that sounds daunting, there is also an empowering message for leaders. They can get off the treadmill of trying to deliver more and better with less, and instead focus on delivering less and better with more. They must focus relentlessly on the areas where the public sector is uniquely placed to make a difference, while making full use of a more powerful array of tools than has been available to any generation of leaders before them.

Those new technologies require a new mindset. Our public sector leaders must be ready to adapt.

Eddie Copeland
Director of government innovation
Nesta

Commercial feature

Voice-enabled ‘rocket’ for local authorities

The NHS is currently trialling technology developed by cloud-based software provider Arcus Global which enables it to answer phone calls using artificial intelligence

Tim Lancaster
AWS practice director, Arcus Global

NHS Business Services Authority (BSA), providers of the European health insurance cards which enable UK residents to get free treatment in other countries, are piloting a service called Arcus Answer. So far, they have found that the technology can respond to 40 per cent of their calls with dramatic cost savings.

Darren Curry, chief digital officer at NHS BSA, says: “We implemented this in four weeks. Soon, over 40 per cent of all the calls we received were being dealt with by this system. It enables our contact centre operators to speak to users who need more support or have complex queries, giving people an increased quality of service.” The pilot service is now live and the BSA is considering implementing the technology more widely.

40%+
of calls can be answered automatically using AI

<£1
per call, reducing call costs from £4 a call

NHS BSA is based in Newcastle, home of Stephenson’s Rocket, the steam engine that became a symbol of the Industrial Revolution. Like artificial intelligence (AI), early locomotives inspired both awe and fear, but ultimately reduced travel costs dramatically. Arcus Answer is set to do the same for customer service. The average cost of a call in a UK contact centre is nearly £4, but the cost of an Arcus Answer service is less than £1.

So why does this matter to local authorities?

Local authorities have to offer good customer service on everything from parking and housing to recycling, waste services and severe weather response. As a result, every local authority has at least one call centre. Expensive to set up and run, staff turnover is often high. Nor are websites the solution; digital transactions often limited to filling out a form, residents who need help often come from groups that don’t have good access to the internet or are not comfortable using online.

Arcus Answer is more like talking to Amazon Echo (Alexa) than calling an automated service. Hold music is replaced by an instant answer; the service deals equitably with angry citizens and can be relied on to give the same answers to the same questions. If linked to back-end systems, these services can also process whole transactions, such as booking appointments, issuing parking permits or recording a missed bin collection.

Services are not limited to inbound calls. Councils are starting to consider using Arcus Answer to call hostels and care homes to find available beds, a daily task that takes an individual time, but which can be done much faster by AI that rings every hostel concurrently.

The answers can be managed via an online database.

Outbound calling is also useful in emergency situations such as flooding where a service can look up which postcodes are affected, call residents individually, find out what help they need or the emergency services at any time of the day or night.

In emergencies, AI can free up budget to spend on human care, for example by calling to arrange home visits.

Often the promise of new technology is lost in the pain of implementation, yet the NHS pilot took just four weeks.

Cambridge-based Arcus Global is now offering a four-week free trial to organisations with appropriate workloads. The pilot enables the buyer to see exactly how the service works before purchasing and it is ready to go live immediately afterwards.

> **Arcus Answer is more like talking to Amazon Echo (Alexa) than calling an automated service**

Visibility comes through a portal that shows what people are asking the system and how many calls are being handled. In the NHS pilot, this revealed a significant proportion of callers wanted a service that no one had previously thought of.

As Newcastle continues to host innovative developments, the question that local authorities will be asking themselves is which of their services will be the first to follow in Stephenson’s footsteps, seize the opportunity for greater efficiency and adopt AI to streamline its customer service?

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