ComputerWeekly

27 JULY - 2 AUGUST 2021

Are we getting cyber security skills all wrong?

As the voice of the security profession, the UK Cyber Security Council is acting on the need to develop professional standards and redefine the role of security

NAO doubts government officials' digital transformation experience

The government needs to better equip senior officials with the right skills to enable them to implement digital programmes if it is to reverse consistent underperformance, according to a National Audit Office (NAO) report. It said public bodies need to deliver high quality digital services as the country becomes "increasingly digital", but to do so the reasons for decades of project failures must be addressed.

Consultation underway for UK digital identity market plans

The government has launched a consultation on its latest plans for the use of digital identities in the UK. The Department for Digital, Culture, Media and Sport wants to gather the views of interested parties on proposals to "make digital identities as trusted and secure as official documents". The consultation follows on from the publication of a draft digital identity and attributes trust framework.

R&D government funding programme launches in UK

A UK-wide investment programme has launched to deliver £375m of government funding to research and development (R&D)-intensive firms operating in "breakthrough" technology sectors. The fund was originally announced by the chancellor during the Budget in March, and will be delivered by British Patient Capital, a commercial subsidiary of the UK government's economic development bank.

NCSC's Cameron urges deeper cyber alliance-building

National Cyber Security Centre (NCSC) CEO Lindy Cameron has talked up the importance of alliance-building in the fight against cyber threats, in a speech at Tel Aviv University in Israel. Addressing the university's annual Cyber Week, Cameron said the UK was "absolutely committed" to working with Israeli firms to protect citizens and build confidence in digital technology.

DOTTEDYETI/ADOBE

Quantum-inspired Fujitsu algorithm to tackle space waste

The University of Glasgow has worked with Fujitsu and satellite service and sustainability company Astroscale on a quantum-inspired project to remove space debris. The project, carried out as part of the UK Space Agency grant aiming to advance research into space surveillance, was developed over six months. It makes use of rapid trajectory design algorithms developed by the University of Glasgow.

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NHS Digital tightens rules for GPDPR data scrape

NHS Digital has abandoned plans to collect patient data from GPs in England on 1 September, and put in place three key tests that must be met before the process can start, saying that tougher safeguards are needed to protect patient data.

Thomson Reuters fleshes out multicloud strategy with Oracle

Thomson Reuters has formed a cloud alliance with Oracle that will see it lean on the database giant's global network of cloud datacentres to serve up locally hosted versions of its financial applications to enterprises around the world.

SAP Q2 2021: Revenue down 1%, 600 new S/4 Hana signups

SAP has reported second-quarter 2021 revenue of €6.669m, down 1% on the same year-ago quarter. Its cloud revenue for the quarter has increased by 11% to €2.276bn, representing 34% of the total.

Zoom expands into contact centre market with Five9 purchase

Zoom Video Communications has spent $14.5bn on the purchase of contact-centre-as-a-service firm Five9. The acquisition is part of the video-conferencing company's plans to build out its existing Zoom Phone product line for business users.

Makers launches third year of the Women in Software Powerlist

The Women in Software Powerlist has been launched for a third year by software bootcamp Makers. The list aims to shine a light on the careers and achievements of 20 women with coding and software skills in the tech sector.

Respect in Security challenges abuse and harassment in cyber

Around a third of cyber security professionals say they have had personal experience of in-person and online abuse and harassment during the course of their work, according to research. ■

Uber drivers face real-terms pay cut

Uber is under fire from its drivers again, over an increase in the service fee charged by the ride-hailing app, in a further example of the controversy surrounding the treatment of workers in the UK's gig economy, which has come under greater scrutiny during the Covid-19 pandemic.

ANTOINE/ADOBE

> ❯ *SAP invests €250m in UK economy.*
> ❯ *Further prosecutions quashed in Horizon scandal.*
> ❯ *Pegasus mobile RAT abused to monitor journalists.*
> ❯ *UK, US confirm Chinese state backed server attacks.*

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HMRC CEO claims email querying legal basis for loan charge was 'overplayed'

HM Revenue & Customs CEO Jim Harra continued to downplay the significance of an email questioning the legal basis of the loan charge during a grilling by the Economic Affairs Committee. Caroline Donnelly *reports*

An email sent by HM Revenue & Customs (HMRC) CEO Jim Harra in which he admits having "very little success" with finding legal backing for the government's controversial loan charge policy has come under scrutiny once more, this time by the Economic Affairs Committee (EAC).

During a 90-minute online evidence-sharing session, Harra and HMRC's director for counter avoidance, Mary Aiston, were quizzed by committee members about the department's positioning and approach to policing the loan charge policy.

The session kicked off with a series of questions about an email that Harra sent in 2019, which was unearthed in a document dump obtained via a Freedom of Information request in April 2021, in which he appeared to call into question the legal basis for the loan charge.

Introduced in 2017, the policy enables HMRC to reclaim the tax it claims tens of thousands of contractors avoided paying by participating in loan-based remuneration schemes between 9 December 2010 and 5 April 2019.

The policy has effectively seen HMRC retrospectively reclassify these loans as income, which makes them taxable, resulting in contractors in a range of industries, including IT, being saddled with life-changing tax bills pertaining to work they did between December 2010 and April 2019. HMRC has consistently maintained that it has never approved the use of loan schemes.

An independent report into the loan charge policy, by former National Audit Office (NAO) comptroller Sir Amyas Morse, concluded in December 2019 that the "legal position" on the use of disguised remuneration mechanisms became clear in December 2010. This declaration was called into question earlier this year by anti-loan charge campaigners and tax barristers following the disclosure of the 31 January 2019 email, which made reference to the social media discourse created by a Treasury Select Committee hearing the previous day about loan charge-related matters in which Harra participated.

Harra said in the email: "The main substantive comments are… HMRC persistently claims that [disguised remuneration]

schemes never worked, but despite allegedly challenging [disguised remuneration] schemes for the last 20 years, we have not obtained tribunal/court decisions that back up this claim. In particular, we have not obtained decisions establishing that individuals are taxable on [disguised remuneration loans] as income."

Harra followed up on this comment by going on to detail his own abortive attempts to secure "legal analysis" to back up HMRC's justification that loans should be taxed as income.

"In recent months, I have repeatedly tried to obtain legal analysis to understand the strength of our claim with very little success," he wrote. "For yesterday's hearing, we were initially given a summary of [tax] avoidance wins, some of which seemed to have nothing to do with [disguised remuneration]."

VICTORY OVER RANGERS

HMRC has sought to downplay the significance of the email since it came to light in April 2021, citing its 2017 victory in the Supreme Court against Rangers Football Club, which had previously used loan-based remuneration schemes to pay its players and senior executives, as providing sufficient legal precedence to support its views that loans should be treated as income and taxed accordingly.

During the Economic Affairs Committee hearing on Thursday 15 July, Harra was again asked to account for the contents of the January 2019 email, in which he appeared to call into question the legal basis for the policy.

Harra told the committee that the contents of the email had been "overplayed" because HMRC was clear on the legal arguments at

HM REVENUE & CUSTOMS/WIKIMEDIA COMMONS

Jim Harra, HMRC: "I was frustrated that misinformation really was going unchallenged"

the time for taxing disguised remuneration users, in the wake of the Rangers case. "I did feel that we needed to be more proactive in refuting what was being said about HMRC and about the basis for what we were doing," he said during the session.

"At the time, I was frustrated that misinformation really was going unchallenged and HMRC's views were not cutting through the public discourse. Specifically, in relation to that email, I felt that for my appearance at the Treasury Select Committee, I hadn't been given the briefing that I felt I needed in order to make those points. So that's really what I was referring to."

Past criticism

Committee member Lord Forsyth then asked about past criticism directed at HMRC that it overstated the importance of the Rangers case in its enforcement of the loan charge.

Harra said he rejected that view, and claimed that anyone who disputed HMRC's view that these loans were taxable had the right to challenge its stance at tribunal, and that there were cases going through the courts with that in mind at the moment.

