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Future Server Fabrics:
How New-Age Servers will Change the World of IT in 2007

Analysis of IDC Data and the Dynamics of the Worldwide Server Market

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What the New Infrastructure Is All About . . .

- The new economic realities have changed IT spending patterns . . .
- . . . Creating new computing infrastructures
  - Thin rack-optimized servers
  - Blade servers
  - Partitions in scalable servers
  - Clusters
  - Grids
- What can IT managers do to cope with the changing computing landscape?

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It's a Classic Stand-Off: IT Buy-In vs. Business-Unit Buy-in

IT manager priorities:

- Building/maintaining infrastructure
- Managing IT Staff and Resources
- Improving Server Utilization
- Reducing Downtime

Business-unit manager goals:

- Setting Corporate standards
- Familiar end-user access to data
- Highly available data and apps
- Service-Level Agreements
- Holding the line on IT Budgets

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CIO Challenges Today

Restructuring

Emerging Applications

Drive Costs Down

Security

Performance

Mobility

Capacity

Increase Responsiveness

Provide Better Services

Heterogeneity

Consumption-based Costing

Distributed Systems

Down

Down

Down

Deliver Services

Outsourcing

P&L Contribution

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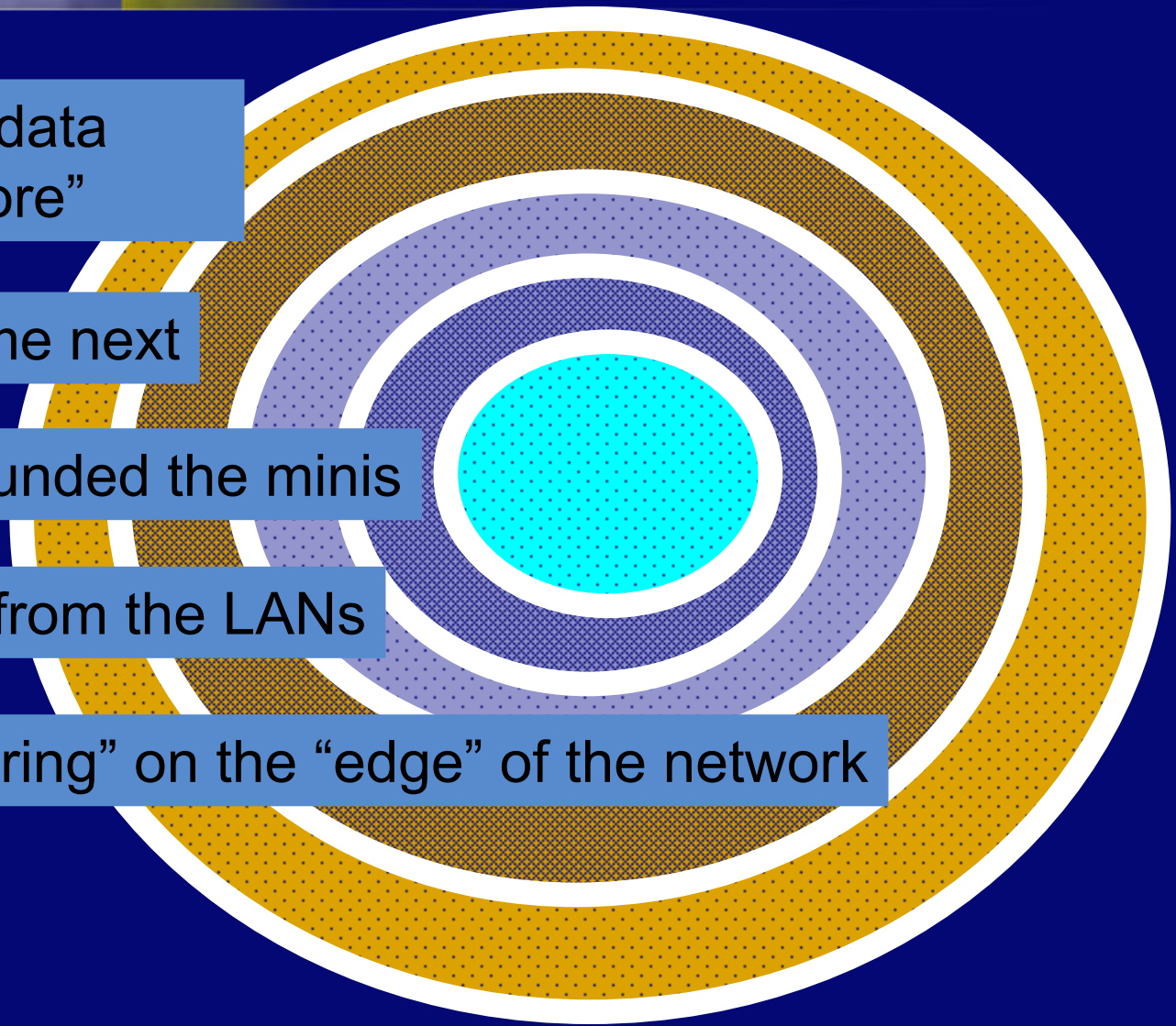
Data Center History: Concentric Circles of IT Systems Acquisition



- Mainframes in the data center were the “core”
- Minicomputers came next
- Unix servers surrounded the minis
- Windows grew up from the LANs
- Linux is the latest “ring” on the “edge” of the network

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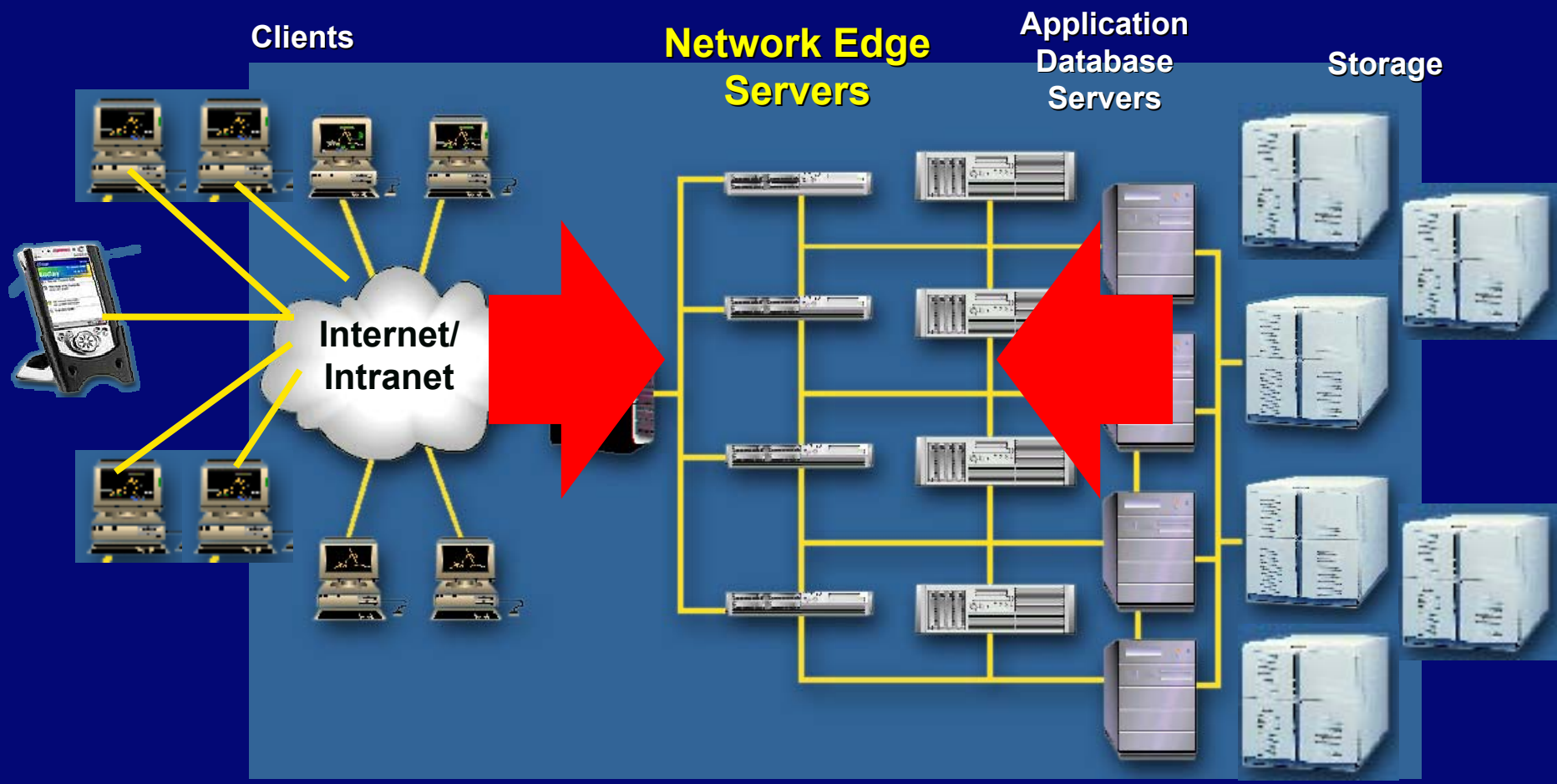
1998–2000:
Internet Growth Impacts the Server Market



