

Smart Work for a Smarter Planet:

## Business Aligned IT Discovery Series 2009.

Get Instrumented, Intelligent, and Interconnected.  
And Ready for a Smarter Planet.



# Deploying a Dynamic Infrastructure Virtualization Priorities, Capabilities, Experiences

Hemant S Shah

ASEAN Executive: Dynamic Infrastructure, Cloud  
Computing, Green IT,  
Systems and Technology Group  
IBM Singapore



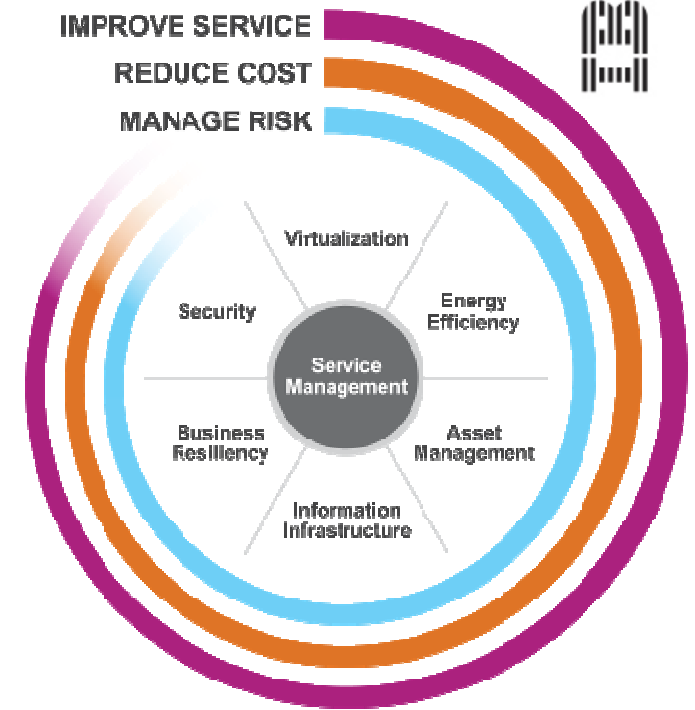
# Deploying a Dynamic Infrastructure

Virtualization Priorities, Capabilities and Experiences

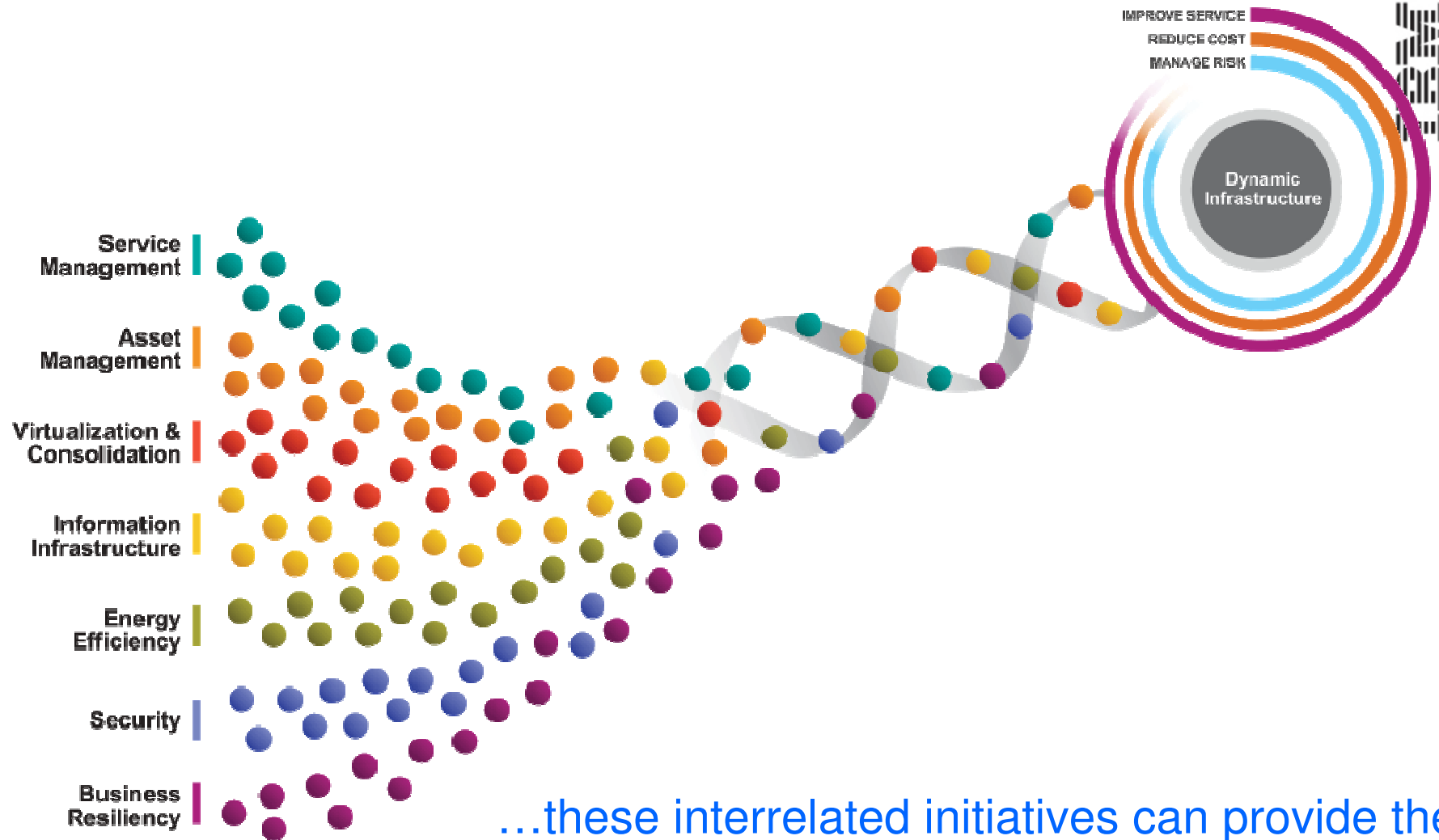


## Agenda

- An overview of Virtualization
- How Virtualization is being exploited in the market
- How ISM Group applies Virtualization
- Business and IT priorities for Virtualization
- How IBM is enabling Virtualization with our clients
- Current Virtualization capabilities
- Customer successes deploying Virtualization

