Operational Management in the Cloud

David Friedlander, Product Marketing

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Agenda

- **The Promise of the Cloud**

- **Operational Management in the Cloud**
  - Automating Key Tasks to Save Time
  - Managing Performance, Changes and Availability to Reduce Risk
  - Effective Capacity and Cost Controls to Right-size the Datacenter

- **Leveraging What You Have**

- **Summary**

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Cloud Computing Represents a New Era in IT

Mainframe

+ Centralized mgmt

+ Secure

- Limited access

- Inflexible

- Costly

Client/Server

+ Distributed CPU utilization

+ Added flexibility

- Complex / costly to deploy & manage

- Not secure

- Not efficient

Web

+ Simple to deploy and manage

+ Broader access

+ Scale
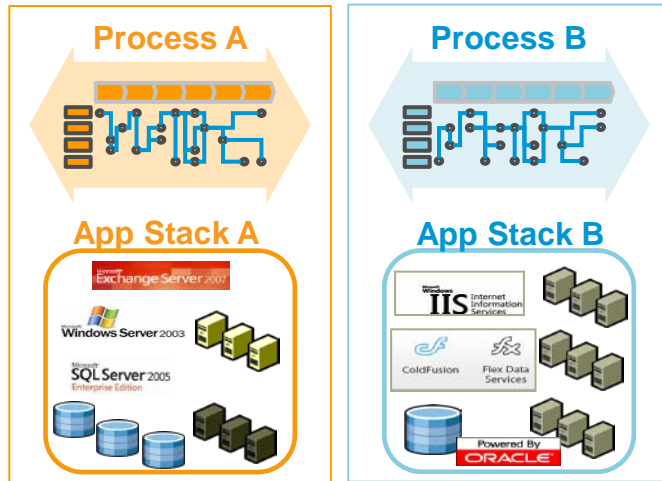
- Limited flexibility

- Limited efficiency

- Not secure

"Cloud"

+ Frictionless deployment

+ Simplified mgmt thru abstraction

+ On-demand scale

+ Unparalleled flexibility

+ Secure

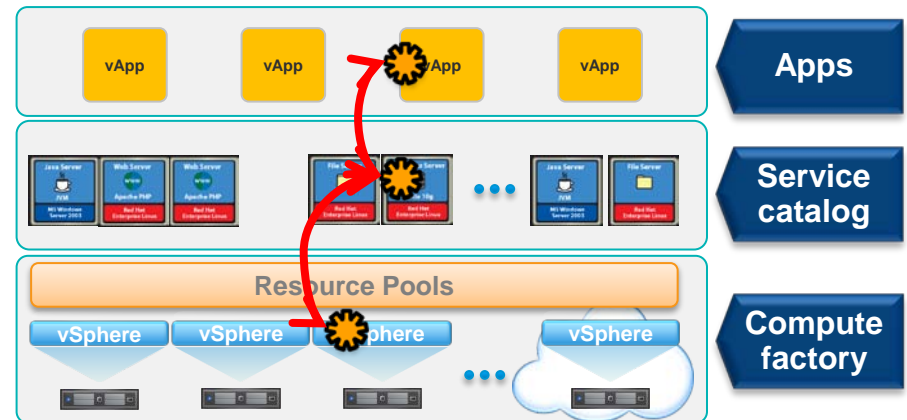+ Highly efficient

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Management is Different in the Cloud


Traditional Management

- Static bindings between processes, applications, and infrastructure

- Change is carefully planned, risky, manual, and slow

- Heterogeneous elements and processes across silos

- Management software executes to the lowest common denominator

Cloud Management

- Dynamic relationships across all layers of the technology stack

- Change is constant and automated

- Massive standardization and high-level abstraction

- Day-to-day is automated; Management tools should focus on higher order tasks

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Virtualization Separates Infrastructure and App Management
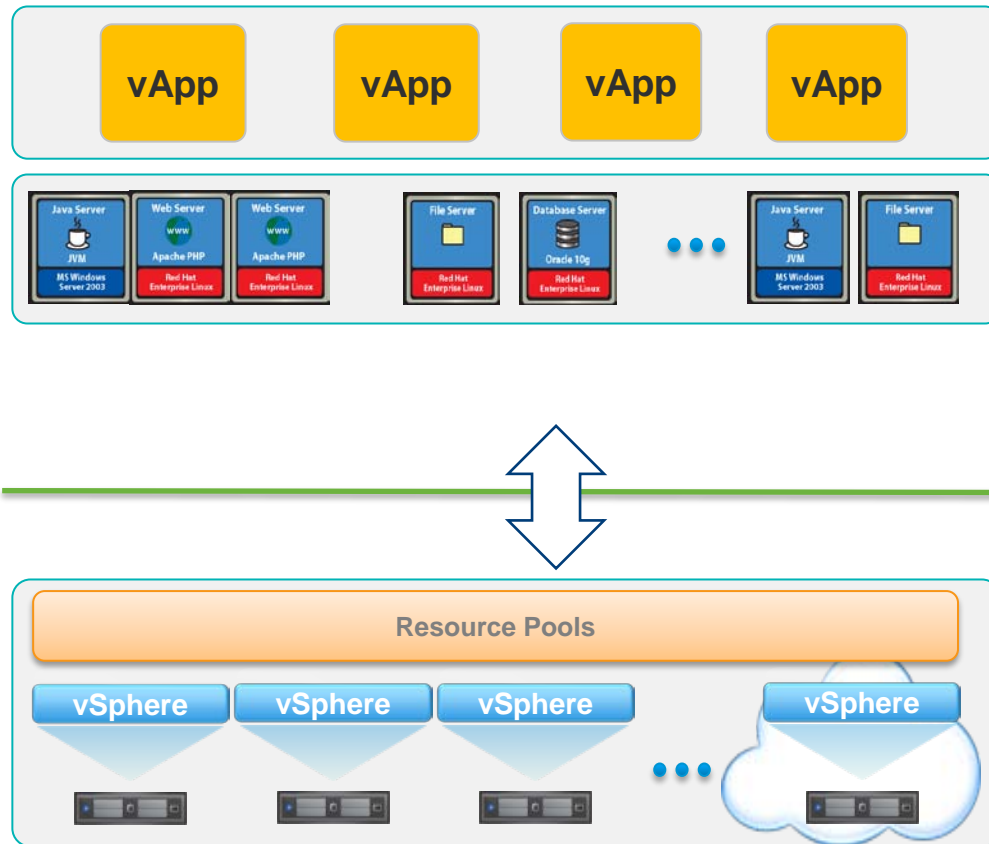
- **Application lifecycles are managed independently of infrastructure**

- **Infrastructure dependencies are replaced by smart infrastructure that translate App SLAs into policies**

- **Infrastructure capacity is tiered and managed through a consolidated and strategically planned process**

- **Infrastructure operations management is minimized with automated "plug-n-play" rather than ad hoc manual processes, and "replace rather than fix"**
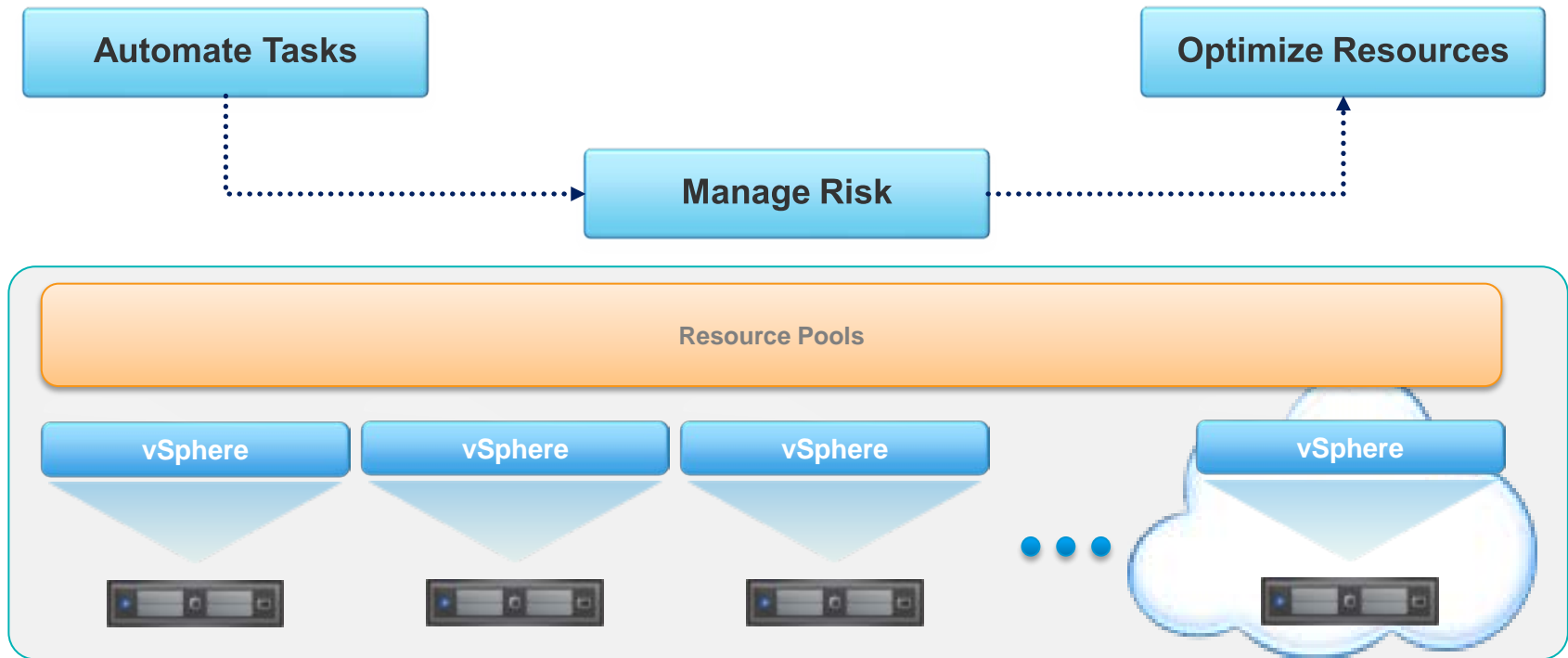
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Automation: A Key Ingredient for the Cloud

- **A ubiquitous, independent compute factory lets us:**
  - Save time and automate day-to-day tasks and processes
  - Reduce risk and streamlines problem management
  - Optimize the IT infrastructure

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Result = New Business Model for Enterprise IT

-
-
-

Sounds good, but how do we get there from here?