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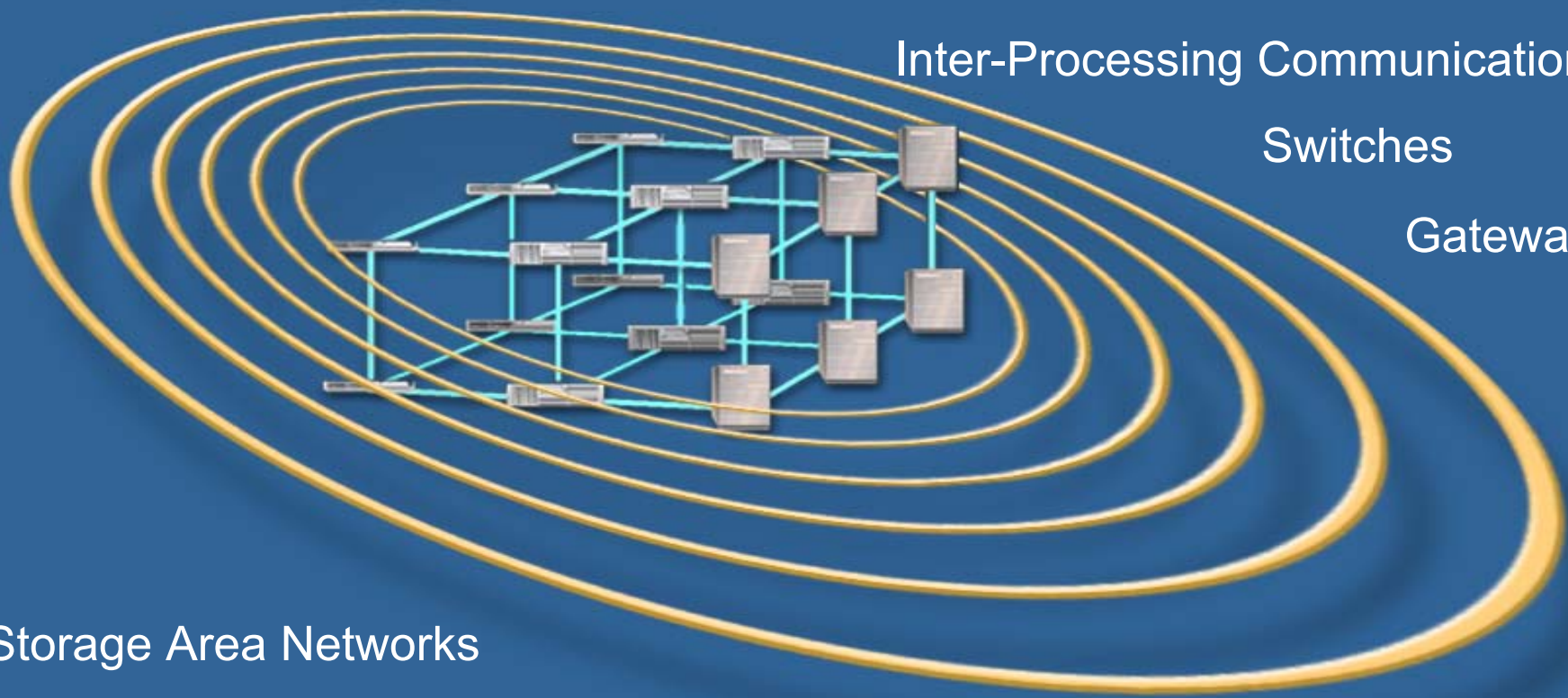
The Emerging Universe of IT Server/Storage Fabrics



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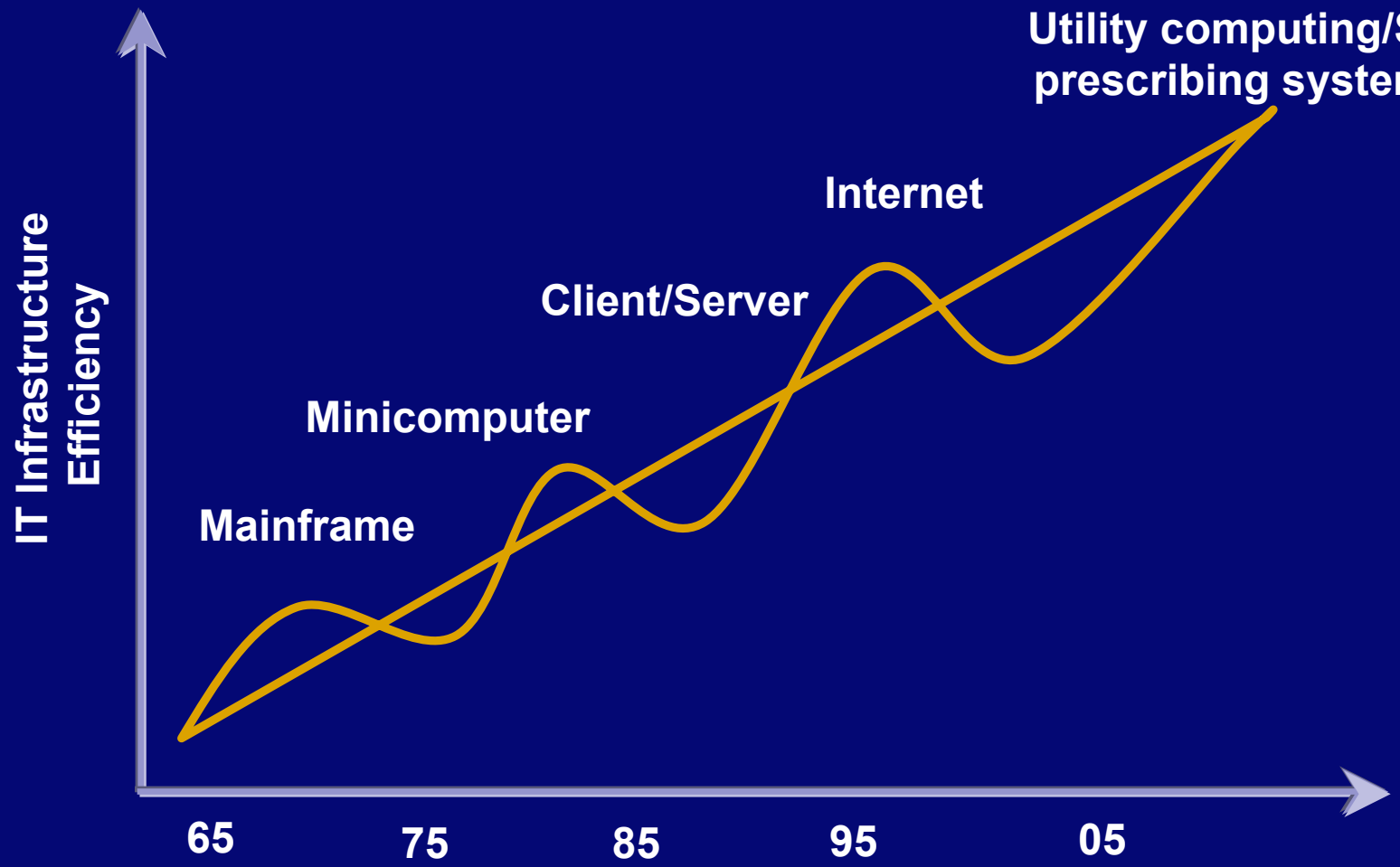
Utility Computing, the Next Transition



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Service Centric Computing = Utility Computing

- The ability to seamlessly access computing capacity on demand across geography, application, operating system
- **Private Utilities** The ability to provide utility computing functionality within an enterprise or a closely knit group of enterprises
- **Public Utilities** The ability to provide computing capacity to any customer at any time independent of customer affiliation

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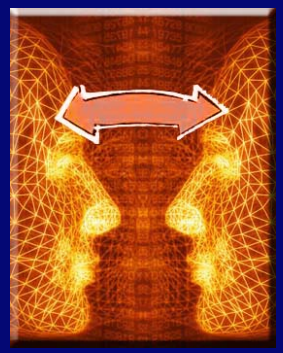
Utility Computing Evolution

