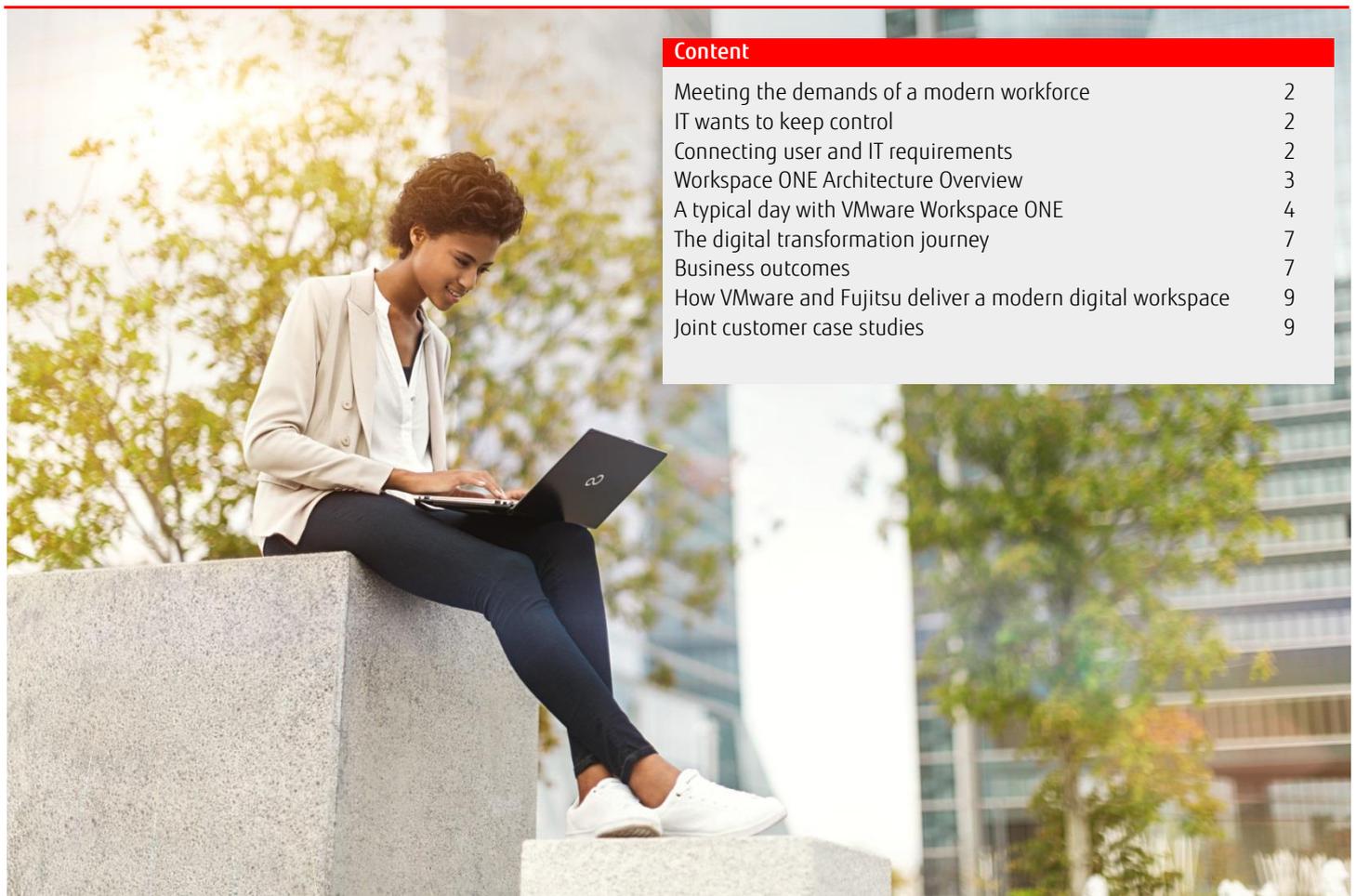


White Paper

Enabling Business Mobility and Digital Workspaces

Many of today's organizations embarking on a digital transformation journey find that digital transformation is less likely to succeed without digital workspace investment. Products, services, and rewarding customer experiences are designed, delivered and managed by employees. So organizations must do all they can to spark creativity and drive productivity by investing in the skills, tools, and environment of the workforce.