Energize Business Through IT
Simplify IT, Lower Costs, Increase Agility

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# Automating Key Tasks: Planning, Orchestration, Provisioning
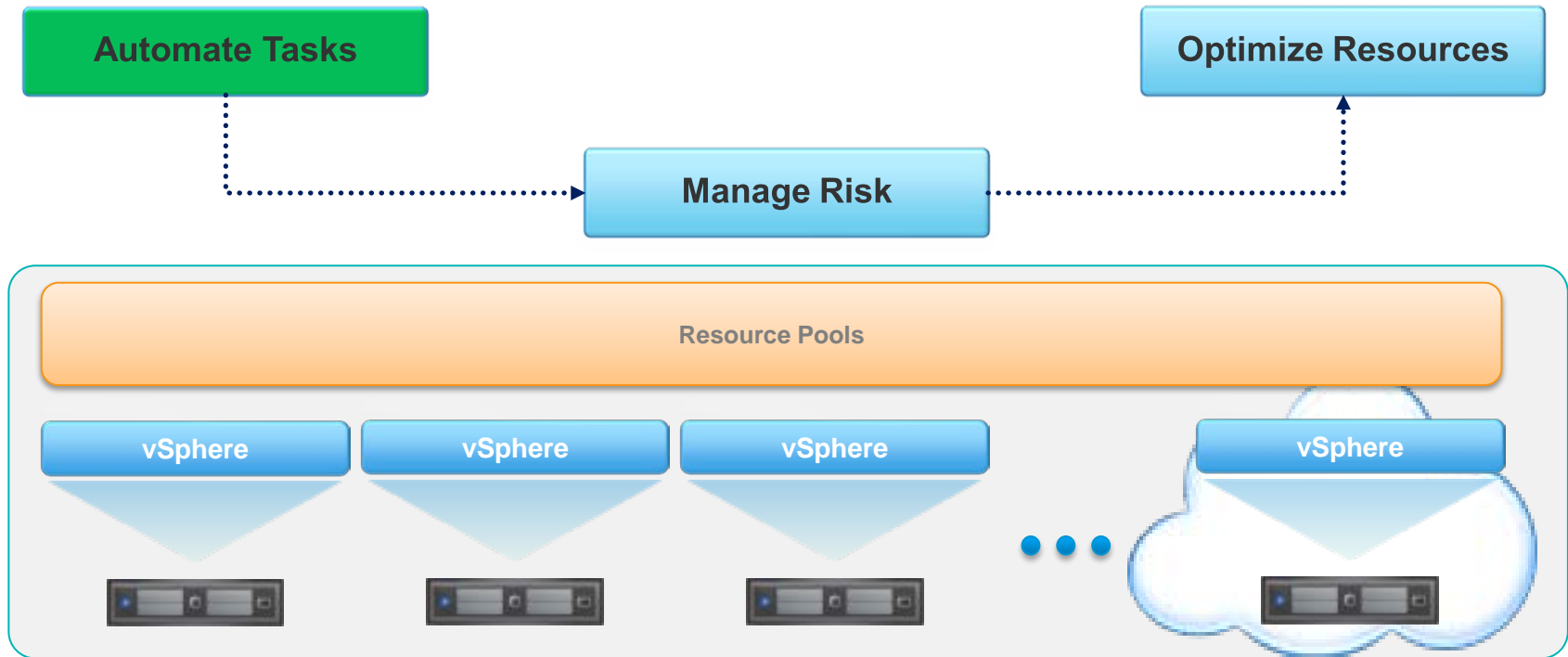
- **Examples of tasks and processes you can automate to save time:**
  - Leverage existing information to quickly assess, size and convert VMs
  - Document complex tasks and make them repeatable with orchestration tools
  - Use standardization to prepare, validate and deploy VMs rapidly

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VMware vCenter Management Platform:
A Unified Control Center
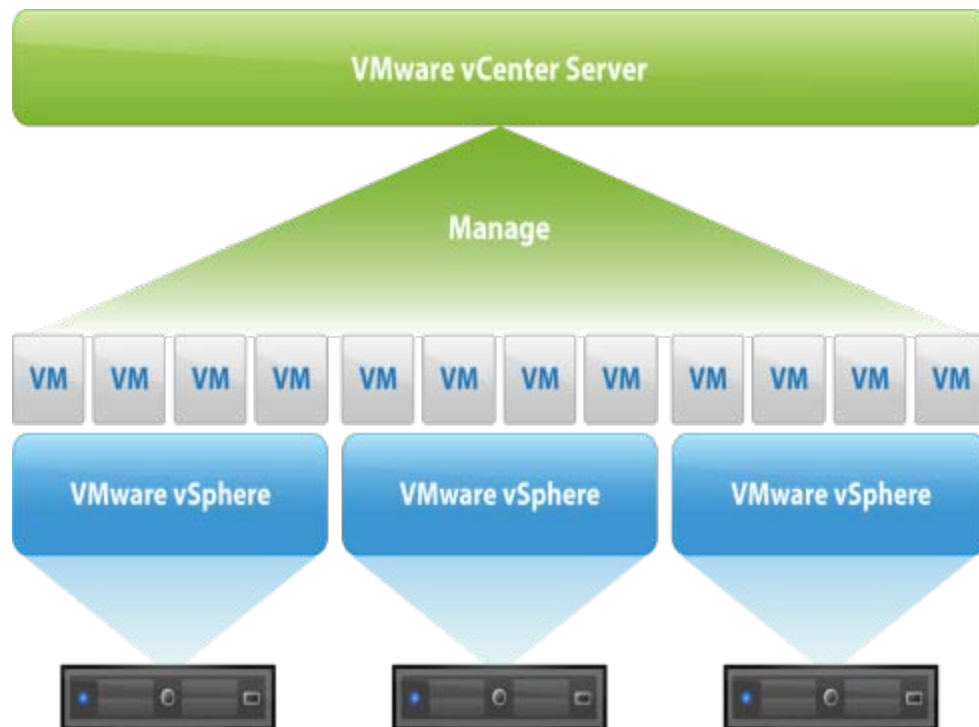
- > Inventory management
- > Automated alarms, alerts
- > Templates/provisioning
- > Including :
  - > P2V Conversion
  - > Consolidation planning
  - > Automated patch management
  - > Orchestration tool
- > Foundation for vCenter Product Family

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Automation with vCenter Orchestrator
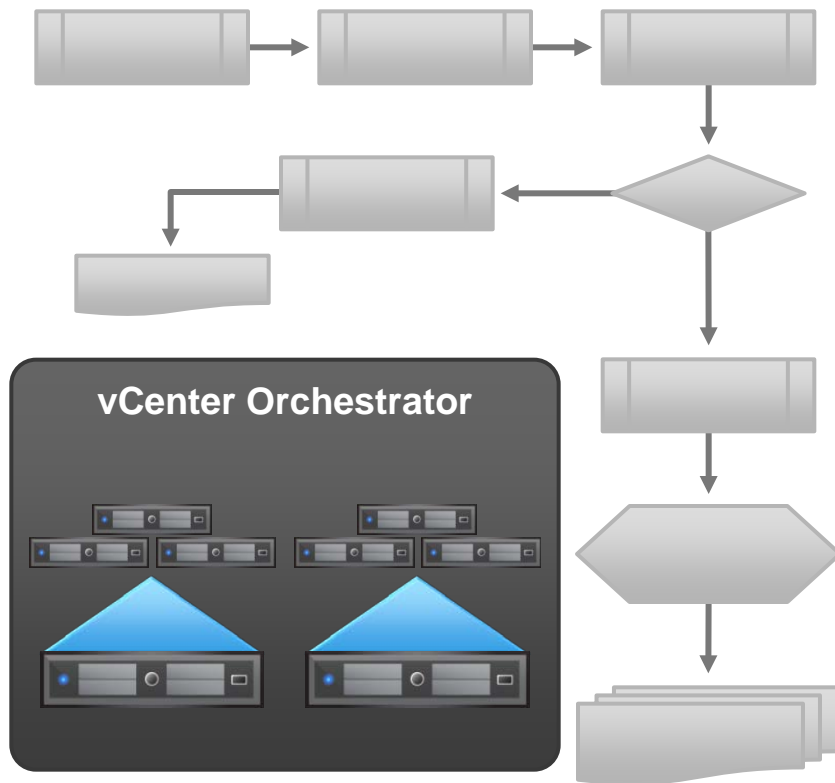
- Workflow engine for orchestrating virtualization

- Automate manual, repeatable steps by drag and drop interface

- Centralize workflow management for all processes associated with the environment

- Administer and control large environments easily

- Provide custom workflows for complex environments

vCenter Orchestrator

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Self-Service Provisioning – Eliminate Manual Fulfillment

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Reduce Risk and Streamline Problem Management
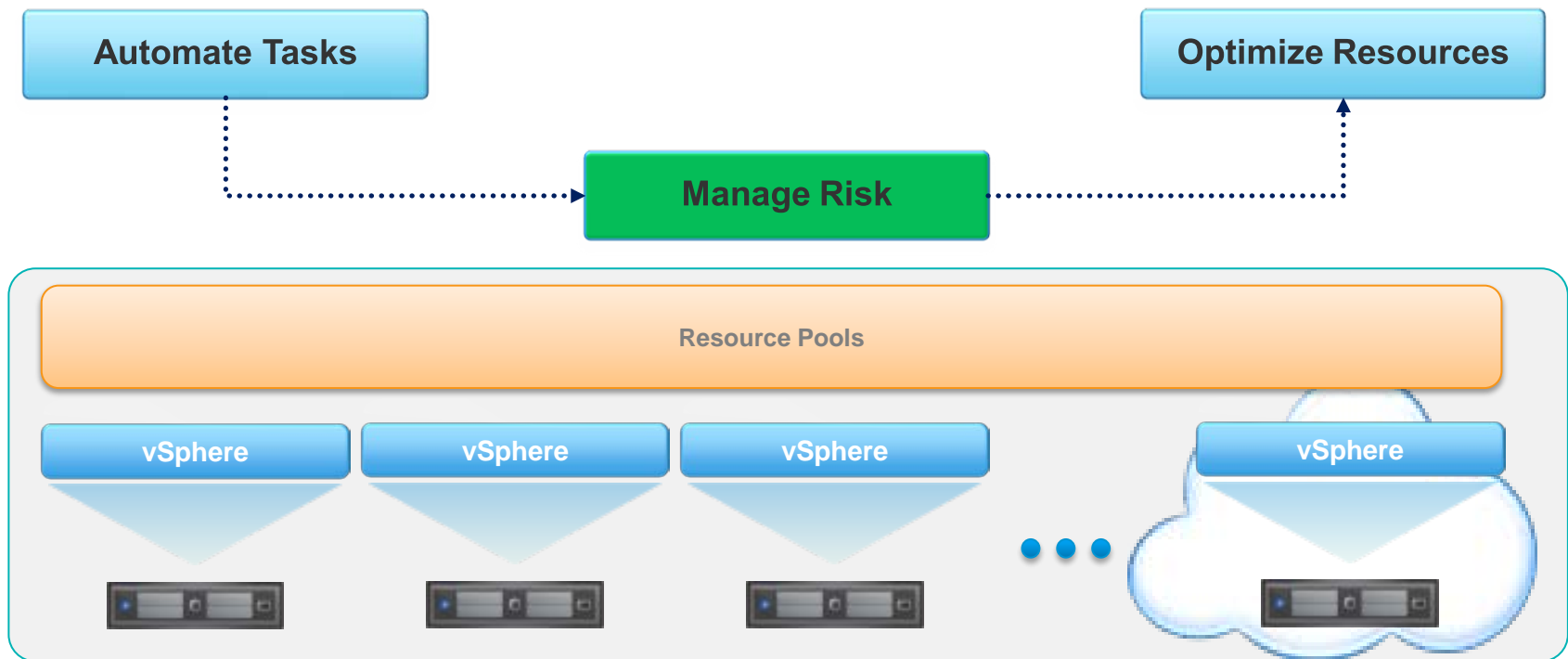
- **Automate performance, change monitoring and continuity to:**
  - Assure performance and availability for business-critical applications
  - Prevent problems by interrogating and understanding the environment
  - Monitor, analyze and quickly remediate performance, configuration and capacity issues when they do occur

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Challenges of Managing Virtualized Applications

CIO: "Virtualize more!"