"Our [past] approach [to addressing disguised remuneration] was to try and litigate cases to establish what the legal position was," he said. "That took quite a long time, and it wasn't until the 2017 decision of the Supreme Court that we got that precedent with Rangers, which did say that these payments are taxable and these schemes do not work to avoid tax.

"The facts of [every case] are not all the same, and at different stages the law has been different as well, so it's not a straightforward thing to explain. But, nevertheless, I did feel that we ought

to be defending ourselves more in the discourse than we were at the time."

Another member of the committee, Lord Bridges, then interjected to query a point raised during the Morse review of the loan charge, about whether the legal stance on using disguised remuneration schemes had always been clear to taxpayers, and Harra admitted it had not.

> ## "I'm not claiming that the law was always clear. It's a very complex area"
> ### Jim Harra, HMRC

As proof of that, Harra pointed to the first iteration of the loan charge policy, which targeted people who had joined loan schemes as far back as April 1999. The Morse review, however, advised the government to trim 11 years off the original 20-year look-back period for the policy on the basis that the law on using loan schemes was not made clear until December 2010, with the passing of the 2011 Finance Bill.

"I will accept that for a significant period, the law was not clear – that's why we are litigating and why we are still litigating," said Harra. "HMRC was clear that we had a legal basis for challenging disguised remuneration schemes. I'm not claiming that the law was always clear. It's a very complex area."

> ❯ *IT contractor community gives its verdict on plans to revamp loan charge policy.*

Steve Packham, spokesperson for the Loan Charge Action Group (LCAG) campaigners, said the answers Harra gave during the session suggest that HMRC was "acutely embarrassed" about the contents of the FOI emails.

"The members of the committee were right to press Jim Harra on his email, where he clearly admits that he couldn't find legal analysis to back up HMRC's strategy of pursuing individuals and [the committee] forced an admission that HMRC have no such opinion," said Packham. "Committee members were right to point out that if the law was not clear even to HMRC, it was not clear for ordinary people and certainly not clear enough to justify pursuing individuals in this life-ruining way."

> ## "THE LAW WAS CERTAINLY NOT CLEAR ENOUGH TO JUSTIFY PURSUING INDIVIDUALS IN THIS LIFE-RUINING WAY"
> ### STEVE PACKHAM, LOAN CHARGE ACTION GROUP

Speaking to Computer Weekly, tax barrister Keith Gordon seemed similarly unconvinced by the response the committee received to its questions. "Jim Harra's response was quite extraordinary," he said. "He explained the difficulty as the fact that each case must be looked at separately, on its own facts and based on the particular set of laws in place at the time. However, if things were so difficult and no single legal opinion could be given, why would Jim Harra have expected to obtain such an opinion?

"More importantly, all HMRC briefings about these arrangements have treated these schemes and the circumstances behind them as identical. Indeed, the loan charge policy is specifically a single response to cover what Harra is now suggesting is a wide range of different types of case."

LOAN CHARGE EXPOSED

Dave Chaplin, CEO of contracting authority ContractorCalculator, said the session has succeeded in "fully exposing" the loan charge policy as a "highly damaging retrospective tax" designed to "bulldoze through long-standing taxpayer protections".

"It is sending thousands of victims of unscrupulous operators into bankruptcy, and it is all forced through Parliament by HMRC and ministers based on misleading information. It is a massive scandal of its own making," he said.

"There's a saying – when you're in a hole, stop digging. HMRC continues to dig, but today finally hit the concrete floor of incontrovertible facts – that the loan charge breaches the rule of law."

Computer Weekly contacted HMRC for a response to the above comments on Harra's appearance during the session, and received this statement: "We encourage any customers who are worried about paying their loan charge liability to please contact us and we will be able to help them. We have been clear that we will work with customers to enter manageable payment plans to spread their tax liability and ensure that they are affordable." ∎

Volvo makes software a defining feature

The head of software platform at Volvo speaks to Cliff Saran about its journey to build a software-defined car

Last month, Volvo Cars laid out its plans to rethink car production based around the idea of a software-defined car platform. The car maker plans to switch to fully electric cars by 2030. The company's CEO, Håkan Samuelsson, believes that by then, cars will be differentiated by their software. Instead of having major hardware components, additional functionalities will be provided through software.

In preparation for this shift, the company has been growing its in-house software development teams and standardising on a core suite of software and hardware platforms. For Samuelsson, the traditional approach of specifying components and having a tier-one supplier deliver a black box of hardware running embedded software is no longer an efficient way to deliver new automotive functionality.

Instead, Volvo is developing a central computing platform and in-house software. Samuelsson believes this shift to a software-defined car is almost as big a change for the industry as the move to electric vehicles.

During the announcement event, Patrik Bengtsson, head of software platform at Volvo Cars, described how multiple levels of transformation are driving digitisation of the automotive industry. According to Bengtsson, the changes that are coming

VOLVO CARS

Patrik Bengtsson, Volvo:
"We are building a system and software stack in-house to connect to VolvoCar.OS. The key is to build an API structure that enables our developers to have access to all car sensors"

in autonomous vehicles, electrification and connectivity have one common enabler – software.

The amount of software deployed in cars is increasing in volume, complexity and value. For Bengtsson, eventually, software will impact, transform or even disrupt every part of the automotive industry.

ON A DIGITISATION JOURNEY

Computer Weekly spoke to Bengtsson recently about how digital transformation at Volvo is being taken to car production. "We are on a journey," he says. "When we look at the current architecture of the car, more and more features are software-driven. In the past, car makers relied on tier-one suppliers to deliver

A SOFTWARE-DEFINED CAR WOULD BE CATEGORISED BASED ON THE FUNCTIONS AND FEATURES ITS SOFTWARE OFFERS

these pieces of new functionality as black box software packages. Apart from Tesla, all other car manufacturers do this."

Volvo's ambition is to utilise all the advantages that software can provide. In a software-defined car, major functions are provided by software. Instead of being recognised for what suspension or engine type it has, a software-defined car would be categorised based on the functions and features its software offers, says Bengtsson.

Bengtsson, who previously headed up the development of infotainment and driver interaction software for Volvo, says the company's experience on this new infotainment system paved the way to its software-defined future. "In 2017, when we developed the infotainment system, we shifted to Android," he says. This represented a major step for Volvo, as the car maker had previously sourced its infotainment systems from a tier-one supplier.

A Volvo car will typically use about 180 computers. Bengtsson says the company is reducing this number by moving the computing modules with the most functionality into core hardware components. The core computing system, which will be introduced on a new Volvo model set to be revealed in 2022, is made up of three main computers. These support each other in operating vision processing and artificial intelligence, general computing and infotainment.

AN OPERATING SYSTEM OF OPERATING SYSTEMS

The next generation of pure electric Volvo models, including the company's first SUV on a completely new electric-only technology base, will run on Volvo Cars' own operating system (OS), called VolvoCars.OS. This will act as an umbrella system for electric Volvo cars.

"We are building a system and a software stack all in-house to connect to VolvoCar.OS. The key is to build an API structure that enables our developers to have access to all car sensors," says Bengtsson.

VOLVO CARS

The aim is to incorporate the company's various operating systems across the car and the cloud, creating a single software OS environment. The underlying operating systems include Android Automotive OS, QNX, AutoSar (AUTomotive Open System ARchitecture) and Linux. Real-time processing is run on the car's main computers, but cloud connectivity is also used to provide additional functionality. Bengtsson says the approach Volvo is taking will enable faster and more flexible development and offer more frequent over-the-air updates to customers' cars.

A MENU OF FUNCTIONS

Thanks to the use of simulators and Android emulators, along with in-house continuous integration and deployment capabilities, the speed with which new functionality can be added to cars is boosted significantly.

Bengtsson says the hardware being deployed in Volvo cars will have headroom to grow, but it can also be replaced with more updated components without affecting the software. This is analogous to the way smartphone users receive new functionality on existing devices through over-the-air OS updates, but at some point, they may want to upgrade to a new device.

From speaking to Bengtsson, an interesting fact about a software-defined car is that the base model and higher-end models incorporate the same basic components. The value-add comes from enabling new software functionality.

