System z Strategy and Technology Update

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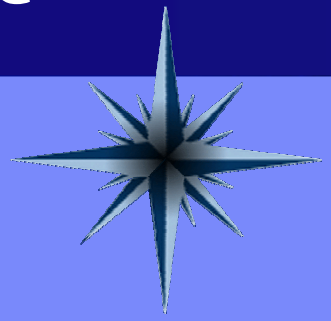
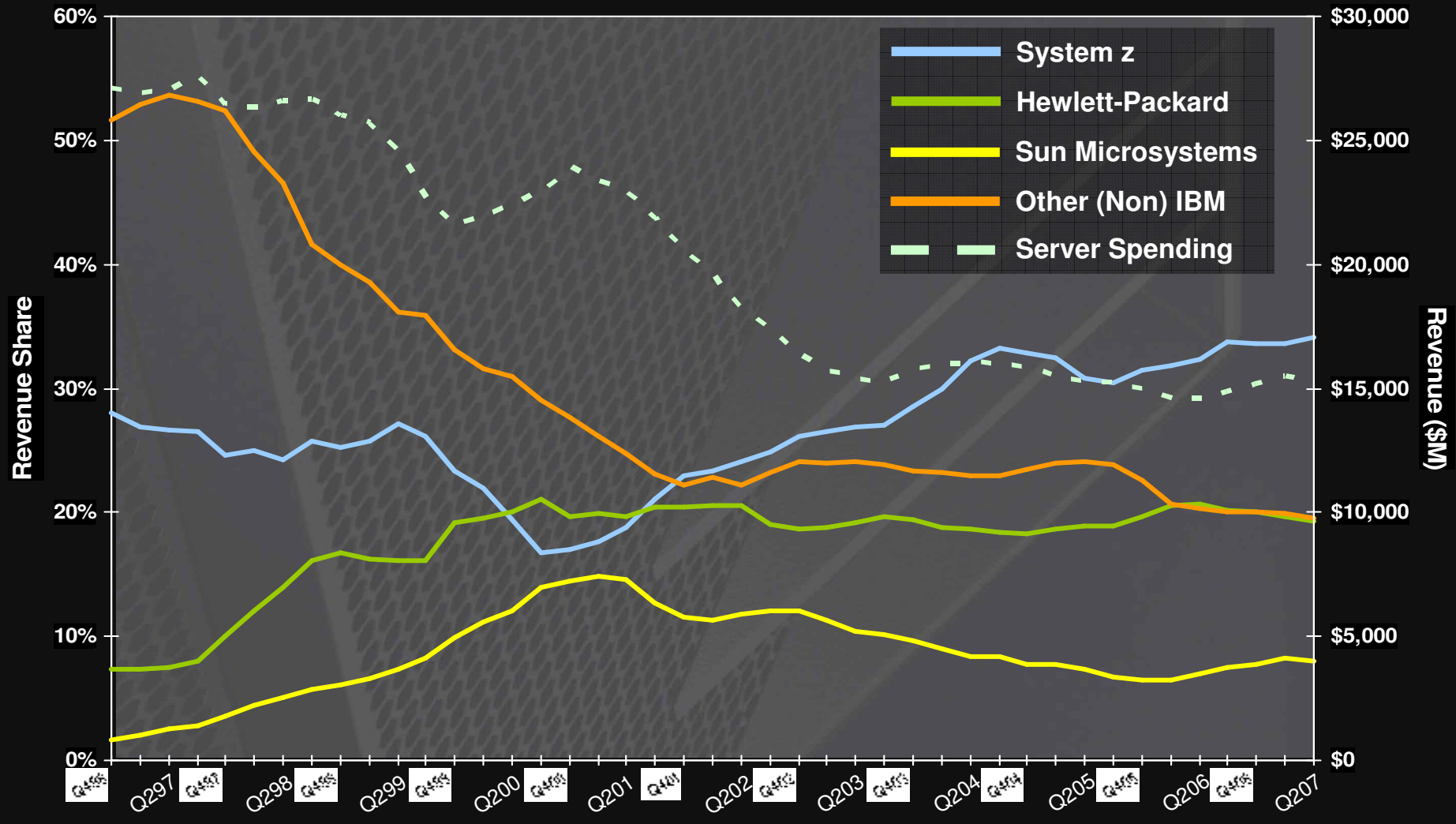


AGENDA

- System z momentum and Growth Drivers today
- Future Trends and the System z
- Summary

$250K Server Segment (1)