"Our CIO told the team that we need to virtualize as much as we can as soon we can."

VI Admin,

VMware Customer

App Owners: "No way!"

"The Exchange owner vetoed the virtualization project; he felt it was too risky."

VI Admin,

VMware Customer

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Eliminate Performance Issues With Proactive Monitoring
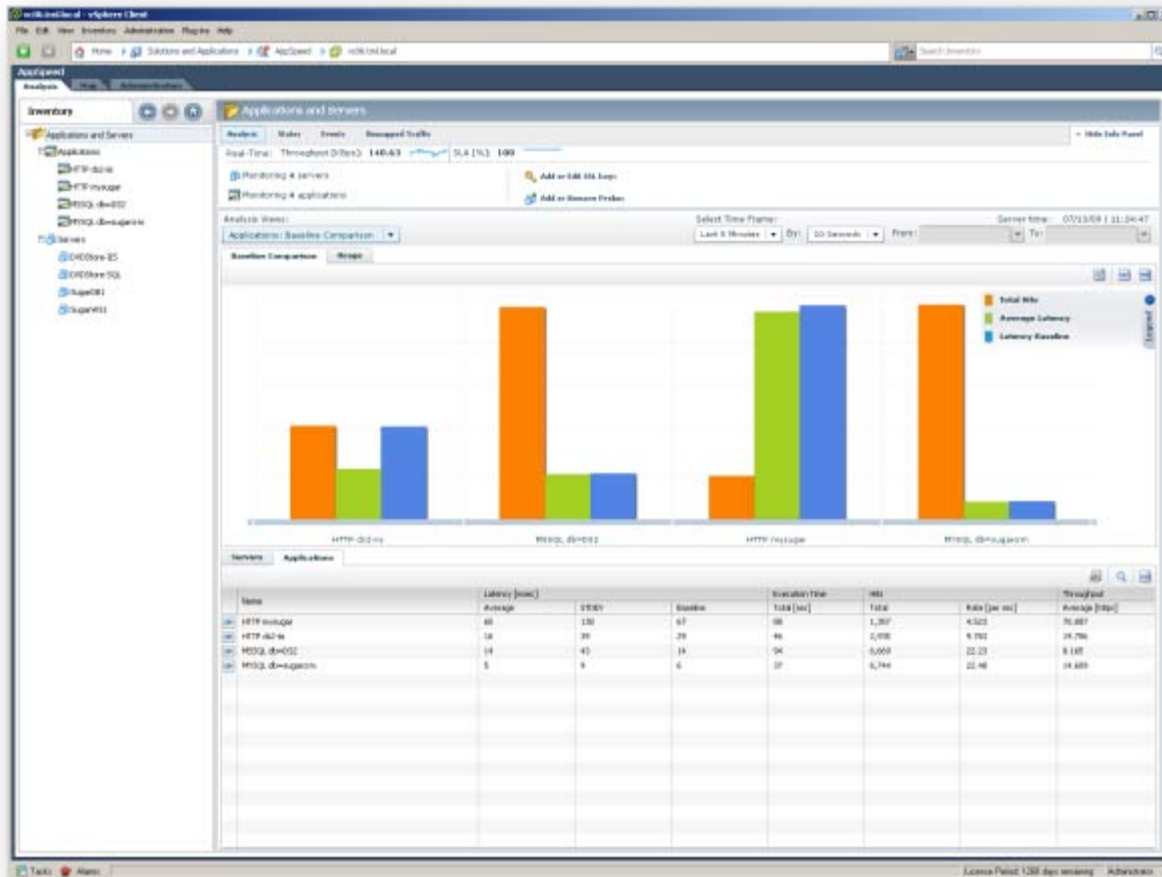
vCenter AppSpeed

- Monitor application performance against SLAs at the transaction level

- Root cause analysis and faster troubleshooting

- Perform "Assured Migrations" where performance is measured both pre and post virtualization of a critical app

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vCenter AppSpeed Overview

AppSpeed Server

MYSQL App

10.0.2.54

MYSQL App

10.0.2.150

10.0.2.55

MYSQL App

MYSQL App

Discovers & Maps

Monitors Performance vs. SLAs

View datacenter & application-level reports and dashboard

Dive into specific tiers, transactions, DB tables and queries

vCenter Server Database

AppSpeed Database

Shipped as a Virtual Appliance

Virtual Appliance

vmware®
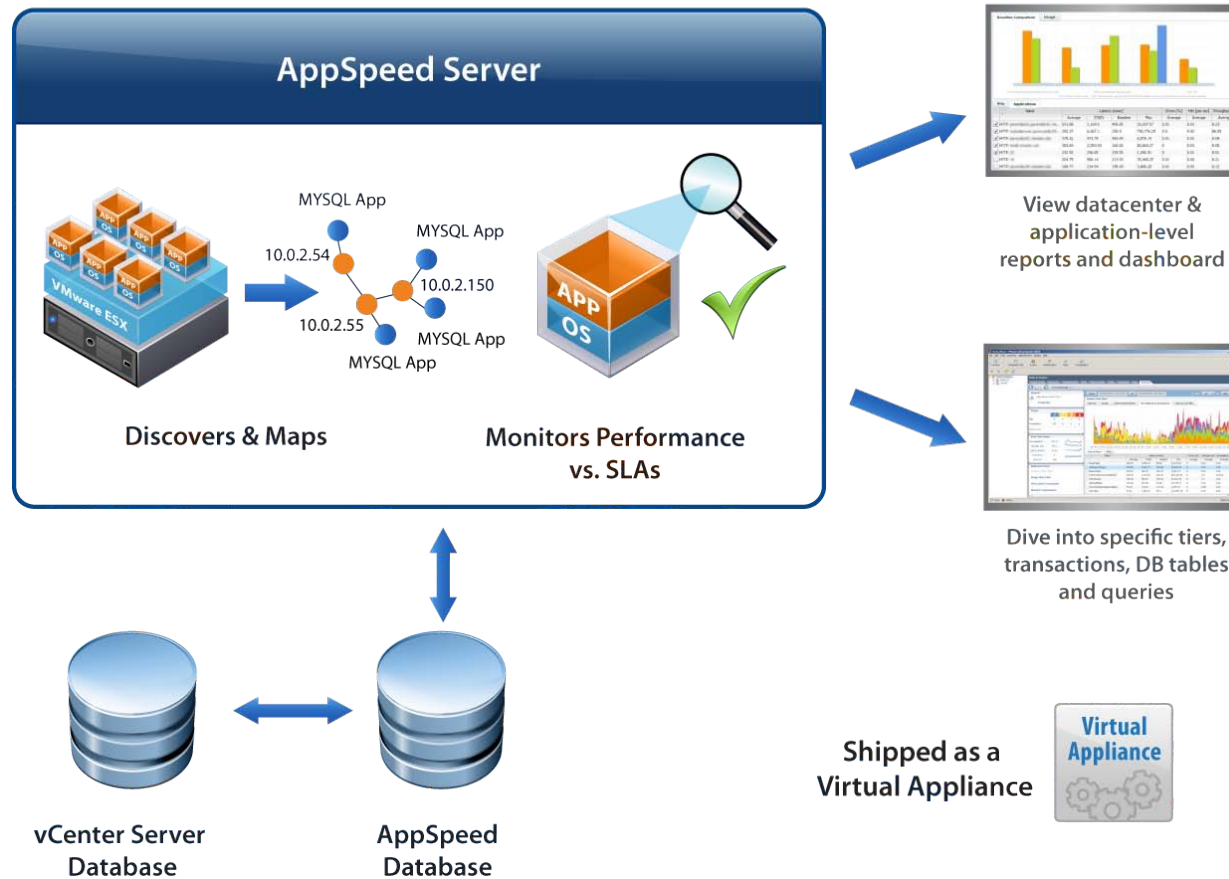
Map the Environment, Monitor Performance, Analyze Root Cause

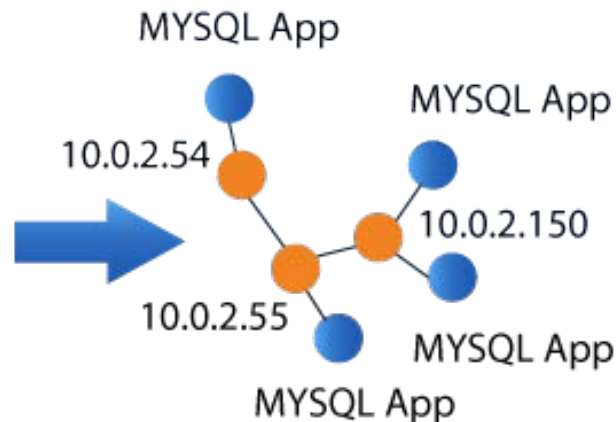| **Automatically** maps interdependencies between application components based virtual switch traffic	→	**Continually** monitor the environment and identify applications performing below baseline	→	Drill down on performance issues to quickly **isolate** and **remediate** problems

MYSQL App

MYSQL App

10.0.2.54

10.0.2.150

10.0.2.55

MYSQL App

MYSQL App

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Reduce Risk With Real-time Insight and Control

Understand dependencies

Complete | Current | Accurate

> Do I have an accurate, up-to-the-minute view of my environment?
> What assets support each VM or application?
> Can I quickly understand dependencies?

Assess changes

Relationships | Historical

> What changes have been made recently, and should they worry me?
> Is a recent outage or problem due to a change?
> Can I make a particular change without affecting service levels?