For instance, a customer may purchase the standard infotainment option, but may later decide to get a software update to enable the higher-quality infotainment features. Similarly, an over-the-air update could be rolled out to improve the battery life and range of Volvo's electric cars. ∎

ON A MISSION TO PROFESSIONALISE IT SECURITY

As chair of the new UK Cyber Security Council, Claudia Natanson is in a superb position to develop professional standards in IT security and, as she tells Alex Scroxton, she intends to fundamentally reimagine what a security job actually is

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The so-called elevator pitch has become something of a cliché espoused by motivational speakers at a hundred Ted talks, but in the late 1990s, Claudia Natanson got a chance to deliver one in person to Peter Bonfield, then CEO and chair of BT's executive committee.

"I remember Peter was CEO at the time, and I knew he was coming over to where we were, so I started to polish up my elevator pitch to him," she tells Computer Weekly in our Zoom-based interview. "I wanted him to think about selling incident response management to support other organisations because I thought that was going to be very important.

"With the explosion of people doing things on the internet, I felt that BT was going to be moving more away from telephony. I said to him, 'As much as I like the red phone boxes, they aren't going to survive this situation; we are going to do more communication on the internet than through those phone boxes. People will want support from us as they move onto the internet'."

An apparently impressed Bonfield agreed to let Natanson pitch her idea into the whole executive team, and with the wind – and BT's head of security – at her back, she was able to win support (and money) to start a new business within BT, which ultimately became BT's security services unit.

Now, as chair of the newly established UK Cyber Security Council, Natanson is on a mission to professionalise the cyber trade – according it the same status as the accounting, legal or medical professions – and attract new, diverse talent to the sector.

Natanson began her journey as a nuclear chemist, where she was struck by the growing number of computers being used

in her work. She decided to change course as a result, pursuing a masters in computer science at Birmingham University. There, she had the idea – no longer a revolutionary one – that computer sciences needed much more support and education in schools than they were getting, so she got special permission from her professors to do something that had never been tried before.

"This was to allow me to span my PhD across the School of Education and the School of Computer Science, with the supervisors for each looking at my work," she says. "It turned out very well because I knew nothing about education per se, as a field of study, so I studied a lot of things that had to do with education – the mind, psychology and special needs – and that's when I went into schools as well to see how computing could help in that way. I'm very grateful to the University of Birmingham for having supported me on that."

Into her subsequent career, Natanson has carried forward the idea that science, technology, engineering and maths (STEM) teaching practice and curricula should be formed in such a way that gives young people the freedom to form new ideas and come to different career paths in their own way, and at their own pace.

Now that she has the opportunity to shape government policy on the cyber security profession – at a panel held at the May 2021 CyberUK event, digital minister Matt Warman said

❯ The topic of securing outbound email traffic is less often discussed than screening inbound emails. Zivver's Rick Goud aims to change this.

the government would be listening intently to the Cyber Security Council's recommendations – she wants to bring this to bear on skilling up Britain's young people to pursue careers in cyber, but only if they want to, she adds, chuckling as the discussion turns to the government's badly received "ballet dancer" ad from 2020.

This, says Natanson, can only happen if the concept of equality is built in at the foundation of the educational system, to give every child an equal opportunity to follow a path that will eventually lead to a cyber security qualification and career, through collaboration with charities, schools, volunteers and other professional bodies.

"I have to make sure I support some of those collaborative thinking actions to make sure that every child has an opportunity," she says. "I can't just start at specialisms or frameworks; I need to start at equality. And this is why I keep saying that every part of the council's work for the profession, every part of it, is going to be underpinned by collaboration."

This notion of collaboration extends through the other areas of work the UK Cyber Security Council has been tasked with. It has already begun a programme of collaborative work with its 16 founding member bodies, each of which is invited to input into its inaugural initiatives, establishing reference frameworks for qualifications and careers, plus professional standards and ethics.

"SECURITY IS ABOUT HEARTS AND MINDS – YOU HAVE TO WIN PEOPLE TO IT"
CLAUDIA NATANSON, UK CYBER SECURITY COUNCIL

Natanson wants every child to have an equal opportunity to follow a path that will eventually lead to a cyber security qualification and career

SEBRA/ADOBE

Such frameworks and standards are sorely needed, says Natanson. "One of the things I want to start with is the definition of cyber itself," she says. "Cyber security is not well understood by organisations. By placing cyber security into the technology stack, we are miseducating people, because immediately they think it is a technology problem, but it is not, it is a business problem, and when you deal with the business, you have to work across functions, influence and educate, because security is actually about hearts and minds – you have to win people to it, and people have to understand why they are doing it."

Natanson believes re-education may be achievable if the industry can collectively reimagine what a security job actually is. She suggests most cyber security job descriptions aren't really for security roles, but for solutions engineers and systems architects. She believes this is causing hiring problems for organisations because, having failed to understand what they want from their security leaders, they go to market with job descriptions that read like a technological wish list and fail to account for other skills that are needed to truly excel in cyber, in areas such as risk assessment and people management.

"We need to help organisations understand what they want to begin with," she says. "We have a skills shortage because we are not communicating, not defining properly, because we have misplaced where cyber should be. To support organisations, we need to bring them back to base, bring them back to how cyber is affecting the business and help them understand the kind of help they will need. This is important, especially to smaller organisations, which will need a lot of support because their understanding of cyber could be anything that they just heard or read. We will need to really put our arms around them to support them."

The industry also needs to emphasise adaptability, says Natanson, because unlike some other areas of the tech stack, cyber security is in constant flux. "I want to make sure we keep relevant and make sure we have a profession that can help folks as they try to keep up with this moving target," she says.

In the long run, the ultimate goal of the Cyber Security Council is to oversee the creation of a professional accreditation, backed by royal charter, for cyber security workers, akin to those that already exist in fields such as accountancy and law. Work is already in train towards this goal, and Natanson expects to be able to report on progress towards this within a year.

"The government is looking to us to set the standards, the baseline standards that we want the profession to have," she says. "That standard has to embody a lot of things, it has to embody discipline."

Just as chartered accountants are bound to an ethical code of conduct, chartered security consultants – for want of a better term – will presumably be tightly controlled when it comes to areas of incident disclosure, client privacy, data protection and ethics in general. "One of the things I look to a profession for, beyond anything else, is ethics," says Natanson. "I want to make sure there is an ethical path, and ethical behaviour, and that you can trust that professional body. For us, first of all, that will be about setting the benchmarks. What do we think a good standard looks like? What

does an entry standard into the profession look like? Where can you go once you're in? How should you behave?"

All of these things will be important, particularly to security leaders making the case for investment to their boards, who will expect consistency of standards, behaviour and execution when they engage a third party, just as they would if tendering for a new financial auditor, she says.

Looking ahead, Natanson is optimistic that the council's work can steer new conversations and embrace new ideas around cyber security practice – and not just in the UK.

"Britain should feel very proud because there is nobody else trying to look at the profession from this point of view," she says. "Everybody is so busy on the defensive, and nobody is talking about the profession. I think this is a key time for us to be shining as a beacon to the rest of the world, and I know the rest of the world will embrace that, because I'm getting those messages already.

"The mandate the government has given us to be that umbrella, across all organisations, not just in cyber security, and to be the voice of the profession – the council takes it very seriously. It is looking to us to guide it on standards, and to influence academia and education. Those two things are very important because they will determine whether we are successful." ∎

> **"BRITAIN SHOULD FEEL VERY PROUD BECAUSE THERE IS NOBODY ELSE TRYING TO LOOK AT THE PROFESSION FROM THIS POINT OF VIEW"**
> CLAUDIA NATANSON, UK CYBER SECURITY COUNCIL

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EDITOR'S COMMENT

Promising progress on digital ID market

Peace appears to have broken out in talks about the future of the UK digital identity market. The government has announced a new consultation on the plan's next phase, covering three key areas: governance of the scheme; opening up access to government datasets; and legal parity between physical and digital identities. Earlier this year, there were huge concerns from industry that the proposed technical standards were incompatible with the anti-money laundering (AML) regulations that are driving the need for digital IDs in financial services. The fact that the proposed standards were the same ones underpinning the failed Gov.uk Verify system, and were supported by its developer, the Government Digital Service (GDS), lent a toxic feel to the plans among private sector players. Computer Weekly understands many in industry considered pulling out of the framework unless government acted on their concerns.