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Meeting the demands of a modern workforce

Over the last years, in many organizations end user experience could not keep pace with the experience the same users could achieve with modern devices they use in their private lives. While we install and use applications on our private smartphones in just a few minutes, the IT department needs weeks to deliver new office applications. Booking hotels or flights for our holidays is so much easier than organizing a business travel using the company's internal travel portal.

It is hard to understand, why we have to boot the corporate notebook to work on a customer presentation, while using a much nicer device to chat with our friends or watch our famous TV series.

Delivering a modern workspace to employees has become an important priority on the agenda of CEO's and IT departments. Those companies are more successful in recruiting wanted professionals and have been also able to increase employee satisfaction.

VMware found that 60% of employees prefer to use a personal device for work and play, the adoption rate of BYOD ("Bring Your Own Device") among enterprises is ca. 70% and the demand for mobile applications will grow five times faster than IT departments can deliver them¹. Meanwhile the top 10 largest global banks, 8 of the top 10 global universities, 9 of the top 10 global retailers, all 5 branches of the U.S. armed forces and the top 5 U.S. hospitals are already using mobility and digital workspace solutions.

This paper discusses how VMware and Fujitsu help customers transform to a modern end-user computing environment providing an easy-to-use, secure computing experience that can deliver the applications and data the employee needs, on any device the employee will use, from any location that the employee may be.

IT wants to keep control

A lingering question of CIOs when confronted with such modern working environments is how to implement effective security mechanisms and keep control of data and application delivery.

Traditionally, this hasn't been such a difficult job. IT departments used to deliver complete end-to-end solutions including access devices and management solutions. They controlled applications, access to data as well as the back-end infrastructure.

However, the introduction of privately owned devices and cloud-based services, as well as new business mobility requirements challenge existing solutions for protecting corporate assets. The well-known managed infrastructure is replaced by unmanaged devices, unknown applications and unsecure networks.

IT departments are unable to proof applications an employee has installed on his private smartphone. They are not able to manage these privately owned devices, nor are they able to harden or configure them. The increasing number of publicly known threats demonstrates every day that existing solutions are weak and unable to stop data theft. Furthermore, IT departments are facing much stricter legal guidelines for protecting private data, such as the EU General Data Protection Regulation (GDPR).

Connecting user and IT requirements

How to satisfy both sides? How can IT deliver data and applications in a way that meets employees' expectations without violating security and compliance?

VMware Workspace ONE™ is the enterprise platform that enables IT to deliver a digital workspace that empowers the workforce to securely bring the technology of their choice, be it devices or applications—at the pace and cost the business needs. Workspace ONE enables you to drastically improve experiences and tasks that were previously costly, time consuming, and resource intensive. With Workspace ONE, IT organizations can:

- Onboard a new employee with all of his or her apps and devices in under an hour without tickets and help desk calls
- Set and enforce access and data policies across all apps, devices, and locations in one place
- Complete business processes from a mobile device, similar to consumer experiences
- Provision a new corporate laptop out of the box, anywhere in the world, from the cloud within minutes

¹<https://www.vmware.com/content/dam/digitalmarketing/vmware/en/pdf/products/workspace-one/infographic-identity-defined-workspaces.pdf>

Workspace ONE Overview

The graphic below shows the major components of a Workspace ONE. Most components are delivered as virtual appliances – some components are delivered as a Windows application.

- **VMware Unified Access Gateway** secures external access to internal content on corporate network shares or internal repositories. Users are only allowed to access the files and folders, on which they have access rights.
- **VMware Identity Manager™** is an Identity as a Service offering providing enterprise identity management, a browser-based user portal, single sign on and a self-service app store.
- **VMware AirWatch®** is a comprehensive enterprise mobility platform that delivers simplified access to enterprise applications, secures corporate data, and enables mobile productivity.
- **The Workspace ONE Native Mobile App** offers a unified app catalog with single sign on, enabling users to search and launch virtual desktops and applications.
- **VMware Horizon®** delivers virtualized or hosted desktops and applications through a single platform to end users. These desktop and application services can all be accessed from one digital workspace across devices, locations, media, and connections without compromising quality and user experience.

