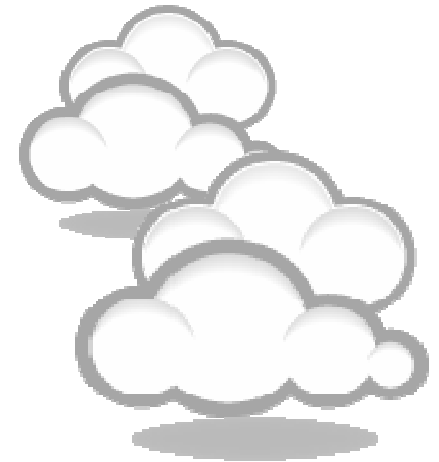# Service Management in the Cloud
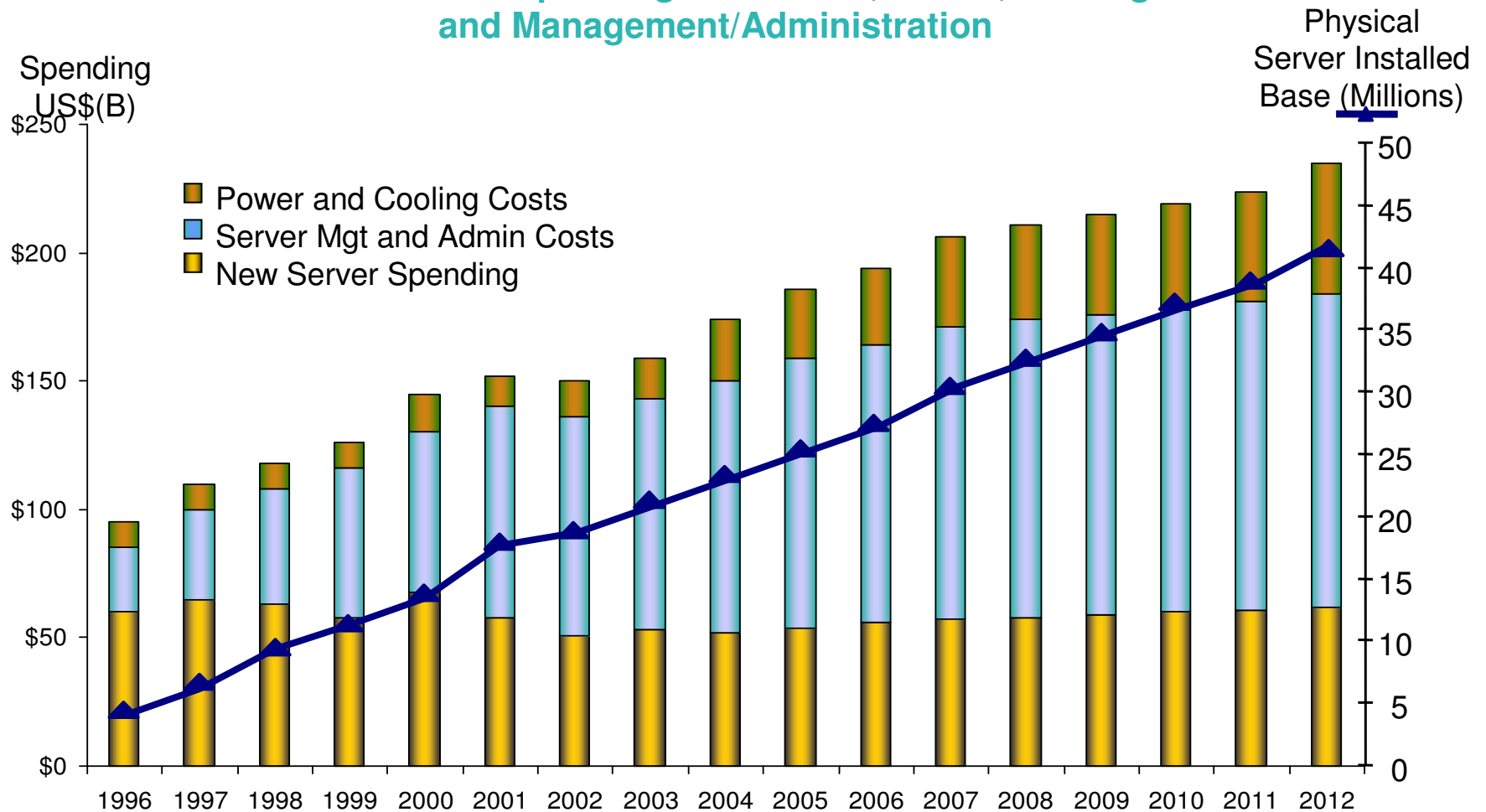
John Kogel

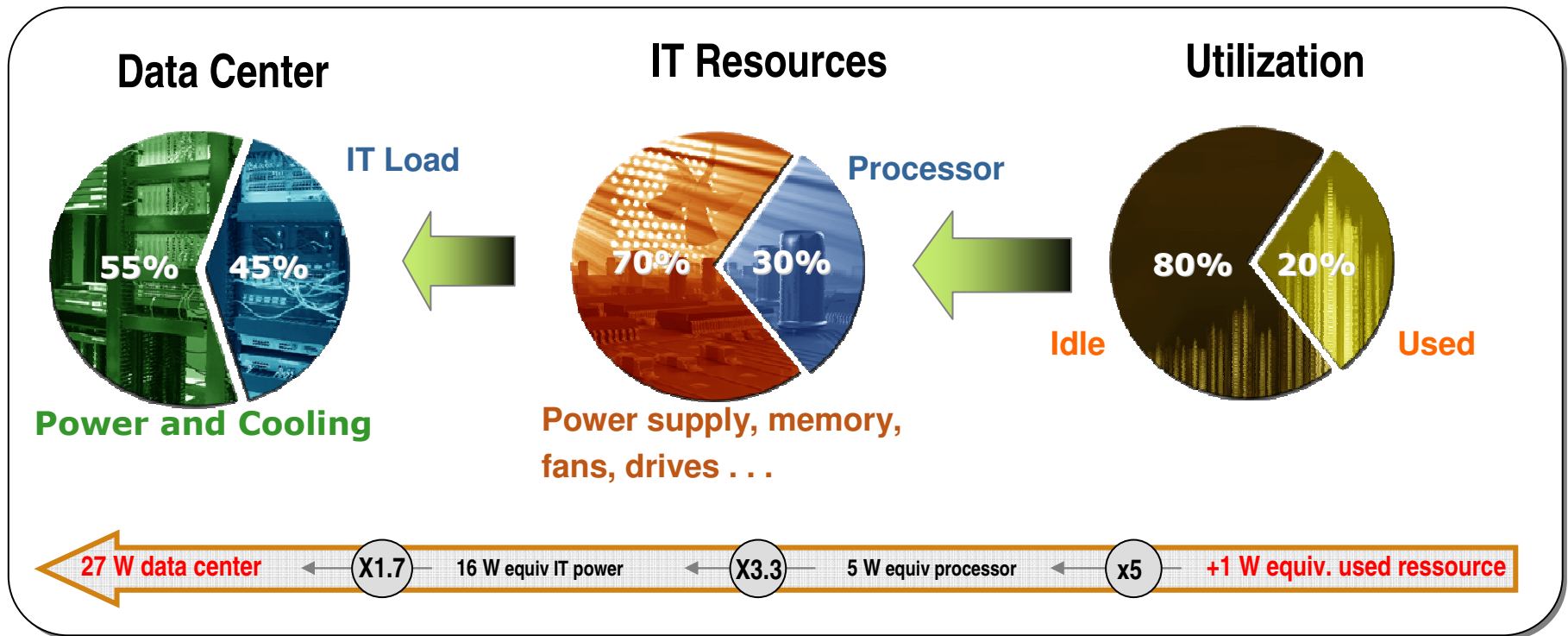**Tivoli Vice President of System z Development**

Annual Operating Costs Are Out Of Control

Worldwide IT Spending on Servers, Power, Cooling and Management/Administration

IDC, 2008

27 Watts of Hardware to Support 1 Watt of Distributed Software

Data Center

IT Resources

Utilization

IT Load

55% 45%

Power and Cooling

Processor

70% 30%

Power supply, memory, fans, drives . . .