Phase 1:
Consolidation



Phase 2:
Sharing Compatible Resources, Automation, Virtualization

Phase 3:
Share All Resources

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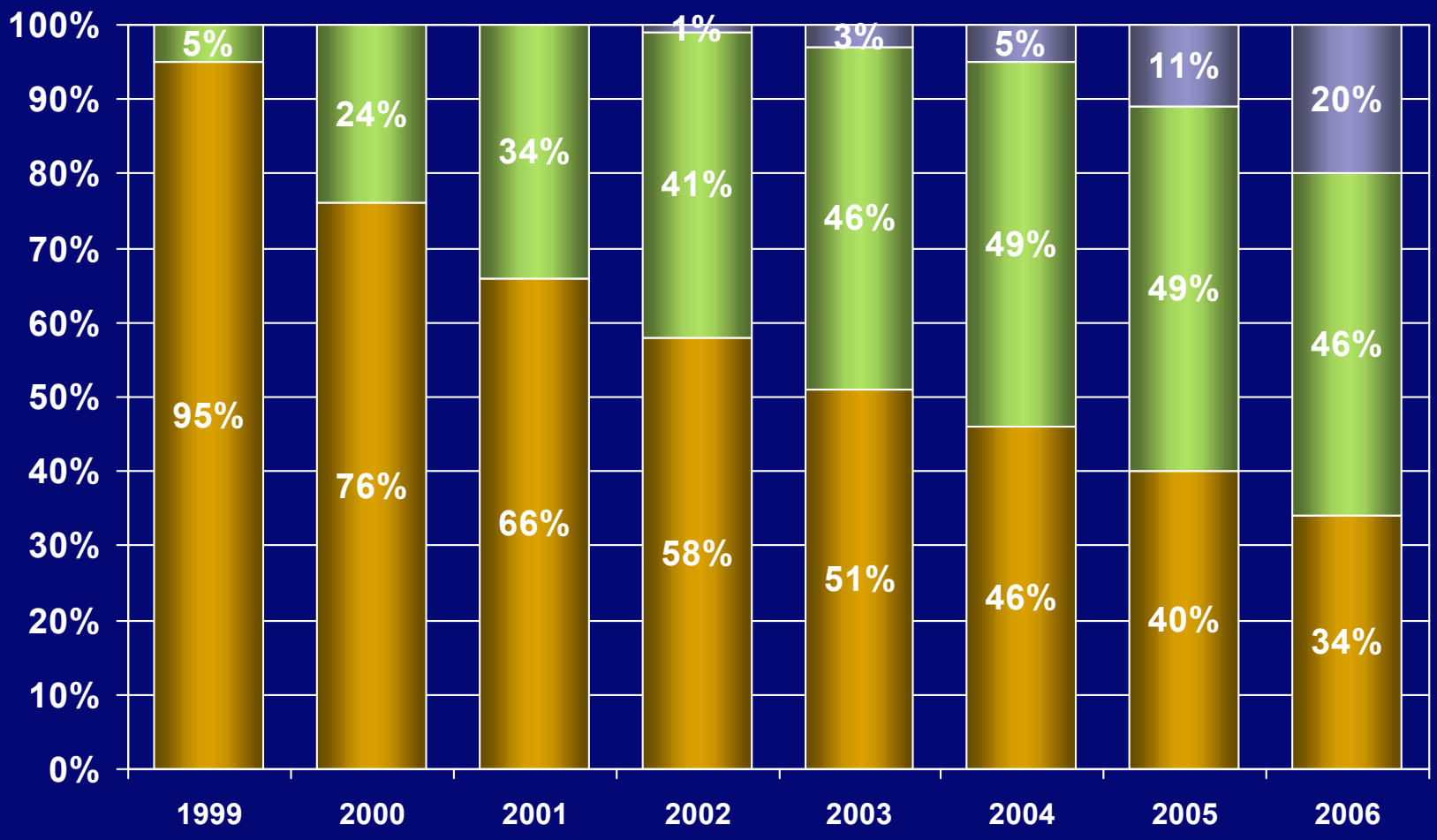
Strategic Outlook – Server Form Factors



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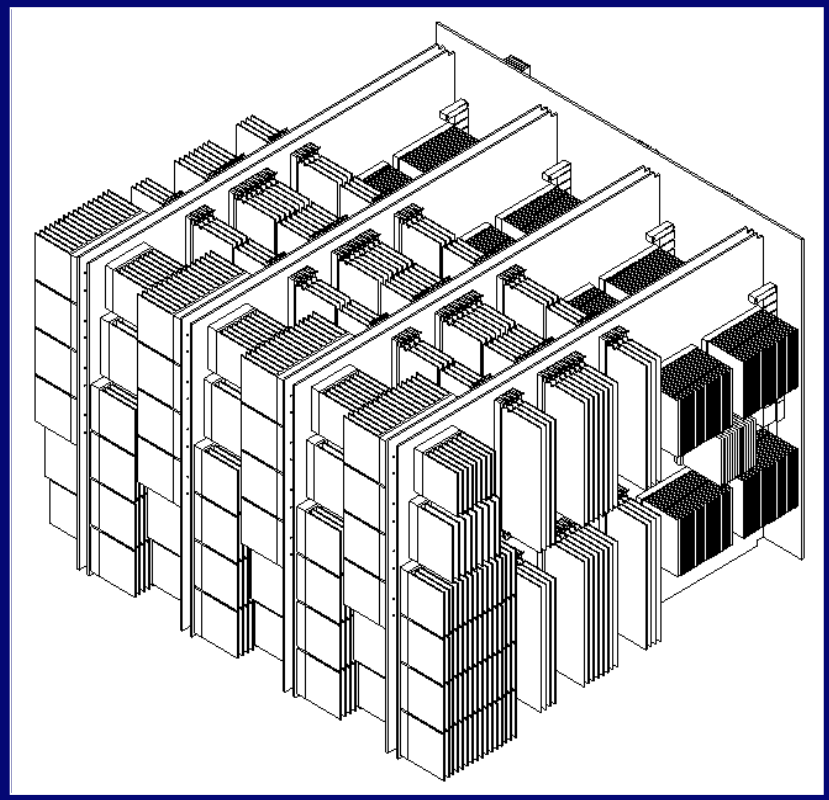
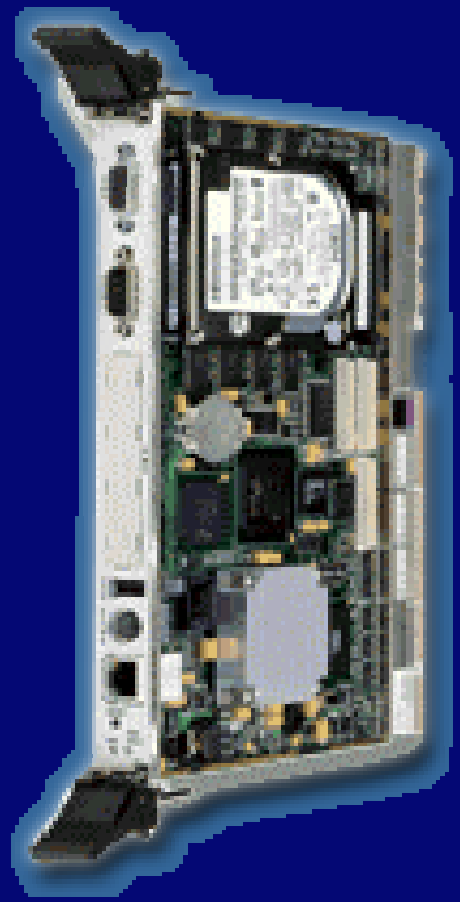
Source: IDC Quarterly Server Forecast 2001-2006

Partitions? Or Blades?