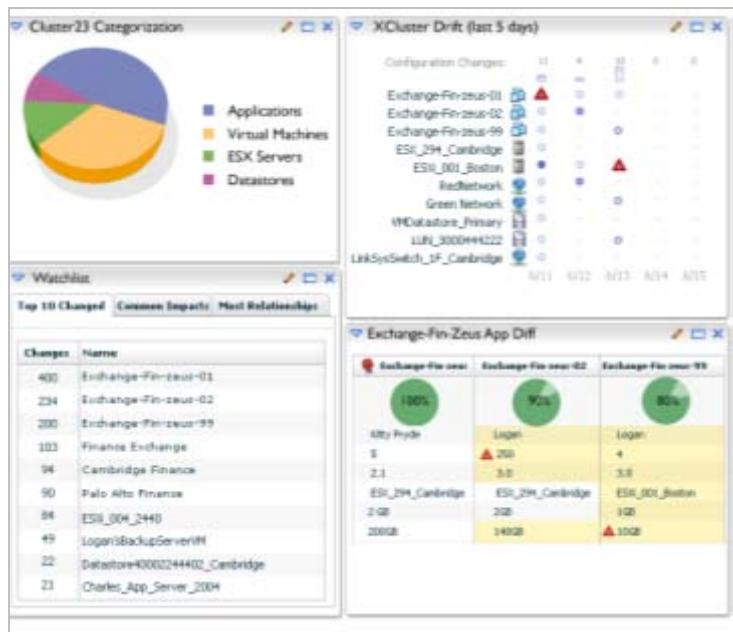**Assure integrity**

Diff | Drift | Link to business

> Are any changes affecting my critical production systems?
> Have any changes or remediation efforts failed?
> Are my systems configured the way I want them to be?

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Change Analysis Drives Environmental Integrity

Track, analyze, assess & take corrective actions to maintain configuration integrity

Features

- Auto-documents environment, all entities, relationships, dependencies

- Tracks and alerts on configuration and relationship changes real time

- Assesses configurations against past, peers and best practices

- Takes corrective actions via policies (e.g. call out to Orchestrator)

Benefits

- Risk mitigation through improved visibility into ripple through effects

- Improve opex through visibility and streamlined remediation

- Integrates with existing products and processes

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Integration of vCenter Change Insight and Orchestrator

Make custom mass configuration changes/ corrections

- Mass-configure hosts or VMs for a given configuration change
- Mass-check for new/changed LUNs across your datacenter, customize

Invoke custom workflows by schedule/ change events

- Select /Create your custom workflows in VCO.
- With Change Insight, setup policies to invoke these workflows on a selected set of entities, upon a schedule or an event

Confidential

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Assure Service Levels by Managing Capacity Proactively
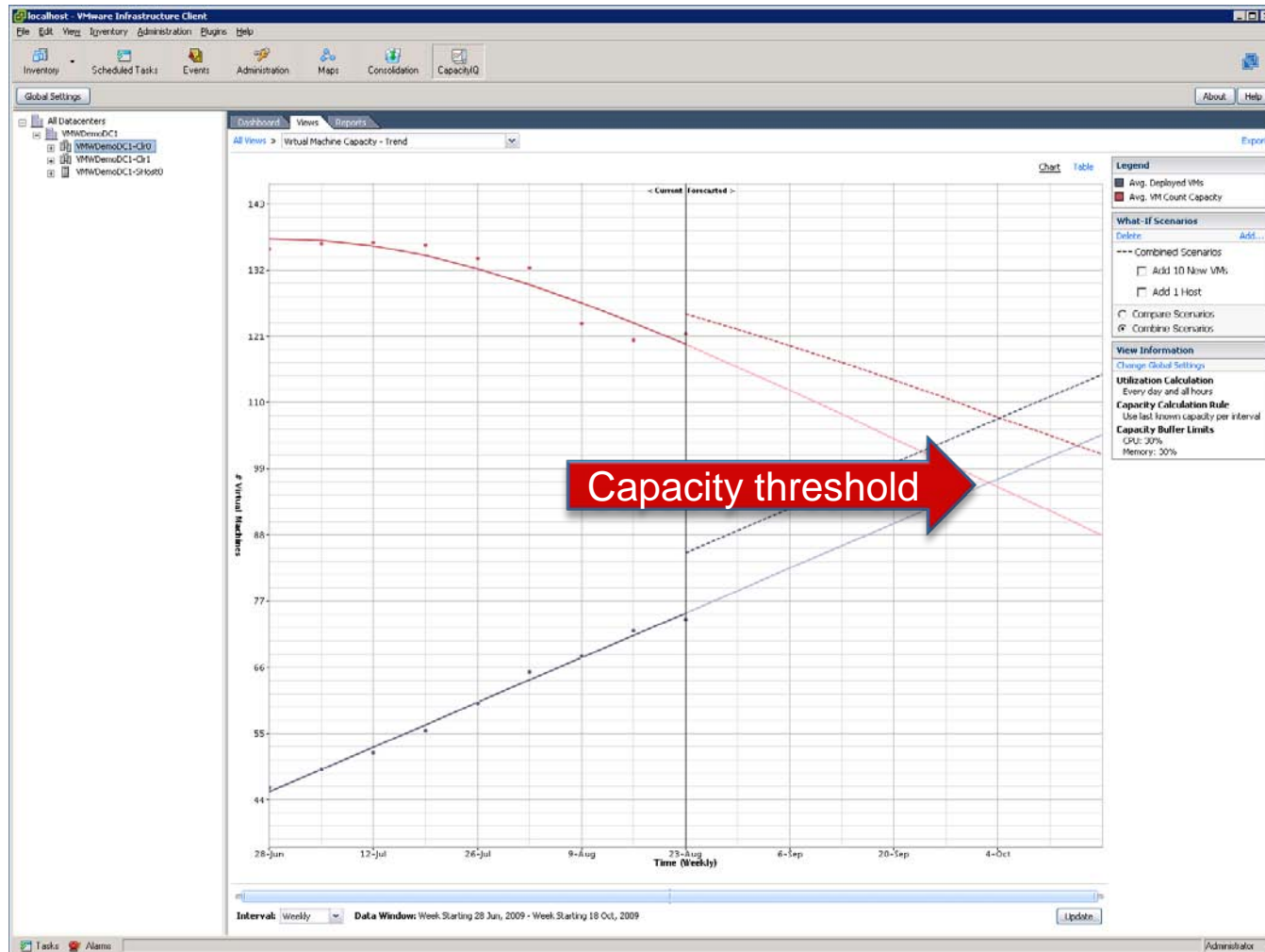
Recognize capacity constraints in advance so you can add resources

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VMware Offers Protection At Every Level

- **Protection against hardware failures**
- **Planned maintenance with zero downtime**
- **Protection against unplanned downtime and disasters**
- **Protect vCenter Server against outages**

VMware Fault Tolerance, High Availability, DRS Maintenance Mode, vMotion

Storage vMotion

VMware vSphere 4

Site Recovery Manager

NIC Teaming, Multipathing

VMFS

VMFS

vCenter Server Heartbeat

VMware Data Recovery, VMware Ready data protection solutions from partners

Component	Server	Storage	Infrastructure & Data	Site
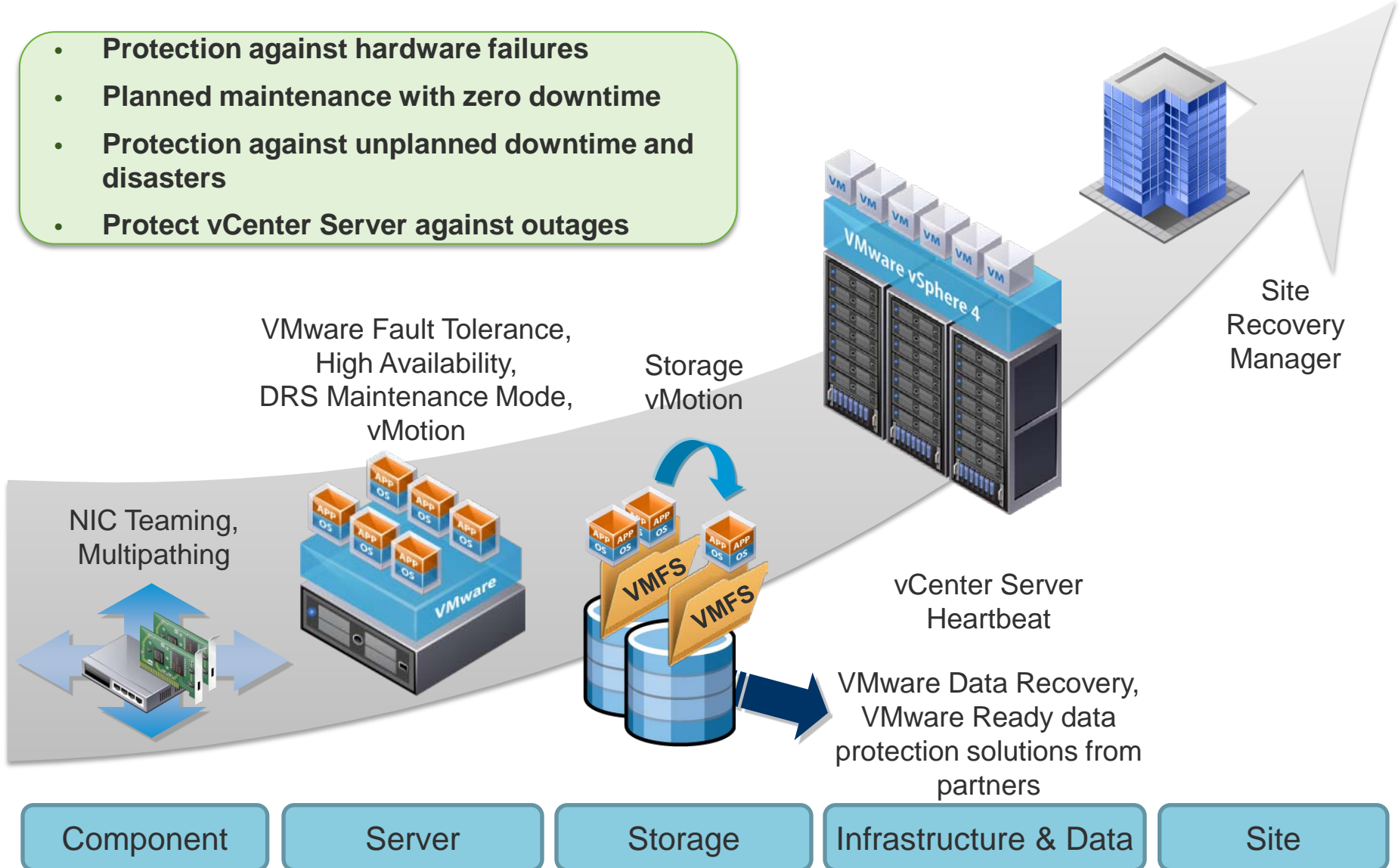
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Protect the Command Center

