



Cisco Data Center Network Architecture



What is Cisco Data Center?

Cisco Systems

Core Technologies

Switching

Routing

Advanced Technologies

Data Center

Wireless

Unified
Comms

Security



SANs (MDS)

ANS (WAAS ACE, WAE etc)

Infiniband Server networking (SFS, Vframe)

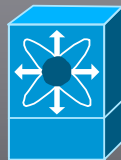
Cisco Data Center Product Families

Data Center Switching



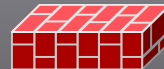
- Catalyst 6500 Series
- Catalyst 4948 Top-of-Rack
- Catalyst Blade Server Switches

Storage Infrastructures



- MDS 9500 Storage Directors
- MDS 9124 Fabric Switches
- Storage Service Modules
- ONS 15454

Data Center Security



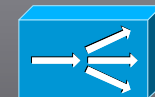
- Firewall Services Module
- Intrusion Detection Module
- CSA Server Security Agent
- ACE/AVS

Compute Clustering Unified Fabric



- SFS 7000 High-Density Infiniband Compute Fabric Switch
- SFS 3000 Infiniband Gateway

Application Network Services



- L4-7 Content Services Module
- Wide-Area Application Services
- SSL Termination
- ACE/AVS

Data Center Provisioning

VFrame Server/Service Provisioning System



Data Center Management

Fabric Manager—Topology Discovery/ Visualization and Transport Provisioning

IME—Advanced L4-7 Services Module Management

Gartner Magic Quadrant 2005

2004: Cisco follows

2005: Cisco leads!

Figure 1. Magic Quadrant for Storage Area Network (SAN) FC Switches, 1H04

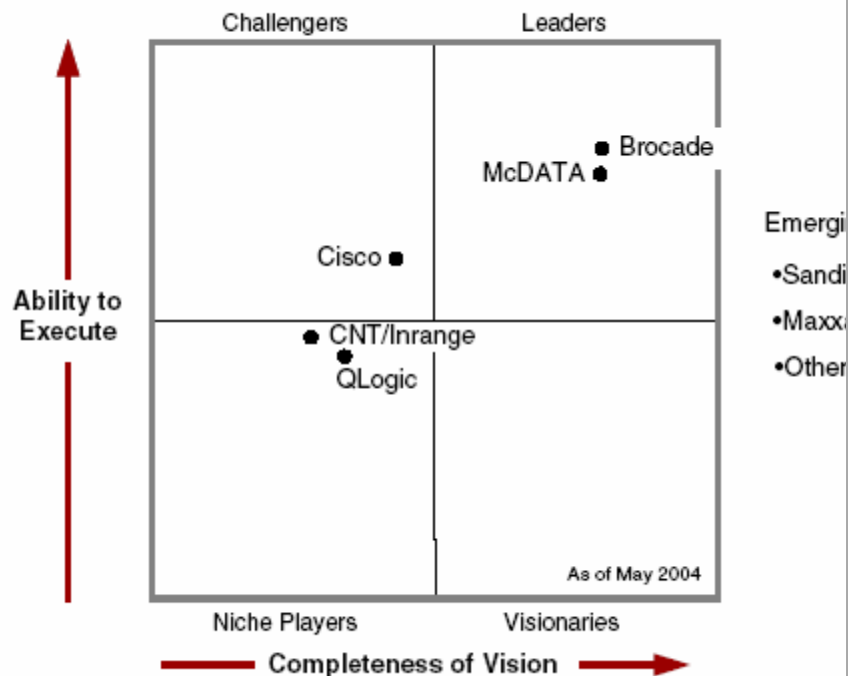


Figure 1. Magic Quadrant for SAN Fibre Channel Switches, 2005



Cisco Data Center Storage Infrastructure Partner Landscape

Storage Manufacturers and Integrators





Data Center Networking Architecture Overview



René Bosman
Business Development Manager Data Center
Tel. +31 (0)653 147 913
rbosman@cisco.com