But since then, much work has taken place behind the scenes to make sure the Department for Digital, Culture, Media and Sport, which is running the consultation, understands what industry wants, with extra impetus provided by the Kalifa review, which examined future opportunities for the UK fintech sector. As a result, the industry has been clear with government about the basis on which support for the latest plans has been established. A fudge has been found to make AML standards compatible.

There is also a recognition that the public are hardly crying out for digital identities. If the investment that industry will have to make is to be rewarded, citizens will need to be educated in the reasons for having a digital identity in the first place. While industry expects to play its part in communicating that to its customers, any such campaign would have to start from government.

Later this year, testing will start for the various commercial and technical aspects – effectively creating a mini-ecosystem in a "sandbox" to enable simulated transactions and attribute sharing between the key players to make sure everything works as intended before the framework moves to its "beta" stage ahead of going fully live. That beta phase is unlikely to start before March 2022. GDS expects its post-Verify system, "One Login for Government", will then be available in prototype and with a more detailed development roadmap.

Overall, the process for creating a digital identity market is in a much better place than it was six months ago. But industry is increasingly in the driving seat and expects the government to deliver on its promises. ■

Bryan Glick, editor in chief

INDUSTRY IS INCREASINGLY IN THE DRIVING SEAT

TechTarget

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How digital operations drive ERP modernisation

When it comes to modernising enterprise resource planning, IT decision-makers have a multitude of options. Duncan Jones looks at what to consider when planning a modernisation project
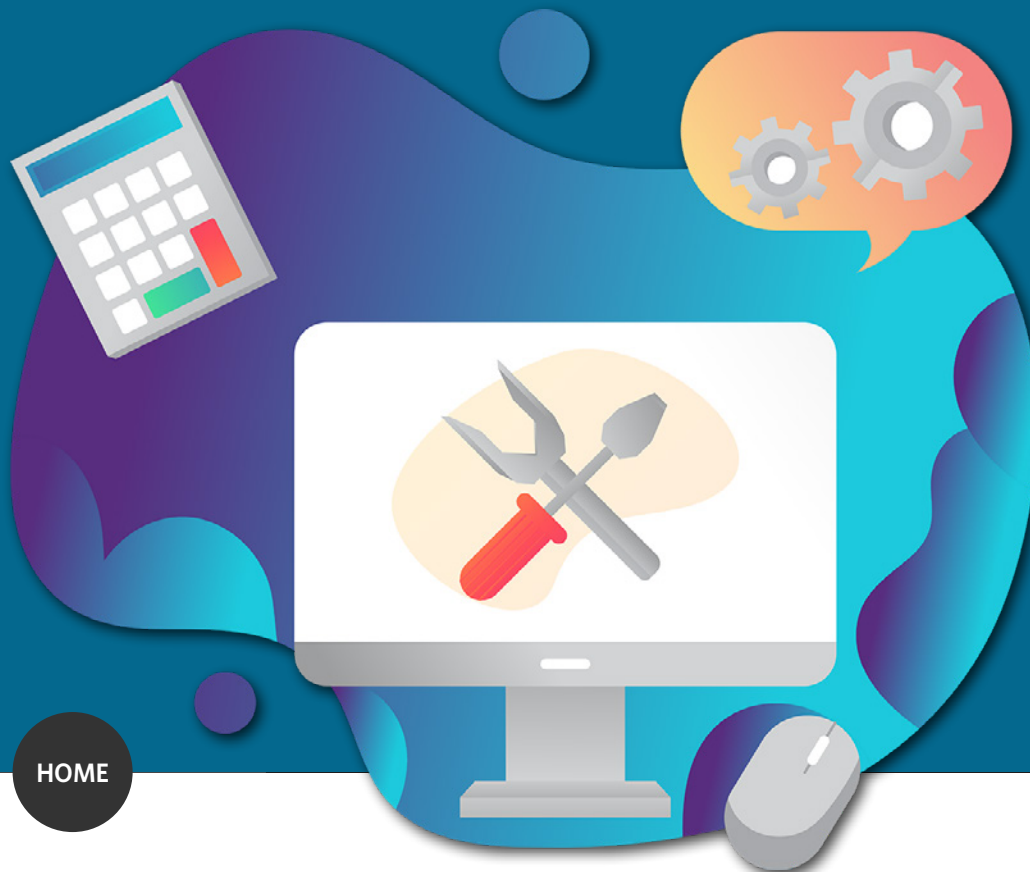
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STONEPIC/ADOBE

Digital transformation gets a lot of hype, especially from the large consulting firms with their vested interest in selling a lucrative (for them) transformation project.

There are, however, many good reasons to move out of your current business applications and buy – or rent, if you choose software as a service (SaaS) – a new forever home. Forrester coined the term "digital operations platform" to describe the new breed of core business applications.

Digital operations platforms handle many enterprise resource planning (ERP) workloads, but with very different architectures that make them more flexible, open and easier to use. IT leaders who are considering replacing legacy ERP suites with modern digital operations platforms are doing so because they want to improve.

The first driver is business agility to meet customers' ever-changing expectations. Many IT leaders are modernising their organisation's core systems so they can power the next wave of process innovation. Changing the business model is a high or critical priority for a quarter of software decision-makers, and 56% of them are considering changing their ERP provision.

However, the siloed instances and rigid, hard-coded processes in legacy ERP can prevent their owners from providing customers with today's operational must-haves, such as "buy online, return to store", pay-per-use subscription contracts, and add-on app marketplaces.

This has driven some organisations to look at modern ERP systems. Moderna Therapeutics' implementation of SAP S/4 Hana, for instance, has enabled the biotech firm to mobilise resources

better and accelerate innovation of multiple new products simultaneously. And Oracle SCM Cloud's flexibility has enabled a large distributor of industrial products to deal with Covid-19's disruption of its network. It is still supplying hospitals, nursing homes and supermarkets, despite closing trade counters at branches and changing work patterns.

Application usability to enhance employee experiences is also driving ERP modernisation initiatives because today's employees won't accept applications that are hard to use. It's not merely dated user interface (UI) design that irritates users and hampers their productivity. Good modern software also addresses many other flaws, such as using smart defaulting to reduce superfluous keystrokes and embedding analytics so that users don't have to collect data manually from multiple sources.

Another factor influencing ERP modernisation is that organisations are striving to achieve operational excellence to serve customers more quickly or more cheaply. Digital operations platforms are a key source of differentiation now that customer experiences have become increasingly similar.

Digital operations platforms are smart, with artificial intelligence (AI) at the core to drive quicker, better decisions. They enable the shift from drill-down to alert-up, triggering proactive action instead of merely supporting post-mortem investigations of what went wrong. For instance, an oil and gas producer is using SAP S/4 Hana to increase output significantly via better scheduling of predictive maintenance. And Kimble's Resourcing Analyzer for professional services firms can improve customer service by optimising resource hiring and scheduling.

ERP INERTIA

Despite powerful arguments for digital transformation, 47% of software decision-makers who have implemented, or are implementing, an ERP product plan to retain it. Also, many of those who are considering a change may have no immediate plans beyond a minor upgrade to a more current release. As an illustration, SAP has had to extend support for Business Suite 7 for five years beyond when it originally hoped to have all customers on S/4 Hana.

One of the reasons for slow adoption of newer technologies that power digitisation initiatives is that CIOs have higher short-term priorities than a major transformation programme. Software decision-makers say their immediate priorities are imperatives such as increasing revenue and improving customer

> **SOFTWARE DECISION-MAKERS SAY THEIR IMMEDIATE PRIORITIES ARE IMPERATIVES SUCH AS INCREASING REVENUE AND IMPROVING CUSTOMER EXPERIENCES. AMBITIOUS — THAT IS, EXPENSIVE AND RISKY — TRANSFORMATION PROGRAMMES DISTRACT FROM THESE IMPERATIVES**

experiences. Ambitious – that is, expensive and risky – transformation programmes distract from these imperatives.

