HPE POINTNEXT SERVICES

Gain cloud agility on-premises with software-defined infrastructure

A blueprint for optimizing IT infrastructure and operations

HPE POINTNEXT SERVICES BLUEPRINTS: HOW TO GUIDES FROM SERVICES EXPERTS OF HEWLETT PACKARD ENTERPRISE

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Executive summary

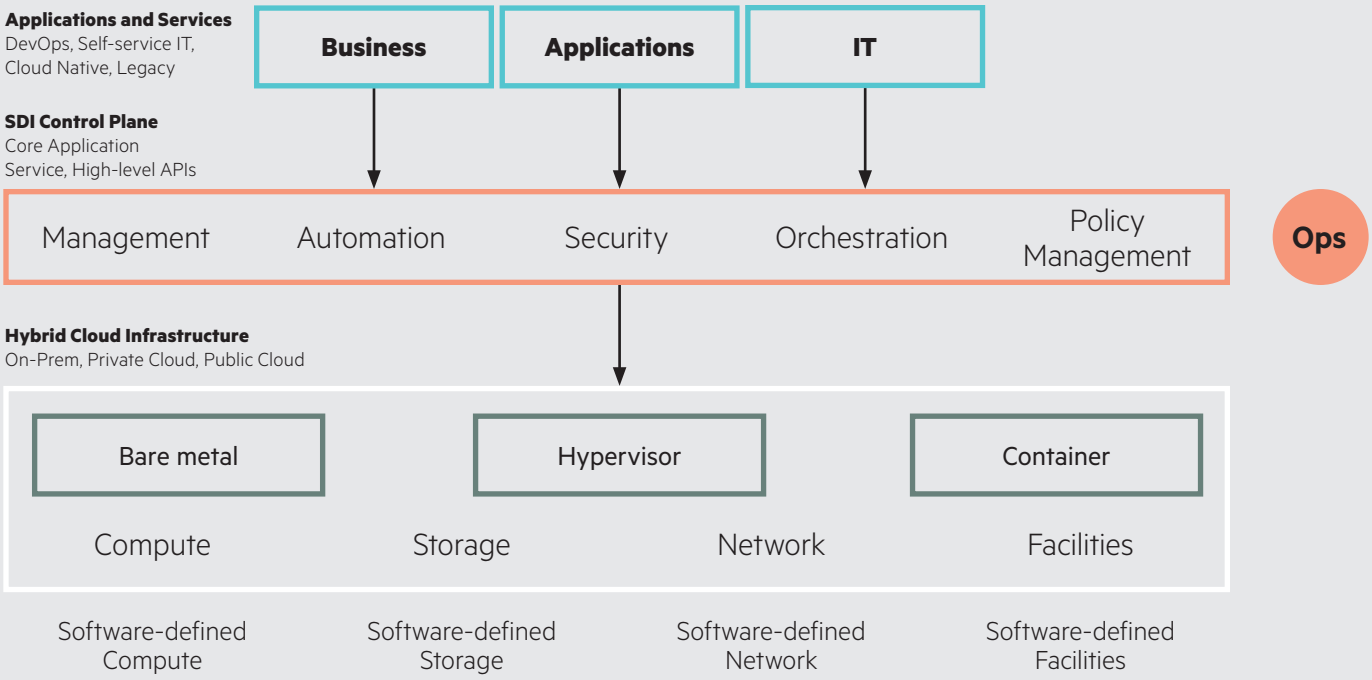
IT organizations must recast IT infrastructure for agility to meet the increased agility and scalability demands of today's on-demand applications, cloud-native services and digital businesses.

Forward-looking organizations are introducing software-defined infrastructure (SDI) to go beyond automation, increase service velocity and accelerate the pace of business.

SDI delivers IT infrastructure as code for superior control, programmability, and extensibility. Business applications, infrastructure management, automation and service orchestration tools can stand-up infrastructure and provision resources in real time to support dynamic workloads and fluctuating business demands, and to enable DevOps, self-service IT and agile development practices.

This guide captures the business and technology challenges driving the need for SDI. This blueprint is based on HPE's real-world experience helping businesses transition to hybrid cloud, taking advantage of software-defined architectures for agile development and self-service IT.

SDI Accelerates Business Agility through Automation



The software-defined infrastructure journey

Today's organizations have more opportunities than ever to quickly deliver new applications and services, embrace new business models and enter new markets. And yet they are also challenged to modernize and support their traditional applications. IT leaders must find innovative ways to more efficiently support existing applications while accelerating the delivery of new services to fuel business growth.

Designed for stability not flexibility, the enterprise data center has become a barrier to innovation. Many organizations are constrained by fractured IT environments made up of discrete compute, storage and networking platforms and management tools. Standing up both physical and virtual infrastructure to support a new application—provisioning server, storage and networking capacity—is a manually intensive, error-prone proposition. Conventional data centers are simply not well suited for the world of agile development and test, DevOps or self-service IT.

Challenges driving the move to software-defined infrastructure for cloud like agility on-premises

- **Siloed data centers are inherently inefficient and inflexible.** Compute, storage and networking resources are overprovisioned to satisfy peak demands or future requirements. And businesses often dedicate entire siloes to specific applications, further stranding capacity and squandering resources.
- **Data centers are notoriously difficult to automate.** Each technology platform supports a distinct, often low-level API that inhibits automation. IT departments often rely on a collection of crude scripts that impair service agility.
- **Disjointed IT implementations are fundamentally difficult to administer and provision.** Turning up new IT services can take days or even weeks and involve a number of different teams and IT specialists.
- **IT operating models were designed for stability not speed.** Existing methods and procedures aren't well suited for agile development and continuous service delivery.

