Vblock Architecture
Accelerating Deployment of the Private Cloud

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Vblock
Frequently Asked Questions

What is a Vblock?

It is a product of the strategic alliance program between VMware, Cisco, and EMC.

The Vblock itself is a turnkey solution of highly integrated IT infrastructure components such as storage, network, compute and management software resources that eradicate the need to build, test and integrate individual components. The Vblock comes in different sizes and level of compute power capacity.

Type 0 Vblock for Commercial and low-end Enterprise: < 800 VM's

Type 1 Vblock for Commercial and Enterprise: 800-3000 VM's

Type 2 Vblock for Enterprise and Service Provider: 3000-6000 VMs

What are the key benefits of a Vblock?

- Architectural Predictability: The Vblock as a whole solution offers a predictable way to scale an environment by adding multiple Vblocks to even meet the toughest demand in the marked.
- Optimized storage, compute and network used to build a Vblock.
- Predictable and efficient power and cooling usage
- Calculable VM scaling
- Standardized workload operation platform
- Ease of deployment and use
- Rapid provisioning capabilities
- Built-in high availability and redundancy
- Simple management of the solution

What features of VMware vSphere were specifically utilized in the Vblock?

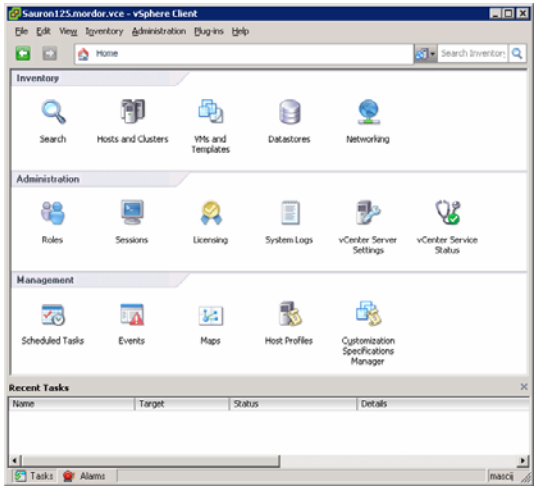
- vMotion, Distributed Resource Scheduler (DRS)
- High Availability (HA), Fault Tolerance (FT)
- Distributed Power Management (DPM)
- VMware Update Manager (VUM)
- VMware Converter
- Templates, Host Profiles
- DVS (Nexus 1000v)
- VMware vStorage API
- VMware Storage vMotion
- VMware PowerCLI, VMware vCLI
- EMC Power Path VE (vSphere Multipathing driver for ESX 4.0)

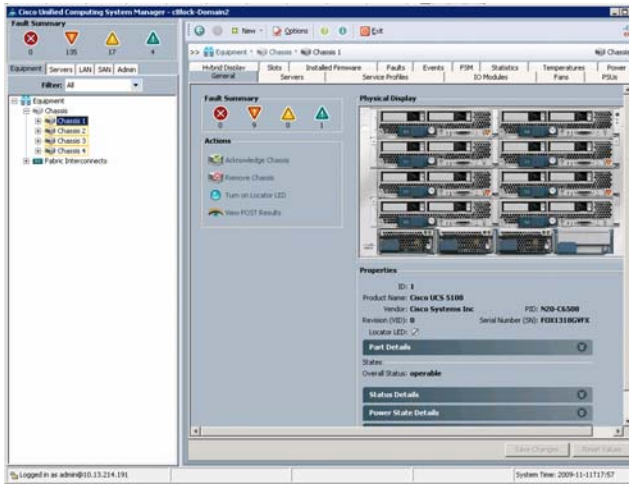
How can a Vblock be integrated into an existing network?

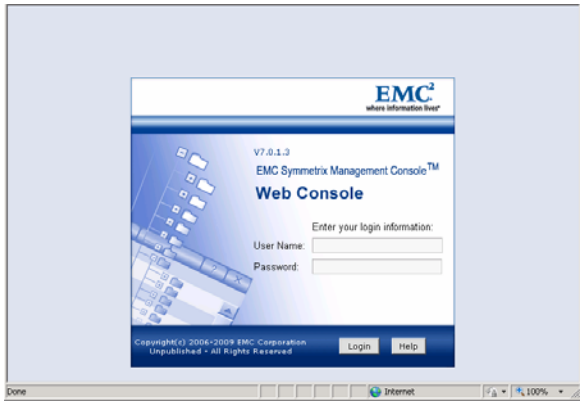
The Vblock uses standard connectivity components which can connect to any data center network through 10 Gb Ethernet, and a 4 or 8 Gb Fiber Channel connection. The number of connections and the degree of network subscriptions can be modified to suit application requirements and business SLAs.

How is provisioning automated for compute, network, storage and virtual machines?

- Compute **– UCS Manager and VMware Host Profiles**
- Network **– UCS Manager, Cisco Fabric Manager**
- Storage **– SMC on V-Max, Navisphere Manager on CLARiiON**
- Virtual Machines **– Templates**





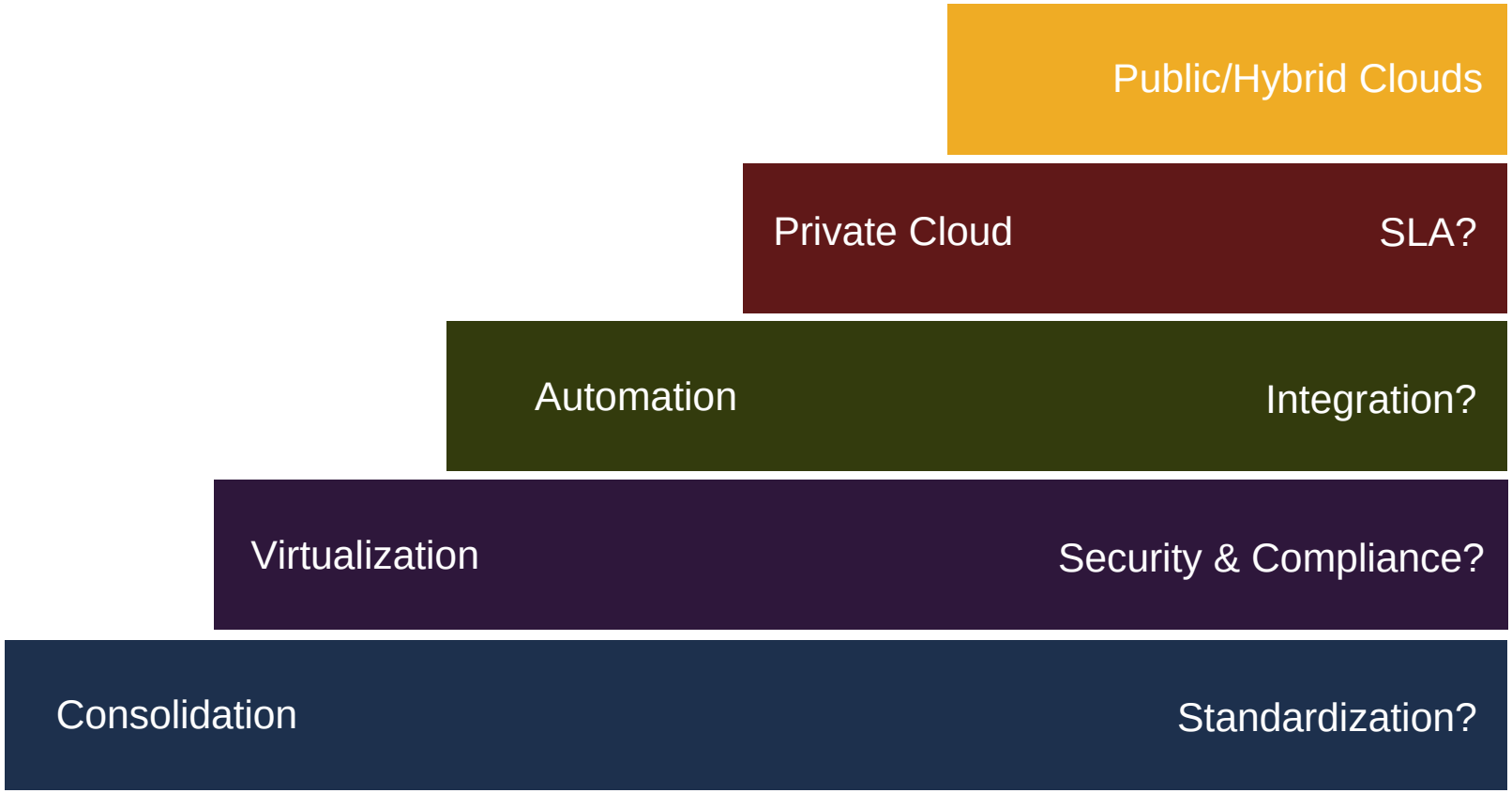


IT is undergoing a transformation…

Enterprise IT solutions remain costly to analyze and design, procure, customize, integrate, inter-operate, scale, and maintain

- The current architecture of IT today increases procurement, management costs, and complexity
- IT is now moving towards a service based consumption model (Private Cloud)
- This new model requires a new way of thinking about both the underlying technology and the way IT is delivered for customer success
- The need for a new IT model has never been more clear, but navigating the path to that model has never been more complicated
- The realities of outdated technologies, rampant incremental approaches, and the absence of a compelling end-state architecture are impeding adoption by customer

IT Transformation has begun….