(1) Source: IDC 2Q07 Server Tracker

Business Challenges Today

Globalization

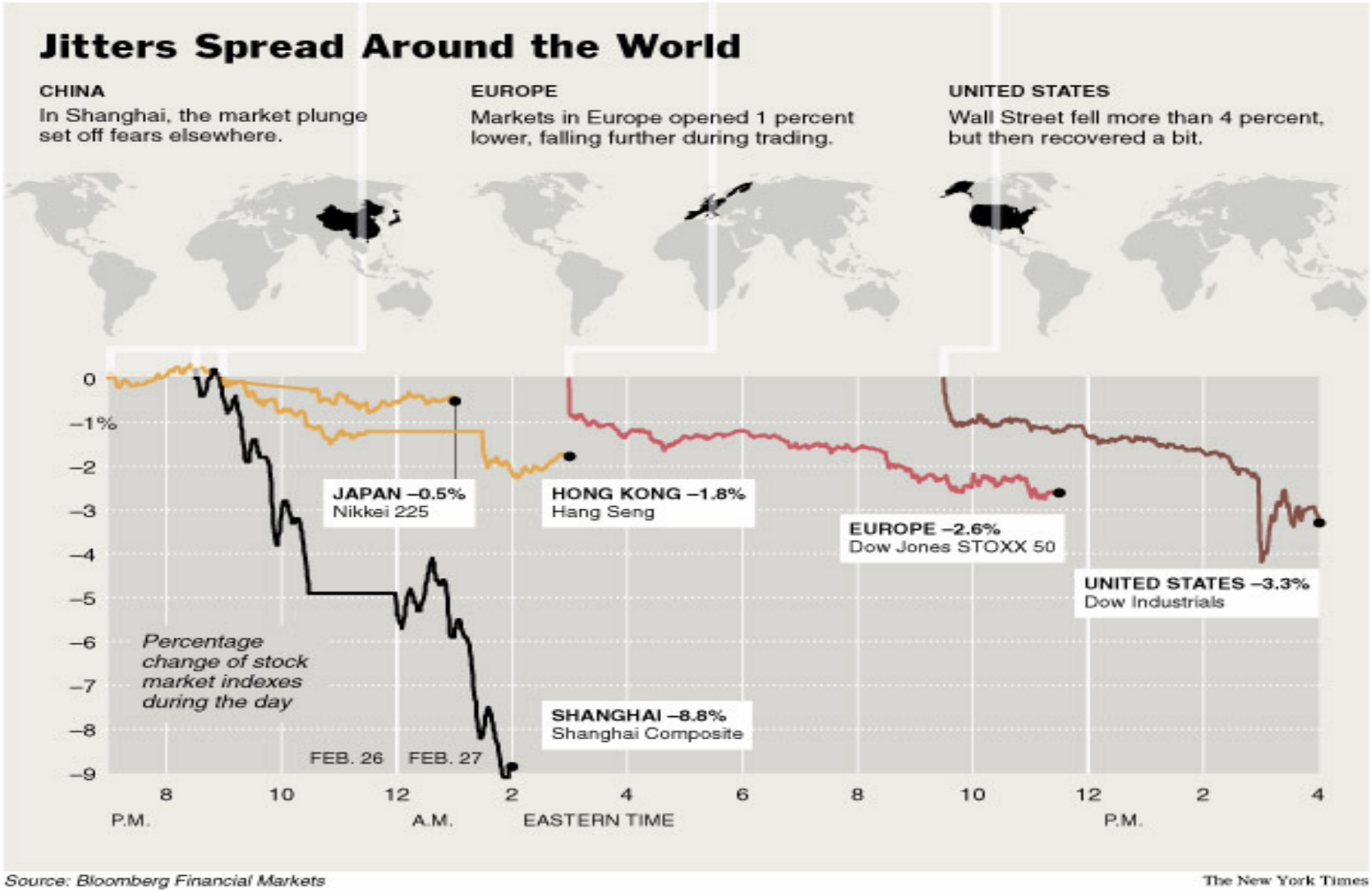
Scale

Complexity

Security

Power

Globalization – February 26, 2007



Scale: India - Relentless Growth

Major Emerging Players

Competing on a Global Scale

India GDP Growth:

9.4%

Extreme Scalability: Bank of China

Over **350 million** accounts with **three billion** transaction histories

30 million transactions in under **60** minutes

Security: The Cost of a Breach

Security Flaw Exposes CVS Purchase Data;
50 Million customers exposed

The Washington Post

MasterCard security breached
More than 40 million cardholders may be affected

MarketWatch

Ohio Sues DSW Over Customer Data Theft

ConsumerAffairs.Com

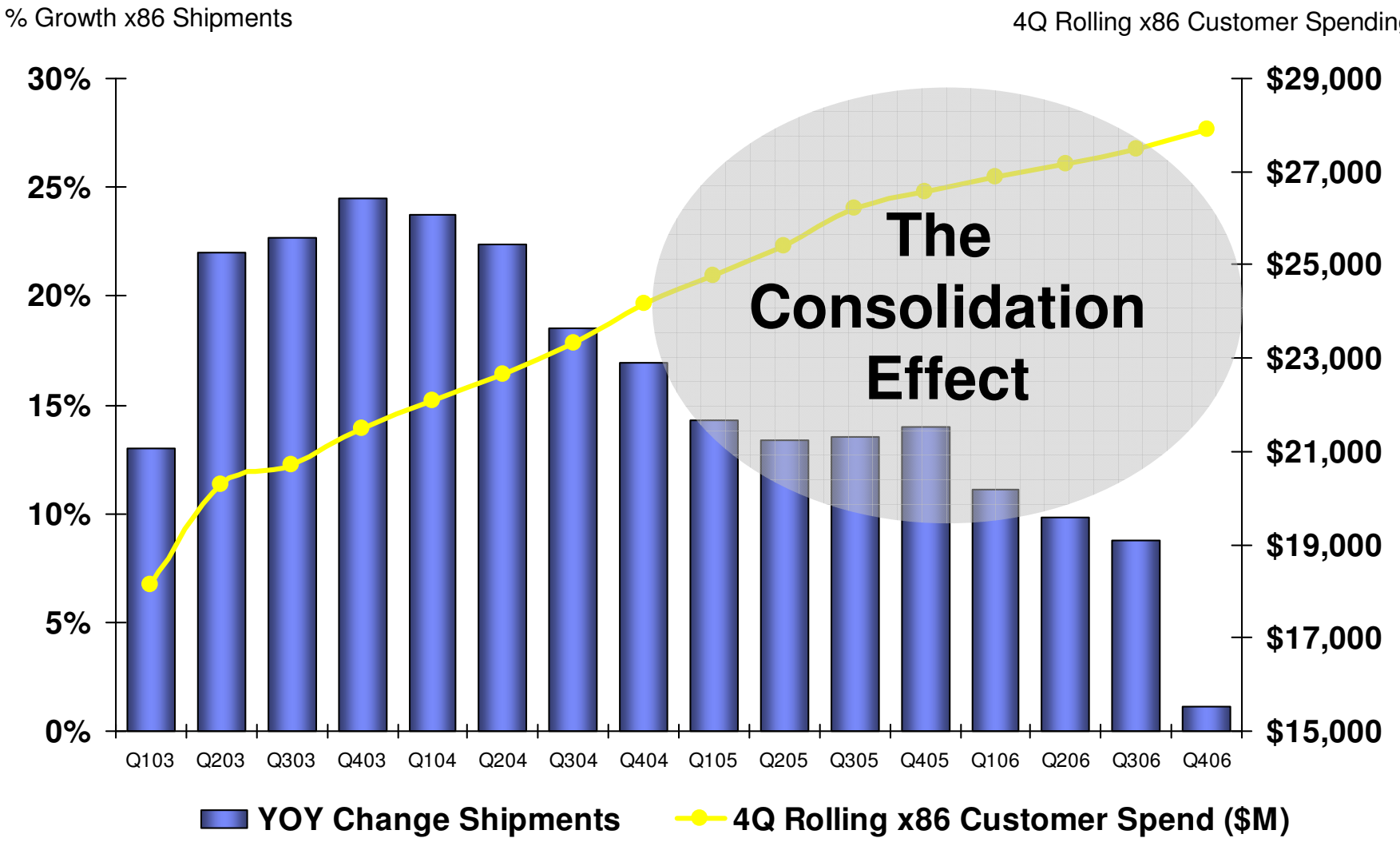
Bill would punish retailers for leaks of personal data

THE WALL STREET JOURNAL.

Rogue Software Programmed to Wreak Havoc on Target Web Sites

The New York Times ON THE WEB

Virtualization



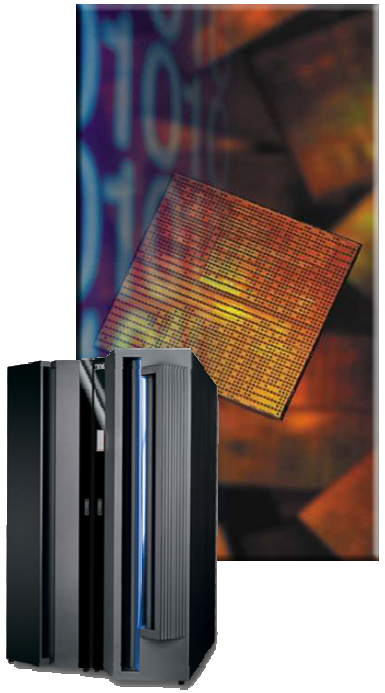
Source: IDC, "Virtualization and Multicore Innovations Disrupt the Worldwide Server Market," March 2007

Virtualization – Is getting even hotter !!