Fully Monitored Redundancy Framework (Heartbeat)
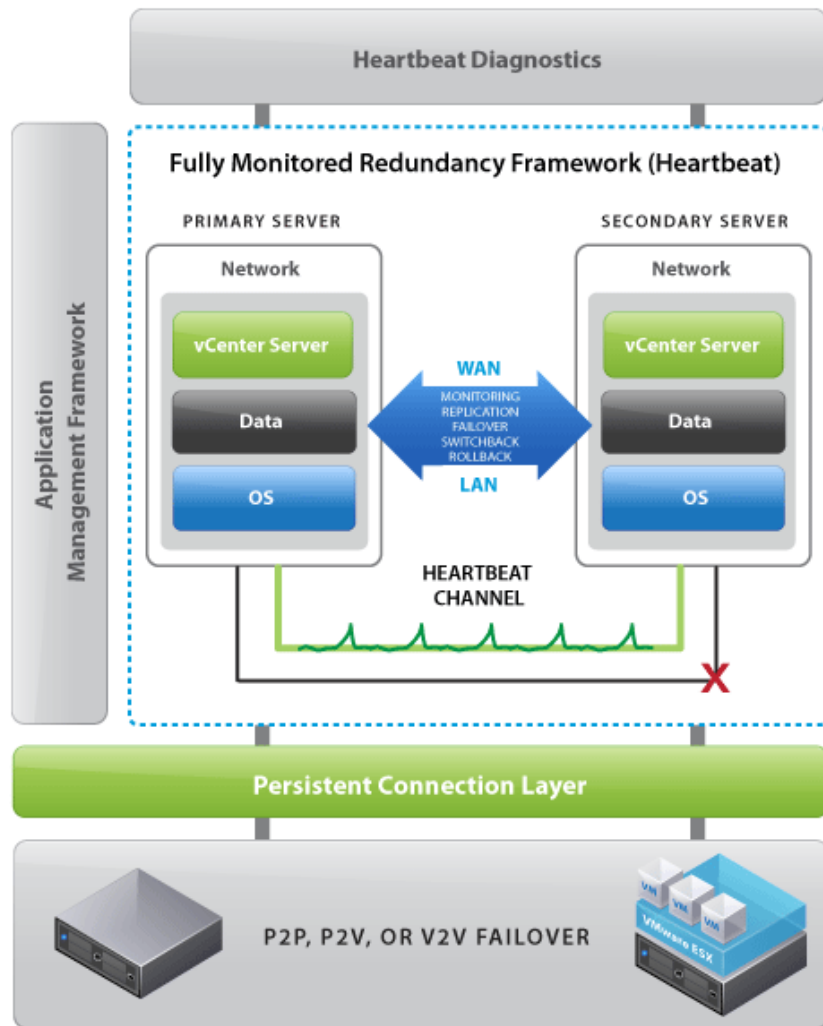
- **Protect the "nerve center" of any VMware deployment**: the vCenter Server and its database against hardware, OS, application, and network downtime.

- Ensure seamless failover and failback of vCenter Server.

- Provide reliable disaster recovery for vCenter Server in local and remote locations.

- No hardware configuration dependencies and automatically detects standard vCenter components upon installation, providing instant monitoring and protection

Protect the Business with Rapid, Reliable, Affordable DR

Site A (Primary)

VMware vCenter Server	Site Recovery Manager

VM	VM	VM	VM	VM	VM

VMware Infrastructure

Failed Servers

Site B (Recovery)

VMware vCenter Server	Site Recovery Manager

VM	VM	VM	VM	VM	VM

VMware Infrastructure

Operating Servers

dr-vc-vim23.eng.vmware.com - VMware Infrastructure Client

File   Edit   View   Inventory   Administration   Plugins   Help

Inventory | Scheduled Tasks | Events | Administration | Maps | Consolidation | Site Recovery

Test   Pause   Resume   Stop   Run

- Site Recovery
  - Protection Groups
  - Recovery Plans
    - Recovery Plan 1
    - Recovery Plan 2
    - Recovery Plan 3 - Complete Site Failover
      - Edit Recovery Plan
      - Remove Recovery Plan
      - Add Permission...

Recovery Plan 3 - Complete Site Failover

Summary | Virtual Machines | Recovery Steps | History | Permissions

Recovery Step

1. Shutdown Protected Virtual Machines at Protected Site "vim22"
2. Prepare Storage
3. Suspend Non-critical Virtual Machines
4. Recover High Priority Virtual Machines
5. Recover Normal Priority Virtual Machines
6. Recover Low Priority Virtual Machines
7. Recover No Power On Virtual Machines
8. Message: Test recovery complete. Please verify the success of the...
9. Cleanup Virtual Machines Post Test
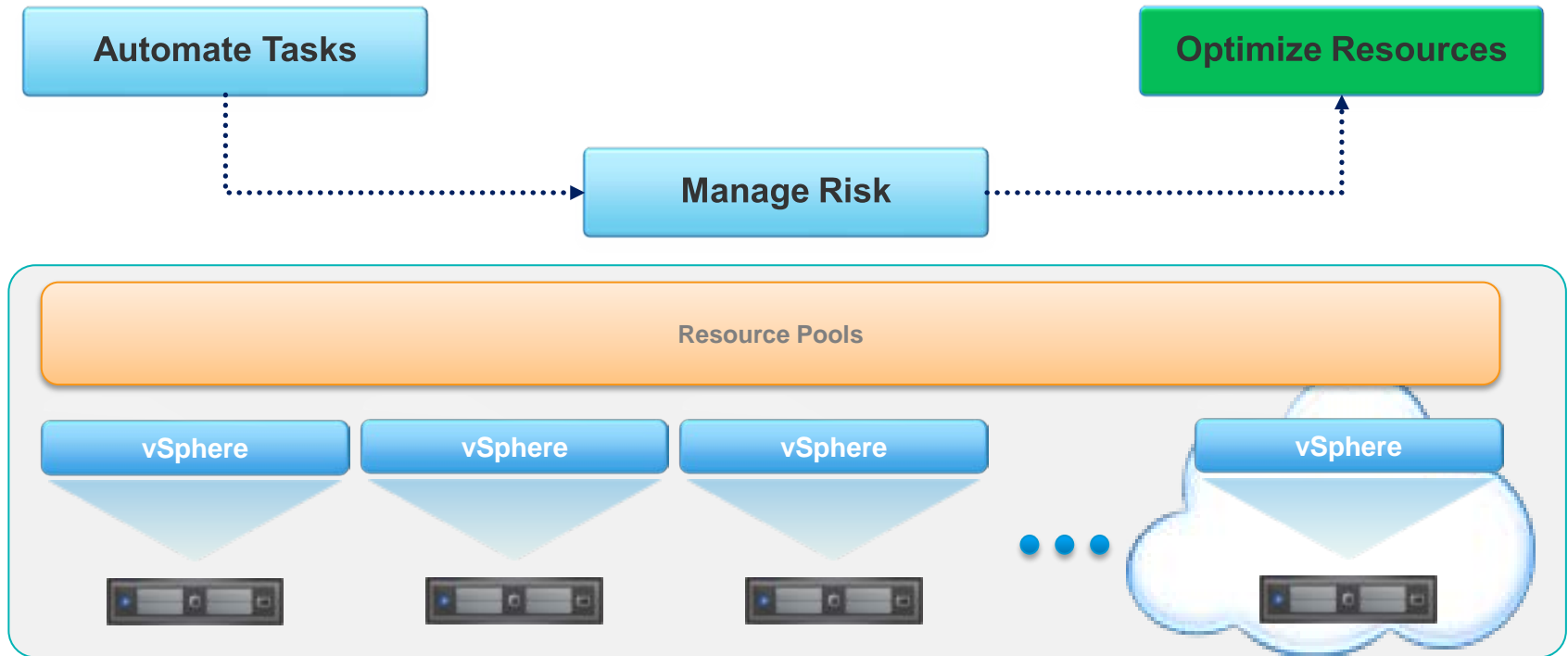10. Resume Non-critical Virtual Machines

vCenter Site Recovery Manager

- Simplifies and automates disaster recovery workflows: setup, test, failover

- Turns manual disaster recovery runbooks into automated plans

- Centralized management of recovery plans from the vSphere client

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Optimize IT Resources

Automate Tasks		Optimize Resources

Manage Risk

Resource Pools

vSphere	vSphere	vSphere	vSphere

- **Optimize the IT infrastructure with:**
  - Proactively allocate and adjust capacity as the business needs it
  - Intelligent capacity management to tune and right-size the environment
  - Effective cost and capacity reports that accounts for a dynamic infrastructure
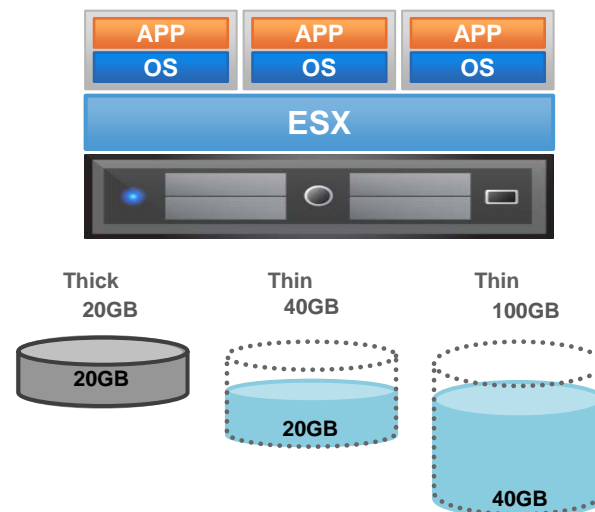
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Optimize Resource Usage With VMware vSphere

DRS

Physical Servers
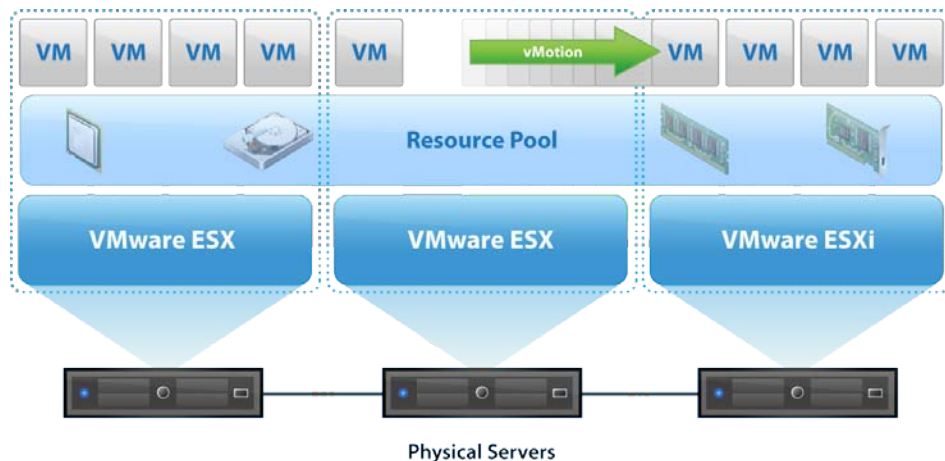
Distributed Virtual Switch

