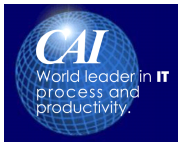
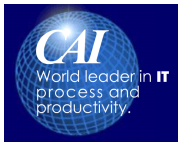


Webinar:

The Economics of Thin Clients

April 14, 2009
11:00 am – 12:30 pm

Please note: The audio portion of this webinar is only accessible through the telephone dial-in number that you received in your registration confirmation email.



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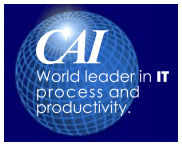
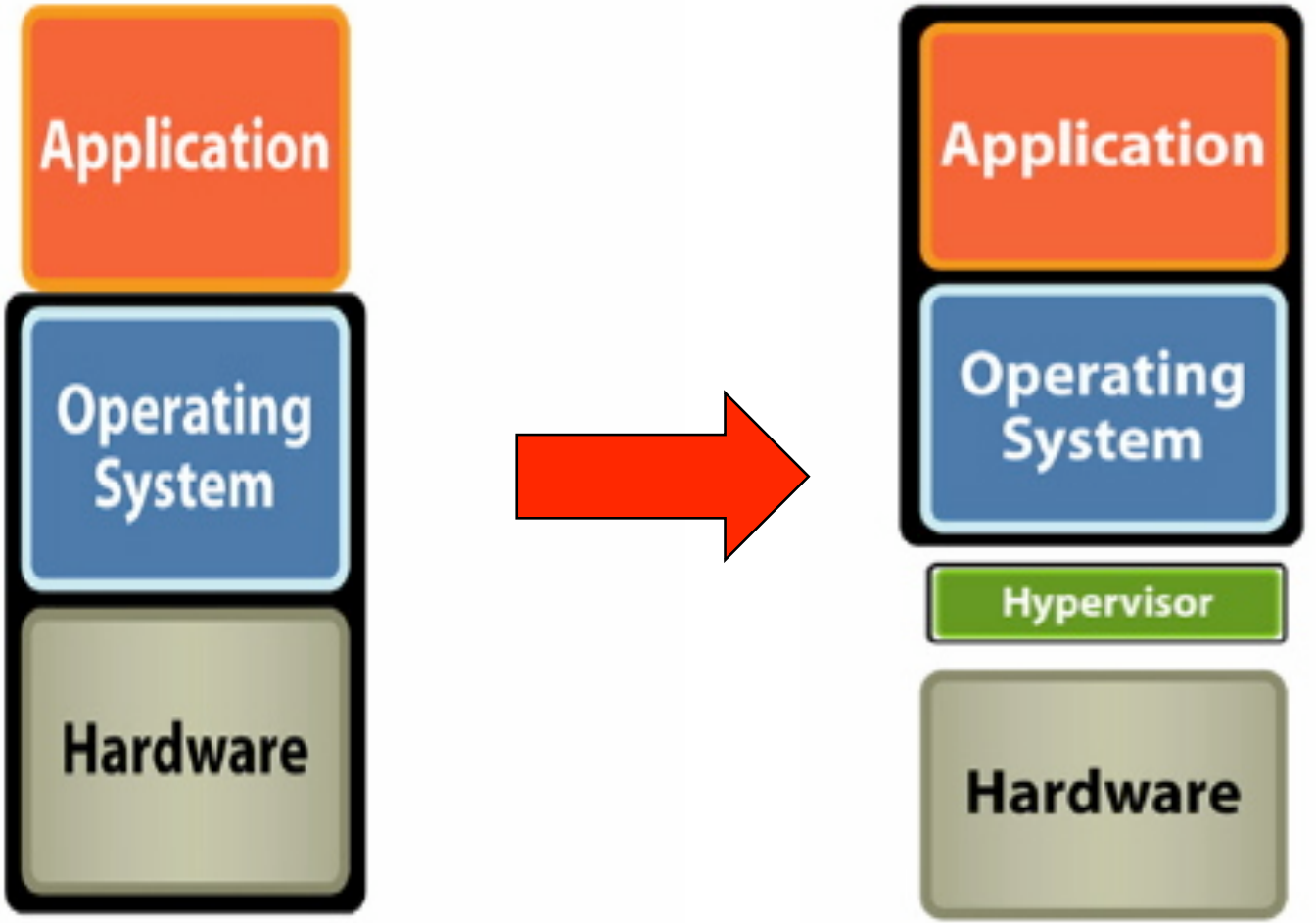
Part I