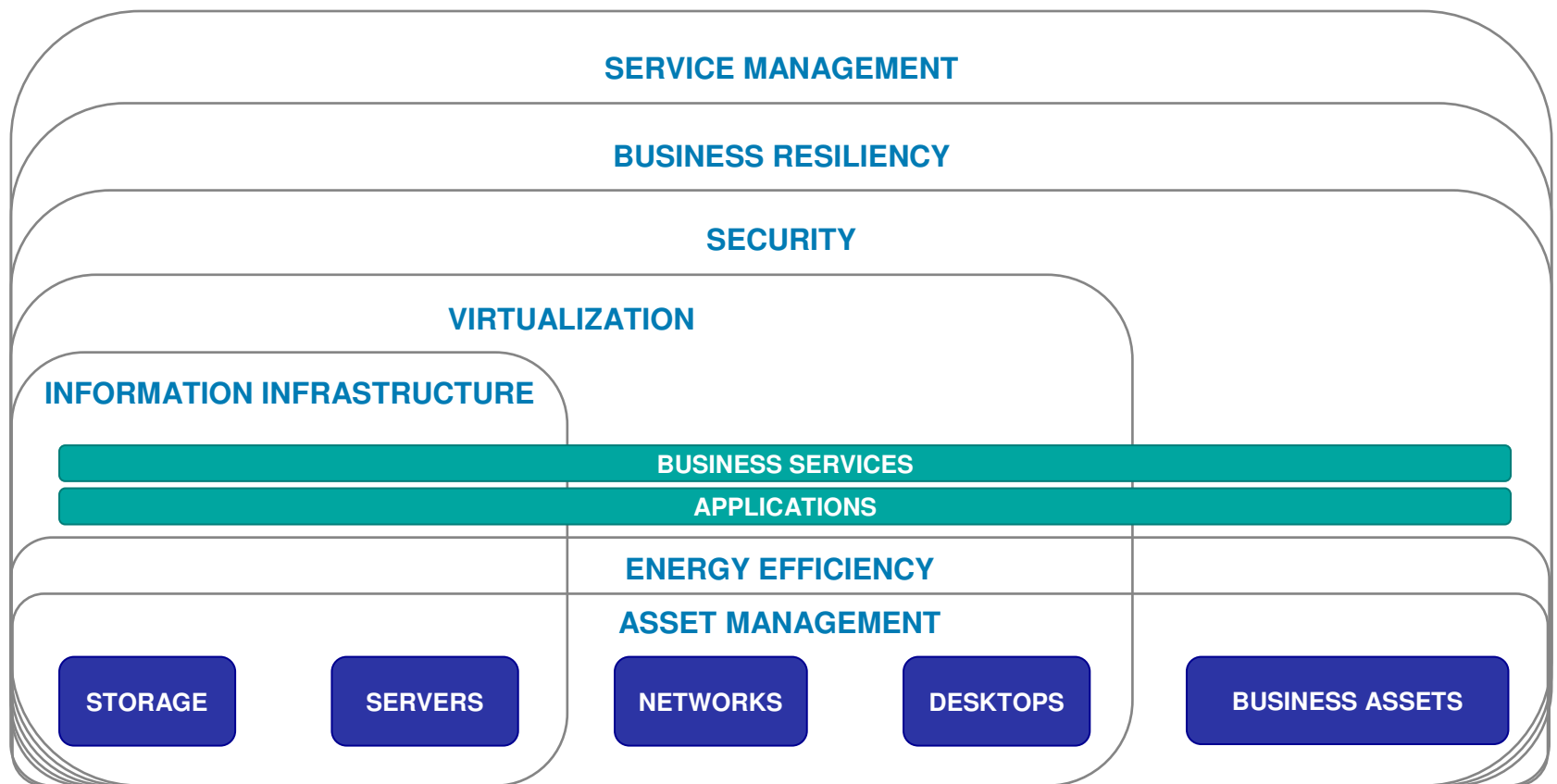


# A dynamic infrastructure is a journey with different stages of adoption...

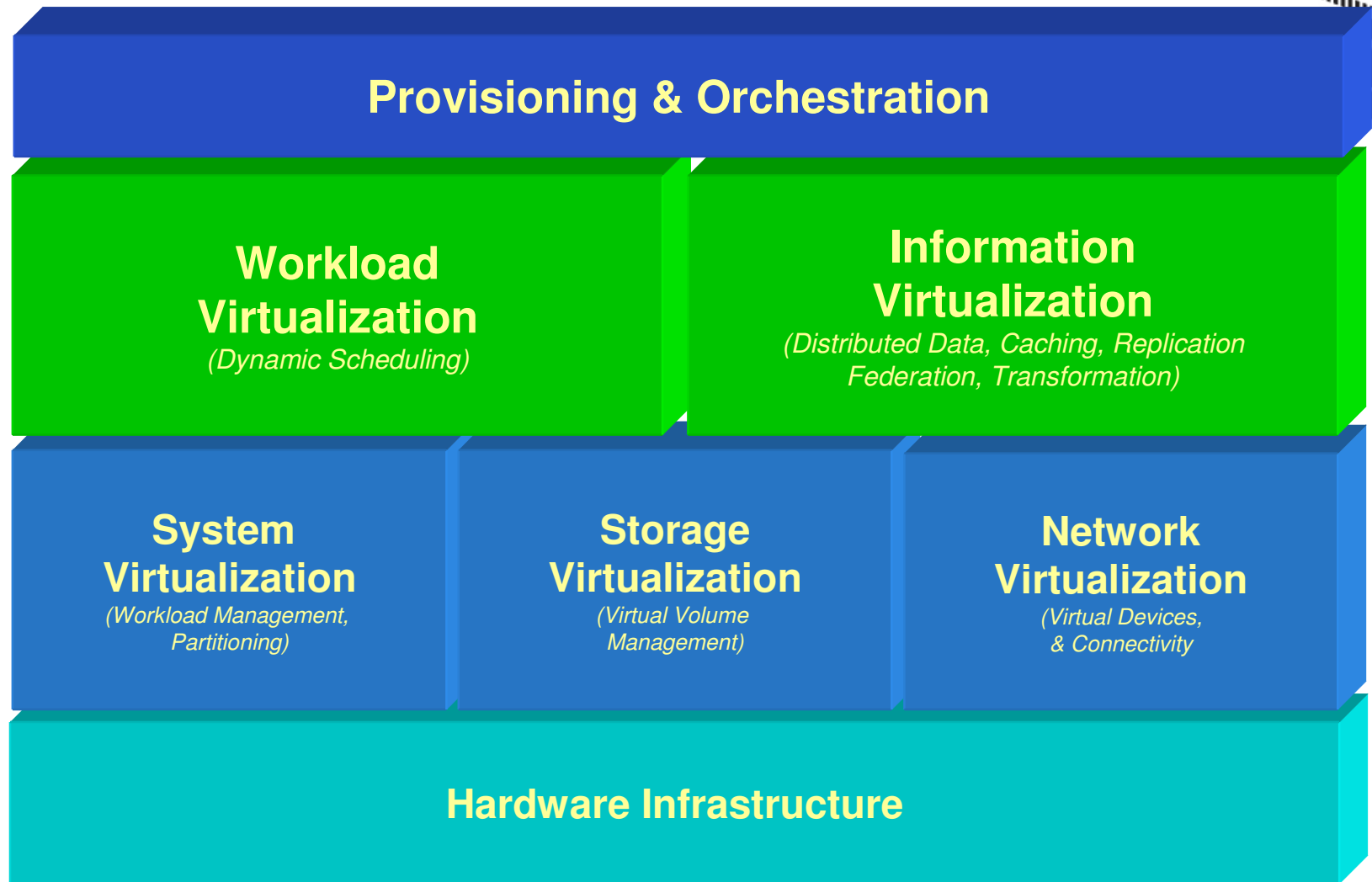


...these interrelated initiatives can provide the DNA needed to thrive in a smarter planet.

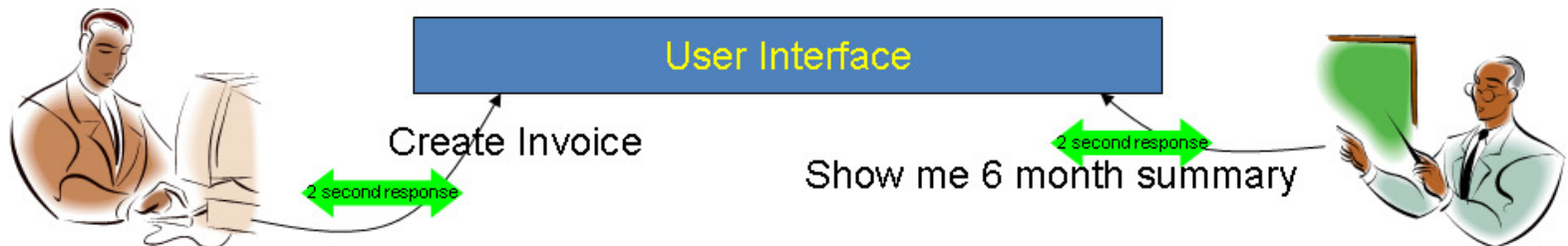
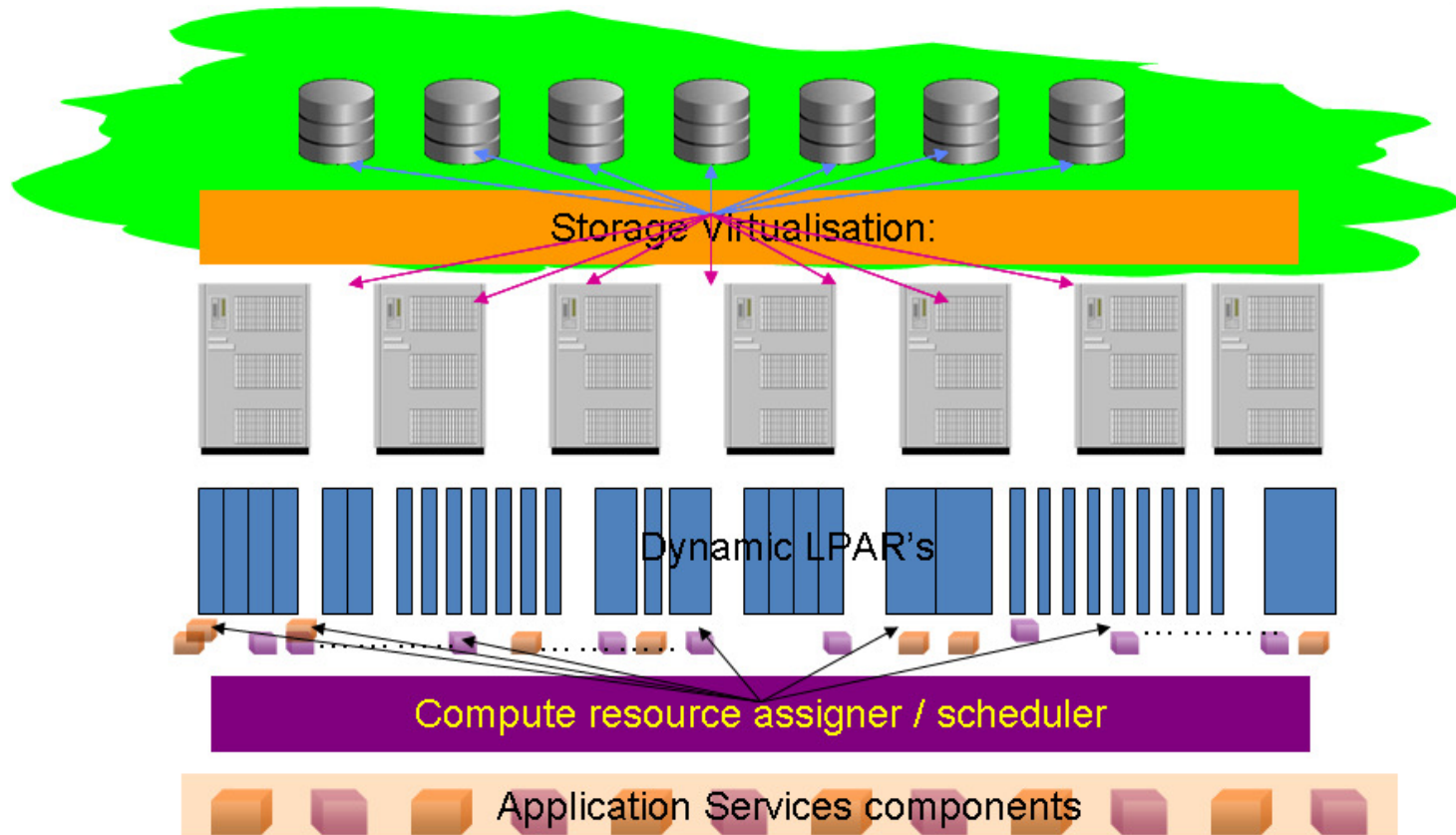
# Virtualization delivers capability for a portion of infrastructure, applications and business services