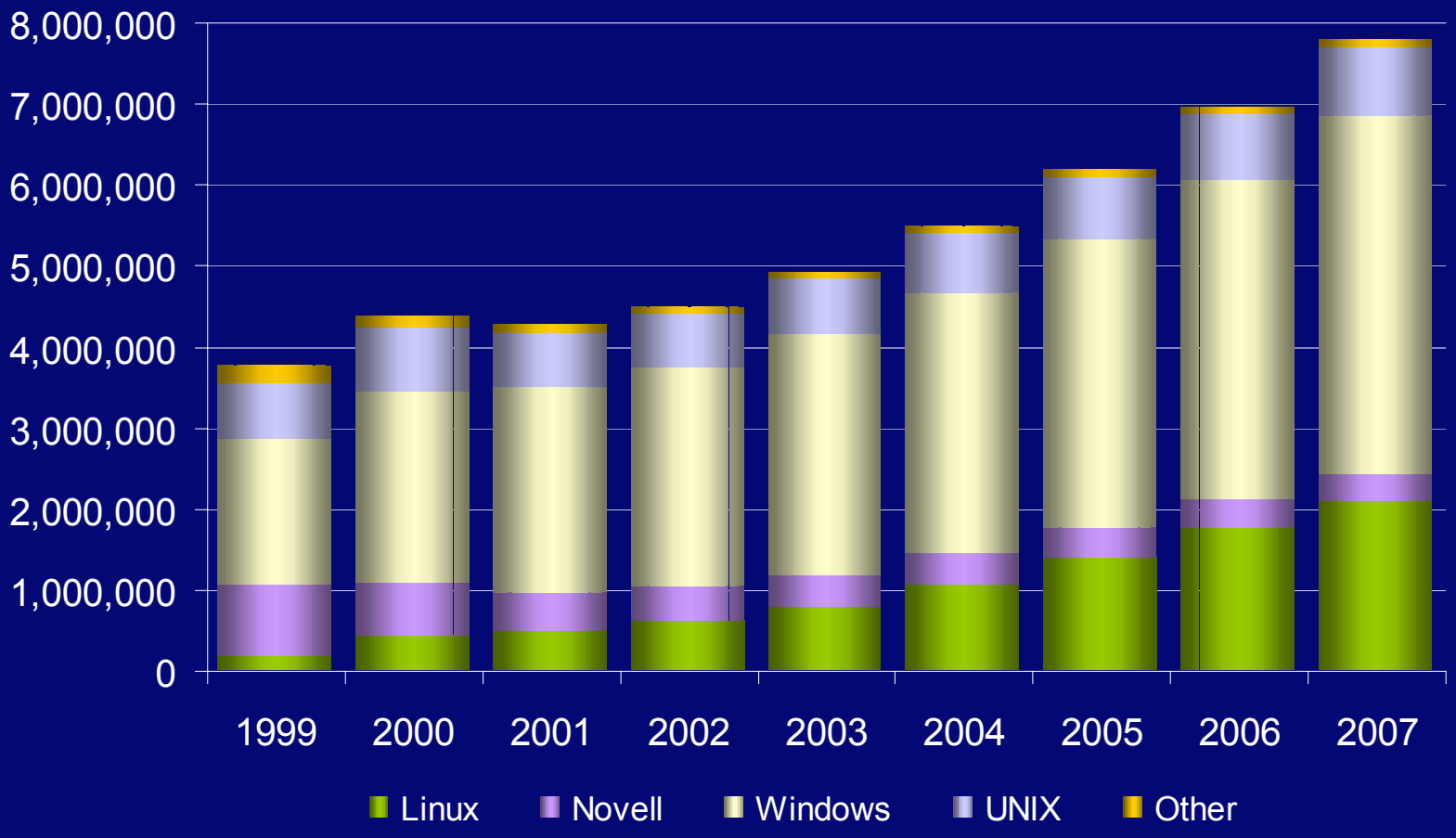




Looking ahead . . .

- Scale-up servers
  - Partitioned servers supporting many operating systems
  - 64+ processors, or more
  - Sophisticated system management moves workloads to resources
- Scale-out servers
  - Flexible growth path
  - HPC/technical clusters
  - Commercial clusters and grids
  - Utility computing by large enterprises; by service providers; and by outsourcers

Worldwide Server Growth: Unit Shipments, 1999-2002 (actual) and 2003-2007 (forecast)



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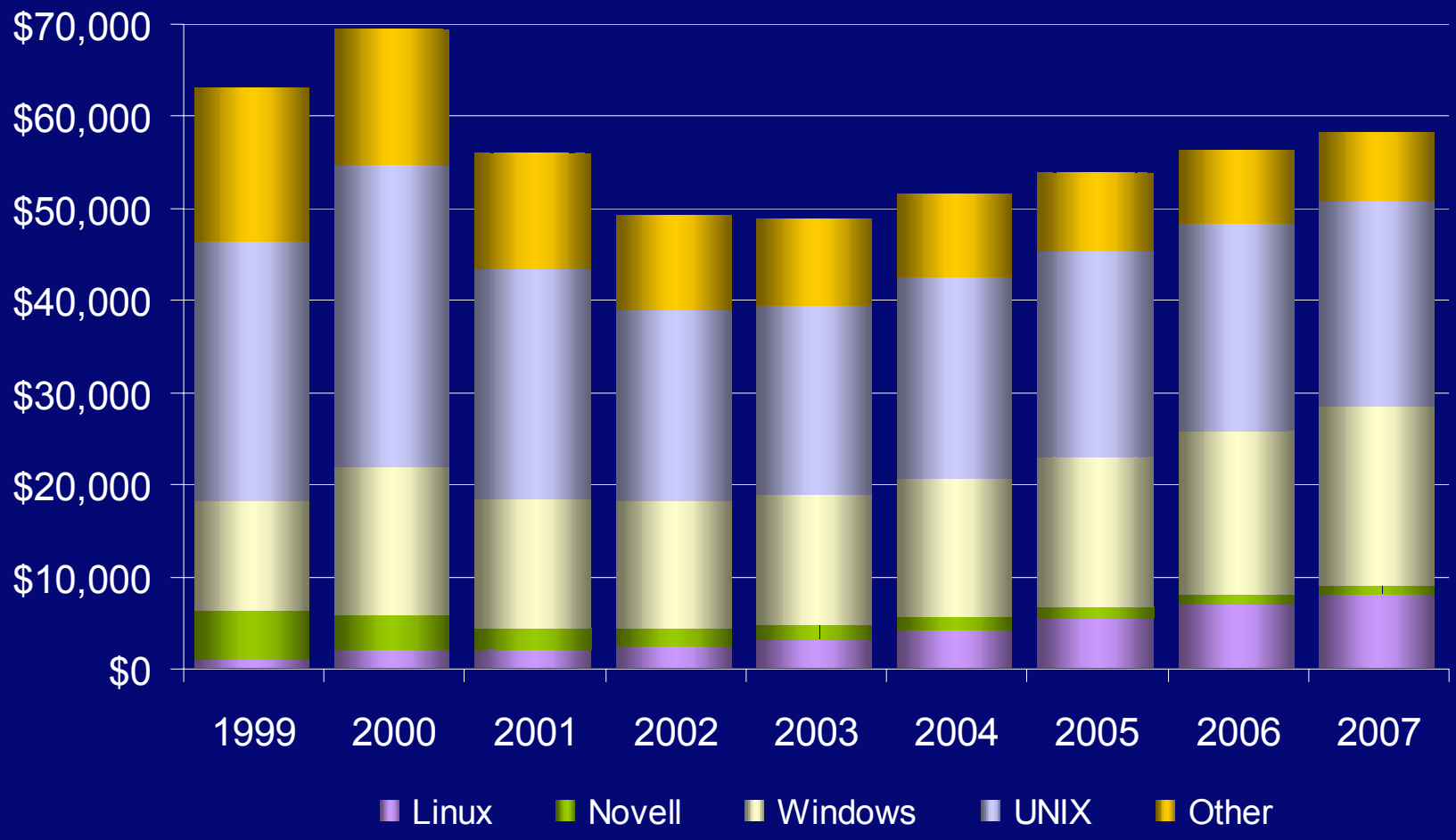
Worldwide Server Growth: Revenue 1999-2002 (actual) and 2003-2007 (forecast)



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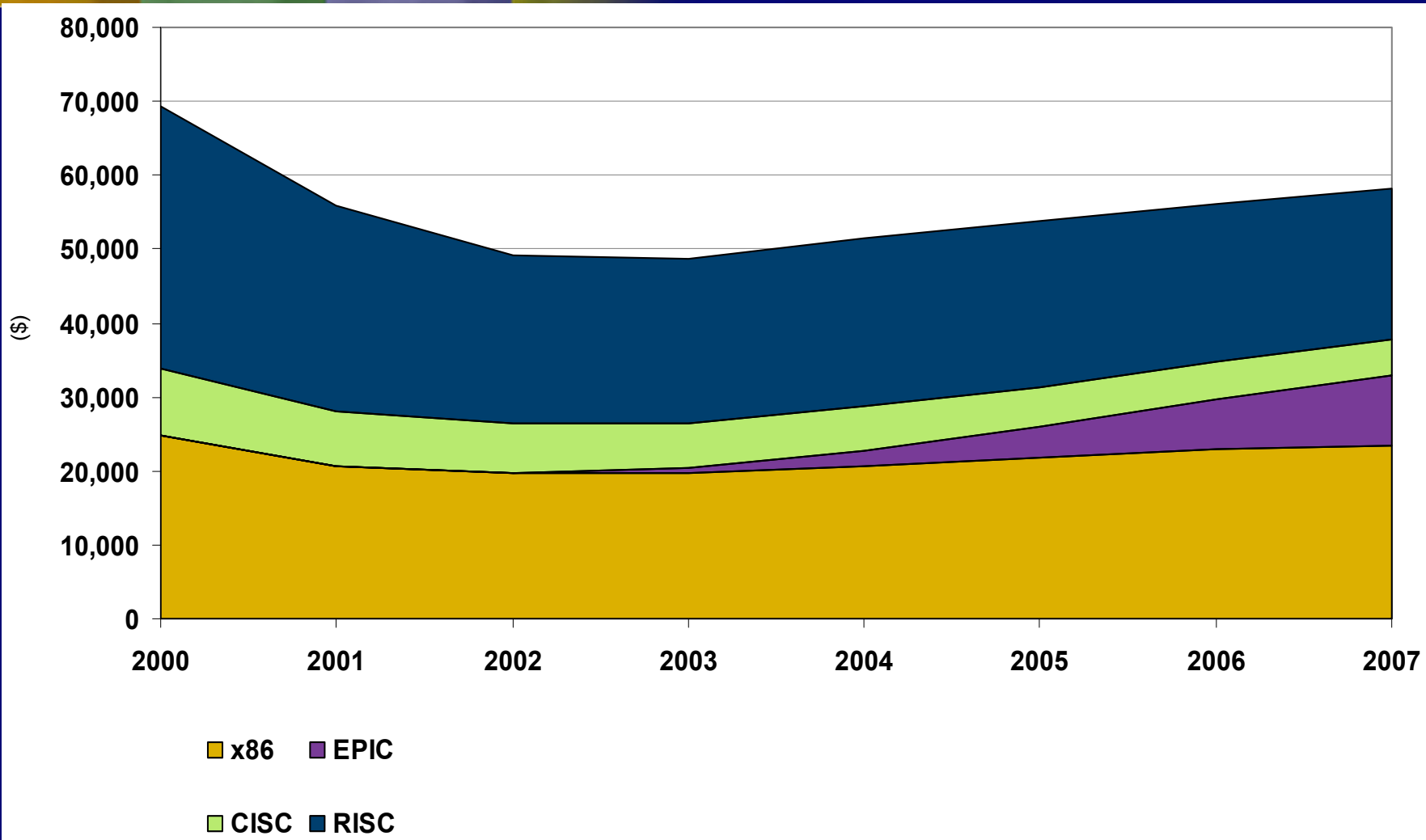
Server Revenue Growth, by Processor Type