Mainframes – The Innovator and Leader in Virtualization Function

- **Share processor, memory, I/O, and network among multiple operating environments**
  - Isolate workloads with EAL5 level security
  - Share resources among workloads
  - Enable communication for workloads internally with an in-memory TCP/IP network
- **35+ year history of virtualization, innovation and refinement**
  - Hardware and software based for optimum performance and flexibility
  - Robust suite of function for creating, provisioning, deploying, and managing virtual servers
- **z/VM Virtualization to simplify your IT infrastructure**
  - Support up to hundreds of concurrent applications with z/VM

    Share applications, data, as well as hardware among large numbers of servers
  - Management tools for operation, maintenance, and accounting

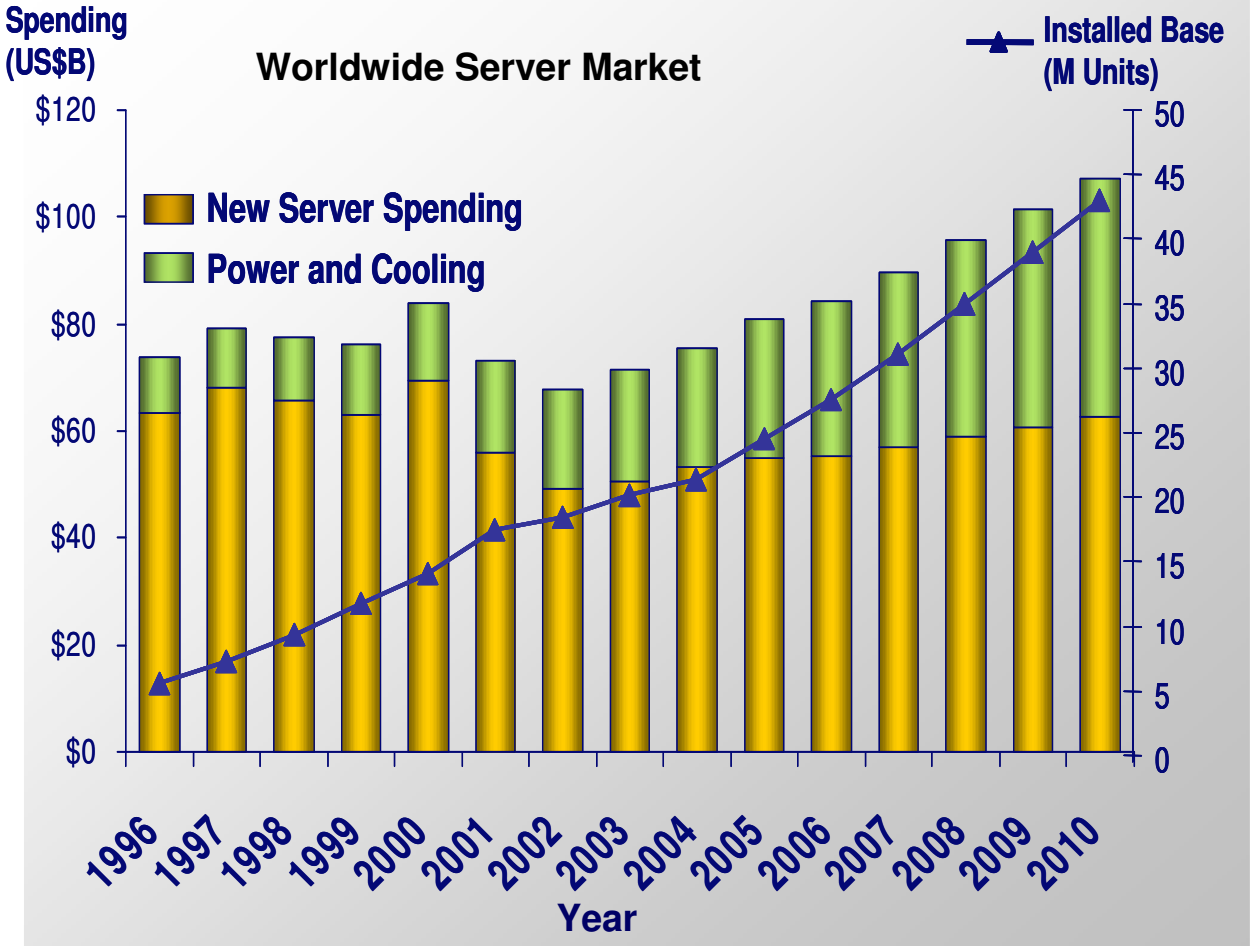


So are Data Centers !!

- Power and cooling spend may eventually exceed new server spending

2000 – Raw processing "horsepower" is the primary goal, while the infrastructure to support it is assumed ready

2006 – Raw processing "horsepower" is a given, but the infrastructure to support deployment is a limiting factor