# Composite or Layered Virtualization



# Virtualization Tiers



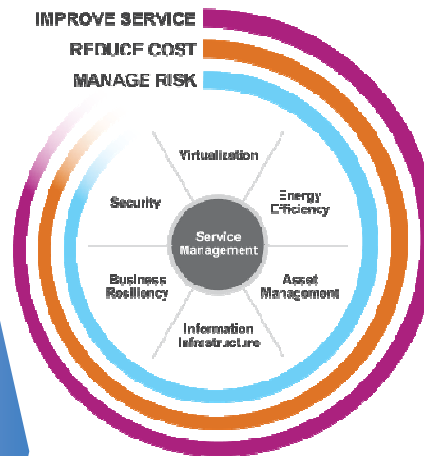
# Management is key to successful virtualisation



**Systems Director =  
Platform Management**

**Detailed “care and feeding”  
of IBM hardware.**

- ✓ Tell me what I have.
- ✓ Let me install & configure it.
- ✓ Tell me if it's working.
- ✓ Let me update it.



**TotalStorage  
Productivity Center =  
Storage Management**

**Detailed “care and feeding”  
of storage systems.**

**Tivoli.** software

**Tivoli =  
Service Management**

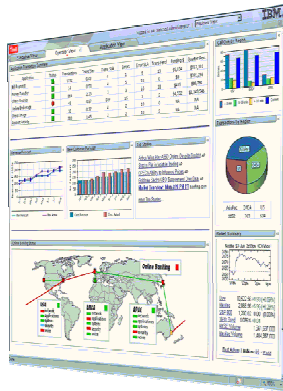
**Integrated visibility, control  
& automation across  
heterogeneous business and  
technology assets.**

- ✓ See the business.
- ✓ Govern and control the business.
- ✓ Optimize the business.

# Service Management empowers Virtualization



## Visibility



## Control



## Automation



.....to create a Dynamic Infrastructure

- Virtualization enables the perception of Infrastructure as a “SERVICE”.
  - Visibility, Control and Automation : simplify the management of this service.
  - Monitoring, Provisioning, detection, Alerts trapping and policy based responses to these alerts, feedback between workload levels and resource allocation changes to virtual servers all combine to deliver a highly responsive, cost effective and flexible Infrastructure Service to the Applications domain! In other words: a **Dynamic Infrastructure!**



# The role of virtualization is expanding

*A Dynamic Infrastructure can also provide a great foundation to construct a more efficient platform for delivering cloud based services*



**Cloud**

## **Physical Consolidation**



- Improve utilization
- Reduce costs
- Lower power usage

## **Advanced Virtual Resource Pools**



- Decouple complexity from scale
- Share resources optimally
- Automate workload management
- Simplify HA & DR

## **Service Management**



- Discover, monitor, meter, secure and automate deployment of virtualized resources
- Assure SLA achievement
- Optimize service placement
- Integrated virtualization management with IT processes

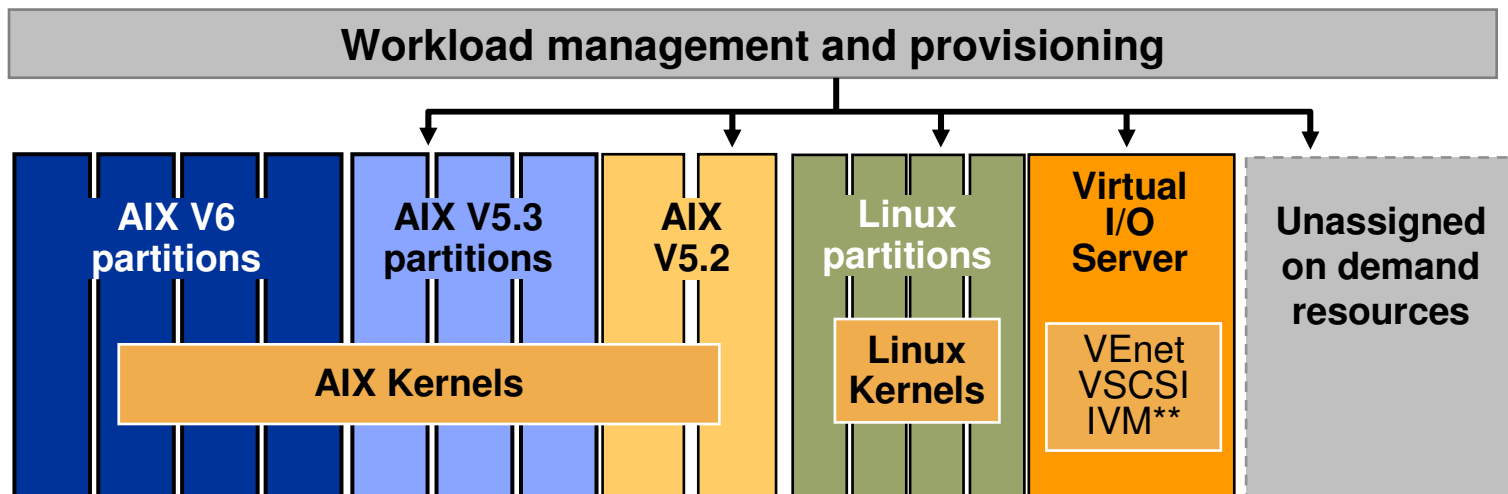


- Always available
- Elastic scaling
- Pay for use
- Automated provisioning
- Simplified user interface

# Virtualization Deployment progression



- Create a number of partitions of different sizes in a LARGE box.
  - Each partition runs a suitable OS and software stack needed by specified applications. Each application deployed on the designated partition. Partition = Virtual Server!
  - Virtual Server size is dynamically changed, depending on the workload of the corresponding application.
  - If an application completes it's function, the virtual server's CPU and memory resources are returned to the common pool, and the server disappears! Alternately, another job with it's own requirements of OS and runtime software stack is started up, and the size of the server is tweaked as required.
- If a particular application faces a sudden demand, increase the Virtual Server size... other partitions (or Virtual Servers) can be "shrunk" to provide this expansion of the loaded server.
- Each "box" is configured with one or two tiny partitions which are inactive, but are earmarked to be fail-over servers for other production partitions on other boxes. Hence, no extra boxes are needed to provide fail-over (i.e. HA) functionality.

