

# Hype Cycle for Digital Workplace Infrastructure and Operations, 2020

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Infrastructure and operations leaders should use this Hype Cycle to understand the relative market maturity levels of user and team devices, evolving endpoint management tooling, and technologies and scenarios for wearables in the enterprise.

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## Analysis

### What You Need to Know

The 2020 Hype Cycle for Digital Workplace Infrastructure and Operations (DWI&O) combines and replaces the “Hype Cycle for Mobile, Endpoint and Enterprise Wearable Computing” and the “Hype Cycle for Unified Workspaces.” The latter Hype Cycle was a more focused look at a subset of DWI&O technologies, and we decided that, due to the large amount of information being produced and the challenges posed for organizations by the COVID-19 crisis, the information would be easier for DWI&O leaders to consume if it were condensed into a single Hype Cycle with other DWI&O innovation points.

Although this necessarily results in the removal of some innovation points from the combined Hype Cycle, DWI&O leaders can find many of the innovation profiles that were eliminated on other Hype Cycles or in other Gartner research. Or they can discuss their status with a Gartner expert.

The DWI&O Hype Cycle illustrates the relative market maturity levels of the major technology areas affecting end users, including related management tools and services. It complements several other Hype Cycles, including:

- “Hype Cycle for the Digital Workplace, 2020” — The digital workplace is enabled by the technologies in this Hype Cycle.
- “Hype Cycle for Frontline Worker Technologies, 2020” — This research focuses on innovative technologies aimed at enabling task/frontline workers to be more effective, efficient and safe

This Hype Cycle will help IT and business leaders assess levels of risk and maturity, and understand the trends and opportunities that these innovations can provide to enterprises.

### The Hype Cycle

As the paradigm shifts toward increased agility in DWI&O technologies, the COVID-19 pandemic is driving a wave of change toward remote work, accelerating the adoption of some technologies. Some of the temporary changes are likely to become part of infrastructure and operations (I&O) leaders’ toolkits for continued use in what becomes the new normal for how people work. Other strategic initiatives include using analytics to drive decisions, consolidating management tools to reduce IT complexity, and improving the user experience across content, devices and applications.

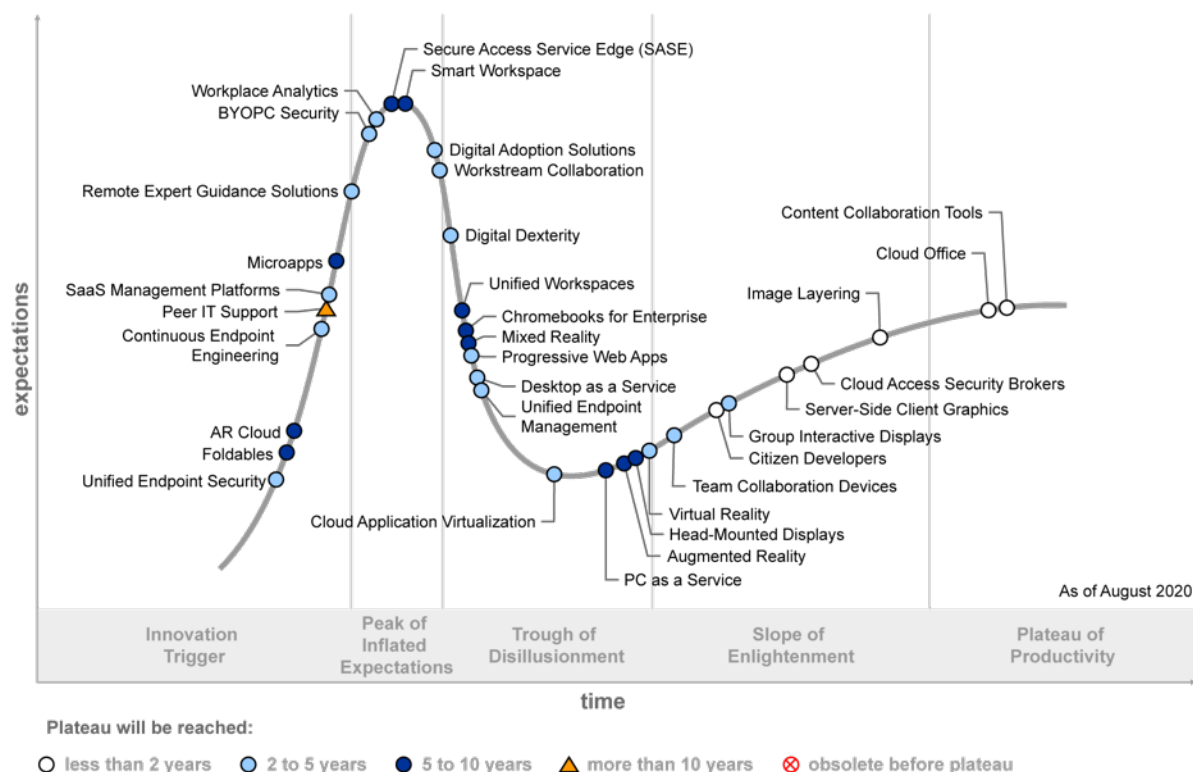
Mobile and endpoint trends and technologies covered on this year’s Hype Cycle include:

- Unified management and security tools for the digital workplace. Innovation points include bring your own PC (BYOPC) security, unified endpoint management (UEM), unified endpoint security (UES), secure remote access and secure access service edge (SASE).
- Software trends, such as the growing use of workstream collaboration, cloud office and progressive web apps.
- Collaboration infrastructure, such as group interactive displays, team collaboration devices and digital adoption solutions.
- Wearable devices and scenarios, such as frontline-worker-focused use of remote expert guidance systems and head-mounted displays (HMDs), plus immersive technologies, such as augmented and mixed reality.
- New operations and support paradigms, and the use of analytics to predict, manage, secure and optimize the end-user experience, such as continuous endpoint engineering and peer IT support.
- User workspaces across multiple devices with a unified and coordinated user experience. Innovation points include desktop as a service (DaaS), image layering and unified workspaces.

The transition to an environment that is dynamic, cloud-inclusive, work-from-anywhere, multichannel and multidevice is accelerating. Organizations must update their roadmaps to ensure alignment with new technology investment prioritization, which will change significantly throughout 2020 and 2021. This should clearly correlate investments to expected business value and highlight dependencies and synergies between existing and new investments.

Figure 1. Hype Cycle for Digital Workplace Infrastructure and Operations, 2020

## Hype Cycle for Digital Workplace Infrastructure and Operations, 2020



## The Priority Matrix

The Priority Matrix maps the benefit rating for each technology against the amount of time required to reach the beginning of mainstream adoption. This alternative perspective can help users determine how to prioritize their mobile and endpoint technology investments. Key technologies will have notably significant impacts across user experience, enablement of new use cases, IT operations and support capability, and organizational agility.

UEM is moving rapidly toward the Trough of Disillusionment, as inflated early expectations meet the reality of the change needed to take full advantage of these tools. We are changing our expectations to two to five years to reach the plateau.

Content collaboration tools and cloud office are nearing the plateau, as are unified workspace technologies such as image layering and server-side graphics. Many other unified workspace

technologies, however, are less mature, as is bringing them all together for a cohesive user experience. As a whole, unified workspaces have not yet reached the Trough of Disillusionment.

Endpoint security technologies are changing, with SASE at the Peak of Inflated Expectations and BYOPC security and secure remote access entering the Hype Cycle as cloud access security brokers (CASBs) move toward plateau.

New ways of managing DWI&O are critical to success. Continuous endpoint engineering and SaaS management platforms are being added, and UEM is moving toward the Trough of Disillusionment.

Figure 2. Priority Matrix for Digital Workplace Infrastructure and Operations, 2020

## Priority Matrix for Digital Workplace Infrastructure and Operations, 2020

benefit	years to mainstream adoption			
	less than two years	two to five years	five to 10 years	more than 10 years
transformational		BYOPC Security Digital Dexterity	AR Cloud Secure Access Service Edge (SASE) Smart Workspace	
high	Citizen Developers Cloud Access Security Brokers Cloud Office Content Collaboration Tools Server-Side Client Graphics	Continuous Endpoint Engineering Desktop as a Service Digital Adoption Solutions Unified Endpoint Management Unified Endpoint Security Workplace Analytics Workstream Collaboration	Augmented Reality Head-Mounted Displays Mixed Reality PC as a Service Unified Workspaces	
moderate	Image Layering	Cloud Application Virtualization Group Interactive Displays Progressive Web Apps Remote Expert Guidance Solutions SaaS Management Platforms Team Collaboration Devices Virtual Reality	Chromebooks for Enterprise Microapps	Peer IT Support
low			Foldables	

As of August 2020

Source: Gartner  
ID: 450317

### Off the Hype Cycle

The following technologies appeared on the “Hype Cycle for Mobile, Endpoint and Enterprise Wearable Computing, 2019” or the “Hype Cycle for Unified Workspaces, 2019.” They have reached

plateau or were removed from the 2020 DWI&O Hype Cycle, due to relevance or space considerations.

**Biometric Authentication Methods** — These techniques are relatively mature for DWI&O technologies, but may be found in the “Hype Cycle for Identity and Access Management Technologies, 2020” and the “Hype Cycle for Frontline Worker Technologies, 2020.”

**Bluetooth Beacons** — These technologies are discussed in the “Magic Quadrant for Indoor Location Services, Global.”

**Bots** — This technology may be found in the “Hype Cycle for Unified Communications and Collaboration, 2020” and the “Hype Cycle for Application Architecture and Development, 2019.”

**Bring Your Own Device (BYOD)** — BYOD for mobile devices has reached the Plateau of Productivity; however, before COVID-19, it was found infrequently for PCs. We have added BYOD security to this year’s Hype Cycle to reflect PC-specific issues.

**Bring Your Own Thing (BYOT)** — This can be found in the “Hype Cycle for the Digital Workplace, 2020.”

**Chrome Devices** — The Chrome Devices profile in past Hype Cycles tried to reflect their position for both enterprises and education, which are quite different. We decided that Chrome Devices have plateaued for use in educational scenarios, so we have created an innovation point for Chrome Devices in enterprise.

**Conversational User Interfaces (UIs)** — Such UIs may be found in many other Hype Cycles, including the “Hype Cycle for Customer Service and Support Technologies, 2020,” the “Hype Cycle for Unified Communications and Collaboration, 2020,” the “Hype Cycle for the Digital Workplace, 2020,” the “Hype Cycle for User Experience, 2020” and the “Hype Cycle for Advanced Future of Applications, 2020.”

**Enterprise Wearable Device Management** — This has been subsumed into UEM.

**Multiscreen Multistream Rooms** — This is a relatively niche technology that has not been progressing in the current environment.

**Mobile Threat Defense** — This has been integrated into SASE.

**Multiexperience Development Platform** — We have removed most development technologies from this Hype Cycle. This innovation profile can be found in the “Hype Cycle for Application Architecture and Development, 2019.” In 2020, see the Hype Cycles for User Experience, 2020; Future of Applications, 2020; and Consumer Engagement With Healthcare and Wellness, 2020.

**Smartwatches** — Consumer-grade smartwatches are well-understood by DWI&O leaders. Smartwatches for frontline worker use will be covered in the “Hype Cycle for Frontline Worker Technologies, 2020.”

**Universal Docking** — This has reached the Plateau of Productivity.



**USB Type-C** — This has reached the Plateau of Productivity.

**Virtual Assistants** — This may be found in:

- “Hype Cycle for Natural Language Technologies, 2020”
- “Hype Cycle for Application Architecture and Development, 2020”
- “Hype Cycle for Unified Communications and Collaboration, 2020”
- “Hype Cycle for the Digital Workplace, 2020”
- “Hype Cycle for User Experience, 2020”
- “Hype Cycle for Advanced Future of Applications, 2020”

**Wristbands** — Wristbands for frontline worker use are covered in the “Hype Cycle for Frontline Worker Technologies, 2020.”

## **Immersive Content and Workflow Creation Tools**

**Intelligent Applications** — These are included in the “Hype Cycle for Artificial Intelligence, 2020.”

**Virtual Desktop Infrastructure Monitoring** — Gartner is consolidating this into the overall infrastructure monitoring market, and will not follow its development separately.

**SaaS-Delivered IAM** — This has been replaced by SASE.

**Workspace Aggregators** — These products have generally been combined into virtual desktop infrastructure (VDI), UEM or DaaS products and are seldom sold on their own.

**Short-Range Wireless Power Charging** — This technology is relatively mature for mobile devices and not progressing for PCs, so we are removing it.

## On the Rise

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### Unified Endpoint Security

**Analysis By:** Rob Smith

**Definition:** Similar to the convergence Gartner saw on endpoint management to a single unified endpoint management system, Gartner sees the evolution of endpoint security toward unified endpoint security. This innovation combines the main features of endpoint protection platform (EPP), endpoint detection and response (EDR), and mobile threat defense (MTD) into one solution. This solution has a single console with threat analysis across all endpoint devices offering the ability to detect previously undiscoverable threats through cross-data analysis.

**Position and Adoption Speed Justification:** Vendors are embracing the initial unified endpoint security (UES) concept offering bundles of all components of endpoint security as a single license,

single console interface, and in a few cases offering cross-platform analysis. The need for UES is being driven by IT demand for a single console for all security events. This has been accelerated by the recent COVID-19 crisis which has forced the need for IT to support whatever device the user has available. Like the unified endpoint management (UEM) market before it, UES will take a few years to mature and gain acceptance.

Successful vendors in UES will be those that can demonstrate significant productivity gains from the integration of security and operations and those that can rapidly process large amounts of data to detect previously unknown threats.

**User Advice:** Recent surveys show that the majority of IT organizations are considering security vendor consolidation. Too often though, combined systems don't provide an overall best-of-breed solution, but instead best-of-breed in some functionality. UES has the potential to be a single best-of-breed solution for all of endpoint security provided the unified product's cross-device data analytics is strong. This will require a vendor who understands traditional client and mobile security to build a single threat detection framework regardless of the device type.

Organizations should evaluate UES adoption with two main goals in mind. On the one side to extend the detection and response beyond the traditional laptop and desktop endpoints, to mobile devices. In that sense the concept of UES is a subset of the concept of XDR, limited to endpoints. On the other, to obtain a single endpoint security management component from where to conduct security management for all enterprise endpoints.

One area for rapid UES adoption is in conjunction with a zero trust network access (ZTNA) system. As ZTNA increases in popularity, UES becomes a critical component in the continuous authentication process providing device security and telemetry data to improve the integrity of the connection.

Gartner has seen MTD deployed primarily to government, military, and other highly regulated organizations, but the technology is spreading to other verticals and companies as the need for mobile device security has increased dramatically. As part of a UES solution, MTD now offers the ability to deliver real-time user telemetry data such as if the user is on a public Wi-Fi or if the user's PC and mobile are in the same location. This adds greater value to the overall security posture of the user.

Gartner also sees demand for UES to closely integrate with UEM to provide a single console for device management and security. This has the added benefit that as a security event occurs, policy can automatically be adjusted across all devices.

**Business Impact:** As the need to support any managed or unmanaged device from anywhere at any time becomes standard, the challenge to secure the device and obtain device integrity information increases. UES has the potential to integrate endpoint management and endpoint security to provide a lower total cost of ownership and better operations productivity. It also provides better security outcomes by reducing the complexity for IT to secure devices, improves visibility across all device types, and offers the potential to detect previously unknown threats — all from within a single console. This has an immediate benefit of lower support costs due to less consoles to manage and monitor. It also has the benefit of reducing risks of successful attacks by

acting as a single integrated point for security improving detection and stopping attacks, such as ransomware from spreading to other devices.

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Sample Vendors:** BlackBerry; Broadcom (Symantec); Cybereason; Kaspersky; McAfee; Microsoft; Sophos; Tanium

**Recommended Reading:**

“Magic Quadrant for Endpoint Protection Platforms”

“Market Guide for Endpoint Detection and Response Solutions”

“Market Guide for Mobile Threat Defense”

“Market Guide for Zero Trust Network Access”

## Foldables

**Analysis By:** Rob Smith

**Definition:** Foldables are device types in which the device screen can fold at least once. Most devices have a single fold in half, so they can be used as phones and tablets or as compact devices. Devices may have large screens that fold to create two smaller screens on each side, or they could have smaller outer screens that open like books or flip upward (similar to a “Star Trek” communicator) to reveal a second larger screen. As the technology matures, Gartner expects to see devices that fold multiple times by different methods.

**Position and Adoption Speed Justification:** During the past year, foldables have experienced several high-profile technical issues and delays in availability. Foldables are available in limited quantities as high-end devices. However, numerous issues around screen reliability have been reported with basic use causing device failures affecting product availability to buyers. Inventories and access to reliable repairs in 2020 are limited.