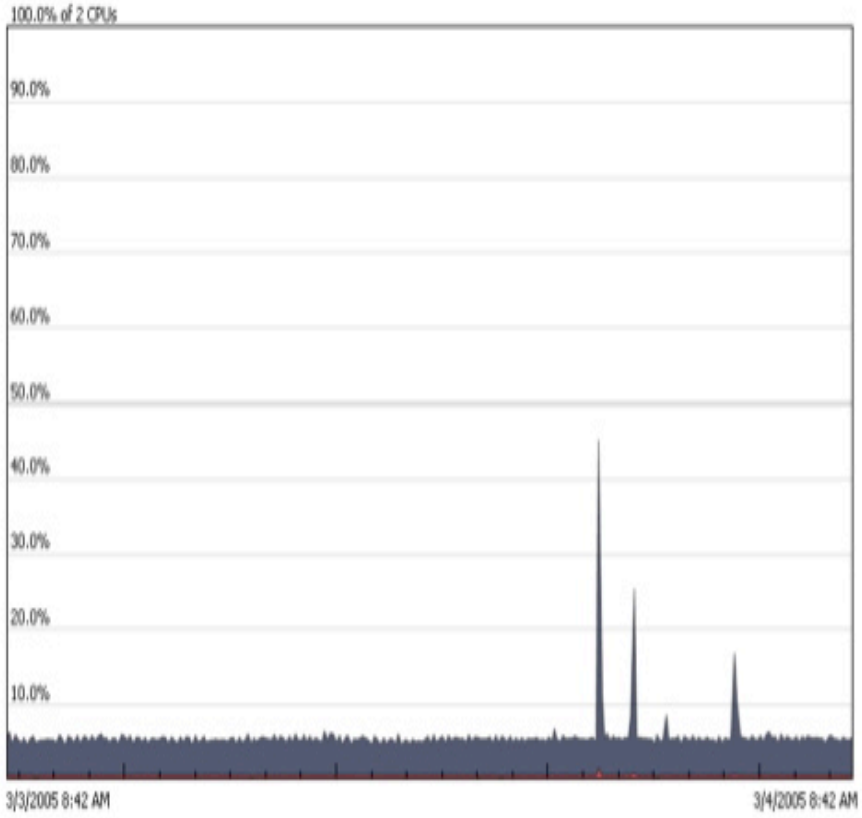
Virtualization Concepts

Changing the Role of the Operating System

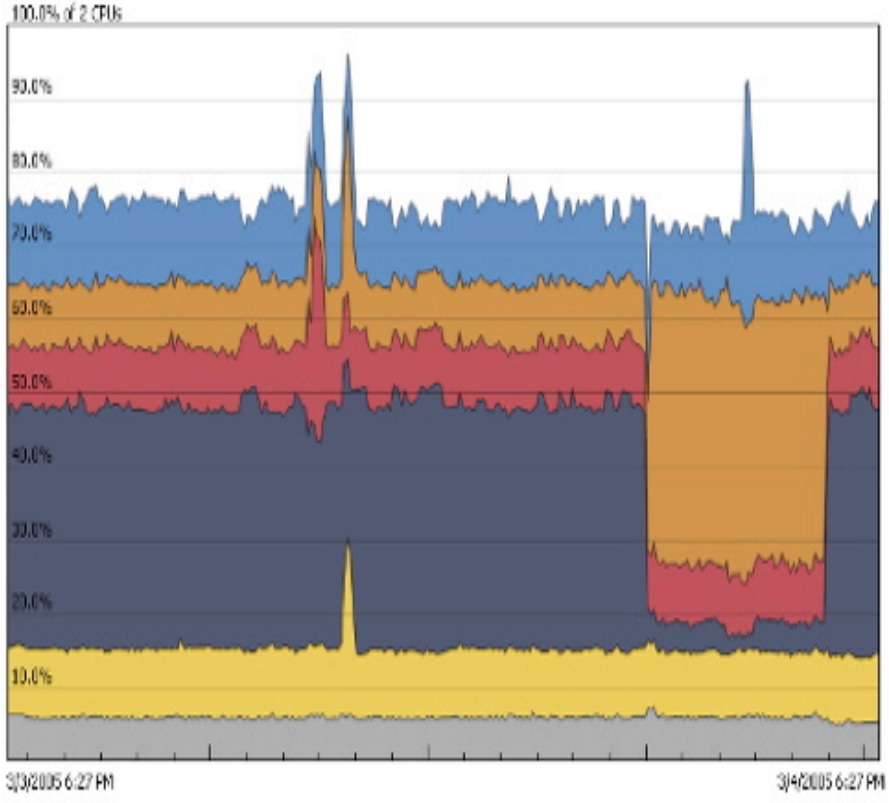


Virtualization Allows Partitioning a Server for Multiple Applications

Capacity Utilization: Stand-Alone vs. Virtualized Servers

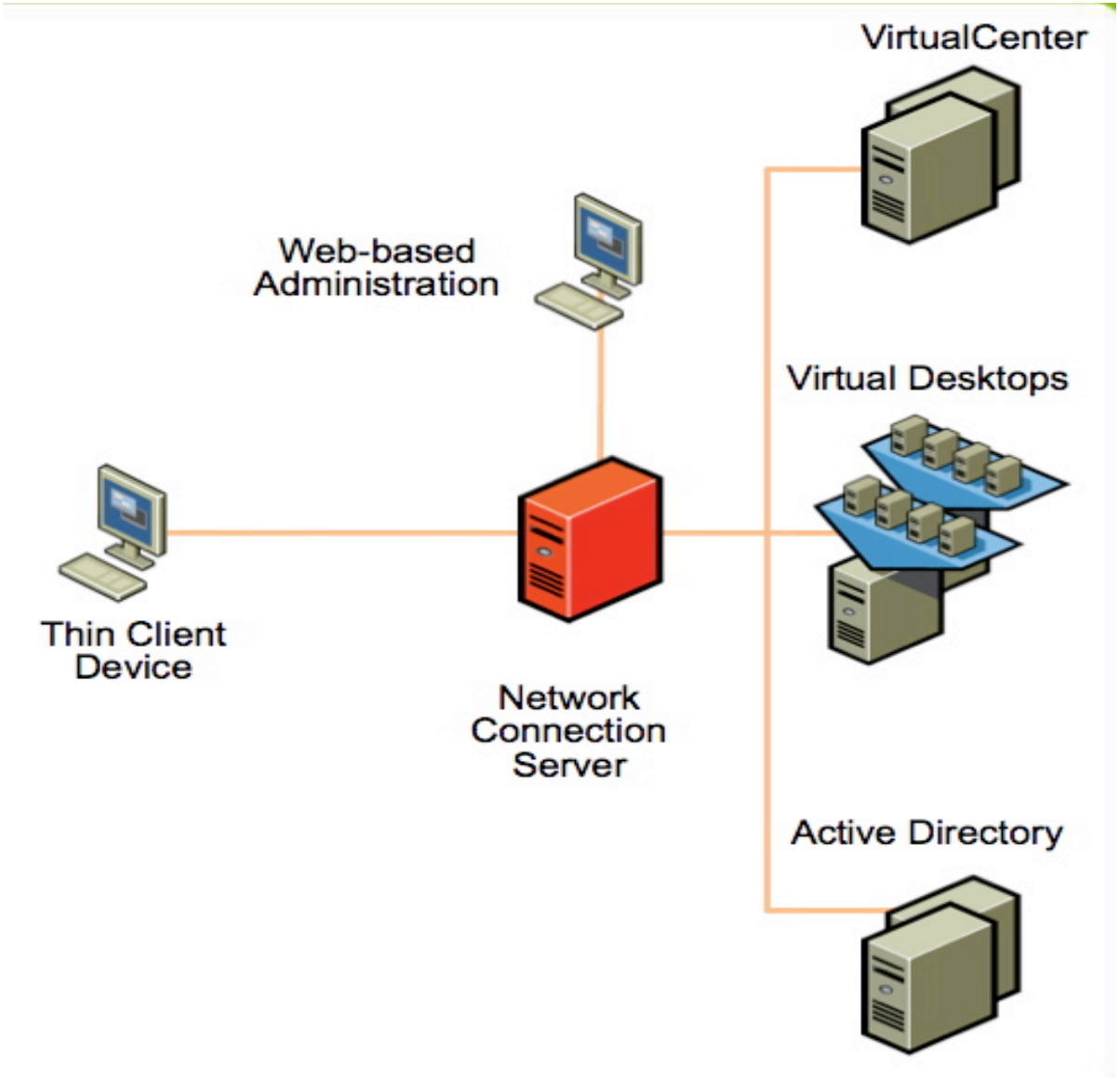


Servers Dedicated to Application

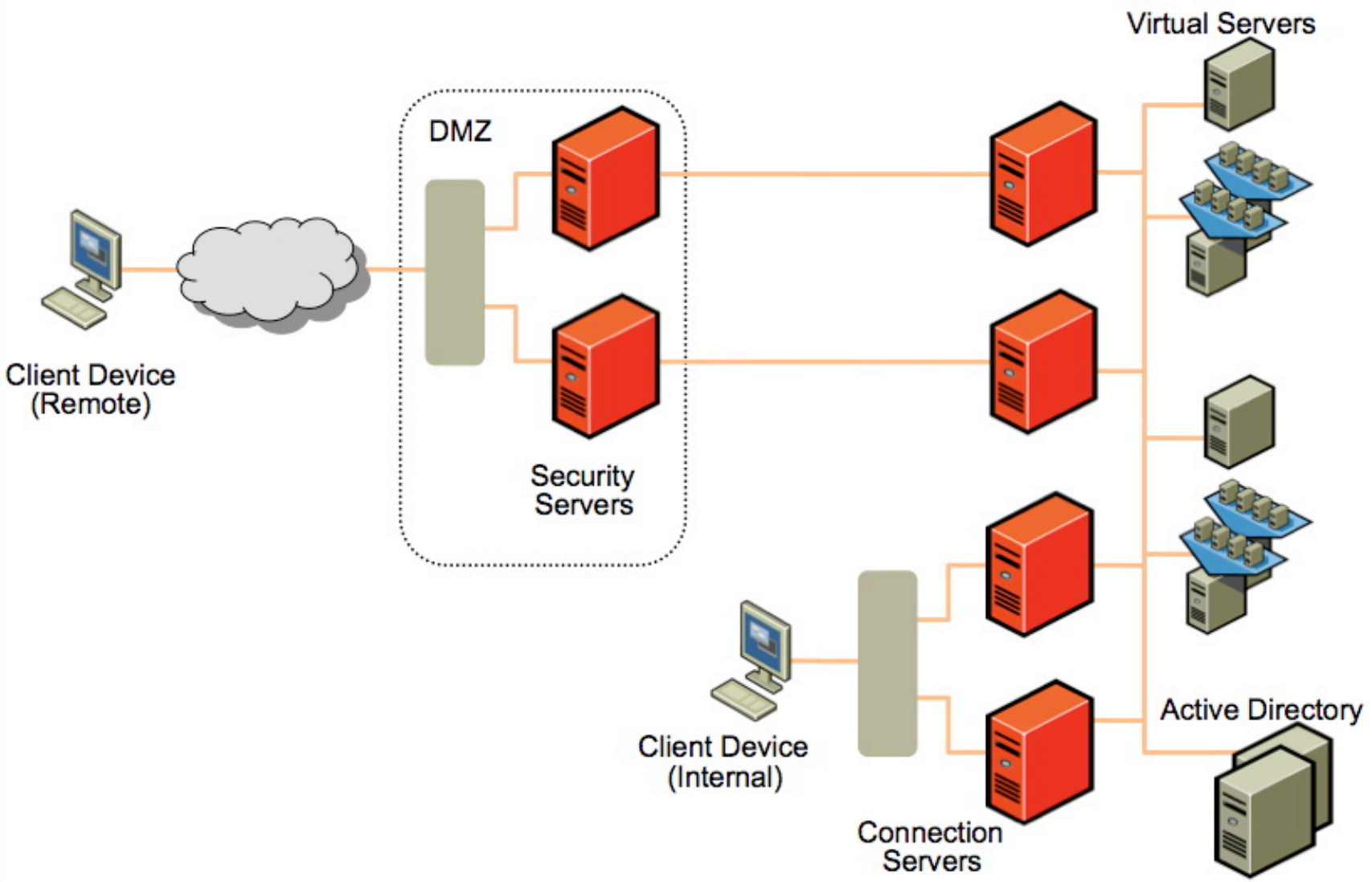


Virtualized Servers Allow Sharing of Applications

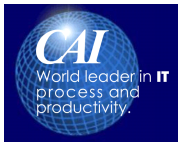
Example of a Simple Thin Client Virtual Configuration



Remote and Internal Thin Client Connections

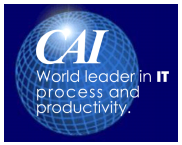


What Does a Virtual Desktop Do?



- It makes it simple to create and run multiple virtual machines on your desktop or laptop computer.
- You can convert an existing physical PC into a virtual machine, or create a new virtual machine from scratch.

What Does a Virtual Desktop Do?



- Each virtual machine represents a complete PC, including the processor, memory, network connections and peripheral ports.