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Multiple Server Form Factors . . .

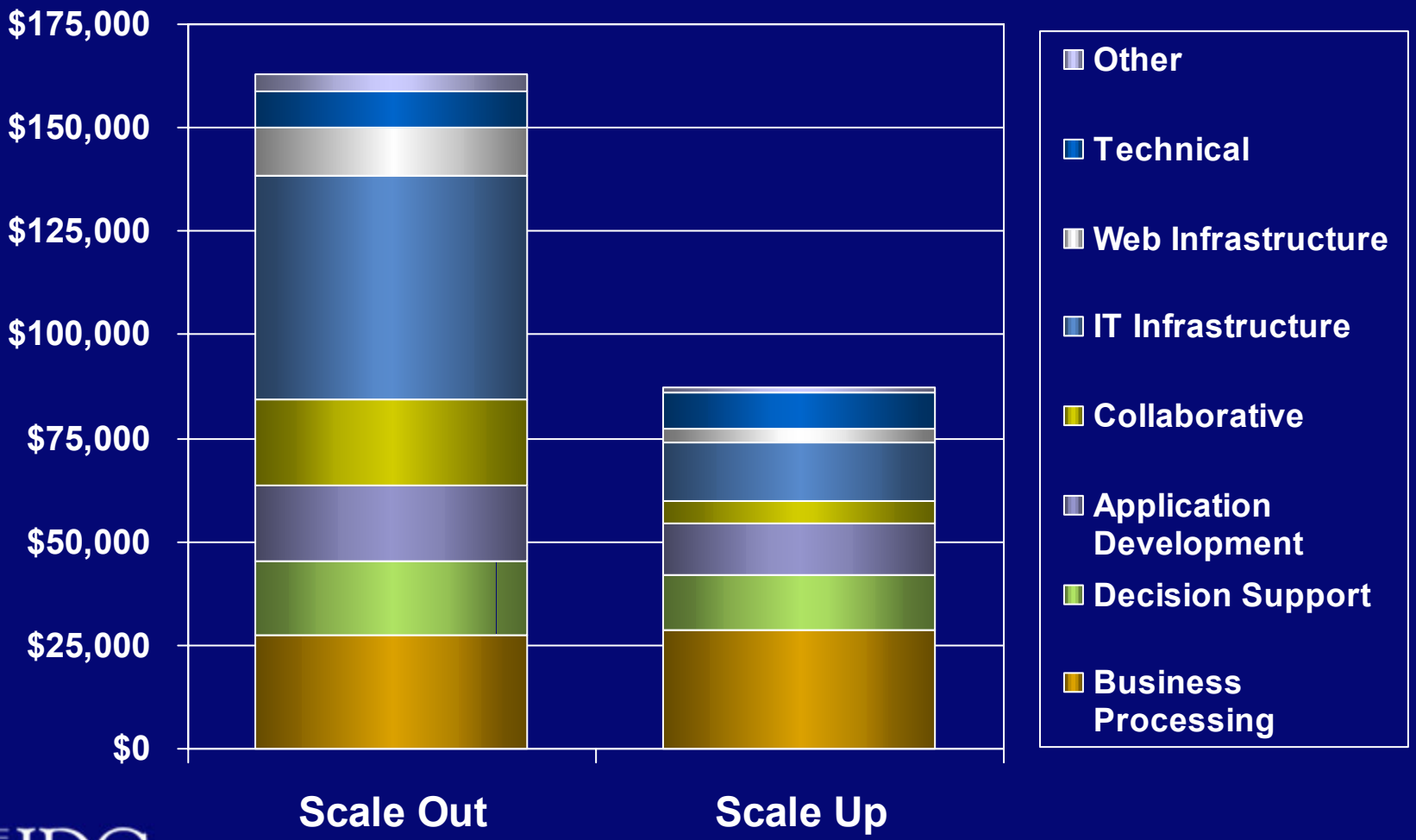
The form-factor is being matched to the workload:

- File/print
- E-mail/collaborative
- Business processing
- Online transaction processing (OLTP)
- Database-centric

A server/storage “fabric” is being woven to tie everything together:

- Rack-optimized servers
- Blades
- Scalable servers
- Storage (SANs; NAS; Direct-Attach Storage)
- Networking devices and I/O Interconnects

Customer Investment: Scale Up vs. Scale Out



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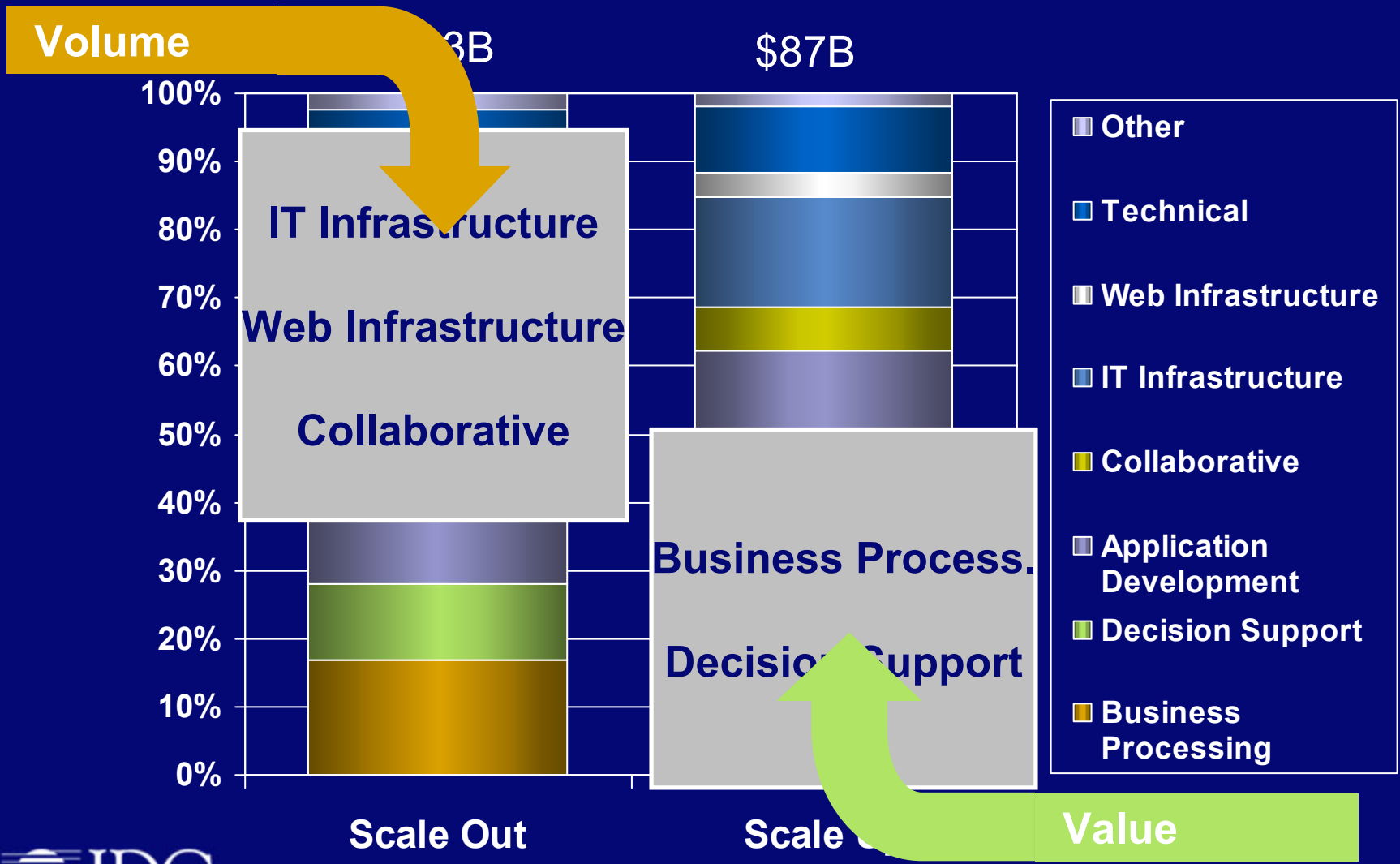
< 8-Way

8-Way+

RISC & IA32 Only

Customer Investment: Scale Up vs. Scale Out



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The Consolidation Lifecycle…..

