
Computacenter
FACING
THE FUTURE
TECH TRENDS FOR 2023
OFFICE OF THE CTO

2023 TRENDS

INTRODUCTION

Paul Bray
CTO UK&I

2022 was another one of those years. Volatile and uncertain, seemingly more bad news than good. With the global economy just starting to put the effects of the pandemic behind it, we were hit by a raft of new issues in 2022, no more so than the terrible conflict in Ukraine.

The technology industry continues to transform itself at pace, offering a raft of new opportunities for businesses – whether in the delivery of services to their consumers, or in how they work internally to optimise their processes to be more productive and operationally effective.

Despite the headwinds of 2022, we see it as a year of progress across many of our customer verticals, with ongoing investment in technology being prioritised – particularly in key areas of cyber defence, user experience and network connectivity to cater for the new "hybrid" world of work that we are all coming to terms with.

Given that context, we have drawn on members of our Office of the CTO (OCTO) team in the UK to provide a summary of the past year and some guidance for key topics that will form part of your future planning, or for which you may already be underway with as we enter 2023.

ACROSS OUR TEAM THIS YEAR...

1,400

engagements with our customers across Technology and Solution topics

of which, over

40%

related to "Maturing" category from our Technology Horizons radar

and a further

25%

covered our "Emerging" category...

...showing that as we adapted to a business as normal mode in 2022, strategic planning was firmly on our customers' agenda.

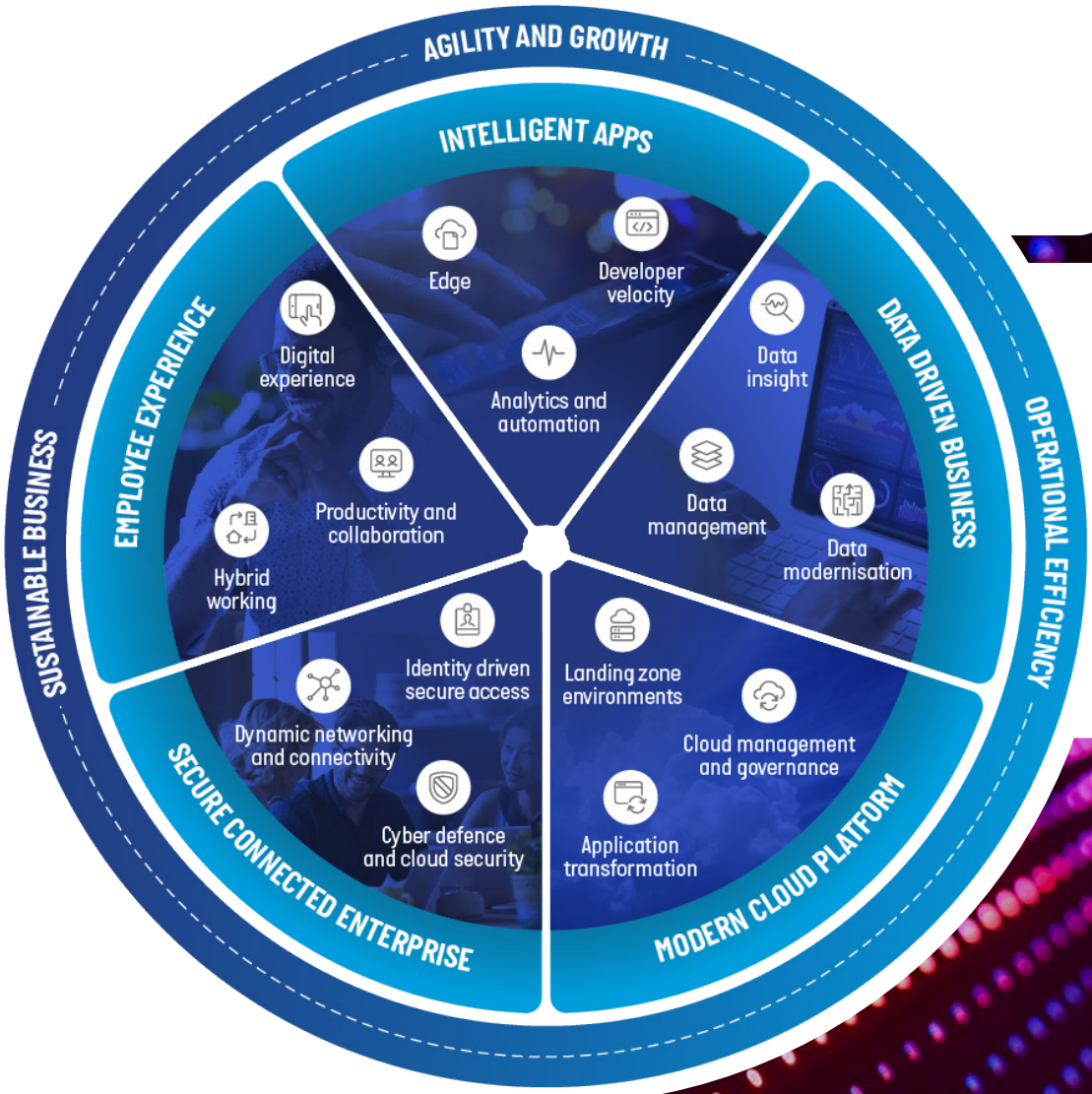
For this paper we picked 5 technology trends aligned to our strategic themes for 2023. We are optimistic about the outlook in 2023, whilst the macro-economic situation will be tough, tech will continue to be an aid and catalyst to progress and growth. Within this we foresee progress delivering future platforms, products and experiences that delight your users, customers, and partners across your entire value chain.