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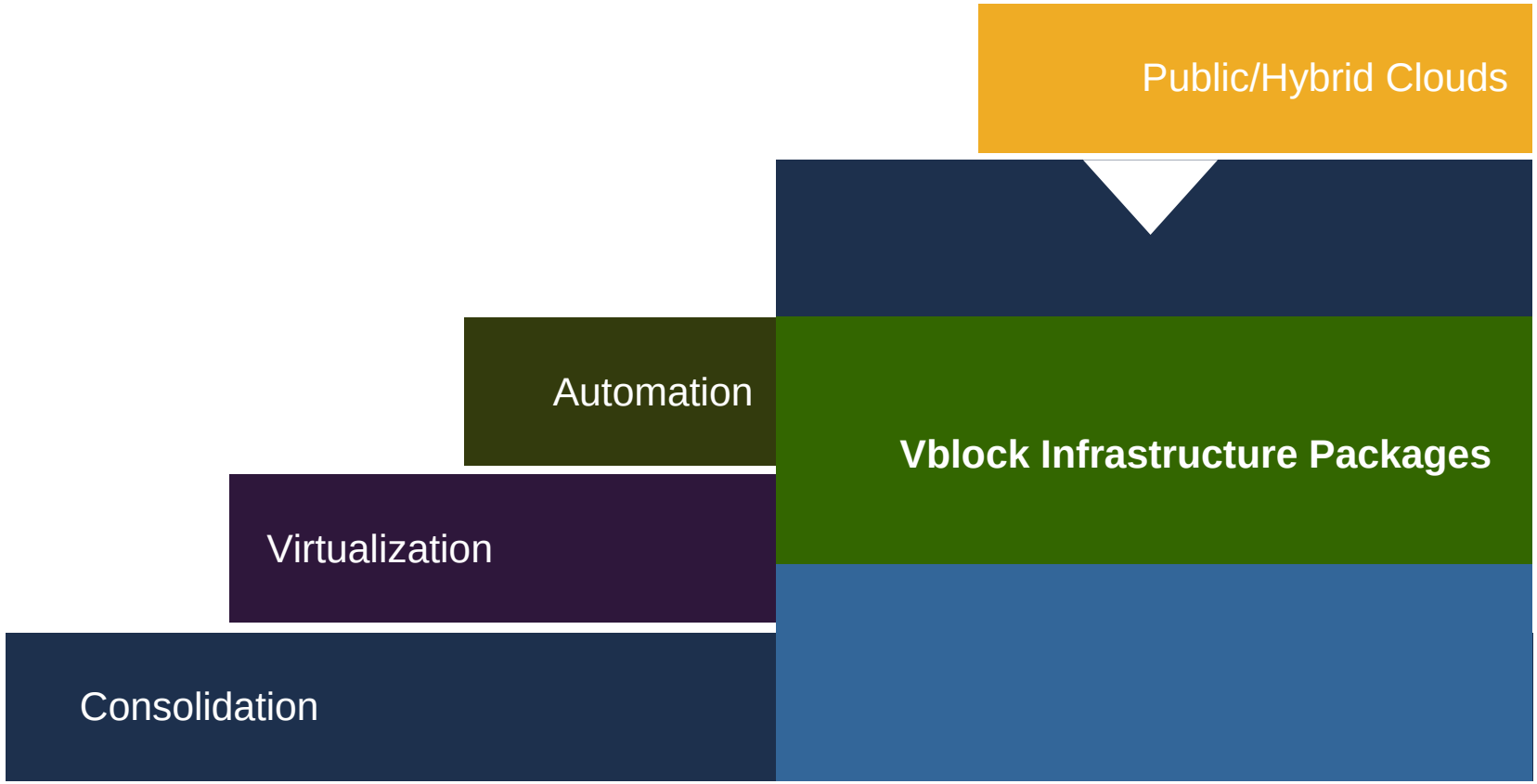


…. Vblock Infrastructure Packages accelerate infrastructure virtualization & private cloud adoption

Vblock: A New Way of Delivering IT to Business

- Production-ready
  - Integrated & tested units of virtualized infrastructure
  - Best of breed virtualization, network, compute, storage, security, and management products
- SLA driven
  - Predictable performance & operational characteristics
- Reduced risk & compliance
  - Tested & validated solution with unified support and end-to-end vendor accountability

Vblock Infrastructure Packages

A New Way of Delivering IT

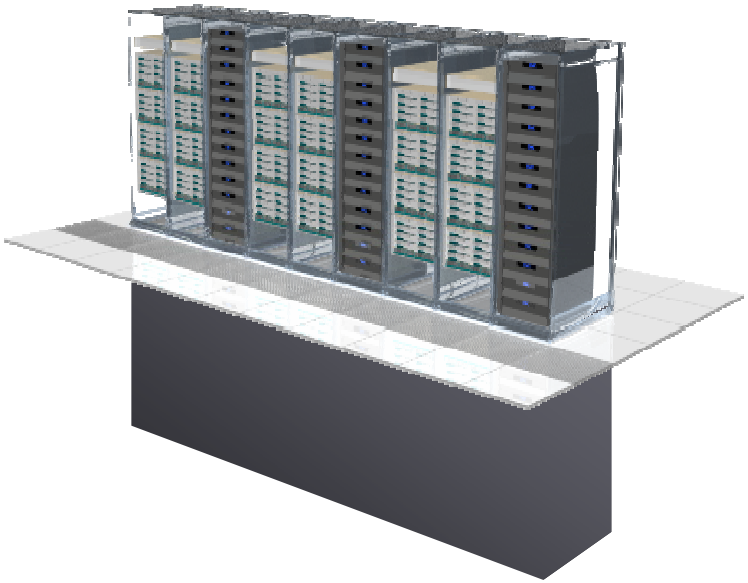
Benefits:

- Accelerate the journey to pervasive virtualization and private cloud computing while lowering risk and operating expenses
- Ensure security and minimize risk with certification paths
- Support and manage Service Level Agreements
  - Resource metering & reporting
  - Configuration & provisioning
  - Resource utilization
- Vblock is a validated platform that enables seamless extension of the environment