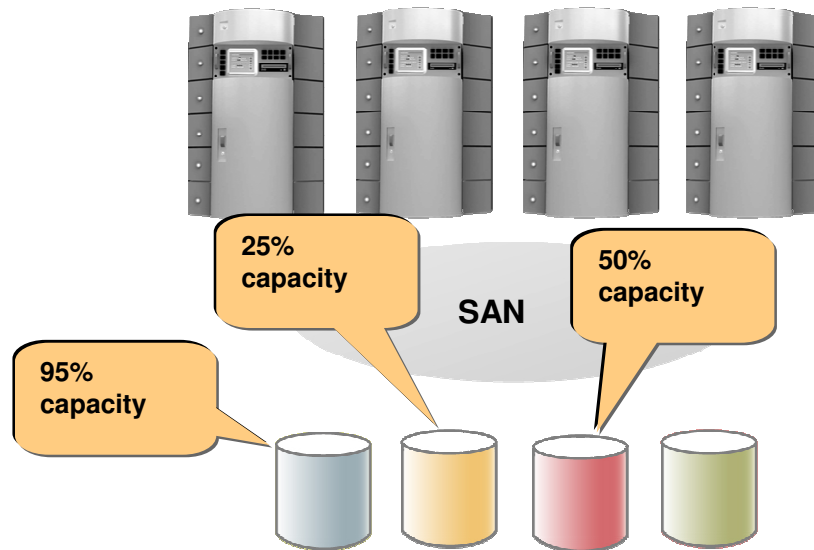


# Virtualization Deployment Progression



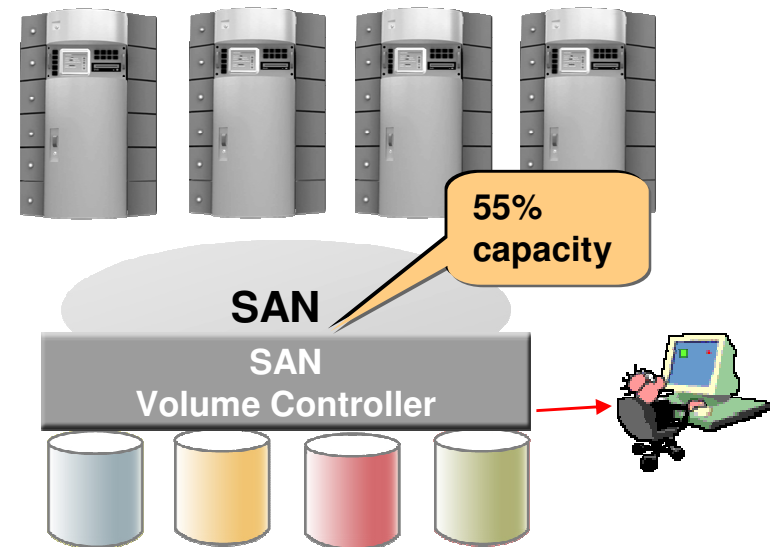
## Traditional SAN

- **Capacity is isolated in SAN islands**
- **Multiple management points**
- **Poor capacity utilization**
- **Capacity is purchased for, and owned by individual processors**