80% 20%

Idle

Used

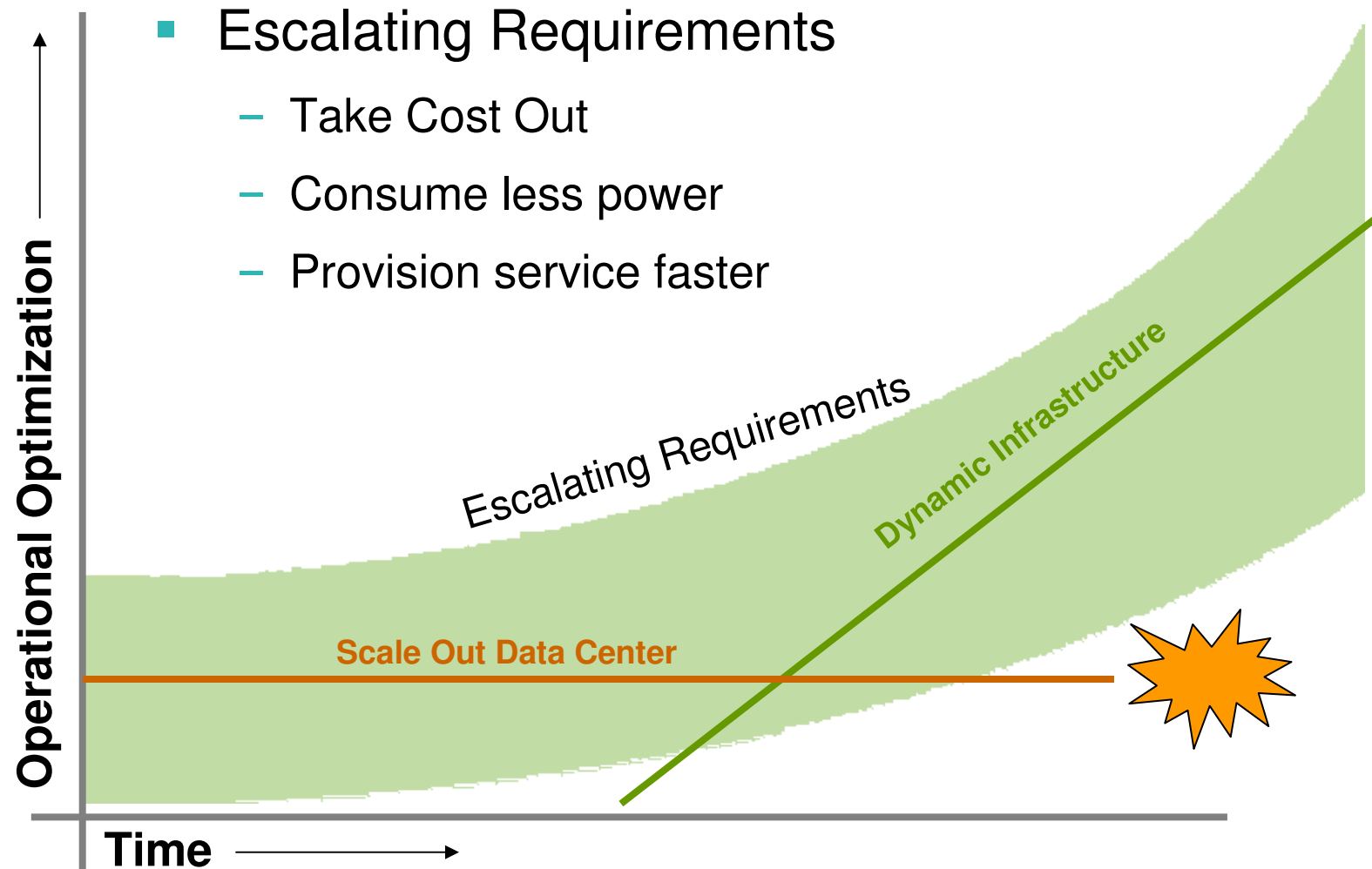27 W data center ← X1.7 16 W equiv IT power ← X3.3 5 W equiv processor ← x5 +1 W equiv. used ressource

Within the last five years, the total amount of energy utilized by all domestic US data centers has doubled.

*Source: Springboard research

Reinventing The Data Center To Meet Requirements

- **Escalating Requirements**
  - Take Cost Out
  - Consume less power
  - Provision service faster

Operational Optimization (y-axis) vs Time (x-axis). Shaded region labeled "Escalating Requirements" and green line labeled "Dynamic Infrastructure". Horizontal orange line labeled "Scale Out Data Center".

Change the Game

"…a period of discontinuity is, for those with courage and vision, a period of opportunity. Over the next couple of years, there will be winners, and there will be losers. And though it may not be easy to see now, I believe we will see new leaders emerge who win not by surviving the storm, but by changing the game."

- Sam Palmisano, IBM, November 6, 2008

What Is The Solution?

- Reinvent the data center to build a more dynamic infrastructure

  - Take Cost Out
    - Virtualization and consolidation

  - Reduce Energy Consumption
    - Green Data Center

  - Request Driven Provisioning
    - Automatic self service

Provides private cloud services to the enterprise

Cloud Computing – a New Paradigm

> *"Clouds will transform the information technology (IT) industry… profoundly change the way people work and companies operate."*

The Economist

- *Provides massively scalable computing resources from anywhere*
- *Simplifies services delivery*
- *Enables rapid innovation of new business models*
- *Dynamic Infrastructure for next generation data centers*

Cloud Computing

Software as a Service

Utility Computing
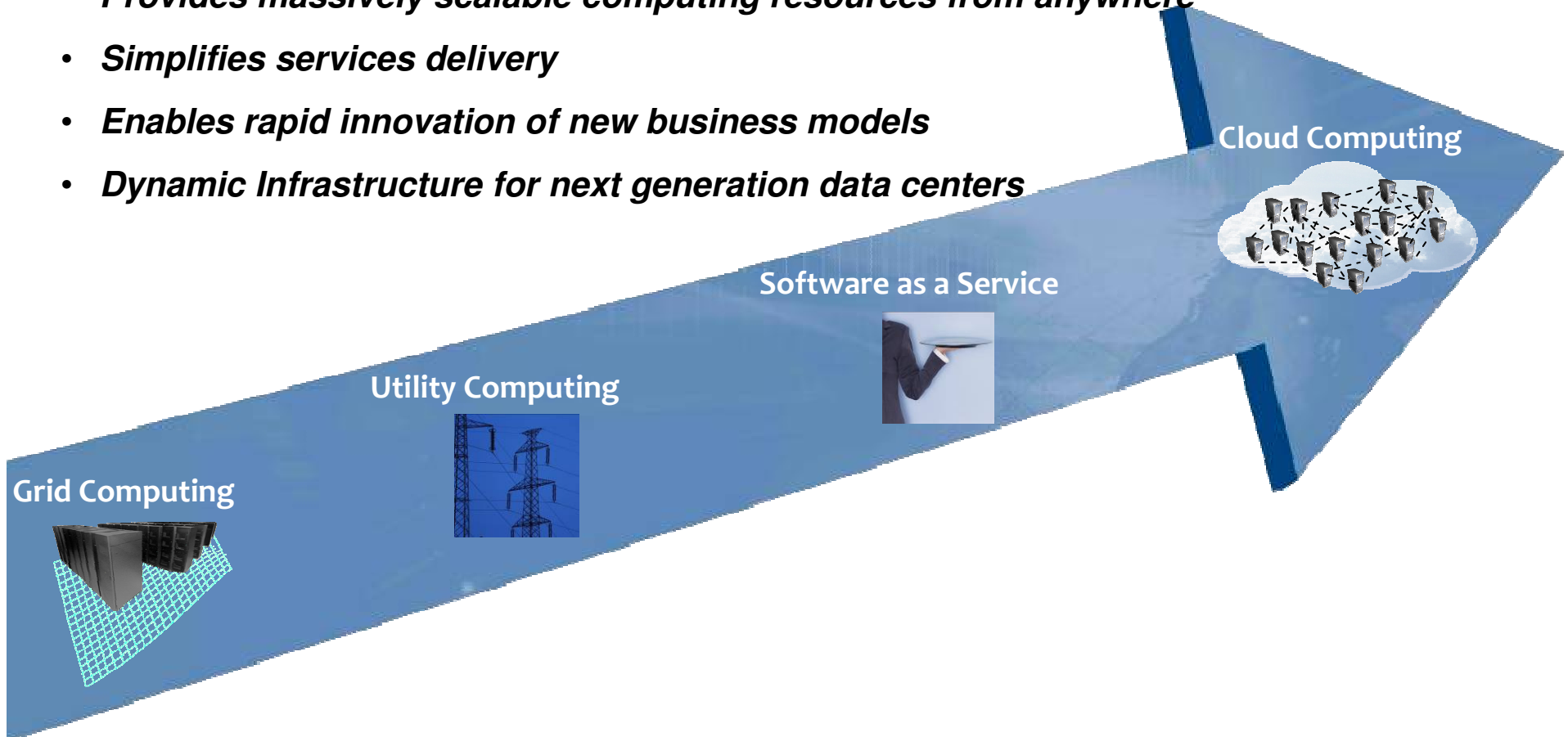
Grid Computing

What is Cloud Computing?