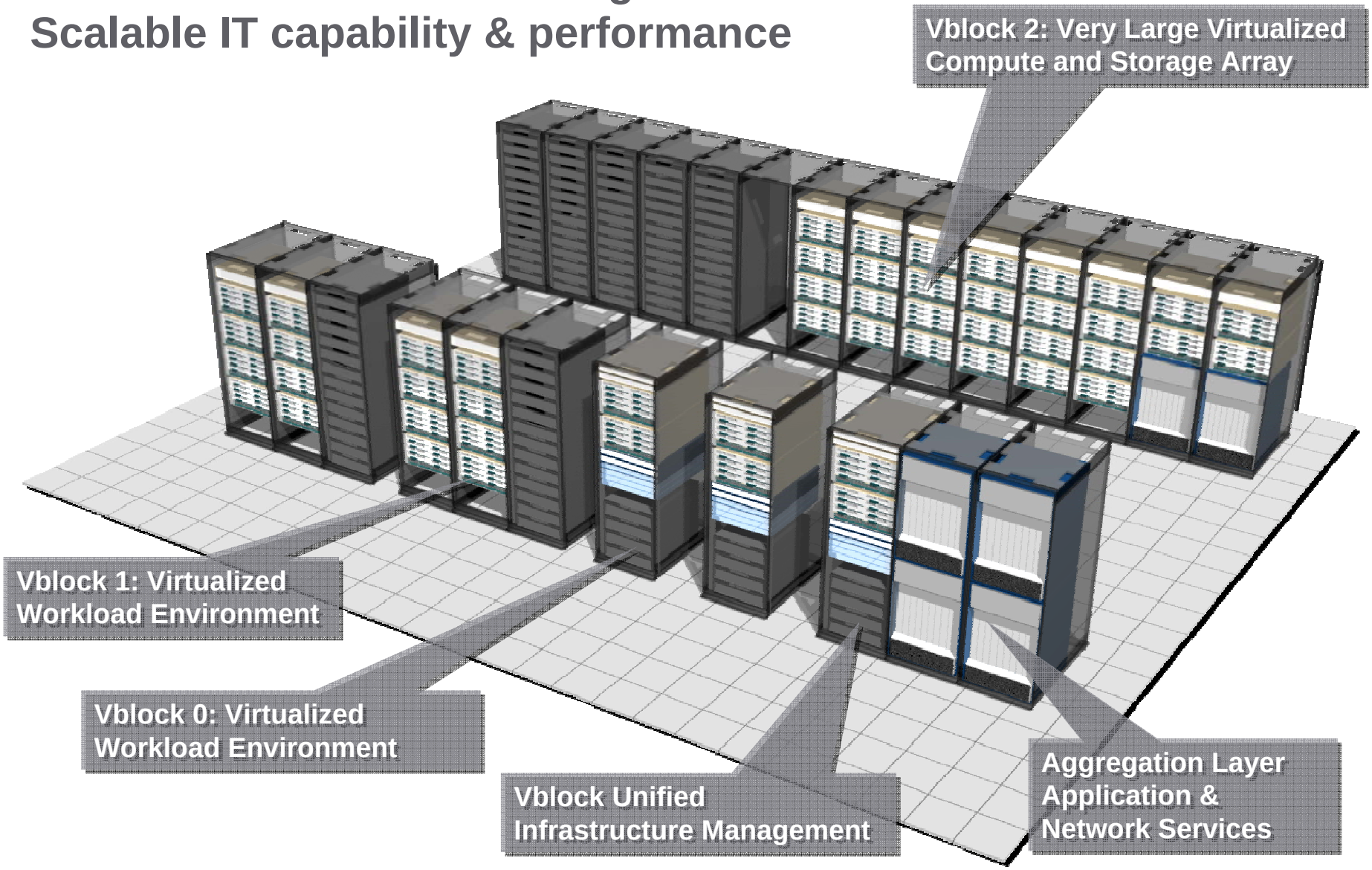
Vblock Infrastructure Packages

Scalable Platform for Building Solutions

- Vblock 2
  - A high-end configuration - extensible to meet the most demanding IT needs
  - Typical Use case:
    Business critical ERP, CRM systems
- Vblock 1
  - A mid-sized configuration - broad range of IT capabilities for organizations of all sizes
  - Typical use case:
    Shared services – Email, File & Print, Virtual Desktops, etc
- Vblock 0 (1H 2010)
  - An entry-level configuration addresses small datacenters or organizations

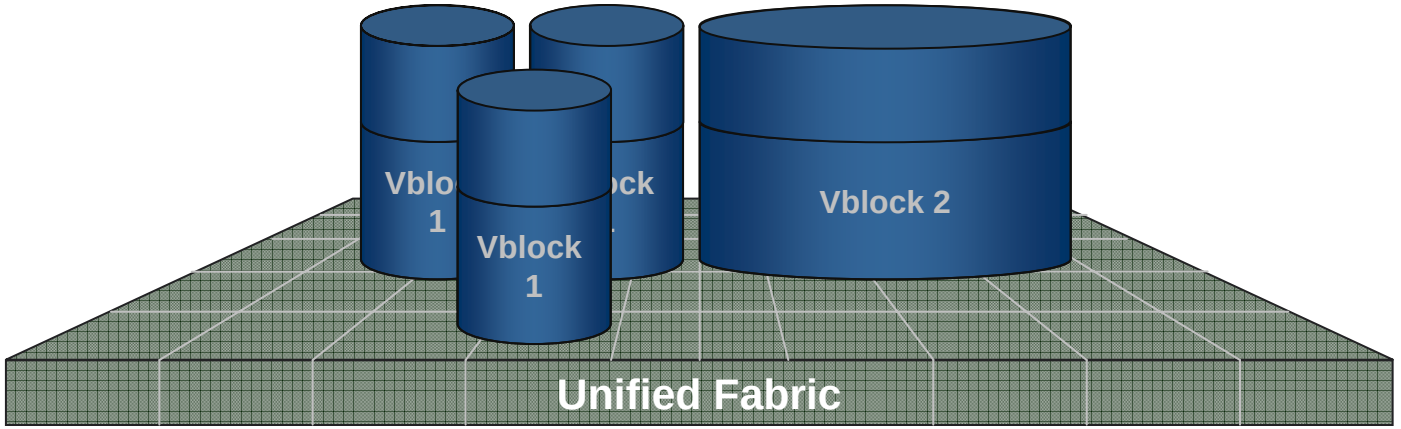


Vblock Infrastructure Packages
Scalable IT capability & performance



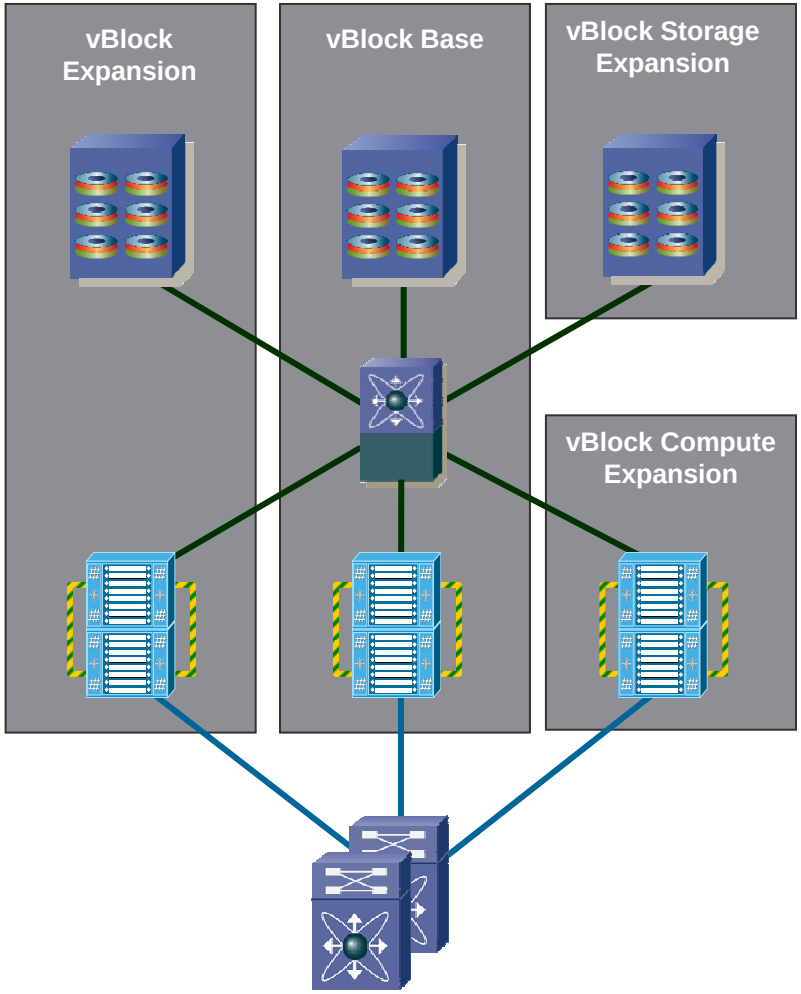
Vblock Scaling

- Modular architecture enables graceful scaling of Vblock environment
- Consistent policy enforcement & IT operational processes
- Add capacity to an exisiting Vblock or add more Vblocks
- Mix-and-match Vblocks to meet specific application needs



vBlock Architectural Solution

Modular, Scalable, Repeatable, Predictable



- Simplifies expansion and scaling
- Add storage or compute capacity as required
- Can connect to existing LAN switching infrastructure
- Graceful, non-disruptive expansion
- Self-contained SAN environment with known standardized platform and processes
- Enables introduction of FCIP, SME, etc later for Multi-pod
- Enables scaling to multi-Vblock and Multi-Data Center architectures

