Employees now have many routes to gain access to their employer's IT. In this 13-page buyer’s guide, Computer Weekly looks at how to orchestrate the variety of devices in use, how to achieve efficient workforce mobility, and the pressure on operating systems caused by cross-platform access.
You may not have noticed, but the much-talked-about death of the PC has happened, at least in some respects.

The traditional desktop PC was a pretty self-contained device – compute power, storage, user interaction, operating system and applications all in one box for one user. Eventually it was added to the network and then shrunk in size so that it became portable – and that’s when the fun started.

Once a reliable, universal network is in place, things can be moved. This is not just about the mobility of the device and user, but pretty much any part of the entire IT system – storage, compute power, apps. Virtualise them and deliver them when required over the network, making it easier to access, manage and secure – from a server, in the cloud, anywhere.

No longer is there the relative certainty of lots of devices, from desktop to laptop, all running pretty much the same operating system and able to be managed as a homogenous group. What has to be relied upon now is the network and structuring control over that, despite the variety underneath.

**Network Computing**

Some of this variety looks pretty familiar. Without many external changes to the physical hardware, some of the complexity of personal computers can be removed and pushed into servers on the network. In the 1990s, this was called “network computing”.

Although it took a little longer for many to feel comfortable that the capability could be delivered over a network, it thrives in several forms today, especially as the capabilities and acceptance of cloud computing have grown.
The “fat” client of the fully-loaded PC morphed into “thin” clients and now “zero” clients, with longstanding PC giants such as HP (with its thin clients now in the new HP Inc part of the split company) and Dell (through its Wyse acquisition in 2012) recognising the shift, as well as network giants such as Google with its Chromebooks, and so on. The operational foundation is no longer a “disk operating system” or even Windows, but a variety of lightweight and simplified bootstraps to connect to services over a network. Essentially, the goal is to deliver an IT service (usable applications) to the user from a central point. Despite the huge appetite for mobile, for many this still means to the user of a desktop.

**VIRTUAL INFRASTRUCTURE**

The virtual infrastructure to deliver usable applications to the desktop, virtual desktop infrastructure (VDI), has its roots in the work done by Citrix from the earliest days of network computing. A datacentre stacked with server and storage capacity can be managed centrally with up-to-date, patched and properly set-up applications delivered to client devices. These, in turn, can be stripped of unnecessary capabilities to reduce cost and unrequired connectivity to remove security vulnerabilities.

From the user’s point of view, their tailored working environment can be delivered to whichever desk they happen to sit at, and on whatever underlying device they use. Company-supplied, bring your own device (BYOD), PC, Mac, Linux and even tablets – with appropriately configured VDI, it should not really matter.

There are challenges, and tweaks are required. Software licensing costs need to be checked, networks do not always have enough capacity – home use on the end of a slow 2Mbps broadband might be problematic – and many employees have a complex mix of enterprise applications that they need to access. The VDI proposition works best for delivering regular knowledge workers a set of “office” tools wherever they need to access them.

Citrix is still a major player, and has been joined, inevitably, by Microsoft VDI and VMware, through its acquisition of Thinstall in 2008 and Desktop in 2013, as well as others. Citrix, through its XenDesktop and XenApp, has targeted enterprise customers, but it tried for a while to deliver a VDI-in-a-box offering aimed at small businesses, although this did not prove a significant breakthrough. The fact that Citrix, with all its experience and knowledge in this area, struggled, is an indication that VDI is applied more easily to larger enterprises than SMEs.

**DESKTOP AS A SERVICE**

This may be changing. Now the model extends beyond the enterprise to cloud-based desktop as a service (DaaS). Amazon launched its WorkSpaces DaaS in 2014 and, recognising the challenges of network capacity, licensed the Teradici PCoIP protocol to compress and encrypt network traffic, and used its own Streaming Experience (SDX) protocol to reduce network chatter.