**User Advice:** Through the next five years, foldable devices will remain a niche product, due to several challenges. All challenges are pointing to limited product availability, and only then in the position of high-end/flagship devices by Tier 1 manufacturers. Users need to see a demonstrable difference in the user experience to eventually pay nearly twice the price they pay for smartphones today.

Avoid deploying any foldable device at scale until the technology matures. Monitor device and screen improvements — specifically unboxing reviews where devices are put through extreme stress tests to determine if the device has matured enough to meet the required use case.

**Business Impact:** Offering a single device, instead of a smartphone and a tablet, offers the promise of lower capital and operating expenditures (opex and capex). However, a single, foldable device typically costs more than the combined costs of a high-end smartphone and a tablet. Future potential impact could be lower cost for equipment after the technology matures. The sole benefit to business today is by lowering device count to a single device from two. In the future, foldables can also be used for marketing purposes, with flexible displays attached to items such as clothing or bags for display as a user walks around.

**Benefit Rating:** Low

**Market Penetration:** Less than 1% of target audience

**Maturity:** Emerging

**Sample Vendors:** Huawei; LG; Motorola; OPPO; Royole; Samsung

**Recommended Reading:**

“Emerging Technology Analysis: Foldable Display Brings New Market Opportunity”

## AR Cloud

**Analysis By:** Tuong Nguyen

**Definition:** AR Cloud enables the unification of physical and digital worlds by delivering persistent, collaborative and contextual digital content overlaid on people, objects and locations to provide people with information and services directly tied to every aspect of their physical surroundings.

**Position and Adoption Speed Justification:** Similar to AR, aspects of the AR Cloud have existed for decades, but the emergence of the AR Cloud as a concept has reemerged as recently as 2017. Many startups (see the Sample Vendors below) are developing revolutionary platforms and systems to bring the AR Cloud to fruition.

A common misconception of AR is that it is a database that will “feed” AR and mixed reality (MR) experiences. The AR Cloud is much more rich and complex than a simple database. Numerous, underlying elements will need to be created. For example, edge networking, high bandwidth and low-latency communications, standardized tools and content types for publishing into the AR Cloud, management and delivery of content, and interoperability to ensure seamless and ubiquitous experiences. These elements will enable a shift in how we organize and interact with digital content. While this is the long-term goal, early implementations of the AR Cloud are expected to be siloed (rather than ubiquitous) before eventually converging into an interoperable, seamless system. Moreover, we expect vendors to fiercely compete to establish dominating, potentially proprietary standards.

Traditionally, leading tech vendors and communications services providers have invested in distributed network infrastructure, but many of them (such as Amazon, Google, Facebook, Microsoft) are adapting to a new paradigm to support localized, persistent, collaborative, shared, multiuser interactions. Some of this infrastructure and requirements will be ushered in by the arrival

of low-latency, wireless networking (mmWave 5G will serve as an enabling tech), while others are still being developed.

**User Advice:** The AR Cloud is in its infancy. The best way to prepare is to evaluate potential areas of impact of business outcomes — areas that can be exploited or affected by the AR Cloud. There are broad possibilities here. For example, in city management, collaborative, dynamic and contextualized maps of cities to highlight details such as public restrooms, public transit locations, traffic issues, wayfinding as well as public utility maintenance records, log fix-it requests, and government office locations.

- Create a roadmap to address potential obstacles caused by the AR Cloud.
- Define privacy parameters. For example, what should be captured by sensors (image, mapping, location, etc.) and how it will be stored.
- Create guidelines to manage content (such as segregating data into public and private realms).
- Establishing hierarchies for data capture and protection.
- Evaluate the impact of massive physical data collection vis-a-vis compliance for regulations such as GDPR.

**Business Impact:** In the next decade, the AR Cloud will form the multilayer digital doppelganger of people, objects and locations in the physical world. This will enable new interactions and in turn new business models and ways to monetize the physical world. The AR Cloud will change the way that enterprises think of physical and digital assets, how they seamlessly interact with each other their customers and the associated risks.

**Benefit Rating:** Transformational

**Market Penetration:** Less than 1% of target audience

**Maturity:** Emerging

**Sample Vendors:** Amazon; Apple; Facebook; Google; Microsoft; Niantic; Ubiquity6; Visualix; Xperiel

**Recommended Reading:**

“Venture Capital Growth Insights: Immersive Technologies”

“Top 10 Strategic Technology Trends for 2020: Multiexperience”

“Gartner’s 2020 Strategic Technology Trends for Product Leaders”

“Market Guide for Augmented Reality”

Continuous Endpoint Engineering

**Analysis By:** Dan Wilson

**Definition:** Continuous endpoint engineering (CEE) is an approach that helps organizations ensure understanding and determine applicability of upcoming changes, rapidly pilot and test critical apps, engage stakeholders to minimize surprises, execute and monitor the deployment, and measure the impact. It is a repetitive cycle that starts when vendors communicate upcoming technology changes or as IT initiates small bundles of changes to be deployed.

**Position and Adoption Speed Justification:** As technology vendors accelerate the release of new technology and software, clients quickly realize that traditional plan-build-transition-operate models are too slow and don't scale. Considering that Office 365 includes more than 20 apps that receive new features each month, clients quickly get overwhelmed. We developed continuous endpoint engineering to help fundamentally change the approach to endpoint management and speed up processing of changes.

Hype has advanced to the trigger/peak midpoint as organizations are clearly seeing the need for change to simply keep pace with technology. They struggle with determining how to implement CEE without wholesale organizational changes.

**User Advice:** Gartner recommends that I&O leaders start by rationalizing their team's daily tasks and focusing on eliminating or automating the technology-focused work. For example, stop building desktop images and GPOs and leverage modern provisioning and policy controls through unified endpoint management (UEM) tools. This helps create capacity for deeper stakeholder and technology vendor engagement, so that the full cycle can be completed.

**Business Impact:** The accelerated push to deploy new collaboration tools and remote work during the pandemic significantly accelerated the need for a continuous approach to endpoint engineering and management. CEE addresses that and helps improve user experience and IT job satisfaction by reducing complexity, overhead, customization, and effort associated with maintenance and testing (mundane tasks). CEE also enables organization to stay aligned with and exploit the benefits of rapid technology updates. Misalignment will result in unpleasant surprises, poor user experience and erosion of trust. With additional capacity, IT can now focus on working with the business to better understanding and resolving their challenges with technology, and on enablement strategies to drive adoption of technology tools.

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Apple; Google; Microsoft

### **Recommended Reading:**

"Adopt Continuous Endpoint Engineering and Modern Management to Ensure Digital Workplace Success"

"Workforce Resilience in the Eye of the Pandemic: Overcoming the Current Remote Work Situation While Planning for the Future"

“Prepare for Unified Endpoint Management to Displace MDM and CMT”

“Enablement Mindset Is the Missing IT Ingredient to Improve Workforce Digital Dexterity and the Employee Experience”

“How to Organize IT to Support Office 365, G Suite and Other Digital Workplace Applications”

## Peer IT Support

**Analysis By:** Chris Matchett

**Definition:** Peer IT support occurs when business consumers get technical support and advice from other business consumers at Level 0 (self-service) before (or instead of) contacting a Level 1 IT service desk. This commonly takes place unofficially and rarely officially via forums and collaboration portals, or in person.

**Position and Adoption Speed Justification:** The consumerization of IT has changed employee expectations of IT support. Business consumers leverage user communities for quick and accessible resolution. This includes support forums, internet search engines and services such as LinkedIn and Quora. Gartner’s research into business consumer support preferences in the digital workplace confirms that digital workers engage with colleagues for support questions before contacting the IT service desk. The research also revealed that asking peers for help both in person and via internet and social media sources were the most popular first-choice support channels. Although this is thriving outside of formal support practices, I&O leaders have been slow to formalize these channels within formal practices.

Early movers are using collaboration portals and gamification to identify and reward knowledge, but this is a support channel that few I&O leaders have paid any attention to until recently, despite the large receptive audience. I&O leader interest in peer support has surged due to the increased shift to remote work due to the COVID-19 pandemic. Some IT service management (ITSM) tool vendors are beginning to provide features that facilitate peer IT support.

The position of peer support on this Hype Cycle represents formal peer support that is facilitated by I&O.

**User Advice:** Unofficial grassroots peer support happens in every company, but formalized Level 0 peer support is not suitable for every organization. Some business consumers prefer to contact only traditional support channels, and some business leaders don’t want non-IT staff to spend any of their own time working on IT issues. I&O leaders must analyze the preferences and requirements of the user community before proceeding. Seek out business unit IT support that is already occurring in your organization, and identify pockets of knowledge within the employee community. Use the collaboration features in your ITSM tool or an already deployed enterprise social network or crowdsourcing platform to facilitate and track the interactions. Interface with the IT knowledge management (KM) processes to discover common issues and update the knowledge base where needed.



Identify valuable support activities that traditional reporting methods might miss (because they wouldn't hit the IT service desk), and take credit for facilitating the behaviors when justifying the performance of I&O to business leaders. Promote and reward collaborative behavior. Tools to support formalized Level 0 peer support are still emerging, so focus on simple activities for now. This is an alternative option that complements traditional support channels for low-urgency issues; it's not a replacement.

**Business Impact:** Business consumers are already going to their colleagues and crowdsourcing for support. IT service desks disrupted by pandemic-driven changes to the digital workplace that formalize these processes could benefit the most from successful, Level 0 peer support programs, because they can decrease the workload on the Level 1 and Level 2 support teams, reduce costs, and allow them to concentrate on other activities. Incident resolution (when measured from the initial interruption to service) can be expedited in cases in which the solution is simple, or when the expertise resides outside the I&O organization. When implemented properly, productive time is returned to business users, despite the perception that non-I&O employees might be distracted from their core duties. Consumer satisfaction with I&O can be improved by building engagement and trust.

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Sample Vendors:** Axios Systems; BMC; Broadcom; ServiceNow

**Recommended Reading:**

"Don't Abuse Business Users for Peer-to-Peer IT Support"

"8 KPIs That Demonstrate How Self-Service Initiatives Advance Your IT Service Desk"

"3 Simple Ways IT Service Desks Should Handle Incidents and Requests"

"2018 Strategic Roadmap for IT Service Management"

## SaaS Management Platforms

**Analysis By:** Chris Silva

**Definition:** SaaS management platforms (SMPs) provide three core functions in the management of SaaS applications: discovery of known and unknown SaaS apps in use, workflow automation of management tasks across disparate SaaS tools and the unification or augmentation of platform-specific security functions. The key benefit of SaaS management platforms is the ability to use a single tool to manage a varied set of SaaS tools in use.

**Position and Adoption Speed Justification:** All enterprise-class SaaS applications offer their own, native management functions, but IT administrators lack a central dashboard to view utilization and



entitlements or centrally automate IT administrative workflows across multiple SaaS applications. These tools are a key ingredient to manage SaaS applications at scale and consistently apply policies for use and data security.

The continued uptake of SaaS applications, such as productivity suites (G Suite, Office 365), storage (Box, Dropbox) and function-specific tools (Salesforce, Workday) have contributed to growing management overhead for IT operations leaders. Initially this market was populated by tools focused on one, specific type of application, but Gartner has witness the market evolve in the past year with multiple vendors branching out and broadening the number of SaaS applications these tools can address. Gartner believes the ability to address multiple SaaS applications as an increasingly important asset for competing in this market.

Buyers and vendors face a similar challenge, finding the right mix of tools supported (for buyers) and the right mix of tools to support (for vendors.) Once top-tier broadly used SaaS applications are supported, there is a large opportunity cost for adding additional, but more niche SaaS applications; for buyers, taking on a tool that only addresses a portion of the SaaS environment undercuts the value of adopting an SMP. As such, Gartner expects vendors to continue growing their portfolio of SaaS applications, but at a slowing pace. Buyers will see grater disparity among vendors in their support for “long tail” SaaS applications that are specific to their region, vertical market or support a diverse best-of-breed SaaS environment.

SMPs represent one of several SaaS security and control planes. Some of the capabilities overlap with tools such as cloud access security brokers and software asset management but are complementary to, not replacements for these technologies. The hallmark of these tools is the focus on SaaS applications and while they may expand to take on on-premises applications as well, Gartner sees this as a potential future development in this market, not a core element of the SMP.

Gartner has accelerated the speed at which we expect SMP to reach its next phase on the Hype Cycle for 2020. This is due to the 2020 COVID-19 pandemic’s impact on remote working, which has driven more investment in SaaS tools. This investment is creating a proliferation of tool-specific management tasks for the growing SaaS portfolio while also increasing scrutiny of costs and utilization of IT assets; two areas SMPs can directly address.

**User Advice:** In organizations looking to bring on an SMP to help increase the visibility of the SaaS application estate, it is critical to choose a tool with discovery capabilities. Using browser plug-ins, network access information and by ingesting financial data these tools will outline which tools are being used — those sanctioned by IT and those adopted by users without IT’s involvement. Many vendors will define “discovery” to mean better usage visibility of tools IT has formally adopted, but lack the ability to detect SaaS apps unknown to IT, providing incomplete visibility, management and risk profiling.

Ensure that the support for key SaaS tools is present in the SMP being chosen, paying particular attention to the depth of functionality for each, supported SaaS application. Due to the varying availability and complexity of the APIs used by the SMP, it is not uncommon to see disparity of SMP function between supported SaaS applications.

Understand that vendors are in varying stages of maturity in their support for functionality in securing data and apps, discovering user-adopted SaaS and breadth of application support, making direct comparisons between many SMPs difficult.

**Business Impact:** SMPs provide many of the efficiency, risk mitigation and total cost of ownership (TCO) benefits of IT operations management tools, extended to the SaaS application estate. SaaS applications often lack sufficient IT management capabilities forcing organizations to choose between delaying adoption or accepting suboptimal management capabilities. SMPs extend management and security capabilities to bridge these gaps and minimize trade-offs between manageability and need for a given SaaS application.

Large IT organizations often rely on scripting (for example, through PowerShell) to automate bulk tasks, produce custom reports and fill gaps in the native SaaS administrative console. This can be time-consuming and detract from consistency in control (due to lack of clear ownership, regular updating and revision or peer review). SMPs can reduce or eliminate the amount of scripting administrators must use to manage their SaaS environments.

As SMPs expand to address more SaaS applications, they will emerge as a key source for analytics data, with some vendors offering analysis of collaboration patterns among workers and across tools; acting as triggers to workflows in other systems and contributing to broader user experience measurement activities.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** AvePoint; BetterCloud; CoreView; Intello; Pointr; Productiv; Quadrotech; ShareGate; Torii; Zyllo

**Recommended Reading:**

“Market Guide for SaaS Management Platforms”

“How to Cut Software and SaaS Costs and Quickly Improve Cash Flow in Times of Crisis”

“How to Evaluate SaaS Providers and Solutions by Developing RFP Criteria”

## Microapps

**Analysis By:** Jason Wong

**Definition:** A microapp is a discrete, yet reusable and portable, app function, process or workflow that operates within the context of a larger app or application — and also across multiple apps or applications. The microapp runs as a self-contained activity but may rely on services, such as identity services or access to location data, provided by an app client runtime or container. The

microapp must be tightly scoped and is composed of UI, logic and data components typically bound to back-end microservices through a mediated API layer.

**Position and Adoption Speed Justification:** The term “microapp” is not new, but the architectural concept of microapps as part of a mesh app and service architecture (MASA) and applied toward multiexperience development (spanning web, mobile, conversational apps) is a recent phenomenon. Microapps have gained traction as part of a mobile app that individually and independently deploys them directly within a meta-app container of an installed mobile app (for example, “miniprograms” within the WeChat mobile app in China). The same microapp may also be used within other mobile apps, as well as in web apps and supporting conversational apps, such as a card UI within a chatbot interaction. Although they can run as headless apps, in the case of supporting a voice interaction, microapps are typically built on web technologies (HTML, CSS, JavaScript). Some vendors rely on specific client-side frameworks or proprietary runtime technologies to implement an architecture supporting microapps and enabling their reuse across digital touchpoints.

In recent years, the total number of vendors using the term microapp as part of their offerings has steadily increased. There has also been a steady increase in the use of microapp-based application architecture by consumer applications, such as Facebook Messenger and WeChat. These social media and messaging platforms enable third parties to create and distribute microapps within the main mobile or web app. Enterprise software providers, such as SAP and Citrix, are also enabling and delivering microapps for greater configuration of a multiexperience UX.