Architectural Principles

- Repeatable “units” of construction based on “matched” performance, operational characteristics & discrete of power, space & cooling
- Repeatable design patterns facilitate rapid deployment, integration and scalability
- Designed from the “Facilities to the Workload” to be scaled for the highest efficiencies in virtualization & workload re-platforming
- An extensible management & orchestration model based on industry standard tools, APIs & methods
- Built to contain, manage & mitigate failure scenarios in hardware & software environments

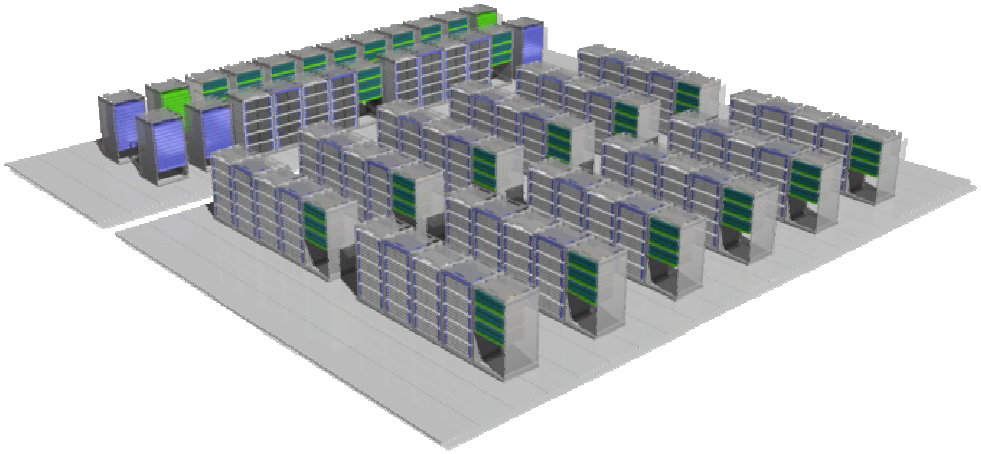
Design

Selection

Assembly

Result

Vblock Design principles

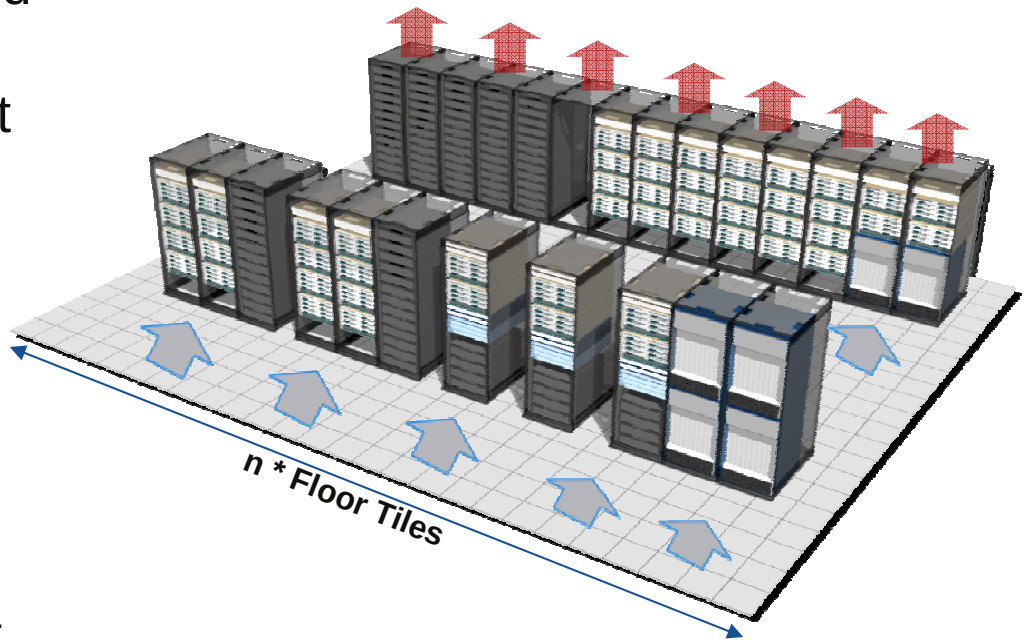


A Data Center Is a collection of pooled “Vblock**s**” aggregated in ‘Zones”.

- A *unit of assembly* that provides a set of services, at a known level, to target consumers
- Self contained, but it may also use external shared services
- Optimized for the classes of services it is designed to provide
- Can be clustered to provide availability - or aggregated for scalability, but each Vblocks is still viable on its own
- Fault & service isolation - the failure of a Vblock will not impact the operation of other Vblocks (Service Level degradation may occur unless availability or continuity services are present)

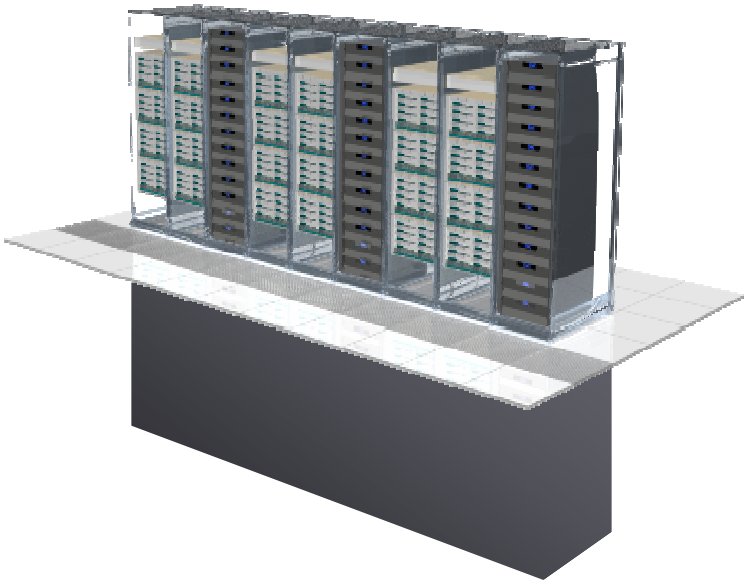
Deterministic Performance, Predictable Architecture

- Predictable SLA:
  Granular SLA Measurement and Assurance
- Deterministic Space and weight
  Floor Tiles become Unit of Capacity Planning
- Power & Cooling:
  consistent Power consumption and Cooling (KWh/BTU's) per Unit
- Pre-determined Capacity & Scalability:
  Uniform workload distribution & mobility
- Deterministic fault & security isolation



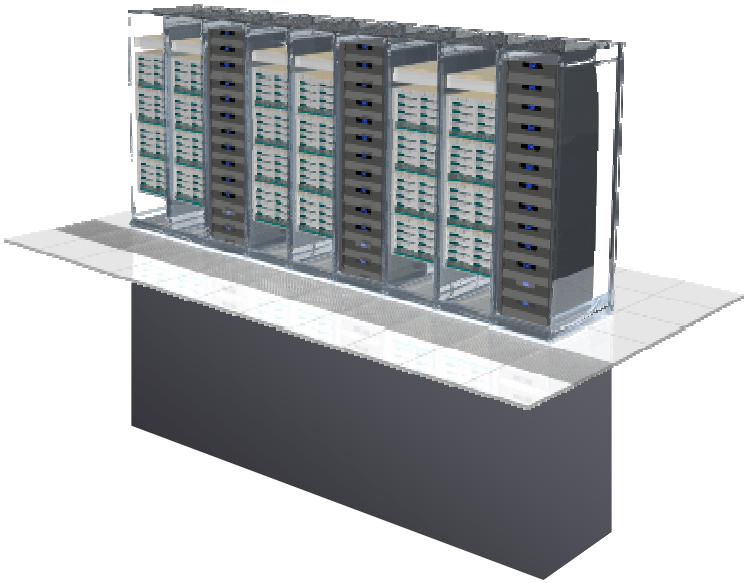
Vblock 1 Components

- Compute
  - Cisco UCS B-series
- Network
  - Cisco Nexus 1000V
  - Cisco MDS 9506
- Storage
  - EMC CLARiiON CX4
- Hypervisor
  - VMware vSphere 4
- Management
  - EMC Ionix Unified Infrastructure Manager
  - VMware vCenter
  - EMC NaviSphere
  - EMC PowerPath
  - Cisco UCS Manager
  - Cisco Fabric Manager