Innovative VDI specialists are also emerging and building on the DaaS proposition, such as Workspot or VDIworks, which are
using the cloud to simplify the challenging aspects of VDI, such as storage, load balancing and performance monitoring. Other long-established suppliers with cloud competence, such as Cisco, Oracle, Dell and HP, have recognised the potential of DaaS as users increasingly demand flexibility to choose their own points of access and shift between them.

Nowhere is this more apparent than in the increasing use of mobile devices to access enterprise IT. Laptops rapidly grew from the tool of the select travelling few to the desktop replacements for many – at work, then at home – and hand-held personal digital assistants (PDAs), then smartphones took over people’s pockets. But the real shift came with tablets and the mobile phone’s bigger cousin, the phablet.

**Convenience and ease of use**

They may not be quite the size of the desktop or laptop experience that most enterprise users like, but the convenience and ease of use and access mean these devices must be served.

One way is to treat them as an extension of the VDI model, but the use of open, public and domestic networks – cellular or Wi-Fi – brings more security challenges and these need to be addressed with secure working environments. Once upon a time, the physical perimeter held back threats, but now the mobile client is outside in the wild and needs protection.

**The use of open, public and domestic networks brings more security challenges and these need to be addressed**

VDI suppliers, on the whole, recognise the importance of improving and securing the mobile experience. VMware’s Blast Extreme protocol is designed to improve the experience of the widest range of clients and has a low impact on mobile client battery life, making video and VDI less daunting. Meanwhile, Citrix makes life easier for mobile Apple users needing access to mouse-driven Windows desktop apps on their touchscreen iPads and iPhones.

Others are focusing on delivering and projecting a controlled, contained secure workspace onto any, and in particular mobile, clients that may be personal rather than corporate controlled devices. Check Point’s Capsule Workspace and Workspot’s Workspace offer seamless secure access to corporate resources and business applications, keeping business data safe and separate from personal data and applications.

**Secure self-service portal**

Numecent has taken a different approach with its Cloudpaging technology. Here, applications are held centrally and made available to any device via a secure self-service portal. The application is then streamed down to the user’s device in a special, highly compressed form, in which it uses local resources to provide a better user experience in a secured environment.

Mobility is now a key driver in influencing organisational IT strategy. The need to make applications work well in mobile
IT access devices require careful orchestration. Options for access to IT have soared, and organisations must strike a balance. Just as previous generations of developers found that “internet-enabling” applications required more than simply dropping everything into a web browser, so mobile application developers realise that architectures need to change.

**Complex tug-of-war**

The has led to a complex tug-of-war between conflicting approaches. For example, native apps may get the best functionality and performance, but need porting across each different base device to support all the different mobile operating system variants. Browser-based approaches using HTML5 may be faster and simpler, but may have to compromise on overall functionality. The emerging reality is that a hybrid approach is proving the most pragmatic.

Mobile app development platforms (MADPs) such as those from Kony, Pegasystems, Appcelerator, OutSystems and IBM, can take much of the pain away, and typically allow developers to build applications with a mobile focus. Where such tools really help, though, is in providing the ability for the app be used anywhere – essentially omnichannel.

For many, such apps will be targeted outside of the organisation to extend the enterprise IT access to encompass customers and the supply chain. However, as new employee-focused applications are developed, these too will need to be implemented as multi-platform to meet employees’ needs.

The desktop PC may not be entirely obsolete as a device, but the options for access to IT have soared and splintered into many different device types and form factors. User preferences and demand, driven by their acceptance and familiarity of technology as consumers, means enterprises face many difficult balancing acts – flexibility versus control, choice versus standardisation, predictability versus uncertainty.

A pragmatic approach is called for that shifts the emphasis from hardware and operating system application programming interfaces (APIs) and onto service delivery and omnichannel applications.

Organisations will need to gain a better understanding of the application profiles in use by different roles, so they can look at common areas for applications to be delivered as a service. They need to assess realistically how much they can deliver or develop in-house and how much requires external service provider and app development support.

Client access device management has become much more about orchestration and a balancing act and less the predictable form of control prevalent in the heyday of the PC.

