

# Migration

Modified on 22 AUG 2017

VMware Validated Design 4.1

VMware Validated Design for Software-Defined Data Center 4.1

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**VMware, Inc.**  
3401 Hillview Ave.  
Palo Alto, CA 94304  
[www.vmware.com](http://www.vmware.com)

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# About VMware Validated Design Migration

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*VMware Validated Design Migration* provides guidelines for adopting this VMware Validated Design keeping an existing (brownfield) environment that does not comply with the architecture and design in this validated design.

Environment architectures can be aligned to this validated design but you must reconfigure some levels. According to the starting point and to the level of deviation from this validated design, the reconfiguration might include a few changes or might require a re-architecture of the environment. This documentation defines migration options that you select according to the configuration of your existing environment, available time, risk profile and other requirements.

This documentation does not cover step-by-step instructions for performing the required configuration tasks because they depend on the customer requirements and the starting configuration.

After a migration is complete, you must validate the resulting configuration against the architecture and design of this VMware Validated Design. This documentation contains a verification procedure for such validation.

## Required VMware Software

*VMware Validated Design Migration* is compliant and validated with certain product versions. See *VMware Validated Design Release Notes* for more information about supported product versions.

## Intended Audience

The *VMware Validated Design Migration* documentation is intended for consultants and architects who have a solid understanding of both the VMware Validated Design for Software-Defined Data Center and existing environments that are not compliant with this VMware Validated Design.



# Overview of Migrations Options

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Each option for migration to an SDDC that is compliant with this VMware Validated Design is based on the requirement to keep VM metadata, the availability of hardware, complexity of deployment and operation, and so on.

## Virtual Machine Metadata

IT infrastructure contains metadata that is associated with each component. You use this metadata to keep track of the current settings and of historical changes, events, alarms and performance metrics. When migrating workloads between environments you must evaluate the importance of this metadata against the migration source.

## Option A - New Greenfield Validated SDDC

Implementing a new greenfield SDDC according to this VMware Validated Design is the most direct method for reaching a state that is compliant with this design without migration work. After you implement this VMware Validated Design, you can manage it as a separate environment. You can use the new SDDC environment to stand up new workloads. The management components of and the workloads in the legacy environment can remain at their original location until you retire them.

Deploying a new standalone validated SDDC has the following attributes:

**Table 1-1.** Features of the New Greenfield Validated SDDC Migration Option

Attribute	Description	
Advantages and disadvantages	Advantages	<ul style="list-style-type: none"> <li>■ Reduced time to value because deployment is fast without migration work</li> <li>■ Reduced implementation complexity</li> </ul> <p>You can leave the new and old environments isolated.</p> <ul style="list-style-type: none"> <li>■ No legacy issues</li> <li>■ The historical VM metadata is available in the old environment</li> <li>■ Migration remains an option at a later date</li> </ul>
	Disadvantages	<ul style="list-style-type: none"> <li>■ You must manage multiple environments.</li> <li>■ The workloads might exceed the lifetime of the environment and you might have to migrate them in the end.</li> <li>■ You must provide more hardware.</li> <li>■ You must re-implement the integration with external and third-party components.</li> </ul>
Alignment with this VMware Validated Design	High	

## Option B - Workload Migration

In the Workload Migration Option, you stand up a new greenfield SDDC according to this VMware Validated Design just as with Option A but you use Cross vCenter Server vMotion to move the existing workloads to the new environment. This option has the benefit of allowing the old and new environment to co-exist while the migration occurs, which allows for little to no downtime for the workloads.

After you evacuate the old environment, you can decommission it and reuse the hardware. You can also avoid purchasing new hardware because the physical hosts become free in the old environment. You can rebuild and add them to the new compute pods on a rolling basis. In this case, you must plan and schedule the migration on a per compute host basis.

Using a workload migration has the following attributes:



**Table 1-2.** Features of the Workload Migration Option

Attribute	Description
Advantages and disadvantages	<div>Advantages</div> <ul style="list-style-type: none"> <li>■ You can use the new environment immediately.</li> <li>■ You can migrate old workloads on demand.</li> </ul> <p>You can reuse the old hardware as needed.</p>
	<div>Disadvantages</div> <ul style="list-style-type: none"> <li>■ Not all VM metadata history is migrated between environments.</li> <li>■ You must provide more hardware while the two environments are running.</li> <li>■ Operation overhead exists because you manage multiple environments.</li> <li>■ You might need to migrate some workloads in waves to keep multi-VM applications intact.</li> <li>■ You must re-implement the integration with external and third-party components.</li> </ul>
Alignment with this VMware Validated Design	High

## Option C - Architecture Alignment

Apply the Architecture Alignment Option to reuse investment or retain complete VM historical metadata. This migration option takes one or more existing components and reconfigures them to align them with the configuration that is prescribed in this VMware Validated Design.