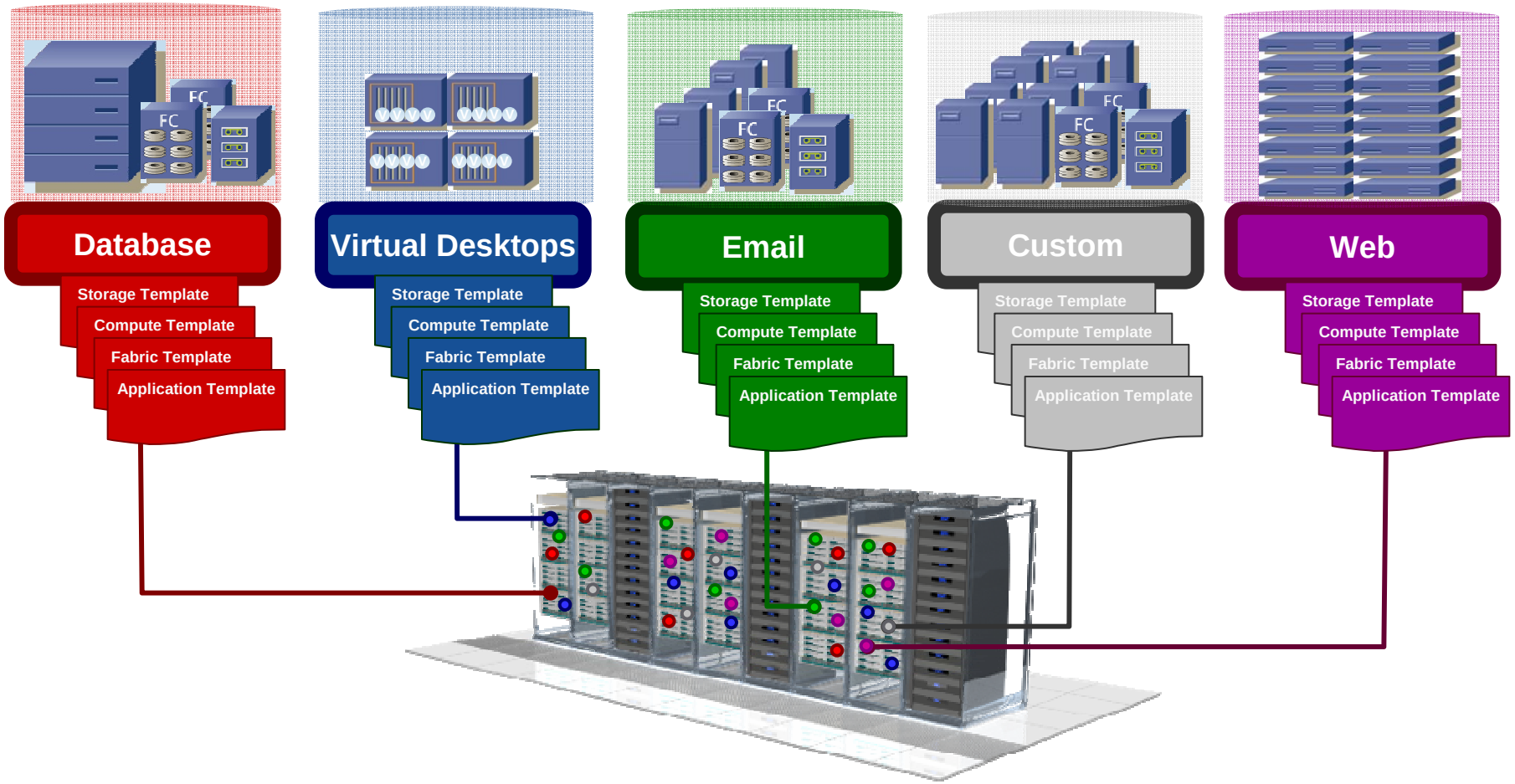
Vblock 2 Components

- Compute
  - Cisco UCS B-series
- Network
  - Cisco Nexus 1000V
  - Cisco MDS 9506
- Storage
  - EMC Symmetrix V-Max
- Hypervisor
  - VMware vSphere 4
- Management
  - EMC Ionix Unified Infrastructure Manager
  - VMware vCenter
  - EMC Symmetrix Management console
  - EMC PowerPath
  - Cisco UCS Manager
  - Cisco Fabric Manager



Use Case: Application Consolidation

Accelerate IT standardization & simplification



Vblock 1: Consolidation Use Case

Vblock 1										
Storage Platform	Minimum					Maximum				
CX4-80	Fibre (450GB)	Flash (400GB)	SATA (1TB)	System Total		Fibre (450GB)	Flash (400GB)	SATA (1TB)	Total	
# of Drives	74	9	17	100		140	17	23	180	
Capacity (GB)	33,300	3,600	17,000	53,900		63,000	6,800	23,000	92,800	
RAID Capacity (GB)	23,310	2,520	11,050	36,880		44,100	4,760	14,950	63,810	
IOPS	13,320	45,000	850	40,807		25,200	85,000	1,150	50,000	
Bandwidth (Mbps)	2,442	1,350	255	4,047		4,620	2,550	345	6,000	

Application Profiles	IOPS per user	Bandwidth per User (Kbps)	Disk/user (GB)
Virtual Desktop	6	12	9
Exchange	0.5	4	0.5
SAP	4	32	1
Sharepoint	0.2	1.6	1
Total	10.7	49.6	11.5

Use Case: VMware View desktops with SAP, Exchange and Sharepoint on Vblock 1							
	Users	IOPS	Bandwidth (Kbps)	Disk	IOPS Utilization %	Bandwidth Utilization	Disk Utilization
Vblock 1 Minimum	3,000	32,100	148,800	34,500	0.79	0.03	0.94
Vblock 1 Maximum	4,500	48,150	120,968	51,750	0.96	0.05	0.81

Note: 5,000 users can be supported at IOPS utilization of 107%

Vblock: O/S & Application support

- Vblock accelerates virtualization of applications by standardizing IT infrastructure & IT processes
- Broad range of O/S support
- Over 300 Enterprise Applications explicitly supported
- Vblock validated applications
  - SAP
  - VMware View 3.5
  - View 4 in-test
  - Oracle RAC
  - Exchange
  - Sharepoint

- Windows NT 4.0
- Windows 2000
- Windows Server 2003
- Windows Server 2008
- Windows Vista
- Windows XP
- RHEL5
- RHEL4
- RHEL3
- RHEL2.1
- SLES10
- SLES9
- SLES8
- Ubuntu 7.04
- Solaris 10 for x86
- NetWare 6.5
- NetWare 6.0
- NetWare 6.1
- Debian
- CentOS
- FreeBSD
- Asianux
- SCO OpenServer
- SCO Unixware
- ...

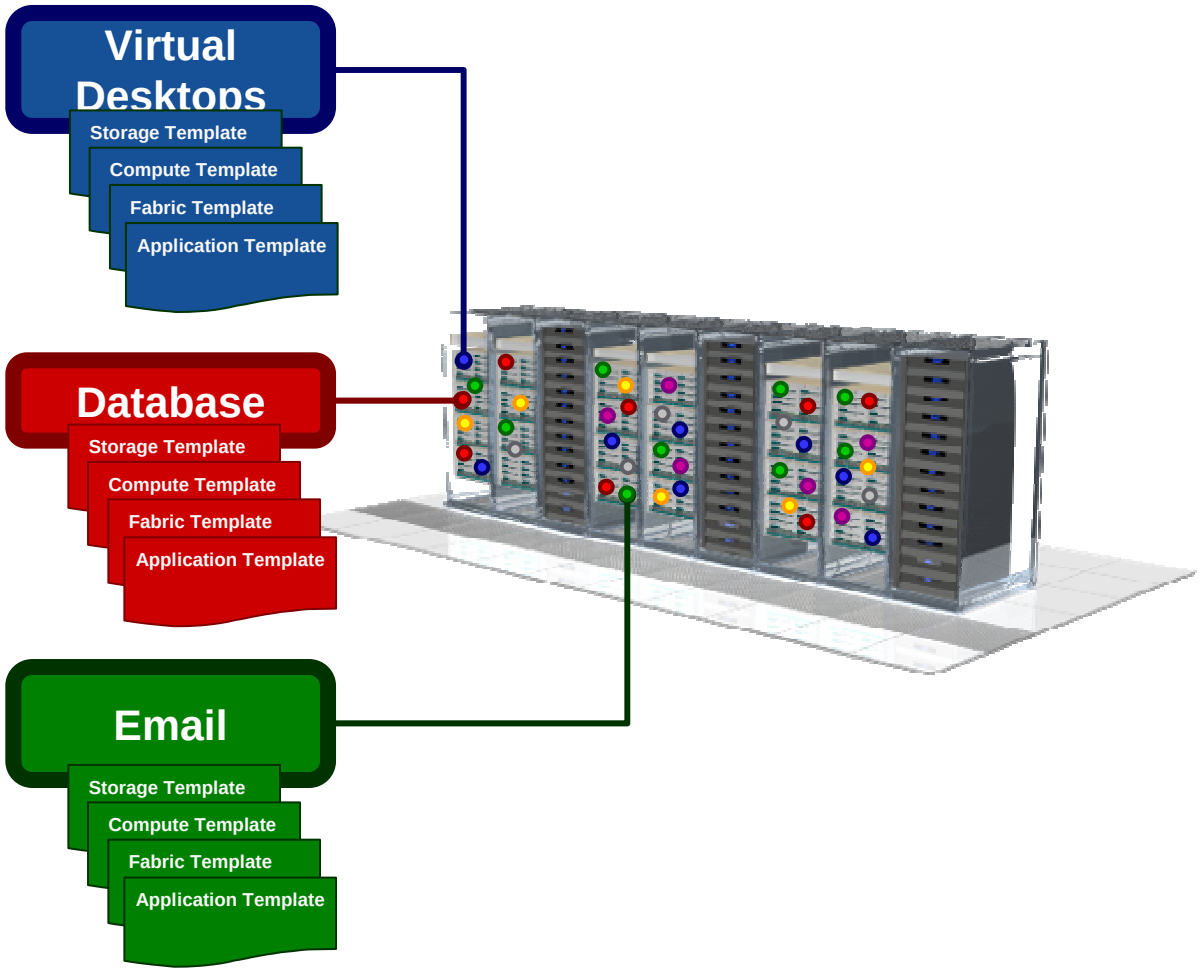
Use Case: Acquisition of 500 Person Sales Force