Centralization:

- **Single Application/Server**
- **Staff Intensive**

Physical:

- **Increased Performance**
- **Management Efficiencies**

Service Centric Computing

Virtualization

Application Integration:

- **Further Standardization**
- **Application Validation**
- **Clusters and Partitions**

Data Integration:

- **Standardization**
- **Application Grouping**
- **System Efficiencies**

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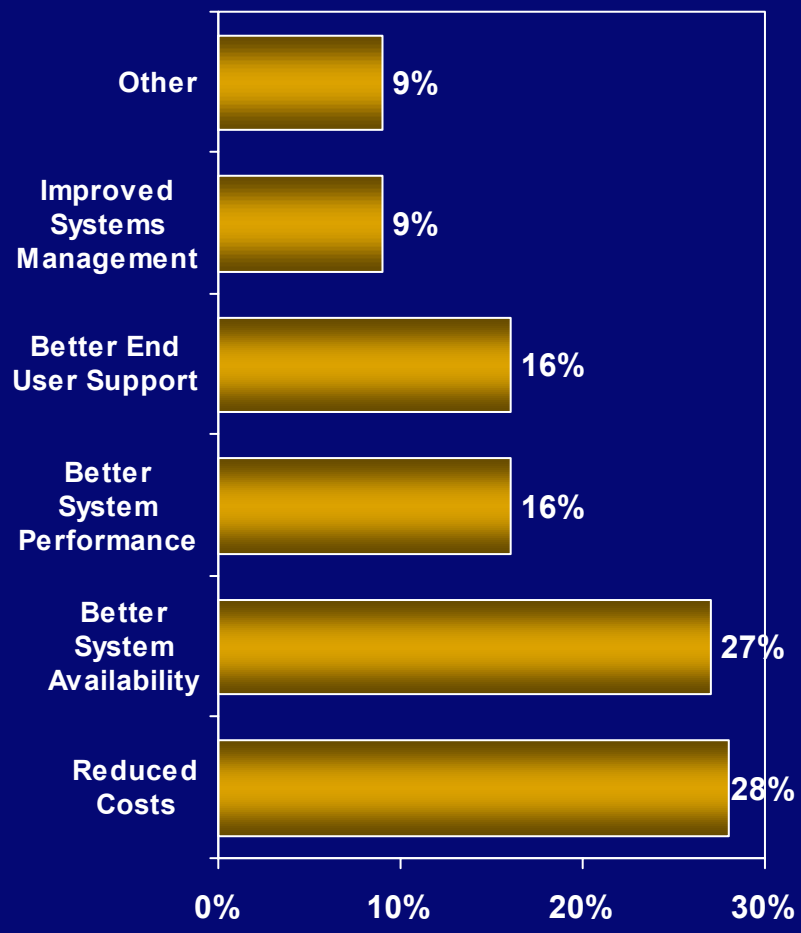
How IT Managers Measure Success in Server Consolidation Projects

- When measuring consolidation success, end-users focus on the underlying systems
- Reduced costs is the top metric, closely followed by better system availability
- These top metrics are followed by better system performance and better end-user support
- The importance of reduced costs and availability increased significantly with company size while performance and end-user support decreased slightly.



N=328

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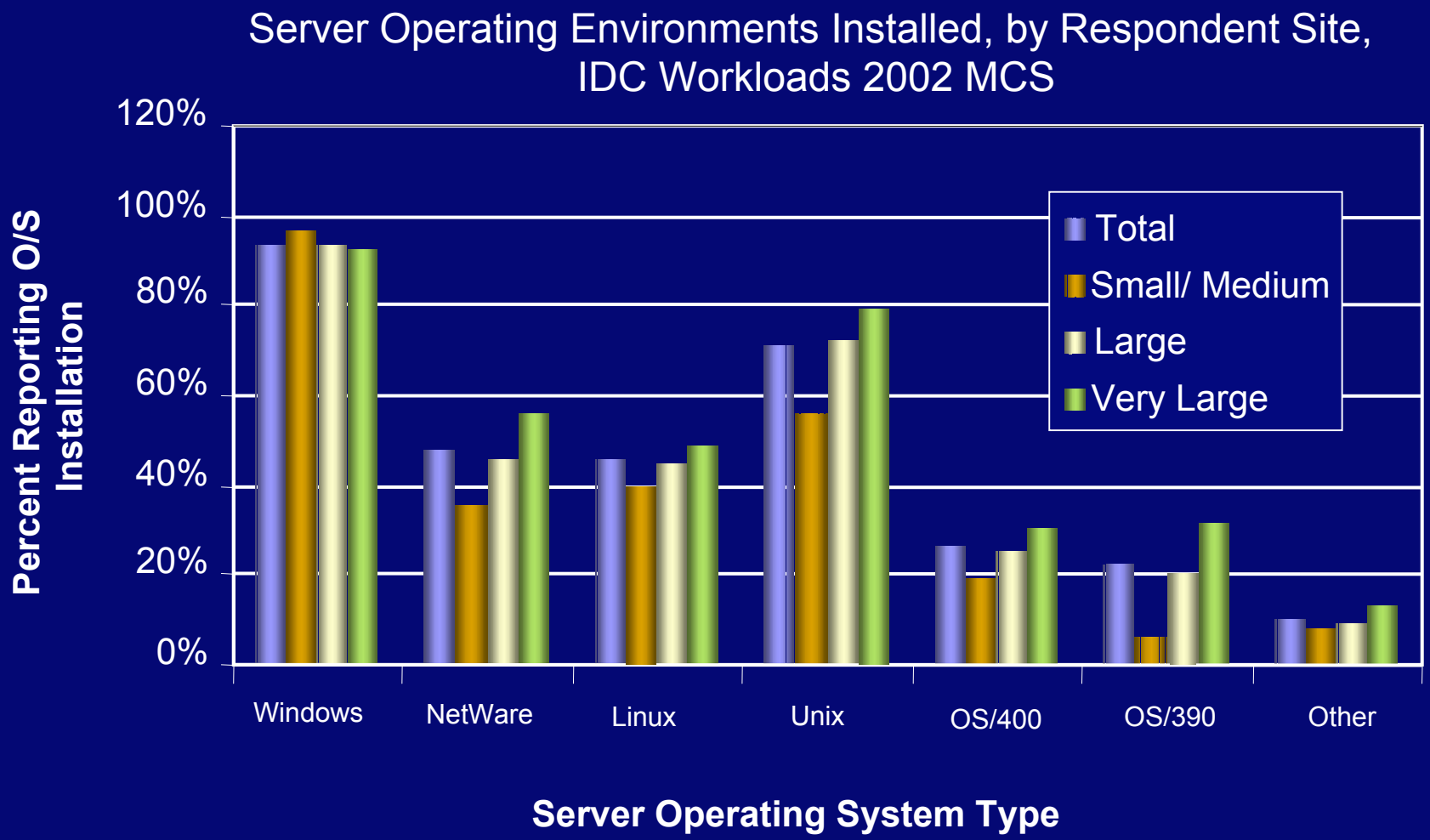
Multiple Operating Systems

- Variety is Not Going Away . . .
- It Supports Choice in Platforms
- And Workload “Sweet Spots”
- Unix, Windows and Linux Emerge as the Biggest “Slices”
- But Other Operating Systems Remain for Enterprise Workloads
- IT Managers Decide on Operating System Choices . . .
- . . . And on Where the Operating System “Images” Run
- What Emerges is a Complex, and Changing, Pattern of Domains
- That System Management Automation Will Simplify
- Metering and Monitoring will be Key . . .
- . . . To Paying for the new Information Systems Utility

Presence of Servers in Customer Sites, by Operating System



Source: IDC Workloads 2002 MCS (N=325 sites)

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What's Fueling Linux Servers' Rapid Growth?