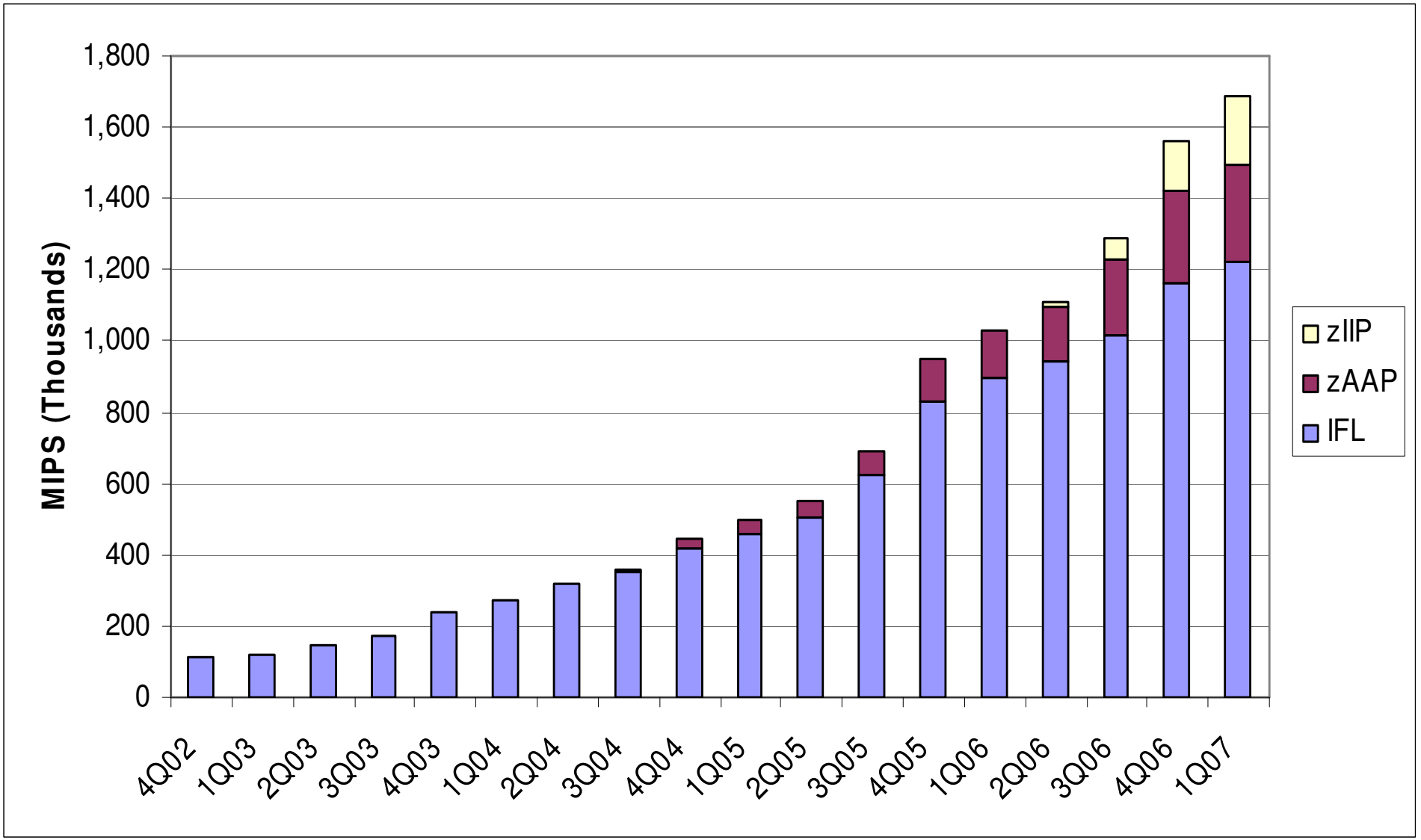


SOURCE: IDC, 'The Impact of Power and Cooling on Data Center Infrastructure,' Document #201722, May 2006"

What's driving the growth - complexity reduction

- **Integration of Java-based workloads through zAAPs**
- **Linux**
- **Database / application integration**
- **SOA**
- **Business resilience**
- **Power and cooling reduction**
- **Security**

Specialty Engine MIPS Growth



Extreme Reliability: Eberspächer

Global Supplier of Specialized Components to the Automotive Industry

Business Need

- Minimize risk of downtime
- Consolidate to a single production data center
- Replicate business critical data across the 200km between existing data centers.

Solution

Long-distance data replication for SAP on the mainframe

Key Benefits

- ✓Reduced hardware spend while keeping administration costs stable
- ✓Continuous mirroring to backup site 200km away
- ✓High protection for business-critical data

System z Linux: Telemar

Largest provider of fixed-line telecommunications services in South America.

Consolidated 16 geographically dispersed servers on a centralized System z9 EC server running SuSE Linux

Benefits:

- Open-standards-based solution
- Maximized manageability, scalability, security and availability of its key business systems.
- Reduced need for server capacity by one-third
- Lowered operating and administration for maintaining email server applications.

New Customers, New Markets, New Wins

Nationwide On Your Side™

FARMERS Gets you back where you belong®

worldspan

CAIXA

First National Bank Omaha

BELARUSBANK JOINT-STOCK SAVINGS BANK

Bank of Tokyo-Mitsubishi UFJ

eci ECI TELECOM

BALDOR MOTORS • DRIVES • GENERATORS

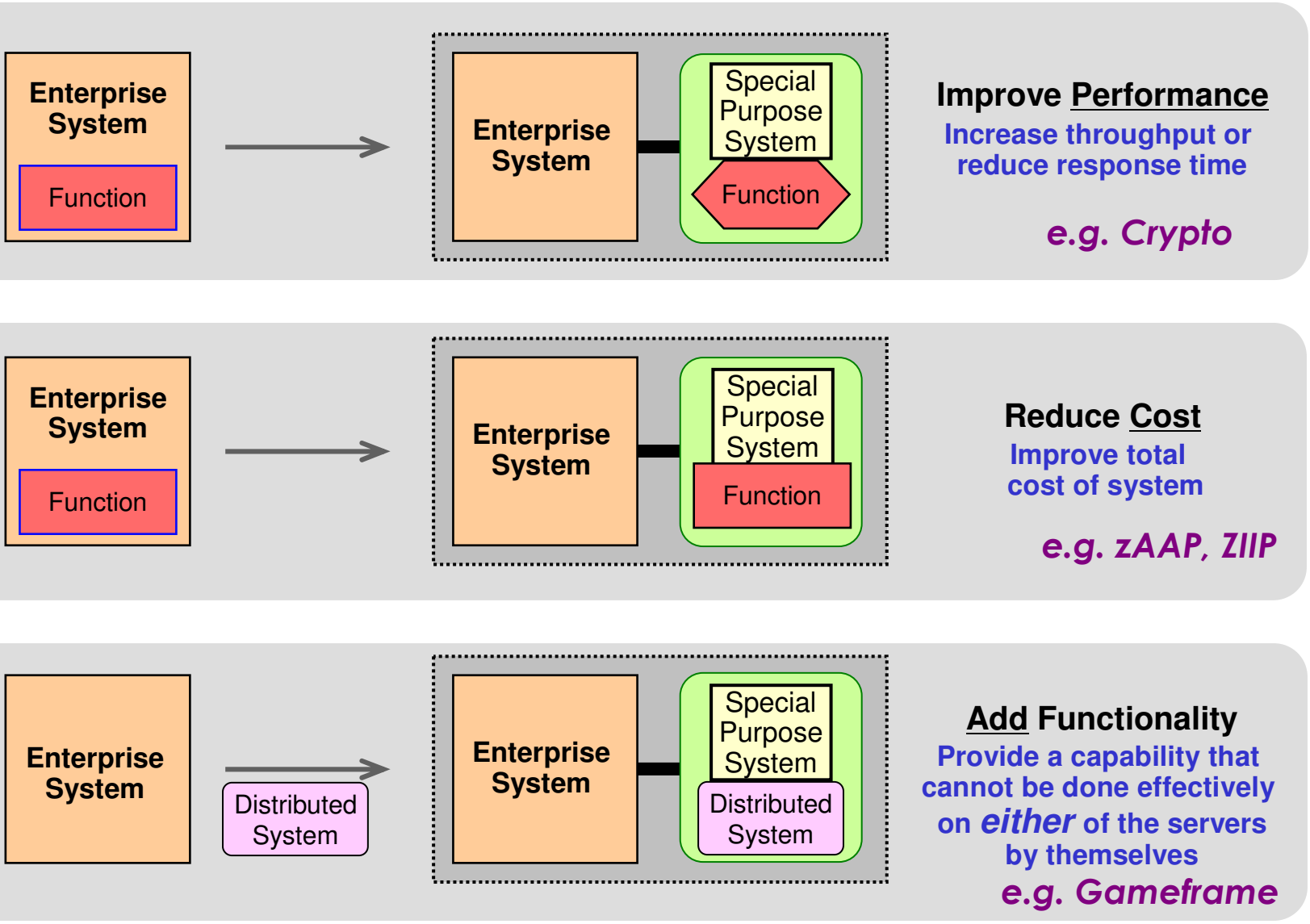
1830

HOPLON Infotainment

神州数码 Digital China

NEXXAR GROUP

Inboard Special Purpose Systems and Accelerators – Value Propositions

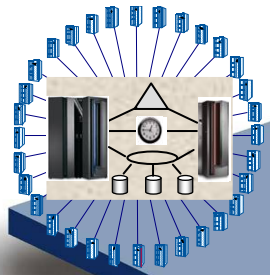


Evolution of specialty engines

Mainframes have a long history with specialty processing, e.g.