Rob Bamforth is a principal analyst at Quocirca.
Unified workspaces are the convergence of two winding roads. This journey began decades ago, with the introduction of PCs in the enterprise, and, for many years, the way forward seemed clear. Work was performed at work locations, using work machines and applications, constituting a person’s “workspace”. Categories of enterprise technology were born and matured. IT teams settled into a known cadence, and, perhaps in some instances, grew complacent.

Then the smartphone arrived, mobility exploded and a new path was discovered. As mobility gained enterprise traction, many new questions surfaced: Are personal devices also work devices? Are these new form factors here to stay? Is work somewhere we go, or is it something we do? Categories of technology that were thought to be entrenched were quickly rendered obsolete. With shocking speed, established suppliers withered and new ones rose to take their place.

Users no longer see mobile as unique – it is simply expected that the present device is the device on which they work. IT has a responsibility to remove the barriers to mobility by providing applications and data irrespective of form factor and operating system. In addition, data security measures must incorporate intelligent protection that restricts access to information to only those users, locations, devices and timeframes that adhere to business and IT policy.

To remove barriers to workforce mobility, CIOs need to deliver the right applications and information to the right user, on the right devices, at the right time and location.

Andrew Garver reports
Unified workspaces are exactly this: the right applications and information delivered to the right user, on the right devices, at the right time and location. Unified workspaces are not all applications to all devices all the time. Contextual provisioning forms the backbone of unified workspaces and spans devices, management layers, applications, identity services and back-end systems.

**Mapping out the options**

For their part, CIOs should strive to understand how unified workspaces expand IT’s original mobility efforts and influence roadmap planning. The technologies that enable unified workspaces build on many platforms employed in businesses today. This includes familiar terms such as client management tools, enterprise mobile management tools, identity and access management platforms, application presentation via server-based computing and server-based remote desktops.

The key lies in understanding what is appropriate for each business capability in each scenario. One possibility uses public cloud app hosting, cloud identity, mobile apps and enterprise mobile management tools for a mobile device capability. Yet the path of a back-end server, on-premise identity, web app and a client management tool is equally valid for mapping a similar capability on a different device, such as a corporate laptop.

A single application may even map differently depending on form factor or other contextual attributes. For instance, a productivity suite may use an on-premise identity for corporate devices, yet use a cloud identity for bring-your-own-device options. A web app may be the user interface for unmanaged desktops, whereas a native app is provided for managed endpoints.

IT has flexibility to mould the strategy to fit the organisation’s infrastructure and application landscape. This will be a wide range of technologies at first, but as the landscape changes, the organisation’s map will also change, favouring more consolidated platforms over time.

**The role of the aggregator**

Workspace aggregators sit on top of endpoint management tools – and, in some cases, absorb them. They unify the presentation, delivery, monitoring, configuration and portability of access to apps and content. Often, they provide a portal-like experience for accessing, installing and launching apps and content.

Strictly speaking, workspace aggregators are not necessary to achieve unified workspaces. Context, personalisation and automation can be unified through consistent configuration across management and application layers. However, many organisations will find an accelerated time to value in
the employment of these tools. Gartner anticipates that by 2017, 25% of organisations that need to deliver Windows applications to multiple devices will use a workspace aggregator.

**FOCUS ON USER REQUIREMENTS**

User centricity is a delicate art whose aim is to maximise productivity through the benefits of user choice while balancing risk mitigation requirements. The disciplines of user centricity will lead to the correct identification of the numerous variables in workspaces. The exercises necessary to intimately understand user needs will comprise the majority of these efforts.

Though user centricity places central focus on the user, it does not imply that users will receive everything they want. This may still be a choice between a fixed number of options. User-centric elements should be applied to unified workspace design, with productivity packages that mix and match form factors, ownership models and connectivity options to enable users to choose a package that matches their work style while adhering to an acceptable per-user cost model.

IT teams must ensure an acceptable user experience (UX) for both short-term and long-term approaches. This may result in multiple user interfaces, each respectful of a form factor, for a single application.

