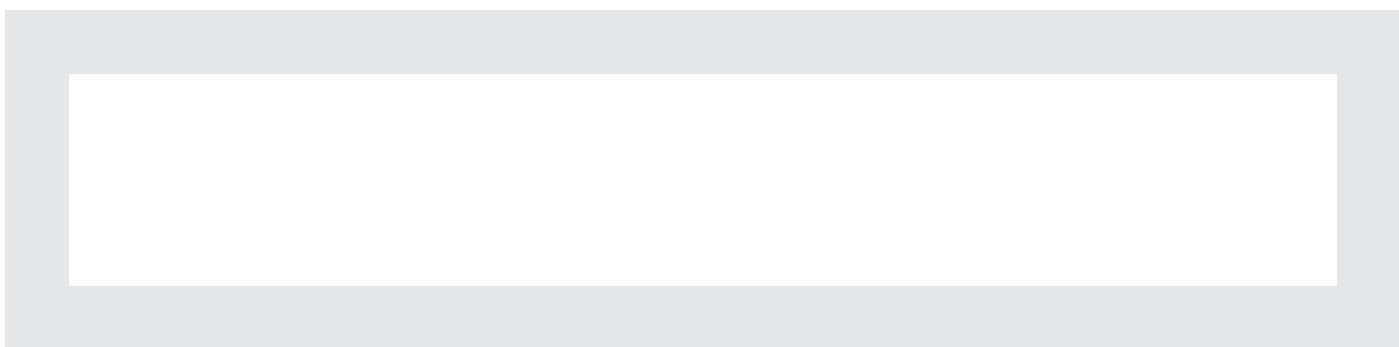
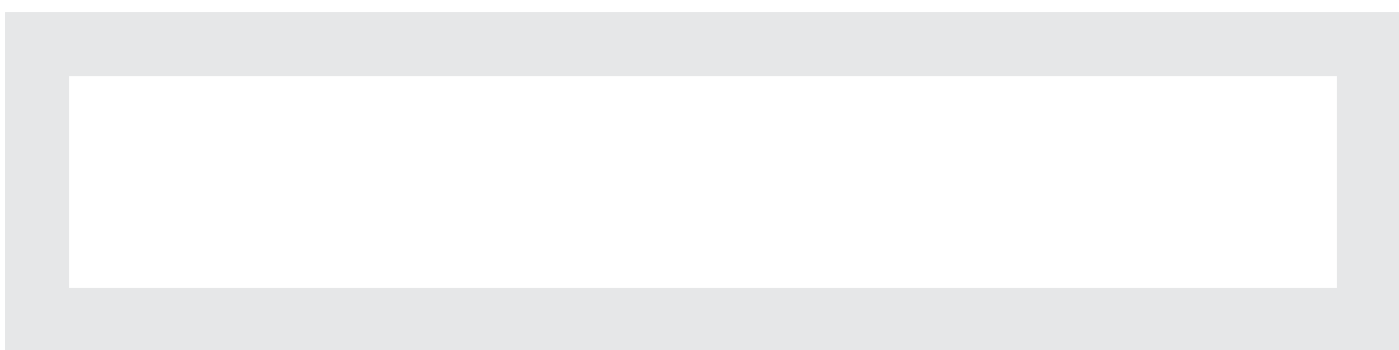
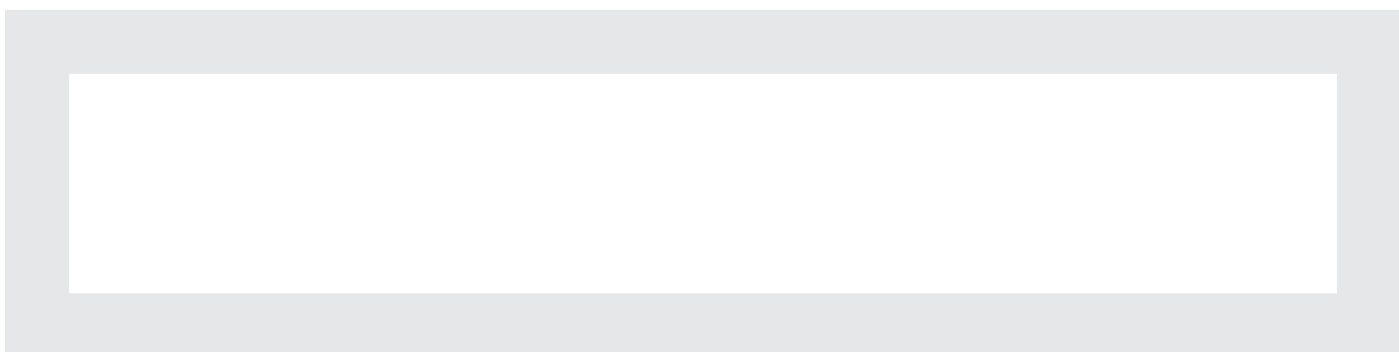




