
SCHEDULE F: SERVICE DEFINITION FOR ENHANCED OPERATIONAL MANAGEMENT LEVEL – VIRTUAL DESKTOP PAAS MANAGED

The Virtual Desktop PaaS Managed enhanced operational support level provides operational management of a Virtual Desktop PaaS environment by Exponential-e to the Customer which consists of:

- the infrastructure that the Virtual Desktop environment consists of, software provided by Microsoft, Citrix or VMware;
- the Virtual Desktop shared session desktops; and
- the Virtual Desktop pooled desktops.

The Enhanced Operational Management Level – Virtual Desktop PaaS Managed provides operational management of the Supported Items within virtual server environments on the Microsoft Azure public cloud, on Hyper-V and VMware hypervisors, as well as physical environments, up to the Operating System (OS) and application level. This Enhanced Operational Management Level provides a fully-maintained Virtual Desktop Operating System and application environment, based on systems listed on the Functional Capability section below, and configured by the Service Desk to the Customer's requirements.

The Virtual Desktop PaaS Managed Enhanced Operational Management Level provides the following components:

- Installation of the Virtual Desktop PaaS Managed environments based on Exponential-e's standard Virtual Desktop PaaS build specification, for the OS and application configurations listed in the Functional Capability section of this Schedule F.
- Decommissioning of the OS and application environments based on Exponential-e's standard ITIL compliant OS and application decommissioning process.
- Installation and configuration of the Virtual Desktop environment software needed to deliver the Virtual Desktop PaaS Managed service.
- Upgrading and configuration of the Virtual Desktop environment software needed to deliver the Virtual Desktop PaaS Managed service.
- Installation and configuration of the required software needed to support Exponential-e's service delivery of the OS and applications (including AV, backup, monitoring software, and the setup of VM tools where applicable).
- Configuration and management of the OS and application environment, including any OS and application options, features, or supported applications installed onto the OS.
- Provisioning of the OS and applications licenses, where purchased by the Customer through Exponential-e.
- Exponential-e's standard AV solution installed and configured for the OS and application workloads, and managed as set out in this Schedule F.
- Continuous (24x7x365) OS and application monitoring and alerting.
- Backup management of the OS and application environment, including configuring daily backups, monitoring the backups daily, picking up backup faults, and remediating them for OS and application issues to Exponential-e's standards detailed in this Schedule F.
- Carry out full system and file level restores from backup for the OS and application environment as requested by the Customer.
- Automated analysis and resolution of incidents raised for configured OS and application alarms and warnings.
- Manual analysis and resolution of incidents raised for OS and application alarms and warnings that cannot be automatically resolved.

- Manual changes raised for OS and application changes recommended by Exponential-e.
- Delivery of approved changes raised by Exponential-e and the Customer.
- Patch Management of OS and application patches in line with Exponential-e's standard, ITIL compliant patching process as detailed in this Service Document.
- Exponential-e administration and user account management.

Functional Capability

Exponential-e manages and supports the Supported Item OS to Exponential-e's standard build specification for the vendor's products under Mainstream Support, as detailed in the following location and amended from time to time: <https://www.exponential-e.com/operating-systems-support>.

The versions of Virtual Desktop supported by this service is limited to supported software versions officially supported by the following virtual desktop software vendors; Microsoft, Citrix and VMware. The versions of the Virtual Desktop PaaS Managed service will be selected by the Customer and communicated to Exponential-e.

Operation

The Virtual Desktop PaaS Managed Enhanced Operational Management Level components are as follows. Exponential-e's responsibilities with respect to the Virtual Desktop PaaS Managed Enhanced Operational Management Level are described within the following table. The Customer is responsible for all management activities not included within Exponential-e's responsibilities below.

Aspect	Exponential-e's Responsibilities
Anti-virus ("AV") Agent	• Set up and manage AV configuration settings including recommended vendor exclusions for the OS and applications. • Identify new AV signature updates and approve these updates to be made to agents automatically on an hourly schedule. • Monitor and manage AV signature downloads and AV application. • Identify eligible AV product and agent software (including upgrades) that apply to all Supported Items. • Notify the Customer of eligible AV product and agent upgrades via new change ticket, and the time when these upgrades will be carried out. • Carry out product and agent upgrades at the time agreed by the Customer. • Install and configure agent software on new Supported Items. • Monitor and notify the Customer of any detected virus infections. • Remove virus infections from Supported Items once detected and where possible. • Produce and maintain a document in the CMDB detailing the Exponential-e AV process and the processes the Customer must follow to report new virus infections, request AV version updates, request AV product changes etc.
Application Management	• Conduct routine maintenance and management of application environments. • Implement maintenance procedures.