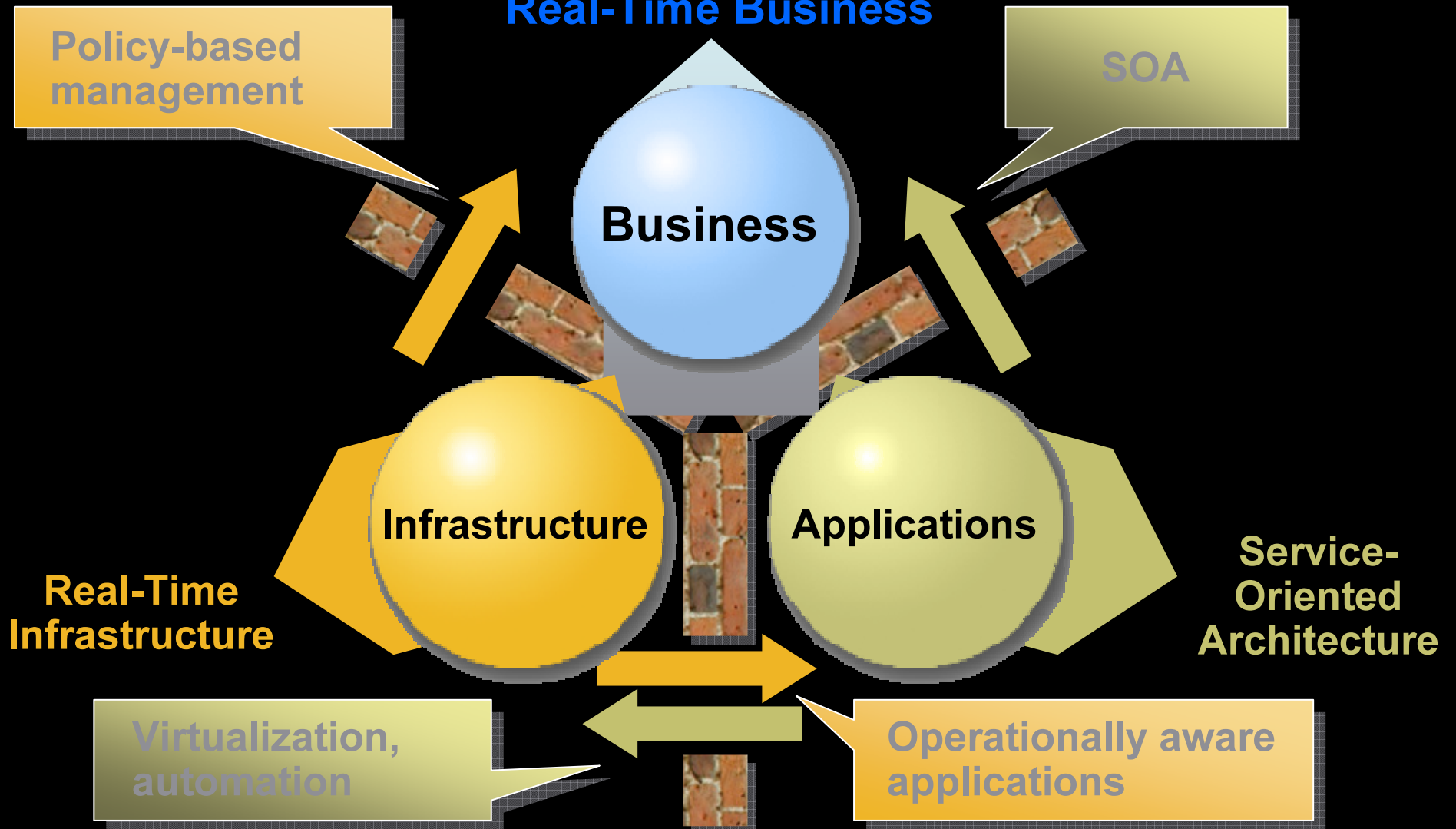


Cisco Data Center Vision



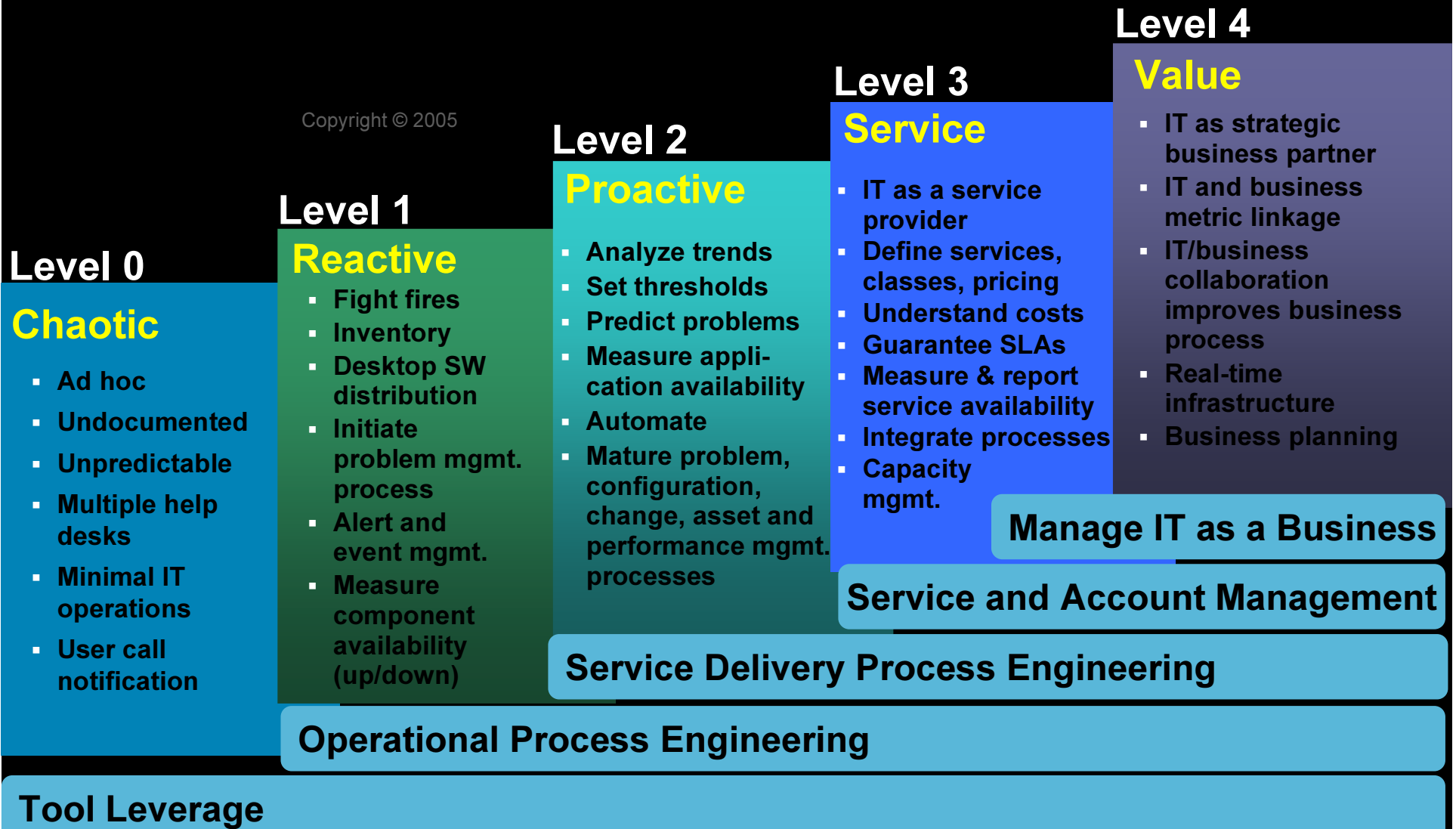