**User Advice:** Application leaders should encourage their teams to:

- Address the need to support ever-increasing digital experiences by using microapps to facilitate multiexperience development running on the mesh app and service architecture (MASA).
- Identify suitable development frameworks or technologies for microapp enablement and orchestration across your target touchpoints (e.g., web, mobile app, chatbots).
- Avoid functional conflicts by managing governance of the microapp runtime container’s capabilities (such as permissions, user consent and location service).

**Business Impact:** Key benefits of microapps include:

- Development agility and reuse, with an ability to develop functionality in isolation by different developers. However, you must design microapps as you would microservices, as both are used to form applications. Both are also fit-to-purpose, portable, reusable, and accessible via APIs or notification.
- A consistent UX, as part of multiexperience development effort, encapsulating a task’s steps or workflow into a reusable component that supports a consistent UX across different touchpoints.
- Support for event-driven scenarios, to present an interaction to the user, based on specific context.

- Composable experiences, to create targeted functions and workflows (e.g., expense approvals) as a single microapp that can be easily deployed into a web or mobile app for specific employees.

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Sample Vendors:** Betty Blocks; Citrix; Facebook; i-exceed; Progress; SAP; Tencent; Tiled; Workgrid Software

**Recommended Reading:**

“Innovation Insight for Microapps”

“One Versus Many — When to Consolidate Your Enterprise’s Apps”

## Remote Expert Guidance Solutions

**Analysis By:** Chris Silva

**Definition:** Remote expert guidance solutions provide two-way communication between a centrally located expert and workers in the field through mobile and wearable devices. Using a device camera, centralized personnel receive a live view of the field employee’s environment and task being performed, allowing the expert to provide verbal guidance and visual cues that overlay the remote worker’s view. Tools can capture sessions for training, post-task audit, and performance analysis.

**Position and Adoption Speed Justification:** Remote expert guidance is on a limited number of proven use cases that are driving wearables adoption, though the technology has been available as part of remote support and control tools for some time. An increase in imaging capabilities (simultaneous camera view, overall image and video quality improvements) along with the growth in availability and throughput of edge connectivity make the use case more approachable for more roles and for a growing number of devices. Gartner expects to see growth and evolution of this technology along the Hype Cycle to continue at a modest pace; the technology’s uptake could be impacted as cost optimization measures take hold in organizations recovering from the impact of economic slowdowns due to the COVID-19 pandemic. At the same time, this technology could see broader use in more common place scenarios such as desktop and mobile device support as remote working remains in place or expands in many companies post-COVID.

Gartner has observed some consolidation of the enterprise wearables marked in the past 12 months, with a few notable vendors such as ODG, with a 20-year history in the wearables market, cease operations due to sustained but low-volume demand for hardware, this will dampen the growth in related software areas such as remote expert guidance, but will not materially change the future prospects of this technology given its potential for use on nonwearable devices. Growth in adoption of these tools will remain relatively modest and this will have a dampening effect on new

interest driven by a need for hands-on support being delivered between employees that are distributed geographically.

**User Advice:** At present, use of these tools in enterprise is limited to supporting highly technical field service, manufacturing and inspection tasks driven by the high cost of maintaining expertise in the field and failures due to human error. In 2017, Gartner cited the cost and availability of upgrading hardware in the field to support this use case. With hardware more readily available, penetration remains low due to the relative lack of familiarity with remote expert guidance use cases. Adoption should remain relegated to drive one of two outcomes; increased utilization of scarce human resources and the extension of those resources' reach through the use of remote expert guidance for less technical field teams, or the reduction in time and cost.

Expanding the use of this technology as part of standard remote support may broaden its appeal when hands-on support for users and/or highly technically complex configurations must be supported remotely. Remote expert guidance capabilities of remote connectivity and control tools (RescueAssist, TeamViewer etc.) though these tools offer a subset of the interactive functionality of dedicated remote expert guidance tool.

**Business Impact:** Gartner lists the current benefit rating as moderate due to its potential to radically improve field service metrics, and a moderate improvement of support operations for end users amid a surge in remote working. The technology can drive cost avoidance through centralizing staff with skills in short supply allowing a less-skilled field force to conduct on-site work with central staff providing guidance using these tools. In cost-avoidance scenarios, Gartner has witnessed examples in highly technical, custom manufacturing where the use of expert guidance tools dramatically reduces the rate of errors that can halt production.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Fieldbit; Fujitsu; Google; Librestream; OverIT; Pointr; PTC; Scope AR; Ubimax

**Recommended Reading:**

“Forecast Analysis: Wearable Electronic Devices, Worldwide”

“Use Wearable Technology to Enhance Frontline Worker Productivity: Field Service Management”

At the Peak

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BYOPC Security

**Analysis By:** Rob Smith; Stephen Kleynhans

**Definition:** Bring your own PC (BYOPC) is an endpoint deployment strategy that allows employees to use a personally selected and purchased client device to execute enterprise applications and access company services and data. It typically spans PCs, Macs, and Chromebooks. BYOPC poses serious potential security threats due to unmanaged, unpatched and infected user equipment.

**Position and Adoption Speed Justification:** Adoption of BYOPC is strong due to the COVID-19 pandemic as organizations simply had no other alternative. Long-term adoption will vary based on hardware availability and IT's desire to provide and manage PCs to work-from-home users. Regardless of the number of BYOPC devices, security risks remain high for BYOPC forcing immediate adoption of new tools to secure access to data and applications from these devices. Gartner expects adoption to increase as IT perfects additional technologies such as cloud apps, virtualized apps and DaaS. For those organizations that do not embrace cloud, adoption will decrease as hardware supply returns.

**User Advice:** Prior to the COVID-19 crisis, there was little interest in BYOPC. However, due to an urgent need to enable working from home for employees and a lack of available hardware, it has become widely adopted in a short timespan posing new and significant security risks. Expect the need to support BYOPC to be dependent on a long-term, work-from-home strategy. Also expect to support security tools needed for a BYOPC environment.

It is important to note that Gartner always recommends providing the user with a device that is managed and secure over using a BYOPC. However, due to global circumstances, BYOPC has become a necessary strategy that requires specific security practices to be in place.

Best security practices for BYOPC include:

- Assume that any BYOPC device has malware or ransomware and should never be trusted. This is a high priority.
- Enabling multifactor authentication (MFA) for all access to any corporate resource regardless if virtual or not and if cloud or on-premises. This is a high priority.
- Contain all cloud application data. Do not allow local storage or upload of local data from any BYOPC device as this could infect the cloud system. This is a high priority.
- Consider using a cloud access security broker (CASB) or a zero trust network access (ZTNA) solution for any access to cloud applications. This is a medium priority.
- For long-term employee usage, enable DaaS to replicate an employee's desktop without the need to manage the BYOPC. This is a medium priority.
- Virtualize access to any traditional on-premises application. This is a high priority.
- Supporting a BYOPC is a difficult challenge. This is why Gartner recommends DaaS, virtualized apps, or cloud services instead so the BYOPC is essentially a dumb terminal. This is a high priority.
- Under no circumstances should normal remote VPN access be allowed from a BYOPC as it poses a serious risk of a ransomware infection. This is a high priority.

- Define a policy for BYOPC that stipulates minimum standards expected of users (including but not limited to: a supported and patched OS from Microsoft/Apple/Google/others, a supported and updated anti-malware solution, completion of cybersecurity awareness). This is a medium priority.
- Understand the risks from other household members potentially using the same device and potentially the same local account. This is a medium priority.

Following the above suggestions will significantly reduce the security risk of enabling BYOPC.

**Business Impact:** BYOPC vastly increases the number of workers that have access to enterprise data and applications without the need for an additional investment in corporate hardware or dedicated office space. However, it poses serious security risks as these devices are often infected with malware or ransomware and fall victim to phishing attacks. As such, IT must be prepared to limit and control access to any BYOPC device. This means offsetting the PC hardware investment with critical security technologies such as MFA, CASB, ZTNA, VDI, and DaaS. Without investment in these technologies, IT faces a much higher potential cost in the form of ransomware. Also, it is critical that IT work with HR, legal, and workers councils to develop a proper work-from-home policy. The policy is critical in order to limit any exposure due to the new work-from-home reality.

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Cisco Systems; Citrix; Google; Microsoft Azure; Okta; VMware

### **Recommended Reading:**

“Solving the Challenges of Modern Remote Access”

“Enhance Remote Access Security With Multifactor Authentication and Access Management”

“Physical, Virtual and Cloud Desktops: Is a Hybrid Approach Inevitable?”

“Market Guide for Zero Trust Network Access”

“Magic Quadrant for Cloud Access Security Brokers”

“Toolkit: Remote Work Policies”

### **Workplace Analytics**

**Analysis By:** Dan Wilson

**Definition:** Workplace analytics are aggregated insights derived by analyzing contextual data from applications, users, endpoint devices, processes and networks to improve technology usage/adoption, employee engagement, user experience, system performance and behaviors that



promote collaboration and productivity. Data is collected through application APIs/SDKs, unified endpoint management (UEM) tools and specialized agents installed on endpoints.

**Position and Adoption Speed Justification:** Workplace analytics remains in the Peak of Inflated Expectations, and is growing in availability from feature inclusion in UEM and similar tools. While mostly used by IT and HR, line of business leaders are now using workplace analytics to measure and improve teamwork and overall performance. Workplace analytics tools can provide insights at various levels — device, employee, team/department and organizationwide. Key challenges are the heterogenous mix of data sources, inconsistent data aggregation methods, differences in metric definitions and calculation methods, varying expectations by role, and compliance with privacy norms and regulations.

Pre-pandemic, Gartner saw steady interest in an objective approach to measure and improve the related categories of employee experience, engagement, collaboration and productivity. The shift to mandatory remote work increased interest in providing insights into employee sentiment, but staff and budget limitations will delay adoption.

**User Advice:** Although most tools currently use basic email/calendar metadata, integration with UEM and digital experience monitoring (DEM) tools are driving additional workplace analytics capabilities. These include executing synthetic transactions, measuring application execution time, collecting event logs from endpoint devices and pulling customer satisfaction data from IT service management tools. Gartner anticipates continued expansion into enterprise social collaboration platforms, conferencing and collaboration tools, license management tools, and SaaS management platforms. Large enterprises with broad technology portfolios see the most value in gaining visibility into data that has traditionally been difficult to gather without advanced scripting, remote controlling into devices or pulling reports from multiple consoles. The most common requirements include:

- Monitoring the adoption of technology, practices or new ways of work
- Measuring the organizational and technical impact of major changes (move to remote work, major application upgrades, cloud office migrations, allowing BYOD, etc.)
- Collecting events, logs, telemetry from devices, aggregating the data and applying AI/ML to spot anomalies and trends
- Highlighting widespread issues, and helping to prioritize resolution and prevent recurrence
- Optimizing costs by better aligning technology (software entitlements) to use case

To maximize the benefits of workplace analytics, application, digital workplace, HR and I&O leaders must:

- Consolidate and align requirements to corporate objectives.
- Minimize potential legal and compliance issues by involving those departments in plans to implement tools.
- Investigate capabilities that are available or on the roadmap of already-owned DEM, UEM and other monitoring tools, and partner with strategic vendors to expand capabilities before buying other tools.



- Avoid comparing scoring/progress with other companies and across tools; rather, establish and measure changes internally.
- Clearly communicate to employees that these are not surveillance tools.

**Business Impact:** Workplace analytics help aggregate disparate data sources (input) and the use of AI/ML to generate meaningful decisions (output). For example, with workplace analytics, it is possible to identify a collaboration and employee satisfaction issue caused by meetings being repeatedly scheduled outside of working hours for one or more parties in a remote workforce that crosses multiple time zones. Workplace analytics enable organizations to:

- Measure teamwork and collaboration at and across various organizational levels
- Personalize services and technology to different worker segments
- Identify gaps and opportunities in process, skill set and technologies to establish an instrumented workplace
- Measure employee engagement by analyzing work patterns between teams on cloud office and workstream collaboration platforms
- Extend the digital workplace to frontline workers with added transparency into device and application experience

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** 1E; Aternity; B2M; GSX; Lakeside Software; Microsoft; Nextthink; StatusToday; SWOOP Analytics; VMware

**Recommended Reading:**

“Getting Value From Employee Productivity Monitoring Technologies for Remote and Office-Based Workers”

“Use DEM to Understand and Enhance Your Employees’ Work-From-Home Experience”

“Operationalize an Instrumented Workplace With Analytics to Support Digital Business”

“Eight Steps for Modernizing Employee Communications in the Digital Workplace”

“Enablement Mindset Is the Missing IT Ingredient to Improve Workforce Digital Dexterity and the Employee Experience”

## Secure Access Service Edge (SASE)

**Analysis By:** Joe Skorupa; Neil MacDonald

**Definition:** Secure access service edge (SASE, pronounced “sassy”) delivers multiple capabilities such as SD-WAN, SWG, CASB, NGFW and zero trust network access (ZTNA).

SASE supports branch office and remote worker access. SASE is delivered as a service, and based upon the identity of the device/entity, combined with real-time context and security/compliance policies. Identities can be associated with people, devices, IoT or edge computing locations.

**Position and Adoption Speed Justification:** SASE is driven by enterprise digital business transformation: the adoption of cloud-based services by distributed and mobile workforces; edge computing and business continuity plans that must include flexible, anywhere, anytime, secure remote access. While the term originated in 2019, the architecture has been deployed by early adopters as early as 2017. By 2024, at least 40% of enterprises will have explicit strategies to adopt SASE, up from less than 1% at year-end 2018.

By 2023, 20% of enterprises will have adopted SWG, CASB, ZTNA and branch FWaaS capabilities from the same vendor, up from less than 5% in 2019. However, today most implementations involve two vendors (SD-WAN + Network Security), although single vendor solutions are appearing. Dual-vendor deployments that have deep cross-vendor integration are highly functional and largely eliminate the need to deploy anything more than a L4 stateful firewall in the branch office. This will drive a new wave of consolidation as vendors struggle to invest to compete in this highly disruptive, rapidly evolving landscape.

SASE is in the early stages of market development but is being actively marketed and developed by the vendor community. Although the term is relatively new, the architectural approach (cloud if you can, on-premises if you must) has been deployed for at least two years. The inversion of networking and network security patterns as users, devices and services leave the traditional enterprise perimeter will transform the competitive landscape for network and network security as a service over the next decade, although the winners and losers will be apparent by 2022. True SASE services are cloud-native — dynamically scalable, globally accessible, typically microservices-based and multitenant. The breadth of services required to fulfill the broad use cases means few vendors will offer a complete solution in 2020, although many already deliver a broad set of capabilities. Multiple incumbent networking and network security vendors are developing new or enhancing existing cloud-delivery-based capabilities.

**User Advice:** There have been more than a dozen SASE announcements over the past 12 months by vendors seeking to stake out their position in this extremely competitive market. There will be a great deal of slideware and marketecture, especially from incumbents that are ill-prepared for the cloud-based delivery as a service model and the investments required for distributed PoPs. This is a case where software architecture and implementation matters

When evaluating SASE offering, be sure to:

- Involve your CISO and lead network architect when evaluating offerings and roadmaps from incumbent and emerging vendors as SASE cuts across traditional technology boundaries.
- Leverage a WAN refresh, firewall refresh, VPN refresh or SD-WAN deployment to drive the redesign of your network and network security architectures.

- Strive for not more than two vendors to deliver all core services.
- Use cost-cutting initiatives in 2020 from MPLS offload to fund branch office and workforce transformation via adoption of SASE.
- Understand what capabilities you require in terms of networking and security, including latency, throughput, geographic coverage and endpoint types.
- Combine branch office and secure remote access in a single implementation, even if the transition will occur over an extended period.
- Avoid vendors that propose to deliver the broad set of services by linking a large number of products via virtual machine service chaining.
- Prioritize use cases where SASE drives measurable business value. Mobile workforce, contractor access and edge computing applications that are latency sensitive are three likely opportunities.

Some buyers will implement a well-integrated dual vendor best-of-breed strategy while others will select a single vendor approach. Expect resistance from team members that are wedded to appliance-based deployments.

**Business Impact:** SASE will enable I&O and security teams to deliver the rich set of secure networking and security services in a consistent and integrated manner to support the needs of digital business transformation, edge computing and workforce mobility. This will enable new digital business use cases (such as digital ecosystem and mobile workforce enablement) with increased ease of use, while at the same time reducing costs and complexity via vendor consolidation and dedicated circuit offload.

COVID-19 has highlighted the need for business continuity plans that include flexible, anywhere, anytime, secure remote access, at scale, even from untrusted devices. SASE's cloud-delivered set of services, including zero trust network access, is driving rapid adoption of SASE.