Aspect	Exponential-e's Responsibilities
	• Investigate application outages. • Investigate application performance issues. • Work with the Customer or 3rd parties to resolve application problems or outages. • Investigate and address root causes for outages and application performance issues. • Provide the Customer with regular updates on resolution efforts. • Ensure that proper systems or management changes are put into place based on recommendations from application vendors.
Asset Management	• Management of OS and application licenses, including arranging Customer renewals and keeping up to date OS and application license records. • Maintain a valid software library for OS and application software owned or leased by the Customer as provided by the Customer. • Maintain a valid software library for OS and application software provided by Exponential-e to the Customer. • Maintain a full and up to date asset management register for Supported Items that is available to the Customer in the CMDB.
Backup	• Configuring daily backups of all Supported Items to include the ability to restore individual files as well as whole Operating System environments and the data it contains. • Monitoring backups daily. • Test application specific backups and restores during the On Boarding activity to prove the recoverability of backed up data. • Use reasonable endeavours to detect backup faults and remediate them for OS and application issues. • Carry out full system restores from backup as requested by the Customer. Each Supported Item includes one full system restore event per annum without additional charge. Additional full system restores can be completed at additional charge. • Carry out OS and application file level restores from backup as requested by the Customer. Each Supported Item includes sixty (60) file system restore events per annum without additional charge. Additional file level restores can be completed at additional charge. • Produce and maintain a document in the CMDB detailing the backup settings used to back up Supported Items, and the processes the Customer must follow to back up and restore Supported Item data.
Certificate Management	• Manage certificate renewals for OS and application functionality with Customer approved providers for Supported Items on behalf of the Customer. • Keep up to date certificate records available in the CMDB. • Link OS and application level certificates to the OS for Supported Items.

Aspect	Exponential-e's Responsibilities
	• Manage bespoke certificate provider authorisation licenses on Supported Items.
Disaster Recovery and Business Continuity	• Provide the Customer with a standard format Disaster Recovery and Business Continuity document for the Supported Items. • Request sign off from the Customer stakeholders for the standard format Disaster Recovery and Business Continuity document for the Supported Items. • Participate in isolated DR exercises for the Supported Items once a year (to support DR failover exercises delivered remotely on a sample and isolated environment as detailed in the Disaster Recovery and Business Continuity document, unless agreed otherwise in writing by the Parties). • Participate in chargeable Disaster Recovery simulations with the Customer on Supported Items if requested by the Customer. This is subject to a minimum of five (5) Working Days' notice provided to the Service Desk by the Customer. • Coordinate with the Customer's representatives to execute DR processes in line with the Customer's IT Disaster Recovery and Business Continuity Plan, at the Customer's request. Exponential-e is responsible for carrying out all activities agreed for completion by Exponential-e in the Customer's IT Disaster Recovery and Business Continuity Plan. • Participate with the Customer on an annual basis to review and improve the Disaster Recovery and Business Continuity document.
Documentation	• Maintain solution design documentation for the Virtual Desktop PaaS Managed environment in the CMDB. • Maintain solution configuration documentation for the Virtual Desktop PaaS Managed environment in the CMDB. • Maintain solution testing documentation for the Virtual Desktop PaaS Managed environment in the CMDB. • Ensure that the CMDB includes the day-to-day operational procedures for the Flex Manage Services. • Implement and maintain version control for all above documentation.
Domain Management	• Manage Customer owned DNS domain names via authorised DNS domain providers. • Document owned DNS domain names in the CMDB. • Advise the Customer at least three (3) months in advance of upcoming end of DNS domain name ownership end dates. • Complete DNS domain name renewals on behalf of the Customer when required to do so by the Customer. • Procure new available DNS domains on behalf of the Customer upon request from the Customer. • Maintain accurate and up to date records of owned DNS domain names.