This migration options requires significant planning and a well-defined starting point. Certain software configuration options cannot be re-configured and therefore might require a new implementation.

Using the Architecture Alignment Option has the following attributes:

**Table 1-3.** Features of the Architecture Alignment Migration Option

Attribute	Description	
Advantages and disadvantages	Advantages	<ul style="list-style-type: none"> <li>■ You must manage only one environment.</li> <li>■ The historical VM metadata is available in the environment.</li> <li>■ Integration with external and third-party components is preserved.</li> <li>■ You provide minimal to none additional hardware.</li> </ul>
	Disadvantages	<ul style="list-style-type: none"> <li>■ Significant time for planning and migration.</li> <li>■ Planned downtime for reconfiguration.</li> <li>■ More time for post-migration verification.</li> <li>■ Inability to migrate all starting configuration.</li> <li>■ You might not be able to align all starting configurations to this validated design.</li> </ul>
Alignment with this VMware Validated Design	Medium	

## Option D - External Infrastructure Endpoint

Apply the External Infrastructure Endpoint Option to use an existing environment as a deployment option from within an SDDC that is compliant with this validated design. You configure the management pod in the validated SDDC to use the existing infrastructure and its cluster resources for compute workloads. The existing legacy environment (endpoint) does not match the specification of this VMware Validated Design and does not comply with the standards in this validated design.

This configuration has several management interfaces and requires additional effort for monitoring, alerting, backup, restore and disaster recovery.

Using the External Infrastructure Endpoint Option has the following attributes:

**Table 1-4.** Features of the External Infrastructure Endpoint Migration Option

Attribute	Description	
Advantages and disadvantages	Advantages	<ul style="list-style-type: none"> <li>■ The existing environment is intact.</li> <li>■ The historical VM metadata is available in the existing environment.</li> <li>■ You use a single tenant workload deployment interface.</li> <li>■ You do not have to migrate hardware.</li> <li>■ Integration with external and third-party components is preserved.</li> </ul>
	Disadvantages	<ul style="list-style-type: none"> <li>■ External endpoint lifecycle (upgrade, patch, backup, restore, and disaster recovery) is not a part of the validated SDDC instance.</li> <li>■ You must use additional monitoring interfaces.</li> <li>■ You must provide more hardware.</li> <li>■ You must manage multiple environments.</li> </ul>
Alignment with this VMware Validated Design	Low	