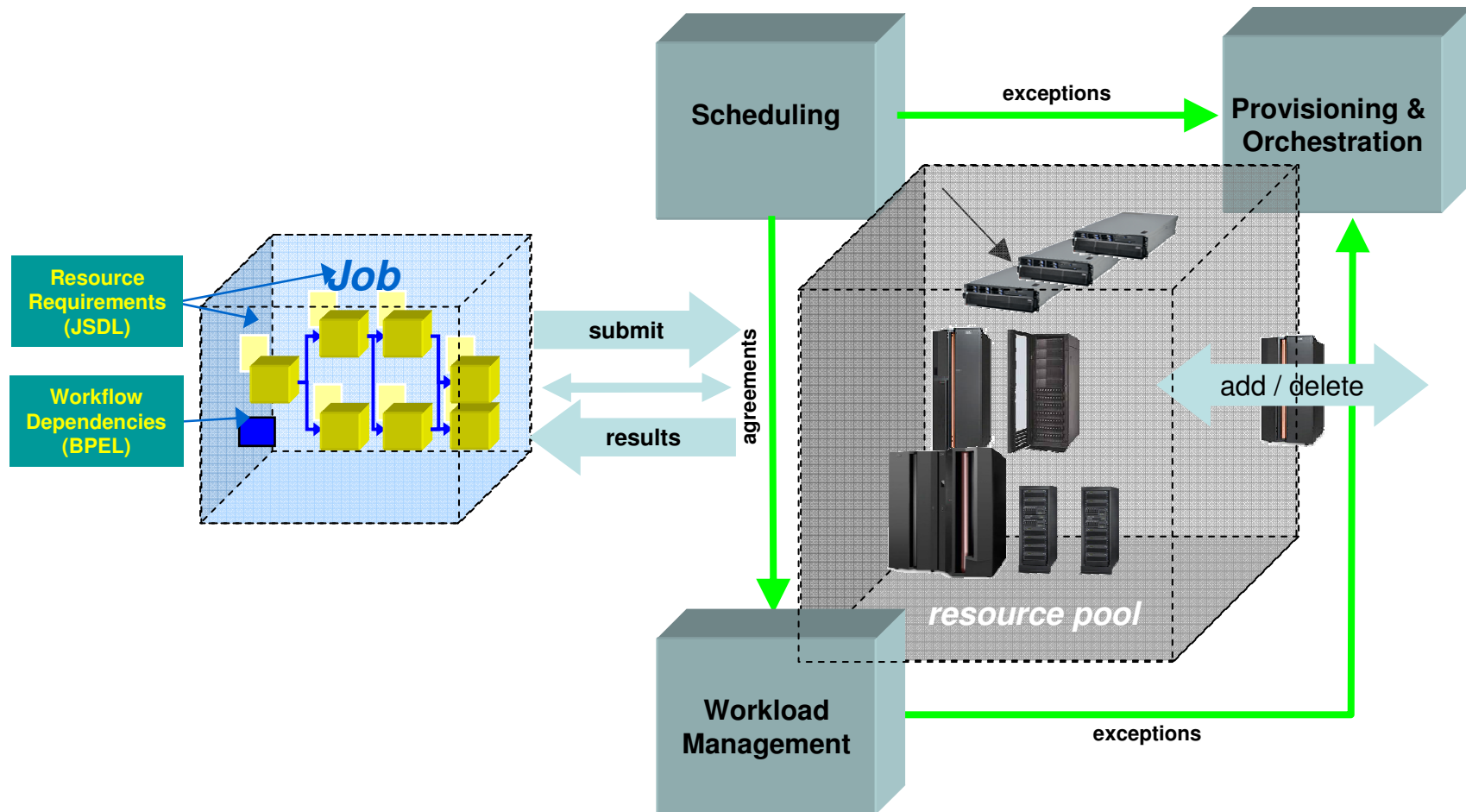


## SAN Volume Controller

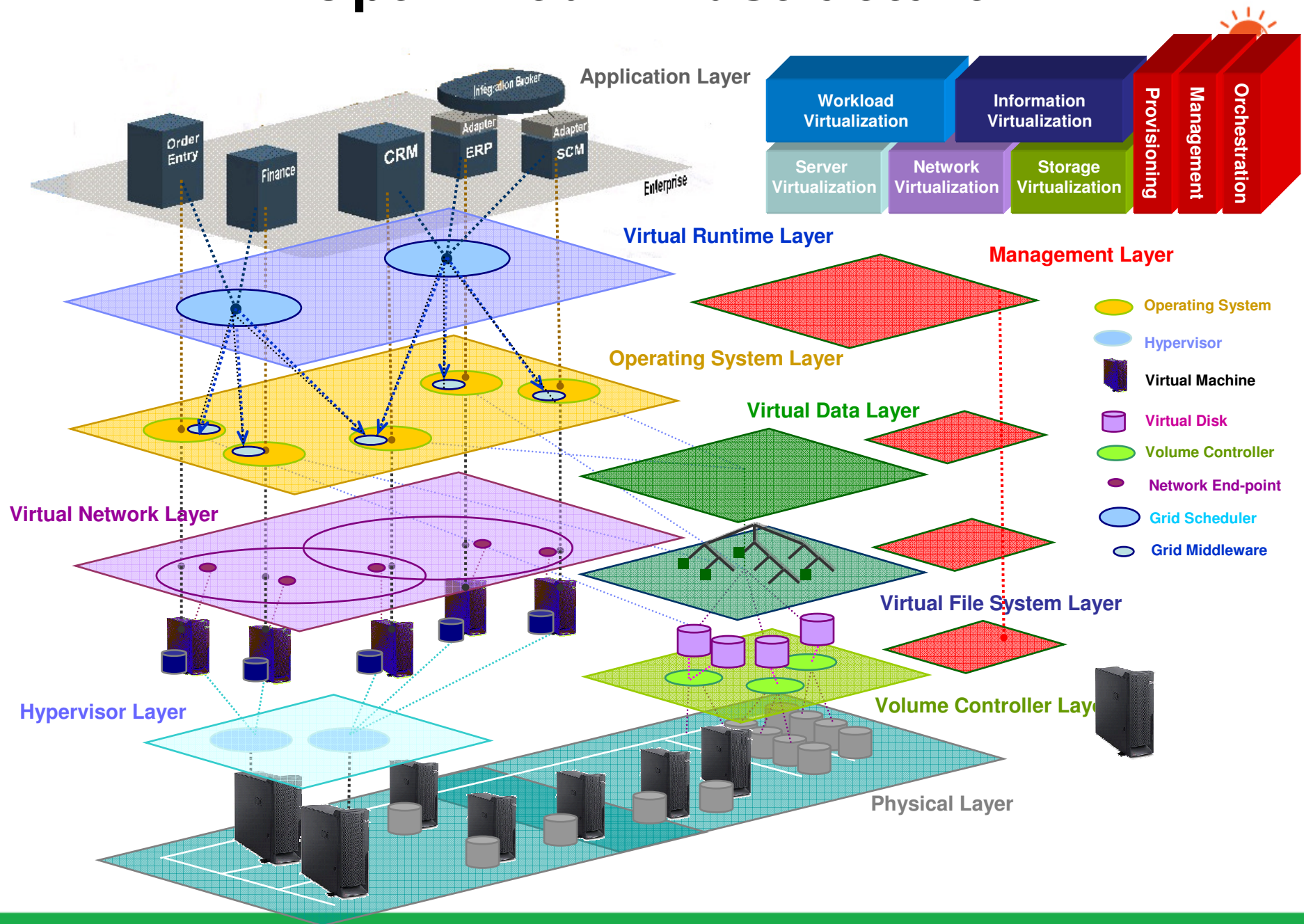
- **Combines capacity into a single pool**
- **Uses storage assets more efficiently**
- **Single management point**
- **Capacity purchases can be deferred until the physical capacity of the SAN reaches a trigger point.**



# Workload Virtualization



# Optimized Infrastructure?



# ISM Company: Virtualization



The screenshot shows a virtualized ISM Company interface. At the top, it displays 'G2G3.COM', the 'IBM' logo, 'Game Page', 'eBoard™', and a clock showing '14:00:00'. The main area is a 3D isometric view of a city and shipping yard with various icons representing different aspects of the business. At the bottom, there are three data panels: 'Round 1', 'International', and 'Domestic'. The 'Round 1' panel shows 'Availability 100%', 'Impact 0%', and 'Shipments 0 / 96'. The 'International' panel shows a list of flight numbers and their status (e.g., '14:02 IJP824 1 Queued'). The 'Domestic' panel shows a list of flight numbers and their status (e.g., '14:01 DAK681 1 Queued').

Round	1
Availability	100%
Impact	0%
Shipments	0 / 96
Max Rev	\$850,000
Actual Rev	\$0
Lost Rev	\$0

International
14:02 IJP824 1 Queued
14:02 ICN935 2 Queued
14:02 IJP295 3 Queued
14:02 ICN092 4 Queued
14:04 IGB609 1 Queued
14:04 IBR711 2 Queued
14:04 IGB894 3 Queued
14:04 IBR269 4 Queued

Domestic
14:01 DAK681 1 Queued
14:01 DME700 2 Queued
14:01 DAK458 3 Queued
14:01 DME976 4 Queued
14:03 DKY461 1 Queued
14:03 DMT362 2 Queued
14:03 DKY247 3 Queued
14:03 DMT289 4 Queued

Mergers and acquisitions enabled through speed and flexibility

Dynamically respond to increased demand during peak periods

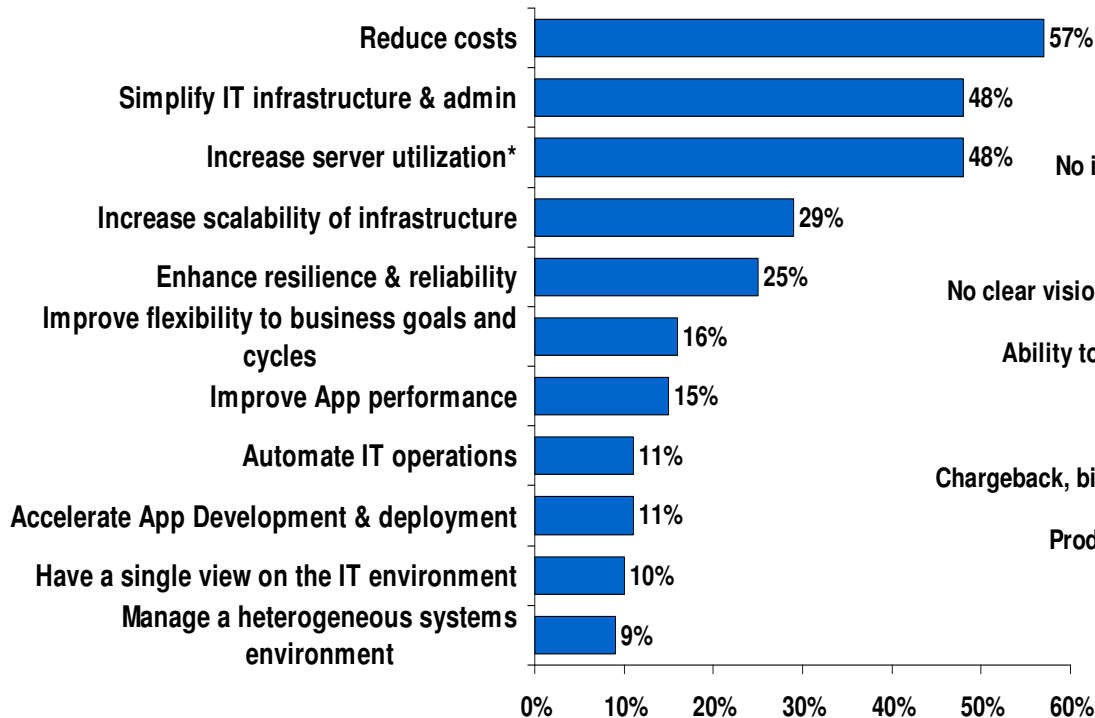
New applications can be deployed more quickly

Reduce costs: HW, energy & Labour

# Virtualization needs and challenges amongst those implementing

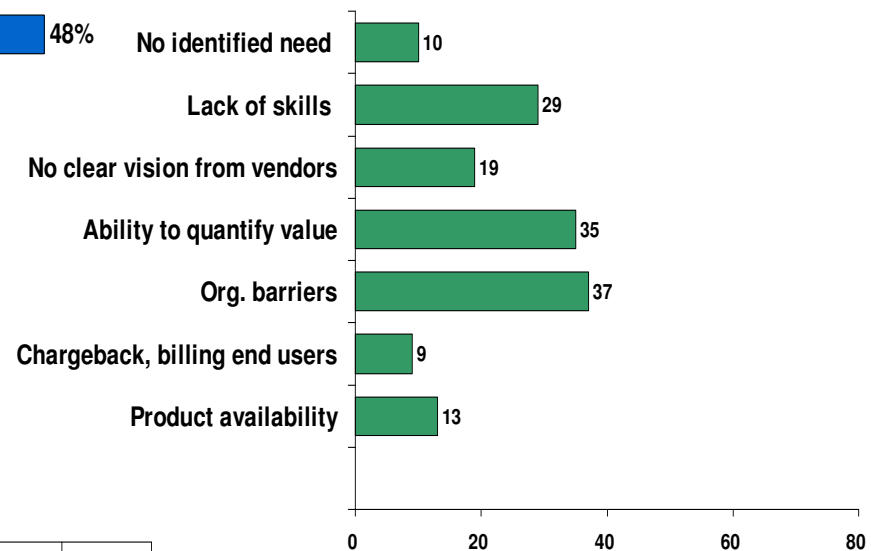


## Motivators



Source: IBM Systems Directions 1Q 2006

## Inhibitors amongst Implementing



Source: IBM Systems Directions 1Q 2006

*\* 'People worry they might not get enough resources. They believe they will get less than they need.'*