CIOs can't do everything at once. More than three-quarters of respondents who are considering changing their ERP suite are also considering changing their customer relationship management (CRM) application. They are likely to do the latter first if they believe it is faster, less risky and affects revenue more directly.

Moreover, Forrester's survey pre-dates the Covid-19 pandemic. Your CIO is even less likely to start a global ERP replacement programme if you can't do key elements in person, such as design thinking sessions, development scrums and user training. In a recent survey of 65 technology service providers, they predicted that 56% of ERP projects would be delayed or cancelled because of Covid.

Another factor is that in some industries, the new products are not yet fully ready. The major suppliers' alternatives to their legacy ERP suites are broad portfolios under a shared brand, not monolithic suites like their predecessors. These portfolios lack vertical depth in some industries.

For example, Infor CloudSuite currently supports 60% of the industries that its on-premise portfolio addresses. The new applications still require extensive tailoring to each customer's needs. Although this is now configuration rather than customisation, it still could be a long, costly process, especially if you take the opportunity to do a "greenfield" implementation that radically reimagines your business processes.

Early adopters also face many integration challenges, not only with third-party apps, but also between the separate products

STONEPIC/ADOBE

in suppliers' portfolios that they have acquired, developed from scratch or re-engineered. For instance, SAP CEO Christian Klein blogged about how SAP is addressing the problem that "integration has become a challenge for many customers".

Adding to this is the fact that it will take years for enterprises to replace all their legacy ERP instances. This is especially true for complex, heterogenous enterprises. IT leaders usually start with horizontal functions, such as finance, that they can standardise across the enterprise, before addressing those that vary by business unit, such as manufacturing. Many legacy business applications will remain in use for years, until they reach the front of the transformation line.

Downsize ERP footprints

A digital operations platform has a smaller functional footprint than ERP, because many functional areas that were modules in ERP are now discrete categories, including e-procurement, human capital management (HCM) and customer service management (CSM). Separating these from ERP enables you to implement one global solution in each area, which brings greater visibility and consistency where business units previously operated independently within their ERP silos. For instance, Tata Steel used Anaplan to create a unified supply chain planning system, while Ross Video implemented Apttus to provide one consistent configure price quote (CPQ)

solution across multiple legacy ERP instances, reducing quoting errors and duplicate data entry.

Alternatively, niche products can be used to support a business unit's specific needs. For example, British Gas used Zuora's subscription billing software for its Hive connected home division. Either way, reducing your ERP to its core scope will ease the eventual migration to a digital operations platform.

Some organisations are also using digital process automation (DPA) and low-code platforms to modernise the user experience. Developers use DPA and low-code platforms to create modern, mobile-first systems of engagement (SOEs) without having to change the back-end systems of record (SORs).

These apps bridge gaps between data silos by displaying information from multiple sources in a single UI and using standard application programming interfaces (APIs) to create transactions in SORs. You can later modify those API calls to update your digital operations platform when you migrate to it, retaining your tailored SOE. Good SOEs eliminate manual workarounds that appeared over time to overcome ERP's deficiencies. You can also use DPA to declutter your environment of ERP customisations that no longer spark joy.

For instance, Hitachi Rail used Neptune Software to develop more than 60 mobile apps that help employees update its SAP ERP system via handheld devices, using barcode scanning and

> **MANY LEGACY BUSINESS APPLICATIONS WILL REMAIN IN USE FOR YEARS, UNTIL THEY REACH THE FRONT OF THE TRANSFORMATION LINE**

intelligent defaulting for data entry. Employees no longer resist using SAP, and the data is closer to real time than when it relied on deskbound data entry clerks processing handwritten forms.

Another option is to use robotic process automation (RPA) to eliminate boring, repetitive processes. RPA can improve the employee experience because robots embrace laborious data entry tasks that cause human clerks to seek alternative employment. It can also be an effective way to paper over process cracks that ERP's deficiencies have created. For example, many IT leaders use RPA to ameliorate the impact of data silos by automatically collecting information from multiple sources and presenting it to the human user in a single view.

However, take care not to spend money implementing RPA to partially automate a fundamentally flawed process. For instance, one large telco reduced employee churn in its financial services centre – and cut total headcount – by using Blue Prism's RPA tools to automate the input of supplier invoices into its ERP system. That's good, but it may have been able to achieve better results more quickly by replacing that part of its ERP suite with a modern, AI-driven procure-to-pay system.

Choosing between loving or listing your on-premise software estate is a strategically important decision for IT professionals, with vested interests on both sides. It is more complex than a simplistic return on investment analysis, based on reducing full-time equivalents. To focus your analysis on the most important drivers, ask yourself which option your organisation's customers would choose, if you asked them. ■

This article is based on an excerpt from Forrester's On-premises ERP: should you love it or list it? *report, by* principal analyst Duncan Jones.

STONEPIC/ADOBE

Windows 11: A first look at the first preview

Microsoft recently unveiled its plans for the next version of the Windows operating system. Simon Bisson gives it a test drive

NADIA_SNOPEK/ADOBE

HOME

Windows 10's days are numbered. A big event at the end of June revealed its replacement is on the way, with Windows 11 launching by the end of 2021. The reveal showed a significant update to Windows' look-and-feel, changing the Start menu and taskbar, and applying a new design language to the entire operating system (OS).

Under the hood there are bigger changes still, with Microsoft going all-in on its virtualisation-backed hardware security tools. This requires eighth-generation or later x86 processors and a Trusted Platform Module (TPM).

It's part of a rethinking of how IT professionals need to consider security in a world of endemic malware, where crime syndicates operate with impunity. Using virtualisation to lock down and isolate untrusted files is perhaps the least an IT department can do, but it is something that works.

HARDWARE-BACKED SECURITY

Microsoft has been rolling out hardware-backed security for Windows 10 in its latest Surface hardware, and with Windows 11 will be bringing it to all supported hardware. This includes requiring trusted boot to reduce the risk of kernel malware, Windows Defender Application guard to open downloaded files in sandboxed virtual machines and user logins managed by encrypted tokens stored in a TPM.

This is, at heart, the secure Windows users have been asking for. The question for Microsoft is: will those users be prepared to use the hardware that supports secure Windows? It is going to be an interesting few months as users, admins and

developers work out what these new hardware requirements mean for their device fleets.

Earlier in July, Microsoft rolled out the first preview build of Windows 11 to Windows Insiders on the Dev channel, updating test machines to the new operating system. The first public build does not have all the features currently planned for the release, but it is stable and ready for testing.

Installation on our test systems was easy enough, using the familiar Windows Insider version of Windows' own update tools. There is no need to download ISOs or reload a PC from scratch: the build downloads in a few minutes and installs relatively quickly, leaving apps and data where they were.

After the first reboot, the user is presented with a subtly updated login screen, displayed with a new font and a slightly changed layout. Settings for biometric sign-in on Windows 10 are preserved,

so Hello camera and fingerprint sensors will continue to work on Windows 11.

GRAPHICAL USER INTERFACE

Microsoft has made a number of tweaks to the Windows 10 graphical user interface.

Where the Windows task bar has always been left justified, it is now centred, with a new-look set of icons and a redesigned Windows logo. The Start menu is perhaps the most obvious change. Opening in the centre of the screen, it drops the Live Tiles of Windows 10 in favour of a separate new Widget pane. A split view shows pinned apps, along with a Recommended view that exposes recent documents and newly installed apps.