# Journey to the SDDC

HPE building blocks for the software-defined data center





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Virtualization, cloud computing, Big Data, and mobility offer significant business benefits, but these initiatives are pushing data centers to their limits. With a business future increasingly challenging, HPE recommends that enterprises begin the transformation to a software-defined data center (SDDC). By doing so, enterprises will be able to narrow the gap between IT and their growing business needs.

## Executive summary

Never have data centers been pressed so hard to deliver so many services so fast than in this era of accelerating change, characterized by cloud computing, mobility, and Big Data. The gap between what business services users need and what their IT organizations can deliver continues to widen. If the data center doesn't find ways to accelerate service creation and delivery, its ability to serve the business could get even more challenging as shadow IT (IT that's not within the control of the IT organization) becomes more prevalent.

Fortunately, emerging computing models are changing the way different infrastructures, software, and business services are sourced and consumed. IT and facilities professionals are bringing innovation to their data centers, but their efforts are being constrained due to disparate architectures, different management approaches and security models, inconsistent tools, and tight budgets. In order to keep pace with business demands, organizations know they must modernize the delivery of IT services. Modernization of the data center requires careful planning and execution in order to meet the complexities of transformation. To assist you with this journey, a new standard for the modern data center is emerging—SDDC, or the software-defined data center. Here are the key business outcomes you can expect from SDDC:

- Speed—Accelerate time to service creation and service deployment
- Alignment—Close gaps in user expectations and business alignment
- Cost—Optimize your technology, processes, and workforce
- Agility—Measurably improve business outcomes to weather impending business and technology storms

At HPE, SDDC is more than just the virtualization and automation of the data center through software. SDDC requires workload or application-driven orchestration and the control of all aspects of the data center, from infrastructure to operations and management, through open and hardware-independent management and virtualization software. However, to achieve the benefits of SDDC, you need to virtualize your servers, storage, and networks.

This business white paper describes the journey to the SDDC and the transformation of your IT infrastructure, facilities, organization, and service delivery model, and the greater efficiency, agility, and cost-effectiveness you can obtain. The journey starts by understanding your business needs, which, in turn, drive your applications and IT infrastructure as well as your servers, networking, storage, management, and security technologies, all of which are converging.

## **Creating a solid foundation for a hybrid IT delivery model**

Analysts agree that IT in the future will look very different from how it looks today. Instead of managing fixed IT assets and delivering IT by traditional means, IT will become a broker of IT services from a range of delivery models, including traditional as well as private, public, and managed clouds. This is widely known as a hybrid IT delivery model.

HPE's view of a software-defined data center treats the entire IT infrastructure (server, storage, network, facilities, security, and resources), both physical and virtual, as an end-to-end process. Control of the data center becomes entirely automated by software, and with the applications making the requests for IT infrastructure resources. To deliver an SDDC, workloads and applications are abstracted from the infrastructure and then provisioned through either a physical or virtualized infrastructure—whichever is appropriate to a given workload and meets the financial and availability targets set by the business. SDDC reflects the next generation of converged infrastructure from a control and management standpoint. HPE believes SDDC will enable IT to optimize the rapid creation and delivery of business services, through policy-based automation, from the infrastructure up to the application using a unified view of physical and virtual resources. To facilitate the move to SDDC, HPE provides the foundation, framework, and a rich portfolio of intelligent software-defined products and software solutions that have been engineered specifically for today's IT, and for the New Style of IT needed for the future. To help customers personalize and begin their journeys at the point and pace most acceptable to them, HPE offers a comprehensive portfolio of professional services.