Aspect	Exponential-e's Responsibilities
End of Life Management	• Advise the Customer at least three (3) months in advance of upcoming End of Life dates of any Supported Items. End of Life meaning the relevant vendor no longer supports the applicable item. • For Customer managed infrastructure, if the Customer is not able to upgrade the OS or applications by the End of Life date, Exponential-e will use reasonable endeavours to continue to deliver the Virtual Desktop PaaS Managed enhanced operational support level in accordance with this Schedule F however the Flex Manage service level agreement shall not apply to any Supported Items that have reached their End of Life date. • For the Exponential-e managed Virtual Desktop PaaS Managed infrastructure, Exponential-e will ensure that all service components are always running a supported vendor version. Major version upgrades (version x.x) to Virtual Desktop PaaS Managed components will be planned to occur every 6 months and prior to the End of Life date. Minor version upgrades (version x.xx) to Virtual Desktop PaaS Managed components will be planned to occur every three (3) months and prior to the End of Life date.
Licensing	• Exponential-e is responsible for licensing management under the Contract to cover: ○ Application agents for AV as applicable for the Supported Items. ○ Application agents for backup as applicable for the Supported Items. ○ License management to ensure the Supported Items have OS licenses and Virtual Desktop access licenses - Windows Server CALs/SALs and Windows 10 Enterprise/VDA ○ RMM monitoring agents as applicable for the Supported Items. ○ Vendor license management for the Virtual Desktop PaaS Managed environment – Citrix and VMware For the avoidance of doubt, this covers the provision and management of licences.
Monitoring	• All Supported Items will be configured with a RMM method that will be used to proactively monitor the health and availability of the Supported Items. • Configuring and maintaining standard, automated OS and application monitors for Supported Items to notify Exponential-e of OS and application issues and outages. • Document all monitoring settings for all Supported Items during the On Boarding activity and make this information visible to the Customer in the CMDB. Update the documentation when monitoring changes are made. • Proactive monitoring of Supported Item CPU, RAM, disk space, and network utilisation if access to this information is provided by the Supported Item, and storing this information for 30 days.

Aspect	Exponential-e's Responsibilities
	• Proactive monitoring of all Supported Items at regular intervals (as agreed during On Boarding) to collect standard OS and application metrics. • Carrying out Exponential-e standard automated health check and performance monitoring for Supported Item Operating Systems and application. • Customers may choose up to five (5) additional OS monitors from Exponential-e's list of available additional OS and application monitors that Exponential-e will monitor for Supported Items. • Logging issues uncovered by OS and application monitoring within the management platform. • Process issues uncovered by OS and application monitoring to remediation (where possible). • Management and maintenance of the monitoring agent software.
Operating System and Application Upgrades	• Minor upgrades include all updates to the OS of the Supported Item that can be performed on the existing system. These upgrades do not require the existing supported OS environment to be rebuilt to perform the upgrades. The following upgrades are included alongside the OS-level minor upgrades: ○ Hardware firmware upgrades ○ All OS RMM agent upgrades ○ All backup software agent upgrades ○ All anti-virus software agent upgrades Minor Upgrades are included within the Virtual Desktop PaaS Managed Enhanced Operational Management Level. • Major Upgrades (including all updates to the OS or other parts of the Supported Item that require a new physical or virtual OS to be built) are not included with the Virtual Desktop PaaS Managed Enhanced Operational Management Level and if required, will be undertaken by Exponential-e subject to additional Charges. • All upgrades to Supported Items will be subject to the change management process, and the Customer will be required to approve all upgrade changes before the Service Desk will carry them out.
Patch Management	• Provide a list of critical, security, and non-critical OS and application updates (as identified by Exponential-e's third party patching solution) to the Customer on a monthly basis, at least five (5) days prior to the scheduled installation date. The Customer must confirm to Exponential-e in writing which of the identified critical and security updates are not to be installed during the next patching event onto Supported Items. • Install Customer approved critical and security OS and application updates onto the Virtual Desktop PaaS Managed environment on a monthly schedule. • Install Customer approved non-critical OS and application updates onto the Virtual Desktop PaaS Managed environment on a monthly schedule,