Even the windows are subtly different, now with curved corners (that match those on the screen of the Surface Laptop Go). This
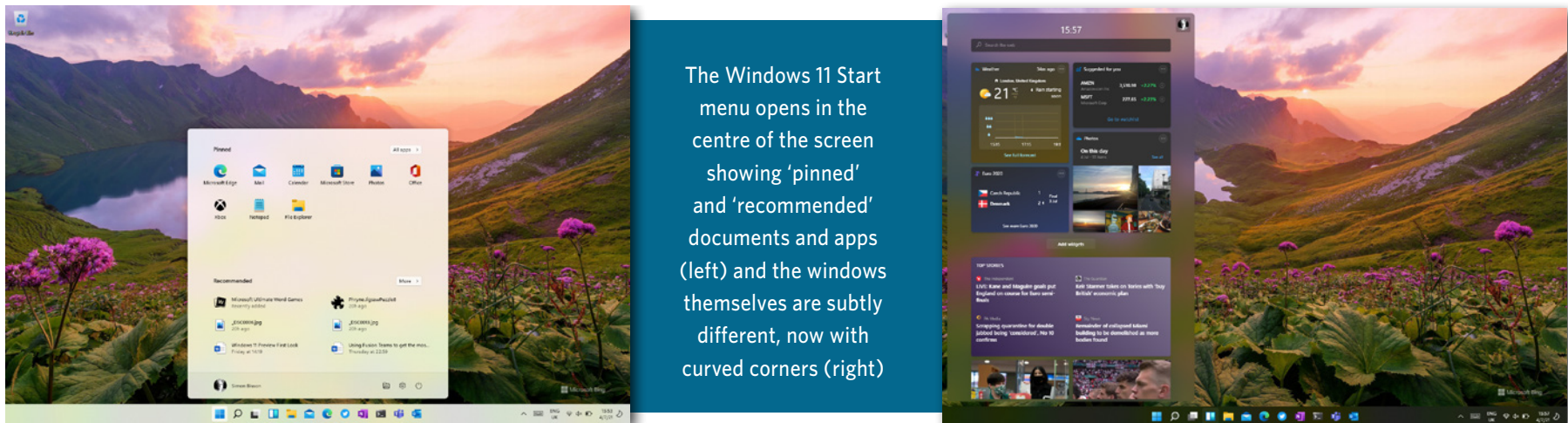
The Windows 11 Start menu opens in the centre of the screen showing 'pinned' and 'recommended' documents and apps (left) and the windows themselves are subtly different, now with curved corners (right)

new look and feel, codenamed Sun Valley, takes Windows' Fluent design language and applies it across the entire operating system. It's a fresh lick of paint on a familiar house, where everything works the way it always used to, only now with some new tricks.

One of those new tricks comes when right clicking or rolling over the maximise button in any window. This opens the Snap Layouts tool, which uses the user's screen geometry to suggest a new layout for applications. It is a surprisingly useful tool, which lets people quickly pick and choose windows to construct a layout for their workflow. Those layouts are stored as Snap Groups that can be quickly brought back as and when there is a need to open an app to deal with a task.

The Snap tools build on an older Windows feature, rethinking it for how people work now. It can be used in conjunction with another older feature that gets to come to the fore – Windows'

support for virtual desktops. These now get a taskbar icon, simplifying switching between different layouts. It's now possible in Windows 11 to have one for work and one for play, enforcing a barrier between work and life, which is increasingly important in these days of working from home.

One big change is to Windows 10's combined Action and Notification Center. These have been separated in Windows 11, with a new look set of notifications that have a much less cluttered look and feel, using the same rounded elements as the rest of the Windows 11 user interface.

The Action Center, with its quick controls for system features is now a standalone panel, again using a rounded pop-up. Now, however, it is triggered by clicking around the network and sound controls in the task bar. Once launched, it has a similar layout to the expanded Action Center in Windows 10, though the new-look
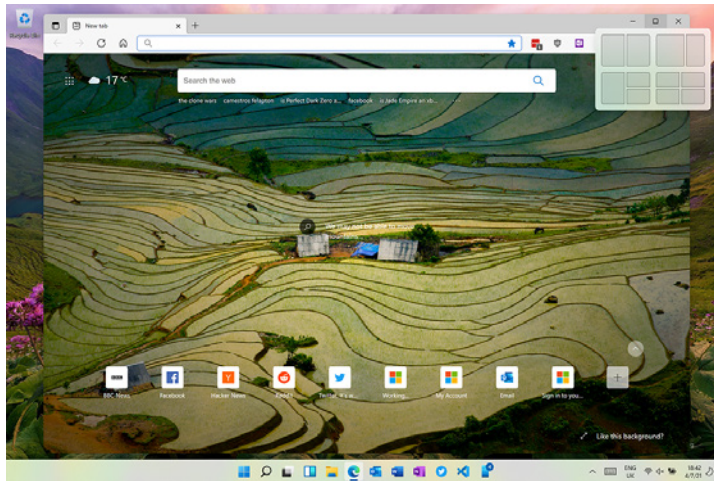
A Snap Layouts tool lets users quickly pick and choose windows to construct a layout for their workflow (left), while notifications have been separated from actions and given a less cluttered look (right)

icons provide more detail, showing connected Wi-Fi networks and Bluetooth devices, as well as offering both brightness and volume controls. Microsoft lets Windows 11 users add and remove features as needed. For instance, a desktop can have fewer options selected than a cellular-equipped Surface Pro X.
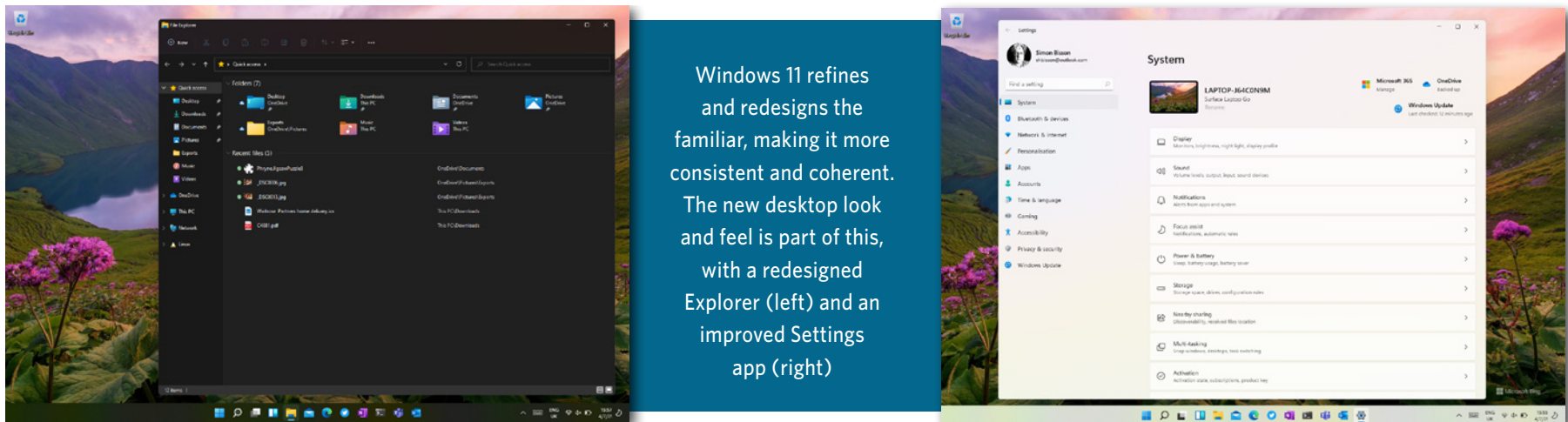
BEYOND THE GUI

Much of Windows 11 is more of the same process: refining and redesigning the familiar, making it more consistent and coherent. The new desktop look and feel is part of this, with a redesigned Explorer and an improved Settings app.

Perhaps the biggest makeover is to the Windows Store. Microsoft has thrown away its limitations, and now anyone can offer any app through the store. It does not have to be packaged as appx or MSIX. App developers can use the old familiar MSI or any EXE-based installer. There is even support for Java packages and web-based apps in Electron or bundled as PWAs. Perhaps most important is that software developers can bring their own payment engine, which enables them to keep all their revenue without giving Microsoft a 15% commission. This is the reason why big subscription applications such as Adobe's Creative Cloud and Acrobat DC are already in the revamped store. It's likely many more apps will be available in the Windows Store before launch.

The main feature missing in this first preview is support for Android apps in the Windows Store. Building on Amazon's App Store and Intel's tools for running ARM code on x64 hardware, it will allow Windows users to install and run familiar Android apps on a PC. While this means it will not be able to support applications that use Google's Play APIs, any application recompiled for Amazon's popular Fire tablets will run on Windows 11.