We understand that organizations will evolve their data centers at different speeds. Abstracting more of their workloads (from the underlying infrastructure) or automating more of their existing processes will only get them so far. Without rethinking the overall data center strategy, architecture, governance, and operations, most organizations will hit a speed bump or two as they strive to become more agile, efficient, and service-oriented.

This is exactly where HPE experts can help. We remove the major barriers to your strategic moves to a software-defined data center, so you can realize such enhancements as economies of scale, enhanced IT resiliency, and vastly improved services levels. For example, without rethinking how siloed organizations share their operational data, you can't obtain a unified view of physical and virtual resources. If your facility management systems fail to communicate with your IT management systems, you cannot optimize the capacity planning for efficiency. Similarly, without an automated, proactive, solution-based model, your data center cannot achieve desired resiliency standards.

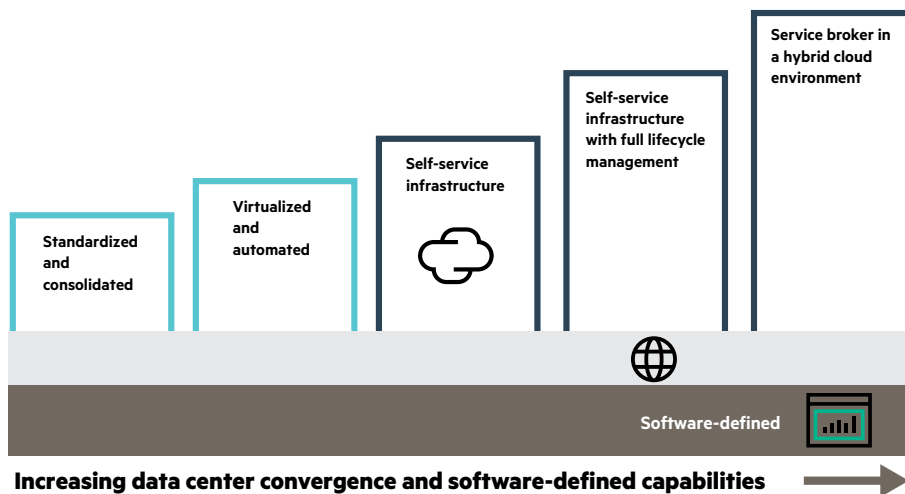


Figure 1: Journey to the New Style of IT

## Journey to the New Style of IT

Knowing where you are in terms of capability and maturity—and where you want to go—is critical for success, and you’ll need to define a journey or roadmap. During the journey, the IT value delivered to the business in terms of speed, cost, and simplicity increases. At each stage, resources become more interrelated and integrated—they start to converge.

Many organizations are at an early stage in this journey. IT sprawl needs to be consolidated and standardized. Resources will be converged until they constitute a hybrid model, where each resource is totally integrated with the other in real time, and there is complete alignment between the business and IT. This can only be achieved by understanding where you are now and where you want to go, and by avoiding the gaps and traps found in between each of the stages of the journey.

As you move through the journey, the level of data center convergence will increase and become more agile as software-defined functions and technologies mature and expand. It is important to build the right IT infrastructure foundation at each stage. By increasing the openness and flexibility of your infrastructure, you can embrace the benefits of a software-defined world. To help you through this process, we provide blueprints, models, and best practices to help you do it right from the start and minimize continuous restructuring costs.