Customers have multiple options to deploy Workspace ONE. The complete solution is either available as a cloud service or as a licensed product. It is even possible to consume some elements from the cloud and combine them with on-premises installations.

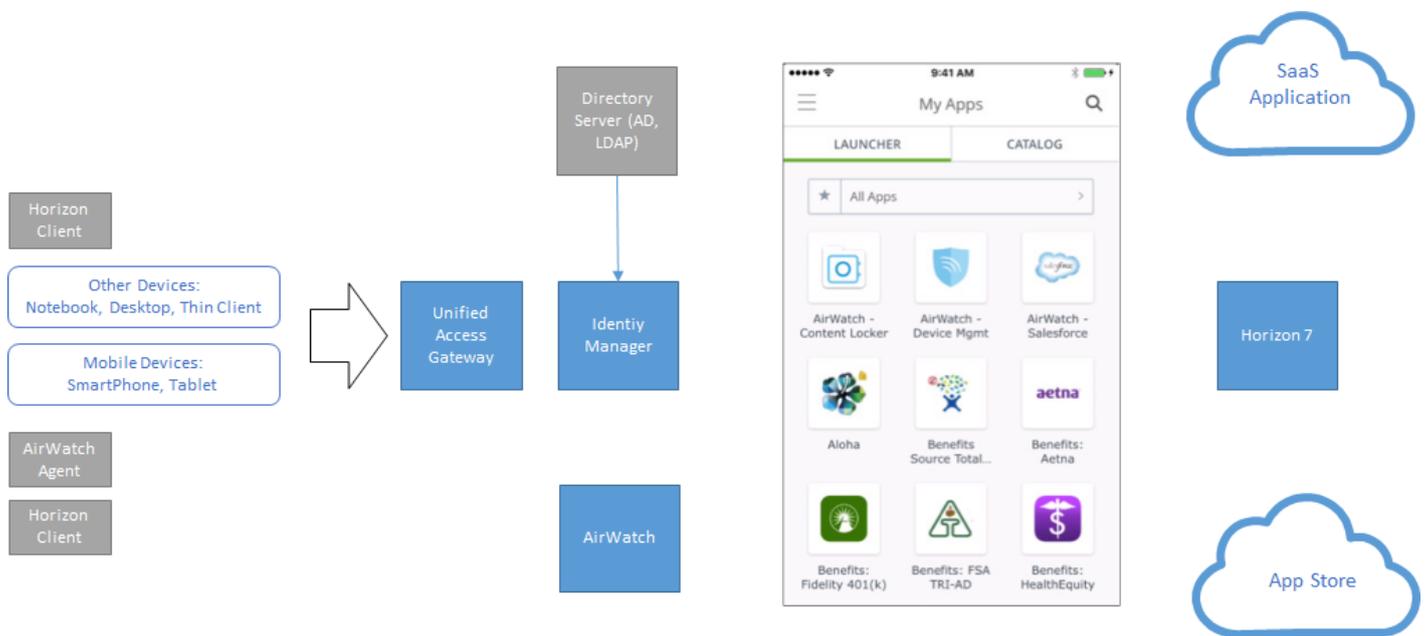


Figure 1: VMware Workspace ONE at a glance

A typical day with VMware Workspace ONE

The following chapters describe the capabilities and features of a modern digital workplace from an end user perspective in combination with technical aspects.

Access to App Catalog

Let us assume you start your first day in a new company. On welcome, your new colleague will show you, how to enable your smartphone for business use. He will give you just a link to VMware Identity Manager, and you visit the single sign-on site using the browser of your smartphone.

VMware Identity Manager will authenticate a user and will grant him access to corporate App Catalog.

VMware Identity Manager supports different types of credentials, such as user name and password or RSA token. It supports biometrical security devices and users from Microsoft Active Directory. In addition, conditional access will differentiate the content of the App Catalog depending on network location, device type, device status and other criteria.

Figure 2 shows that the user is requested to enter a RSA token instead of a password, since his device connects through the Internet to VMware Identity Manager.

After having entered a user name and password, you will see the App Catalog. Here you find all IT services you are able to access. Figure 3 shows all available applications, which your currently used device is able to support, and allows you to bookmark frequently used apps or data stores (i.e. SharePoint, One Drive, etc.)