Consolidation and Rapid Provisioning via Templates

Create 500 virtual desktops to enable new team to access corporate information and applications

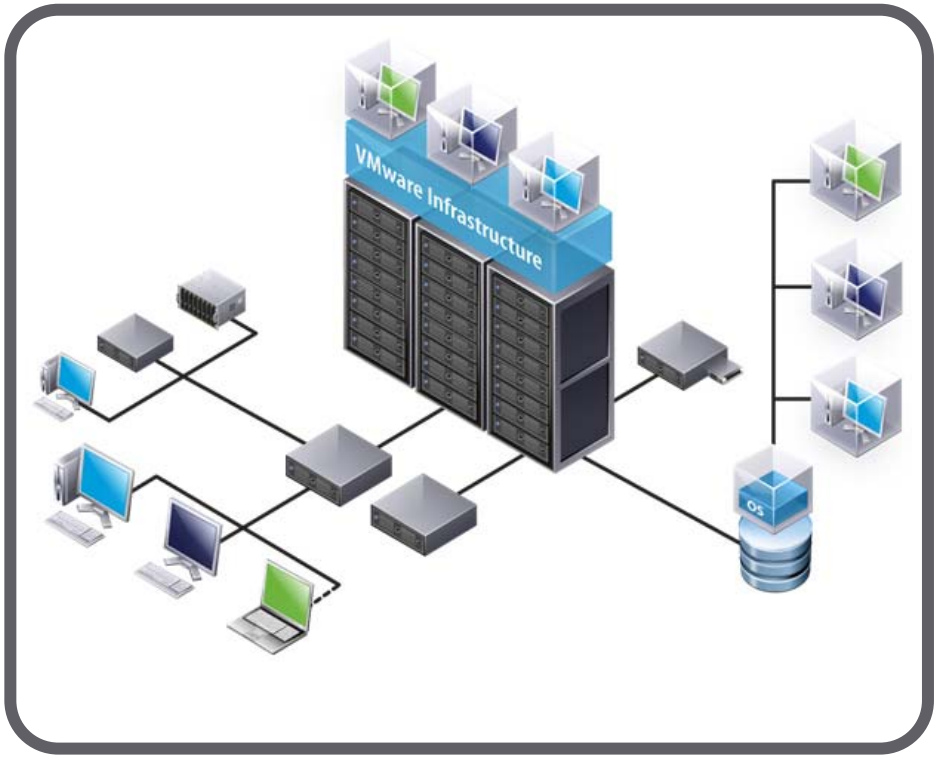
Increase database capacity to support sales consolidation effort

Create 500 new mailboxes

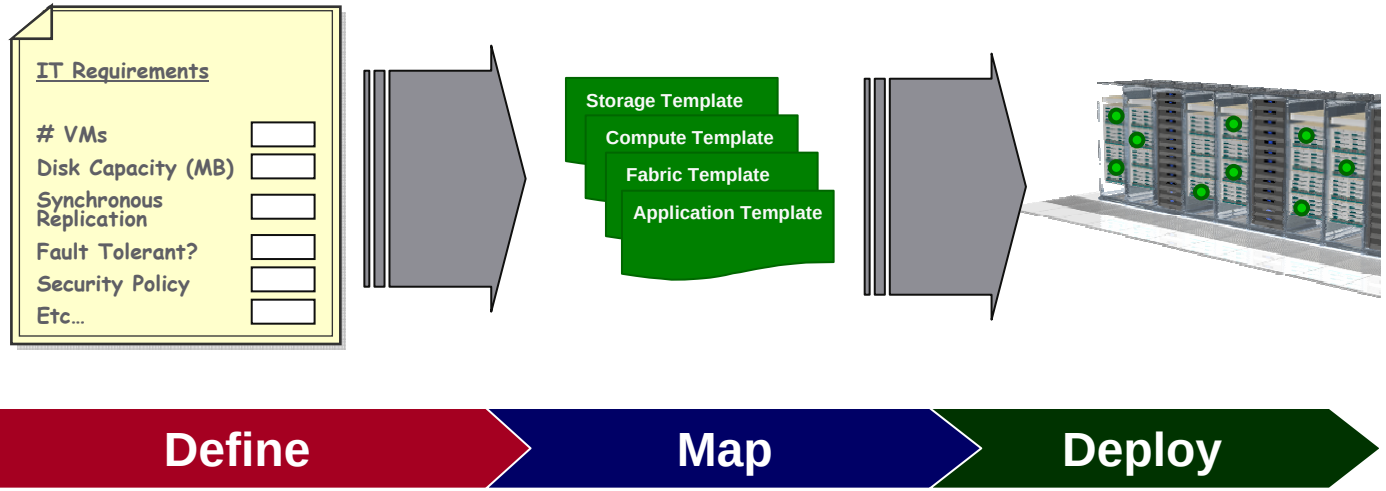


Vblock Use Case: VMware View

- Accelerates VDI adoption
  - Simplify desktop support
  - Improve Security, Data leakage Protection and compliance
  - Reduce TCO
- Enterprise-Class tiered storage environment
  - Supports VMware View today
  - Graceful expansion to support application workloads later

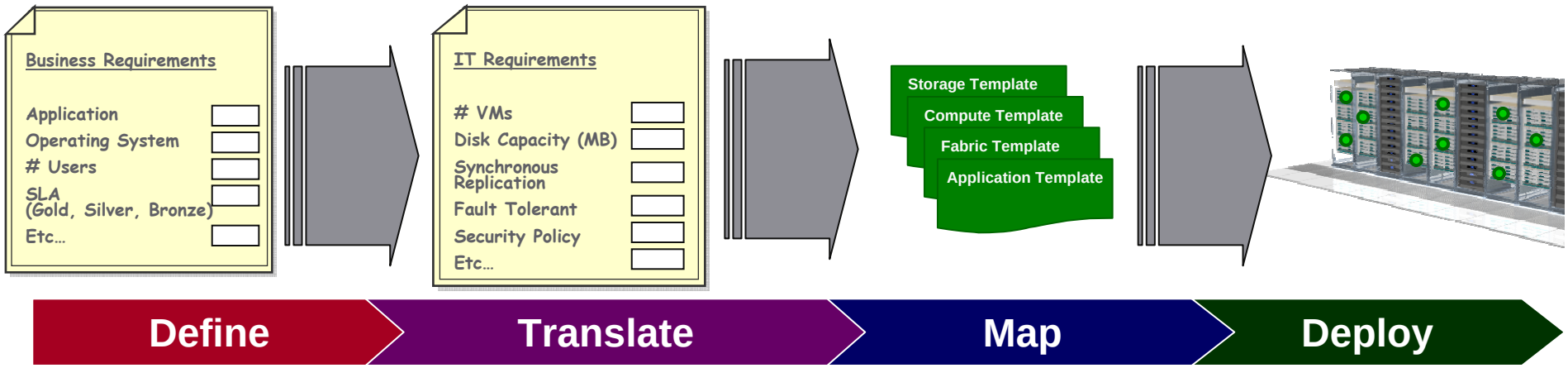


Policy driven IT Infrastructure



- Templates ensure repeatable, compliant IT processes
  - IT defines storage, server, fabric & application and OS configuration policies to meet the business SLAs
- Resources rapidly assigned according to IT policies & SLA reducing time to application availability
- Reduces configuration error & non-compliance