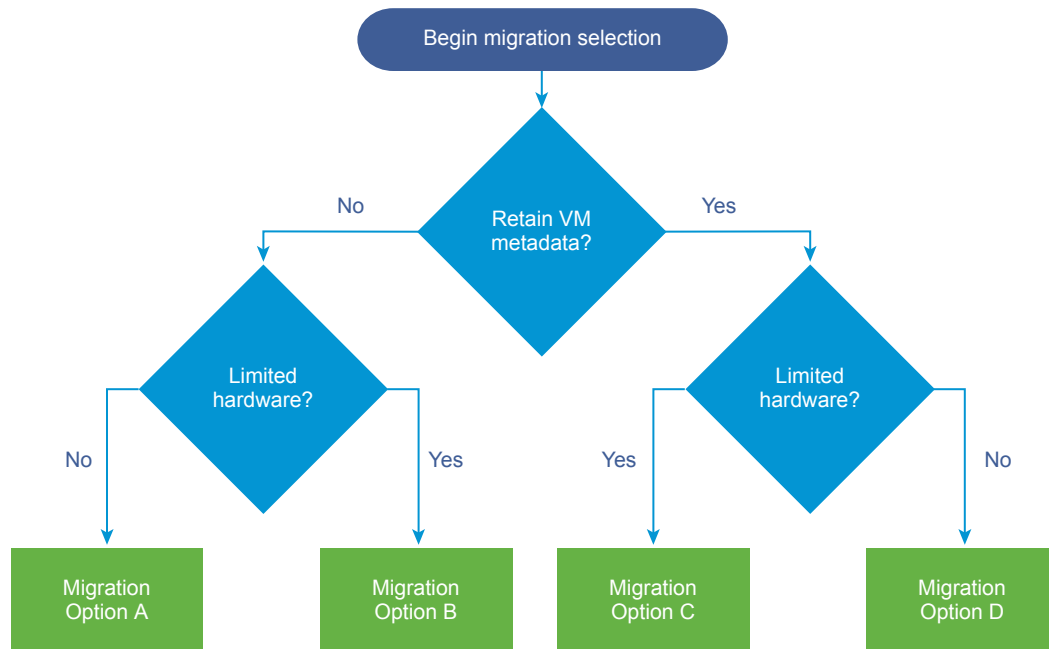
## Migration Options Decision Matrix

Select the migration option to implement an SDDC that is compliant with VMware Validated Designs according to the advantages and disadvantages of each approach.

Requirement	New Greenfield Validated SDDC	Workload Migration	Architecture Alignment*	External Infrastructure Endpoint
Retain metadata history			x	x
Retain legacy environment		x		x
Limit new hardware		x	x	
Existing complex external integrations				x
Limited time on existing environment	x	x		
Reduced complexity	x	x		
Requires a clean infrastructure state	x	x		
Trailing migration window	x	x		
Reduced management overhead	x	x		
Minimal downtime	x	x		x
Reduced post migration verification	x			x

The following decision tree evaluates the decision matrix using to two primary points:

- 1 Need to retain the historical VM metadata
- 2 Limits to using existing hardware

**Figure 2-1.** Decision Tree for Migration to a Validated SDDC

## Pre- and Post-Migration Actions

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When you plan to migrate VMs or infrastructure components, perform checks and verifications before and after the change to reduce the risk and increase the chances for a successful and flawless migration.

### Design Decision Checklist

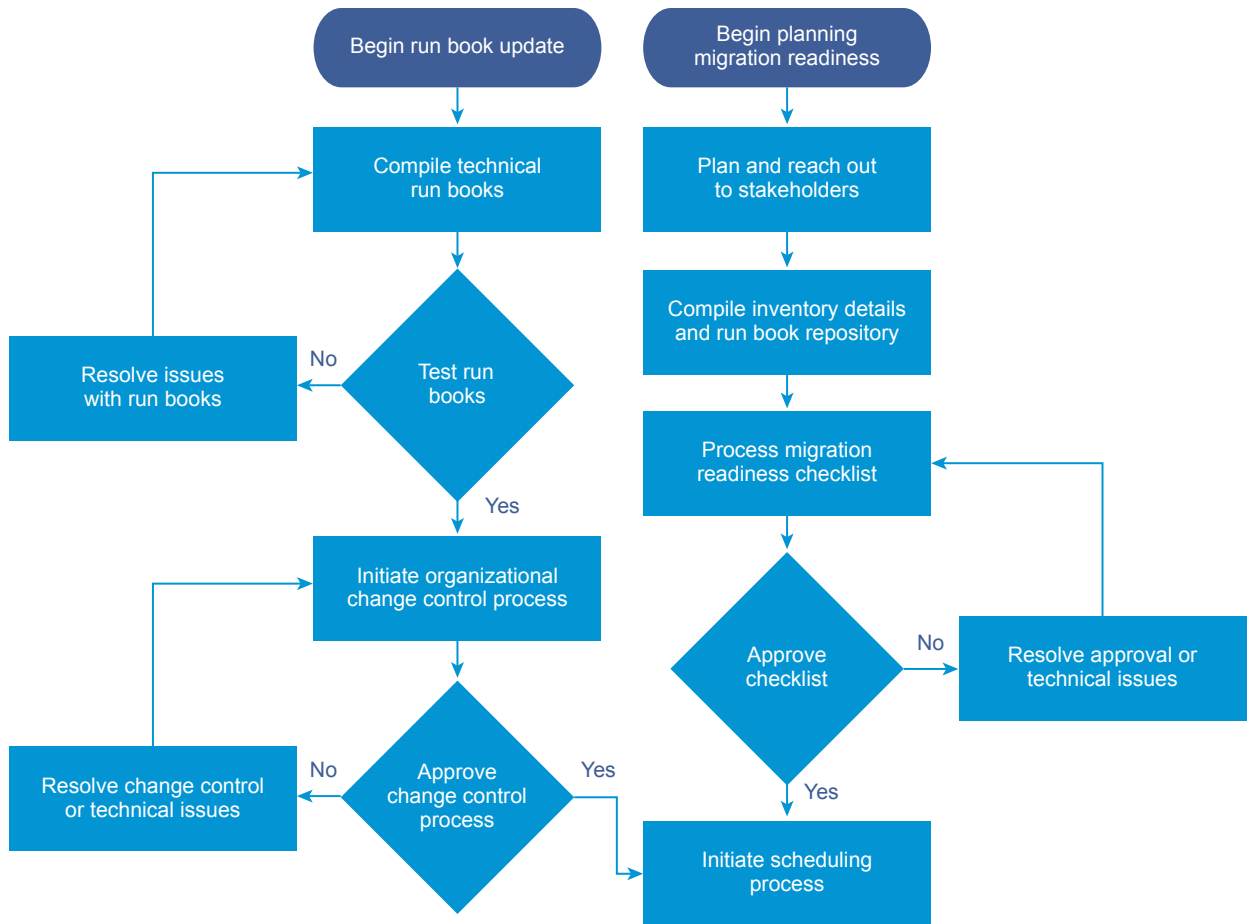
The VMware Validated Design contains all design decisions that should be aligned to the deployed configuration. You use these design decisions in two ways to ensure alignment of the architecture and accurate implementation:

- Before you plan the migration, review and agree on all design decisions. If there are non-aligning design decisions, contact VMware.
- After you complete the migration, compare the design decisions with the migration target environment.

### Migration Preparation

Collect the following information before you prepare for environment migration:

- 1 Key Stakeholder Information
- 2 Migration Candidate Inventory Details
- 3 Migration Readiness Checklist
- 4 Technical Run Books
- 5 Change Control Processes

**Figure 3-1.** Preparing for Migration to an SDDC That Is Compliant with VMware Validated Designs

## Migration Candidate Assessment

Regardless of the migration type, perform a Migration Candidate Assessment to gather information before migration.

The Migration Candidate Assessment is different according to the migration option. The actual candidates being assessed could be the following units:

- Workloads being migrated as in the Workload Migration Option
- Infrastructure or management components as in the Architecture Alignment Option or External Infrastructure Endpoint Option.

The Migration Candidate Assessment contains following details:

- Number of CPUs
- Size of memory
- Size of disks
- Average I/O activity
- Application criticality and spike periods
- Application owner
- Virtual Machine owner



- VM shares or limits
- Upstream and downstream dependencies



# Option A - New Greenfield Deployment

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Installing a new greenfield environment without migrating any existing workloads is a valid and time saving technique. Migrations can be complex leading to lengthy projects that need to be planned accordingly.

Perform a detailed analysis of the migration candidates at both a business and technical level to work out the possible migration candidates. At a high level, a business might have the requirement that all workloads should be running on an infrastructure that is compliant with VMware Validated Designs. However, under certain conditions, you might need to make a decision on an application-to-application or VM-to-VM basis for each candidate. Any change in existing workloads, such as changing the platform or migrating, carries potential effects that might not be offset by the re-hosting benefits. Leaving applications and VMs in their existing locations and building adjacent infrastructure to host new workloads might be the best solution in some circumstances.

## Requirements

Understanding the management component, workload application, VM or groups of VMs from a performance, availability and maintenance tolerance is important when choosing a migration method. This assists with planning of the migration including timing and dependencies. The requirements vary for each, and you must also consider infrastructure-wide requirements. Document all requirements and match them to a specific migration option.

## Duration and Maintenance Windows

Align duration and maintenance windows to migration process planning. If you deploy a new SDDC environment without migrating any workloads, you do not have to align to any specific timing schedule.

## Risks

Risk is minimal when you do not change any workload by migrating it to a new environment.

Consider also the risk associated with not migrating a workload, for example, when the existing workloads are hosted on aging or unstable infrastructure.

## Metadata Considerations

The existing management components, applications and VMs have a large set of associated metadata. When migrating workloads between environments, this metadata might or might not be needed according to the business and technical requirements. In the non-migration, greenfield, approach, all metadata is retained at the source.

## Backup and Rollback

When you select to leave existing workloads in their current environment, there is no need to change the existing backup, restore or rollback methodology. For information about the new considerations for the new validated SDDC environment, see the VMware Validated Design operations documentation.

## Decommissioning

The process of finalizing an existing environment is different according to the environment. You consider the size, location, criticality and data retention policies. When choosing not to migrate existing workloads to a new validated SDDC environment, the existing environment typically hosts the existing workloads for a more extended time period, until the last application is no longer needed, or a migration project is established and completed.