To do this, we are focused on delivering a **Modern Cloud Platform** that embraces the best of on-premises and hyperscaler services in a well-managed and governed way. A **Secure Connected Enterprise** to mitigate the ever-prevalent cyber risks and vulnerabilities, embracing ubiquitous connectivity of people and things with appropriate inherent security controls. Amazing **Employee Experiences** are critical, requiring us to think differently about productivity, collaboration, and engagement in a world of "hybrid work" that appears to be the reality for many organisations.

As you look further forwards to your customers and driving value from your business, it is not just your employees that enable this, but the **Intelligent Apps** and services you deliver from the Edge or the core, and the ability to harness and exploit data to growth in your business through direct revenue opportunities or increased customer advocacy end engagement rates is what the **Data Driven Business** is all about.

Whether you are at the start of your journey for these , we wish you well with them and hope they drive measurable value and success for you. We're always here for you at Computacenter to discuss these topics further and help provide our independent perspective and expertise to enable your success.

Good luck in 2023 and beyond!



TREND 1

Embracing Intelligent Apps and Next Generation Experiences

Neil Cant
Solution Leader

INTERNET OF THE FUTURE

The World Wide Web was conceived on March 12, 1989, by the legendary Tim Berners-Lee. Since then, it has undergone significant evolution from the early static web pages, through to the more dynamic and social content we enjoy today. It is not stopping there, we are now entering the next phase of its evolution, where richer 3D content and more immersive experiences will become prevalent.

So, what will be the future of the Internet? Right now, there is no definitive answer, however "Metaverse" as a concept, and the early scenarios and definitions are starting to be used to describe it.

The Metaverse is still a working concept that will no doubt evolve over the next few years, however early definitions will most likely include the ability for it to be "Interactive, Realtime, 3D, Social and Persistent". It will not be a single digital place, multiple Metaverses will exist bringing together and exploiting technologies such as Augmented and Virtual Reality. But it will not be exclusive to these technologies, it will also be accessible from smartphones and traditional computing devices, allowing a full and inclusive experience.

2023 AND BEYOND

2023 will see an explosion of enterprise focused immersive and mixed reality headsets, digital avatars and connected devices, which will allow businesses to provide richer, more engaging, collaborative, and captivating experiences for their employees. These shifts in technology will be critical to the future of the Internet and how organisations will evolve their existing Web2.0 paradigm and embrace the new Metaverse principles to provide the services and experience we need for the future.