Simply put, legacy siloed data centers can't deliver cloud speed and economics. Unable to access and provision IT resources in real time, many line-of-business (LOB) managers are bypassing IT altogether, using public cloud offerings and on-demand services to satisfy their requirements.

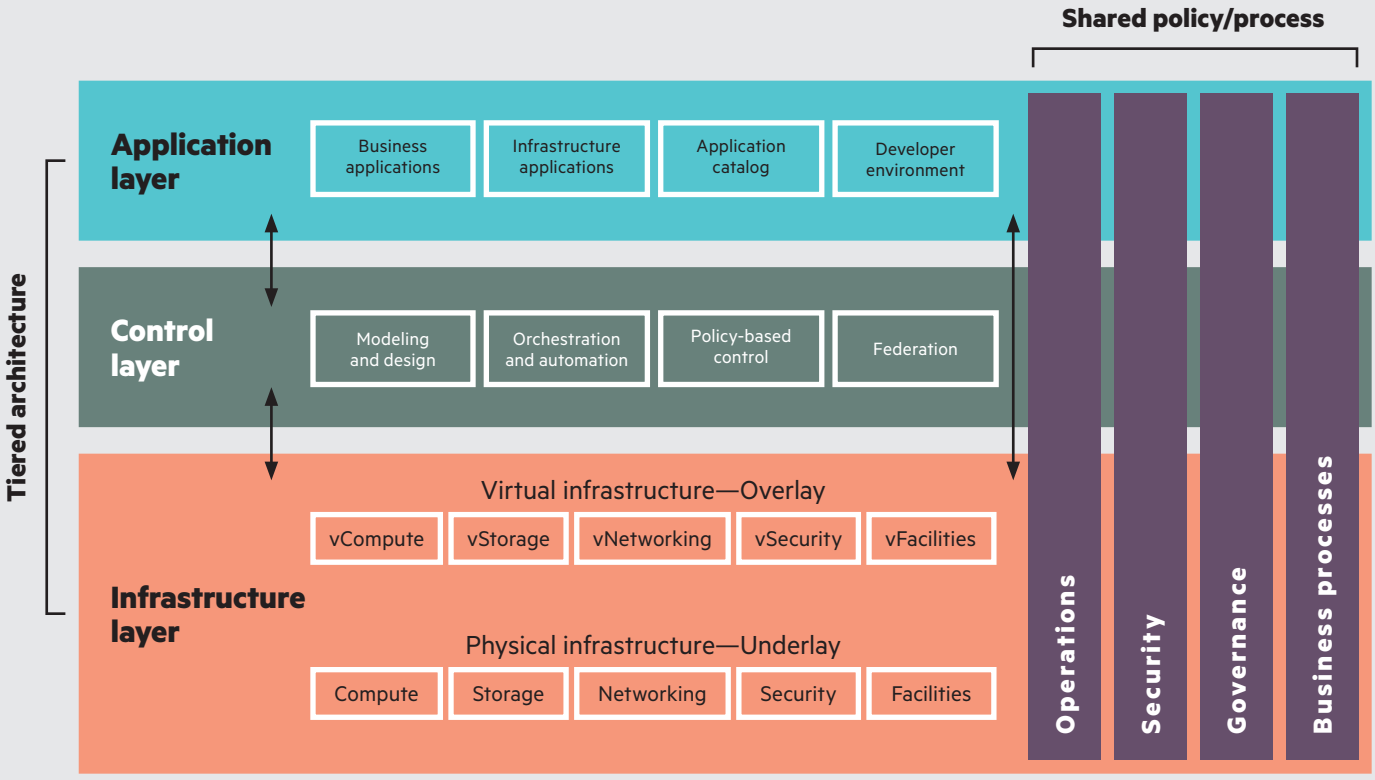
Based on real-life customer implementations delivered by HPE Pointnext Services experts, this blueprint offers four guiding principles addressing software-defined infrastructure implementations.

HPE Pointnext Services SDI architectural blueprint

The HPE Pointnext Services SDI architectural blueprint helps you create programmable, adaptable, and repeatable IT infrastructure that efficiently supports both traditional and cloud-native applications. It helps organizations reduce human intervention and friction, discourage shadow IT and accelerate service agility.

The architecture is composed of distinct infrastructure, control and application layers with open interfaces for greater scalability, flexibility, and programmability. HPE has found that defining and automating common operations, security, governance, and business process models across applications and technologies ensures consistency, streamlines administration and management, and reduces risks.

SDI architecture optimizes IT and unleashes automation



Guiding principle 1: Introduce fluid pools of physical and virtual resources with open APIs

BUSINESS CHALLENGE: Siloed data centers are inherently inefficient and inflexible. They squander CAPEX and OPEX.

To eliminate inefficiencies and human friction through converged, hyperconverged and composable infrastructure solutions, SDI takes convergence to the next level. It delivers infrastructure as a programmable resource, allowing the applications to flex the infrastructure as required and allowing application teams, administrators or cloud users to consume the infrastructure as required through the use of a common control plane.

More than 25% of data center outages are caused by IT or software errors.

– Source: Uptime Institute Research Report

The infrastructure layer of the SDI architectural blueprint includes the underlying physical compute, storage, networking, security, and facility resources powering the data center. These physical resources are abstracted and pooled to simplify automation, accelerate service agility and eliminate overprovisioning and stranded capacity. The abstracted infrastructure resources include physical and virtual resource pools (holding compute, storage, network, security, and facility resources) as well as virtualized network functions (e.g., firewall, router, load balancer). Pooled resources are allocated in real time to support dynamic workloads ranging from traditional applications to containerized workloads, and from cloud-native applications to applications based on micro services, which are all required to meet evolving business demands.