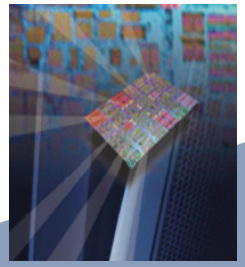
- **Data compression**
- **Sort**
- **Encryption**

Transparent to applications



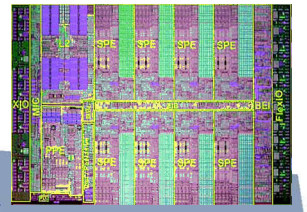
Internal Coupling Facility (ICF) 1997

Integrated Facility for Linux (IFL) 2001



System z9 Application Assist Processor (zAAP) 2004

IBM System z9 Integrated Information Processor (IBM zIIP)



Potential technologies; XML, Java, Cell….

<u>FUTURE</u>

<u>Integrated Technology enablement</u>

Increased performance and throughput
Application Assist & Application Integration
Enabling of Emerging Transaction models

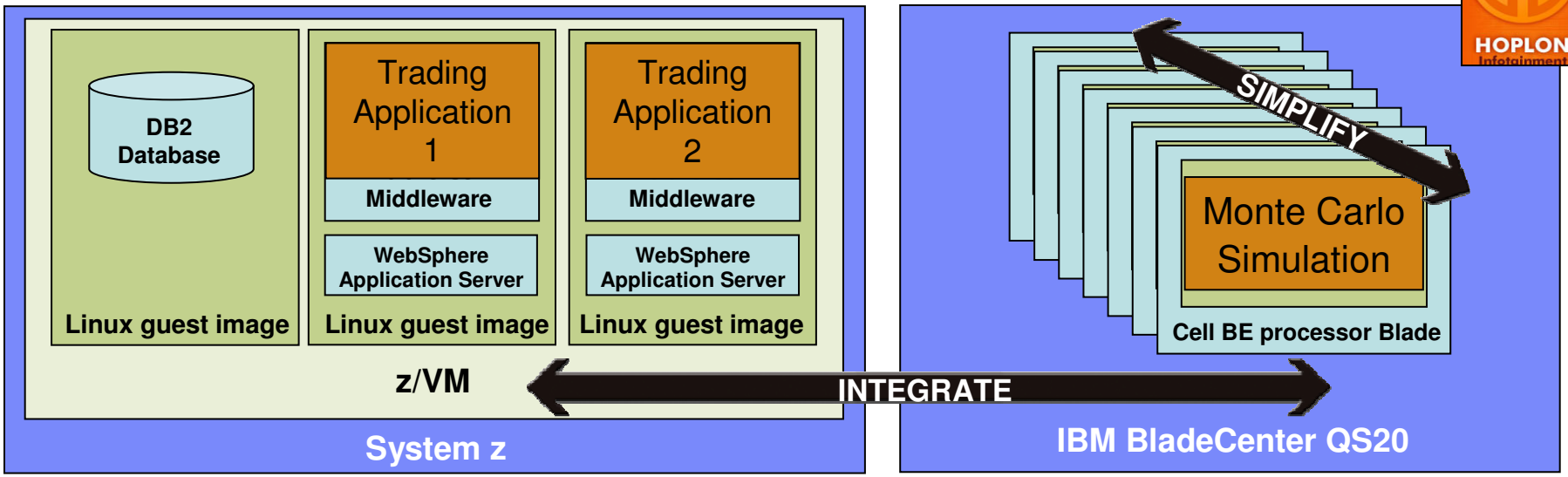
IBM and Hoplon: ‘Gameframe’ Project

Cell Broadband Engine

IBM System z

Mainframe Power for Virtual Worlds and Gaming

Hoplon: Hybrid Schema Mainframe and Cell Processor



Why Taikodon on System z

- **Large Shared Resource Pool**
  - Single point of resource management
  - Single point of operational control
  - Efficient use of underlying compute resources
  - Manage unpredictable loads between Virtual World instances
  - Easy/fast provisioning
- **Integration w/Commercial Business Processing**
  - Security
  - Reliability
  - Availability
  - Auditing
  - Monetary Transactions

Why Taikodon on Cell

- **HPC for Motion and Collision Detection**
  - Physics Simulation
- **Realist Animation**
- **Artificial Intelligence**

Why Taikodon on Cell integrated w/ z

- **HPC enhanced commercial computing**
- **Single System z operational domain**
  - **Avoid standalone distributed cluster**
- **Extend strengths of System z**

The Economics of Workload Consolidation

- **Distributed servers = 5% to 20% utilization**
  - Production, development and test servers
- **Virtualization and workload management enable consolidation on the mainframe**
  - Multiple images on fewer processors
  - Utilization levels of 85% or more