Whilst the Metaverse is still in its infancy, and elements such as interoperability between Metaverses are not yet established, current trends show significant interest and excitement for these more immersive experiences. It could be easy to see this trend as purely transient and one that will disappear in the next few years; however, we believe that the Metaverse, driven by innovation and modern technologies is the next logical evolution of the Internet as we understand it today.

ARTIFICIAL INTELLIGENCE AND THE FUTURE OF WORK

Artificial intelligence (AI) and its impact on our future is not a new conversation, we have all heard about AI for some time now and this technology is becoming more prevalent. There is a good chance you have already encountered AI if you have ever used a smart device at home, they all use AI to answer your questions.

WE BELIEVE THAT THE METAVERSE, DRIVEN BY INNOVATION AND MODERN TECHNOLOGIES IS THE NEXT LOGICAL EVOLUTION OF THE INTERNET AS WE UNDERSTAND IT TODAY. "

There are many upsides to AI, but the big plus to using AI in the workplace is that it will willingly do the repetitive and mundane tasks that no one really wants to do. Making work for employees easier, making us more productive with less effort.

One element of AI activity in 2023 will be around the augmentation of employees. Although AI will inevitably lead to the disappearance of some types of jobs, new ones will emerge to replace them. Forward-looking employers will be looking at capitalising on this impact whilst also supporting those employees that are impacted, through upskilling and role transitions.

AI may automate some jobs out of existence but, in many cases, AI decision-making tools work best when collaborating with, and augmenting, our capabilities. Employees will need to acquire new skills and adapt to the strengths and limits of any AI system with which they are working. The biggest risk will come to organisations that rely on AI systems will be employing sufficient oversight to ensure appropriate judgements and decisions are being made (an innately subjective matter!). Organisations will need to ensure its employees use their new skills to both complement the insights from AI, but also to know their limitations and when the AI recommendation should be ignored or negated.

No major industry will be spared the impact of AI, some sectors are in their infancy of their AI journey, others are already experts in leveraging this technology. But both have a much longer journey ahead. We believe that AI is already impacting and will continue to have a significant effect on the future of work.

INTELLIGENT CONNECTED WORLD

The Intelligent connected world is key to harnessing AI and the Metaverse. It is the underlying network of sensors, devices, and infrastructure that collects the data we need to help build the Metaverse, create Digital Twins, and train AI and intelligent machines. The Internet of Things (IoT) is the very fabric that keeps expanding to include all connected devices we have today. It can be just about any device that we use in our homes, offices, or wear on our body.

There are many ways IoT can impact organisations, one area often referred to is the industrial Metaverse, IoT combined with the Metaverse, and AI has huge implications for the way organisations manufacture goods, provide services, and sell to customers. Smart factories and logistics plants are increasingly automated, and the availability of robotics and smart infrastructure "as-a-service" enable more companies to take advantage of the opportunities this offers. Organisations in 2023 will continue to build smart automation into their business models giving them the ability to benefit from increased efficiency, gaining a data-driven understanding of their operations and processes.

The bridging of the physical world to a virtual world will provide several opportunities for manufacturers, potentially unlocking new revenue streams. Transforming how organisations plan new factories and use these 3D digital twins to simulate business and process change, without the need to impact the physical world at all.

In the near future, in our intelligent connected world, we will be able to experience a truly smart world which integrates systems that were previously operated individually and create powerful new values and opportunities that we have yet to experience.

AI WILL REMAIN ONE OF THE TOP WORKLOADS DRIVING INFRASTRUCTURE DECISIONS THROUGH 2023.