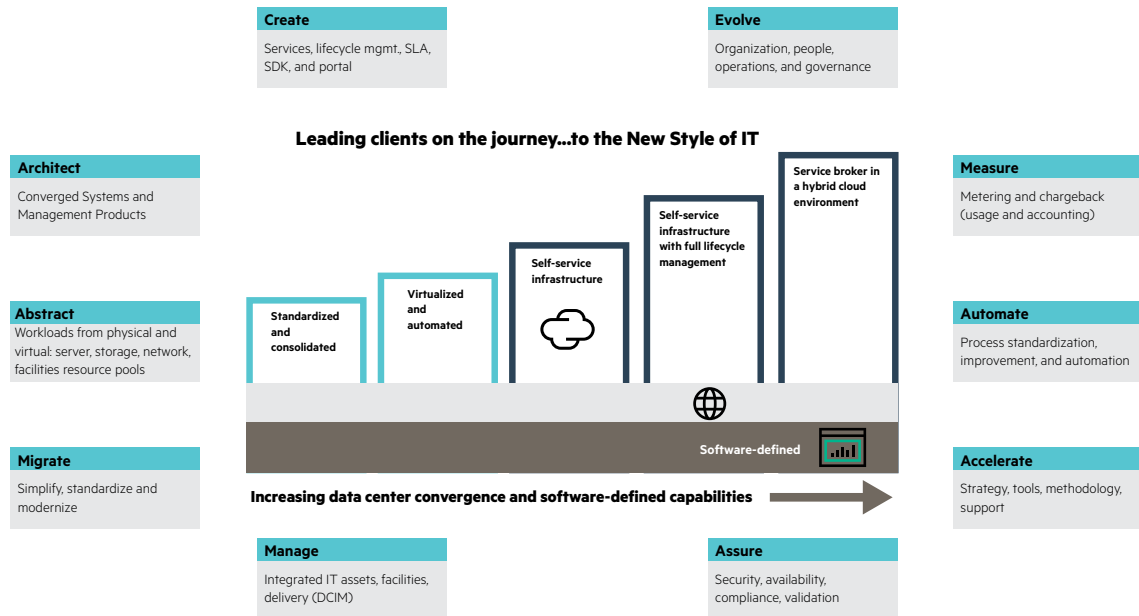


Figure 2: Preparing for the journey to the SDDC

## Building blocks of SDDC

The path to a software-defined data center requires interrelated activities that support the increasing level of convergence and resulting level of alignment between IT and the business. HPE has defined a building-block approach to simplify this process. Each block represents a specific set of interrelated activities that will allow you to move toward SDDC in the sequence and at a pace that take full advantage of your resources and budget. Our approach to SDDC is a well-orchestrated ecosystem that operates effectively and efficiently to meet your business demands and service-level requirements.

### Preparing for the journey

HPE consultants apply the relevant building blocks to address the most pressing pain points, helping to ensure your journey to SDDC is not only methodical and pragmatic, but also provides immediate, quantifiable benefits. Each building block offers substantial business and technical benefits in its own right, so there’s no need to wait years or risk a “big bang” approach to know that moving toward the SDDC is a wise and safe investment. The following describes each of our building blocks:

#### Migrate

The activities within this building block focus on the simplification and standardization of the applications on modern operating systems and platforms. This involves moving applications (and potentially legacy applications) off legacy operating systems and platforms and onto modern ones. This migration requires the removal of obsolete hardware and software, which tend to be complex and expensive to maintain, and their removal can significantly reduce operating expenses. It is often difficult to upgrade, consolidate, and converge legacy platforms that are not yet ready for cloud or the delivery of IT as a service. Older servers and devices may be slow, costly to maintain, and complex to manage, and may be distributed throughout many different data centers and other IT sites. They may also be unable to support the dynamic allocation of computing resources through virtualization, which is critical for a successful transition to cloud computing. In addition, the applications will have the necessary APIs added to enable the application to interact with the SDDC control layer.

**Abstract**

The activities within this building block define when and how IT resources are abstracted from the underlying technology to satisfy application service requests. Here, when appropriate, IT resources (servers, network and storage) are abstracted from their physical implementation in order to improve flexibility, asset utilization, and response time. This abstraction involves virtualizing not only servers but also storage and networking assets. In some cases, particularly with extreme low-energy (ELE) servers, it may be more efficient and economical to avoid virtualizing specific applications. With the applications available on modern operating systems and platforms, it is possible to consider how they are to be hosted in the future. Some application services might be suitable targets for hosting on cloud environments, some will be suitable for consolidation, others for virtualization, and some applications might be best hosted on emerging technologies, such as HPE Moonshot ELE servers.