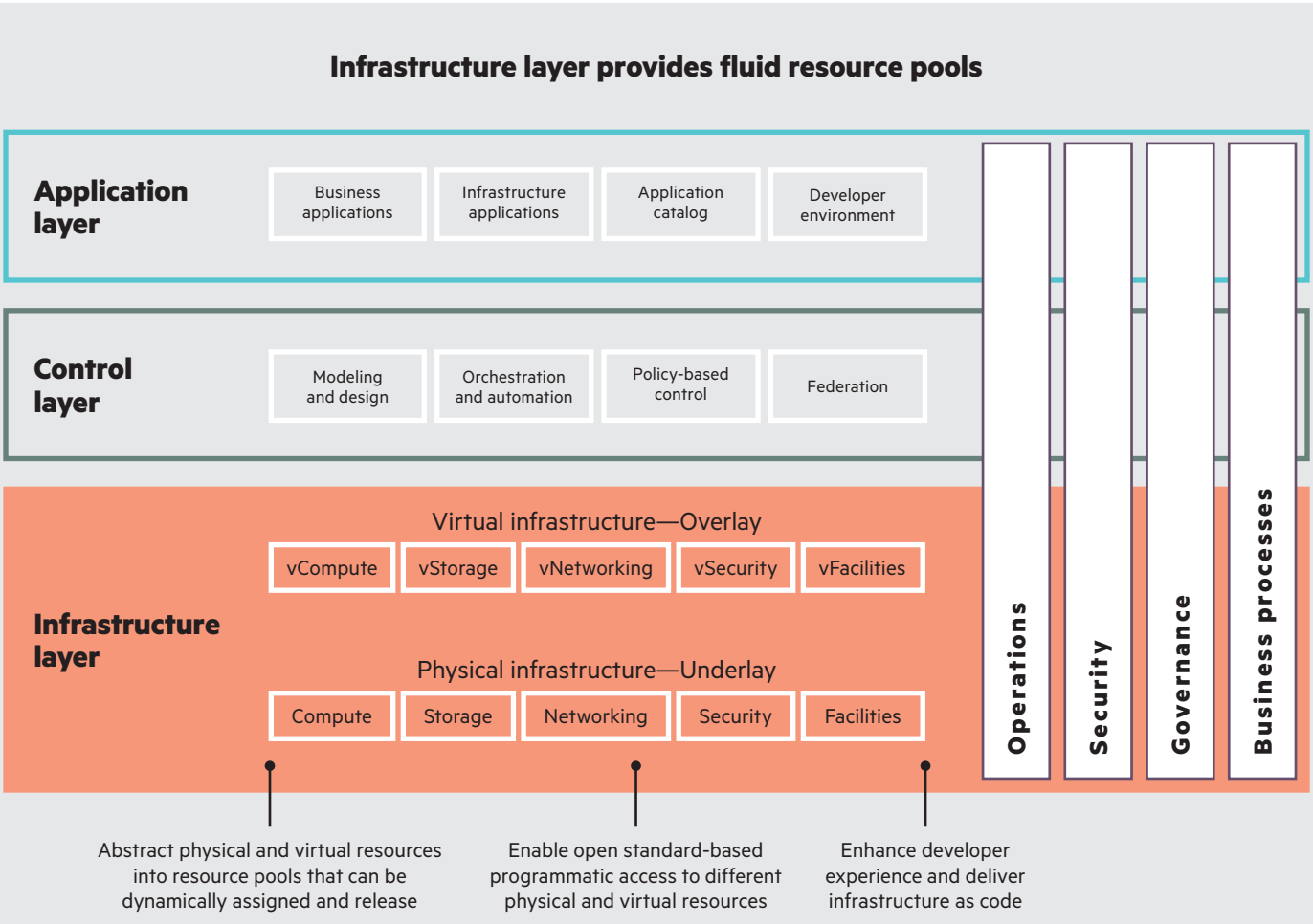
Open APIs provide programmatic, standardized access to physical and virtual resources. Rather than programming distinct compute, storage and networking elements individually, developers can commission physical, virtual, and containerized resources through a single line of code.

Checklist

1. Consolidate technology platforms and eliminate siloes by introducing hyperconverged systems or composable infrastructure. Enable linear, pay-as-you-grow scalability.
2. Introduce dynamic pools of physical and virtual resources with unified APIs. Transform independent compute, storage, networking, security, and facilities resources into uniform infrastructure.
3. Allocate resources in real time to support on-demand applications and elastic services. Deliver infrastructure as code for greater flexibility and extensibility.

Expected results

- Optimal utilization of resources by avoiding overprovisioning and stranded capacity
- Greater flexibility with dynamic resource pools and open APIs that enable highly agile and adaptable infrastructure
- Better economics by converging infrastructure and collapsing siloes, which reduces CAPEX and OPEX and tightly aligns TCO with business demands



Implementing an agile, software-defined experience on-premises—what are your options?