GARTNER PREDICTS THE FUTURE OF AI TECHNOLOGIES, NOVEMBER 2019

TREND 2

Create Engaging Employee Experiences with Low Code Technology

Gwyn Smith
Workplace Technologist

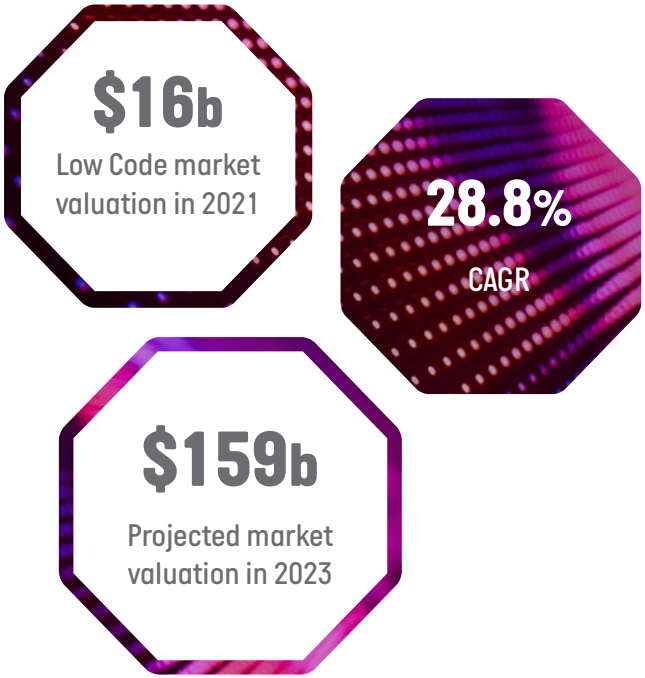
Like many other people, I developed a lockdown hobby. Something to keep me mentally stimulated when things around me were so uncertain, to distract me from what was happening outside, and – in my case – to flex some long unused muscles.

It wasn't sourdough or gardening – it was Low Code Apps. I chose Microsoft's Power Platform. If that sounds like work, well I grant you it is, but it's also a fast, effective, and rewarding way of building apps, automation and reports that can tackle real business problems for an individual, a team or even an entire organisation. Building something that can make your working life easier and deliver better business outcomes is every bit as satisfying as it sounds. I was able to use Low Code to create solutions to improve my own experience at work, and those of my colleagues.

And now in 2022 we see what the analysts think. According to Gartner's Hype Cycle approach Low Code Application Platforms have emerged from the "Trough of Disillusionment", climbed the "Slope of Enlightenment", and raced to the front of the "Plateau of Productivity". For those who are unfamiliar with the Hype Cycle approach, this basically signposts mainstream adoption at scale as the relevance and applicability is proven.

Low Code is a way of addressing a huge shortage in skills, making the business of building real world business solutions accessible to many more people. With Low Code you can build solutions quickly – making it an attractive choice for even Professional Developers. You can literally create your own Employee Experience in the workplace.

Microsoft has shown us their direction of travel too – at Microsoft Ignite this year we've seen new capabilities now starting to appear in Power Platform where you can just use natural language to describe what you want an app or automation to do, and the code essentially writes itself. You can import a photo of a paper form and an app is generated automatically. This makes the entry bar into Power Platform lower than ever and is sure to expand its reach into more and more users. It's big business too. The market valuation for Low Code apps is predicted to have huge growth through the rest of the decade.



Source: Acumen Research & Consulting

So, when the barriers to entry are lower, and usage is projected to increase year on year for the rest of the decade, what should enterprise IT leaders be doing about it?

In 2023 and beyond I think it is increasingly important to make sure that app makers of all types are well supported by the IT department. To make sure that apps are being built to an agreed standard, are working well within the guiderails that are set up within corporate policies, peer networks are developed and nurtured, and help and encouragement is available to those who need it.

5 PIECES OF BEST PRACTICE...

for IT departments that we have identified as you embark on your Low Code journey at scale.

1. Ensure you are up to speed on the use of Low Code technologies within their corporate environment, identifying any "Shadow IT" type usage.
2. Take the lead in creating policies that guide app makers to use good practice in line with corporate standards.
3. Implement tools to help them discover, manage, and govern apps and data across the business – like Microsoft's own Centre of Excellence toolkit.
4. Proactively encourage makers to connect with each other by hosting events like hackathons and champions meetings.
5. Support and enable Pro Devs and Citizen Developers working together ("Fusion Teams") to build better solutions at pace.

Low Code has proven its worth, is becoming easier to get into than ever, and it's here to stay. Business Users can create their own solutions to enhance their experience, and they're very well placed to do so given they understand intimately the business processes that need to be improved.