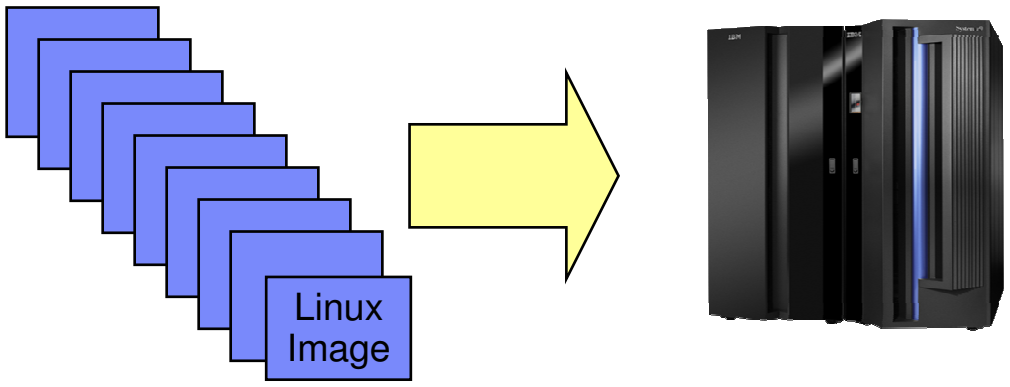
Lower TCO

-

Lower energy and facility costs

-

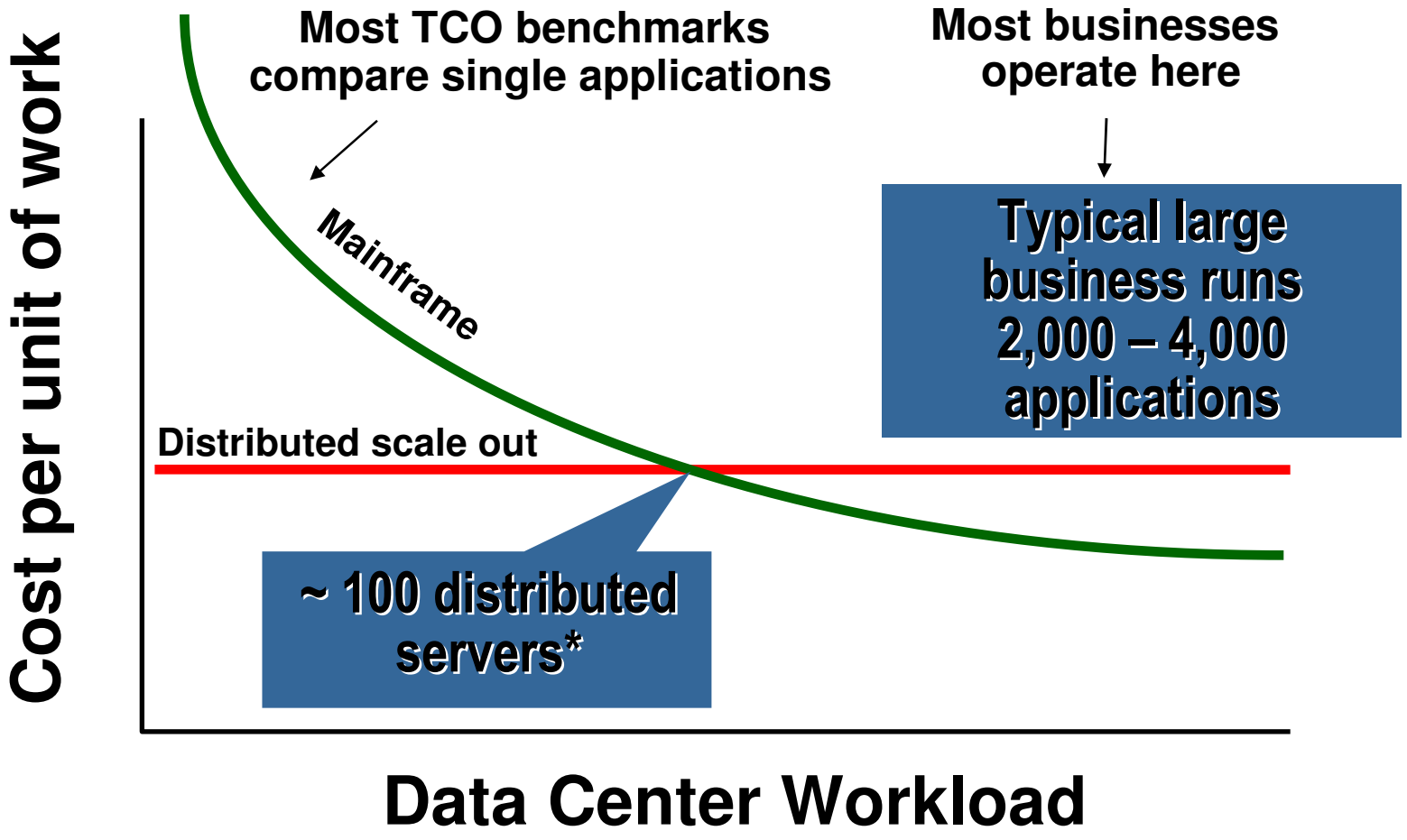
Reduced complexity and management costs



5% to 20% utilization

Full utilization

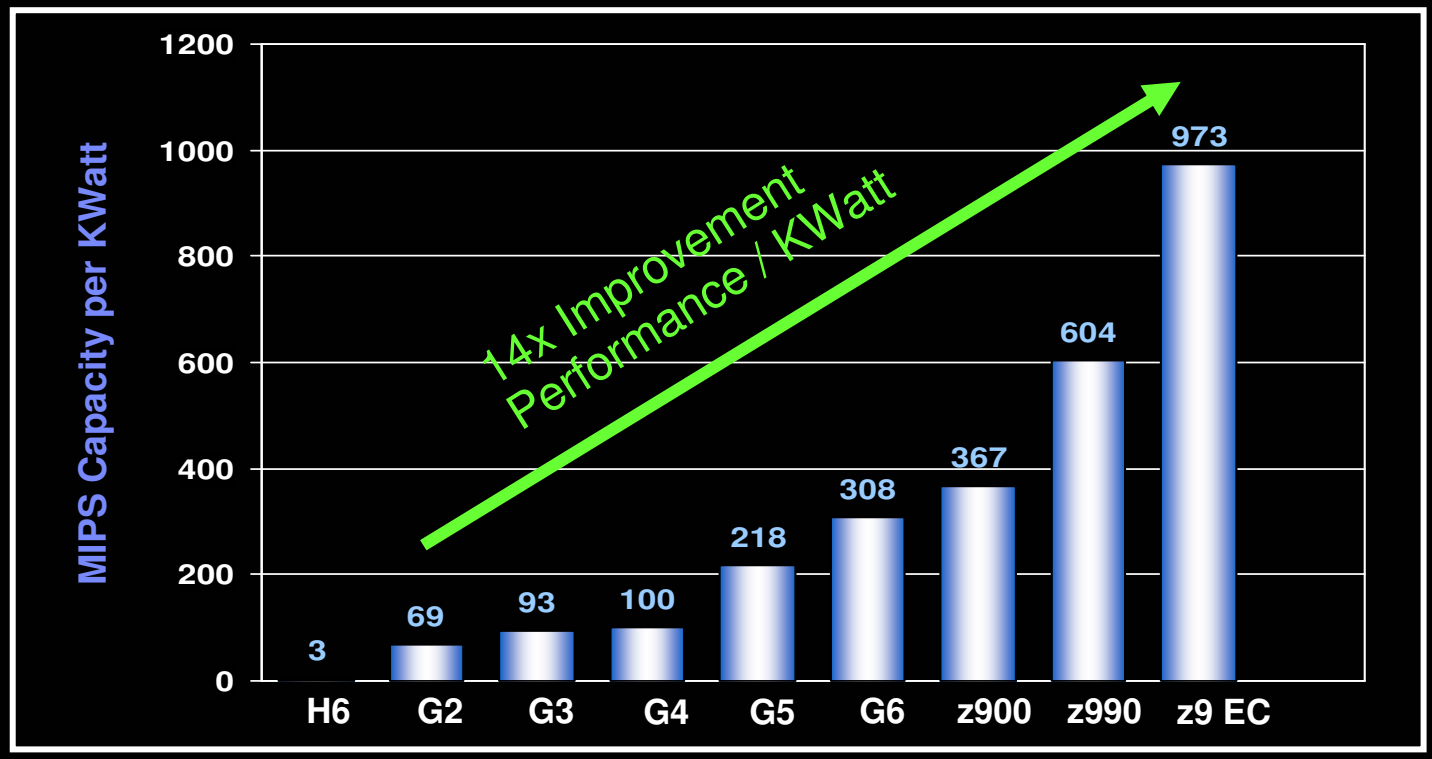
Mainframe: Lower TCO



*According to Robert Francis Group

System z is Lean and Green

System z energy efficiency gains



1/12 the Power in 1/4 the Floor Space

IBM Consolidation Announcement Highlights

- *IBM will consolidate thousands of servers onto approximately 30 System z mainframes*
- *We expect substantial savings in multiple dimensions: energy, software and system support costs*
- *Major proof point of IBM's 'Project Big Green' initiative*
- *The consolidated environment will use 80% less energy*
- *This transformation is enabled by the System z's sophisticated virtualization capability*

IBM'S PROJECT BIG GREEN SPURS GLOBAL SHIFT TO LINUX ON MAINFRAME

Plan to shrink 3,900 computer servers to about 30 mainframes targets 80 percent energy reduction over five years

Optimized environment to increase business flexibility

ARMONK, NY, August 1, 2007 – In one of the most significant transformations of its worldwide data centers in a generation, IBM (NYSE: IBM) today announced that it will consolidate about 3,900 computer servers onto about 30 System z mainframes running the Linux operating system. The company anticipates that the new server environment will consume approximately 80 percent less energy than the current set up and expects significant savings over five years in energy, software and system support costs.