Software-defined solutions allow you to gain efficiency and control using software to deploy IT resources quickly, for any workload. The most popular and successful options include:

1. Composable:

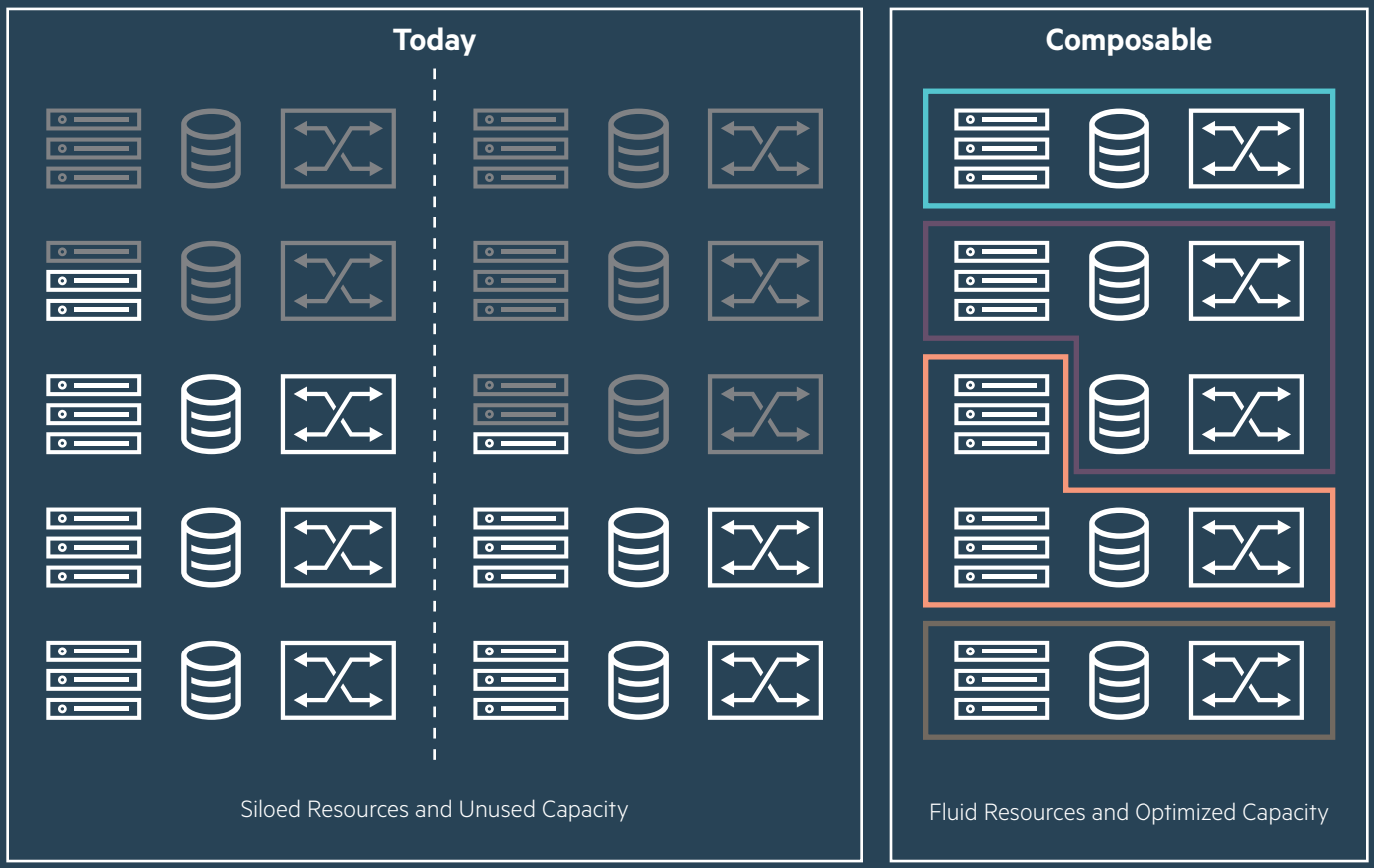
A single software-defined infrastructure for physical, virtual, and containerized workloads, with fluid resource pools of compute, storage, and fabric, at cloud speed and scale.

2. Hybrid cloud platforms:

A turnkey solution that offers enhanced capabilities such as end-to-end automation, built-in AI operations, an innovative fabric for composable environments, and hybrid cloud management.

3. Hyperconverged:

A virtualized, all-in-one solution that integrates software-defined compute, storage, and networking into a single, easy-to-manage platform.



Guiding principle 2: Introduce an abstract control layer with core application services

BUSINESS CHALLENGE: Today's data centers are notoriously difficult to automate. They impair service agility and slow the pace of innovation.

The control layer of the architectural blueprint acts as an abstraction layer that shields developers from the complexity of the underlying physical infrastructure. Rather than configuring discrete resources individually, developers or system administrators provision IT services holistically using software-defined constructs. Physical, virtual, and containerized resources can be composed into any configuration, for any workload—instantaneously.

The control layer decouples higher-layer applications from the underlying infrastructure. IT organizations can swap out infrastructure components without having to update applications or rewrite code.