Even the Pro Devs are getting on board as they find they can build solutions faster, with better outcomes, less stress, and satisfied users. And there's plenty of ways for them to extend the platform using their existing knowledge with API integrations, webhooks and plug-ins.

Let's take it, embrace it, and allow makers of all types to solve business problems and create amazing experiences – and support them on their journey.

TREND 3

Delivering the Networking and Security Solutions required of the Modern Cloud Platform

Mark Prior
Solution Leader

There are many reports that speak about Multi-cloud in the enterprise, and we can clearly see the reality of that from our customer interactions. Multi-cloud (including hybrid-cloud) adoption is real for many of our customers and has happened in various ways, ranging from a thorough and well considered strategy at one end of the spectrum, through to tactical implementation driven by business line needs for specific services at the other end.

The idea of designing for Multi-cloud even with a single cloud strategy is starting to take shape, with many organisations concerned about Cloud Service Provider (CSP) lock-in, business continuity or the impact of strategic business events such as merger or acquisition forcing them into the adoption of multiple clouds. In some industries regulatory bodies are asking for businesses to have a Multi-cloud strategy as a means of risk mitigation and business continuity.

Regardless of the reason for Multi-cloud adoption the complexity inherent with such an architecture is clear and can be described in both operational and business terms. The diagram below illustrates these challenges.

MULTIPLE CLOUDS - BUSINESS CHALLENGES

Application mobility

Ensuring connectivity provides the best user experience

Securing the end-to-end without impacting velocity

Effective troubleshooting to maximise application availability

Minimising service time to value through automation

Minimising costs and avoiding lock-in

> **NETWORK AND CLOUD STRATEGISTS WOULD DO WELL IN 2023 TO START INVESTIGATING THESE TECHNOLOGIES TO UNDERSTAND ALL THE VALUE THEY COULD BRING."**

In a single cloud architecture, there is reason to focus on using native cloud services. They are easy to deploy and consume, and in the truest sense are 'born in the cloud'. So long as they are good enough then they are probably the best option.

In a multi-cloud environment however the challenge of only deploying native cloud services is that you are consuming different services to achieve the same outcome, as well as dealing with different architectural and operational best practices, and this then becomes a significant overhead. Imagine if you were to deploy different technologies to perform the same functions across multiple on-premises data centers. At best the cost overhead of managing disparate technologies would be an issue, at worst the stability and security risks posed could be catastrophic.

In addition, you are now adding technology to connect to, between and within clouds, which in turn creates end-to-end visibility challenges and new complexity to deal with. One way of tackling these challenges is by looking to centralise operations through a targeted set of independent tools and solutions. There has been significant development of solutions that address the multi-cloud problem challenge, that we would describe as 'born for the multi-cloud', that need to be carefully assessed and factored into a new operating model for multi-cloud management. Through the adoption of a centralised multi-cloud management operating model, organisations can gain significant benefits:

- Consistency and abstraction simplifying management, automation and improving mobility
- Innovation and enhanced capabilities improving functionality, security, and visibility
- Less dependence on native cloud services while not necessarily reducing the use of them

This streamlining of operations and automation in turn improves:

- User and customer experience
- Services stability
- Application deployment velocity
- Infrastructure and services scale out
- Cloud independence
- Cost efficiency

As highlighted, there are now many solutions that can contribute to the optimisation of a multi-cloud environment, but here we are going to briefly discuss what Gartner calls Multi-cloud Networking Software (MCNS).

There are several solutions on the market that could be categorised as MCNS, some are because of successful on-premises and private cloud partners pivoting their solutions, and some are targeted 'born for the multi-cloud' solutions from new vendors.

All MCNS solutions are attempting to tackle the same set of challenges derived from the complexity of a multi-cloud environment:

- Improving efficiency of network connectivity between multiple clouds, both public and private, and between multiple public cloud regions.
- The imperative to ensure security policy is consistently and effectively applied between applications and across clouds.
- Providing clear visibility and analysis of the end-to-end topology, network paths and application traffic flows to ensure service and application uptime is maximised.
- Simplifying automation to speed up delivery of those services and applications.