A user experience and a business model

- Standardized offerings
- Rapidly provisioned
- Flexibly priced
- Ease of access

An infrastructure management and services delivery method

- Virtualized resources
- Managed as a single large resource
- Delivering services with elastic scaling

Similar to Banking ATMs and Retail Point of Sale, Cloud is Driven by:

- Self-service
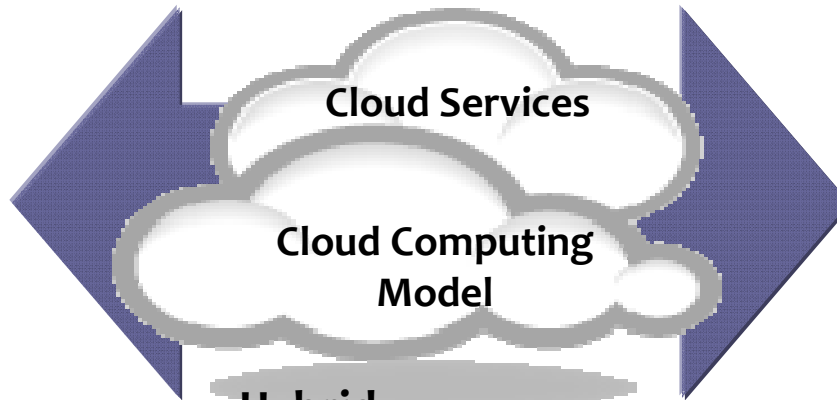- Economies of Scale
- Technology Advancement

Banking

IT

Retail

Cloud Computing Delivery Models

Flexible Delivery Models

Public ...

- Access by Service provider owned and managed.
- subscription.
- Delivers select set of standardized business process, application and/or infrastructure services on a flexible price per use basis.

Cloud Services

Cloud Computing Model

Hybrid ...

- Access to client, partner network, and third party resources

Private ...

- Privately owned and managed.
- Access limited to client and its partner network.
- Drives efficiency, standardization and best practices while retaining greater customization and control

.... Standardization, capital preservation, flexibility and time to deploy

.... Customization, efficiency, availability, resiliency, security and privacy

ORGANIZATION → CULTURE → GOVERNANCE

...service sourcing and service value

Cloud Computing For Improved Service Delivery

Service Requests enter the cloud from Internal Users, External Users, and Business Partners through Public, Private, or Hybrid Clouds