Checklist

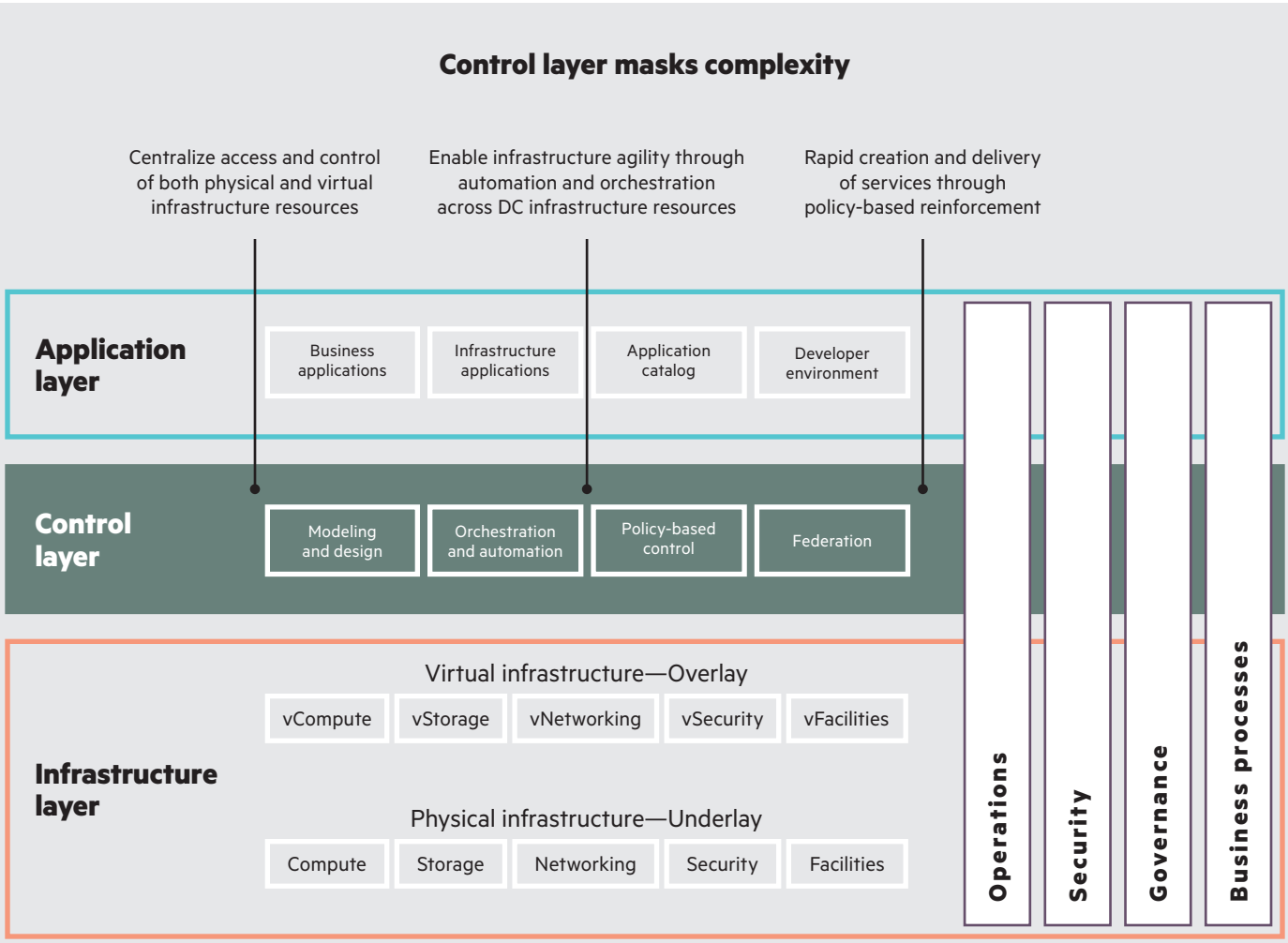
Introduce a management and control platform that includes the following components:

1. A policy engine for enforcing privileges and service classes. External applications dynamically assign and release resources based on administratively defined policies and real-time performance, availability or security data.
2. A modeling and design component for creating and managing service templates. Self-service IT and application catalogs use service templates to automatically provision resources and stand-up infrastructure.

3. A service orchestration and automation engine for allocating and adjusting resources. External service orchestrators and provisioning applications use this capability to dynamically instantiate and adapt resources in response to changing workload requirements.
4. A federation component for interworking with third-party SDI platforms or resources maintained by an external service provider.

Expected results

- Rapid service creation and delivery through easy programmability of infrastructure with high-level APIs
- Superior service quality and security with administratively defined, policy-based access and service level controls
- Greater extensibility and choice by decoupling applications from underlying IT infrastructure and eliminating vendor lock-in



The essentials of agile infrastructure management—what to look for

To streamline day-to-day IT operations with software-defined automation, you'll want to implement a single interface for infrastructure management designed for open integration with your existing tools and processes.

Characteristics to look for include:

- Template-driven automation to rapidly provision, update, and deploy infrastructure
- A global dashboard
- Modern, standards-based API

Guiding principle 3: Enable continuous development, self-service IT and dynamic applications

BUSINESS CHALLENGE: Disjointed IT implementations are fundamentally difficult to administer and provision. Turning up new IT services can take days or even weeks and involve a number of different teams and IT specialists.

The application layer of the architectural blueprint includes the full suite of enterprise applications used by the employee community, corporate IT organization and LOB application developers, test engineers, and administrators. Examples include automation tools like Chef, Ansible, and Puppet for provisioning bare metal infrastructure, Docker for configuring host containers infrastructure, and VMware vRealize® Operations Manager™ for managing virtualized applications. HPE has found that service orchestration tools and application catalogs help organizations avoid shadow IT and improve LOB satisfaction by streamlining automation and enabling self-service IT.

Checklist

1. Introduce application catalogs for self-service IT. Let LOB users and administrators enable applications and services on-demand. Physical and virtual resources are provisioned automatically through the control layer.
2. Leverage DevOps and DevTest applications like Chef and Ansible for LOB development teams and system administrators. Support the entire application lifecycle including continuous development, integration, testing, deployment, and release management.