(Mgr. IT Germany)

*'It's a matter of convincing people at the beginning because they won't have their own hardware. For us, virtualization worked so long as it was on one platform, but then platforms were assigned to different departments and those departments now had to work together.'*

(Dir. IT Germany)

*'It involves trying to convince people not to order servers but to allow resources to be pooled into a virtual environment...trying to convince the business stakeholders to do this. The first moment someone has a problem, they will blame the virtualization.'* (VP IT; US)

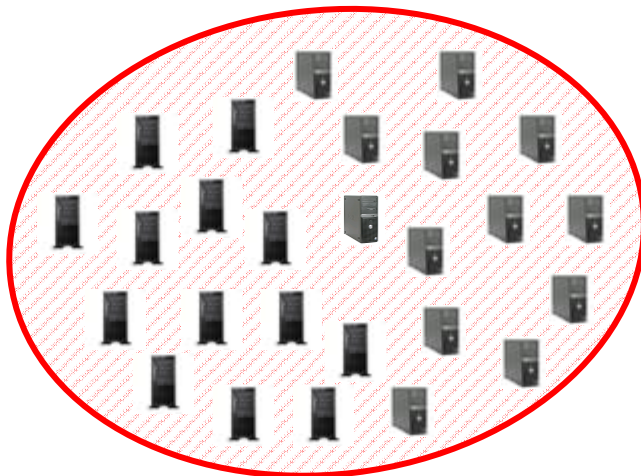
Source: ITS Virtualization Research Feb 2006

# Real client example



## Initial Situation

27 Physical Servers & 45 Logical Servers



## Final Situation

2 Physical Servers & 45 Logical Servers



## Cost elements

### Capital expenditures

- Server grown and refre



### •Operations cost

- Software maintenance
- Hardware maintenance
- Labor
- Facilities (power, cooling, floor)

### One time costs

- Migration
- HW and SW purchases



# Where does Increased Productivity rank in your current Business priorities?



## Select the most appropriate answer

1. Our organization is not currently focused on increasing productivity of resources and personnel.
2. Our organization is focused on delaying investments and redeployment of existing resources.
3. Our organization is focused on adopting various schemes and best practices for increasing efficiencies of monies invested.
4. Our organization is focused on reducing both operational and CapEx costs, while increasing the productivity of staff as well as equipment.

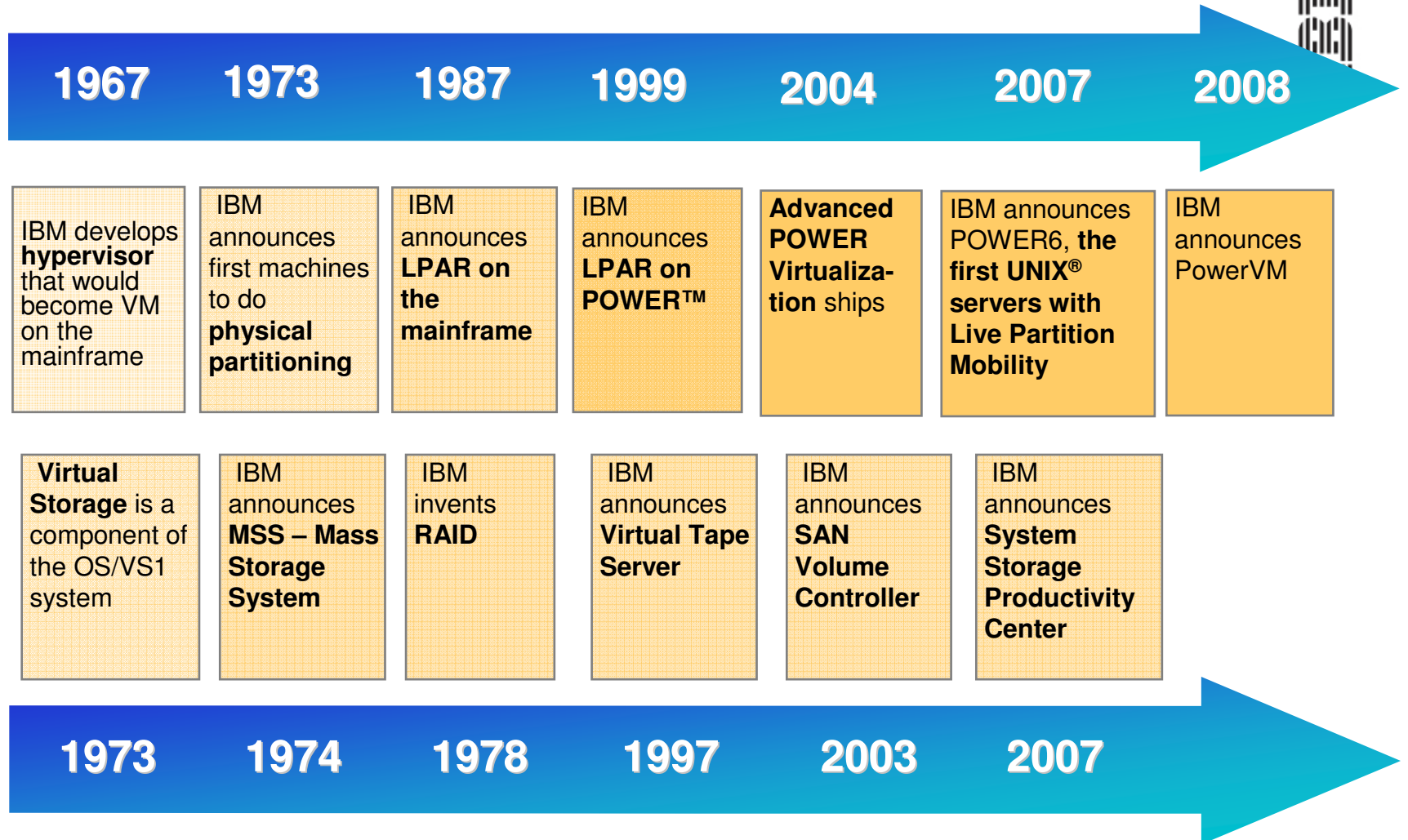
# Where does Virtualization rank in your current IT priorities?



## Select the most appropriate answer

1. Our organisation is not currently focused on implementing Virtualization solutions.
2. Our organisation is focused on implementing Virtualization only on new server acquisitions.
3. Our organisation is focused on implementing Virtualization where it has a direct impact on operational costs and CapEx reduction.
4. Our organisation is focused on implementing a fully Virtualized infrastructure, and an automated provisioning system for increased productivity of all resources.