- The time was "right," the acquisition cost was "right"
  - 41% revenue growth year/year, Q402; 35% in Q103
- Piggy-backing on the Internet
- Economic downturn helped adoption
- Business model: Getting into the source
- Alternative to the two largest application platforms: Unix servers and Windows servers
- Programming/administration Unix skills were present
- Demographic change

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Windows Servers: "Scale up" and "Scale Out"

- Windows has always been a strong volume server platform (servers priced less than $25,000)
- But Windows servers are growing in the midrange enterprise space ($25,000-$499,999)
- And will scale up into the high-end enterprise ($500,000 or more) as the decade progresses
- 64-bit capabilities will benefit DB and HPC workloads
- Databases will become more scalable on Windows servers (e.g., Microsoft SQL Server, Oracle)
- Windows servers will gain more OLTP and business processing software as they become more scalable

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Unix Servers Will Remain Data Center "Anchors" for Enterprise Networks

- Mainframe alternatives
- Database powerhouses (data warehouse; decision support)
- Platforms for Enterprise Applications (ERP, CRM)
- Supporting online transaction processing (OLTP)
- More scalable than other environments (64-128 CPUs)
- High levels of RAS (reliability, availability, serviceability)
- Advanced systems management and clustering
- Security is enhanced through physical, logical partitions

HP's Approach to Server Infrastructure

Multiple form factors

- Blades
- Thin servers
- Scalable servers

Multiple operating systems

- Unix, Windows, Linux in 2003
- Adding Open VMS and NSK to Itanium servers in 2004

Support for Utility Computing

- Utility Data Center offering
- Capacity on Demand
- Outsourcing and Managed Services

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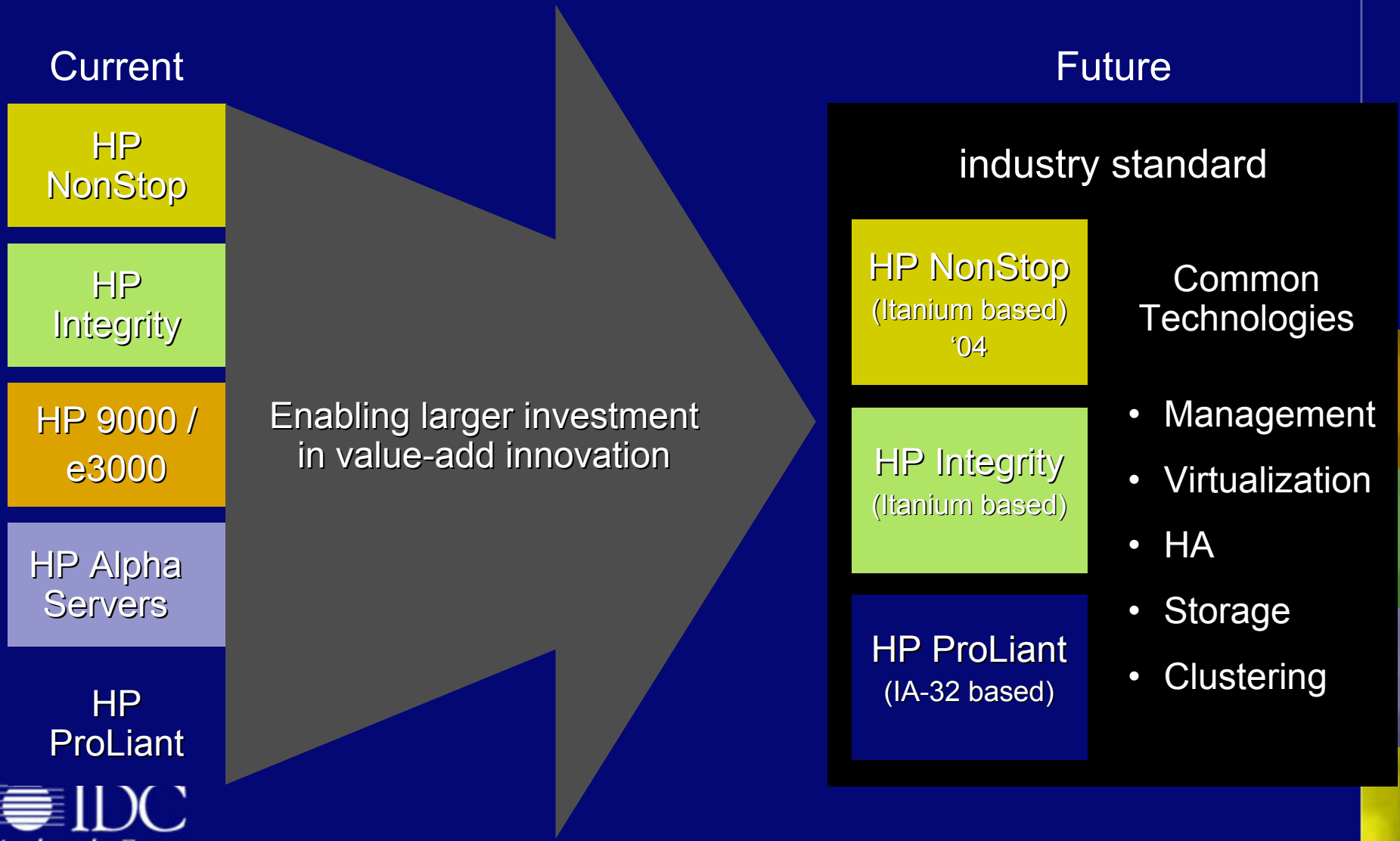
Moving to 3 product lines – built on 2 industry-standard architectures (Source: HP)



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What Is the Emerging Itanium Ecosystem?

- More ISV applications, server solutions
- Enhanced middleware "build out"
- More 64-bit applications (HPC and commercial)
- Many server OEMs support Itanium 2 as a volume microprocessor platform, supporting volume economics
- Enhanced workload management for operating systems in partitions on scalable servers
- Enhanced workload-balancing software for HPC computing and Web services
- Sophisticated systems management software for commercial clusters and utility computing

Services and Tools: Providing service and support as customers define it (Source: HP)

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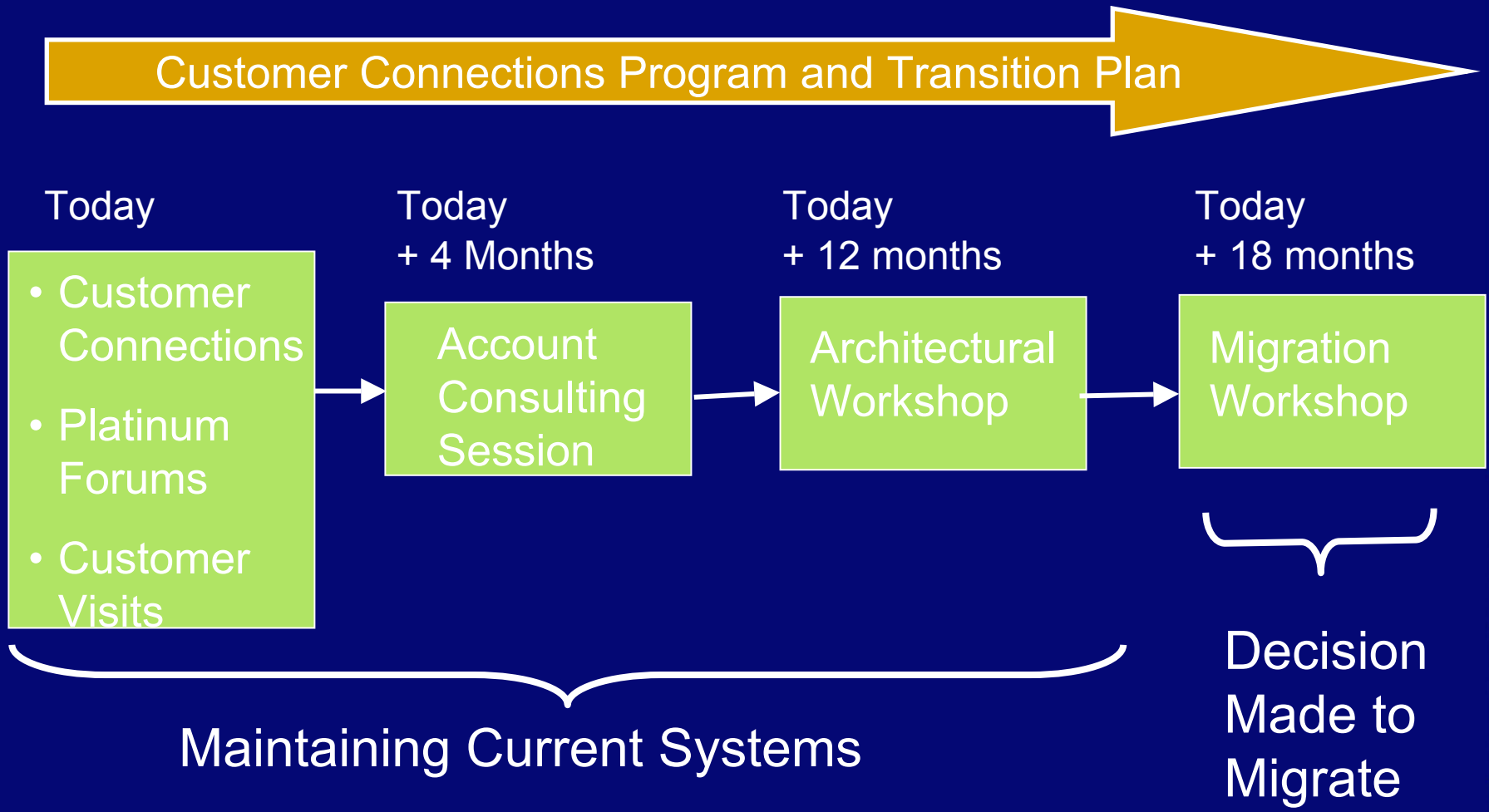
Types of HP Service Customer Engagements for Transition to Itanium (Source: HP)