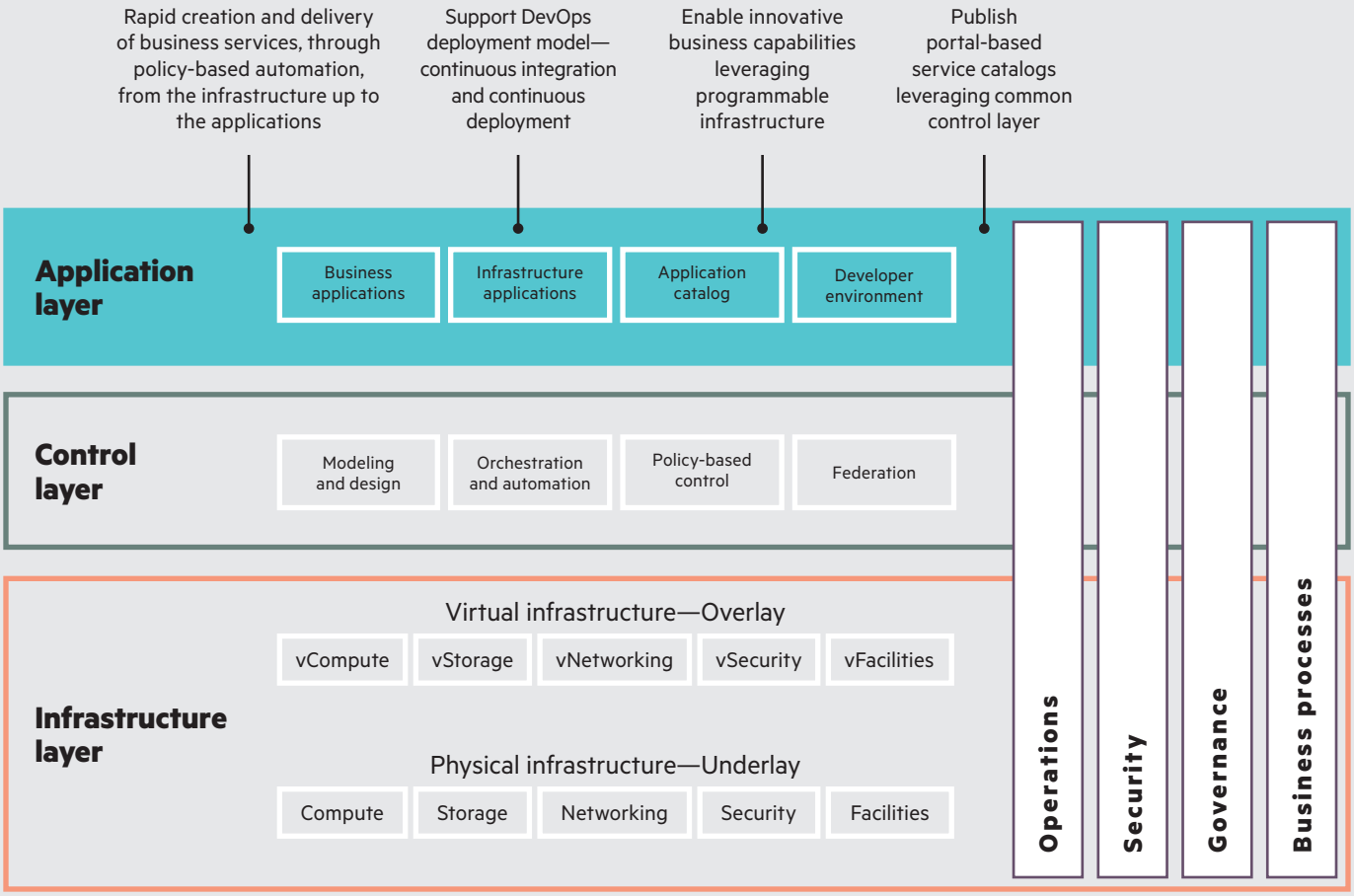
> Automation of business process, workloads, and application release account for 70% of all critical automation efforts
>
> **– Source: Gartner**

3. Add programmatic control to LOB applications and general-purpose business applications, using open APIs to provision infrastructure dynamically based on business logic and real-time conditions. With SDI, applications can automatically reallocate resources in response to evolving workload demands.
4. Automate system management applications used by corporate IT administrators to configure and maintain physical and virtual infrastructure and control access and authentication privileges.

Expected results

- Increased business agility by enabling rapid service turn-up and application delivery
- Greater customer satisfaction by allowing LOB developers to stand up resources in minutes vs. weeks without involving corporate IT
- Improved IT productivity by freeing up IT specialists to focus on core business issues

Application layer enables agile development and test



Guiding principle 4: Institute common IT operations and business practices

BUSINESS CHALLENGE: Today's IT operating model was designed for stability not speed. Existing methods and procedures aren't well suited for agile development and continuous delivery.

SDI fundamentally changes the way IT services are delivered, administered, and consumed. Enterprises must revise IT operations, security and compliance systems and practices, as well as business processes to support the new model. IT organizations must retrain staff or onboard new talent to take on the new environment. With abstraction of the physical infrastructure and definition of it as a code, the skill specialization for managing infrastructure shifts from traditional vendor and application-specific system admin skills, to the ability to write and manage code.

Part of the transformation to SDI involves a cultural change towards software-based development practices like Agile. For example DevOps, as a culture, has emerged from this, and embraces these new roles and responsibilities.