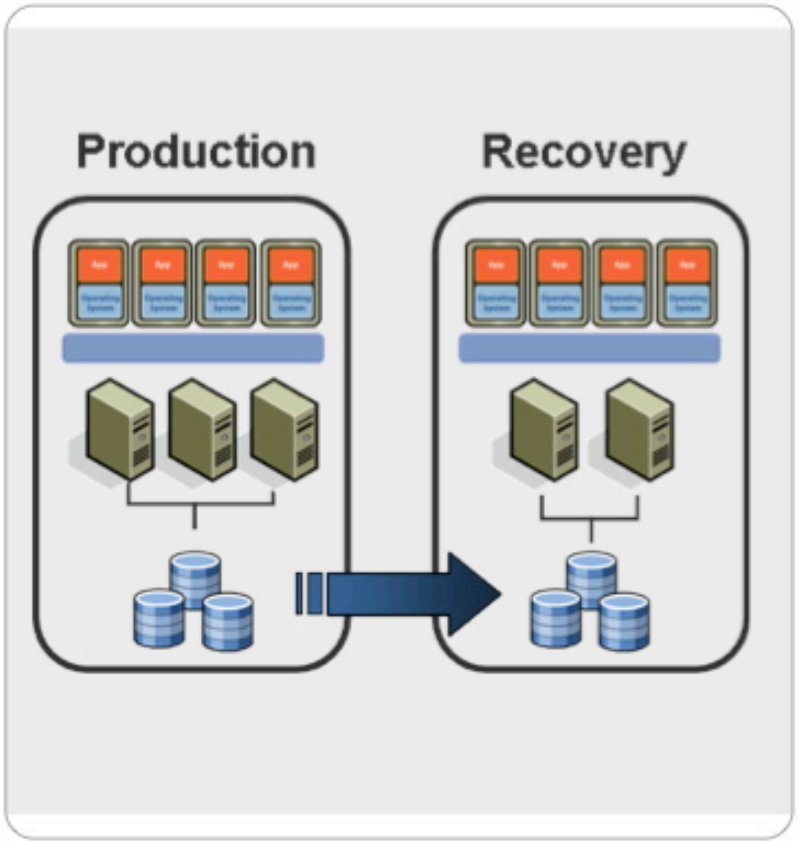
What Does a Virtual Desktop Do?

- A Virtual Workstation lets you run Windows, Linux and a host of other operating systems side-by-side on the same computer. You can switch between operating systems instantly with a click of a mouse, share files between virtual machines with drag-and-drop functionality and access all the peripheral devices you rely on.

Examples of Productivity using Virtualization

	BEFORE	AFTER
Instant Provisioning	> 4-6 weeks	> Fully automated to days
Live Migration	> Hardware maintenance window; app migration takes days/weeks	> No maintenance window or planned downtime; migrate app in seconds
Patch Management	> Patch each host manually with downtime	> Automated patching with no downtime
Disaster Recovery	> Weekend testing, uncertain restore	> Automated testing during day, quick/reliable restore
Service Delivery	> Slow, error-prone development / testing	> Automated self-service development / testing
	> Iterative, error-prone release management	> Push-button, precise release management

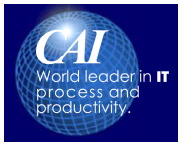
Virtual Site Recovery Management



- Simplifies and automates disaster recovery workflows:
  - Setup, testing, failover
- Turns manual recovery runbooks into automated recovery plans
- Provides central management of recovery plans from central control

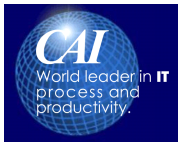
A virtual Infrastructure makes disaster recovery rapid, reliable and manageable

Virtual Machine Mobility



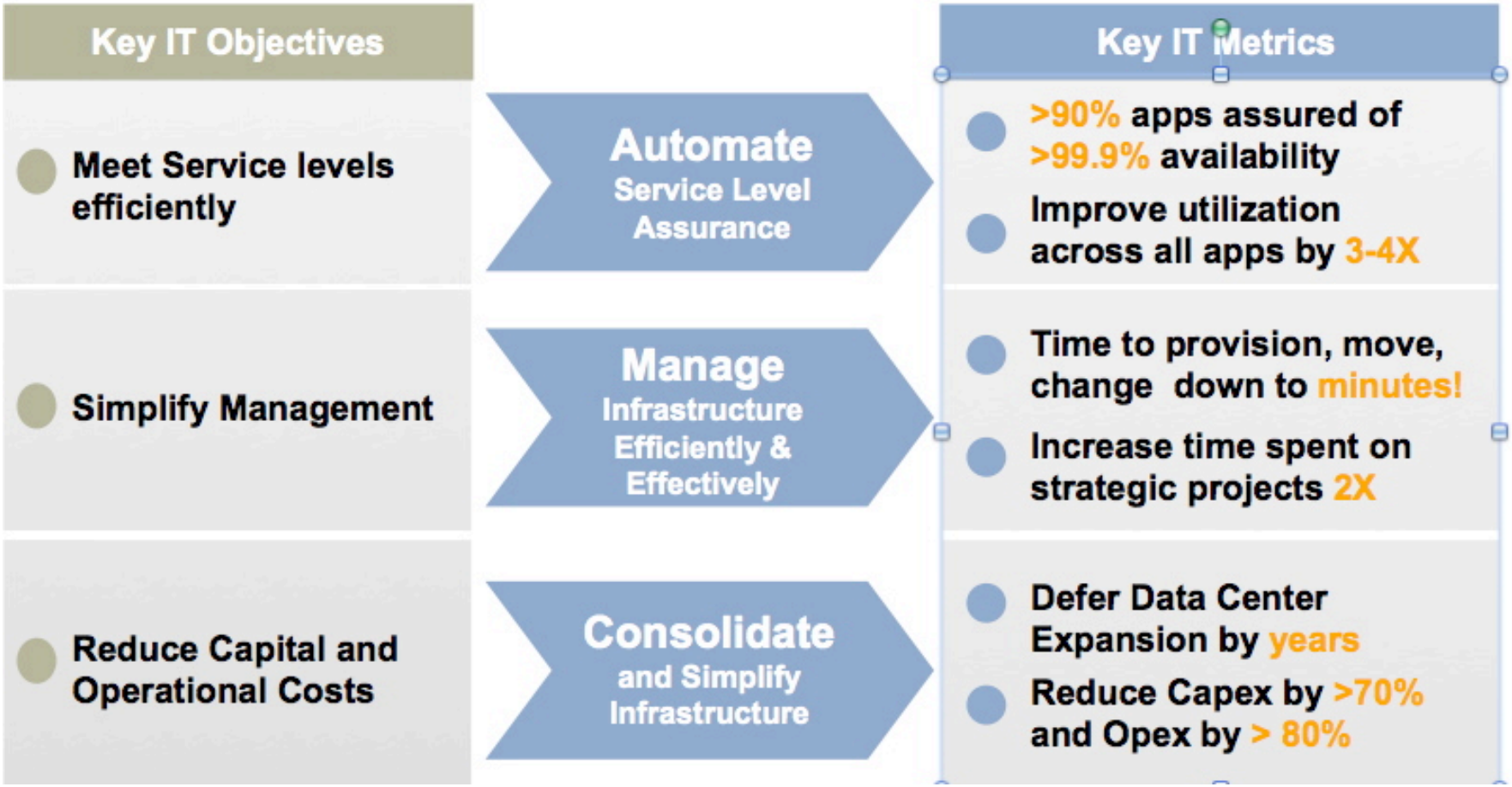
- You might need to move virtual machines around for a variety of reasons—to move them from one host computer to another, to run them under different virtualization products, or to run them under different versions of the same virtualization product.