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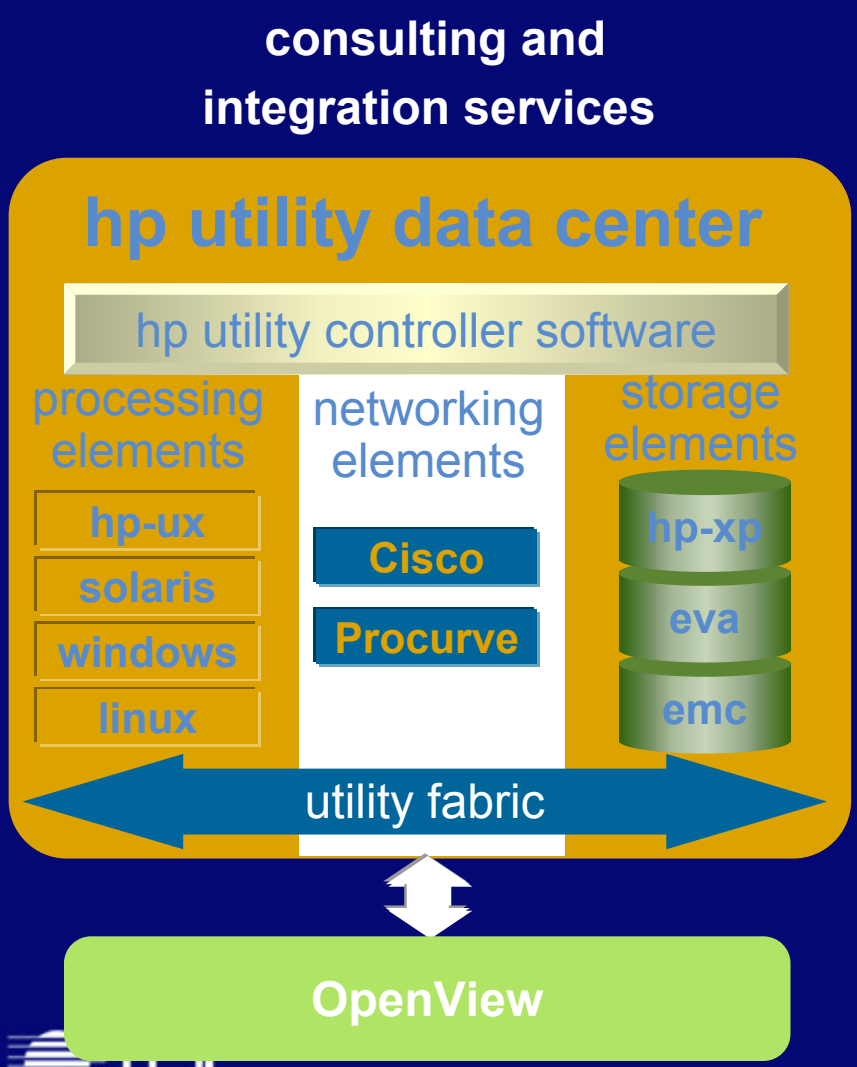
UDC Components (Source: HP)



Virtual Server Pools

- HP-UX, Linux, Solaris, Windows
- AIX with customization

Virtual Network Pools

- VLAN
- Cisco and HP Procurve switches

Virtual Storage Pools

- HP XP and EVA storage
- EMC Symmetrix

Utility Fabric

- Any to any topology

Utility Controller Rack & Software

- Manages service templates
- Automated resource, workload and failure management

HP's Utility Data Center at HP Labs
(Source: HP)

HP UDC at the Palo Alto Research Labs. 12/02

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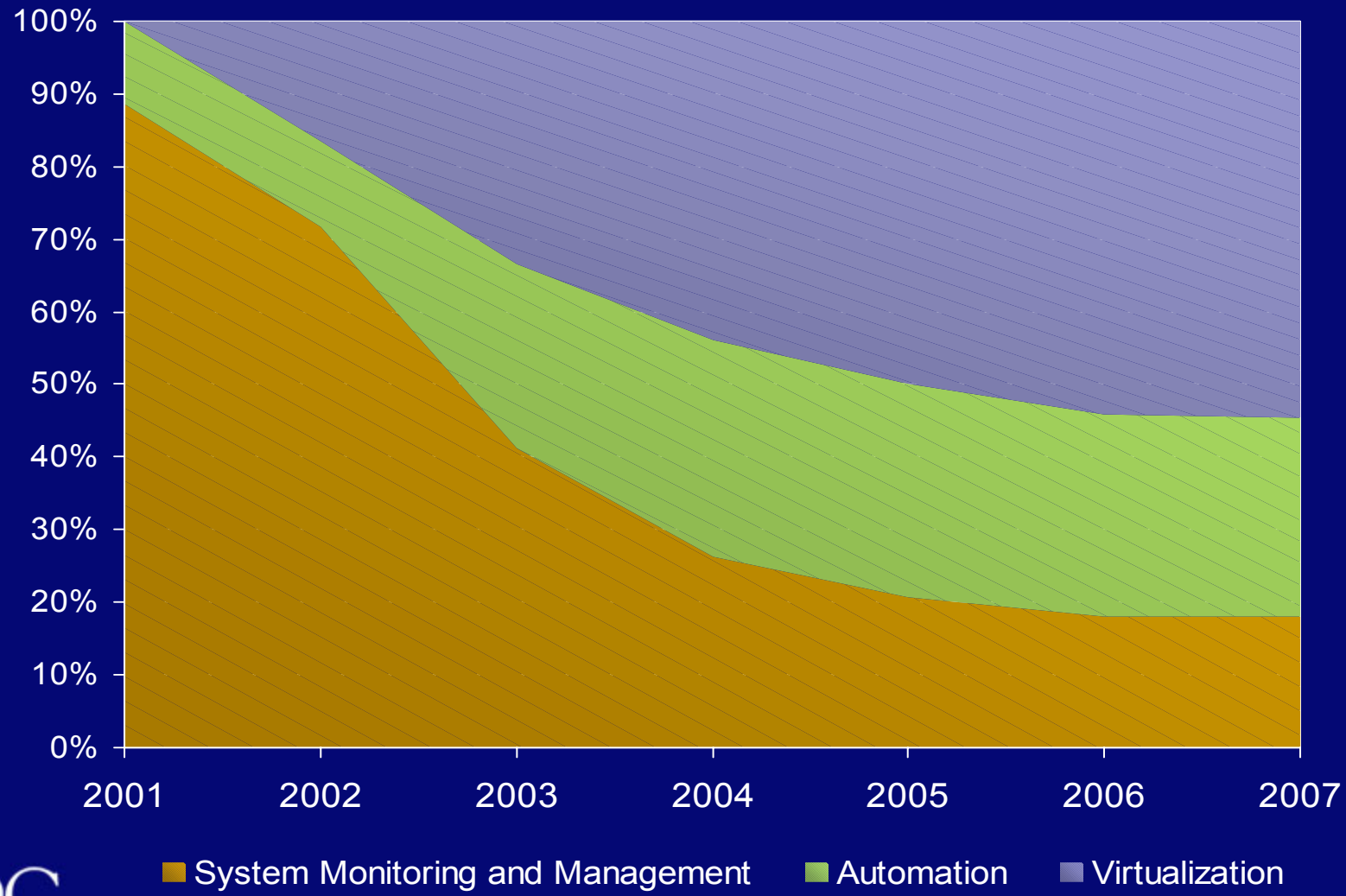
Utility Computing — When to Expect the Technology



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Questions?

Please email me at

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