# IBM's 40-year history of leadership in virtualization



# Building on your existing infrastructure

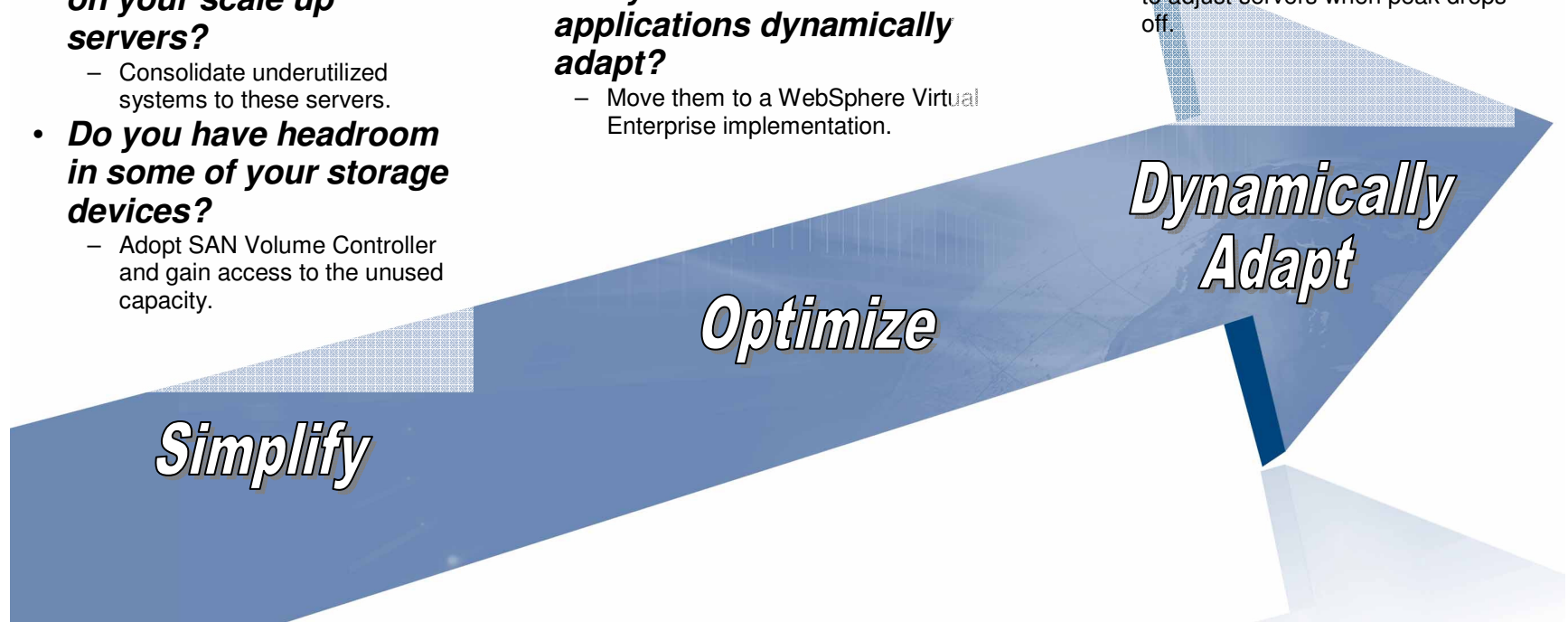


## Some examples

- **Do you have headroom on your scale up servers?**
  - Consolidate underutilized systems to these servers.
- **Do you have headroom in some of your storage devices?**
  - Adopt SAN Volume Controller and gain access to the unused capacity.

- **Can you dynamically move resources from one OS instance to another?**
  - Implement mobility technologies such as PowerVM and VMotion.
- **Can your J2EE applications dynamically adapt?**
  - Move them to a WebSphere Virtual Enterprise implementation.

- **Can you deliver your IT resources as services?**
  - Implement business driven service management with Tivoli Service Management products interoperating with your current systems management solution.
- **Can your servers draw less power when demand is low?**
  - Implement Active Energy Manager to adjust servers when peak drops off.



# Virtualization offerings and capabilities from IBM



## VIRTUALIZATION OFFERINGS FROM IBM

- Strategy and planning services
- Virtualized servers and storage
- Server consolidation efficiency studies
- Server and storage virtualization solutions
- Virtualization management solutions
- Virtualization and consolidation services
- Application infrastructure virtualization
- Client virtualization solutions
- Network optimization solutions
- Implementation services
- Financing and IT asset disposal services

## IBM LEADERSHIP

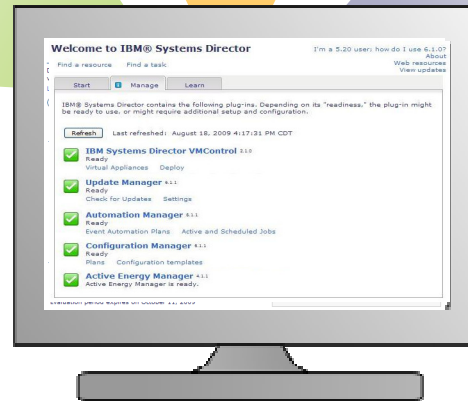
- More than 40,000 clients benefiting from IBM system-level virtualization
- More than 10,000 IT optimization engagements
- 100 percent of IBM mainframes are designed to be delivered virtualization ready
- Remote managed infrastructure services from IBM typically reduce monitoring and management related costs by more than 20 percent
- IT transformations that have consolidated thousands of servers onto approximately 30 IBM System z mainframes
- Recognized leader in storage services,<sup>1</sup> IT consolidation consultancy services,<sup>2</sup> network consulting and integration services<sup>3</sup> and virtual infrastructure access services
- “Most innovative use of virtual infrastructure” at VMworld Europe 2008

# Virtual system pools... a necessary next step



## VMControl System Pools

- Simplifies the management of complex and heterogeneous data centers
- Drives higher utilization and efficiencies of systems
- Enables energy efficiencies via dynamic consolidation
- Industry leading heterogeneous virtualization management



***“I need to consolidate to reduce sprawl and OPEX.”***

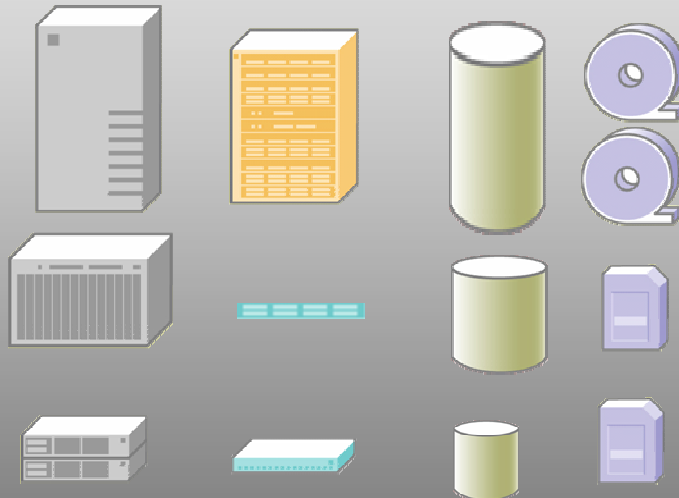
***Can improve capital utilization by 75%, while significantly reducing power and cooling costs.***

# A New Model For Building Infrastructure Environments

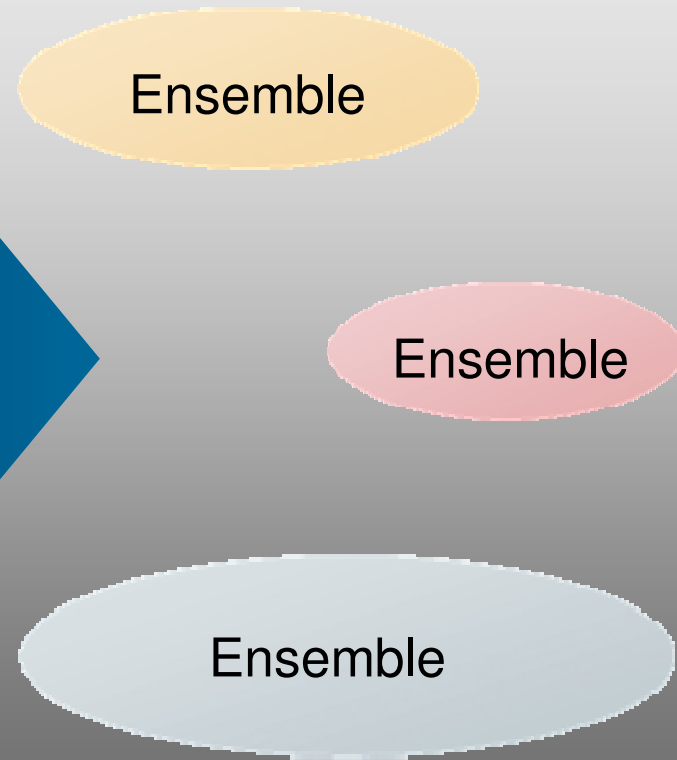
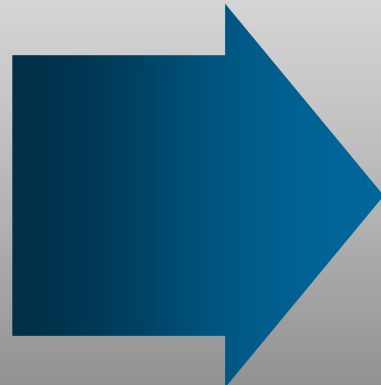


*Ensembles are scalable pools of computing power and storage capacity that are manageable as single systems. They will replace multitudes of individual IT systems and reduce the labor required for physical systems management.*