Virtual Machine Mobility



- Move your virtual machines manually, by copying the files that make up a virtual machine from one location to another.
- Use the VMware Converter utility to import virtual machines from different source formats into the VMware product you are using.

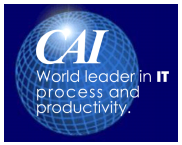
Transforming Costs, Efficiency and Availability



Example of Potential Reductions for a Large Network

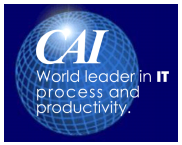
	Unvirtualized	Virtualized	Reduction
Number of Clients	360,000	360,000	
Users per Server	148	440	
Number of servers	2,432	818	-66%
Servers per Manager	16	30	
Number of Managers	152	27	-82%

Advantages of Virtualization

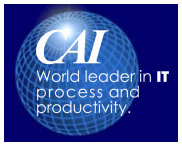


- Zero downtime maintenance: Permits shifting of applications.
- Instant provisioning of multiple clients from control site.
- Pooling hardware resource for higher capacity utilization.

Advantages of Virtualization



- Supports multiple legacy operating systems
- Dynamic resource sharing by shifting capacity.
- Security and fault isolation from central console.
- Business continuity, backups, and automated restoration.



Virtual Desktop

Driving Change

- PC Management is time consuming & inefficient
- Desktop Operating Costs are High
- Low End User Service Level Agreement (SLA) levels
- Security and Compliance Risks

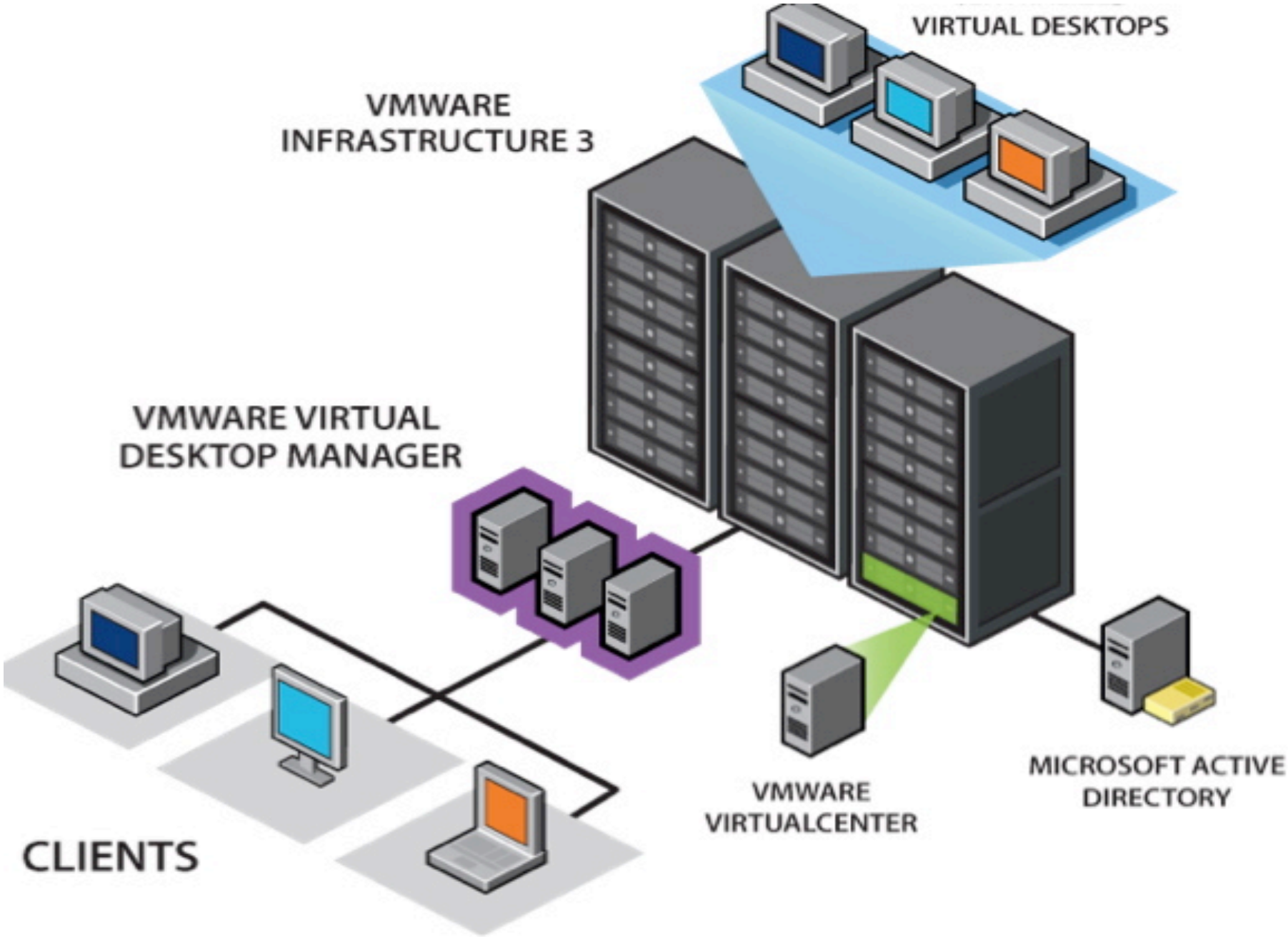
Apply Virtualization to the Desktop

OS and apps are decoupled from the physical device

Desktops run as virtual machines in secure data center

Transform static desktop to a stateless virtual desktop

Connect to virtual desktop from thick or thin clients


VIRTUAL DESKTOPS
VMWARE
INFRASTRUCTURE 3
VMWARE VIRTUAL
DESKTOP MANAGER
VMWARE
VIRTUALCENTER
MICROSOFT ACTIVE
DIRECTORY
CLIENTS

Thin-Client Support

Virtual Desktop Infrastructure supports Linux and XP clients. This includes the majority of thin clients.