The App Catalog is a website (accessible via a standard browser or the Workspace ONE mobile app) and therefore available on every device an employee will use. The App Catalog contains different types of applications and services, such as web-based services (i. e. Salesforce), typical Windows applications (i.e. a web browser), access to file shares (i. e. SharePoint™), databases or any sort of client server applications, virtual desktops, hosted applications – even existing server hosted applications, e.g. based on Citrix XenApp®, can be integrated.

Due to the single-sign on feature of VMware Identity Manager, the launch of such applications or services does not require additional credentials. The solution will create anonymous credentials for every required logon, which also allows IT to stop the access to all applications by denying the access to the App Catalog.

In addition, you may be wondering how a Windows application can be accessed from your tablet. Workspace ONE offers a couple of methods for doing so. For SaaS applications, Workspace ONE will log you in and will present them in your browser. Windows applications will run in a full screen window – either executed in a dedicated virtual desktop or hosted by a Windows Server.



Figure 2: VMware Identity Manager - Login screen

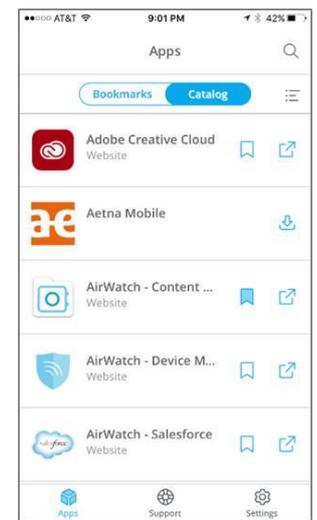


Figure 3: VMware Identity Manager - App catalog

Securing your mobile devices

Mobile devices have a tendency to be lost or stolen. In order to minimize the damage in such an event, VMware AirWatch offers a number of features to secure your company assets.

- An AirWatch agent installed on your private mobile device will allow you to encrypt data on your device, will prevent you from copying data into unsecured applications, and is able to delete all corporate data in the event of device loss or theft
- VMware Boxer and VMware Browser offer much more secure alternatives to your standard email or browser application, to prevent you from copying data from your mailbox to your Facebook account
- VMware Content Locker stops copy/paste of data and files to file shares like Microsoft SharePoint, Office 365, Box or OneDrive
- VMware Socialcast enables secure enterprise chat and collaboration so employees can get work done faster
- VMware People Search makes managing employee information effortless by integrating with identity
- AirWatch Tunnel enables you to use separate VPN connections for applications, a methodology which is much harder to attack than traditional VPN solutions, just setting up a single VPN connection for the entire data center

All these functions and mobile apps can be delivered as a virtual appliance for on premises use or are available as a cloud based service. VMware AirWatch supports all major mobile operating systems (Android, iOS and Windows) and manages the majority of smartphones and tablet devices.

For developers of mobile apps VMware provides the AirWatch SDK and AirWatch application wrapper. With both tools, new mobile apps will follow the applied data loss prevention policies.