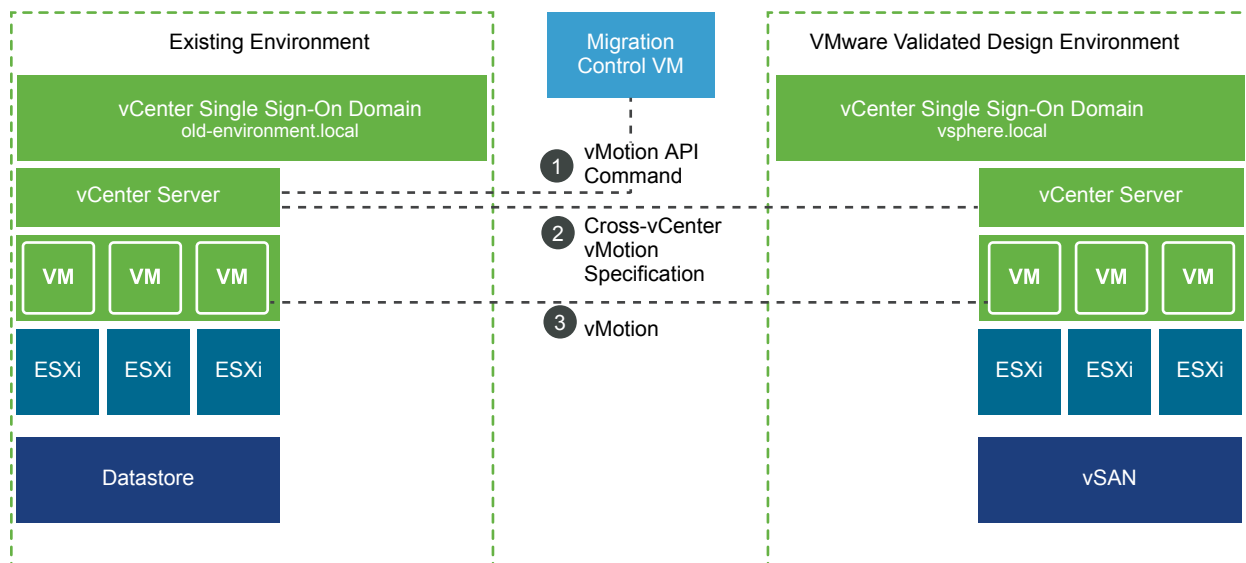
## Option B - Workload Migration

Migrating existing workload VMs using Cross vCenter Server vMotion to a new validated SDDC environment can be a quick and effective. After the requirements and connectivity are in place, the migration can happen in a single large migration window or run through on an ad-hoc or on-demand basis.

In this migration option, the existing source and the new SDDC environment co-exist during or after the migration process is complete. According to the requirements, you can keep the old environment online or decommission it for another purpose.

The exact process of workload migration might differ slightly according to the configuration of the existing source environment but using vSphere vMotion is one of the simplest and safest methods for aligning to a VMware Validated Design standard.

**Figure 5-1.** Workload SDDC Migration Option



## Requirements

You must fulfill the following requirements to establish a cross vCenter Server vMotion migration of the workloads from an existing non-validated SDDC to a new validated SDDC:

- The source and destination vCenter Server instances and ESXi hosts must be running version 6.0 or later.
- The cross vCenter Server and long distance vMotion features require an Enterprise Plus license.

- When using the vSphere Web Client, both vCenter Server instances must be in Enhanced Linked Mode and must be in the same vCenter Single Sign-On domain so that the source vCenter Server can authenticate to the destination vCenter Server.
- Both vCenter Server instances must be time-synchronized with each other for correct vCenter Single Sign-On token verification.
- For migration of compute resources only, both vCenter Server instances must be connected to the shared virtual machine storage.
- vSphere APIs/CLI is needed if both vCenter Server instances exist in separate vSphere Single Sign-On domains.

After the new environment is configured, you must provide the following configuration for workload migration:

- Establish network connectivity between source and destination hosts.
- Temporarily configure NSX Layer 2 bridging for workload subnets or reassign IP addresses of the workload VMs as a part of the migration process.
- Build or assign an existing virtual machine to run the migration scripts. This virtual machine must communicate with the vCenter Server and Single Sign-On instances in both the source and destination environments.
- Use test VMs to ensure end-to-end technical and process coverage.