At the same time, the transformation will make IBM's IT infrastructure more flexible to evolving business needs. The initiative is part of Project Big Green, a broad commitment that IBM announced in May to sharply reduce data center energy consumption for IBM and its clients.

Strategic Investments

System z9

- **$1.2 billion, 5,000 tech professionals**
- **Increased investments for next generations**

ISV investments increasing

- z/OS and Linux

$100M simplification investment

Academic initiative

Centers of Excellence

Field technical skills expansion

1. Planned investment

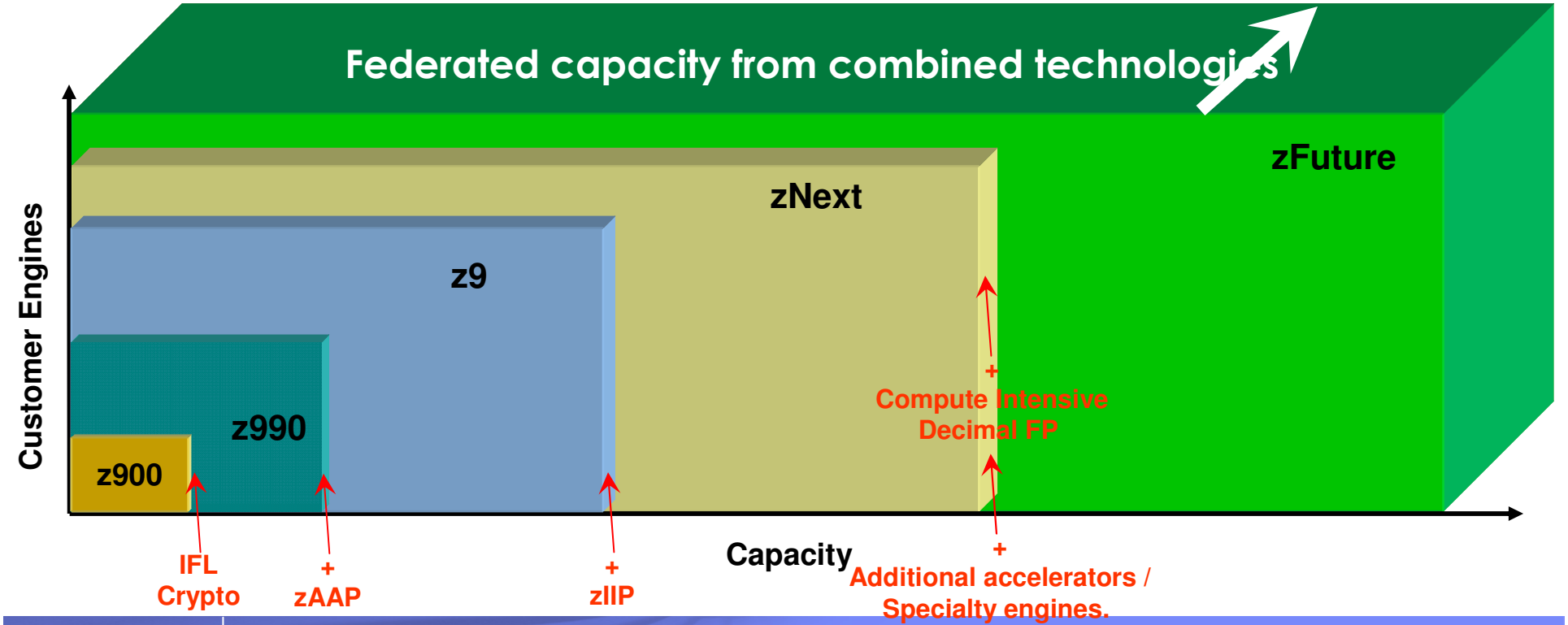
Processor Performance and Scalability

Business Advantage of the "z" dimension

- Significant capacity for organic growth and consolidation
- Performance will come with increase engine capacity as well as additional engines
- Performance objectives for equivalent n-way configurations:

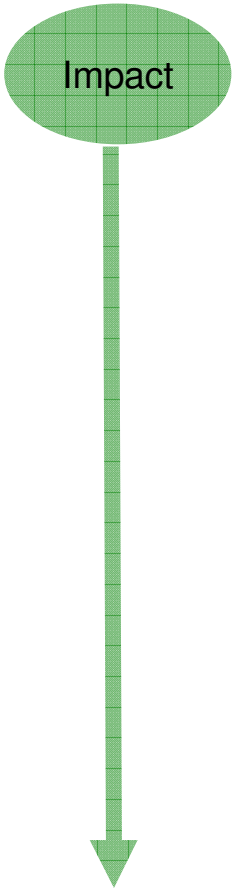
  Traditional workload = 1.5x predecessor

  New workload = 2.0x predecessor
- Sub-capacity engine sizes available for smaller configurations
- z/OS image size will grow with Hardware



* All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Server Availability Design Focus



	Past	Present	Future
Unscheduled Outages	✖	✖	✖
Scheduled Outages	✖	✖	✖
Planned Outages		✖	✖
Preplanning Requirements			✖