**Benefit Rating:** Transformational

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Sample Vendors:** Akamai; Cato Networks; Cisco; Citrix; iboss; Netskope; Open Systems; Palo Alto Networks; VMware; Zscaler

**Recommended Reading:**

“The Future of Network Security Is in the Cloud”

“Magic Quadrant for Cloud Access Security Brokers”

“Market Guide for Zero Trust Network Access”

“Market Trends: How to Win as WAN Edge and Security Converge Into the Secure Access Service Edge”

“Quick Answer: Cost Effectively Scaling Secure Access While Preparing for a Remote Workforce”

## Smart Workspace

**Analysis By:** Gavin Tay; Annette Jump; Rashmi Choudhary

**Definition:** A smart workspace exploits the growing digitalization of physical objects brought about by the Internet of Things (IoT) to deliver new ways of working, scheduling resources, coordinating facility services, sharing information and collaborating. The programmability of physical environments enables smart workspaces to work contextually with mobile devices, software applications, enterprise social graphs and artificial intelligence (AI) to improve workforce efficiency and effectiveness. Any location where people work can be a smart workspace.

**Position and Adoption Speed Justification:** Digital workplace strategies that focus on facilities modernization, more agile work environments and the value of employee experience continue to shape interest in smart workspace technologies. We see synergies between 10 trends:

- The IoT
- AI-related technologies
- Digital signage and electronic whiteboards
- Indoor mapping
- Smart buildings, including trends in integrated workplace management systems (IWMS)
- IWMS platforms (as they move into IoT-based services)
- Remote working/collaboration and virtual workspaces
- Motion sensors
- Wearables
- Facial recognition

A smart workspace is a key aspect of a digital workplace initiative, as it includes strategists involved in facilities and real estate as key stakeholders. It applies to physical environments, such as:

- Building and campus environments, including in-building open spaces
- Co-working spaces
- Office and desk spaces
- Conference rooms
- Huddle rooms (small spaces where people congregate)

- Retail and shop floors
- Manufacturing assembly lines
- Home spaces (workspace resulting from instituted remote work given COVID-19)

“Things” participate in a smart workspace. Examples include applications and devices such as electronic whiteboards, building interfaces (HVAC), large digital displays, smart badges, workstations, mobile devices and wearables.

As workers return to work post COVID, we’ll expect organizations to take full advantage of a smart workspace. It will require organizations to revisit design strategies to include methods for gaining a better understanding of how people participate in physical spaces or adhere to social distancing. Such insight can create new capabilities related to seating and room allocation, access management and wayfaring.

Adoption rates will vary based on organizations’ requirements to support flexible work models that optimize the physical and interactive aspects of places and things (as well as employees’ privacy concerns).

**User Advice:** Enterprise strategists focusing on a digital workplace strategy and digitalized business processes should follow smart workspace trends and look for deployment opportunities, such as meeting rooms, huddle rooms and in-building open spaces. Emerging applications will expand beyond traditional productivity scenarios to include situations that are more industry- and process-specific. Examples derived from COVID-19 include: an insurance professional using a remote digital pen that interacts directly with back-end processing systems; or a patient being remotely monitored via a wearable interface in their home that interfaces with diagnostic systems and advises healthcare professionals to improve care delivery. IT organizations will need to work much more closely with real estate and facilities teams, and vice versa. Identity, access management, privacy and security teams will also play a critical role. Anonymizing data is key to safeguard privacy expectations and help promote adoption of new services.

Additionally, electronic whiteboards are becoming integrated with traditional collaboration and content software systems, providing more opportunities for experimentation. Meeting artifacts can be better captured and connected to digital workplace graphs, to become more widely searchable. Beacons and sensors placed in key locations within a workplace can interact with mobile apps to deliver personalized information to workers, based on proximity. These can be used to improve employee learning, provide relevant information on products, or communicate safety procedures based on employee location. As workers return to work post-COVID-19, contactless authentication using facial recognition and QR code scanning will become the norm.

The smart workspace will emerge at an uneven pace as organizations prioritize potential solutions independently of one another. For instance, building upgrades may take longer than expected, and some market sectors will be laggards in terms of smart workspace adoption. Localization needs will also influence smart workspace adoption.

**Business Impact:** Instituted remote working resulting from COVID-19 has diversified smart workspaces even further. They now span home spaces, to improved employee productivity and cultural perception of the workplace by workers, to improved customer experience as employees make better use of smart workspaces to serve clients. The results of these changes will often be a reduction in cost because office utilization data will guide decisions about what types of workspace are most conducive to employee effectiveness.

The digitalization and programmatic evolution of places and things will impact IT methodologies related to system design, requiring new skills for design teams to understand how people use places and things. Smart workspaces will also have organizational impacts as traditional software teams now need to work with facilities management teams in ways not previously envisioned. The digitalization and programmability of the workplace will create new integration opportunities. For instance, smart workspace activities will signal information to digital workplace graphs and smart machines, and vice versa.

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** AgilQuest; Condeco; Estimate; Eutech Cybernetic; Microsoft; Oblong; Planon; PRYSM Group; Spacewell; Trimble

**Recommended Reading:**

“Top 10 Strategic Technology Trends for 2019: Smart Spaces”

“Crafting Workspaces That Enhance the Employee Experience”

“Market Guide for Integrated Workplace Management Systems”

“Market Guide for Resource Scheduling Applications for the Workplace”

“Emerging Technology Analysis: Building Successful Solutions for Smart Spaces”

“Market Insight: Choose the Right Technology to Dynamically Track People Within a Smart Space”

## Digital Adoption Solutions

**Analysis By:** Melissa Hilbert

**Definition:** Digital adoption solutions improve adoption of multiple tools across the organization. The software walks a user through business processes across multiple products, providing a consistent user experience, eliminating in some cases, manual entry, and providing visually clear paths to complete tasks. It enables employees to be onboarded faster and improve productivity. Sales, HR, ERP and digital workplace are key use cases but this technology applies to all functional areas in an organization as well as external products sold by an organization.

**Position and Adoption Speed Justification:** Digital adoption solutions are evolving at a fast pace. They should be used to increase overall adoption and ROI of purchased point solutions. These solutions increase usage of multiple point solutions, helping employees gain efficiency and provide a faster time to full performance for new hires. The largest use case is for sales onboarding to get them up to full productivity faster utilizing multiple point solutions. The second use case helps with process change management. The technology requires little technical involvement and deploys quickly. It is deployed mainly on top of cloud solutions showing little, if any, degradation in performance of the original software; although in some cases they can be deployed with legacy on-premises solutions. Analytics are evolving and use of simple bots is emerging. The larger vendors can provide quantifiable evidence that can attest to improved performance and justification for the expense of a digital adoption solution. Digital adoption solutions do not replace formal training or sales training solutions, but rather reinforce formal learning.

**User Advice:** Application leaders should investigate these solutions where there is lack of adoption for a required application such as sales force automation (SFA) or Office 365 (O365) as a first use case within a job role. If there are multiple applications that are required for full connection of work, these should be considered as a bundled purchase to minimize pricing of the overall solution. Make sure to include employees in the design and testing of the workflows and to benchmark and track improvements to performance.

**Business Impact:** Digital adoption solutions can provide high value to an organization looking to improve adoption of existing tools. Performing tasks more quickly can enable new employees to become fully productive faster and existing employees to change rapidly as business processes change. For example, tenured sellers will be able to focus more on selling than the execution of tasks. The solution provides the best path to accomplish tasks resulting in the elimination of manual and “offline” data input and tracking.

Digital adoption solutions are relevant for any organization in any vertical where an SFA, HR, ERP or digital workplace solution is used. They are most helpful for when:

- There are multiple solutions that need to be adopted for a user to perform their job
- Tasks are complex
- Tasks are performed infrequently
- Business processes are changing frequently

For external use cases where your company sells software, consider OEMing a DAS. Its capabilities help with onboarding, user adoption and increased customer satisfaction. While the initial use case is for sales, it should be considered for other parts of the organization such as HR, ERP, procurement and digital workplace.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent



**Sample Vendors:** Appcues; AppLearn; Apti.io; Digital Attitude; InsideBoard; Pendo; Toonimo; Userlane; WalkMe; Whatfix

**Recommended Reading:**

“Increase Sales Productivity With Digital Adoption Solutions”

**Workstream Collaboration**

**Analysis By:** Mike Gotta

**Definition:** Workstream collaboration tools create a persistent chat-based workspace that helps groups coordinate shared work activities. Tools integrate direct and group messaging, alerts, activity streams, files, tasks, bots, search, meetings (audio, video) and applications into a channels-based experience.

**Position and Adoption Speed Justification:** Workstream collaboration (WSC) tools are best used to coordinate project- or process-related teamwork. Business use cases include project management, service and support, sales, marketing, and operational scenarios. Workstream collaboration improves team communications and coordination using channels to unify interaction with applications, tasks and content. As products include AI-related services, greater levels of collaboration automation and a broader set of use cases will emerge.

**User Advice:** Evaluate workstream collaboration technology for use by groups and teams whose work activities are conversationally driven, with dynamic workflows and that are geographically dispersed. Growing adoption of WSC tools can lead to ill-suited use cases, creating change management burdens and weakening business results. While a strong solution for remote work in response to COVID-19, organizations should provide contextual training and information on how to use WSC tools for their particular role and work activity (versus generic tech learning). Add-on apps can also help with team creation, usage, and task coordination as third-party vendors fill tool gaps. Adopters of workstream collaboration solutions report that onboarding new team members is relatively easy; however, etiquette takes time to establish and effective use can require team members to work in new ways, which can require a range of enablement services to improve adoption.

**Business Impact:** Workstream collaboration tools improve teamwork across a variety of business activities. With the rise in remote work, there has been significant acceleration to deploy these tools to create a common activity hub. WSC tools will become as vital to employees as email. As WSC tools are used more to automate work activities, the operational and logistical benefits will continue to broaden as well.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Cisco; Google; Mattermost; Microsoft; Slack



**Recommended Reading:**

“Market Guide for Workstream Collaboration”

“Adoption of Meeting and Workstream Collaboration Solutions Spikes in Response to Coronavirus (COVID-19) Pandemic”

“Forecast Snapshot: Workstream Collaboration, Worldwide, 2019”

“A 6-Step Checklist for Effective Deployment of Microsoft Teams in the Digital Workplace”

“Embrace Workstream Collaboration to Transform Team Coordination and Performance”

## Sliding Into the Trough

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### Digital Dexterity

**Analysis By:** Matt Cain

**Definition:** Digital dexterity is the ambition and ability to work and live digitally. While technology acumen is an essential ingredient, the most digitally dexterous employees also have an open mindset and work in an agile fashion.

**Position and Adoption Speed Justification:** Increasing recognition of the need to balance workforce skills development with technology and business change initiatives has propelled digital dexterity forward through the Hype Cycle. The 2020 pandemic which necessitated mandatory work-from-home programs was a clear indication of the need for workforce digital dexterity. Developing talent and workforce effectiveness, building high-performing teams and encouraging self-directed learning have increasingly become sources of differentiation and competitive advantage. Building a desire among the workforce to develop digital dexterity practices usually involves a change in the workforce culture. Promoting digital dexterity is an enterprisewide effort, evidenced by a 60% growth in technology skills needed for non-IT roles, according to Gartner analysis. Yet, few organizations make internal, coordinated efforts to develop digital dexterity, and even fewer have developed a corporate culture that nurtures digital dexterity.

Digital dexterity will move through the Hype Cycle and become mainstream among organizations within five years. Gartner estimates that, on average, only 15% of organizations overall have the digital dexterity to pivot to new ways of work, although there are significant variations by region, industry, company size and worker age. Only 7% to 18% of organizations (depending on region) currently possess the digital dexterity to succeed with software and services requiring digitally enlightened workers. Building digital dexterity across large organizations will take longer, whereas smaller, more agile organizations will evolve faster.

**User Advice:** Today, the digital workplace is characterized by a shift away from repetitive process jobs to nonroutine work. This is demanding greater employee agility, problem-solving skills (coping with high levels of ambiguity, complexity and constant change), critical and creative thinking, and harnessing of available and new technologies. Digital workplace leaders should place special

emphasis on talent and programs that encourage skills acquisition through individual plans, technology enablement efforts, job descriptions and recruiting practices.

Digital workplace leaders should:

- Exploit the mandatory work-from-home programs required by COVID-19 to promote the need for workforce digital dexterity.
- Partner with HR and line-of-business leaders to project digital dexterity workforce practices and implement a strategy for attracting, developing and retaining the optimum mix of staff with such skills, talent and competencies. Create and run a digital dexterity training service, making selections from a wide range of programs and tool options.
- Help top executives make the connection between technology growth, the future of work and employee engagement/experience factors to fuel digital dexterity investments.
- Backfill gaps in digital dexterity via a talent search across the organization and through worker realignment and purposeful recruitment processes, as well as by exploiting outsourced talent.
- Engage employees in programs that build digital dexterity (such as hackathons, innovation programs, and citizen development and IT job rotations).
- Use a digital workplace program with an organizational maturity model to systematically drive digital dexterity and workplace analytics to measure and monitor impact.
- Clearly align digital dexterity initiatives with the organization's data science strategy. This entails building core citizen data science competencies across the organization in a systematic fashion that should engage HR and business stakeholders.

**Business Impact:** Digital dexterity is a transformational capability that is applicable across the entire organization and across different industries. It defines the critical “people” component that enables digital businesses to thrive. Organizations need to develop a business and cultural environment that enables them to operationalize employees’ digital dexterity and apply it in novel and intelligent ways.

COVID-19 highlighted for organizations the need for digital business transformation. To achieve this, they will need to build digital dexterity into the workplace and make full and effective use of media and information to mobilize and deliver results in both physical and virtual environments.

Digital dexterity enables people to forge effective personal and working relationships with others across physical and virtual environments — this became apparent during the 2020 pandemic. It is an essential ingredient for successful transformation to agile working practices, the offloading of processes and repetitive tasks to smart machines, flatter management hierarchies, and highly collaborative work styles.

We did not advance digital dexterity along the Hype Cycle curve this year because many organizations concluded that their employees were less capable of leveraging team productivity tools remotely than anticipated. The pandemic, however, did force many employees to quickly develop basic skills with these tools.

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Emerging

**Recommended Reading:**

“Employee Digital Dexterity Is an Essential Element of the Next-Generation Workforce”

“Create a Culture of Digital Dexterity With the ‘New Work Nucleus’”

“Enablement Mindset Is the Missing IT Ingredient to Improve Workforce Digital Dexterity and the Employee Experience”

“The Role of Workstream Collaboration in the New Work Nucleus”

“Collaborative Work Management in the New Work Nucleus”

“What’s Trending With Application Leaders?: Digital Dexterity and the New Work Nucleus”

## Unified Workspaces

**Analysis By:** Nathan Hill

**Definition:** Unified workspaces is a user-centric computing model that delivers applications and data in a contextual and adaptive work experience designed to empower individuals and drive productivity and satisfaction. The strategy integrates identity, SaaS applications, on-premises applications and data into a workspace that is accessible from a broad range of devices. In its most advanced form, it applies analytics and machine learning to provide alerts, suggest actions and automate responses across applications within the workspace experience.

**Position and Adoption Speed Justification:** Unified workspaces are enabled by a collection of integrated technologies that deliver a continuous and contextual workspace experience to end users across their devices. Unified workspaces offer flexibility and choice in how employees work — allowing personal preferences for applications and devices. Elements include device and application management tools, content and collaboration tools, contextual identity management and security tools, and workplace analytics. Each individual component has a different level of maturity.

In 2020, unified workspaces is positioned at the midpoint between peak of hype and the Trough of Disillusionment. Unified workspaces have tremendous potential but integration challenges and tactical reprioritization, for the fundamental needs of supporting remote work during COVID-19, will limit adoption to the minority of organizations through 2021. Despite current circumstances, unified workspaces remain a valuable innovation.

**User Advice:** Review the client computing investments holistically, as individual investments in capabilities contributing to a unified workspaces strategy may be initiated and deliver benefits independently. Not having a cohesive approach may create gaps and inefficiencies in the business

or in end-user workflows. Determine what elements (e.g., lack of strategy, budget or skills) are holding you back from moving toward a unified workspace vision, and plan for investment in those areas in the coming years. Calculate the total cost of ownership (TCO) of moving from traditional endpoint management to full unified workspaces. Improved user satisfaction and productivity can help offset the likely increase in technology costs.