Windows 11 refines and redesigns the familiar, making it more consistent and coherent. The new desktop look and feel is part of this, with a redesigned Explorer (left) and an improved Settings app (right)

Still, that gives us something to look forward to for future builds. This first preview is intended for developers, but feels a lot more stable than early builds of Windows 10 did. This is perhaps not surprising, as Microsoft is building on its Windows-as-a-service model, which it has used for the past few years.

In fact, much of Windows 11 has been running in the dev channel for some time now, masquerading as a preview build of an upcoming Windows 10 update. The Windows 11 release represents the marriage of the heavily tested Windows platform with a set of new user interfaces.

Under the hood

Under the hood, Microsoft brings support for 64-bit Intel apps to its ARM-based devices, while new ARM-programming tools finally deliver an ARM64 version of Office. Windows 11 breathes a breath of fresh air into Windows on ARM, and the Surface Pro X feels snappier with the new operating system. Hopefully more ARM devices will be available in the future, as their connectivity and battery life makes them an ideal portable device. Support for Android applications should also help here, with a library of tablet- and mobile-ready apps.

Microsoft's shift to a continuous integration/continuous delivery development model has allowed it to change the way it builds software, and we're seeing the benefits of that approach in Windows 11.

It may not be the big bang of a Windows XP or a Windows 7, but it is a big change from what's come before and deserves its new number. It will be interesting to see how the previews continue to develop, and how it integrates with Microsoft's other big 2021 launch, a new version of Windows Server. ■
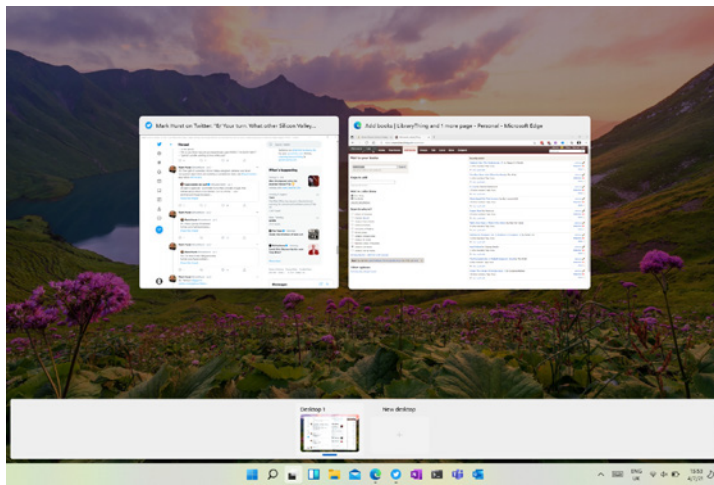
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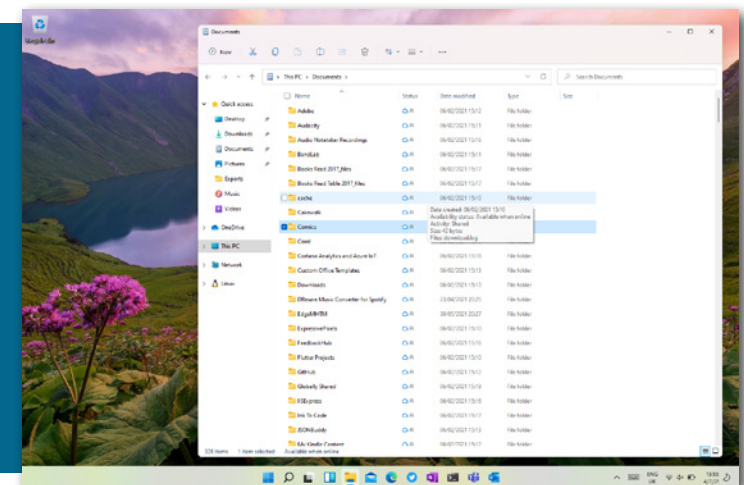
Storage performance metrics: Five key areas to look at

Stephen Pritchard looks at the essentials in storage performance metrics: capacity, throughput and read/write capability, IOPS and latency, and hardware longevity measured by failure rates

VISUAL GENERATION/ADOBE

HOME

Assessing any investment in storage is a question of balancing cost, performance and capacity. But with the growth of solid-state storage and cloud data storage services, evaluating storage systems can be complex. Nonetheless, there are key storage performance metrics and definitions that IT teams can use to simplify comparisons between technologies and suppliers.

We look at some of the most useful storage performance metrics – capacity; throughput and read/write; input/output operations per second and latency; mean time between failures and terabytes written; and form factors and connectivity – some of which are primarily of use for assessing on-premise storage while others also apply to the cloud.

1. Storage capacity metrics

All storage systems have a capacity measurement. Storage hardware today is largely measured in gigabytes (GB), or terabytes (TB). Older systems measured in megabytes (MB) have largely fallen out of use, though megabytes is still a useful metric in areas such as cache memory.

One gigabyte of storage is 1,000MB, and a terabyte is 1,000GB. Petabytes (PB) contain 1,000TB of data, and large storage systems are often referred to as working at "petabyte scale". A petabyte of storage is enough to host an MP3 file that will play for 2,000 years.

It is worth noting that although most storage suppliers round capacities to the nearest thousand, based on kilobytes of data, some systems use units based on the power of two. By this

definition, a [kibibyte](#) (kiB) is 1,024 or 210 bytes, a [mebibyte](#) (MiB) is 10242 bytes and a gibibyte (GiB) is 10243 bytes. Fortunately, only the decimal system, using powers of 10, applies from terabytes and upwards.

Storage capacities can apply to individual drives or solid-state subsystems, hardware arrays, volumes or even system-wide capacity, such as on a storage area network, or the provisioned storage in a cloud instance.

2. THROUGHPUT AND READ/WRITE STORAGE METRICS

Raw storage is of little use unless the data can be moved in or out of a [central processing unit](#) (CPU) or other processing system.

Throughput measures the number of bits a system can read or write per second. Solid-state systems, in particular, will have different read and write speeds, with write speeds typically lower.

The application will determine the most important metric of the two. For example, an application such as an industrial camera will need storage media with fast write speeds whereas an archival database will be more focused on reads.

However, suppliers might use calculations based on average block sizes to market their systems. This can be misleading. Calculating throughput – or [input/output operations per second](#) (IOPS) – based on either an "average" or a small block size will give a very different set of values to the same system's performance under real-world workloads.

Manufacturers also distinguish between random and sequential read and write speeds. The sequential read or write speed is how quickly a given storage device can read, or write, a series of blocks of data.

This is a useful measure for large files or series of data, such as a video stream or a backup. Random read and write is often a more realistic guide to real-world performance, especially for local storage on a PC or server. Solid-state drives (SSDs) should have a stronger performance advantage over [spinning disks](#) for random read and write.

3. IOPS AND LATENCY STORAGE METRICS

IOPS is another "speed" measurement. The higher the IOPS, the better the performance of the drive or storage system. A typical spinning disk has IOPS in the range of 50 to 200, although this can be improved significantly with [redundant array of independent disks (RAID) and cache memory](#). SSDs will be 1,000 times or more faster. Higher IOPS does, however, mean higher prices.

IOPS measurements will also vary with the amount of data being written or read, as is also the case for throughput.

Latency is how quickly the input/output (I/O) request is carried out. Some analysts advise that latency is the most important metric for storage systems, in terms of real-world application performance. The Storage Network Industry Association (SNIA) describes it as "[the heartbeat of a solid-state disk](#)".

The latency for a hard disk drive (HDD) system should be between 10ms and 20ms (milliseconds). For solid-state storage, it should be just a few milliseconds. In practical terms, applications will expect about 1ms latency.

4. MTBF AND TBW

Mean time between failures (MTBF) is a key reliability metric across most of industry, including IT. For storage devices, this will usually mean the number of powered-on hours it will operate before failure. Failure in the case of storage media will normally mean data recovery and replacement, because drives are not repairable. Storage subsystems such as RAID arrays will have a different MTBF, because drives can be replaced.

A hard drive might have a typical MTBF of 300,000 hours, although newer technologies mean this can range up to 1,200,000 hours or 120 years of operation.