Virtual Desktop Infrastructure has been tested specifically with the following thin clients:

Custom OS

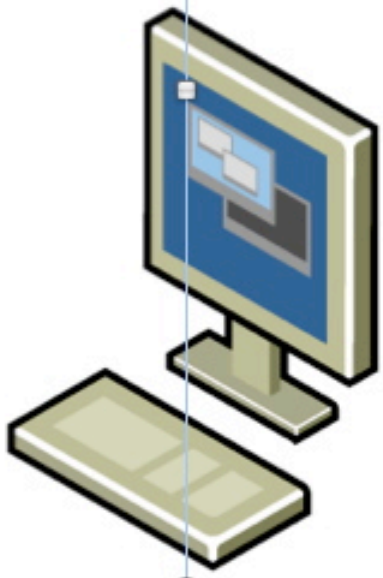
- WYSE S10 VDI Edition
- WYSE V10L

Linux Based

- WYSE S50, WYSE V50
- WYSE V50L

XP Based

- WYSE V90
- WYSE V90L
- Neoware c50



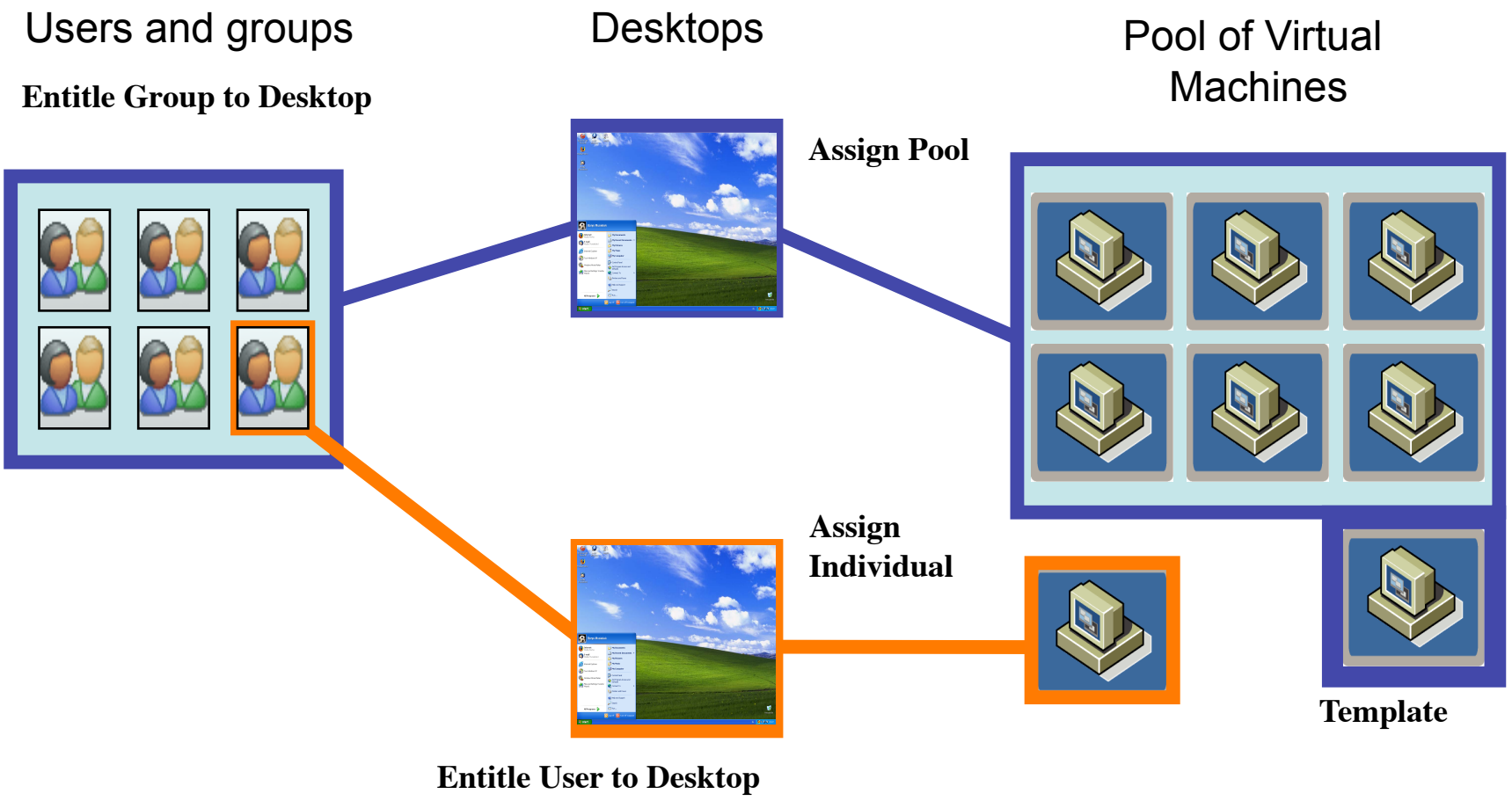
Viritual Desktop Types

- Individual Desktop:
  - Static 1-to-1 relationship between user and virtual desktop.
  - Can assign individual settings and resource allocations.
  - Existing virtual machines are brought in from Virtual Center.

Viritual Desktop Types

- Desktop Pool Non-persistent Pools:
  - All virtual desktops in the pool are cloned using the same template.
  - Automatically created and assigned to users by Virtual Connection Server.
  - Assignment is on a session by session basis
  - Desktops are returned to the pool for reallocation after logoff.