Checklist

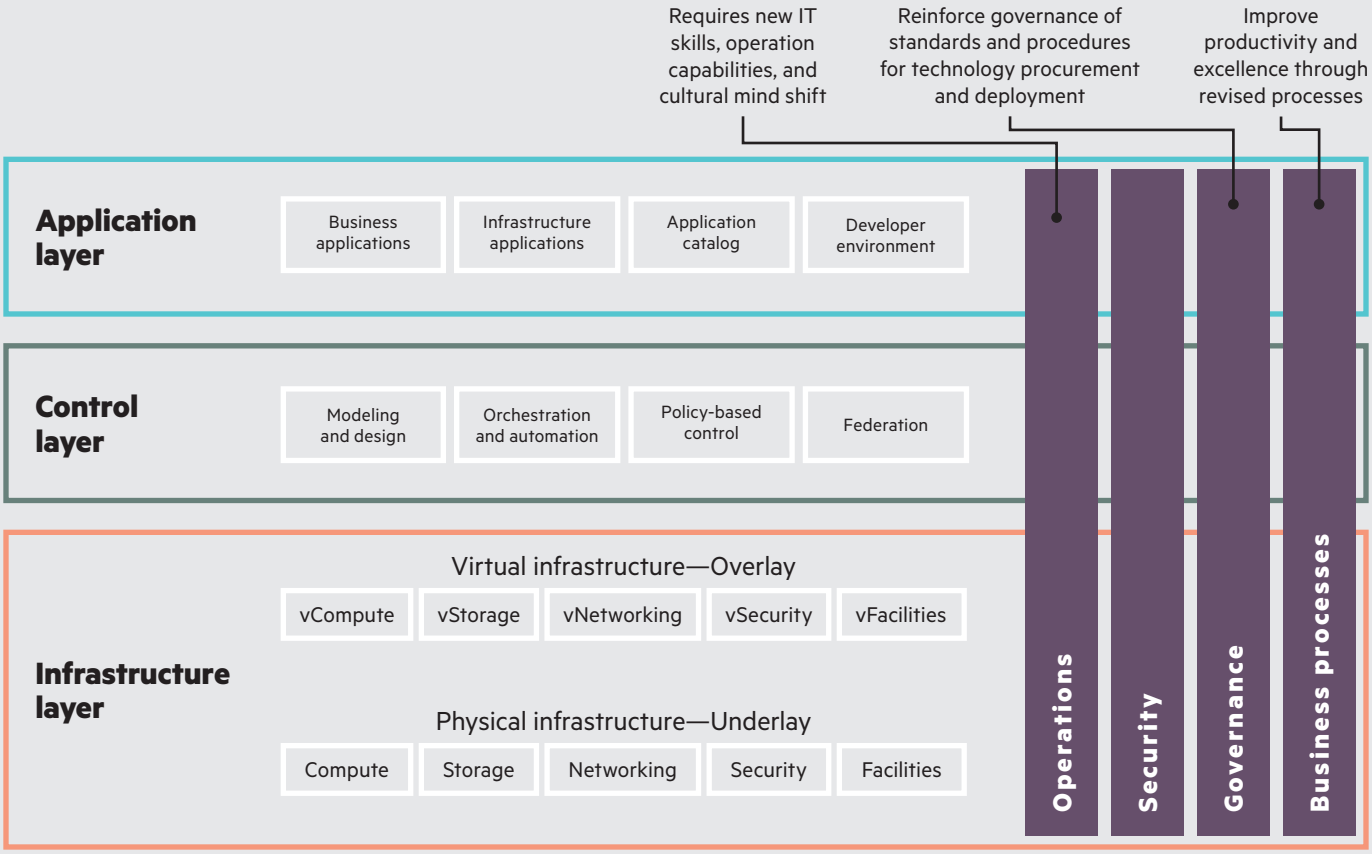
1. Update IT operations methods and procedures including the help desk and all Information Technology Infrastructure Library-based functions such as problem, incident, change, performance, availability, configuration and capacity management. SDI will require new IT skills, operations capabilities, and most importantly a cultural mind shift.
2. Institute strong security practices including access control, authentication and authorization, and protection against denial of service attacks, data theft, fraud, abuse, and other threats. Security controls and monitoring capabilities must be implemented across the entire SDI stack to protect physical and virtual infrastructure against a wide range of internal and external threats.

3. Adhere to governance policies and procedures including IT performance management, risk management, and compliance. The SDI implementation must conform to corporate technology procurement and deployment standards and procedures and all applicable government regulations.
4. Revise business processes including strategy, demand, financials, invoicing, procurement, and client relationships. The ultimate goal of this vertical is to improve productivity of the SDI platform through revised processes.

Expected results

- Increased IT agility through the use of automation tools
- Reduced risk by implementing strong security practices and ensuring compliance with corporate policies and government regulations
- Improved productivity with revised processes that leverage automation and eliminate friction

Uniform operations and business practices streamline adoption



Transformation in action—Otto Group Case Study

Germany-based Otto Group is a global retail and service company that employs almost 50,000 people around the world, with 4 active data centers.

They noticed it was taking too long to provide hardware and services for areas such as databases and networks, which was delaying new services for customers, such as online stores. They felt it was simply unacceptable to take two months to do something such as provide new servers for tasks like these.

During the transformation process, HPE Pointnext Services experts helped Otto Group identify their sticking points, how to work differently in the future, and how to implement a shift across people, processes, and technology.

The resulting benefits for Otto Group included delivering infrastructure services 90% faster, while reducing IT's running costs by around 40%—a benefit that can be passed on to their customers.

You can read more about Otto Group's transformation here.