The Secure MCNS Survey Report from Futurium describes multi-cloud and hybrid-cloud networking as the third wave of networking (the first being client/server and the second being data center networking). The third wave takes cloud networking into multi-cloud and hybrid-cloud environments While MCNS solutions are attempting to solve the challenges of multi-cloud in a software defined, abstracted and automated way, the technologies themselves vary significantly in their approach and the capabilities they offer, aligning to many different use cases.

Network and cloud strategists would do well in 2023 to start investigating these technologies to understand all the value they could bring to both single and multi-cloud architectures. Given that for the most part deployment will be into existing environments time will be required for proof of concept, pilot and production testing, and deployment stages, as well as a focus on the operating model changes a centralised approach to deploying services will require.

TREND 4

Delivering the Data Driven Business

Darren Franklin
Solution Leader

When writing a paper on the likely trends for data in 2023, I can be certain of four things without even reaching for my crystal ball.

1. **There will be more of it**
Regardless of the sector or vertical, the amount of data being created and stored is growing and shows no signs of slowing down anytime soon.

2. **It will be placed in increasingly more diverse locations and consumed by more platforms, and applications**
From edge to core to cloud(s), the platform and application landscape continues to evolve and grow.

3. **The consumers will expect more of it**
Be it through advanced analytics, the ability to look at data from across business units or the ability to be consumed from less IT literate communities.

4. **The business will be expecting it to be stored more efficiently, cost effectively and securely**
Having all this data is great but if you can't control, secure or manage it, or it's costing you more to keep it than it's worth, then what's the point?

So, with that in mind, it's fair to say that I see the trends in data for the next year seeking to address some of those challenges.

The ability to provide data more effectively across the entire workforce is likely to rank highly on the 2023 agenda. Enterprise data manipulation and presentation has long been to domain of a select few data engineers or scientists that sit in darkened rooms producing models to benefit specific use cases within the business. Whilst this will undoubtedly continue to be the case, we will also see data being made available to staff working closer to the end customer. Real-time data access providing recommendations on recent purchase history and the added benefit of cross-sell or up-sell is one common use case, but this level of access given to the team closest to the customer has benefits that could be applied across verticals.

The term Data Democratisation has been floating around for many years, but we have still yet to fully contextualise this in terms of what it means, much less realise its full potential. Many businesses have increased their awareness on the importance of Data Literacy which is prompting questions like "What is the quality of this?" "How do we make decisions from that?". As business cultures swing and mature their data literacy, we see typical users taking accountability for building their own insights.

This swing is a huge driving factor behind data democratisation and data fabric trends. Equally, as businesses become data literate, they naturally desire to develop meaningful data strategies enabling them to mitigate any risks to the value, efficiency, and effectiveness of their data. In short more companies are seeing data as a product, or even a commodity.

This level of democratised data access naturally starts the conversation about the Edge and I expect to see an increase in this over the coming year.

As a consequence of increasing data access across the workforce companies will need to provide a robust means of accessing and collecting data at the Edge. The use cases for consuming and creating Edge-based data are almost as vast as the potential problems it can cause if an organisation is not set up correctly to manage this type of data gathering activity. The needs of a retail worker are significantly different from those of an oil refinery worker, the former is expecting to be provided with historic data about customers buying habits, whilst the latter is reliant on real time data from localised sensors to make critical and immediate decisions. Both need the local compute power and data storage capability to ensure accurate results.

5G is going to be an enabler in this space with the ability to reduce infrastructure costs whilst still providing the speed of access required. There will still be those use cases and customers that will need to house the bulk of their data centrally, which will mean uplifts in network infrastructure capability, but the cost and development benefits of operationalising the Edge for data and compute may well see these needs reducing.

Given some of the current analyst figures around conservative customer adoption rates and the expected growth over the next year or so, I would expect to see increased adoption for both development and production analytical use cases. The benefits of using cloud data services for large analytical workloads are significant, reducing data center infrastructure CAPEX with OPEX, creating flexibility for burst workloads, and removing data center assets could be seen as a real boost to any corporate sustainability activities.