Aspect	Exponential-e's Responsibilities
	or less frequently (as agreed by the Parties during the Supported Item On Boarding process). • Provide a list of critical and performance updates for Supported Item hardware to the Customer on a quarterly basis, at least five (5) days prior to the scheduled installation date. The Customer must confirm to Exponential-e in writing which of the identified critical and performance updates are not to be installed during the next patching event to the Virtual Desktop PaaS Managed environment. • Install Customer approved critical and performance updates onto the Virtual Desktop PaaS Managed environment hardware on a quarterly schedule. • Provide a list of non-critical and firmware updates for the Virtual Desktop PaaS Managed environment hardware to the Customer on a semi-annual basis, at least five (5) days prior to the scheduled installation date. The Customer must confirm to Exponential-e in writing which of the identified non-critical and firmware updates are not to be installed during the next patching event to Supported Items. • Install Customer approved non-critical and firmware updates onto the Virtual Desktop PaaS Managed environment hardware on a semi-annual schedule. • Install critical and performance updates onto the Virtual Desktop PaaS Managed environment hardware on a quarterly schedule. • Install non-critical and firmware updates onto the Virtual Desktop PaaS Managed environment hardware on a semi-annual schedule. • Notify the Customer of proposed OS, application, and hardware updates to the Virtual Desktop PaaS Managed environment at least three (3) Working Days prior to the scheduled update. • Configure all of the Virtual Desktop PaaS Managed environment for automated update installation by the Service Desk. Virtual Desktop PaaS Managed environment components that are not compatible with the Exponential-e automated update process will be updated manually. • Invoke the Emergency Patch Procedure when updates are identified by the vendor, Customer, or Exponential-e as urgent. This procedure is a variation of the Standard Patch Procedure and aims to expedite the installation of the OS and application updates for the Virtual Desktop PaaS Managed environment. This procedure is documented in the CMDB. • Create the Standard Patch Procedure and the Emergency Patch Procedure jointly with the Customer and document these procedures in the CMDB and schedule Patching in line with the Procedures. • Patch management excludes any item that would in Exponential-e's reasonable opinion cause significant impact to the existing Supported Item. For example, a patch that may require a full rebuild of the Supported Item. This will be a chargeable Professional Services engagement.

Aspect	Exponential-e's Responsibilities
	• Patch Management excludes security hardening of the Supported Item required by regulatory or compliance purposes. This will be a chargeable Professional Services engagement.
Performance Testing	• Perform OS, application, and service testing on request from the Customer as required in response to a perceived performance issue. • Confirm OS & application testing prior to entry into Early Life Support. • Prepare and execute load simulations against managed application environments in response to a perceived performance issue. • Provide the Customer with reports from these load simulations. • Analyse application behaviour during load simulations to help isolate performance bottlenecks. • Recommend configuration changes to reduce bottlenecks as required in response to a perceived performance issue against the OS or applications. • Monitor the performance of the Virtual Desktop PaaS Managed environment. • Highlight performance exceptions to the Customer and recommend remediation actions.
Platform	• Implement platform changes to the Virtual Desktop environment based on changing Customer requirements. • Monitor Virtual Desktop environment capacity and communicating this to the Service Manager. • Monitor overall Virtual Desktop platform health and configuration to vendor best practices. • Ensure break fix remediation of all Virtual Desktop platform issues and incidents. • Provide gold image updates on a quarterly basis with new approved software and patches. • Assist the Customer in eliminating the Virtual Desktop platform as a possible cause of end user issues. • Manage user access to the Virtual Desktop platform • Arrange and manage the shared session desktops and pooled desktops reboots to occur on a weekly basis after hours. • Create new shared session desktops and pooled desktops following a change request from the Customer.
Reporting	• Delivering the following performance and management reports for servers covering a 30 day period: ○ Microsoft OS Licensing ○ Citrix/VMware Virtual Desktop Licensing ○ Virtual Desktop Performance Review ○ Virtual Desktop Computer Audit ○ Virtual Desktop Patch Compliance ○ Virtual Desktop Anti-Virus Health