Desktop Entitlement



Thin Clients as Non-Persistent Pools of Access Devices

- Common template used to create all desktops
- Individual isolated desktops returned to pool after each use
- Reverts to pre-determined state for future use
- Ideal for kiosks, transaction workers or hoteling

Some of the Features of Thin Client Applications

Active Directory

- Retain existing user accounts and policies
- Single sign on to virtual desktops
- Retain user-management processes and skills
- Do not need to modify existing Active Directory in any way

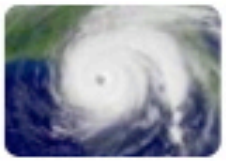
SecurID

- Optional integration with SecurID for two-factor authentication

The Uses of Virtual Desktops

Desktop PC Replacement

Replace traditional PCs with centralized virtual desktops for better control and efficient management. End users have flexibility



Disaster Recovery & Business Continuity

Provide continuous availability of desktops to end users by making high availability and disaster recovery solutions more cost-effective, simpler, and more reliable

Alternative Access

Centralize corporate data while enabling employees to work from home and branch offices. Enable partners/customers access to corporate desktops while protecting information

Insurance Case Study: Business Continuity

"..our virtual desktop environment has scaled exactly as expected. CPU utilization has been running at approximately 60 percent, and we've maintained a consistent computing experience for our desktop users while easing management requirements."

Nationwide On Your Side

—Randy Tackett, *IT Consultant, Nationwide*

Business challenges

- Need to reduce desktop operational costs
- Required High Availability of desktops
- Simplify desktop management

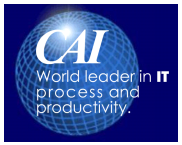
Technical solution

- Deployment using Clearcube thin clients to access virtual desktops

Results

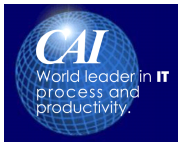
- 45% reduction in support costs
- Used HA features to provide robust desktop disaster recovery protection
- Servers running at 80% utilization
- Will deploy 10,000 desktops

The Megatrends of Virtualization



- Moving from a device centric world to a personal info centric world
- Buying hardware independent of microprocessor or operating system
- Information last longer than products
- Applications associated with personal identity

Part III



Implementing Virtualization

Proceeding with Virtualization is Complex

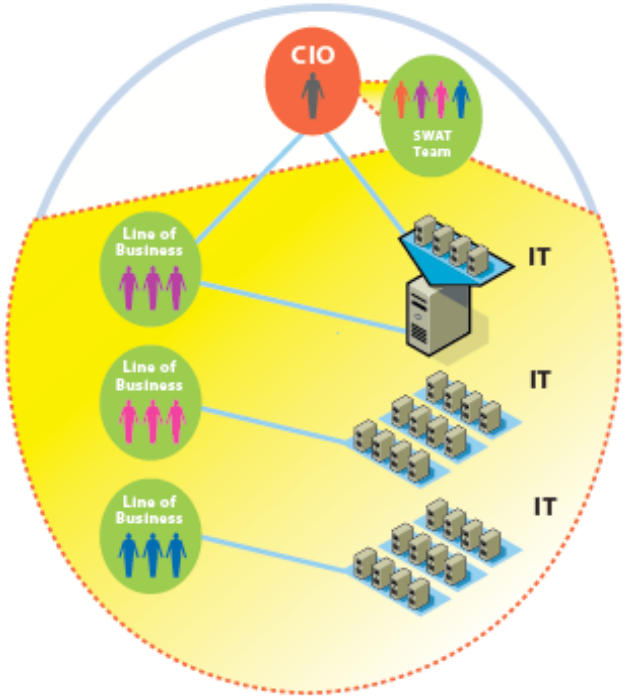
Understanding Key Success Factors

Organizational Success

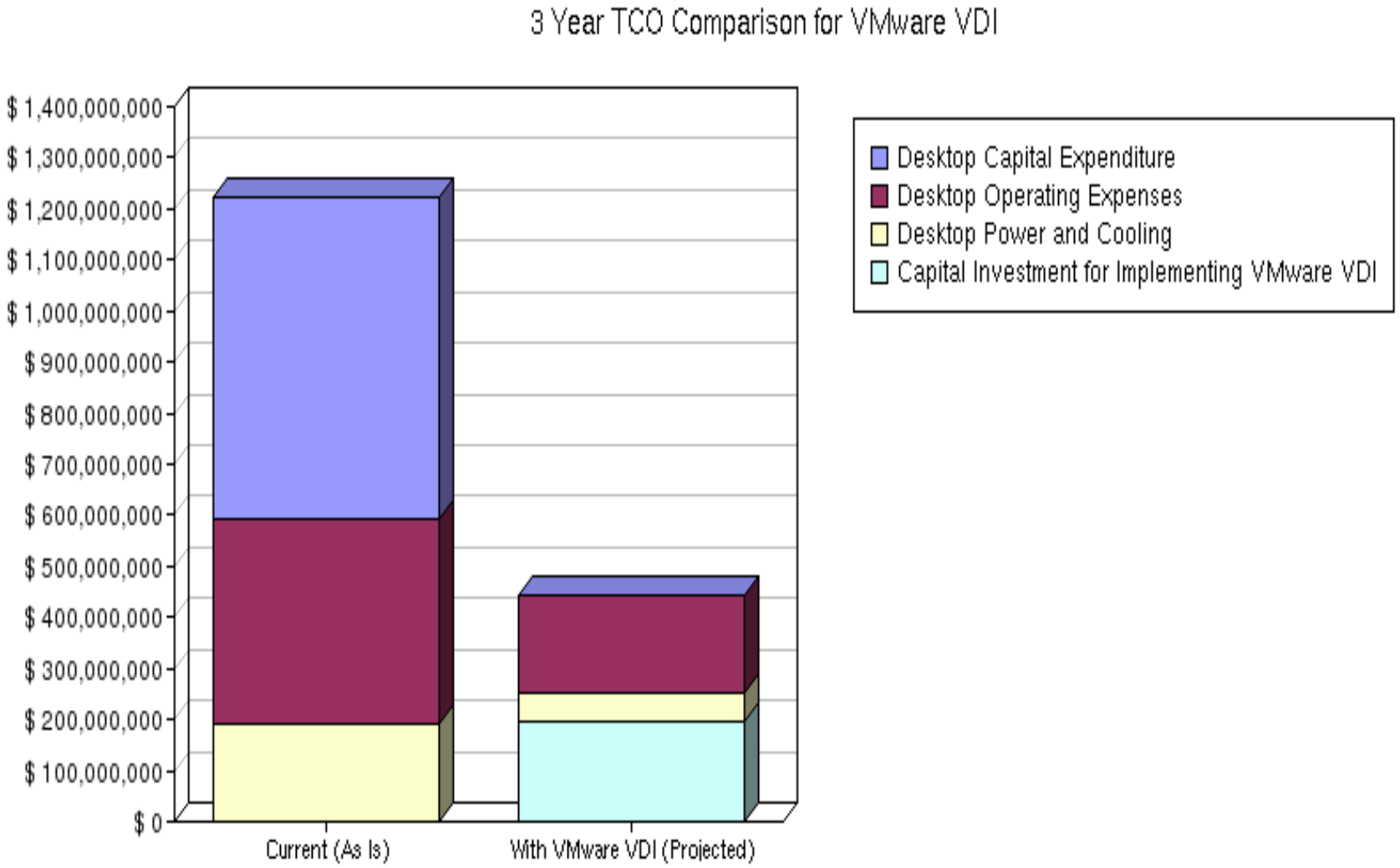
- Top-down sponsorship
- Achieve and maintain stakeholder buy-in through education
- Form a core virtualization team