Stack Oriented



Servers    Networks    Disks    Tapes



# Ensemble Components



Ensemble

Ensemble

Ensemble

*Ensembles are a pool of resources that are managed as a single system*

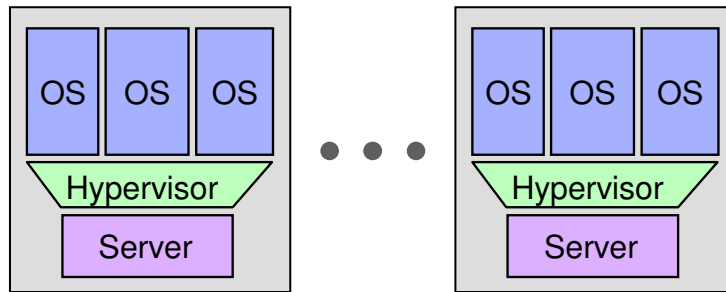
- A **pool of compatible system nodes** (need not be homogeneous)
- The **networks** which interconnect the ensemble nodes (may be local / optimized)
- Resource **virtualizers** (hypervisors, I/O virtualizers, storage virtualizers, ...)
- An **ensemble manager** appliance that provides platform management for the ensemble virtual and physical resources
- **Tools** for planning, ensemble creation, migration, image mgmt. & composition, ...
- Ensemble-local **automated optimization software** of performance, availability, energy usage, security, ... with intelligent defaults
- **Multi-system services** (locking, caching, message queuing, ...) may be integrated with some ensembles



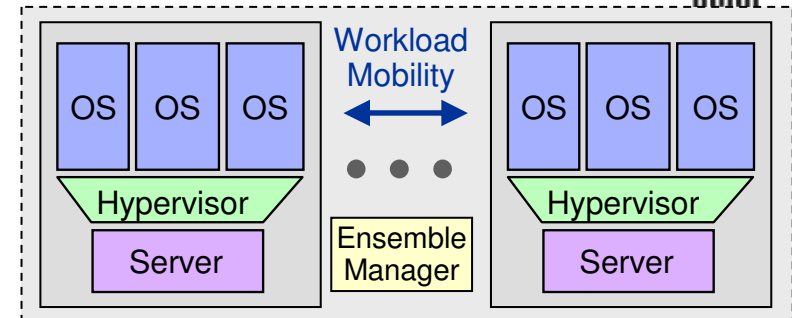
# Group of Servers vs. a Server Ensemble



**Individual Servers**



**Server Ensemble**



<b># of Things to Manage</b>	<b>N virtual servers; M physical servers</b>	<b>N virtual servers; one physical ensemble</b>
<b>Create, Test, and Maintain</b>	<b>Do it yourself; few assemblies are alike</b>	<b>Standard “off the shelf” assemblies</b>
<b>Management Automation</b>	<b>Add-on software, custom scripts, ...</b>	<b>Built-in optimizations; intelligent defaults</b>
<b>Management Interfaces</b>	<b>Many individual knobs and variables</b>	<b>Menus of selectable standard behaviors</b>
<b># of Consoles</b>	<b>Separate consoles for physical &amp; virtual</b>	<b>Single console; in-context functionality</b>
<b>Data Center Mgmt. Arch.</b>	<b>Monolithic; spans d. c. heterogeneity</b>	<b>Hierarchical; pool-level modularity</b>

# Which best describes your current Business Productivity capability?



## Select the most appropriate answer

1. Able to redeploy resources from less productive areas.
2. Conduct “appropriate” resource assignment with productivity as primary criteria for people and equipment.
3. Implementing specific measures centred on IT and automation to increase staff productivity.
4. Implementing an enterprise wide integrated capacity and utilisation audit system to ensure increased productivity of both staff and equipment.

# Which best describes your current IT Virtualization capability?



## Select the most appropriate answer

1. Some of the new servers on the Linux platform have been Virtualized.
2. All new server acquisitions on all platforms must be Virtualized, and storage Virtualization is under evaluation.
3. All servers on all platforms use Virtualization, and Storage Virtualization covers all critical systems data.
4. All servers and storage are Virtualized, and all multi-tiered applications are deployed through a job scheduling and monitoring system.

# Which best describes your current level of automation?



## Select the most appropriate answer

1. All automation is confined to OS provided and scripted jobs automation.
2. System management and alert processing has been automated and system monitoring tool is under evaluation.
3. Mission Critical applications are on appropriate Ensembles, but provisioning is still manual through operations.
4. Resource detection and provisioning of virtual computing resources is automated for program triggered demand for mission critical systems, and other applications get manual provisioning.

# Nationwide Insurance

## Using virtualization as a foundation for innovation



### Business challenge

Faced with the need to build a new, multimillion-dollar data center to cope with server proliferation and seeking to streamline application development and daily operations overall, Nationwide Insurance instead made a strategic decision to move to a flexible, virtualized IT environment.

### Solution

Nationwide deployed two IBM System z™ mainframes running Linux.® The solution is a cornerstone of Nationwide's strategy of moving all new development to virtualization and Java 2 Enterprise Edition (J2EE) as a means of "future-proofing" its IT platform. The new approach to IT has reduced environmental costs and made the development of new applications far less risky through the rapid, low-cost and efficient provisioning of server capacity. This enables Nationwide developers to try new ideas that would otherwise not have been attempted, fostering innovation and out-of-the-box thinking.

### Benefits

- US\$15 million cost savings anticipated over three years
- 85-90 percent server utilization
- 80 percent reduction in environmental costs
- Web hosting costs lowered by 50 percent

*"The ability to flexibly add capacity wherever we need it changes the whole mindset of the developers. It promotes out-of-the-box thinking, because the risk cost is so low. What virtualization really gives us is a strong foundation for innovation."*

*– Buzz Woeckener, manager of Linux, Nationwide Insurance*



**Nationwide®**  
On Your Side

### Solution Components

- IBM DB2®
- IBM System z
- IBM WebSphere® Application Server
- IBM z/VM®
- Linux

# Australian Open



## Business challenge

Tennis Australia organizes and runs the Australian Open two weeks each year, where millions of eyes and users are on the tournament's official Web site, which must deliver round-the-clock 100 percent availability.

## Solution

To help provide real-time, flexible, and scalable access to the tennis action, IBM provides a secure and self-managing infrastructure based on service-oriented architecture (SOA), and multiple geographically dispersed servers, virtualized as one, to scale up to support a massive increase in traffic more than 100 times its typical volume.

## Benefits

- Provides 100% secure tournament web-site availability
- Provides real-time analysis and prevention of malicious Internet attacks before they gain access to the website infrastructure
- Automatic detection of any active security threats, risky user behavior, performance issues and security policy violations
- 23% reduction in energy consumption; 25% reduction in cooling demands
- Flexibly adjusts to fluctuating demands to support 100x normal traffic with automatic provisioning
- Centralized management and monitoring of the security systems

*“ Making sure our Website can't get hacked into is a key issue. With IBM we have been able to keep it tightly locked up and prevent unauthorized access.”*

*-Dr. Chris Yates, CIO Tennis Australia*



**australian open**  
The Grand Slam of Asia/Pacific

# Bank of Russia

## Saving US\$400 million per year by consolidating to IBM System z9



### Business challenge

As the central bank for the Russian Federation, the Bank of Russia serves the interests of the state, the Russian people, and private businesses. Its main responsibilities include supporting the Russian currency, managing the national payment system, overseeing money and loans policies, and supervising the country's financial sector. With a variety of local payment processing systems running on more than 200 distributed servers in 74 data centers across 11 time zones, Bank of Russia faced significant challenges in terms of operational efficiency, technical support, and security.

### Solution

Working with IBM and EC-Leasing, the Bank simplified and consolidated its entire infrastructure to just four IBM System z9® Enterprise Class mainframes in two data centers. IBM Global Mirror and Metro Mirror enable mutual fail-over between the data centers, which are separated by a distance of 1,000 kilometers for disaster-protection and business resilience.

### Benefits

- Payment processing costs reduced by 95 percent, saving US\$400 million per year
- Server and data center consolidation creates further savings on hardware and software licensing, maintenance and electricity, and increases security
- Workload for technical staff has been reduced by 85 percent

*“With IBM System z, instead of buying an oversized server and growing into it over the years, we only need to pay for what we use. As volumes increase, we can ask IBM to activate more processors within the mainframe to deal with the demand. “*

*-- Mr. Mikhail Senatorov, Deputy Chairman, Bank of Russia*

### Solution Components

- IBM WebSphere MQ
- IBM Tivoli OMEGAMON
- IBM System z™
- IBM Business Partner EC-Leasing
- Linux



Smart Work for a Smarter Planet:

## Business Aligned IT Discovery Series 2009.

Get Instrumented, Intelligent, and Interconnected.  
And Ready for a Smarter Planet.



# Thank You

Hemant S Shah

ASEAN Executive: Dynamic Infrastructure, Cloud  
Computing, Green IT,  
Systems and Technology Group  
IBM Singapore