**Business Impact:** The nature and style of work continue to evolve, becoming increasingly mobile, personal and collaborative. Key benefits of unified workspaces are:

- Increased support for technology adoption and employee digital dexterity
- Increased technological autonomy, which is expressed in the ability to use personal devices for work (i.e., BYOD)
- The ability to rapidly support new technology use cases and business models

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Awingu; BlackBerry; Blu5 Group; Citrix; Liquit; oneclick; VMware; Workspace365; Workspot

### **Recommended Reading:**

“The Next Phase of Unified Workspace Evolution: Contextual Workspaces Optimize a Digital Workplace Strategy”

“Enablement Mindset Is the Missing IT Ingredient to Improve Workforce Digital Dexterity and the Employee Experience”

## Chromebooks for Enterprise

**Analysis By:** Stephen Kleynhans; Katja Ruud

**Definition:** Chromebooks are notebook computers running Google’s ChromeOS, rather than Microsoft Windows OS or Apple macOS. Although initially targeted solely at the education and consumer markets, Google has expanded into the enterprise market adding business-focused Chromebooks running ChromeOS for Enterprise. New features include expanded management options through G-Suite Admin Center, better control of updates, enhanced operational modes, and integration with corporate identity and security tools.

**Position and Adoption Speed Justification:** Chromebooks are well-positioned for organizations that operate the majority of their apps and workloads in the cloud, especially G-Suite customers. Accessing legacy applications introduces additional complexity and cost as it requires VDI to deliver a virtual desktop.

In this sense, Chromebooks are a form of mobile thin client with similar functionality and usage. Chromebooks are easy to install and manage, with minimal IT support. While consumer-grade Chromebooks have been available \$160-\$350, Enterprise-grade devices typically have a more premium price run in the \$700-\$1000 range.

The usage of Chromebook devices continues to expand slowly. Gartner estimates that total worldwide Chromebook sales reached 16.3 million units in 2019, a growth of 9.3% versus 2018. Enterprise Chromebooks are still a new addition, and have seen slow adoption with mixed results.

However, we expect gain traction as they mature as both a mobile thin client option and secure “grab and go” mobile alternative for normally office bound users.

**User Advice:** Although Chromebooks have done well in education, particularly in North America, they face challenges in the corporate setting.

As organizations embark on a digital business transformation moving toward a cloud computing model, many have adopted browser-based applications and the Chrome browser, making them potential candidates for Chromebooks.

Although new applications are typically cloud centric and align well with a browser based access model, there is still a large base of legacy applications and work-processes that are built around traditional Windows PCs. Chromebooks work best for users needing occasional mobility whose work is already primarily browser based or delivered using VDI.

Although functionality has improved during the past year, issues still exist with localization, hardware support, peripherals and basic functions like printing, which could derail many classic office worker use cases. As a result the purchase volumes remain small especially as the price points for enterprise Chromebooks are not significantly below traditional notebooks. The launch of hybrid form factors for Chromebooks has the potential to make them more appealing for front-line workers vs. clamshell Chromebooks since users can use the device as both tablet or a notebook. For larger organizations, Chromebook can be used by companies that have already deployed cloud-based applications and can embrace Google ecosystem and G-Suite productivity tools.

**Business Impact:** Buying enterprise Chromebooks could help companies to reduce device management costs, accelerate deployment and minimize investment in on-premises infrastructure, however, gaining organizational support may be difficult.

Deployment of Chromebooks is often positioned as part of digital transformations requiring buy-in from senior management. G-Suite customers find the justification easier, and have embraced Google’s product development vision and its drive for simplicity.

Conversely, Chromebooks are more difficult to integrate in organizations using Office 365 where users need more than the browser versions. Chromebooks also typically require an investment in a VDI environment, either on-premises or via a cloud-based DaaS, to present legacy Windows applications to users.

Chromebooks can enable new front-line worker use cases and improve collaboration with users across the rest of business. Overall, the adoption of enterprise Chromebooks will continue to improve vs. traditional PC deployments in North America, the U.K., the Nordic countries and France, but remain a niche overall.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Acer; Dell; HP Inc.; Lenovo

**Recommended Reading:**

“Market Guide for Enterprise Desktops and Notebooks”

“Adopt Continuous Endpoint Engineering and Modern Management to Ensure Digital Workplace Success”

## Mixed Reality

**Analysis By:** Tuong Nguyen; Marty Resnick

**Definition:** Mixed reality (MR) is the merging of real and virtual worlds, where physical and graphical objects appear to interact and integrate naturally. MR, in concept, is a single technology. However, MR includes an underlying group of technologies encompassing the spectrum of immersive displays and interactive systems that spans from the digitization of real environments to augmented reality (AR) and virtual reality (VR).

**Position and Adoption Speed Justification:** MR is an overarching technology that includes all immersive displays (mainly, head-mounted displays [HMDs]) and combines functionality that spans from the displaying of fully immersive virtual worlds to ones that are augmented with matching graphics and overlays. MR’s position on the Hype Cycle curve is roughly similar to AR and VR technologies, but earlier in its maturity due to its more sophisticated capability and wide-ranging use cases.

In some respects, MR devices will be the ultimate AR/VR systems, but the most sophisticated ones are still years away from being produced. However, MR’s advanced capability means it is not as mature as its component technologies and likely won’t be adopted at mass-market levels for five years due to limits of the technology and the lack of popular apps. Leading startup Magic Leap’s decision to reduce head count in response to the COVID-19 impact will have limited impact on the progress of MR IP development due to the long maturity horizon of MR. Furthermore, new vendors such as Nreal and ThirdEye Gen are gaining press and traction in the marketplace. Microsoft continues to empower the ecosystem with advancements introduced by HoloLens 2 as well as enterprise partnerships through its Mixed Reality Partner Program. Minecraft Earth has brought significant exposure to MR experiences. Finally, technology improvements and advancements such as object occlusion provide the steppingstones to more sophisticated experiences. The

combination of these developments continues to move Mixed Reality along the Hype Cycle at a steady pace.

**User Advice:** Apply MR technology to enable new types of experiences and interactions; more personal and contextually relevant for the user to:

- Assess the tactical value of MR. While it may be the culmination of AR and VR technologies, MR will demonstrate more value in scenarios that will benefit from digital objects being aware or interacting with the physical environment. For example, fitting new surgical equipment into dimensional constraints of an operating room
- Evaluate ROI potential by focusing on a small number of pilots benchmarked against traditional, non MR experiences as well as AR and VR experiences
- Build in-house expertise for MR experiences by hiring developers with immersive skills (such as gaming engine, 3D modelling and UI design)

**Business Impact:** During the next 10 years, MR and the user experiences that it enables will undergo a fundamental change above and beyond the capabilities of AR and VR. Today, MR capabilities focus on optimizing “hands-busy” work environments such as maintenance and repair. Over time, MR will expand to include many types of experiences that can visually enhance everyday objects. New business models will emerge that change how customers buy products using MR or how they conduct operations by visually connecting the user’s view of the real world with their data-driven virtual world counterparts such as for rapid prototyping and testing of products and marketing.

**Benefit Rating:** High

**Market Penetration:** Less than 1% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Google; Magic Leap; Microsoft; Nreal; ThirdEye Gen

**Recommended Reading:**

“Venture Capital Growth Insights: Immersive Technologies”

“Emerging Technology Analysis: Augmented and Mixed Reality Opportunity for 3D Design Software and Vertical ISVs”

“Quality Is the Key to Avoiding ‘Digital Distortion’ With Your Augmented Reality Strategy”

“Top 10 Strategic Technology Trends for 2020: Multiexperience”

“Gartner’s 2020 Strategic Technology Trends for Product Leaders”

“Forecast Analysis Wearable Electronic Devices, Worldwide”



“Competitive Landscape: Head-Mounted Displays for Augmented Reality and Virtual Reality”

“3D Design and Device Convenience Hinder AR and VR Adoption”

“Market Insight: Mixed-Reality Immersive Solutions Are the Ultimate User Experience for Everyone”

“Competitive Landscape: Augmented Reality Tools for Enterprise, 2018”

## Progressive Web Apps

**Analysis By:** Jason Wong

**Definition:** Progressive web apps (PWAs) are designed to deliver an applike experience without the need to install app binaries on devices. They combine an app shell with service workers installed on desktop or mobile devices, which enable HTML5, JavaScript, Cascading Style Sheets and web content to be cached and synchronized for optimal performance. When users opt to enable them, PWAs deliver applike features such as offline data access, push notifications and a home screen icon.

**Position and Adoption Speed Justification:** Having only been introduced in 2014, PWAs are the future of desktop and mobile web experiences. All leading desktop and mobile browsers have embraced advances originally introduced by Google, Facebook, Mozilla and others. Browsers such as Google Chrome, Microsoft Edge, Mozilla Firefox and Apple Safari enable developers to implement service workers (albeit not consistently across browsers and operating systems), so that websites can behave like apps. Service workers are embedded within the browser to surface PWA functions, such as the installation of a website as an app icon on the home screen with an app shell. The installation can be done directly from a PWA-enabled website and can be shared through links and QR codes. Microsoft allows PWAs to be listed on, and deployed through, Microsoft Store; Google has also done the same for PWAs on Google Play.

Although PWAs are gaining momentum, such as use in multiexperience development platforms and digital commerce platforms, PWAs are headed toward the Trough of Disillusionment. This is due to the still fragmented user experience across browsers, fairly basic app capabilities and, unlike mobile apps, a general lack of consumer awareness of the term. Also, Apple continues to take an “arm’s-length” approach to supporting PWAs and uses the term “HTML5 apps” to describe them instead.

**User Advice:** Application leaders should:

- Inventory their organization’s mobile apps and evaluate which can be reproduced simply using PWAs, based on UI and functional feature requirements.
- Evaluate PWAs for employee-facing app use cases, such as extending intranet and employee portal functionality to a mobile-optimized interface.
- Investigate the potential security limitations of PWAs in terms of securing data cached locally on devices that use default web security and encryption technologies, such as HTTPS.
- Use PWAs in digital commerce as a means of turning web users into mobile-first users by increasing engagement and conversion rates with high-value, frequent interactions.



**Business Impact:** There are two main benefits for businesses. First, users do not need to visit an app store and install an app in order to get the capabilities of PWAs (although PWAs can be displayed in the Microsoft Store and Google Play). Second, PWAs can be changed and updated without the requirements to push revisions to an app store and force updates on users' devices.

PWAs offer fewer capabilities than native apps, but they can be achieved at a fraction of the cost associated with native app development. What is more, they can be delivered quickly and with existing web development skills and teams.

In the long run, moving to PWAs, in place of dedicated native apps, is likely to reduce platform-specific maintenance costs for mobile apps in particular. In the short term, however, fragmentation of the PWA experience across different browsers may lead to adoption challenges, as may fragmentation of support by web development tools and frameworks.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Adobe (Magento Commerce); Apple; Elastic Path; Google; Ionic; Lumavate; Microsoft; Mobify; Moovweb

**Recommended Reading:**

“Key Considerations When Building Web, Native or Hybrid Mobile Apps”

“How Progressive Web Apps Improve Digital Commerce Experience”

“Assessing Progressive Web Apps: Installable, Offline and Notification-Capable”

## Desktop as a Service

**Analysis By:** Nathan Hill; Michael Silver

**Definition:** Desktop as a service (DaaS) is a service offering that provides users with an on-demand, virtualized desktop experience delivered from a remotely hosted location. It includes provisioning, patching and maintenance of the management plane and resources to host workloads.

**Position and Adoption Speed Justification:** Organizations have long been interested in adopting virtual desktop infrastructure (VDI), but complexity and capital investment have made VDI implementations difficult. Relying on a service provider to take on the risk of platform build-out and to provide high-volume computing services is an attractive alternative for organizations that want to deliver applications on a device-neutral basis.

DaaS vendors originate from a software, cloud or hosting backgrounds. Some own the complete platform (such as Amazon WorkSpaces and Microsoft Windows Virtual Desktop), while others

leverage hyperscale platforms, especially from Amazon and Microsoft, to bring a service-brokered offering to market.

The adoption of cloud office and SaaS increases the viability of a DaaS solution as an organization's data and services become increasingly externalized, especially when supporting highly geographically dispersed workers. This, coupled with the entry of Microsoft into the market, has injected a significant amount of hype back into DaaS. Microsoft isn't the only DaaS choice, but it heavily influences digital workplace I&O leaders' thinking, due to Microsoft's control points in the ecosystem. DaaS is moving toward the Trough of Disillusionment partly because of greater understanding of its long-term cost implications, but also as knowledge of all strengths and weaknesses become more widely understood.

COVID-19 has highlighted the value and business continuity strength of DaaS in its ability to rapidly enable remote work where on-premises options have stalled due to issues with data center access and infrastructure supply chains. COVID-19 is likely to accelerate adoption of DaaS, and may perpetuate as a delivery architecture even when employees return to the office.

**User Advice:** Enterprises should consider DaaS for use cases related to transient access requirements, business continuity needs or accelerating business goals. The typically high total cost of ownership (TCO) makes it hard to justify DaaS, but COVID-19 has highlighted it as a very strong solution for remote working and work-from-home scenarios. Organizations should not hesitate to conduct a proof of concept (POC) to gain a better understanding of how this service can benefit their organization.

Use DaaS for:

- **Short-term employees** — such as seasonal workers, where user volumes spike, or for workspace provisioning to third parties and contractors. The per-user/per-month common billing approach makes this ideal to avoid asset-loss risk and to reduce the provisioning lead time associated with notebooks.
- **Merger and acquisition (M&A)** — As with short-term employees, VDI can help with M&As, but the lead time for infrastructure procurement and underutilized capacity may make DaaS a better fit to accelerate the M&A process, even if only temporarily.
- **Remote workers** — DaaS can extend the workspace to remote users, especially with hyperscale solutions that have deep global penetration, and may be preferable to expanding an existing data center or colocation footprint.
- **Business continuity** — DaaS can be used as a workspace recovery solution and has proven a successful solution during COVID-19, enabling organizations to securely extend work from home.

Graphics-enabled DaaS extends the service to designer use cases. However, the cost differential compared with on-premises VDI and the performance sensitivity can be even greater here. Organizations must test functionality and performance thoroughly. Look to combine DaaS with other services provided from the same cloud provider to improve network connectivity to the cloud (such as SLA-backed, dedicated links) to optimize performance.

For smaller organizations that are aggressively migrating to cloud services and have fewer legacy integration challenges, the adoption of DaaS as a complete workforce solution is likely to be more viable. Typically, these organizations do not want to invest capital expenditure (capex) in data center infrastructures and operating expenditure (opex) in associated administration staff, if this distracts them from their core business goals.

**Business Impact:** DaaS has suffered from the challenges associated with the technologies that power it, namely server-based computing (SBC) and VDI. Cost, complexity and connectivity have all been inhibitors. However, with more organizations looking to deliver user-centric services across different devices and locations with an ever-increasing consumption of cloud services (SaaS, storage and productivity tools), DaaS is considered a strategic solution. The benefits of the “pay-per-use” utility of the DaaS opex model have gained mind share, as has the entry of Microsoft into the market. However, the service needs to be able to deliver a complete workspace solution for it to be viable as a primary business platform. Growth in adoption through the COVID-19 pandemic is helping to accelerate maturity in the service, but hype still remains.

Many DaaS vendors are expanding their service portfolio beyond simple OS hosting to deliver a complete workspace management life cycle solution. However, organizations that are totally reliant on browser-agnostic web applications will question the need for a Windows OS-based workspace intermediary.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Amazon; Citrix; Diso; Dizzion; Evolve IP; Microsoft; Nutanix; Tehama; VMware; Workspot

### **Recommended Reading:**

“Market Guide for Desktop as a Service”

“Forecast Analysis: Desktop as a Service, Worldwide”

“Microsoft’s WVD Will Accelerate Virtual Desktop Maturity but May Not Lower Total Cost of Ownership Enough”

“Physical, Virtual and Cloud Desktops: Is a Hybrid Approach Inevitable?”

“How to Keep End Users Connected to the Digital Workplace During Disruptions”

## Unified Endpoint Management

**Analysis By:** Dan Wilson; Chris Silva

**Definition:** UEM is a set of offerings that comprise management of mobile devices (MDM) and personal computers via traditional client management technology (CMT) or modern OS management. This is through a single console that combines the application of data protection, device configuration and usage policies. UEM tools use analytics and telemetry from users, apps and devices to inform policy and related actions; and integrate with unified endpoint security (UES) tools to enhance policy management and enable frictionless authentication.

**Position and Adoption Speed Justification:** Gartner has long described the evolution to UEM as a journey through three waves:

- Using separate tools for PCs and mobile devices (traditional management)
- Using the same management product, but different processes, for PCs and mobile devices
- True convergence — PCs and mobile devices are managed through the mobile device management (MDM) APIs provided by the OS, whether it's Apple iOS or macOS, Google Android, or Microsoft Windows.