**Manage**

The activities within this building block provide for the management of the physical and virtual resources into a single pool capable of being managed from one location with converged tooling. Further, there is a need to integrate infrastructure management with facilities management in order to optimize the supply and demand for IT resources.

Data center infrastructure management (DCIM) is a specific industry approach for managing IT and facilities infrastructure assets. Today's DCIM capabilities do not take into consideration the elements of applications—or the more complex details of IT infrastructure—that provide businesses with detailed operational capabilities beyond just infrastructure, as most DCIM products are highly proprietary with little interoperability capabilities. Managing a software-defined infrastructure requires an approach that aligns with how people interact with complex and highly dynamic systems. To really increase productivity, the management software for the SDDC must enable infrastructure resources to be defined once and instantiated multiple times, facilitate collaboration across multiple domains of expertise, help IT and facility administrators assess the impact of changes to their environment quickly, and enable greater automation through programmatic access to monitoring and control functions.

**HPE OneView** is designed from the ground up to manage the SDDC. It is not just another management tool. HPE OneView dramatically enhances productivity by focusing on how to improve workflows to achieve significantly greater efficiencies in these administrative and operational tasks. The entire architecture is built on open, RESTful APIs that are common to two-thirds of today's top Web environments. With consistent APIs, the data model and message bus replace the hodgepodge approach of traditional legacy systems. HPE OneView features a fully programmable interface to easily create customized workflows and scripts.

The goal of integrated data center management is to provide your business with a “single pane of glass” that allows you to manage the operations of your IT, facilities, and service model.

**Assure**

The activities within this building block provide for the universal management for the software-defined data center's security, continuity, and management software. Here, logical and physical threats are analyzed uniformly to produce a holistic risk profile of the data center. Data center operations and orchestration platforms are integrated with security information and event management systems to support unified threat analytics. Compensating measures are automatically applied to address emerging threats. For example, assets registered in your organization's configuration management database (CMDB) contain configuration items (CI) related to security and continuity. When an application making a service request is detected as containing credit card information, only servers, storage, and network segments rated as PCI-compliant are abstracted.

**Automate**

The activities within this building block are an absolute prerequisite for building the control layer of the SDDC and specifically for supporting the hybrid delivery model. For example, the move to the cloud through SDDC is a process, not a project; it requires automating infrastructure elements as well as business processes and service delivery. In order to realize the speed of response enabled by abstraction, organizations need to automate where possible. Automation can be used to streamline and optimize a wide range of tasks: bare-metal provisioning of physical and virtual machines, servers, networks, storage, and databases; compliance reporting; operating system or security patch management; configuration updates; and more. It can be applied to automate tasks, processes, and service delivery time. Through automation, IT departments can standardize their tools and processes and achieve new levels of consistency and accuracy.

**Create**

The activities within this building block occur during the initial assembly of the SDDC. Your organization will start to move from the inflexible, asset-based definition of IT to a service-oriented view, where there will be a need to assemble a set of fully articulated IT services. This requires looking outward to internal and external customer needs, instead of internally to IT assets and processes. The first step is to define the specific IT services, with a focus on three key elements: customers (the “who”), suites of services (the “what”), and SLAs (the “how well”).

Once the portfolio of IT services has been defined, it can then be distilled into a catalog of standard, repeatable IT services aligned with your business—where real IT value is created. The service catalog clarifies what the individual services are, how to order them, when to expect the transaction to be completed, and what to do if expectations are not met. Typically, a portal is created to allow users to interact with the service catalog.



**Measure**

This building block measures activities of the infrastructure to enable chargeback and report-back, making it possible to allocate the usage of resources to the specific consumers of those resources. With IT departments facing growing pressure to control costs and demonstrate responsible financial management of IT resources, services need to be delivered cost-efficiently. One way to contain costs is to implement an effective chargeback system that enables organizations to identify what IT services are being provided and what they cost, to allocate costs to business units, and to manage cost recovery. Under this model, both the IT service provider and its respective consumers become aware of their IT service requirements and usage and how they directly influence the costs incurred.