Cloud Computing For Improved Service Delivery

Service

Service

Service
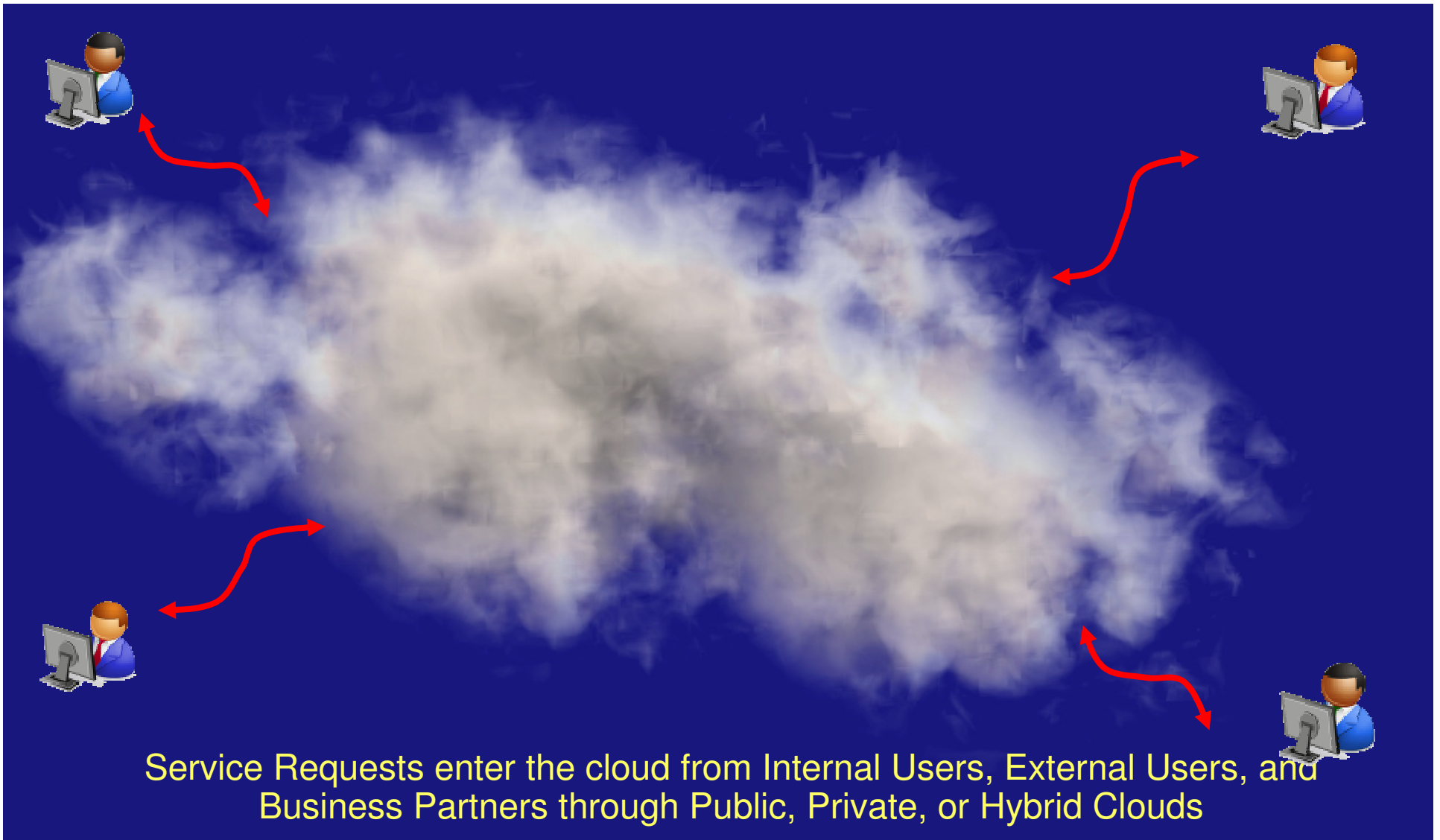
Service

Service

Service

Service

Service

Service
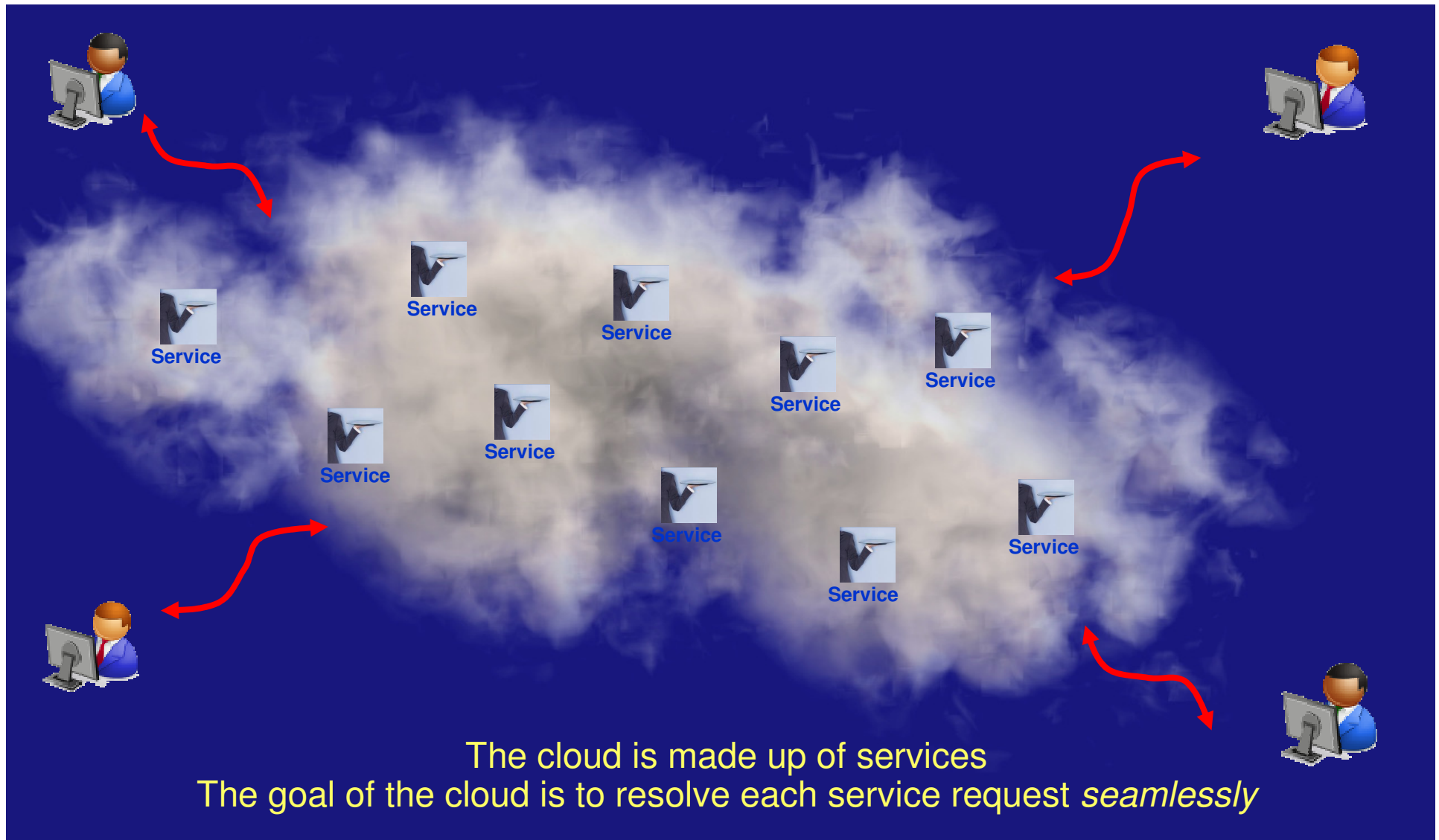
Service

Service

The cloud is made up of services
The goal of the cloud is to resolve each service request *seamlessly*

The Mainframe Cloud agenda

Focus on Strengths

Extend the Data Serving and Massive Virtualization Strategy of System z to embrace Cloud Computing

Take advantage of System z efficiencies

As the industry drives the focus from capital to operational costs, the opportunity to grow the presence of the mainframe is clear

Extend the mainframe strategy

Use the traditional strengths of System z to offer a differentiated IBM Cloud offering to our enterprise customers and transparently to the broader community.


Security
Scalability
Availability
Performance
Cost-effectiveness

CAPEX

OPEX

Cloud Scenario

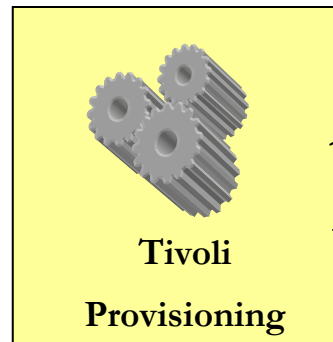## Enterprise Pre-production Scenario

Private Test cloud: Testers request basic infrastructure resources for a defined period of time. These resources are used in testing a new version of the online retail application
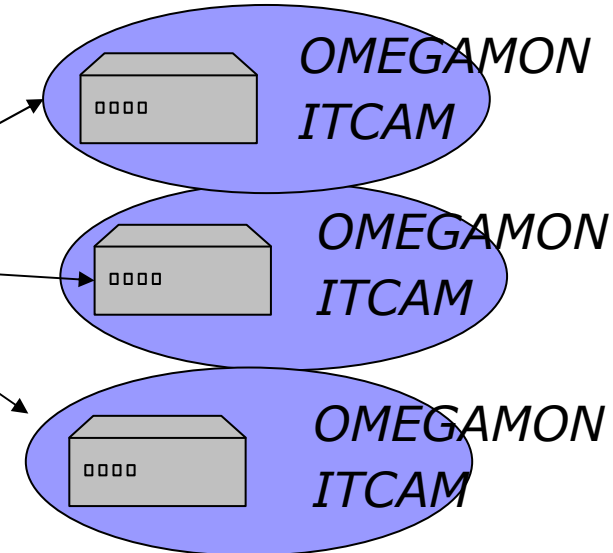
Request   **Deploy**   **Manage**

Tivoli

Provisioning

OMEGAMON

ITCAM

OMEGAMON

ITCAM

OMEGAMON

ITCAM
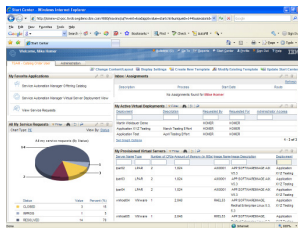
A Tester uses the service catalog to request 3 Linux on System z virtual machines for two weeks

The request begins the automation process which deploys the requested virtual machines, and installs specified software stacks onto the VMs
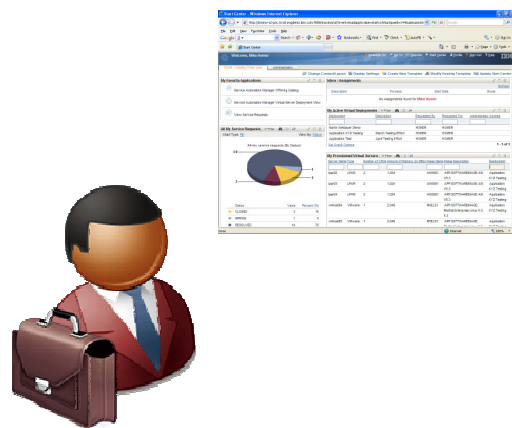
Monitoring agents are deployed on the virtual machines. Real-time utilization statistics are used to determine necessary modifications to the service

Cloud Scenario

## Enterprise Production Scenario

Private Application cloud: A Sports Retail Company uses cloud computing internally to save on capital expenses, IT operational expenses, and increase time to market.

Request	**Deploy**	**Manage**

Tivoli

Provisioning

Resource and application monitoring

Usage and accounting

Resource and application monitoring
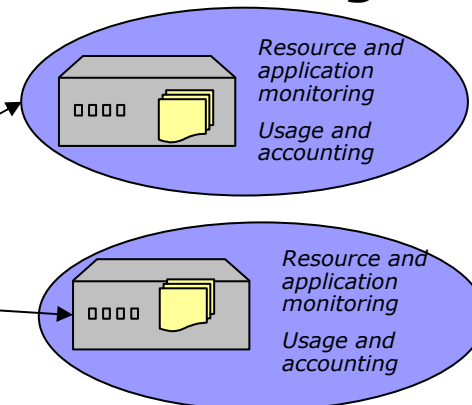
Usage and accounting

A Marketing Manager uses the service catalog to request an image of the online CycleWorld retail application. The new instance will be used to accommodate the expected surge in sales due to the Tour de France.
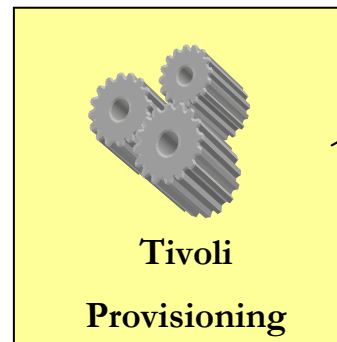
The request begins the automation process which first notifies the appropriate IT service delivery manager for approval. After his approval, automated workflows deploy the application image from the image repository.

Utilizing monitoring and event management, application performance has reached defined thresholds. Another image is deployed to meet the higher than expected customer demand.

IT is able to utilize usage and accounting tools to report IT costs to the marketing department.