Contextual provisioning is the secret ingredient of unified workspaces. As each user is presented with an increasing number of endpoints, it becomes necessary to thoughtfully provide only the
IT access devices require careful orchestration

Options for access to IT have soared, and organisations must strike a balance.

Navigate to unified workspace success

To remove barriers to workforce mobility, CIOs need to deliver the right applications and information.

Windows cracks under data access demands

Operating system struggles as workers demand cross-platform access to corporate data.

Applications and data that are appropriate for their current context. Failure to do so increases the risk of user confusion, dissatisfaction, policy circumvention and platform abandonment.

Organisations that have invested heavily in mobility will be able to leverage the groundwork already laid. IT should assemble and prioritise conversions and migrations to build the short-term and long-term roadmap towards unified workspaces. This dual approach ensures user benefits are realised early in the journey, while minimising the risk of stagnation. At the same time, respecting the links between form factors, the user interface and user experience will ensure the IT department avoids wasting valuable time and resources, creating a poor UX that will quickly be abandoned.

Consumer-grade apps and services are not somehow “different” to the user. They are IT’s competition, and to ignore them is to lose to them.

This is an edited excerpt from Gartner’s “Unified workspaces: The convergence of the mobile and end-user computing journey” report. Andrew Garver is a research director at Gartner.
The enterprise workforce now has more choice than ever when it comes to endpoint devices, with smartphones and tablets, as well as the more traditional PC and Mac, all deployed in many organisations. This shift means that Windows, once the predominant business platform, may be losing its importance as the gateway to corporate applications and data.

Not too long ago, worker access to corporate data meant running Windows applications, and by extension, using a Windows PC or laptop. Nowadays, many employees can access their customer relationship management (CRM) system and transact sales from an iPhone, or update spreadsheets from an iPad, and many other functions that previously could only be performed on a PC.

This doesn’t mean the PC is dead, a point that Forrester Research made explicit in a report earlier this year. “Traditional PC hardware and PC-based software remain priorities; the PC isn’t dead,” it stated. “But mobile devices and apps are rising in importance, and providing workers with flexibility and supporting customer service – on both company and consumer-owned devices – are now key IT disciplines.”

Other options available
This has led to many enterprise applications being made accessible via platforms other than Windows. In some cases, this has been accomplished by offering native versions of client software for platforms such as Android and iOS, as Microsoft has done with its Office mobile apps, while firms such as SAP have offered developer tools that enable mobile software to connect into their applications.
Microsoft also tried to move towards a more cross-platform model in Windows 10 by enabling so-called Universal Windows Platform (UWP) apps, with the intention that these would run across PCs, laptops, Windows tablets and Windows smartphones. However, that vision was hampered by the fact that Windows Phone accounts for just a tiny percentage of the overall smartphone market, with most users preferring an iPhone or Android device. In recognition of this, Microsoft has switched to developing iOS and Android versions of its apps that link to Office 365.

Another factor is the continued growth in cloud services, specifically cloud-based software-as-a-service (SaaS) applications that are accessed via a web browser. Business applications such as CRM and enterprise resource planning (ERP) have long been delivered this way, but more are following, notably Microsoft with its Office 365 suite of productivity tools and Google Apps (now rebranded G Suite).

With this approach, the browser becomes the client rather than the device or its operating system, and this has been given a boost with the emergence of standards such as HTML5 that enable web developers to create more dynamic and interactive applications, and customise the interface for different devices by serving up a mobile-friendly version of the page to smartphones or tablets.

The increasing sophistication of web-based apps also led to the introduction of the Chromebook, a laptop platform based on a lightweight operating system from Google that is focused around the browser and Google’s cloud-based services, including Google Apps and automatic backing up of user data to the cloud.

These have been gradually finding a home in many organisations as a low-cost business client for employees that primarily work with documents and SaaS applications, with a range of models now available from suppliers such as Toshiba and HP, as well as Acer and Asus.