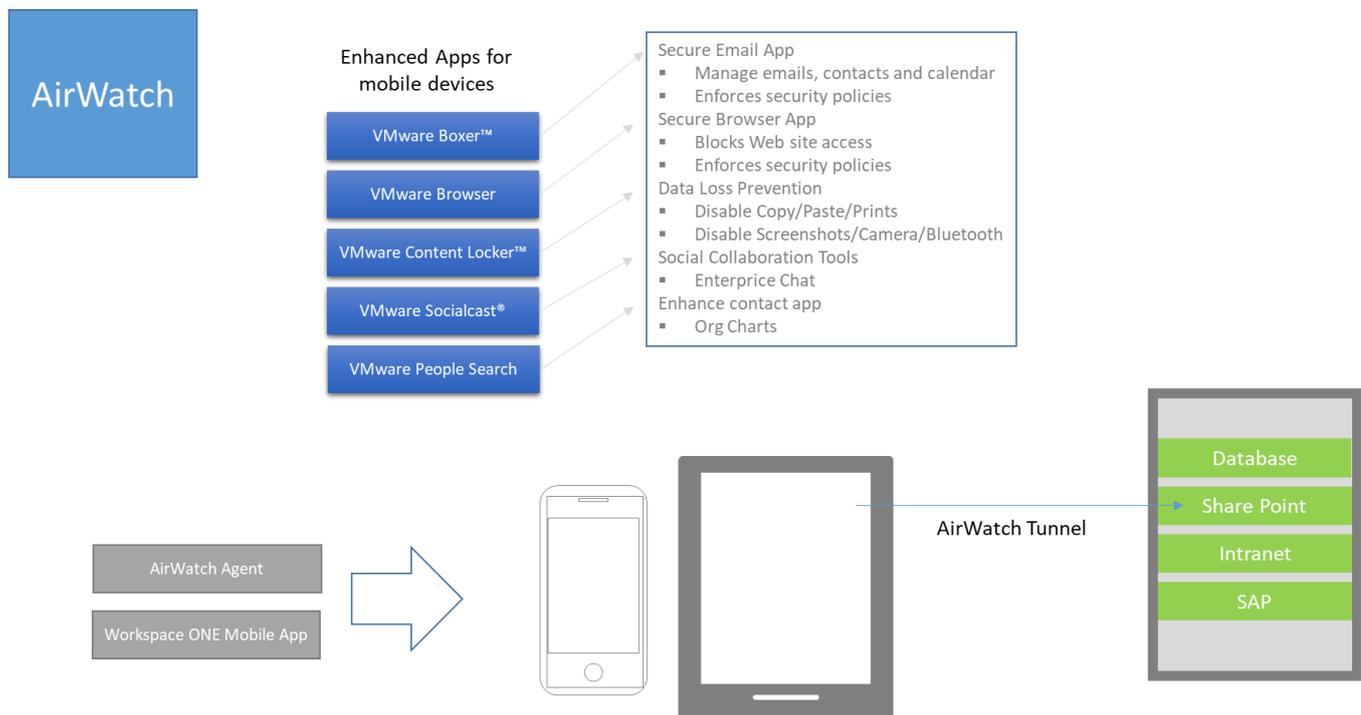


Figure 4: VMware Airwatch at a glance

Virtual Applications and Desktops

At this time, your smartphone is ready to use, and you are already able to logon with your password (or your RSA token). Perhaps on the second day in your new company, you startup your device, which you found at your desk. This might be a traditional desktop, a laptop or even a thin client. You use this device for accessing your virtual desktop. As you never worked before with a virtual desktop, you are sceptic and concerned. What about performance? What about the quality of pictures and videos? Will Skype for Business work at all? How are files and documents stored? Can you copy them to your USB device? VMware Horizon, as part of Workspace ONE will give you the answers you need.

If you have found your virtual desktop, it will already be running. Horizon has a few more desktops running than currently needed, and therefore you get instant access to your virtual desktop - much faster than to a traditional PC.

With your logon, VMware Horizon personalizes your environment. It maps your data and applications to your virtual desktop. You may use these applications as you are used to them – or you like the previous App Catalog, which you have seen on your smartphone or tablet already. You will be able to work with various types of applications in your virtual desktop. They may be locally mapped, they may be hosted or web based applications – all of them will be available in your virtual desktop.

VMware Horizon uses a couple of advanced technologies to provide users with a better experience compared with physical desktops. As shown in the graphic below, a user will access his environment with his web browser and will logon to the Unified Access Gateway (which establishes a VPN tunnel) The Connection Server will present virtual desktops and / or applications. Using the logon name, the User Environment Manager takes an empty virtual desktop (created as a linked clone by View Composer). A linked clone is a copy of a virtual desktop, which uses a link (instead of a full copy) to the virtual disk of the original virtual desktop. This clone will therefore consume much less storage capacity compared with a full copy.

User Environment Manager will now personalize this empty virtual desktop with the user's server mappings, his desktop settings and applications. Instead of installing applications into the empty virtual desktop each time a user logs in, VMware App Volumes, a tool to simplify application deployment in virtual desktop infrastructures, will "install" user specific applications by adding an already prepared additional virtual disk on which those applications are already installed.

Of course, your virtual desktop will not be available in your office only; it will be available for you any time and at any location. You just need a device with a browser to get access. You can see your virtual desktop even on your smartphone. There is no difference, if you use your tablet or the publicly available desktops in your hotel. And in case you just have your smartphone at hand and need to get Microsoft Internet Explorer running – Horizon delivers this application in full screen, while adding some enhancements to access legacy applications even through a touch screen.