Recent Experience: Financial Services

Business Problem

- Complex IT environments, lacking automation. This results in long lead times for requests, and high cost for deploying and managing environment.
- Little standardization of configuration leading to quality issues and additional maintenance overhead. Want to improve audit results and IT compliance for development and test.
- Need to improve capacity without increasing cost.

Solution Overview

- Phased pilot, with first phase completed in Q408.
- Use TSAM as the cloud management solution (incl. service management) in a pilot.
- Manage the deployment of distributed WAS ND instances on Linux on System z, z/VM, DASD.
- Implement and prove a set of scenarios:
  - Instantiation of a distributed WAS ND cluster running on Linux on System z.
  - Increase capacity of a WAS ND cluster service instance.
  - Delete a WAS ND cluster service instance.
- Tangible results from Pilot:
  - Simplified – Requires less interaction with developers to get a new WAS ND Cluster.
  - Faster time-to-market for developed apps.
  - 100% consistent deployment of environment

Lessons Learned

- ✓ "Don't eat the elephant in one go!"

- ✓ Set scope around a process not around a function – focus on the people and the skills to drive rapid implementation.

- ✓ This is transformative and crosses organizational boundaries. Executive sponsor support is vital.

Recent Experience: Insurance Company

Business Problem

- Customer needs to deploy and manage 50-100 WebSphere Portal server instances, across multiple environments.
- Manual deployment effort and timeline is excessive and error prone.
- Lack of internal skilled resources to deploy complex systems quickly.

Solution Overview

- TSAM initially implemented as the service catalog and service management layer.
- WS Portal Topology (DB, WAS, WPS, WCM) defined for each deployment environments
- TSAM integrates and leverages existing customer provisioning assets.
- On track to meet immediate customer needs.
- Longer term, greater opportunity to provide full end to end solution from TSAM implementation
  - service catalog,
  - bare metal provisioning,
  - service life cycle management.

Best Practices / Lessons Learned

- ✓ Map out whole deployment process, and focus upon key pain points / manual intensive steps.

- ✓ Don't loose sight of the business benefits – technology is the enabler, not the outcome. People and process interfaces just as critical.

- ✓ Incremental and phased approach, identify early (business benefit) wins, build upon successes.

Recent Experience: Retail Bank

Business Problem

- Time to reclaim a test server is two years in average "Next Generation Server Sprawl" is driving down utilization.

- Inconsistent configurations. Difficult to reproduce test server images, and debug problems.

- Process for provisioning test environments is cumbersome, error-prone, and requires frequent manual intervention.

Solution Overview

- Implement Request Driven Provisioning self service portal using TSAM and TPM.

- Provision virtual servers with middleware and applications to a specified given hardware, OS
    - IBM p5/6 LPARs and AIX images
    - x86 VMware VMs &Linux/Windows images

- Integration Tivoli Process Automation Platform to provide real time environment metrics / KPIs.

- Capability implemented:
    - Reserve a test server with a standard image for a predefined amount of time
    - Provision and configure selected software stack on test servers
    - Upgrade CPU and RAM for function and stress testing on request
    - Save and restore test servers per schedule or request.

Lessons Learned

- ✓ Phase the implementation and demonstrate business value in each phase.
- ✓ Close collaboration across Operations and Development in sharing requirements.
- ✓ Educating stakeholders on the long term benefits of the solution is essential for accelerated adoption.

Retail Bank: Results thus far…

- Improved time to market
  - Reduction in installation and configuration time per request
  - Elimination of manual task management, reducing time to deliver new application capabilities, resulting in **$1.5M in additional revenue**
  - "Restore" capability allows fast re-creation of a previous configuration, permitting fast recovery after changes
  - Standard configurations enable "zero-touch" process, providing quick access for testing
  - Automatic de-provisioning reduces time and effort to find free servers, creating more availability when needed

- Reduced costs
  - Automated provisioning process yielding **$0.6M in labor savings**
  - Greater availability of skilled staff to work on high-value activities
  - Improved server utilization yields

- Higher Quality
  - Better control of server inventory and reuse of existing assets
  - Increased customer satisfaction & retention

Note: Benefits realized over a 3-year period

Benefits of Running Applications on System z

Combine the availability, scalability and security of System z with the industry leading Application Server for:

- ✓ Integration with existing mainframe assets

- ✓ High performance access to customer information

- ✓ Server consolidation and simplification of spiraling server assets

- ✓ True dynamic scalability for unpredictable workloads

- ✓ Zero downtime for services that drive the business

- ✓ Exploitation of Java/J2EE programming skills

- ✓ Uninterrupted support of unpredictable workloads

- ✓ Lowest TCO for the lifetime of the application environment
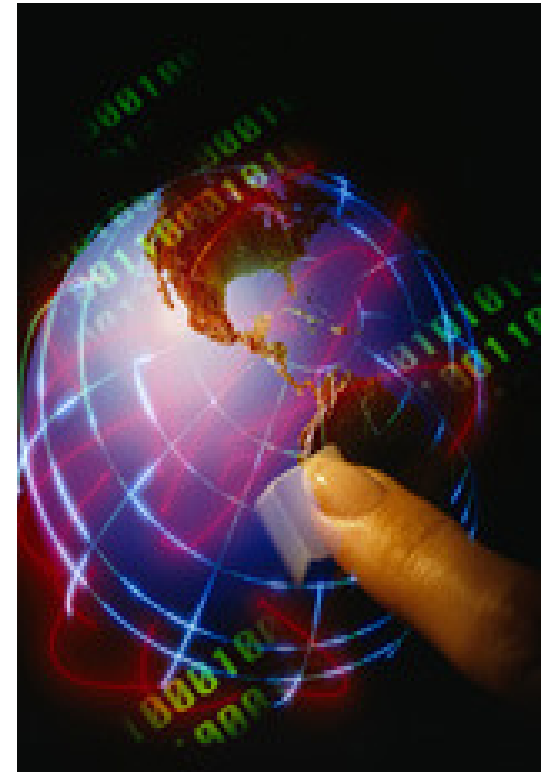
Hardware, operating system, and middleware working together to bring true 99.999% application availability to your business critical services.

A Benchmark Comparison

We ran a benchmark to compare how many images can be consolidated in practice

**Friendly Bank online banking benchmark
(WebSphere Application Server)**

Intel servers x366
 4 cores @ 3.66 GHz
 12 GB memory

Linux on System z z10-EC
 8 IFL cores @ 4.4 GHz
 256 GB physical memory
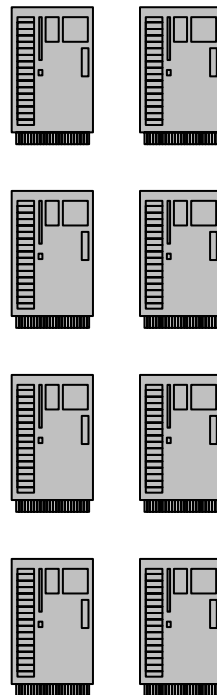
Workload on each one
 5% utilization
 40 ms response time
 4.5 tps
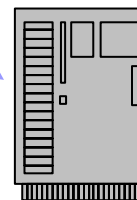
Intel server x3950
 8 cores @ 3.5 GHz
 64 GB physical memory