DPM

Standby Host Server — Power Optimized Servers

Thin provisioning

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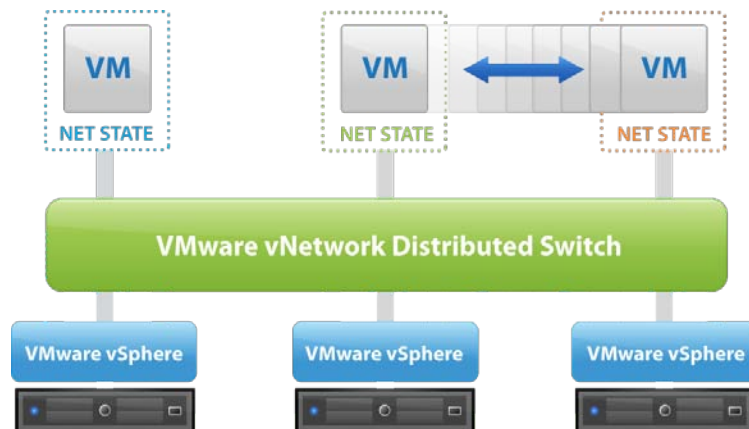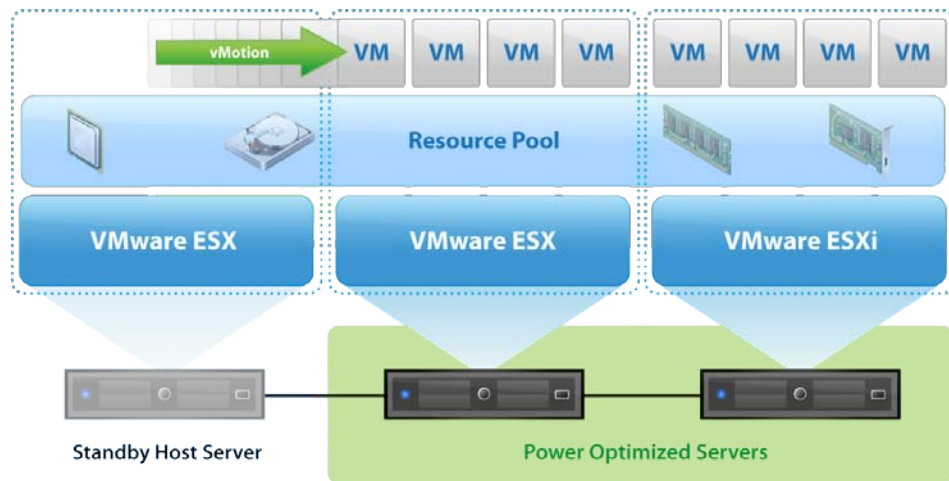
Capacity Management Challenges: Traditional Methods Fall Short

Rule of Thumb
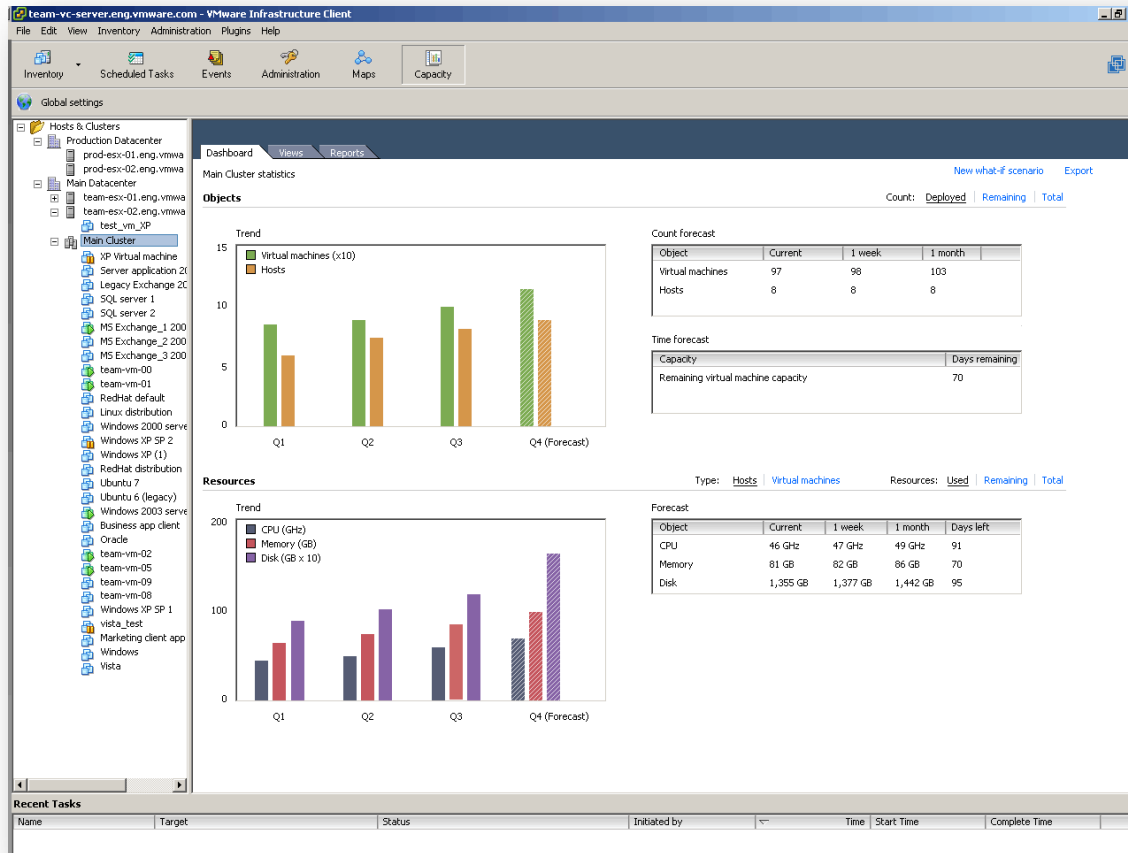
"It worked for me in the past…"

"To be safe, I'll add an x% buffer…"

- Guesstimates
- Tacit Knowledge
- Subjective to experiential bias
- Overly conservative to be safe

Homegrown Tool

- Excel spreadsheet
- SQL / Perl script
- Time-consuming to build, maintain, prepare and analyze
- Static snapshot in time

Capacity Management: Improve CapEx by 25%

vCenter CapacityIQ

- Forecast timing of capacity shortfalls and needs

- Perform "What-If" impact analysis to model effect of capacity changes

- Identify and reclaim unused capacity

Capacity Modeling

Multiple Host and VM What-If scenarios can be modeled

> Virtual Machine Capacity – Trend View displays results

> > Up to five scenarios can be modeled

> > Compare or combine scenario results

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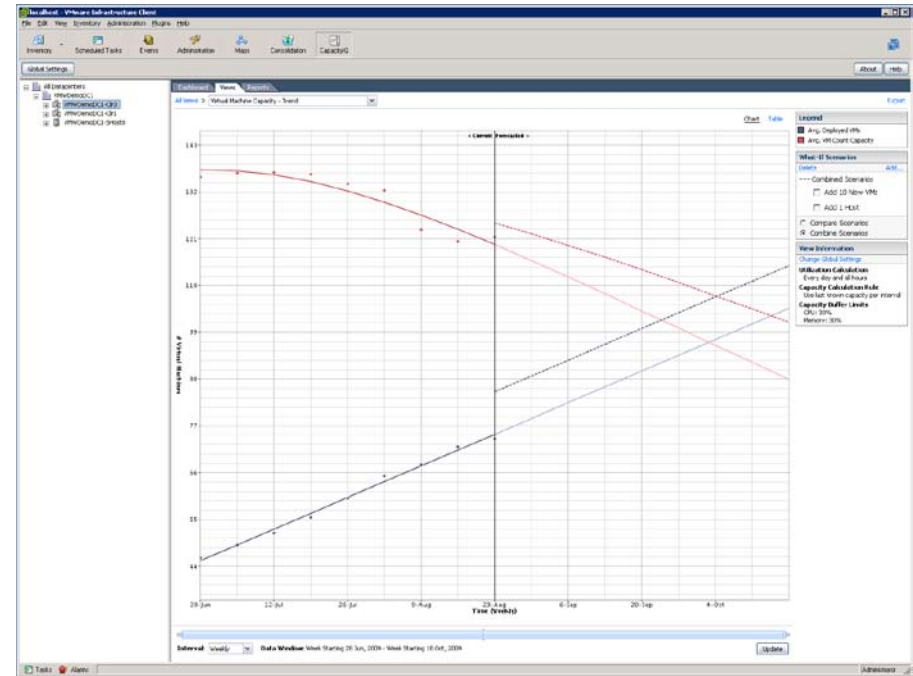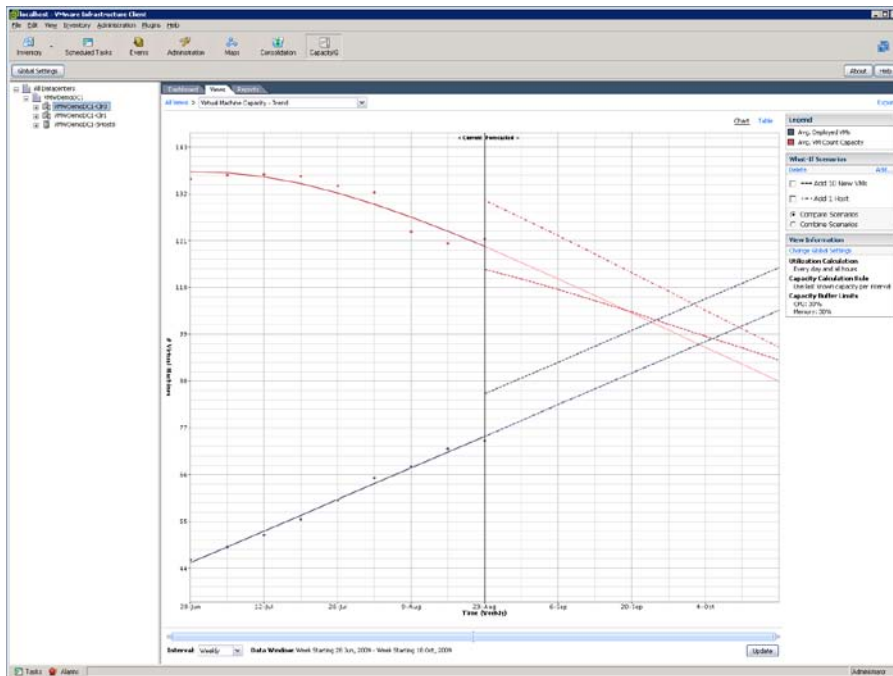
VM Profiling: Idle and Powered-Off VMs

▪Idle Capacity

- **Idle VMs:**
  VM has consistently low resource utilization over a long period of time