## Duration and Maintenance Windows

Before you migrate the workloads to the new validated SDDC environment, conduct a Migration Candidate Assessment to verify that all information is known and migrations can be timed and scheduled as appropriate.

Understanding the migration time lines is critical for planning and scheduling. Careful analysis of the Migration Candidate Assessment for the workloads that need to be migrated must take place before to any migration starts.

By using Cross vCenter Server vMotion, the downtime when migrating workloads can be zero. However, according to the details that you discovered during workload analysis, shutting the workload down prior to the migration could be a better option. For example, shut down the workload in the following cases:

- High average I/O activity on the workload
- Workload that is a part of a multi-machine application whose VMs must reside in the same environment

Perform test migrations before the actual workload migration to capture performance metrics about the environmental capabilities. Test large and small VM configuration sizes and use these metrics to estimate each workload migration. Advise application and VM owners of the expected migration time.

## Risks

To reduce the risks when performing changes in an environment, perform the following activities:

- 1 Perform the Migration Candidate Assessment. See [“Migration Candidate Assessment,”](#) on page 16.  
This process ensures that the source and destination environments, and the migration candidate details as known and documented.
- 2 Input the details from Migration Candidate Assessment in the Migration Schedule which in turn drives the entire repeatable process for migrations.

Consider the following best practices to avoid common mistakes during migration:

- Avoid splitting application VMs in different migration groups. Keep VMs that host a single application in the same migration group.
- Ensure that the appropriate networks are available in both locations.
- Document and duplicate any existing reservations or limits to ensure VMs perform the same post-migration.
- Ensure that management authentication and authorization models are identical in both locations.
- Test and document the network bandwidth and latency between the source and destination.
- Consider workload-specific external dependencies such as Active Directory, external databases or physical load-balancers.

## Metadata Considerations

When you migrate virtual machines between vCenter Server systems using this option only a limited set of metadata is transferred with each VM. The metadata that is not migrated includes but is not limited to the following:

- Performance metrics
- Events
- Alarms
- Tags
- Backup jobs
- Shares and limits
- Business group association
- Permissions
- All infrastructure logs but the in-guest logs

## Backup and Rollback

Before any migration work can commence, implement a backup and restore mechanism for all management components and workload VMs. Test the restore capabilities of these backups to ensure data integrity.

vSphere vMotion does not complete until it verifies a successfully working end state. If a vSphere vMotion operation fails, the source is always left intact, and you can resume the operation of the workloads without loss of data. If a situation occurs where something fails to work or to perform as expected, because vSphere vMotion is bidirectional, you can migrate the workload VMs back to their original source environment to ensure that up-time is retained and fault detection started.

## Decommissioning

As you migrate workload VMs from the old environment to the new validated SDDC, hosts will be less utilized until unutilized at some stage during the process. Prepare a migration schedule that allows rebalancing of host clusters and expedited removal of hosts.

- If the hosts are still serviceable, you can rebuild the hosts and join them to the new validated SDDC environment at a steady pace so that you can use the available capacity for incoming migrated workloads. Plan the capacity and expansion of the new validated SDDC environment according to the migration schedule and workload sizing.

- If the hosts within the old environment are no longer serviceable, perform environment-specific steps for a correct decommissioning process.

After all hosts are evacuated, perform a final backup of all the management VMs before you power them off. After the management VMs are powered off, all management hosts can be either reused or decommissioned in the same way as the compute hosts.