**Consolidate VM
images on two
different platforms**

**Each VM image
 4 virtual cores
 1 GB virtual memory**

Response Time Comparison

Standalone Server
CPU: 5%
TP: 4.53 trans/sec
RT: .04 sec
TT: .18 sec

Response Time Comparison

— z/VM — x86 Hypervisor
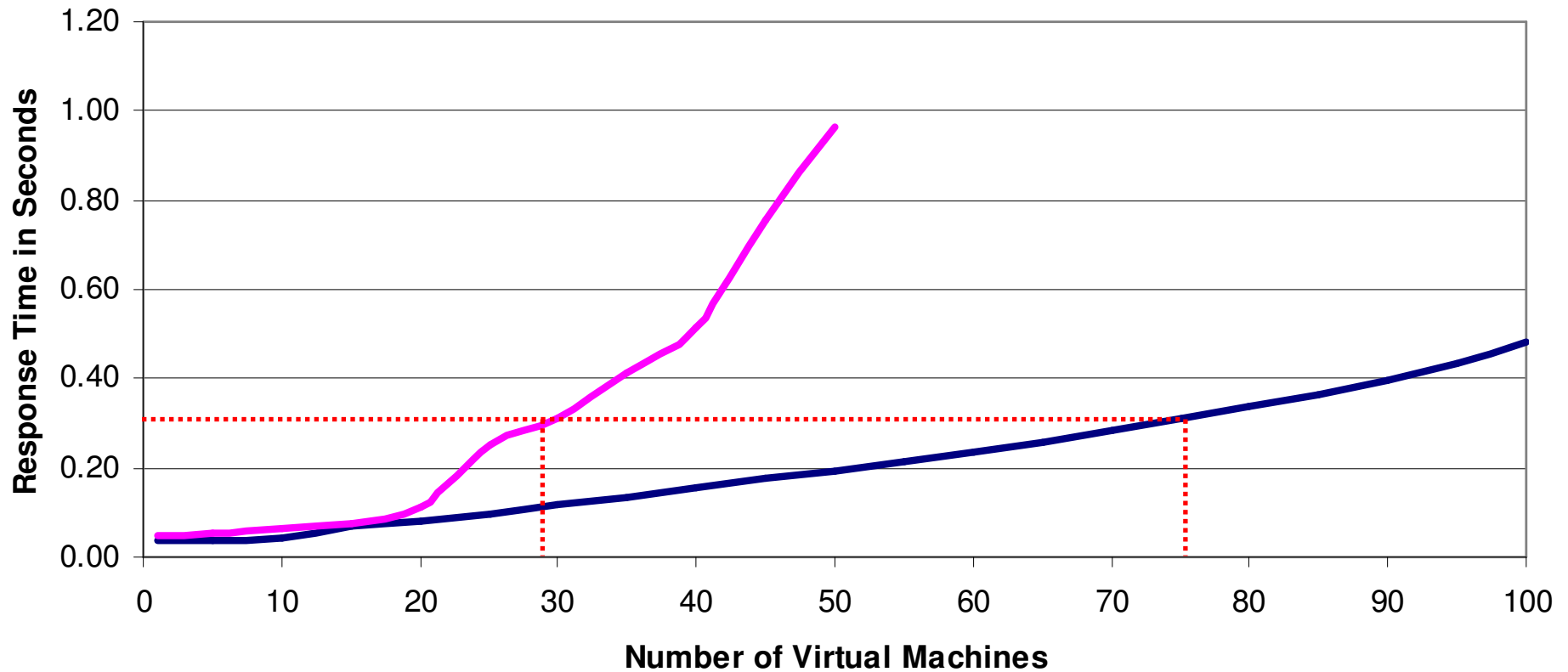
Throughput Comparison

Standalone Server
CPU: 5%
TP: 4.53 trans/sec
RT: .22 sec
TT: .18 sec

Throughput Comparison

z/VM — x86 Hypervisor

(Chart: Total tps vs. Number of Virtual Machines)
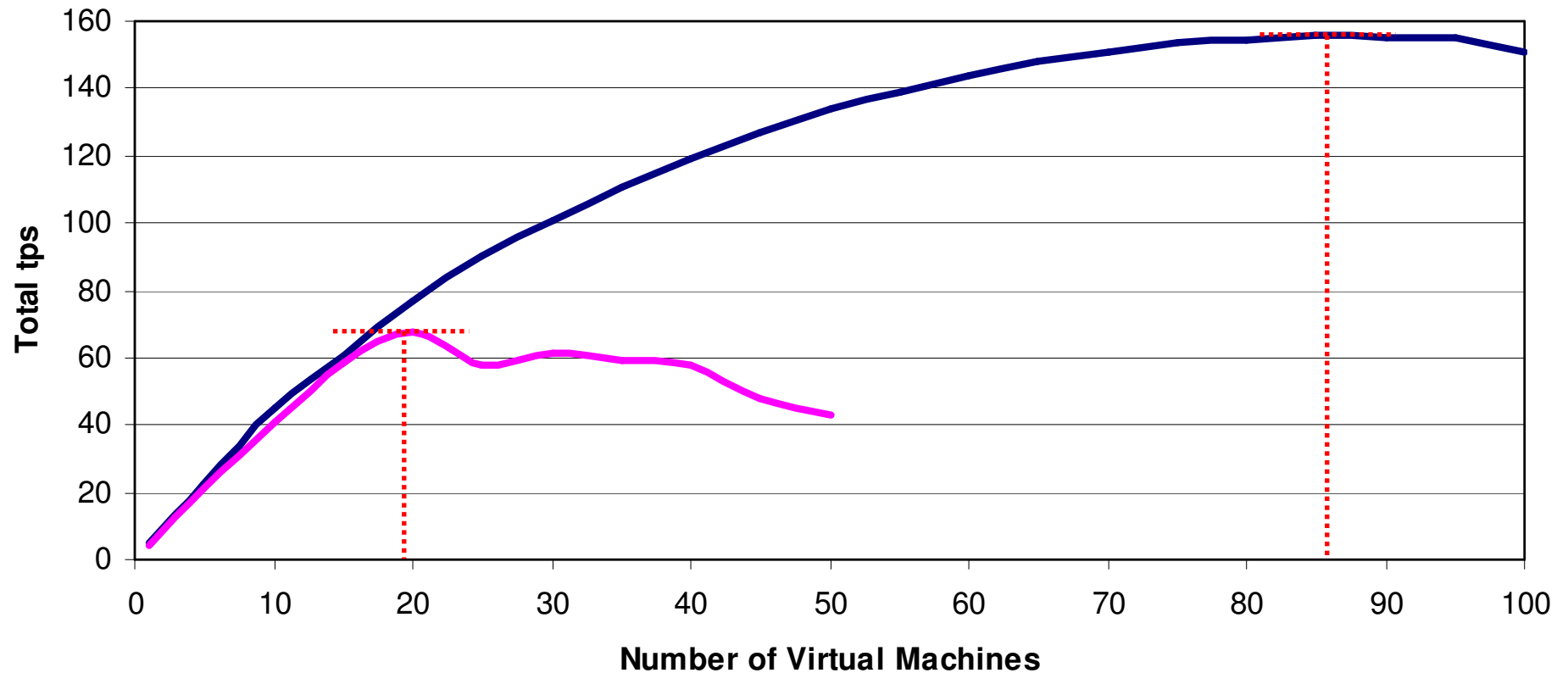
Utilization Comparison

Standalone Server
CPU: 5%
TP: 4.53 trans/sec
RT: .22 sec
TT: .18 sec

Utilization Comparison

z/VM ▬▬ x86 Hypervisor
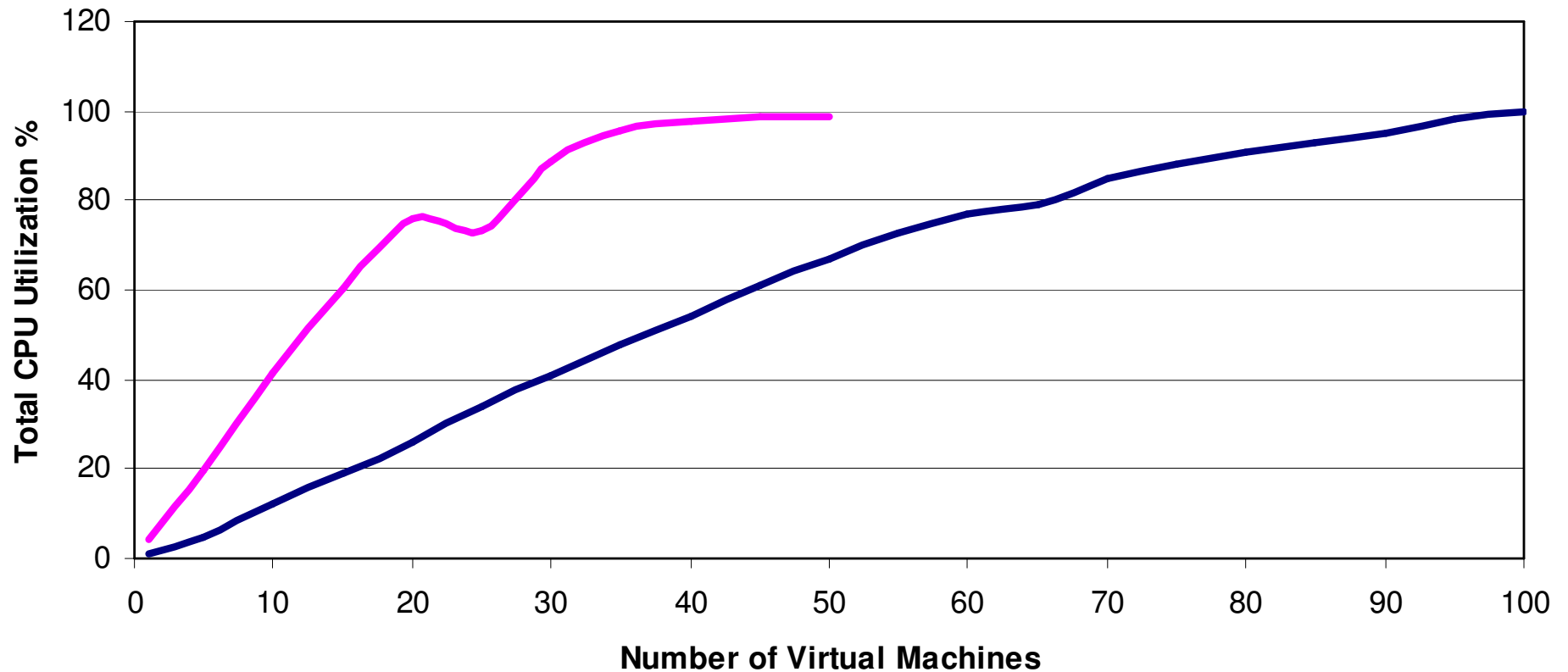
Cost Per Image for Linux Workloads (5 Yr TCO)