Now we are seeing UEM expand beyond the management of PCs and mobile devices to offer deeper insights through endpoint analytics and deeper integration with identity and access management and unified endpoint security tools. In addition to the base UEM capabilities, many vendors are expanding their offering to differentiate. While Gartner is seeing some clients embrace UEM tools and modern OS management, most organizations are still seeing UEM as a roadmap item to be addressed in the next few years. In preparation for UEM, organizations must do two things:

- Modernize application stacks, removing dependencies of critical apps on a specific platform or a specific browser/runtime environment
- Consolidate mobile and endpoint management teams to eliminate political barriers to UEM adoption
- Upskill staff to understand how to address the critical functions of CMT with UEM techniques

Hype is moving toward the trough. Interest in UEM remains strong and use-case-driven, yet many organizations revealed the significant processes and technology changes that are required for modernizing management.

**User Advice:** Clients should stop procuring and consider not renewing licenses for disparate MDM, EMM and CMT tools. They should review existing entitlements to determine the most cost-effective and best fit UEM solution to adopt to replace those tools in the next year. They should investigate the potential to embrace modern OS management using the UEM products in the next two years.

**Business Impact:** Taking full advantage of UEM disrupts long-standing traditional processes, tools and organizational designs. It will require a new approach, consolidated organization and significant process reengineering, but has several benefits:

- Simplifies management of continuous OS updates.

- Enables management of devices regardless of their connection (on LAN, VPN, or internet connected).
- Support a wider range of devices and operating systems.
- Enables internet-based patching, policy, configuration management.
- Reduces the total cost of ownership (TCO) of managing endpoint devices by simplifying device management and support processes.
- Supports tool portfolio rationalization and reduction efforts.
- Establishes a baseline for integrated UES tools to provide continuous, contextual authentication and controls.

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** BlackBerry; Citrix; IBM; Ivanti; ManageEngine; Matrix42; Microsoft; MobileIron; Sophos; VMware

**Recommended Reading:**

“How to Keep End Users Connected to the Digital Workplace During Disruptions”

“Essential Considerations When Choosing Separate PC and Mobile Management Tools”

“Adopt Continuous Endpoint Engineering and Modern Management to Ensure Digital Workplace Success”

“Prepare for Unified Endpoint Management to Displace MDM and CMT”

“Magic Quadrant for Unified Endpoint Management Tools”

“Solution Criteria for Unified Endpoint Management Systems”

## Cloud Application Virtualization

**Analysis By:** Nathan Hill

**Definition:** Cloud application virtualization is an application packaging and deployment technology that isolates applications from each other and limits the degree to which they interact with an underlying OS. The “cloud” aspect is that the technology is designed to be managed and/or delivered over the public internet without changing the underlying application code, thus enabling cloud delivery of a non-cloud-native application.

**Position and Adoption Speed Justification:** Cloud application virtualization optimizes the secure delivery of Win32/64 and web applications over the public internet. Organizations often use application virtualization to support application management for server-based computing and virtual desktops without increasing the number of images required.

Cloud application virtualization can be considered an important tool in an application modernization initiative, especially as a supporting technology during transformation, but is still some way from the mainstream, where traditional application virtualization resides.

**User Advice:** Cloud application virtualization shares a value proposition very similar to PC application virtualization. Therefore, organizations should assess whether existing application virtualization technologies need to be supplemented or replaced with new cloud delivery or management functionality. The demand for adoption will be predicated on the need to access applications from internet-connected endpoints, move to a more ubiquitous cloud management approach and free up endpoint migration activities from legacy application friction points. However, organizations must analyze how this technology will interface with established and planned client management tools, including existing application virtualization and packaging tools, to avoid driving up total endpoint management costs and to ensure that virtualized applications are manageable.

Test the most important applications you need to virtualize. Use cloud application virtualization tactically as a quick way to modernize apps and accelerate a move to a modern management workspace strategy. This works best if the number of applications is small and/or there is a planned retirement date. Use cloud application virtualization strategically by delivering self-service applications as part of a bring-your-own device (BYOD) program, especially in education. It can also be used tactically to enable contractor or third-party access scenarios.

Enterprises must consider the potential support implications of this technology. Not all application vendors support their applications running in a virtualized manner (where native application as a cloud service can help), and there may also be license compliance issues that should be investigated prior to investing in the technology.

**Business Impact:** Cloud application virtualization can improve manageability by building on the benefits of application virtualization to provide more ubiquitous access to the existing application portfolio, especially older, OS-dependent applications. This technology may increase IT agility by allowing applications to be delivered to users more quickly after they request them, or even to self-provision via (cloud-hosted) application stores without installation on the end-user device.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Apporto; Citrix; Cloudhouse; Microsoft; Numecent; VMware

PC as a Service

**Analysis By:** Stephen Kleynhans

**Definition:** PC as a service (PCaaS) refers to a PC procurement model in which customers pay a monthly fee per user to get a configured, managed PC. It builds on a combination of leasing, configuration support and a range of services, but promises more flexibility than traditional leasing and an opex model. PCaaS, although sometimes called “device as a service,” is distinct from DaaS, as Gartner defines it. DaaS describes an as-a-service model for delivery of virtual desktops from the cloud.

**Position and Adoption Speed Justification:** Pressure to transform IT delivery services to support and add value to new business initiatives is causing enterprises to examine alternatives to traditional PC acquisition and management practices. PCaaS is available from a number of providers (including PC makers, large corporate resellers and managed workplace service outsourcers), although much of the focus is coming from the PC makers. Offerings typically build on standard PC leasing agreements, and bundle basic life cycle services with some process management for a single monthly per-seat fee.

However, in the last year we have seen that the offerings are maturing and expanding with varied terms and conditions and service options, while there are still a number of custom deals and there is less confusion for customers. We expect that offerings will continue to evolve through 2022, as customers become more familiar with the concept, and vendors grapple with building attractive, profitable and affordable deliverables by expanding the service offered. Ultimately, it will appeal to many of the same organizations that are looking at PC leasing today, or those looking to off-load basic logistical activities associated with PC hardware deployment and maintenance.

**User Advice:** Customers interested in moving toward a pay-as-you-go model associated with PC procurement should investigate PCaaS offerings as an alternative to standard leasing. However, they must ensure that the services bundled with the offerings are not duplicative of existing contracts or internal capabilities. Be prepared for potential volatility in the price of the services, as vendors evaluate the true cost of providing these capabilities. Additionally, challenge suppliers to prove their ability to provide the services offered and to establish appropriate SLAs and a monitoring process.

**Business Impact:** PCaaS enables customers to convert some costs associated with outfitting users with a PC to a single predictable monthly fee. It can also reduce the number of touchpoints and contracts needed for service delivery, potentially improving accountability. However, it can also hide hidden fees and encourage vendor lock-in.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** CompuCom; Dell; HP Inc.; Lenovo; Microsoft

**Recommended Reading:**

“How to Successfully Move to PC as a Service”



## Augmented Reality

**Analysis By:** Tuong Nguyen

**Definition:** Augmented reality (AR) is the real-time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real-world objects and presented using a mobile, head-mounted-type display or projected graphics overlays. It is this “real world” element that differentiates AR from virtual reality. AR aims to enhance users’ interaction with the environment, rather than separating them from it.

**Position and Adoption Speed Justification:** Current technology is best suited for purpose-built, specialized solutions. As such, position and adoption speed will vary by vertical and industry. Current horizontal tasks seeing the most traction are task itemization, visual design and context-based work instruction. This profile represents a homogeneous view of AR implementations across market segments.

Market interest is growing steadily, but AR continues to struggle with mismatched expectations (vendors promising solutions beyond current capabilities) and poor implementations (for example, solutions delivered without immersive development [3D design and interface] knowledge or workflow integration, or not mapped to business value or need). Current solutions are better described as AR-inspired solutions — experiences that contain elements of AR to offering limited, purpose-built capabilities. AR adoption continues mainly in enterprise applications. Consumer-facing implementations are still struggling to show consumers consistent value. Better hardware, coupled with more compelling use cases, is needed before further progress can be made.

Based on Gartner inquiry (25% increase in inquiries in 2019 over 2018) and industry news, B2B AR continues to gain traction as more enterprises are seeing the value of using AR in their workflow. Moreover, a Gartner 2020 CIO survey indicates that 27% of respondents are currently using, or evaluating/exploring AR. HMD sales reflect the burgeoning pilot deployments. Advancements in HMD hardware (lighter, more durable, safer, etc.) will provide more compelling hands-free use cases for AR as well.

**User Advice:** Organizations looking to implement AR experiences should:

- Decide on the audience for your AR experience. Internal- and external-facing solutions are not transposable.
- Restrict initial trials to a specific task or goal. Set benchmarks against unaugmented solutions to understand risks and benefits.
- Set the business goals, requirements and measurements for your AR implementation before choosing a provider.
- Rich and robust offerings can bring value only if you have a clear intention for the deployment. For external-facing implementations, use AR as an extension of your brand and experience. For internal-facing implementations, use AR as a tool that will enhance employee job function.

This could include, for example, delivering context-specific information at the point of need for mobile workers, better leveraging experts (using one-to-many video support) in plant and maintenance operations, or enhancing business processes via AR-based training and instruction.

**Business Impact:** AR bridges the digital and physical world and provides cognitive augmentation for user. AR provides a digital filter to enhance the user's surroundings with relevant, interesting and/or actionable information. This has an impact on both internal- and external-facing solutions. For example, internally, AR can provide value by providing checklists for training and maintenance or for remote telestration in see-what-I-see video collaborations. Externally, it offers brands, retailers and marketers the ability to seamlessly combine physical campaigns with their digital assets. As such, AR is broadly applicable across many markets, including gaming, industrial design, digital commerce, marketing, mining, engineering, construction, energy and utilities, automotive, logistics, manufacturing, healthcare, education, customer support, and field service.

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Apple; Atheer; Google; Librestream; Microsoft; PTC; Scope AR; Ubimax; Upskill; Wikitude

### **Recommended Reading:**

"Venture Capital Growth Insights: Immersive Technologies"

"Emerging Technology Analysis: Augmented and Mixed Reality Opportunity for 3D Design Software and Vertical ISVs"

"Quality Is the Key to Avoiding 'Digital Distortion' With Your Augmented Reality Strategy"

"Competitive Landscape: Head-Mounted Displays for Augmented Reality and Virtual Reality"

"3D Design and Device Convenience Hinder AR and VR Adoption"

"Augmented and Virtual Reality in the Digital Workplace: Top Use Cases"

"Market Opportunity Decision Framework for Tech CEOs: Augmented Reality and Virtual Reality Use Cases"

"Competitive Landscape: Augmented Reality Tools for Enterprise, 2018"

"Market Guide for Augmented Reality"

"Market Trends: Advancements in Immersive See-Through Technologies Will Differentiate Augmented Reality Glasses"

## Head-Mounted Displays

**Analysis By:** Tuong Nguyen

**Definition:** Head-mounted displays (HMDs) are small displays or projection technology integrated into head-worn devices. They are worn or mounted on or near the head so their displays can be seen by the wearer at an ideal viewing distance. Additionally, aspects of the visual content will be contextual information that translates the wearer's state into visual cues.

**Position and Adoption Speed Justification:** HMDs were subject to significant hype, and as a technology it is maturing. Industry efforts indicate positive momentum in this market, key factors include:

- Growing popularity, availability and success (for example, Oculus Quest) of all-in-one VR HMDs; creating a midtier category of product that's more user-friendly
- More accessible and usable devices driven by all-in-one VR HMDs
- Growing landscape of mixed reality (MR) HMDs
- Steady enterprise adoption of augmented reality (AR) HMDs
- Continued technology improvements across the spectrum of HMDs such as 6DOF, field-of-view, and interfaces have made experiences much more immersive

Despite sales growth in 2019, HMD sales (dominated by VR) continue to be modest, with indications that sales have slowed in 1Q20 (even prior to the pandemic). Although industry interest in the potential of virtualized interactions for consumers is high, that impact and investment is more likely to be seen in the enterprise; where the value proposition is still much stronger. Mass-market penetration won't be achieved until key elements such as content availability and device usability and accessibility are vastly improved. Apple's rumored head-worn device has had a limited impact on the pace and trajectory of HMDs, but will likely accelerate adoption as the launch date draws near and details are confirmed by the company. In the meantime, prosumer devices such as Vuzix Blade and Focals 2.0 by North will improve visibility and acceptance among the broader market.

**User Advice:** Use HMDs as an extension of your current endpoint devices (laptops, smartphones, tablets, monitors) spectrum and also:

- Evaluate AR/MR HMDs for situations where the user's hands are occupied with a task or when the user is moving while accessing information — for example, to review work instructions, schematics or customer data.
- Assess the cost of VR experiences against the benefits. The cost of service and customization for VR experiences can come at a high cost, but there are also barriers around user interfaces (how to interact with virtual, 3D objects) and user experience (motion sickness and other adverse, physical reactions due to sensory mismatch).
- Adopt HMDs tactically — current devices are purpose built hardware with rapid (yearly) product release cycles.

Evaluate ROI potential by monitoring HMD advancement such as improvements in display resolution, expanded fields of view, better battery life, comfort and lower cost.

**Business Impact:** HMDs can provide an immersive and potentially hands-free, intuitive way to interact with the physical and digital world. Large enterprises are seeing value in using AR HMDs for use cases such as first-time fix reduction, increase in productivity and work order completion, and improved safety. Value from VR HMDs is mostly for entertainment, but businesses are seeing more adoption for training and product design and reviews. MR HMD use cases are further down the timeline and technology intersects with usability and use cases that benefit from digital interaction with physical objects such as combining physically accurate dimensions and measurements for large equipment, or facilities to visualize architectural fit.

**Benefit Rating:** High

**Market Penetration:** Less than 1% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Epson America; Facebook; Google; HTC; Microsoft; Nreal; RealWear; ThirdEye Gen; Varjo; Vuzix

**Recommended Reading:**

“Venture Capital Growth Insights: Immersive Technologies”

“Top 10 Strategic Technology Trends for 2020: Multiexperience”

“Gartner’s 2020 Strategic Technology Trends for Product Leaders”

“Competitive Landscape: Head-Mounted Displays for Augmented Reality and Virtual Reality”

“Market Trends: Advancements in Immersive See-Through Technologies Will Differentiate Augmented Reality Glasses”

“Forecast Analysis Wearable Electronic Devices, Worldwide”

“3D Design and Device Convenience Hinder AR and VR Adoption”

## Virtual Reality

**Analysis By:** Tuong Nguyen

**Definition:** Virtual reality (VR) provides a computer-generated 3D environment (including both computer graphics and 360-degree video) that surrounds a user and responds to an individual’s actions in a natural way, usually through immersive head-mounted displays (HMDs). Gesture recognition or handheld controllers provide hand and body tracking, and haptic (or touch-sensitive) feedback may be incorporated. Room-based systems provide a 3D experience while moving around large areas, or they can be used with multiple participants.

**Position and Adoption Speed Justification:** Current use cases continue to focus on gaming, entertainment and 360-degree video. A number of supply-side and demand-side factors have slowed the momentum of consumer and enterprise adoption:

- The supplier ecosystem has been slow to advance products
- Breadth and quality of content remain limited
- Solutions lack scalability
- Lack of enterprise-ready solutions
- Consumer interest has slowed
- Hardware and technology innovation, while progressing will take three to five years to significantly improve solutions

**User Advice:** Use VR to support your organization's efforts for training, visualization and collaboration tasks requiring 3D content (such as BIM and CAD)

- Identify procedures and experiences which may benefit from virtualized visual interactions
- Discover potential benefits of VR by benchmarking traditional practices against VR experiences
- Focus on a small number of pilots based on platforms designed to meet enterprise requirements
- Avoid point solutions and mixing VR trials with AR/MR ones

**Business Impact:** Although VR can be amazingly sophisticated and beneficial, the level of customization and limited scalability can come at a high cost — outweighing potential benefits in many situations. VR developers should consider targeting scenarios where using advanced visualization and HMDs can benefit the task or customer interaction point due to their ability to offer higher degrees of visual fidelity and personalization over what flat-screen-based systems can provide. Examples include immersive video game development, interactive movies and new storytelling experiences, and live events. Alternatively, focus on training simulations for empathy and decision making skills that are high-cost, high-insurance or high-risk. Examples include expensive or inaccessible locations, such as space or deep-sea exploration, surgical training, and onboarding for dangerous, or remote locations, such as an oil rig. Potential benefits of VR include:

- Reduce training costs for inaccessible and centralized training facilities, or equipment downtime to train employees
- Reduce risk/increase safety by allowing employees to acclimate to equipment and environments through simulated experiences prior to live participation
- Improve design cycle time through direct collaboration with 3D assets

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** EON Reality; Facebook; Google; HTC; Insta360; Matterport; Motive; Ricoh; Sony; STRIVR

**Recommended Reading:**

“Venture Capital Growth Insights: Immersive Technologies”

“Top 10 Strategic Technology Trends for 2020: Multiexperience”

“Gartner’s 2020 Strategic Technology Trends for Product Leaders”

“Competitive Landscape: Head-Mounted Displays for Augmented Reality and Virtual Reality”

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“Market Opportunity Decision Framework for Tech CEOs: Augmented Reality and Virtual Reality Use Cases”

## Climbing the Slope

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### Team Collaboration Devices

**Analysis By:** Stephen Kleynhans

**Definition:** Team collaboration devices combine a computer and, usually, videoconferencing and/or audioconferencing hardware with a digital whiteboard and custom software to create a turnkey solution for meetings. As self-contained devices, these are relatively expensive; however, they can provide customized interfaces and simple operation. They typically are shared devices, without a specific assigned user.