Policy-driven Infrastructure enables Private Cloud

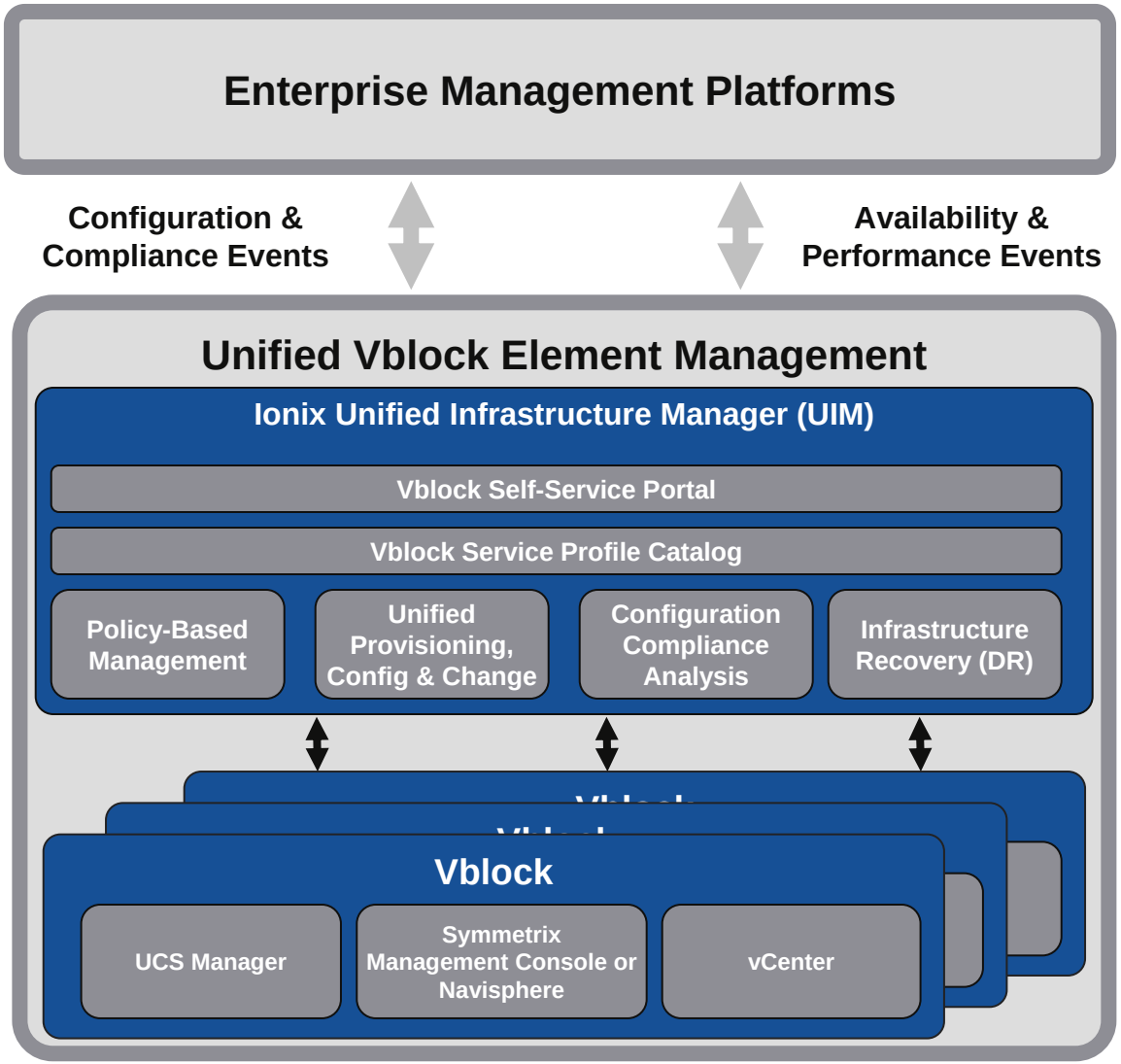


- Enables business requirements to translate to IT resources
  - Business owner inputs application, uptime, number of users, business continuity, backup, and security requirements
  - Resources are rapidly assigned according to user specification reducing time to application availability

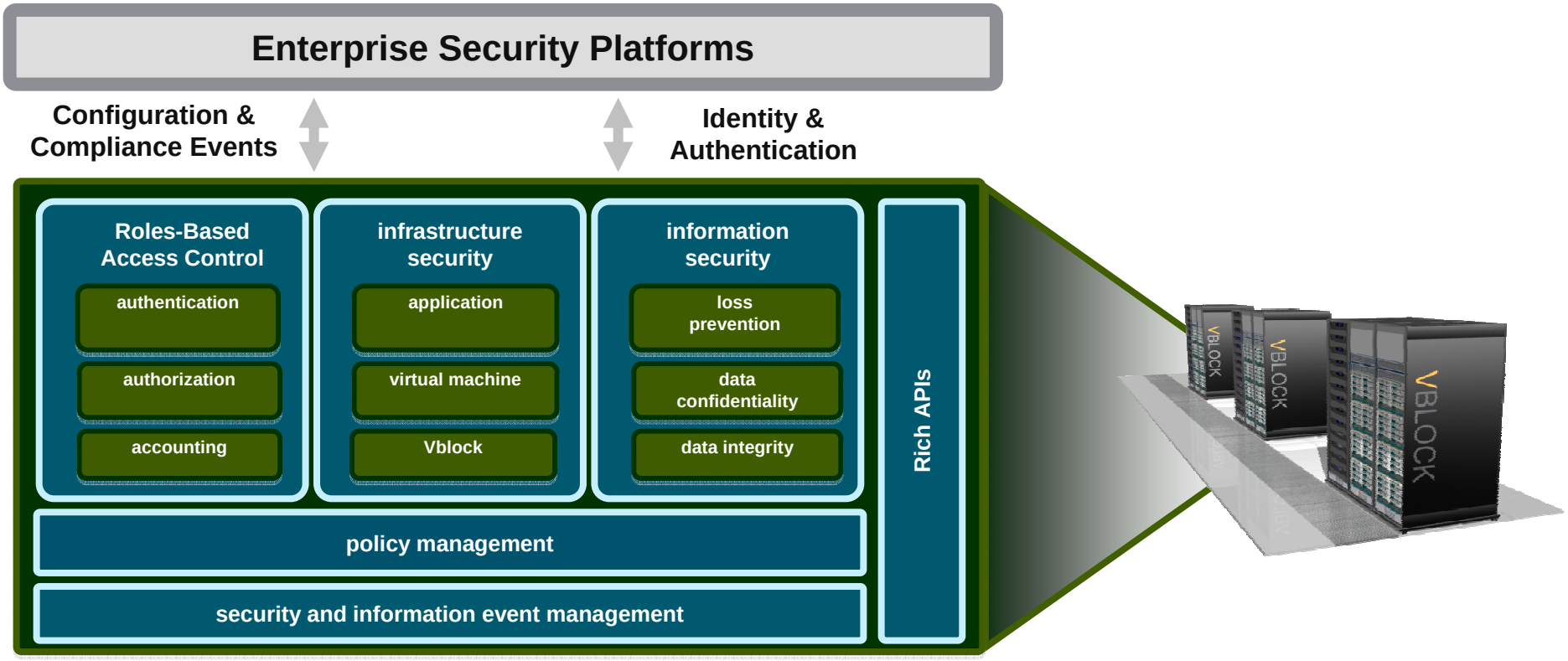
Unified Vblock Element Management

Single Point of Management, Extensible integration framework

- Unified Vblock Management Interface
  - Consolidated view into all vBlock infrastructure
  - Single Integration point
- Vblock self-service portal
  - Mini service catalog & dashboard for self-provisioning
- Policy-based management
  - Fine-grained tracking, traceability, reproducibility
  - System-wide compliance & remediation
- Automated discovery & deployment