SDN Case Study—Accelerating speed to market

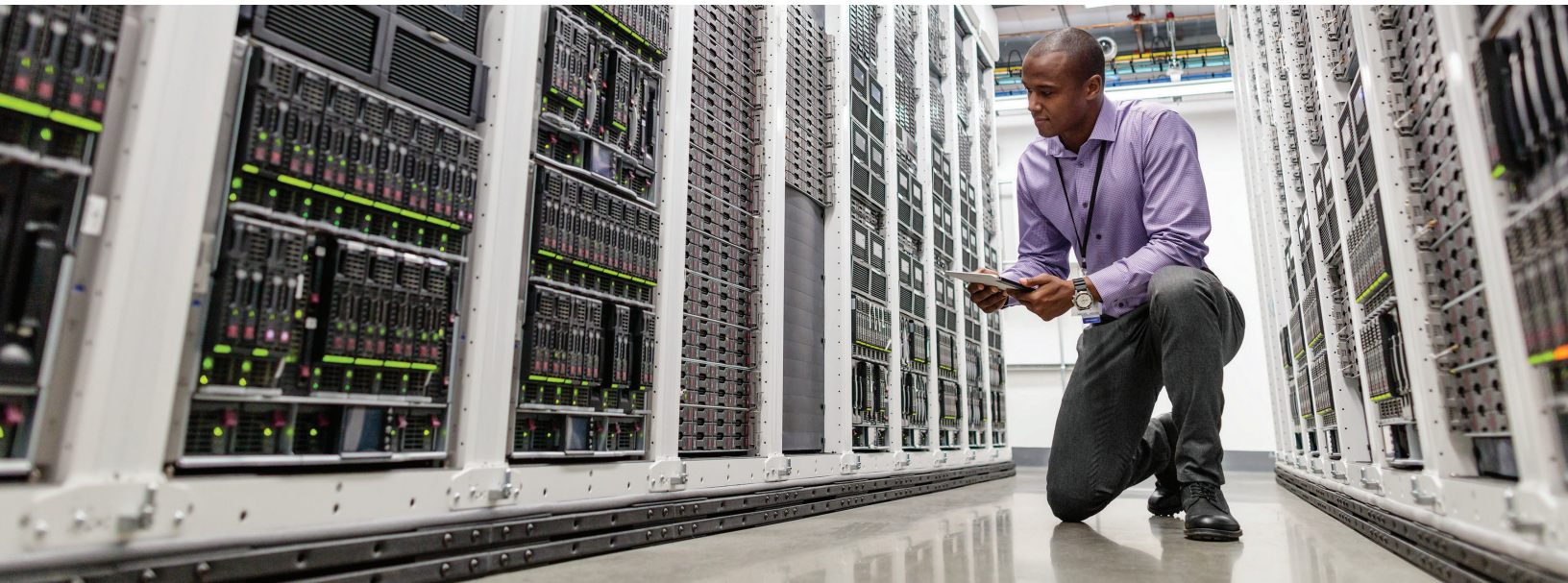
Diversified Agency Services worked on a multi-year project to consolidate its IT infrastructure and implement software-defined networking (SDN). Using a proven transformation approach from HPE Pointnext Services, in just 18 months, DAS was able to build and onboard its agencies to the new SDN-enabled network infrastructure. With SDN, DAS could now program its network using an open standards infrastructure, dynamically change how its network responded to business needs, and rapidly deploy applications—all at speeds far faster than its agencies had ever experienced.

Achieving software-defined infrastructure in four steps

Recognizing the transformative power of SDI is the first step. Navigating and transforming is a difficult journey and can introduce risk. How you do something is just important as what you do.

Based on real-world experience helping customers optimize IT infrastructure and operations with hybrid cloud and software-defined solutions. HPE Pointnext Services recommends organizations consider the following approach to ensure a successful SDI rollout:

1. Establish a future state software-defined architecture to govern strategic investments. Define a long-term strategy for creating a software-centric, programmable data center that is more agile and efficient. Include provisions for migrating legacy applications and updating existing management systems and administrative practices.
2. Assess current and future workload requirements to support business strategy. Assemble a cross-functional team to assess application requirements across various business units. Ensure the architecture meets projected performance, scalability, and automation needs of various applications and workloads.
3. Implement a software-defined architecture and operational model for a specific use case to prove out the future strategy. Identify an application to use as a proof-of-concept program. Make mid-course corrections throughout the pilot program to ensure readiness.
4. Scale out through workload migration and modernization, engaging developers for next-gen code integration. Gradually transition existing workloads to the new infrastructure. Encourage LOB developers to leverage the software-defined infrastructure for new initiatives.



Conclusion

Forward-looking enterprises are looking to software-defined infrastructure to accelerate the pace of innovation and extend their competitive edge in today's fast-paced global information economy. The HPE Pointnext Services SDI architectural blueprint lets businesses create programmable, repeatable infrastructure that automatically adapts to evolving business demands and real-time application requirements.

The HPE Pointnext Services SDI blueprint helps businesses slash CAPEX and OPEX and eliminate human latency. Independent technology platforms with discrete, vendor-specific interfaces give way to fluid resource pools with uniform, abstract APIs. Application catalogs and self-service portals let LOB developers and administrators stand up infrastructure and provision IT services on their own, helping businesses avoid shadow IT, improve governance, and accelerate application development.

Ideal for today's on-demand applications, the HPE Pointnext Services blueprint delivers software-defined infrastructure that redefines service agility.

About HPE Pointnext Services

Need help with your private cloud implementation? HPE Pointnext Services provides expert IT consultation services, financial flexibility, and operational support to streamline business transformation initiatives. Our network of 25,000 IT professionals handles more than 11,000 transformation projects a year globally.

HPE Pointnext Services offers a variety of services to assist with software-defined infrastructure (SDI) and operations, including SDI Transformation Workshops, SDI Readiness and Roadmap Services, SDI Discovery Services, SDI Accelerators, and VMware® SDI Services.

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