- **Powered-Off VMs:**
  VM has been powered off over a long period of time
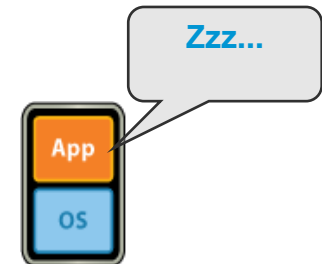
All Views > Idle Virtual Machines - List

Virtual Machine	CPU Demand	CPU % Idle Time	Disk I/O
VMWDemoDC1-Clr0-Host1 ...	36 MHz	100%	1 KBps
VMWDemoDC1-Clr0-Host1 ...	52.8 MHz	100%	1 KBps
VMWDemoDC1-Clr0-Host1 ...	24.6 MHz	100%	1 KBps

All Views > Powered-Off Virtual Machines - List

Virtual Machine	Total Virtual Disk Space Usage	% Time Powered-Off
VMWDemoDC1-Clr0-Host1 ...	762.9 MB	100%
VMWDemoDC1-Clr0-Host1 ...	762.9 MB	100%

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VM Profiling: Oversized and Undersized VMs

VM Sizing Opportunities

Capacity

> **Oversized VMs:**
VM has been allocated more capacity than it needs **Demand**

> **Undersized VMs:**
VM needs more capacity than it has been allocated

App

OS

Dashboard | Views | Reports

All Views > Undersized Virtual Machines - List

Virtual Machine	Configured vCPU
VMWDemoDC1-Clr0-Host...	1 vCPUs
VMWDemoDC1-Clr0-Host...	1 vCPUs
VMWDemoDC1-Clr0-Host...	2 vCPUs
VMWDemoDC1-Clr0-Host...	2 vCPUs
VMWDemoDC1-Clr0-Host...	1 vCPUs

Dashboard | Views | Reports

All Views > Oversized Virtual Machines - List

Virtual Machine	Configured vCPU	Recommended vCPU	Configured Memory	Recommended Memory
VMWDemoDC1-Clr0-Host...	1 vCPUs	0.5 vCPUs	1 GB	0.75 GB
VMWDemoDC1-Clr0-Host...	1 vCPUs	0.5 vCPUs	0.75 GB	0.75 GB
VMWDemoDC1-Clr0-Host...	1 vCPUs	0.5 vCPUs	0.98 GB	0.98 GB
VMWDemoDC1-Clr0-Host...	2 vCPUs	1 vCPUs	2 GB	1.5 GB
VMWDemoDC1-Clr0-Host...	2 vCPUs	1.8 vCPUs	4 GB	2 GB
VMWDemoDC1-Clr0-Host...	4 vCPUs	2 vCPUs	4 GB	2 GB
VMWDemoDC1-Clr0-Host...	2 vCPUs	1 vCPUs	1.1 GB	1.06 GB
VMWDemoDC1-Clr0-Host...	2 vCPUs	1 vCPUs	1.12 GB	1.09 GB
VMWDemoDC1-Clr0-Host...	2 vCPUs	1 vCPUs	2 GB	1.5 GB
VMWDemoDC1-Clr0-Host...	2 vCPUs	1.5 vCPUs	3 GB	1.5 GB
VMWDemoDC1-Clr0-Host...	4 vCPUs	2 vCPUs	3 GB	1.5 GB
VMWDemoDC1-Clr0-Host...	2 vCPUs	1 vCPUs	4 GB	2 GB

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Transparent Cost Management

vCenter Chargeback

> Account, monitor and report on costs associated with virtual resources

> Easily map virtual resources to organizational cost centers

> Flexible costing models and cost tiering

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vCenter Chargeback Overview
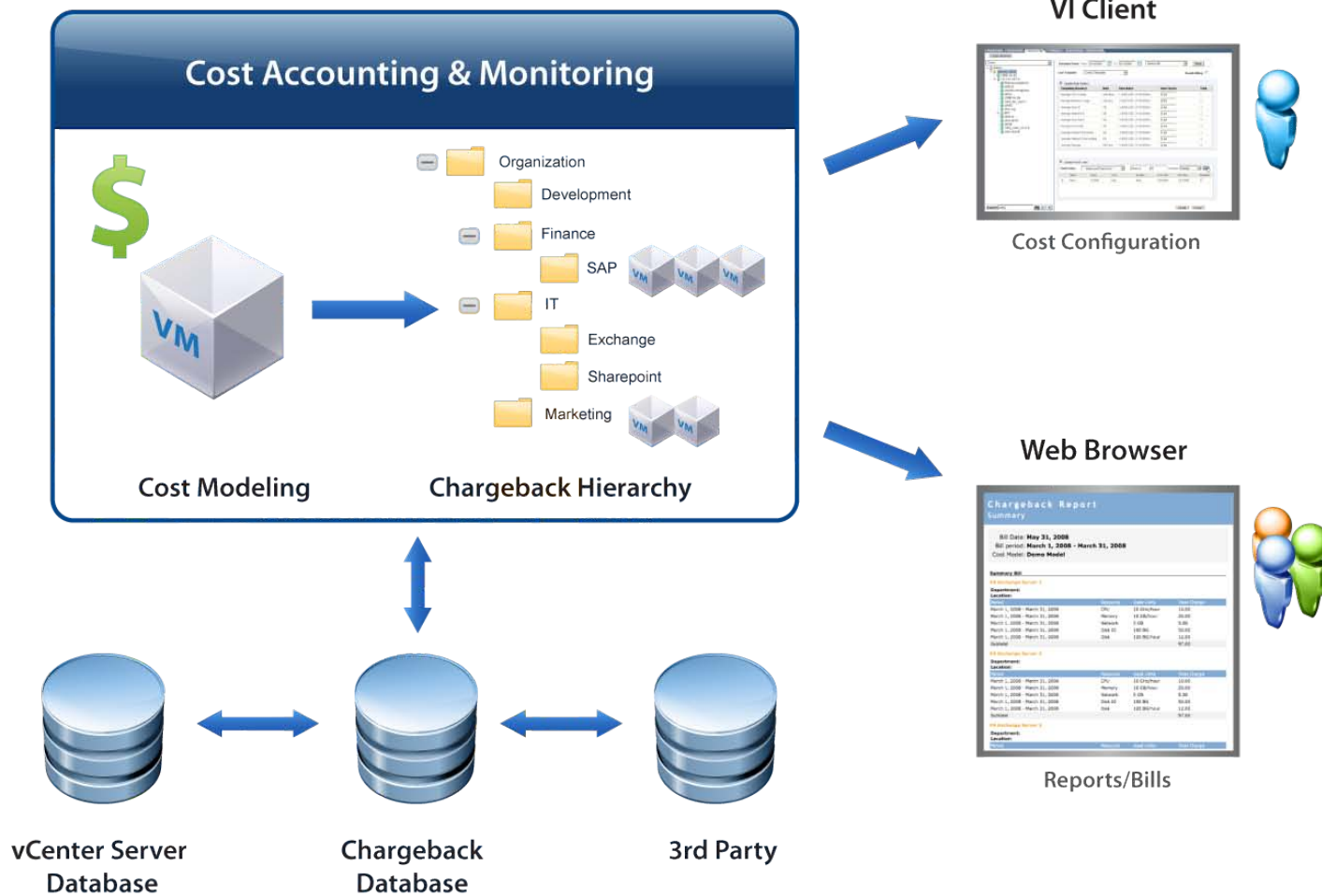
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VMware vCenter Integrates With What You Have