Playing devil's advocate for a moment though. The need to abstract data from a cloud proprietary service or technology is becoming high on customers agenda. Avoiding vendor lock-in is still a challenge outside of traditional IT technology and the cloud in this instance is just another vendor who has technology to market. With Multicloud or at least multiple clouds being the norm for most enterprises, this need for cloud abstraction or data mobility is likely to be a major priority in the coming year.

And finally, I would like to spend a little time discussing the topic of Data Management, or lack of it. There are so many definitions and opinions about the right and wrong way to address this topic that it is diluting the important message of getting it right.

When using the lens of DAMA, they define data management as "Data Management is the development, execution, and supervision of plans, policies, programs, and practices that deliver, control, protect, and enhance the value of data and information assets throughout their lifecycles." It is worth keeping this front of mind when designing new services or understanding what data use cases are driving growth, as without the ability to manage appropriately we are walking into the unknown. Data Management should be to the fore, like the "secure by design" mantra that many companies work by.

Appropriate Data Management by design, but in doing so, understanding what the end goal is, management is not the end goal, it's a by-product that helps create a tangible asset that is core to today's data driven business.

TREND 5

Secure Connectivity for the 'New' Enterprise

Paul Norman
Chief Architect

VPN technologies have been the de facto solution to allow remote connectivity to business applications and data for decades. It's a neat solution, customers typically have all their apps and data hosted and protected within their data centers protected by a perimeter of security products. VPNs create a secure tunnel across the internet into the corporate network allowing users to access resources hosted within. You authenticate once on connection and then you are trusted to move around the corporate network as if you were connected locally.

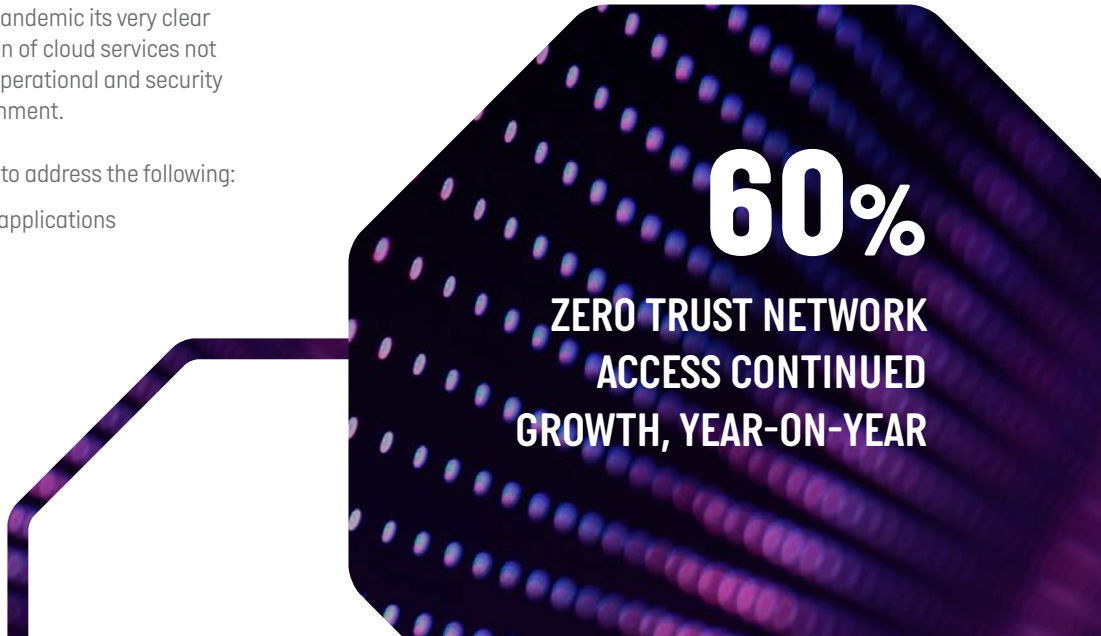
The strategic trend towards mobile workforce enablement and the move to cloud has been greatly accelerated by the pandemic. This has resulted in customer apps and data being distributed across a mix of SAAS solutions (e.g., Microsoft 365), hyper-scale cloud providers (e.g., Microsoft Azure, Google and AWS) and their own private data centers. The pandemic necessitated enterprises to move quickly, many of which had to adapt and scale the on-premises networking solutions and amend their security posture to allow the business to continue to function.