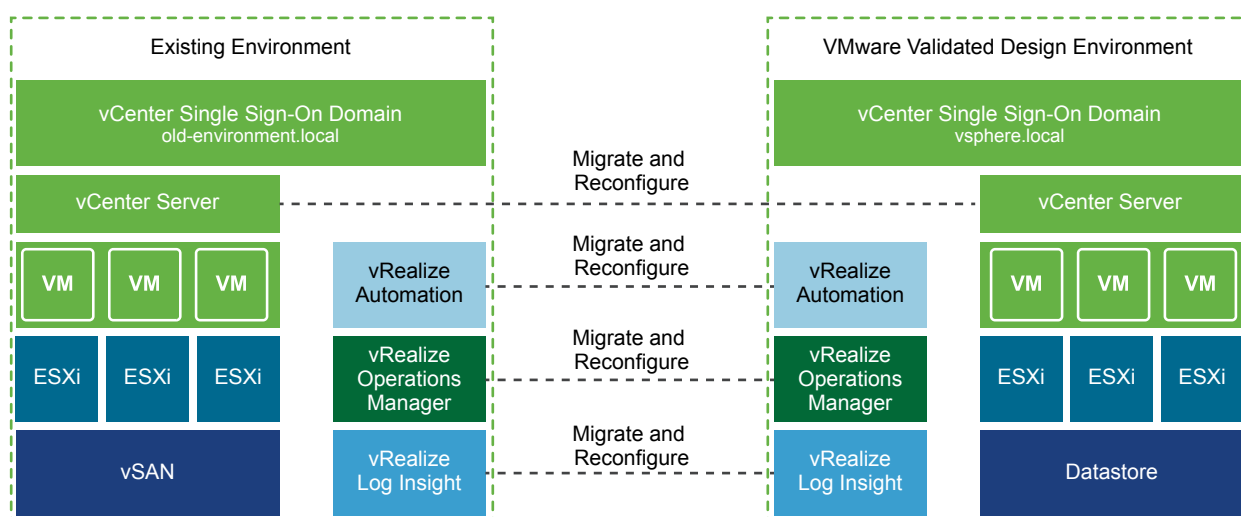


## Option C - Architecture Alignment

Integrating existing SDDC management components and aligning their architecture to the VMware Validated Designs standard could be required if retaining VM metadata is a requirement or if the environment contains many third-party or custom integrations.

This migration option requires significant planning and a well-defined starting point to ensure the migration plan will be successful. Certain software configuration options cannot be re-configured and therefore might require a new installation. Using this process does not require a significant decommissioning process because it reuses the existing infrastructure.

**Figure 6-1.** Architecture Alignment SDDC Migration Option



## Requirements

Document the software version, build number and architecture of the existing management components. Evaluate the following requirements about each component.

- Is the current version of the management component compatible with the software stack that is used in this VMware Validated Design?
- Can you upgrade the current version of the management component directly, or is a multi-step upgrade process required?
- Can architectural changes be made during the upgrade process?
- What inter-dependencies does this version of the software have with other parts of the management stack?

## Duration and Maintenance Windows

After you have the initial information about the management components in the environment and establish a high-level migration plan, prepare a test environment to simulate the existing source deployment. Use it to establish a baseline for migration time lines, ensure that the order of operations is correct and identify gaps in the initial migration plan.

After a baseline has been established through successfully migrating the test environment, you can start detailed planning of the exact maintenance windows for the production migration. According to the size of the environment, the amount of data the management components hold and the size of available maintenance windows, you might define a multi-stage process to complete the migration end-to-end.

## Risks

Perform the migration on a test environment that is as similar to the production environment as possible.

Consider the following best practices to avoid common mistakes during migration:

- Document every change that you must make including a rollback plan for the change.
- Avoid trying to change too many management components within the same change window.

If a management component change can support a hybrid state, allocate the modified component time before moving on to the next.

## Metadata Considerations

Having VM metadata is beneficial to understand how the environment has acted in the past, but it also brings a lot of potentially outdated and unused information. This obsolete information can impact management component performance because the management components are not starting on a fresh installation.

Under certain conditions, you might not be able to reconfigure some management components and you must reinstall them. In this case, the metadata associated with such a component is lost and a complete historical view might not be possible without some gaps.

## Backup and Rollback

Before any work can commence, implement a backup and restore mechanism for all management components and workload VMs. Test the restore capabilities of these backups to ensure data integrity.

Using VM snapshots during the migration provides multiple rollback points. Ensure that old snapshots are cleaned up both before and after the migration procedure.

Prepare a plan about the order of the operations and how to roll back to a previous state. You avoid the case where several products have been changed, but only one has been rolled back because of an error. Such a situation might make break the integrity of the environment if the rollback is related to the progress of the other components through the migration plan.