Configuration Management Example at a Large Telco

VMware vSphere

VMware vCenter Server 4

VMware ESX

VMware ESX

vMotion

3) Which is being monitored by the ESM

2) Raises an event in vCenter

4) ESM creates an incident in the service desk

1) DRS triggers a vMotion

App Mapping

5) which updates the CMDB and service map

6) then creates a Change Notification and auto-closes the incident
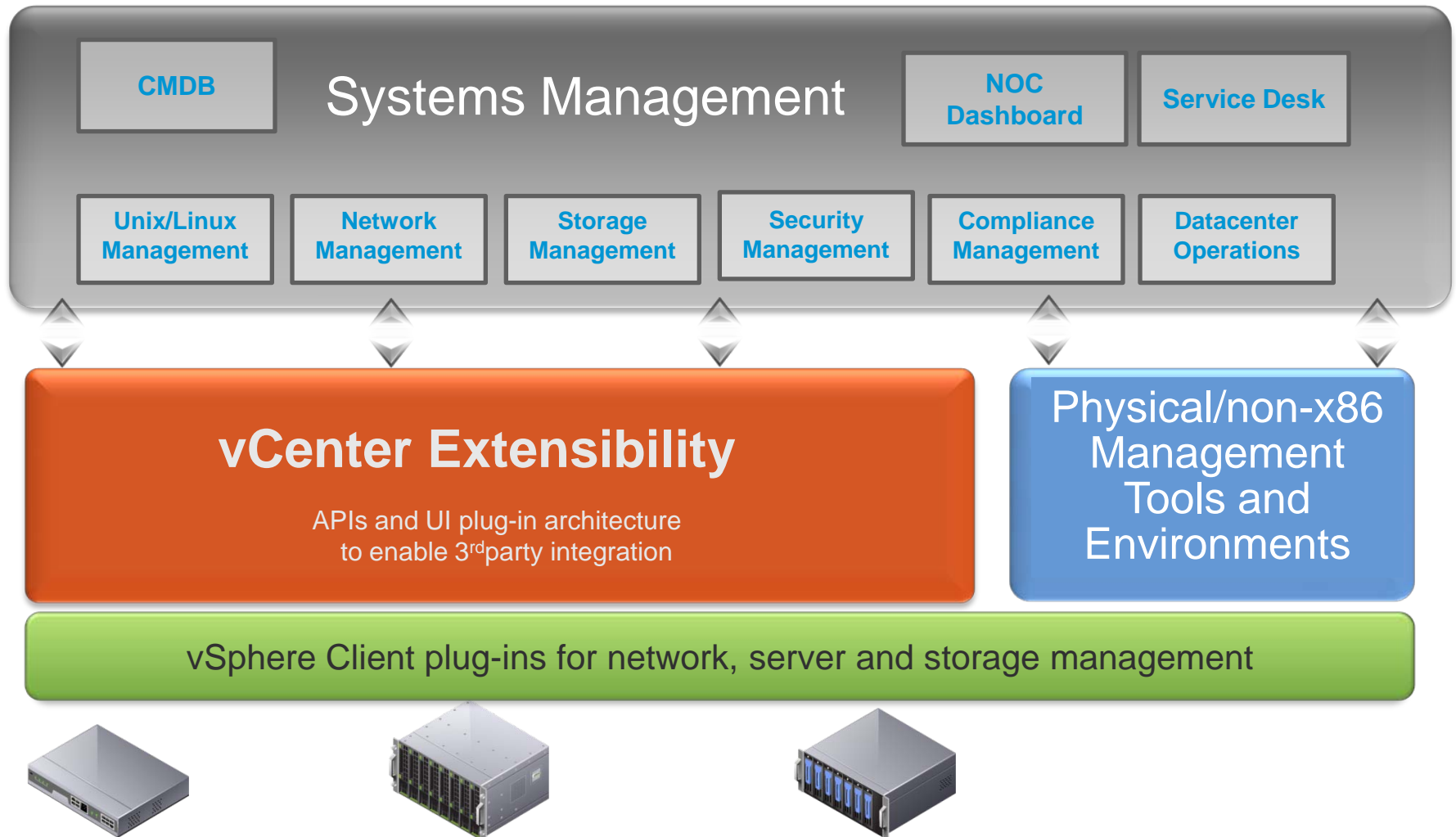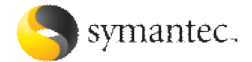
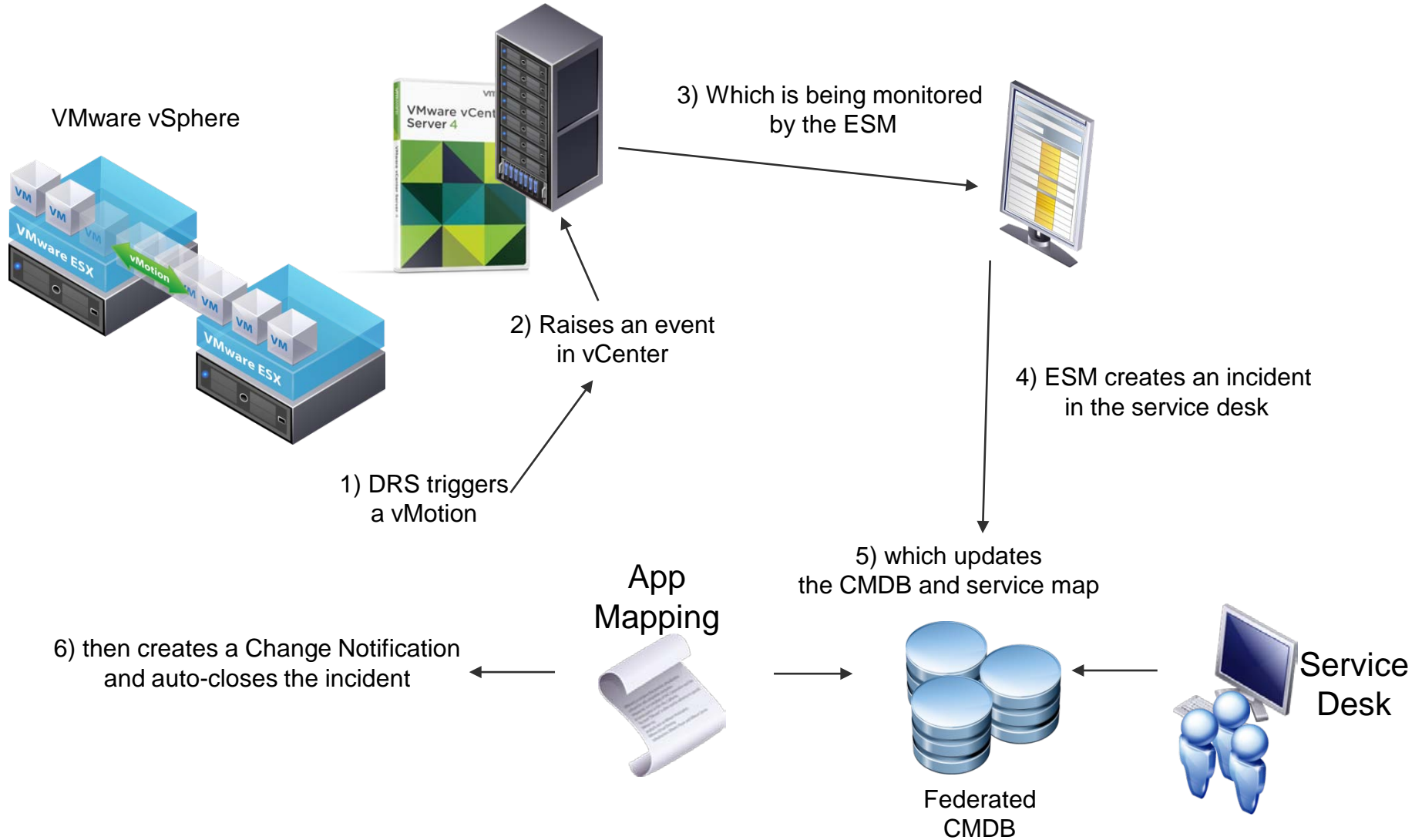Federated CMDB

Service Desk

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VMware Management: A Key Ingredient for the Cloud

Automate Tasks

Manage Risk

Optimize Resources

- vCenter Server, Host Profiles, vCenter Orchestrator
- vCenter Guided Consolidation, Capacity Planner
- vCenter Change Insight

- vCenter Server, Update Manager, Host Profiles
- vCenter AppSpeed, Change Insight, CapacityIQ
- vSphere vMotion, HA, FT, Data Recovery, vCenter SRM, Heartbeat

- vCenter Server
- vSphere DRS, DPM, DVS, Thin Provisioning
- vCenter Change Insight, CapacityIQ

Resource Pools

vSphere

vSphere

vSphere

vSphere

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Reducing OpEx Costs With Cloud Computing

Process and Technology Transformation
Reduction in Valueless Activities and Costs Using VMware

VMware customers who achieved operating cost savings of 25% or more.*

30% Funding Innovation

70% Infrastructure Maintenance

83%

One-time server management tasks "overall"

25% saved >75%
25% saved > 50%
33% saved > 25%

66%

Day-to- day tasks "overall"

14% saved >75%
14% saved > 50%
38% saved > 25%

Funding Innovation

New Funds for Innovation

Infrastructure Maintenance

"Business as Usual"
Physical Infrastructure
Funding Profile

Business
Infrastructure
Virtualization
Funding Profile

http://www.vmware.com/solutions/cost-savings/operating-cost-savings.html

* January 2009 survey of 41 VMware customers

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Independent Analyst Research: Enterprise Management Group
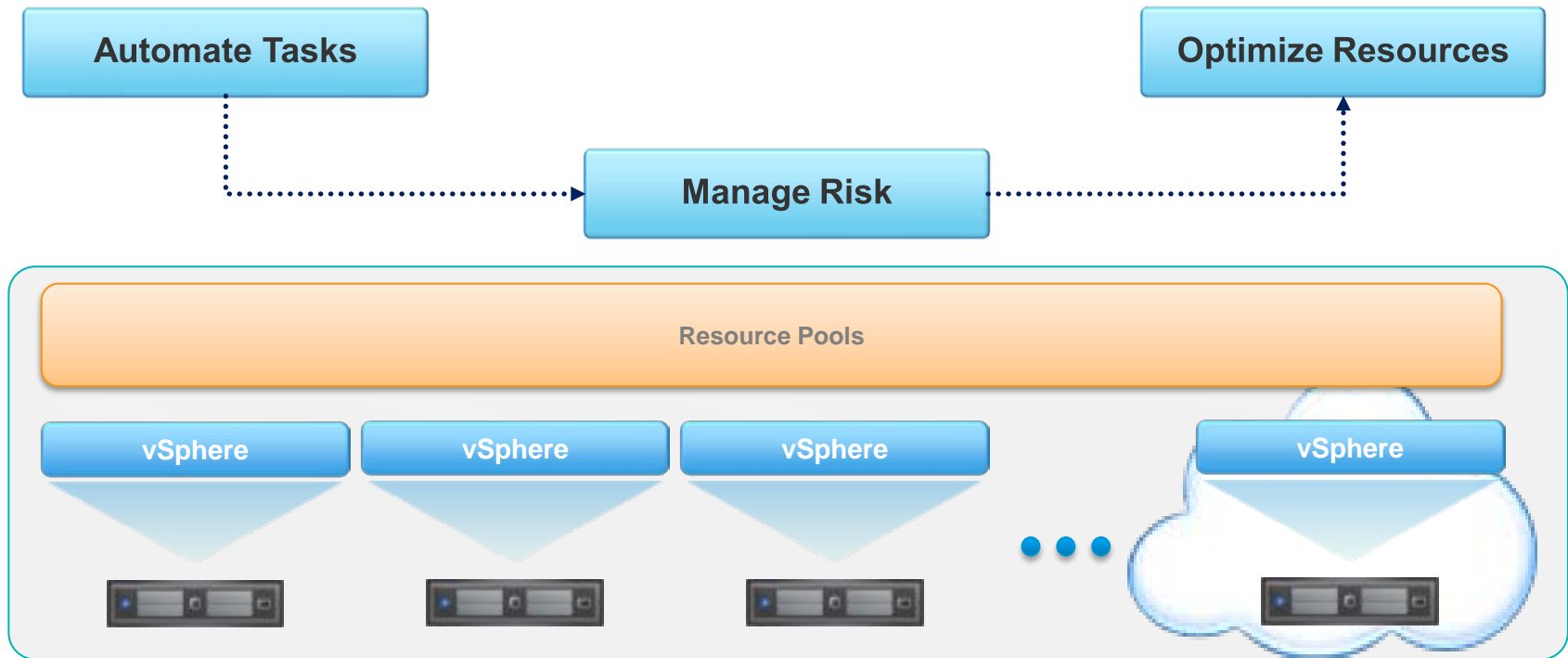
- **Reduction of Service Failures –** fixing problems up **to 24 times faster**, **eliminating up to 43 hours of downtime a year**, improving uptime to as high as 99.999 percent, to reduce the impact, frequency, duration, and cost of service issues, troubleshooting, out-of-hours support, and productivity loss

- **Improved Staff Efficiency – increasing administrator efficiency by an average of 10 percent, and as much as 270 percent**, by allowing a single administrator to manage up to 1,800 servers, reducing annual management costs by up to $1,000 per server

- **Faster Service Deployment –** allowing new systems to be deployed up to 240 times faster, and new applications up to 96 times faster, **saving almost $2,000 in wage costs alone per deployment**, while reducing downtime, and improving time-to-market for new products and services

http://www.vmware.com/solutions/cost-savings/operating-cost-savings.html

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- **A ubiquitous, independent compute factory lets us:**
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Accelerating the Path to Cloud Computing with VMware

Save time and automate day-to-day management tasks

- Zero-touch provisioning with granular control

- Rapid host and VM patching and profile management

- Self-service access to eliminate process bottlenecks

Assure service levels and reduce risks

- Assured migration of business-critical applications from physical to virtual

- Simple, efficient and inexpensive availability and DR to help you meet your business RTOs

- Quickly troubleshoot and remediate capacity and performance issues before your phone rings

Optimize the IT infrastructure

- Ensure sufficient ongoing capacity to meet application SLAs

- Plan ahead: Model the impact of new applications on capacity

- Manage costs proactively and recover unused resources

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