Private Cloud Cost Advantage

- $387K — Buy Standalone Servers
- $289K — Public Cloud (Amazon)
- $87.7K — Private Cloud x86 hypervisor
- $68.8K — Private Cloud Linux on z Add IFL's To z10 EC

Cost per Workload/Image
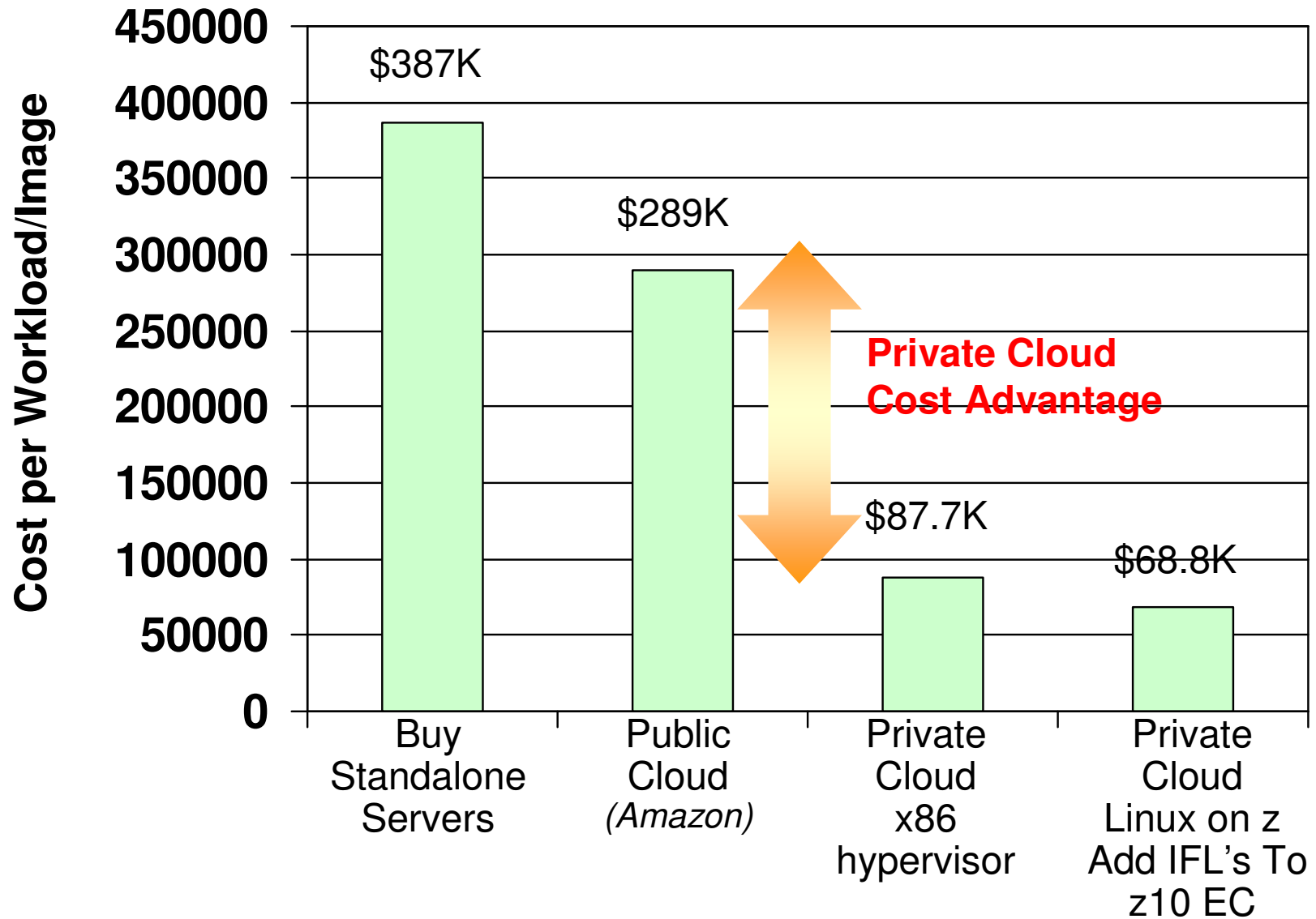
Linux on System z and x86 Hypervisor are Close in Total TCO

- ## However System z provides better qualities of service

  - Better platform reliability and serviceability

  - Higher I/O bandwidth

  - Opportunity to use RACF for consistent security

  - Systematic disaster recovery for Linux on System z workloads

- ## And there are additional System z cost savings

  - Low cost of disaster recovery backup (Backup capacity on demand)

  - Specialty processors are upgraded free when upgrading

  - Smooth predictable growth of capacity as workloads grow

Putting it all together
An architectural model for cloud computing

Service Request & Operations

IT Infrastructure & Application Provider

Service Creation & Deployment

Service Request & Operations

End User Requests & Operators

. . .