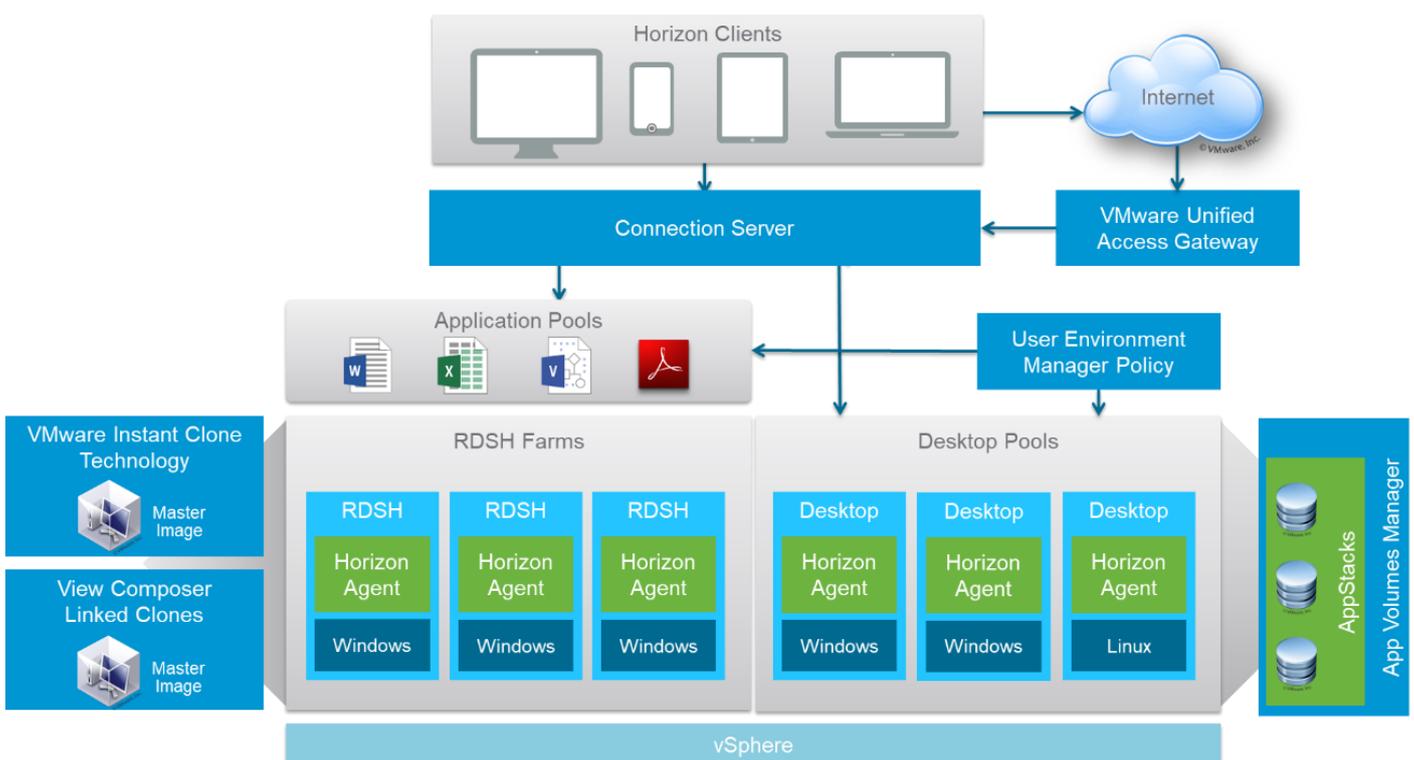


Figure 5: VMware Horizon at a glance

The digital transformation journey

Companies have multiple choices to establish digital workspaces and introduce business mobility. Some might already use parts of Workspace ONE and have already virtual desktops in place. In this case individual components (Identity Manager, AirWatch, App Volumes) can be added to complete the solution. Since Workspace ONE bundles VMware Horizon and VMware AirWatch, it is easy to add missing products individually.