System z expanding to a wider set of workloads

Leading edge technology

zNext Entry and High End offerings

- **High frequency multi-core microprocessor design**
- **High bandwidth, low latency interconnect using open standards**
- **Large memory support**
- **Operating System and PR/SM affinities for improved performance**
- **Advanced power management – environment optimization**
- **Integrated Cell processor**

Compute intensive capabilities
HW (CPU/IO) & SW efficiency

zfuture- granular range of offerings from Entry to High End

- **Highly integrated federated platform**
- **Industry leading I/O performance**
- **Appliance, Application accelerator**
- **Continued exploitation of Specialty Engines**

Throughput Computing
Platform for Integration
Multiple Application Personalities
Data Server and Messaging Appliances

System z expanding to a wider set of workloads

System z as the Enterprise Data Server

- **OLTP/ERP**
- **Data Warehouse**
- **Enterprise Archiving**
- **Master Data Management**
- **Threat and Fraud**
- **Information**

Transactional DB, Warehouse, Data Analysis, Content Mgnt., Infrastructure DB, Mining, Web & Collaboration Content DB

SOA, Consolidation and Enterprise Wide Role

- **Enterprise SOA**
- **Virtualization**
- **End to End Security**
- **End to End Business Continuance**

Business Process Apps, Application Accelerators, System Management, Web Serving/Proxy Caching, Gaming & Interactive Virtualization, Network IMS/VOIP

ISV Ecosystem Growth

- 70+ new WebSphere® and DB2 z/OS applications in six months
- 30% growth in Linux: 380 ISVs and 1036 applications today
- 1600+ applications on z/OS 1.7 and above
- Increased investments

System z Growth with Systems Integrators

$1B System z influence revenue

- *Steady growth for 3 years*

Tripled System z resources for SIs

- *Business development, IT architects*
- *Classes, workshops, training*
- *Equipment for development/test and training*

Announced : System z for SIs

- *Application Modernization*
- *SOA*
- *IT Resource optimization*
- *ERP – SAP and Oracle*

SI-Influenced Client Examples

FARMERS INSURANCE GROUP
Symbol of Superior Service
FARMERS

- Savings in cooling, maintenance, SW and equip
- Optimized CPU Utilization
- Greater operational and managerial efficiencies

Nationwide
On Your Side™

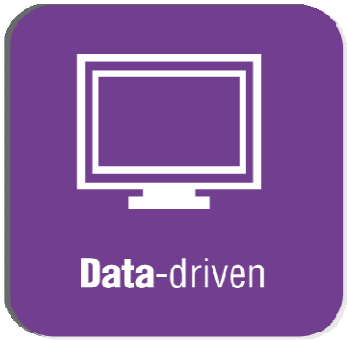
- Reduced MIPS from 1200 to 700
- zAAP WebSphere Workload
- Reduced MIPS from 1200 to

IBM Services and Expertise for System z

Solutions that optimize IT systems and processes – helping clients achieve faster ROI

Over 20 Service Product Offerings

5000 Skilled Services Professionals supporting the mainframe

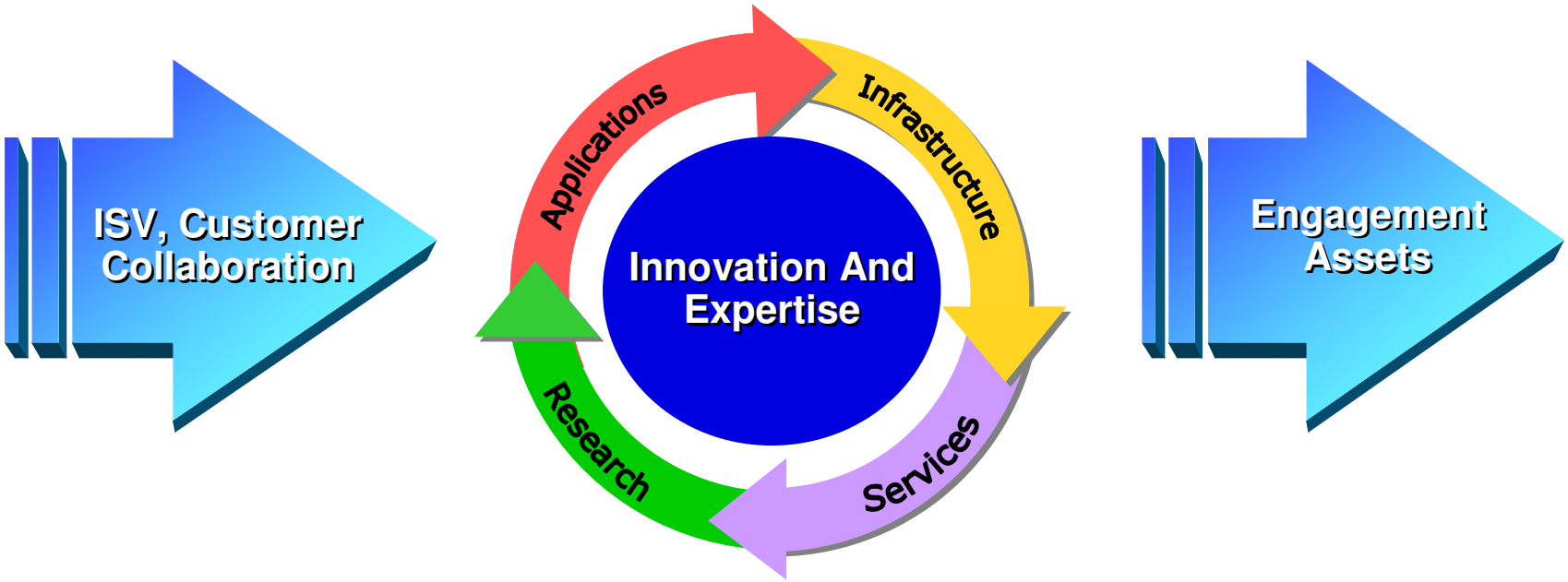


Solutions that ensure critical business data and systems are available – helping clients stay open for business 24/7

Solutions that allow clients to be resilient, quickly respond and recover from disasters and crises with agility – helping clients prepare for the future

IBM Banking Center of Excellence

Transform back office processing systems for banking clients



Be the Trusted Intermediary

Provide Global Coverage

Lower the Risk

IBM System z Value

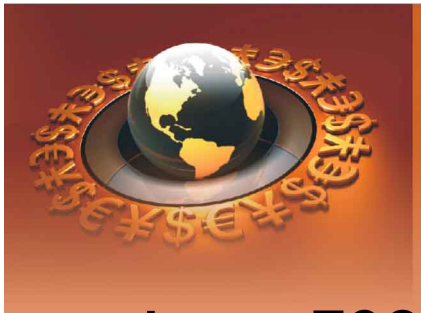
Security

EAL5

Encryption

ID/Threat Management

Economics



Lower TCO

New Entry Point

Growth Businesses

New Workloads

Power Efficiency

Lower Power / Cooling Costs

Less Space

RFG Study

Thank you.