**Evolve**

The activities within this building block are designed to create the SDDC with the exact level of capability and maturity aligned to the ever-evolving needs of your business. Here, continual process improvement is the order of the day. Using HPE's proprietary Converged Infrastructure Capability Model (CI-CM), HPE consultants are able to gauge your current IT service capabilities, define a target capability, and plot a trajectory path that helps your organization achieve it on time and within budget.

The evolution path to SDDC begins with elevating your organization from its siloed state, optimizing it for efficiency, and moving toward a service-enabled organization. These steps will be followed by the achievement of a hybrid delivery model and the arrival at the point where IT is providing dynamic reconfigurable services. Each one of these steps will require the evolution of many aspects of your IT organization, including people, policies, processes, products, and proof of value.

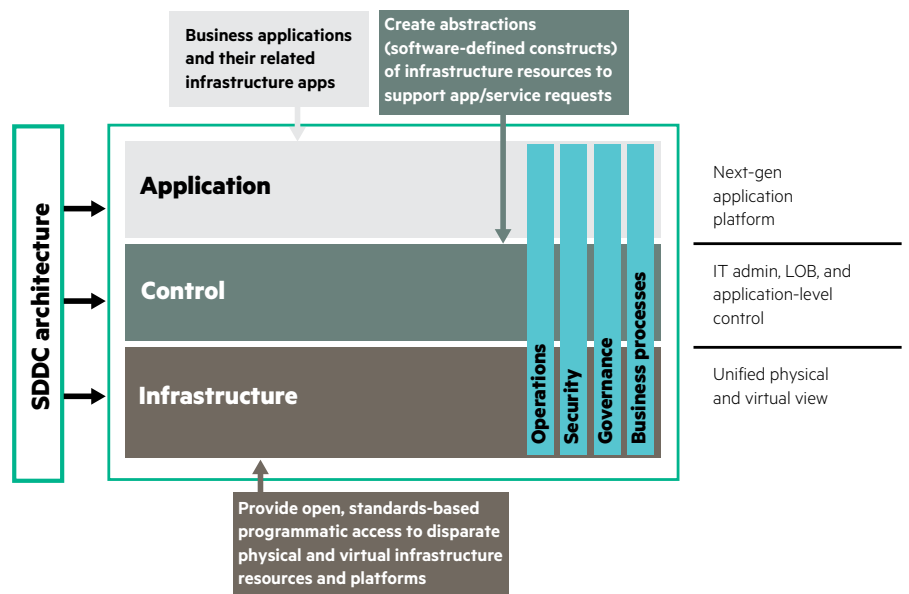


Figure 3: High-level view of the HPE software-defined architecture

### Architect

This building block represents the foundational activities associated with the delivery of an SDDC. It emphasizes the essential use of a robust architectural approach and software-defined technologies that include methodologies, project lifecycle and management, and solution architecture. HPE's solution architecture methodology ensures that the enterprise architecture governs the development of all solutions based on business, functional, and technical and implementation requirements and decisions. HPE's SDDC architecture ensures that your organization takes full advantage of the latest software-defined server, storage, and networking products and technologies from HPE and HPE partners.

For example, **HPE Software-defined Networking (SDN)** provides an end-to-end solution to automate the network, from data center to campus and branch. Expanding the innovation of SDN, the HPE SDN ecosystem delivers resources to develop and create a marketplace for SDN applications. HPE also offers storage for the **Software-Defined Data Center**, with programmatic control of infrastructure via open and standards-based APIs. The application-specific orchestration environment is a defining requirement in the HPE Software-Defined Data Center—and a core part of HPE's Converged Storage strategy since 2010.