Providing virtual desktops
Meanwhile, another approach that organisations have been turning to for cross-platform access to applications is to provide virtual desktops, or to present the user interface of a Windows application on an endpoint device. In both instances, the application is actually running on a Windows server in the corporate datacentre or in the cloud, and the user interacts with this using their device as a remote display.

This is technology first pioneered by Citrix long ago, but which has seen something of a revival since the bring-your-own-device (BYOD) trend saw employees start to bring iPads into the workplace and demand access to corporate applications with them.

Delivering access to applications this way has some advantages. It enables users to access standard Windows applications such as Microsoft’s Office suite via non-Windows devices including Apple or Android tablets. Also, because the application is hosted on a central server, no data is stored on the endpoint device, which means that if a tablet should be lost or stolen, the data remains secure.

However, the downside of a remote desktop strategy is that it often calls for a significant amount of infrastructure to support it, especially if organisations choose to provide a full
virtual desktop instance to users rather than simply virtualising individual applications.

Another drawback is that it requires a constant network connection between the endpoint and server, which may be fine for on-campus working over Wi-Fi, but impractical for travelling sales staff, for example.

In addition, licensing costs have often made the server-hosted desktop approach prohibitive for all but the largest organisations.

**Parallels Remote Application Server**

One company seeking to change this is Parallels, which acquired 2X Software in 2015 for its remote desktop services technology. It used this to deliver its Remote Application Server (RAS) product, which is based around a simple subscription-based annual licence that starts at £66.66 per user.

Parallels customer Enterprise South Liverpool Academy (ESLA), a secondary and sixth form school, saw this as an ideal way to provide IT services to students and teaching staff both on-site and in their homes, without over-stretching their budget.

“We wanted to bring technology into the classroom, and we knew we were going to have to go for quite a mobile solution, because the days of a fixed classroom, the big fixed computer suites, have gone,” says ESLA head of ICT Chris Little.

“So we were looking at independent learning, enabling a lot of use of iPads and tablets and things like that.

“We decided to get a robust Wi-Fi solution, and we wanted a good virtualisation system that we could use to deliver apps to students on their own devices or school devices, and for staff to be able to access it from outside of school.
after hours. We looked at quite a few solutions brought to us by Capita, including the usual big names like VMware, and then we were demonstrated the RAS system, which was considerably better value for money,” says Little.

So far, ESLA’s RAS deployment has been largely trouble-free, according to Little, with few issues reported by users when accessing server-hosted applications over a Wi-Fi connection or remotely via the internet.

On the device side, Parallels has used some features from its Parallels Access product to give Windows apps a native look and feel when accessed on an iPad or Android tablet, such as support for touch input and gestures like pinch-to-zoom, making them easier to use.

Similar capabilities are offered by VMware’s Horizon platform and Citrix’s XenDesktop, which are targeted more at larger organisations. Horizon, for example, is designed to run on top of VMware’s vSphere platform, which many enterprises will already have deployed in their infrastructure.

**Windows not going away**

However, this growing interest in cross-platform access to applications should not imply that Windows or PCs are going away any time soon. While it is possible to perform many tasks on devices such as tablets and smartphones, running demanding tasks or having many applications running simultaneously is still best served by the power of a PC or Mac and a large screen.

Also, the decline in PC shipments does not necessarily mean they are being replaced by devices such as tablets. In many cases, factors such as the greater reliability of modern PCs enables organisations to renew them less frequently, while workers are making use of tablets and smartphones alongside their PC or Mac instead of replacing it.

**Every industry is different**

“We must remember, when looking at the commercial PC market, that the decline in sales is not totally hardwired to the growth in smartphone and tablet sales. Most employees in the ‘knowledge worker’ category have one of each,” says Richard Edwards, principal analyst for enterprise ICT at Ovum.

“Every industry is different, each having a different mix of role types, application types and activities that need to be undertaken.

Today’s computing landscape provides choice that extends in both reach and range to meet these different needs, and that’s what matters.”