The journey can be also started with AirWatch for addressing security concerns with mobile devices. Other companies may use Horizon Cloud for increasing their number of virtual desktops almost on demand in adding cloud hosted virtual desktops to their VDI environment. Or they are interested in implementing App Volumes for speeding up delivery of (new, patched or upgraded) applications to their employees.

VMware Workspace ONE is available in three editions. The Standard Edition includes the App Catalog, Identity Manager with SSO and mobile device management functions. Conditional access control, mobile application management including VMware Browser, Content Locker and the AirWatch tunnel are features of the Advanced Edition. The Enterprise Edition includes Horizon for virtual applications and desktops.

VMware offers test and trial versions, providing a fast and easy way to test-drive the full technical capabilities of these products. These evaluations are free, up and running on your browser in minutes, and require no installation.

Business outcomes

Financial results and benefits of implementing this solution are depending on multiple parameters. We will therefore describe the business outcomes of VMware’s own implementation of Workspace ONE, which have been documented in a white paper “VMware’s move to a digital workspace”¹. VMware implemented Workspace ONE during the first half of 2016. After the migration in October 2016, around 30,000 users worked with about 51,000 devices. Workspace ONE manages around 400 different applications, about 370 of them are SaaS / Web based.

VMware defined two sets of objectives, which should be achieved by implementing Workspace ONE:

- End-user service objectives:
 - Respond faster to new employees, when introducing new applications and services
 - Improve end user experience
- Security and risk management objectives
 - Control and manage IT reality (“shadow IT”, unchecked applications, BYOD)
 - Pro-active risk management (reduce time on remediation of exploits)
 - Improve resiliency (higher application availability for internal and external facing services)

After rolling out Workspace ONE, the company analyzed financial and non-financial results in order to measure the return of investment. For analyzing the financial achieved ROI, the following parameters were considered:

- Deployment costs
- Cost savings in operations
- User productivity through time savings

Hardware, software and project costs represented a total cost of \$ 3.83 M. For the savings, the paper identifies two major tasks IT operations had to execute: Password support issues as well as the identification and remediation of incidents:

Total costs per year	\$ 3.83 M
Hardware costs	\$ 1.15 M
Software costs	\$ 2.60 M
Project costs	\$ 0.076 M
Total savings per year	\$ 5.78 M
Password support issues savings	\$ 1.32 M
Identifying and remediating incidents	\$ 4.46 M

Measurements on user productivity showed that Workspace ONE helped save annually approximately 3,140 working days.

The above calculations resulted in an ROI of 150% in the first year. For the coming years, the ROI was expected to increase over time since there are lower costs in the following years, while the savings remain unchanged. In addition to the positive ROI, Workspace ONE led to additional benefits for the company. They recognized significant improvements in managing and mitigating security risks, as well as a reduction in developing and deploying mobile applications.

1) <https://www.air-watch.com/lp/vmwares-move-to-a-digital-workspace/>

The above analysis presents the specific situation within VMware. For other environments, various tools are available to calculate potential financial savings.

- The [“End-User Computing Business Case Calculator”](#) analyzes the total cost of ownership of various virtualized desktops compared with a classical physical desktop infrastructure.
- When using App Volumes a small [“Business Case Estimator”](#) can help determine cost savings.
- Together with SysTrack, VMware developed a [desktop assessment tool](#) specifically designed to analyze Windows 10 migration scenarios.
- The [“Horizon 7 Edition Selector”](#) helps you define which Horizon edition fits into a given situation.

In addition to VMware’s own experience, various analyst firms acknowledge the benefits of VMware’s approach.

- In a study published by Principled Technologies, the analyst firm concluded “VMware Workspace ONE created a better experience for feature-rich management than Microsoft EM+S”. They found out that Workspace ONE requires 78 fewer steps and 35% less time for all processed scenarios¹.
- After having tested Workspace ONE in a lab validation, ESG was impressed with the ease and speed of adding an application to the App Catalog for SSO, and how simple multi-factor authentication can be².
- And finally, Gartner appointed VMware as a leader in their “Magic Quadrant for Enterprise Mobility Management (EMM) 2017”, for the seventh consecutive year³.