In order to build a solid foundation and integrate SDDC within your existing IT environment, it is important to have an overall blueprint. A blueprint protects existing investments and helps make the right decisions that provide the long-term flexibility and agility needed to meet the increasing demands of the New Style of IT. The HPE SDDC architecture blueprint gets you started and steers you in the right direction toward advancing the maturity of your SDDC environment. The HPE SDDC architecture is based on the use of open standards to enable compatibility with software-defined technologies. HPE's SDDC architecture blueprint addresses business, functional, technical, and implementation requirements—a layered approach essential to total alignment of the SDDC ecosystem to support your business needs.

### Organization

Throughout the journey to the SDDC, the degree of integration between the IT infrastructure, facilities, delivery model, and organization will change. It is not sufficient to focus on technology alone, as the organizational impact in terms of people, process, and governance are critical factors that can mean the difference between success and failure. This alignment requires a solid understanding of how people, skills, structure, roles, metrics, process, and governance all need to change throughout the journey to support the new IT models. It is important that these changes are anticipated and correctly implemented through a management of change (MoC) program. Alignment between business and IT will increase throughout the journey. There are various tools and models that can help in understanding where the gaps are and how they should be filled.

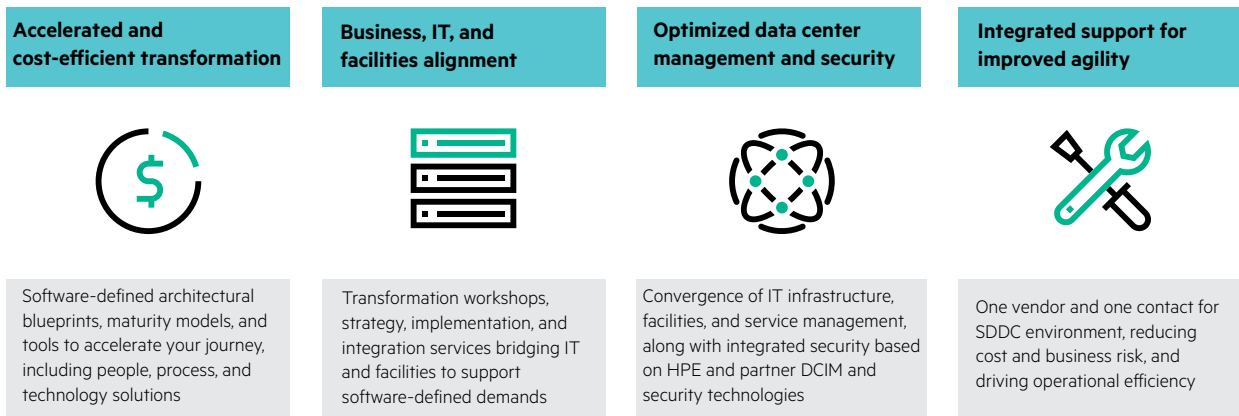


Figure 4: Partnering with HPE Technology Services

HPE offers a full portfolio of converged technologies, such as the HPE BladeSystem, HPE ConvergedSystem, HPE 3PAR StoreServ Storage, HPE OneView, as well as consulting, support, and educational services for IT infrastructure, facilities, cloud, and much more. Each of these products and services is embedded in HPE's unique SDDC approach, which is built on convergence domains (right sourcing, right sizing, and right shaping), the convergence journey (right place and right time), and the convergence model (the right way)

### How HPE can help

To evolve and transform to an SDDC through parallel and coordinated projects, you need vision, converged technologies, converged management, and converged expertise, all of which are provided by HPE. Based on years of experience with global, heterogeneous, complex data center projects and operations, HPE can help you with consulting, support, and financial services, as well as market-leading hardware and software products.

### Technology with a human touch

You rely on technology to run your business efficiently. To stay competitive and capitalize on new revenue opportunities, you have to learn how to access technology in new ways. Team with the HPE technology consulting and support experts to help you take full advantage of technology to drive your business. Combining technology expertise with business intelligence, our service professionals help organizations around the globe meet their evolving needs. They can do the same for you. Connect with our service experts to explore ways to do more with your technology investments and move your business forward. Visit [hp.com/go/tsconnect](http://hp.com/go/tsconnect).

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