Some manufacturers are moving away from MTBF. Seagate now uses the metric annualised failure rate (AFR), which sets out to predict the percentage of drives that will fail in the field in a given year due to a "supplier cause" (so excluding customer-side issues, such as damage from a power outage).

Solid-state storage systems, with their different physical characteristics, are also measured by endurance. Total terabytes written (TWB) over time sets out the lifespan of a solid-state drive. Drive writes per day (DWPD) is based on how many times the entire drive can be rewritten over its life. Manufacturers will usually state these metrics in their hardware warranties.

Endurance will vary by flash generation. Single-level cell (SLC) SSDs have generally been the most durable, with multi-level cell (MLC), triple-level cell (TLC) and quad-level cell (QLC) packing more activity into smaller cells and trading durability for capacity. However, manufacturing techniques have improved the durability of all flash types through technologies such as enterprise multi-level cell (eMLC) designs.

5. FORM FACTORS AND CONNECTIVITY

Although strictly speaking not performance metrics, storage buyers will need to consider how equipment connects to the host system and shares data.

The typical form factor for laptops, now also common in storage arrays, is the 2.5in SSD, although larger, 3.5in drive bays remain available for HDDs. These drives use Serial ATA (SATA) or, for enterprise applications, SAS interfaces.

M.2 uses a PCI Express Mini Card format to interface with the host hardware. U.2 connectors are more commonly used on 2.5in SSDs, and unlike M.2, they can be hot-swapped.

NVMe is an interface allowing storage, usually Nand flash, to connect to a host's PCIe bus; U.2 devices can also use the NVMe interface. ◾
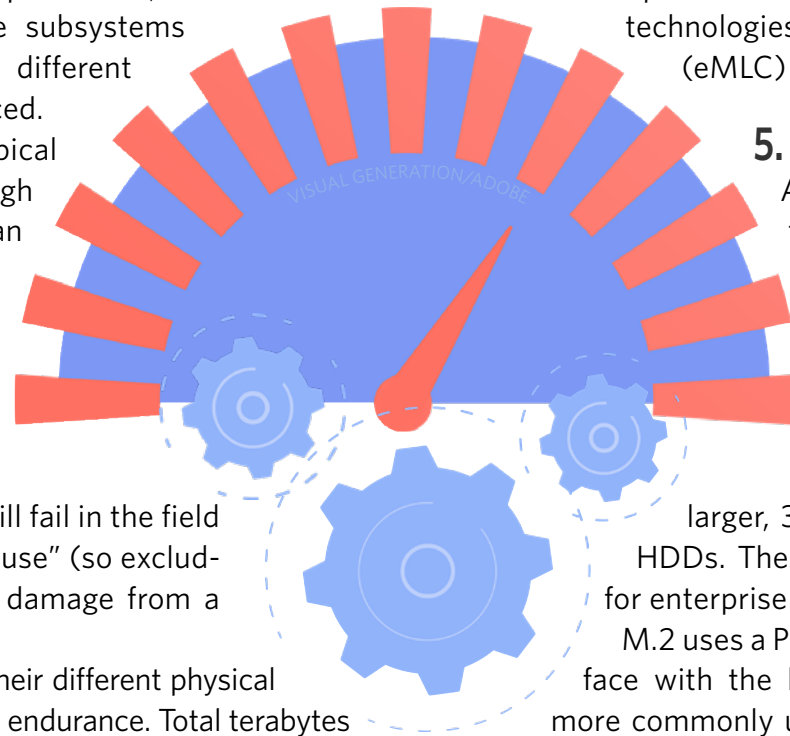
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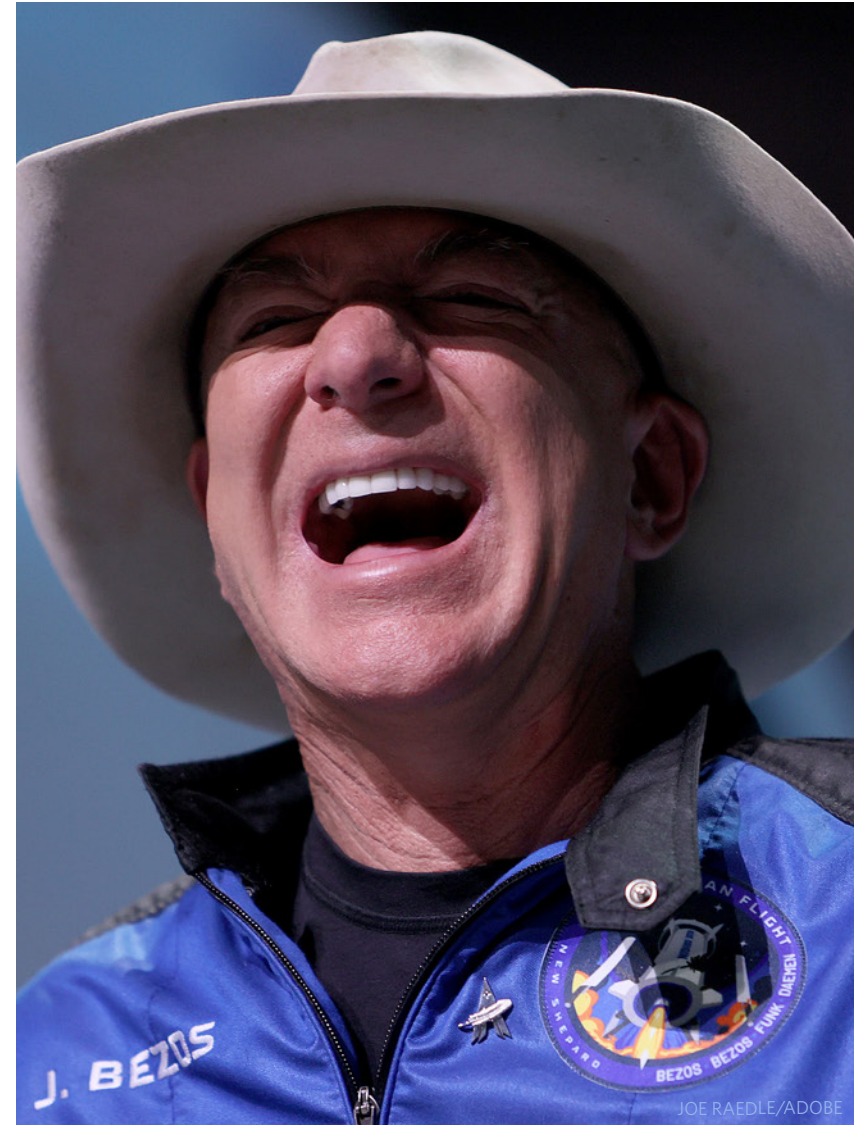
All my exes avoid Texas

Jeff Bezos has [taken his rocket ship, New Shepherd, for its first ride](#). A ragtag team of Bezos, his brother, wee [Wally Funk](#) and the teenage son of a Dutch financier left Earth for 10 minutes and 10 seconds, making the latter two the oldest and youngest to enter space respectively.

The Guinness book of records will also have to log the fact that the Amazon founder's rocket boasts the biggest windows to have ever taken the trip, which we hope has at least resulted in the notoriously tiny-paned Richard Branson feeling inadequate.

There's an indignity in our spacefaring being spearheaded by these cockalorums rather than some noble international committee, especially when they return from gazing out their big windows to let us all know it's made them see how important our own planet is. "When you look at the planet, there are no borders," said Bezos. "It's one planet, and we share it and it's fragile." Deep, bro.

He remembered to thank his employees for being exploited enough to facilitate the unprecedentedly grotesque level of wealth that made this happen, before also giving a special nod to his customers, which turned us into that meme of Marge Simpson hiding her face in shame.

And while all the unbearably trite "taken-the-divorce-well" Twitter sardonicism may be the most numbing thing to come out of this, when you watch Bezos there at that Texas press conference, in his space gear and cowboy hat, we can't deny his ability to test our resistance to using that kind of patter to new limits, and the McWhirter boys would've loved that. ∎

JOE RAEDLE/ADOBE

❯ *Read more on the Downtime blog.*