1) http://www.principledtechnologies.com/clients/reports/VMware/Workspace_ONE_admin_experience_0917.pdf

2) <http://www.itbusinessbook.com/admin/downloadpdf.php?file=50513-esg-validation-report-workspace-one-pdf>

3) <http://ir.vmware.com/overview/press-releases/press-release-details/2017/VMware-Named-a-Leader-in-Gartner-Magic-Quadrant-for-Enterprise-Mobility-Management-Suites-for-Seventh-Consecutive-Year/default.aspx>

How VMware and Fujitsu deliver a modern digital workspace

With over a decade of strategic partnership, VMware and Fujitsu offer one of the industry's most complete VDI portfolios covering a broad range of client and data center solutions and services. Delivered on-premises, off-premises or from the cloud, the sheer breadth of the portfolio gives you unprecedented choice to find a tailored virtual desktop solution that exactly fits to your organization's needs. With one-stop shopping for an entire VMware VDI environment, Fujitsu provides you with the fastest on-ramp to VDI.

Fujitsu data center systems for VMware VDI

Fujitsu data center systems featuring all-flash storage, hyper-converged systems and server-side graphics processing provide a high-performing platform for VMware virtual desktop environments. With excellent price / performance ratio leading 70% of VMware's VMmark benchmark categories, Fujitsu x86 servers provide the most powerful virtualization platform. And with tailor-made Fujitsu integrated systems featuring VMware vSphere, vSAN and Horizon, we reduce complexity, time, risk and cost in VDI infrastructure deployment to provide you with fastest time to production.

Fujitsu client systems for VMware VDI

With a broad range of flexible, secure and reliable stationary and mobile devices certified for VMware virtualization technologies, Fujitsu client systems meet every user requirement. Fujitsu thin client systems provide integrated security features supported by VMware's Identity Manager, be it SmartCard or biometrics support like palm vein scanning based on Fujitsu's PalmSecure technology, enabling multi-factor authentication. In addition, lean and customizable operating system support in combination with best-in-class client management provides an operating platform that is used for the largest thin client deployment world-wide with over 200,000 devices.

Fujitsu cloud hosted virtual desktops and applications

Fujitsu provides a fast, flexible and low risk cloud-based service offering for VMware virtual desktops and applications from its public cloud platform significantly lowering the barrier to virtual desktop adoption. The service is highly scalable, provides 24*7 availability and predictable costs on a "pay as you go" basis with no upfront investment. It's extremely easy to get started: Your virtual desktop is just 5 clicks away.

Fujitsu services for VMware VDI

Fujitsu offers a broad range of VDI-related services provided by Fujitsu or its local partners covering professional services, infrastructure support services, financial services, security services and managed services. Fujitsu's global service capabilities are available both on-shore and off-shore from 5 global delivery centers and local service desks in more than 30 countries. You profit from the experience of a global service provider managing over 5 million desktops worldwide making Fujitsu a leader in the Gartner Magic Quadrant for Managed Workplace Services.

Joint customer case studies

Fujitsu has successfully delivered many VMware VDI projects across various industries:

- Fujitsu has been building a company-wide, secure and easy-to-use virtual desktop infrastructure based on VMware technology for approximately 80,000 of the Fujitsu Group employees in Japan, including affiliates.
- For Nakilat, a Qatari-owned shipping and maritime company running the world's largest LNG (Liquefied Natural Gas) shipping fleet, Fujitsu provided a highly reliable backend data center infrastructure running VMware Horizon.
- For BBAC, one of the top 10 banks in Lebanon. Fujitsu revamped the aging VMware Horizon deployment with high-performance and secure server and storage systems supporting all key banking applications.
- By expanding the virtual desktop infrastructure of Gunsan City Hall, Fujitsu helped the local Korean government agency to execute on their low carbon policy to implement a green IT environment.
- For the Mediterranean University of Reggio Calabria in Italy, Fujitsu created a virtual desktop environment based on VMware vSAN and Horizon that puts the university at the cutting edge in terms of facilities and infrastructure for food and agriculture research.
- For East Japan Marketing & Communications, Inc., an advertising agency of the East Japan Railway Company, Fujitsu provided a VMware virtual desktop infrastructure based on thin clients to make their sales staff more efficient by introducing a hot desk workplace system and a secure remote access environment.
- For Callidus, an Australian manufacturing company. Fujitsu provided a comprehensive end-to-end VDI solution, which allowed the customer to introduce a rich media environment with centralized management and a more scalable desktop platform.