**Position and Adoption Speed Justification:** Digital workplace initiatives are driving an interest in new options for conference room and meeting technology solutions. Team collaboration systems include software to manage meetings (start, stop, share and archive), enable projection from both the device itself or from participant devices, and include all of the functionality of interactive whiteboards. Features include the ability to walk up and start using the device immediately with limited or no sign-in process. The process may be aided by proximity and presence detection.

Prices in this space run from \$5,000 to \$10,000 for entry-level systems to more than \$25,000 for large, full-featured solutions. Smaller units are well-positioned for huddle spaces, offices and ad hoc meetings, with larger units servicing full-size meeting rooms. Both help enable small-to-midsize groups to have more effective meetings, with some participation from remote participants. The downside is that they are often best integrated with a specific vendor’s communication and collaboration ecosystem.

The three most recognized products in this space are the Microsoft Surface Hub, Cisco Webex Board and Google Jamboard. Successful devices in this category provide:

- Easy walk-up usage with minimal effort on the part of users
- High-precision pen inputs with low latency, to make drawing feel natural
- A whiteboard canvas with easy capture to an enterprise repository (OneDrive for Business and Google Docs)
- Content sharing with local and remote participants (Microsoft Teams and Cisco Webex)
- Security that removes meeting content from the device after it ends
- Integration with enterprise collaboration tools

Team collaboration devices provide a natural use model with no setup required to start drawing on the device. However, some basic user training may be required to fully unlock some of its more-complex features around multitasking or conferencing.

**User Advice:** Even though these devices are simpler to use than cobbled together solutions, they often still are not used optimally as users are often poorly trained or unable to understand their value. Ensure user education and localized expert champions are developed to ensure a return on the investment.

To some extent these device compete with, but also complement, turnkey meeting room systems from various suppliers (Microsoft Teams Room, Zoom Room Systems) although the lines are blurring to enable these separate solutions to work together more smoothly.

Analyze collaboration requirements across different user groups and physical workspaces. Select vendors based on integration with existing productivity software, and on the ability to support your organization's different geographical locations. Some vendors require an ongoing cloud subscription that should be calculated as part of the overall platform investment.

Expect the life span of these systems to be no more than five years.

**Business Impact:** As the nature of work becomes increasingly collaborative, organizations will invest more to equip shared workspaces to encourage physical and virtual collaboration. In some instances, organizations may require complex and expensive room systems with multiple screens and telepresence. In other cases, many smaller, shared spaces used for team collaboration will be fitted with less-expensive devices.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Cisco; Google; Microsoft; Prysm; Ricoh; Sharp

**Recommended Reading:**



“Select the Right Technology for Modern Meeting Rooms”

“Create a Catalog of Activity-Based Spaces in the Digital Workplace to Improve the Employee Experience”

## Citizen Developers

**Analysis By:** Jason Wong

**Definition:** A citizen developer is an employee who creates new business apps mainly for internal consumption, normally by teams or workgroups, using development tools and runtime environments sanctioned (or at least not actively forbidden) by corporate IT or the business units.

**Position and Adoption Speed Justification:** Citizen development is part of the business-led IT shift and the democratization of technologies trend. Business leaders are increasingly looking outside the IT organization for applications, as well as building an increasing number of applications themselves. A trend in the digital workplace is promoting digital dexterity in the workforce, which includes fostering citizen development. The COVID-19 pandemic has compounded the need for greater business agility and putting better tools in the hands of employees so they can more rapidly solve their problems with new apps and automation for enhanced productivity and decision making. According to a 2019 Gartner survey on citizen development, 41% of respondents have active citizen development initiatives and 20% of those that don't are either evaluating or plan to start citizen development initiatives. We expect this adoption trend to accelerate further due to the changes brought on by COVID-19, which promote the idea of a digital workplace.

Citizen developers are empowered by the availability and power of low-code development tools, and “no code” tools that specifically market to the nonprofessional developer. Many smaller vendors and some large ones (such as Microsoft and Salesforce) now provide powerful low-code application platforms that make it easier for end users to develop their own applications — even applications that once required professional development skills, such as building mobile apps and using AI services. Typically cloud-based and offered as SaaS, many of these tools require only a web browser to login and build, deploy and run an app. Over time, some citizen developers will become part of fusion teams that include business and IT collaboration and development.

**User Advice:** Application leaders must engage potential citizen developers more actively to enlist and enable them to become “good citizen developers.” Ignoring or attempting to prevent citizen development often carries more risks and limits enterprise innovation. Specifically, application leaders should:

- Mitigate shadow IT risks by working with business unit leaders to enlist citizen developers to establish trust and define safe activity zones.
- Enable self-governing citizen development practices by fostering a community of practice (CoP) across business units and with IT.
- Improve outcomes for citizen-developed apps by joint (business and IT) selection of the right tools and enabling technologies.

**Business Impact:** The long-term strategic impact of citizen development is enabling self-service business innovation through employees in business units, aided by IT. Citizen development hackathons are a great way to promote and foster citizen development, while enhancing digital dexterity across the enterprise. Citizen developers have the potential to generate new ideas that can lead to greater business agility, as well as increased workforce productivity and efficiency.

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Google; monday.com; Mendix; Microsoft; Oracle; OutSystems; ProntoForms; Quick Base; Salesforce; ServiceNow

### **Recommended Reading:**

“The Future of Apps Must Include Citizen Development”

“Platform-Enabled Citizen Development (BP)”

“Maximize Digital Dexterity by Cultivating Citizen IT”

### Group Interactive Displays

**Analysis By:** Stephen Kleynhans

**Definition:** Group interactive displays are large-format (typically, 50-inch to 86-inch) touch displays that include the ability to project content from various devices and enable markup, using touch or special pens. These peripheral devices are usually connected to a PC.

**Position and Adoption Speed Justification:** The focus on the digital workplace continues to drive increased interest improving conference and meeting rooms across organizations. Large interactive digital whiteboards have been available in the market for more than a decade, but have seen limited traction due to high cost, poor performance and uneven support. Decreasing hardware costs for large, full HD and 4K displays is enabling more organizations to outfit meeting rooms replacing projectors, as they renovate their meeting spaces. They are often paired with a large nontouch display for use in video conferencing set ups. However, the promise of delivering a truly interactive meeting experience is often lost due to the complex setup and generally poor user training. This situation began to change with Microsoft Windows 10, as software support improvements (in collaborative tools, OS and other apps in general) and user familiarity with collaboration and touch technologies increased. Microsoft has also introduced the Windows Collaboration Device specification to standardize capabilities across multiple vendor products.

**User Advice:** Group interactive displays enable relatively low-cost deployment, good flexibility, and are not tied to a specific collaboration vendor or presentation tool. However, the experience provided is limited to the applications that users are able to run on their devices and is not specifically tuned for particular meeting or collaborative experiences. Additionally, starting a meeting

is often still a multistep process, and this complexity has limited the success of many deployments. Compare the physical device experience with the vendor's PC client, browser and mobile apps. If there are gaps in terms of feature parity, prepare best practices to share with workers who need the richest capabilities. Providing user training, information cards and encouragement to engage with the devices continues to be important to a successful project, as does providing simple tools for connecting and displaying from multiple devices.

While usually installed in meeting rooms, these large interactive displays can also be considered for larger private offices and, potentially, classrooms or executive briefing facilities. They cost only marginally more than basic large displays, but provide significantly more functionality.

**Business Impact:** Meeting room technologies have a long life and must take into account long-term enterprise needs and future growth, so analyze organizational requirements for meeting space technologies by looking at current and future digital workplace needs.

**Benefit Rating:** Moderate

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Dell; HP Inc.; Newline Interactive; Ricoh; Samsung; Sharp; SMART Technologies

**Recommended Reading:**

"Select the Right Technology for Modern Meeting Rooms"

### Server-Side Client Graphics

**Analysis By:** Nathan Hill; Philip Dawson

**Definition:** Server-side client graphics are used to speed up the execution of compute-intensive applications and to improve the rendering of screen graphics, especially for virtual desktop infrastructure (VDI) workloads. Graphics processing unit (GPU) graphic cards are installed on servers and dedicated to individual users, or shared among user sessions running in physical or virtual machines (VMs).

**Position and Adoption Speed Justification:** Server GPU platforms targeted at improving the remote client computing user experience (for example, with server-based computing [SBC] and VDI) help address remaining multimedia limitations with centralized computing, while maintaining desktop densities through CPU offloading. The use of GPU-based desktops for knowledge workers is now an option. The technology is integrated at the hypervisor layer for shared-user platforms, although SBC can share a GPU across multiple sessions in a physical deployment. The technology also enables a whole new set of design, high-end 3D modeling, engineering and architecture use cases with an increasing number of production deployments. There is increasing use of GPUs on cloud server platforms to enhance DaaS especially for architecture, engineering and construction (AEC) use cases.

**User Advice:** Configuring graphic cards on servers can restrict choices (for example, forcing the use of systems large enough to accommodate a graphics card internally). GPUs add cost and increase power consumption. Balance the advantages of a dedicated pool of GPU-configured servers against the flexibility and other benefits of including GPUs in a virtualized resource pool that handles a broad range of use cases.

High-performance workstation use cases, especially designers working with complex 3D models and graphic-intensive workloads, should be assessed first to see if the server-side client graphic model can improve performance by positioning compute close to the data. The best way to do this is by reducing model load times and avoiding data distribution and synchronization challenges. This architecture can also increase accessibility, collaboration and software license utilization, as well as enable access to a remote talent pool that would be harder to source when restricted to geographically local staff.

Consider GPU-based DaaS where an operating expenditure (opex) model is preferred and where consumption can be flexed up and down. This delivers increased agility, even if the total cost of ownership (TCO) may be higher over the long term than on-premises options.

**Business Impact:** Server-side client graphics expand the use case for remote client desktop and application delivery to graphically intensive workloads. Remote delivery models have generally focused on task and process workers, and have struggled to penetrate the dominance of the traditional distributed PC model for more demanding users. This technology enables richer content delivery for multimedia and 3D graphics.

Knowledge worker use cases will continue to be cost-sensitive, especially when compared with distributed delivery options. At the higher end, designer use cases are likely to drive a high penetration where the business case is particularly strong in protecting intellectual property, improving storage performance with large data models and/or increasing accessibility.

Industries with significant computer-aided design needs, such as manufacturing, have been early adopters in the technology life cycle. However, this technology should now be considered cross-industry (including healthcare and higher education). I&O leaders are increasingly looking for GPU-based workspace options from cloud service providers.

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** AMD; Intel; NVIDIA

**Recommended Reading:**

“Forecast Analysis: Discrete GPUs, Worldwide”

“Market Guide for Desktop as a Service”

## Cloud Access Security Brokers

**Analysis By:** Steve Riley

**Definition:** Cloud access security brokers (CASBs) provide crucial cloud governance controls for visibility, data security, threat protection, and compliance assessment in SaaS and IaaS. CASBs consolidate multiple types of security policy enforcement into one place. Examples include authentication, single sign-on, authorization, device profiling, data security, logging, alerting, and malware removal. Most CASB deployments are cloud-based; on-premises deployments are rare.

**Position and Adoption Speed Justification:** Vendors offer feature-rich products to increase cloud visibility and apply consistent policy across multiple providers. Execution across all vendors is variable: while some have incrementally improved and added new capabilities, the leading vendors continue to make significant investments that have contributed to the rapid maturation of the market. The acquisition phase of the market has ceased. Major incumbent security vendors now offer a CASB, either stand-alone or as part of a product portfolio; integration with other products in portfolios is inconsistent but improving. While the number of independent vendors has stabilized, the most relevant independent vendors demonstrate sustained innovation and broad market reach. Differentiation among vendors is becoming difficult, and several have branched beyond SaaS governance and protection to include custom application support in IaaS clouds, cloud security posture management (CSPM) capabilities, and user and entity behavior analysis (UEBA) features. The most relevant independent vendors continue to receive venture capital funding, while funding for the less well-known private vendors remains uncertain. The pace of client inquiry indicates that CASB is a popular choice for cloud-using organizations. Gartner's 4Q19 security spend forecast predicts a significant but slowing growth rate for CASB: 45.3% in 2020, 40.7% in 2021, 36.7% in 2022, and 33.2% in 2023. While the forecast predicts slowing spend for all security markets, CASB's growth remains higher than any other information security market (see, "Forecast: Information Security and Risk Management, Worldwide, 2017-2023, 4Q19 Update").

**User Advice:** Examine vendor capabilities in four functionality areas: visibility, data protection, threat detection and compliance. All relevant CASB vendors interact with SaaS applications via APIs and can be positioned in-line for real-time traffic visibility. CASB proxies may or may not require endpoint agents for traffic steering outside proxied networks; factor this into your evaluation. Increasingly, CASB vendors offer remote browser isolation as an adjunct to in-line deployments.

Common deployment scenarios that deserve special scrutiny include:

- **Cloud discovery and risk assessment.** Evaluate the thoroughness of the CASB's analysis of an organization's cloud security posture. The CASB should discover every cloud service in use and assign each one a risk score (ask vendors for information about how often this is updated), gleaned from attributes whose weights can be modified by customers. Evaluate the CASB's CSPM capabilities for assessing risk in IaaS storage, compute, and virtual network configurations.
- **DLP.** Evaluate whether CASB capabilities are sufficient or require augmentation with deployed enterprise DLP product, either via ICAP or RESTful API integration. In-line CASB DLP capabilities should provide a mechanism to control the movement of sensitive information into

and out of cloud services in real time. Examine CASB support for data classification features that can link to existing enterprise classification tools.

- **Adaptive access control (AAC).** Examine techniques vendors provide for altering the behavior of governed applications based on signals observed during and after login. AAC allows for shades of access (e.g., read-only access to content on unmanaged devices) that are more useful to the business than blocking access completely.
- **UEBA.** Evaluate how CASBs detect and isolate risky users and devices. Insider threats and compromised accounts are common attack vectors. Seek mechanisms that build baseline behavior profiles (such as typical upload/download amounts and user locations) and alert and mitigate when behavior deviates from baselines. Step-up authentication is an important capability to test with whatever IAM vendor is already deployed.
- **Third-party app discovery and control.** Ensure that the CASB can detect all third-party apps that have been granted access to SaaS applications (almost always via OAuth). Look for more than single yes/no controls for each app and instead favor the ability to group third-party apps into categories based on OAuth scopes.
- **Regulatory compliance.** Determine whether the CASB offers sufficient visibility and control for aspects such as user privacy and data residency. Carefully scrutinize encryption mechanisms. Encrypting data before sending it to a cloud service might negatively affect certain functionality in the service. Evaluate the CASB's CSPM capabilities for comparing IaaS workload configurations to common regulatory baselines.

**Business Impact:** CASBs are uniquely positioned to enable organizations to achieve consistent security policies and governance across many cloud services. Unlike traditional security products, CASBs are designed to protect data that's stored in someone else's systems. CASBs are suitable for organizations of all sizes in all industries and are uniquely positioned to help demonstrate that cloud use is well-governed. Given the expected continued feature expansion and relative ease of switching, favor one-year contract terms over lengthier ones.