Now the dust has settled, and customers are settling back into a "normal" set of working practices post pandemic its very clear there is a trend towards more consumption of cloud services not just for business apps and data but also operational and security controls of the end user workplace environment.

This is seeing enterprises actively looking to address the following:

- Provide efficient secure user access to applications wherever they are
- Remove unsecured split tunnelling
- Reduce the 'hair-pinning' of traffic through the on-premises data centers to eliminate bottlenecks and bandwidth constraints
- Reduce reliance to on-premise resources such as on-premise security controls
- Increase user experience through transparent security and better network performance
- Increase end-to-end visibility from the user to the resource being accessed
- Consolidate tooling
- Reduce operational and security risk

The above points are all common goals for many customers that had to adapt quickly during the pandemic and are now struggling with the scalability and security constraints of traditional network controls such as VPN.



Security Services Edge (SSE) solutions address these problem areas by allowing remote users to securely access corporate services directly over the public internet without being forced through the customers on-premises data center, increasing user experience and security in the process.

SSE solutions typically an integration of several technologies including **Zero Trust Network Access (ZTNA)**, for accessing private applications; Secure Web Gateways (SWG) for securing Internet access; Cloud Access Security Brokers (CASB) for securing SaaS and cloud app access, and Firewall as a Service (FWaaS). Customers may already have one of more of these provided by different vendors that have previously specialised in these fields. SSE is an integration of these technologies into a single vendor delivered solution.

2023 will see more customers who have a cloud first strategy move away from VPN and implement ZTNA and SWG technologies to address scalability, user experience and security concerns. ZTNA has continued to grow 60% year on year and increasingly toward an SSE agent-based architecture. While these new customers may not implement the full SSE stack straight away its expected that customers will prefer vendors that have a full SSE capability with 80% of customers adopting this technology by 2025.

WHAT IS SSE?

Security Services Edge (SSE) is a collection of integrated, cloud-centric security capabilities that facilitates safe access to websites, Software-as-a-Service (SaaS) applications and private applications

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WHAT IS ZTNA?

Zero Trust Network Access (ZTNA) is a product or service that creates an identity- and context-based, logical access boundary around an application or set of applications.

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SUMMARY

Paul Bray
CTO UK&I

The 5 trends chosen offer a glimpse to the priorities of our customers in the coming year, and where we will be focussing some of our attention and investment activities. But, change is happening across the entire technology landscape, covering areas that we've chosen not to focus on this time.

The recurrent themes of the paper speak to a required transformation of operating models and practices to embrace the opportunities of new technology – whether that is exploiting the Low Code revolution, preparing yourself for a multi-cloud reality, or very simply doing all that you can do to remain secure in the face of ever prevalent cyber risks and threats.

There are also a range of business issues that are driving the technology agenda. Sustainability as part of the wider ESG framework continues to be a business-critical imperative. With the conclusion of COP27 recently, continued focus is required on delivering the decarbonisation agenda, with many organisations focussed on delivering robust science backed plans to support their own activities in this area.

The impact of global political uncertainty and tensions are having an influence on business thinking. At a global trade level, we are seeing a shift in stance from globalisation towards more nationalistic tendencies, impacting not only businesses market opportunities but their supply chain and technology delivery models – such as the continued references to "cloud lock-in" cited throughout this paper.

Nonetheless, in the face of a challenging and uncertain world, we remain optimistic that technology is one of the keys to unlock the challenges you may face. Regardless of your role in IT or business, working together and collaborating on key initiatives that drive business value is a vital ingredient for success!

"Working together and collaborating on key initiatives that drive business value is a vital ingredient for success!"

Office of the CTO

The Office of the CTO (OCTO) team leads in the exploration and application of technology products and delivery methodology to aid the digital transformation of our customers.

As a team of cross-functional technologists with extensive industry and IT experience we deliver thought leadership, advice and real-world implementation experience to help our customers achieve their goals.

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