Aspect	Exponential-e's Responsibilities
	○ Virtual Desktop Software List
Server Replication	• Installation and configuration of Server Replication software agent on Exponential-e provided virtual servers that are identified as Server Replication targets during the Virtual Desktop PaaS Managed On Boarding process. • Monitor and alert on the availability and performance of the Server Replication software applied to the Virtual Desktop PaaS Managed environment. • Provide proactive remediation of Server Replication issues generated through the monitoring and alerting toolsets for the Virtual Desktop PaaS Managed environment. • Identify new Server Replication software updates via a new change ticket for the software updates, and the time when these updates will be carried out. • Carry out product and agent updates at the time agreed by the Customer.
SQL Server (where applicable)	• Monitor and manage SQL Services ensuring they are online. • Monitor the general Server performance on SQL Servers, which includes only CPU, RAM and Disk Capacity. • Perform backups of SQL Server Databases. • Manage basic SQL Server permissions, agreed during on-boarding. • Patching SQL Server engines, agreed during on-boarding.
Standard Installation Activities	• Installation of Exponential-e RMM agents on the Virtual Desktop PaaS Managed environment. • Configuration of Exponential-e standard monitoring on the Virtual Desktop PaaS Managed environment.
Standard Operational Activities	• Configuration of remote access to the OS and applications. SSH is configured for Linux, and ScreenConnect is configured for Windows systems. • Configuration of management accounts for Exponential-e engineering staff. • Virtual Desktop server and XenDesktop workstation reboots when required to keep OS and application functionality working, and when required by the Customer. • Service restarts for OS and application services on Virtual Desktop shared session desktops and pooled desktops • Clearing temporary files and logs to release available OS and application space. • Identification of high-risk OS and application issues. • Monitoring the Flex Manage service level agreement.

Customer Pre-requisite Requirements

To start Virtual Desktop PaaS management of the Virtual Desktop PaaS Managed environment, Exponential-e requires the following pre-requisites to be fulfilled by the Customer during the On Boarding period.

- Provision of an OS license for the Supported Item if this is not provided by Exponential-e.
- Provision of an Application license for the Supported Item if this is not provided by Exponential-e.
- Provision of an AV license for the Supported Item if this is not provided by Exponential-e.
- Provision of a Backup license for the Supported Item if this is not provided by Exponential-e.
- Conducting the On Boarding activities (as identified by Exponential-e during the On Boarding process) including provision of information needed by Exponential-e to correctly manage and support the Virtual Desktop PaaS Managed environment.
- Provision of design documentation for currently running Virtual Desktop environments, where this exists.
- Provision of Configuration documents or CMDB information for currently running Virtual Desktop environments where it exists.

Customer Dependencies

For Exponential-e to deliver the Virtual Desktop PaaS Managed enhanced operational support level, the following Customer dependencies exist. Failure of the Customer to meet these Customer Dependencies may affect the service Exponential-e is able to deliver to the Customer, and Exponential-e's obligations under the Flex Manage service level agreement.

- The Customer shall provide documented active Customer IT policies for all existing deployed Virtual Desktop deployments at the time of starting the On Boarding process.
- The Customer shall provide Exponential-e with advice in advance of any peculiar, special, or particular modifications required on the Virtual Desktop PaaS Managed environment.
- The Customer shall be responsible for documenting and maintaining any differing configuration and build requirements pertaining to the existing OS environment that is peculiar, special, or has had particular modifications applied.
- The Customer shall provide, in accordance with the timelines defined during the On Boarding activity, approval for patching events, the approved list of updates to be installed, and approved list of firmware to be installed on physical Supported Items.
- The Customer shall review the compatibility of all custom and non-standard applications or line of business applications with the OS and service packs to be used.
- The Customer shall undertake application and pre-deployment compatibility testing before authorising Exponential-e to deploy recommended patches to shared session desktops and pooled desktops.
- The Customer shall assess in advance the application suitability for virtualisation of their applications, and for use with the hypervisor used for VMs.
- Customer shall provide all reasonably required information for application installation and configuration for applications installed on Virtual Desktops.
- The Customer shall provide Exponential-e with reasonable assistance with deployment activities as reasonably required.
- The Customer shall provide third party application supplier contact and contract details.
- The Customer shall carry out reasonable application functional testing.
- The Customer shall carry out reasonable user acceptance testing.
- Advise Exponential-e of the Customer's reasonable business and technical requirements for the low level design.
- The Customer shall test the environment during On Boarding and signing off the configuration.