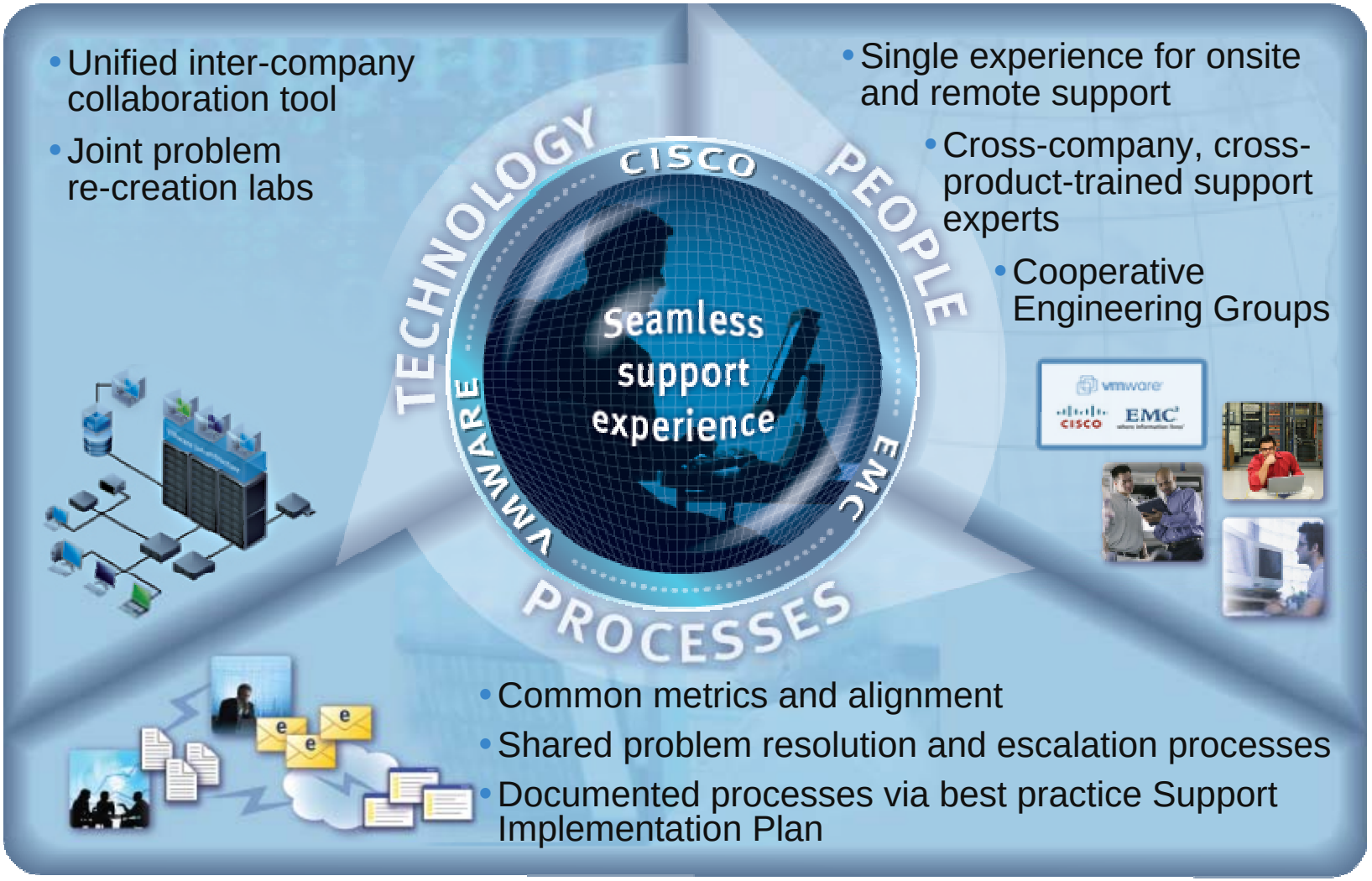


Vblock Security Framework



- Integrates with existing security tools & frameworks
- Ensures consistent security between physical & virtual infrastructure
- Deliver better-than-physical security

End-to-End Seamless Support Experience



Benefits of a Seamless Support Experience

Simplified Support Process

- Single contact point to cross-company, cross-product support experts
- Collaborative support process across all three companies
- Sophisticated tools to speed collaboration (Telepresence, WebEx)

Reduced Time to Resolution

- Cross trained technical teams
- Experts with deep virtualization, networking, compute and storage expertise needed to resolve technical problems

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Lower impact on business operations

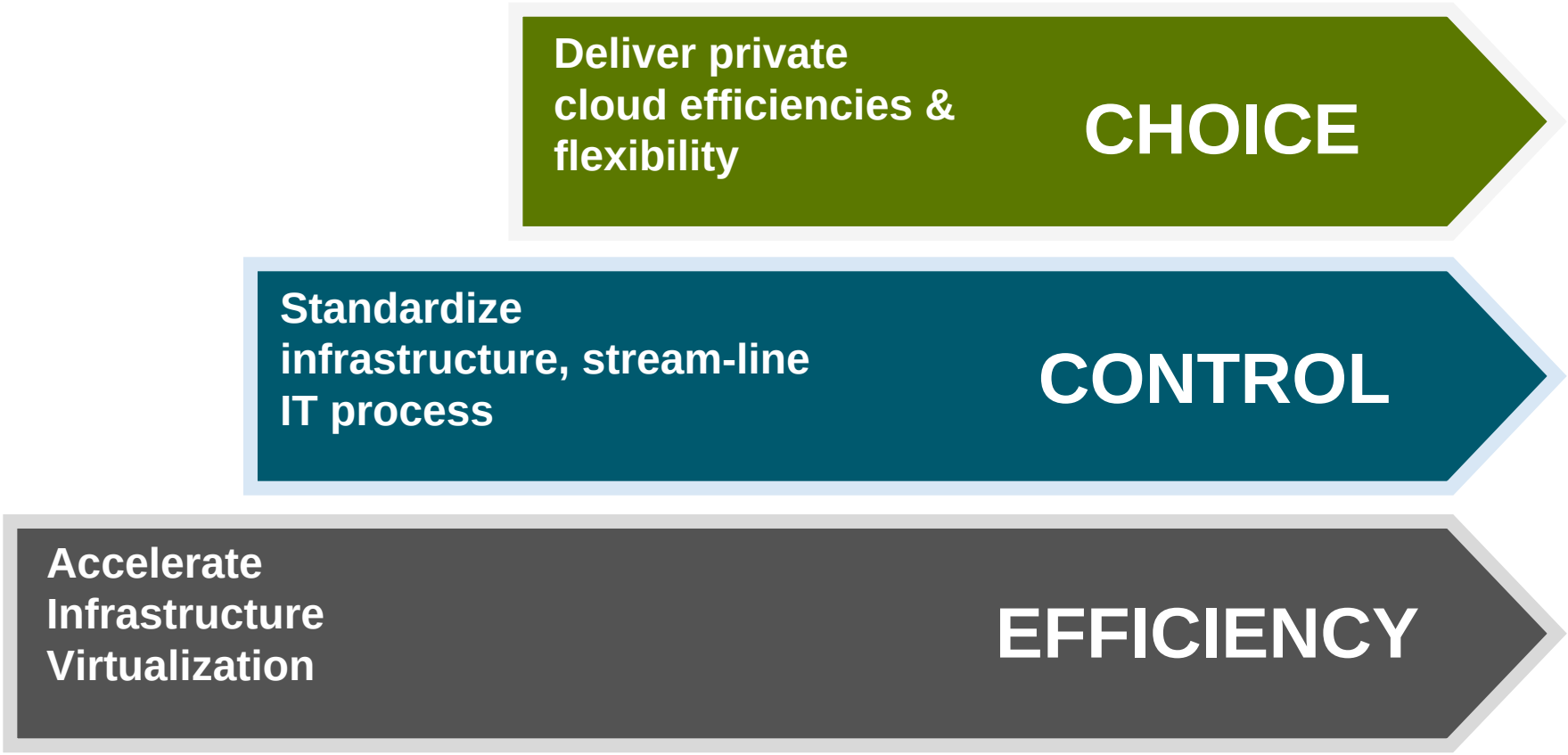
- Interoperability testing and troubleshooting

Increased solution availability, reliability, and productivity

- Labs with equipment and software from all three companies to help replicate and resolve problems

Vblock Infrastructure Packages

Accelerating Deployment of the Private Cloud



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