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Bitglass; Censornet; CipherCloud; Forcepoint; McAfee; Microsoft; Netskope; Proofpoint; Symantec; Zscaler

### **Recommended Reading:**

"Magic Quadrant for Cloud Access Security Brokers"

"Critical Capabilities for Cloud Access Security Brokers"

"Peer Lessons Learned: Implementing Cloud Access Security Brokers"

"How to Secure Cloud Applications Using Cloud Access Security Brokers"



## “Best Practices for Planning, Selecting, Deploying and Operating a CASB”

### Image Layering

**Analysis By:** Nathan Hill; Michael Silver

**Definition:** Layering simplifies application life cycle management by separating the Microsoft Windows image into logical layers that can be delivered to the platform without installation and can be managed independently. Image layering also cuts down on storage requirements for virtual desktop infrastructure (VDI) images and backup images for physical PCs. Its benefits have extended to certain DaaS offerings.

**Position and Adoption Speed Justification:** Different vendors take different approaches to defining the layers that can be separated and determining the ones that prevail when changes are applied. Examples of layer contents include:

- OSs
- Drivers
- User personalization and data
- Companywide applications
- Departmental applications
- User-installed applications

Much of the customer interest centers on application-layering capability, rather than full-image layering, for the benefit it brings in managing VDI and DaaS deployments. Products on the market vary in different ways: the number of layers handled, the ability to restore different versions, the ability to merge layers and self-service capabilities. Some products have the ability to work across architectures, such as VDI, physical PCs and server-based computing (SBC). This reduces the requirement for different layering products for different deployment types. The technology has become one of the established mechanisms for managing applications and images in virtual workspaces on-premises and in the cloud, whereas use for physical PC management is niche.

**User Advice:** With layering technologies, image updates and patches can be applied once, then cascaded to all users. This is instead of updating each machine individually, as with traditional software distribution tools. Only the layers that contain user personalization data and files need to be managed and saved on an individual basis.

I&O leaders responsible for digital workplace infrastructure and operations should:

- Use layering to reduce support and help desk costs by reducing the requirement to perform full system reimaging. For VDI and DaaS, layering can be effective for addressing user and departmental application requirements with pooled and persistent images.



- Use layering to deal with high image complexity as they plan their virtual workspace deployment to increase the chances of a successful deployment. However, identify the objectives and management issues to be solved, because they will dictate technology and product choices. Management capabilities, as well as the range and depth of functionality, should be carefully evaluated in vendor and product selections.

**Business Impact:** Image layering creates many advantages for VDI, as well as for SBC and DaaS. Layering reduces the time required to manage user images, and it can be used to accelerate workspace recovery. Image-layering technologies reduce the storage requirements in VDI deployments. The physical PC management niche will gradually lose relevance as organizations embrace unified endpoint management.

**Benefit Rating:** Moderate

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Citrix; Liquidware; Microsoft; VMware

## Entering the Plateau

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### Cloud Office

**Analysis By:** Gavin Tay

**Definition:** Cloud office, also known as the “new work nucleus,” refers to a collection of the most broadly used SaaS-based personal productivity, horizontal collaboration and communication tools, combined into one product. It generally includes email, IM, file sharing, conferencing, document management and editing, search and discovery, and collaboration. Microsoft’s Office 365 and Google’s G Suite are the primary examples. The term “cloud office” is a general term. “Microsoft Office” refers to a specific set of products.

**Position and Adoption Speed Justification:** Cloud office continues to advance quickly along the Hype Cycle as enterprise adoption grows and the technologies become well-understood. In 2020, cloud office has reached the Plateau of Productivity as it becomes an accepted cornerstone of most organizations’ collaboration and communications infrastructure.

Enterprise adoption has increased on account of a general preference for cloud deployments and the desire to reduce costs, redeploy IT staff, drive simplicity and provide more functionality to users. Vendors are also offering their most attractive new features — such as mobile apps, content discovery tools and artificial intelligence available through cloud deployments only.

**User Advice:** Application leaders responsible for digital workplace initiatives should:

- Look beyond a “like for like” deployment that focuses only on recreating previous on-premises functionality through the cloud. Although this can be a good initial step, investigate the unique capabilities of cloud office suites to improve digital dexterity, efficiency and innovation.

- Not assume that the chosen cloud office product will meet all collaboration and communication requirements. Look beyond cloud office to meet specific needs or user requirements.
- Monitor the cloud office vendor's roadmap and product announcements closely. The cloud model assumes almost continuous enhancement with new features and improvements coming regularly. Assess these additions for their impact on your operations and how to take advantage of them.
- Plan specific efforts to address user adoption by focusing on user change management. It is usually not obvious how to use the new capabilities to increase effectiveness. Users will benefit from assistance and guidance, perhaps from more advanced colleagues, as a part of the digital dexterity initiative.
- Look to cloud office suites as a source for continuous innovation in a form that is relatively easy to adopt. Innovations such as everyday AI, cross-tool integration and better meetings are likely to come from cloud office products.

**Business Impact:** Cloud office solutions are so widely adopted that they are becoming the basis on which other vendors innovate, through add-ons and integrations. Cloud office is an important part of the emerging new work nucleus. These products support a wide variety of styles of collaboration including video, conversational, and social as well as the more conventional email and IM. Most organizations have made the move, developed a plan, or specifically decided to put off making a move that will be difficult to avoid in the longer term. Organizations that were adept at using cloud office prior to COVID-19 have had a much easier time pivoting to mandatory remote work.

**Benefit Rating:** High

**Market Penetration:** More than 50% of target audience

**Maturity:** Mature mainstream

**Sample Vendors:** Google; Microsoft; Zoho

#### **Recommended Reading:**

“Market Guide for Cloud Office Migration Tools”

“Create a Culture of Digital Dexterity With the ‘New Work Nucleus’”

“Enable More Productive Meetings With Google G Suite or Microsoft Office 365”

“Maximize the Effectiveness of Office 365 and G Suite With Everyday AI”

“How to Organize IT to Support Office 365, G Suite and Other Digital Workplace Applications”

#### **Content Collaboration Tools**

**Analysis By:** Michael Woodbridge

**Definition:** Content collaboration tools (CCTs) provide content services within the “new work nucleus.” They enable access to content regardless of location or device, which makes them essential for remote work. Core functionalities include file sharing, search, collaborative document creation, team workspaces, lightweight content management and workflow automation. Deployments can be in public, hybrid or private clouds, or on-premises.

**Position and Adoption Speed Justification:** CCTs (formerly known as content collaboration platforms) are the evolution of enterprise file synchronization and sharing (EFSS) products, which emerged in 2010 and progressively expanded to support personal and team collaboration, secure external collaboration, lightweight content management and file-centric workflows. Fierce competition (particularly from Microsoft) and the commoditization of key features has driven market segmentation, as vendors have looked to differentiate themselves by branching into other areas, such as content protection and broader collaboration. In addition, established CCT vendors face competition from content services platform (CSP) vendors that are adding collaborative capabilities to their products.

CCT vendors are increasingly expanding their skills to add more formal capabilities. For certain use cases, this enables them to be considered as alternatives to the more heavyweight CSP vendors. There also remains demand for more application-focused CCTs, such as board portals and deal rooms.

CCTs are an important part of the new work nucleus and have helped transformed the way people work with, and collaborate on, content. For organizations enabling enforced remote working in response to the COVID-19 crisis, they are essential. CCT technology is well-established in the workplace and increasingly familiar to end users. We therefore place CCTs on the Plateau of Productivity.

**User Advice:** CCTs are most commonly deployed as modern alternatives to network file shares. They enable a greater degree of user agility and provide an easier point of access to content than file servers located behind a corporate file wall. This makes them an essential consideration when organizations have to manage unprecedented levels of remote access, as in response to the COVID-19 crisis. Procurement of CCT services has accelerated during 2020, but application leaders should centralize CCT capability where possible. Leaving users and departments to implement personal services poses significant risks. Only the enterprise versions of common CCTs contain the security, privacy and data loss prevention controls necessary for organizational deployment.

Application leaders should plan to deploy CCTs for a variety of collaboration use cases. Modernization of collaboration transactions that take place via email or legacy FTP would be a good choice. Integration with workstream collaboration tools such as Slack and Microsoft Teams should also be a key consideration. The increasing presence of Microsoft Office 365 in the workplace means that OneDrive is often a default consideration for CCT implementation. However, application leaders should evaluate its capabilities and those of other vendors’ offerings to determine the best fit for their requirements. Despite the enhanced features of CCTs when compared with file shares, users often work in traditional patterns and are slow to utilize these enhancements. Application leaders in IT departments need to focus on enabling the workforce to fully exploit these new capabilities.

Another important consideration when choosing CCTs is cloud strategy. Organizations with a public cloud strategy should consider vendors such as Box, Dropbox, Google and Microsoft. Organizations with stringent data control requirements or a large storage infrastructure should focus on hybrid solutions, such as those of Citrix, Axway (Syncplicity) and Egnyte, that enable organizations to maintain greater control and to draw on existing storage investments.

**Business Impact:** CCTs enable productivity and collaboration for workers and teams (distributed or mobile) by offering a modern user experience. They lead to a more agile and connected workforce by virtue of consumerized interfaces and experiences. They are relevant to all sectors and business units. Organizations investing in them will enable more modern and collaborative real-time workplaces, while reducing or avoiding the inherent security and compliance risks associated with personal cloud services. Business benefits include support for remote working, increased productivity, application rationalization and cost savings, and digital workplace transformation.

**Benefit Rating:** High

**Market Penetration:** More than 50% of target audience

**Maturity:** Mature mainstream

**Sample Vendors:** Axway; Box; Citrix; Dropbox; Egnyte; Google; Microsoft

**Recommended Reading:**

“Market Guide for Content Collaboration Tools”

“Gartner Retires ‘Magic Quadrant for Content Collaboration Platforms’”

“Toolkit: Sample RFP for Content Services Platforms and Content Collaboration Platforms”

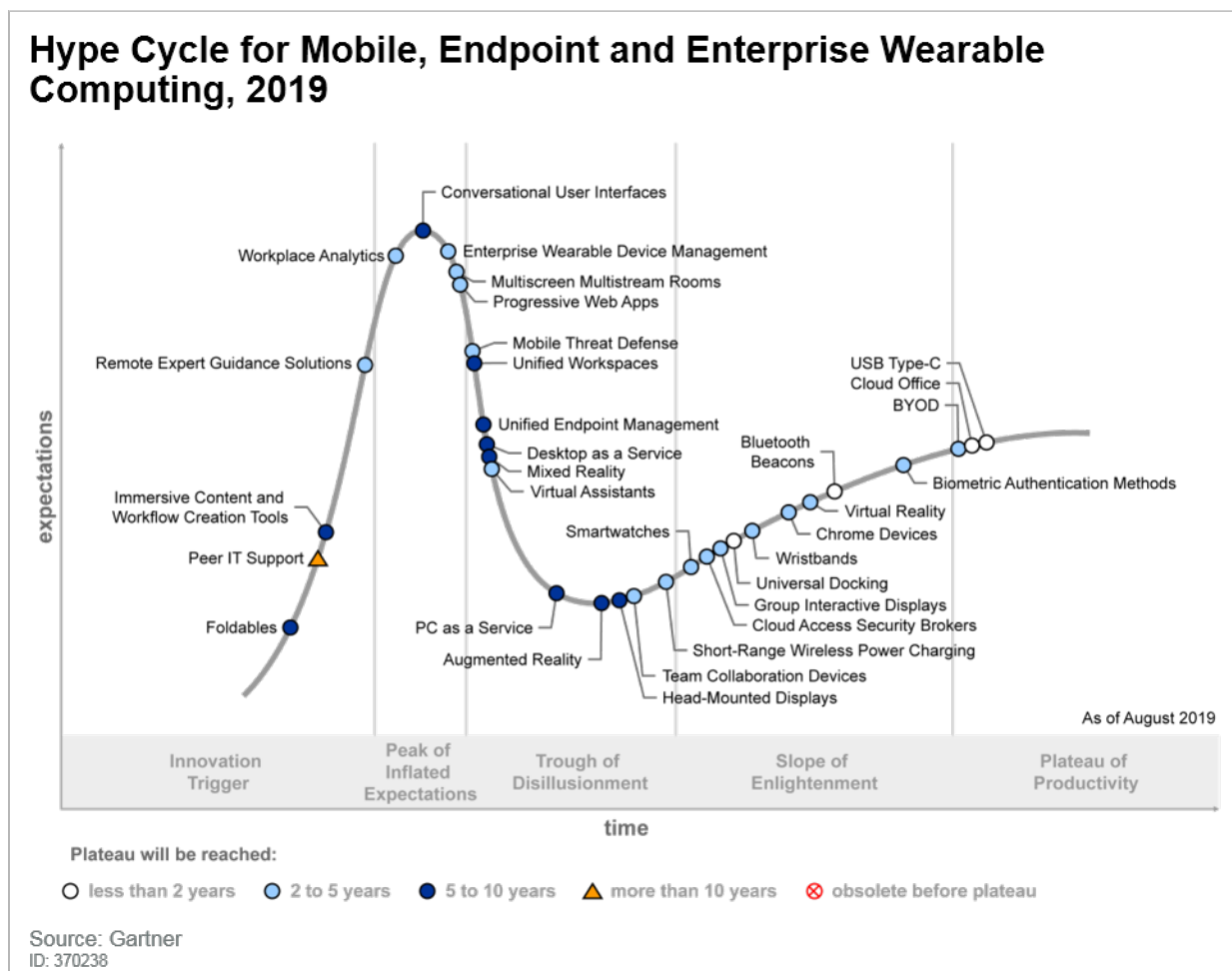
“How to Secure a Content Collaboration Environment”

“Assess the Role of Content Collaboration Platforms in the New Work Nucleus”

“How to Select Collaboration Technology Using Gartner’s ACME Framework”

## Appendixes

Figure 3. Hype Cycle for Mobile, Endpoint and Enterprise Wearable Computing, 2019



## Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 1. Hype Cycle Phases

Phase	Definition
<i>Innovation Trigger</i>	A breakthrough, public demonstration, product launch or other event generates significant press and industry interest.
<i>Peak of Inflated Expectations</i>	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the technology is pushed to its limits. The only enterprises making money are conference organizers and magazine publishers.
<i>Trough of Disillusionment</i>	Because the technology does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
<i>Slope of Enlightenment</i>	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the technology's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
<i>Plateau of Productivity</i>	The real-world benefits of the technology are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
<i>Years to Mainstream Adoption</i>	The time required for the technology to reach the Plateau of Productivity.

Source: Gartner (August 2020)

Table 2. Benefit Ratings

Benefit Rating	Definition
<i>Transformational</i>	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
<i>High</i>	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
<i>Moderate</i>	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
<i>Low</i>	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (August 2020)

Table 3. Maturity Levels

Maturity Level	Status	Products/Vendors
<i>Embryonic</i>	<ul style="list-style-type: none"> <li>In labs</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
<i>Emerging</i>	<ul style="list-style-type: none"> <li>Commercialization by vendors</li> <li>Pilots and deployments by industry leaders</li> </ul>	<ul style="list-style-type: none"> <li>First generation</li> <li>High price</li> <li>Much customization</li> </ul>
<i>Adolescent</i>	<ul style="list-style-type: none"> <li>Maturing technology capabilities and process understanding</li> <li>Uptake beyond early adopters</li> </ul>	<ul style="list-style-type: none"> <li>Second generation</li> <li>Less customization</li> </ul>
<i>Early mainstream</i>	<ul style="list-style-type: none"> <li>Proven technology</li> <li>Vendors, technology and adoption rapidly evolving</li> </ul>	<ul style="list-style-type: none"> <li>Third generation</li> <li>More out-of-the-box methodologies</li> </ul>
<i>Mature mainstream</i>	<ul style="list-style-type: none"> <li>Robust technology</li> <li>Not much evolution in vendors or technology</li> </ul>	<ul style="list-style-type: none"> <li>Several dominant vendors</li> </ul>
<i>Legacy</i>	<ul style="list-style-type: none"> <li>Not appropriate for new developments</li> <li>Cost of migration constrains replacement</li> </ul>	<ul style="list-style-type: none"> <li>Maintenance revenue focus</li> </ul>
<i>Obsolete</i>	<ul style="list-style-type: none"> <li>Rarely used</li> </ul>	<ul style="list-style-type: none"> <li>Used/resale market only</li> </ul>

Source: Gartner (August 2020)

## Gartner Recommended Reading

*Some documents may not be available as part of your current Gartner subscription.*

Understanding Gartner's Hype Cycles

2020 Strategic Roadmap for Digital Workplace Infrastructure and Operations

Prepare for Unified Endpoint Management to Displace MDM and CMT

Moving From the Adaptive to the Continuous and Contextual Workplace

Adopt Continuous Endpoint Engineering and Modern Management to Ensure Digital Workplace Success

How to Successfully Move to PC as a Service

How to Keep End Users Connected to the Digital Workplace During Disruptions



## Getting Value From Employee Productivity Monitoring Technologies for Remote and Office-Based Workers

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