- The Customer shall ensure that the Customer endpoints and management environments are secured, patched, and maintained in accordance with Good Industry Practice.
- The Customer shall update existing Virtual Desktop clients or thin client software in order to make best use of Virtual Desktops where reasonably recommended by Exponential-e.
- The Customer shall be responsible for management of any thin client infrastructure.
- The Customer shall deploy Virtual Desktop client software to end user devices.
- The Customer shall provide application and connectivity support for end user devices.
- The Customer shall ensure that the Customer applications layered on top of the OS are secured, patched, and maintained in accordance with Good Industry Practice for Supported Items that exists prior to the On Boarding activity.
- The Customer shall work with Exponential-e to replace all End of Life Supported Items before the arrival of the End of Life date.
- The Customer shall review the compatibility and suitability of the selected Supported Item configuration for its intended application usage.
- Exponential-e shall retain administrative rights on the Virtual Desktop environment in order to provide the Virtual Desktop PaaS Managed enhanced operational support level.
- Details of application installations or updates must be notified to Exponential-e prior to their application via the change management process.

Service Education

Exponential-e will provide education to Customer staff about the details of the service provided, and how to make use of the provided Virtual Desktop PaaS Managed service. Exponential-e will provide the following service education.

Education	Timeline	Method
Raising incidents for faults/issues	On Boarding	Face-to-face CMDB document
Raising changes for system changes	On Boarding	Face-to-face CMDB document
Reporting	On Boarding	Face-to-face CMDB document
Requesting the creation of new Virtual Desktop PaaS Managed infrastructure systems, shared session desktops, or pooled desktops	On Boarding	Face-to-face CMDB document
Requesting the addition of Virtual Desktop PaaS Managed resources	On Boarding	Face-to-face CMDB document
Disaster Recovery and Business Continuity design and process	On Boarding	Face-to-face CMDB document
High level solution design and configuration documentation for the Virtual Desktop PaaS Managed environment	First 3 months of BAU	CMDB document
Solution testing documentation for the Virtual Desktop PaaS Managed environment	First 3 months of BAU	CMDB document

Accountabilities and Responsibilities

RACI

A responsibility assignment (RACI) matrix showing whether Exponential-e, the Customer or any relevant third parties are Responsible, Accountable, Consulted or Informed in respect of a particular aspect will be drawn up to ensure a joint understanding. The RACI is bespoke to the Customer, is formalised during the On Boarding phase, and is documented in the CMDB.

The following table details who is responsible for high level ITIL-level RACI activities for the Virtual Desktop PaaS Managed enhanced operational support level. Some activities are shared between Exponential-e and the Customer, where the Customer will be responsible for activities such as raising or approving change requests. Specific details are documented within the CMDB.

ITIL Process	Exponential-e	Customer
Asset Management	RAC	CI
Change Management	RAC	RACI
Configuration Management	RAC	CI
Event Management	RAC	CI
Incident Management	RAC	CI
Patch Management	RAC	CI
Release Management	RAC	CI
Request Management	RAC	RACI

The Customer is responsible for all RACI activities for areas that Exponential-e is not responsible for. During the On Boarding activity the Customer shall identify key internal and 3rd line primary and back-up contacts to the Service Desk and promptly inform the Service Desk of any changes during the term of the Contract.

Adding Users

The Virtual Desktop PaaS Managed service is provided for the number of users set out on the Order Form. The Customer may request the addition of users to the Virtual Desktop PaaS Managed environment via an official change request. Adding more users to the Virtual Desktop PaaS Managed environment may require the Virtual Desktop platform to be reviewed and redesigned, and this may require additional Virtual Desktop PaaS environment servers and will be subject to additional charges and completion of the Change Management Process.

Service Requests

Service Requests are requested changes to a Supported Item or a request for an operational task made by the Customer. Service Requests will be carried out by Exponential-e on a 24x7x365 basis.

All Service Requests will be reviewed, verified and are subject to approval by Exponential-e, and Exponential-e will confirm if additional charges apply. Additional charges will only apply to the extent that such Service Request do not fall within the scope of this Enhanced Operational Management Level as set out herein.