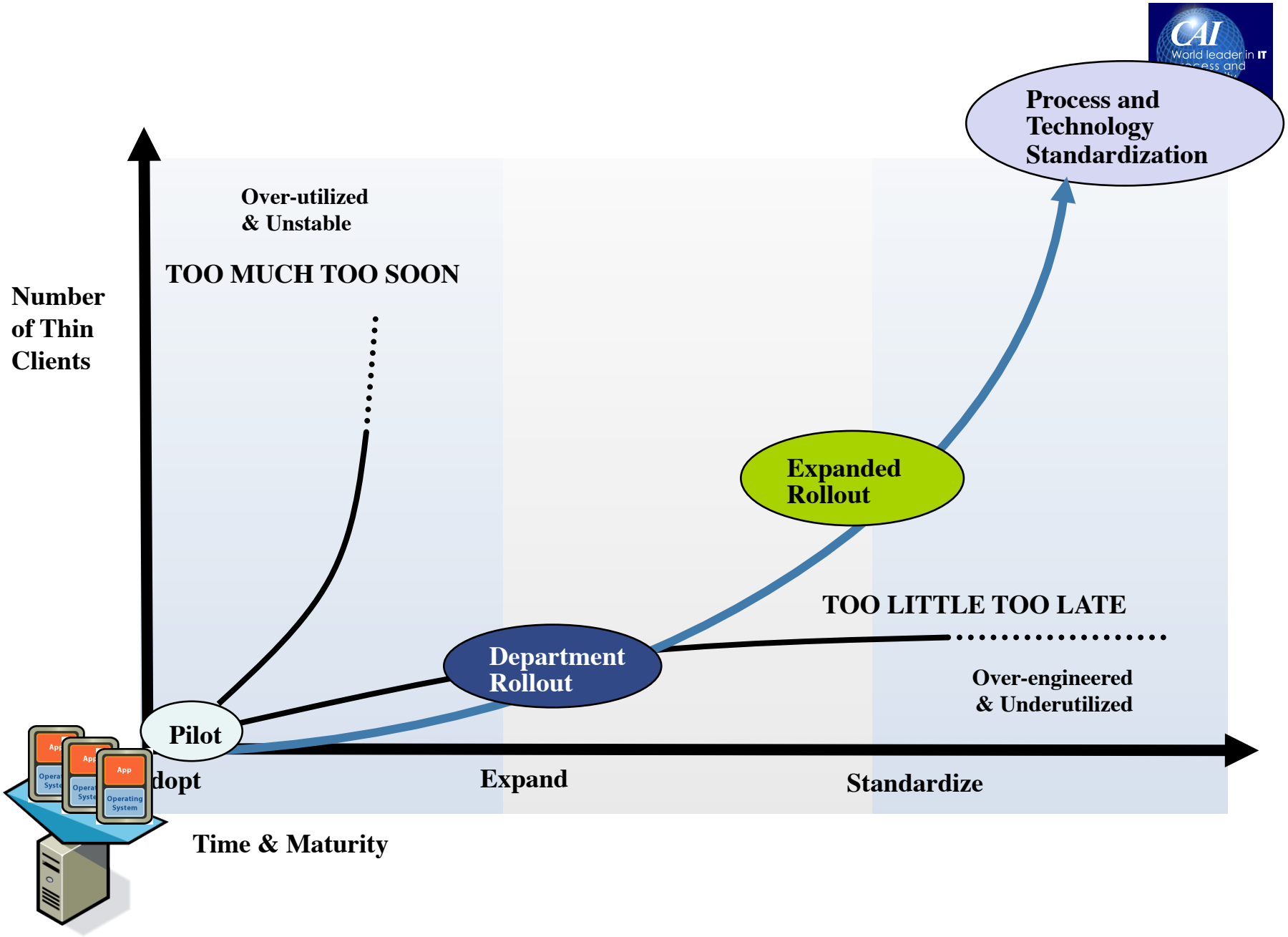
Implementation Success

- Treat virtualization as an architectural decision
- Design for the big picture—deploy incrementally for rapid ROI
- Create high quality design and remediation through best practices

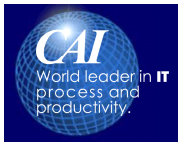


Virtual Desktop Total Cost of Ownership

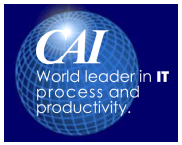



Process and
Technology
Standardization
Over-utilized
& Unstable
TOO MUCH TOO SOON
Number
of Thin
Clients
Expanded
Rollout
TOO LITTLE TOO LATE
Department
Rollout
Over-engineered
& Underutilized
Pilot
dopt
Expand
Standardize
Time & Maturity

Summary



- Thin clients offer major savings in operations.
- Thin clients make possible significant reductions in the costs of managing data centers, with simplification of systems management tasks.
- Thin clients offer increased redundancy for delivery of high performance and high availability services.
- Thin clients is a step in the direction of “cloud computing”.



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