Service Catalog Request UI APIs

IT Infrastructure & Application Provider

Datacenter Infrastructure

Services

Service Catalog,

Service Management Center for System z

User Request Management/Self Service Portal

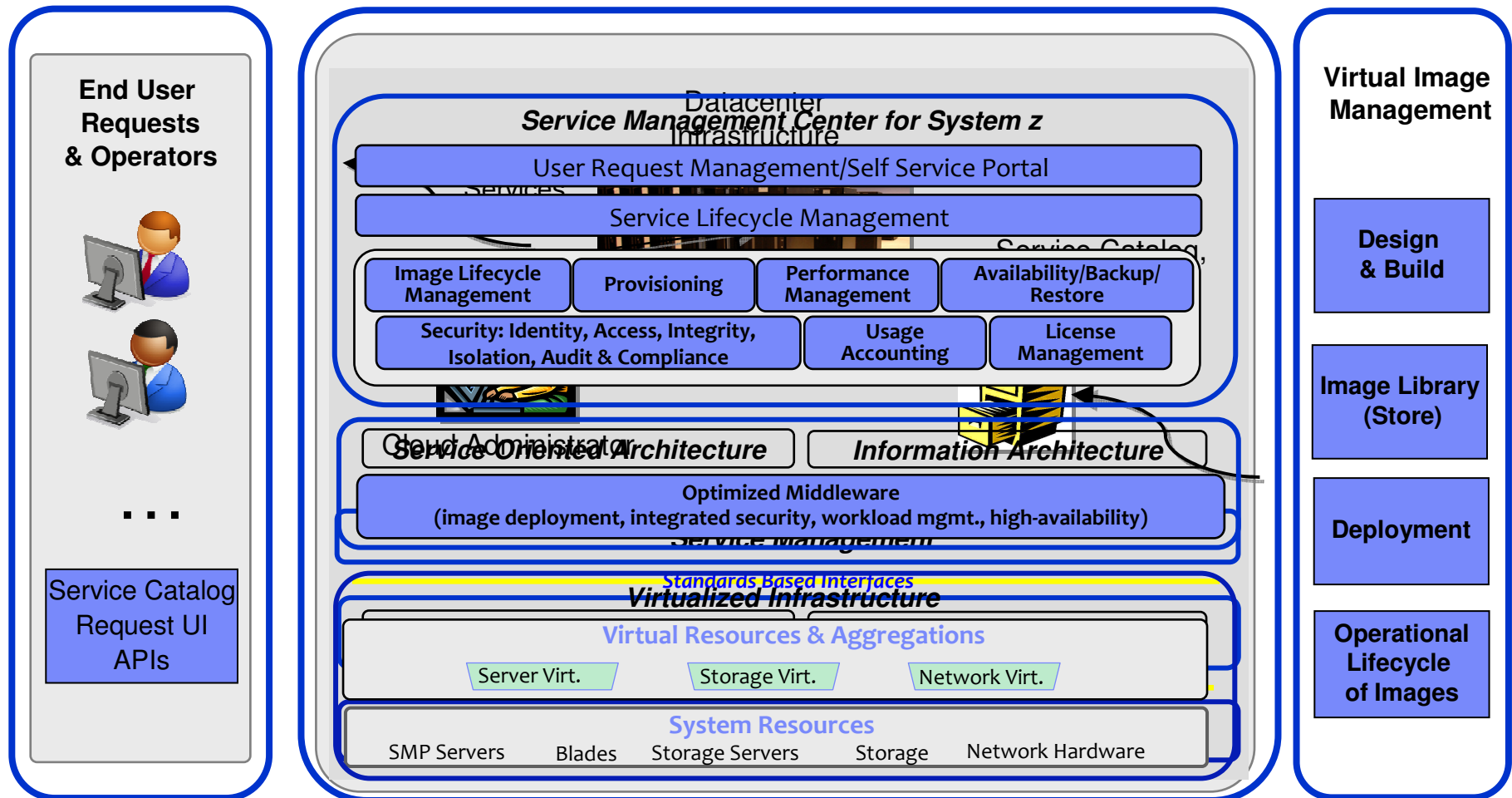| Service Lifecycle Management |
|---|

Image Lifecycle Management	Provisioning	Performance Management	Availability/Backup/ Restore

Security: Identity, Access, Integrity, Isolation, Audit & Compliance	Usage Accounting	License Management

Cloud Administrator

Service Oriented Architecture	*Information Architecture*

Optimized Middleware (image deployment, integrated security, workload mgmt., high-availability)

Service Management

Standards Based Interfaces

Virtualized Infrastructure

Virtual Resources & Aggregations

Server Virt.	Storage Virt.	Network Virt.

System Resources

SMP Servers	Blades	Storage Servers	Storage	Network Hardware

Service Creation & Deployment

Virtual Image Management

Design & Build

Image Library (Store)

Deployment

Operational Lifecycle of Images

IBM Service Management Center for System z

A Service Management and Best Practices Model for System z Clients

Manage your enterprise from System z

Enables System z as the Strategic Platform of Choice for managing the enterprise
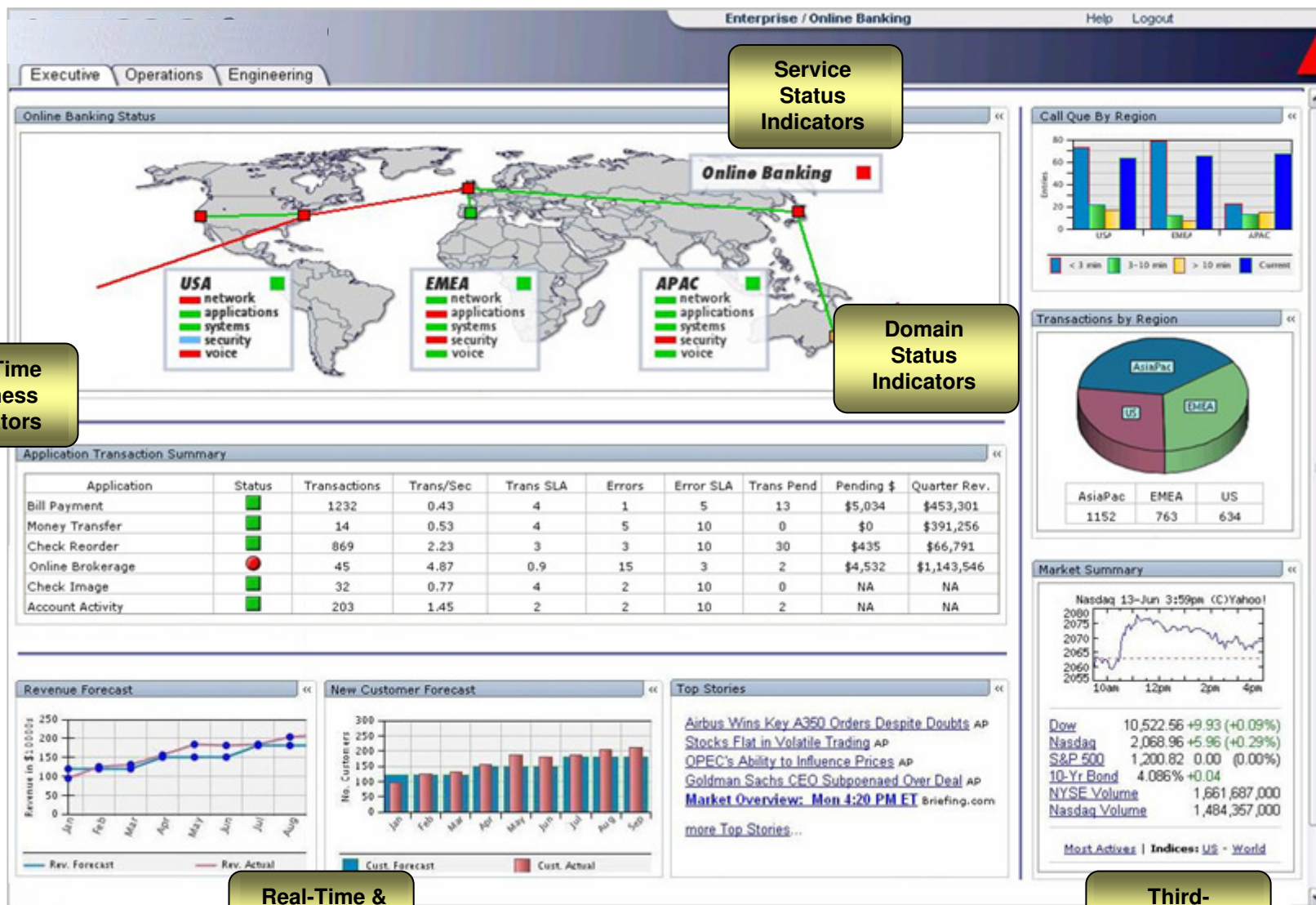
Integrate across service management & business delivery processes
– Improve visibility, reduces complexity and cost, increases efficiency

Incremental roadmap to transform to a green and cloud infrastructure
– Further realize cost savings, Increase flexibility and efficiency

Centralized Management

IBM Service Management Center for System z

Integration

Flexible Resource Management

Here's an example of visualizing service management using TBSM

Tivoli Preview Announcement

Provide Business Aligned Dashboards

Consolidate Operational Information

Visibility

Automate Service Operations

Automation

Monitor Infrastructure Resources

Automate Infrastructure Management

NEW! ...rage, and Asset M...

NE... ...bility
Ma... ...ement
N...

M... ...MON

Centralized Management

IBM Service Management Center for System z

Integration

Flexible Resource Management

Fulfill Service Requests

Align, Control Assets and Resources to Business Priorities

Map Service Dependencies to Infrastructure

Manage Risk and Compliance

Control

Product Preview Summary

- IBM Tivoli is committed to bringing System z solutions that:

  - Expand System z capabilities while enhancing its proven strengths

  - Reduce the costs associated with operational and systems management

- Integrate and Interoperate

  - Maintaining our leadership in enhancing System z hardware and software to integrate and interoperate with new platforms and applications

- End to End Solutions

  - Providing End-to-End management solutions to find and fix problems quickly, leveraging System z and Tivoli Solutions

- Enabling Cloud implementations

For more information:

- Read the IBM Tivoli Technology Preview Announcement on www.ibm.com

- Visit the IBM booth at the SHARE Technology Exchange

- Join us tomorrow at 12:15 p.m. for a Lunch & Learn for a more detailed look at Cloud Computing

- Visit ibm.com/software/tivoli/itservices

Questions ?