## Decommissioning

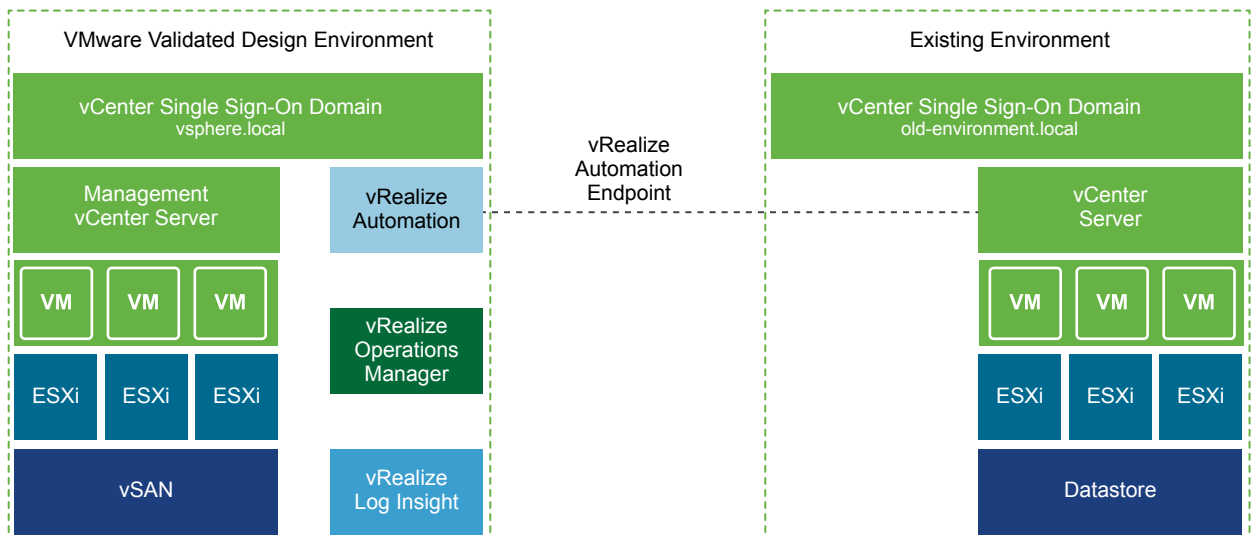
When you reconfiguring existing infrastructure, you can decommission unused or outdated components according to the number of the components that you must reinstall. Before a VM is powered off for the last time, back it up to ensure that you can recover it as needed.

# Option D - External Infrastructure Endpoint

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Use an existing environment as a deployment endpoint for a new validated SDDC for a hybrid state where both old and new environments are connected. After the requirements and connectivity are in place, workloads can be provisioned on either the new validated SDDC environment or on the old environment from the management interface that the new validated SDDC provides.

**Figure 7-1.** External Infrastructure Endpoint SDDC Migration Option



## Requirements

The validated SDDC environment is a self-contained infrastructure unit that you connect to the existing environment. When planning to add an endpoint in the validated SDDC environment, consider the following requirements:

- Hardware in both environments needs to be supported and maintained.
- The vCenter Server version that you map to a vRealize Automation endpoint must be compatible with the vRealize Automation version of this VMware Validated Design.
- Network bandwidth must be enough for deploying templates from one environment to the other.

## Duration and Maintenance Windows

Adding an endpoint does not require any downtime for either the validated SDDC environment or for the external endpoint environment. Align the configuration changes that you must do before you enable the endpoint for workload deployment to the change practices of the environment.

## Risks

Operating multiple environments can introduce additional complexity. Ensuring that the operational practices are updated to align to the new configuration requires planning and evaluation.

Consider the following best practices to avoid common mistakes during migration:

- Operational practices between environments will be different.
- Some of permissions must spread between both environments.
- Scalability between the environments will be different.
- Performance might be different between the environments. Evaluate it.
- Sustaining the external infrastructure endpoint version compatibility is out of scope of the operational guidance in this VMware Validated Design.

## Metadata Considerations

Using external infrastructure as an endpoint means that some metadata is retained in the existing environment. The environment contains some metadata in the validated SDDC and some metadata in the external infrastructure endpoint environment. This configuration of data might make environment-wide analysis difficult because you must do manual work to bring the data together.

In a future migration of the workloads that run on the external endpoint, the metadata associated with these workloads will be in the source environment and will not be transferred.

## Backup and Rollback

Although there is a limited number of configuration changes to enable this migration option, you must perform backup and restore tests on both the existing and new validated SDDC environments before you join them and after the migration configuration and tests are complete.

In the backup schedules, back up groups of management components as close together as possible to avoid configuration drift. See the *VMware Validated Design Backup and Restore* documentation.

## Decommissioning

In the external endpoint configuration, you can reuse of the majority of the existing environment.

- 1 Decommission the components that are no longer needed in the original environment after the endpoint configuration is complete and backups certified as successful.
- 2 Before you power off all virtual machines that are no longer needed for the last time, back them up individually.
- 3 Perform a data destruction according to the company policy.