The Walls Are Coming Down

Real-Time Business



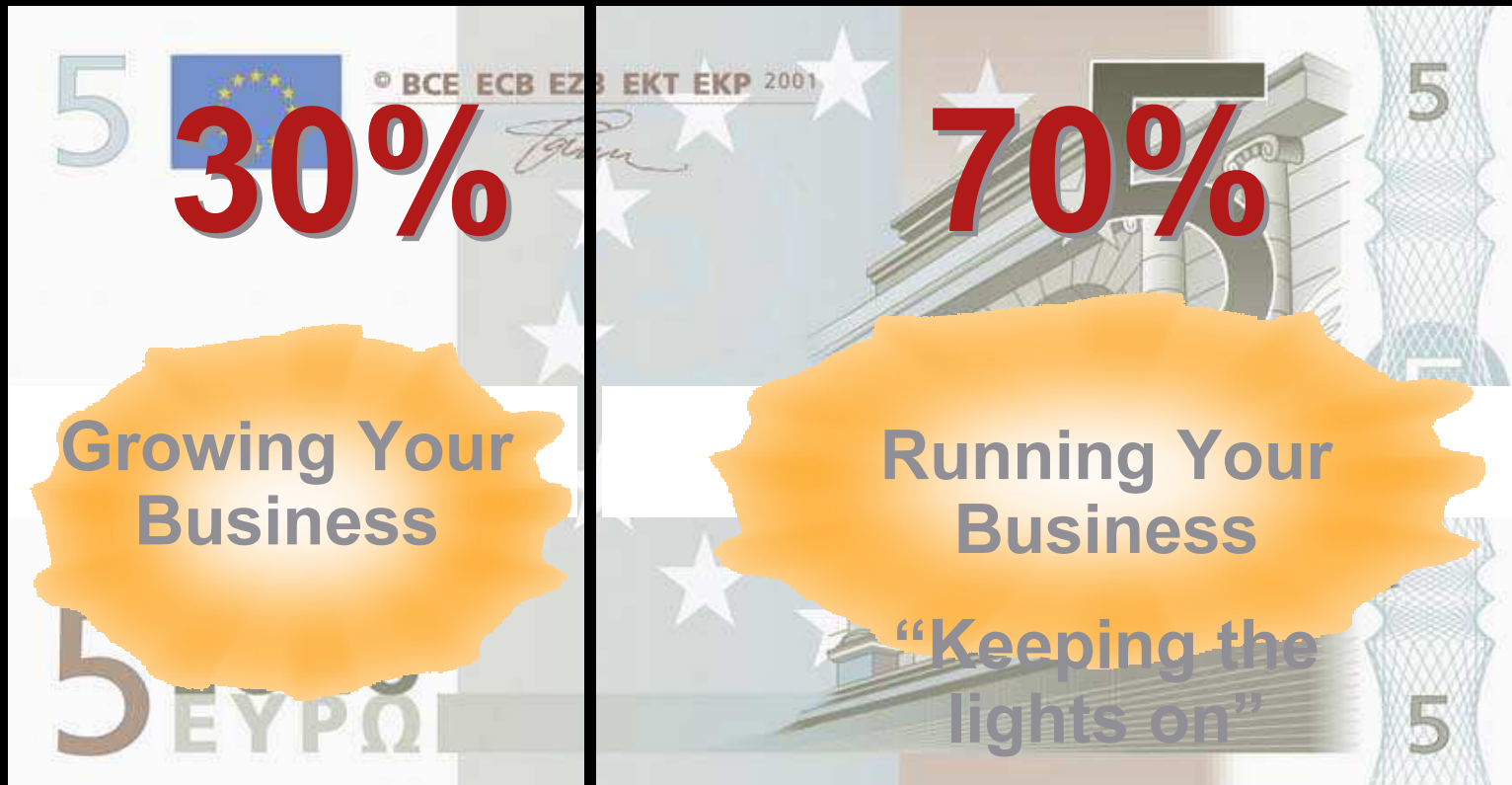
Gartner's Infrastructure Maturity Model

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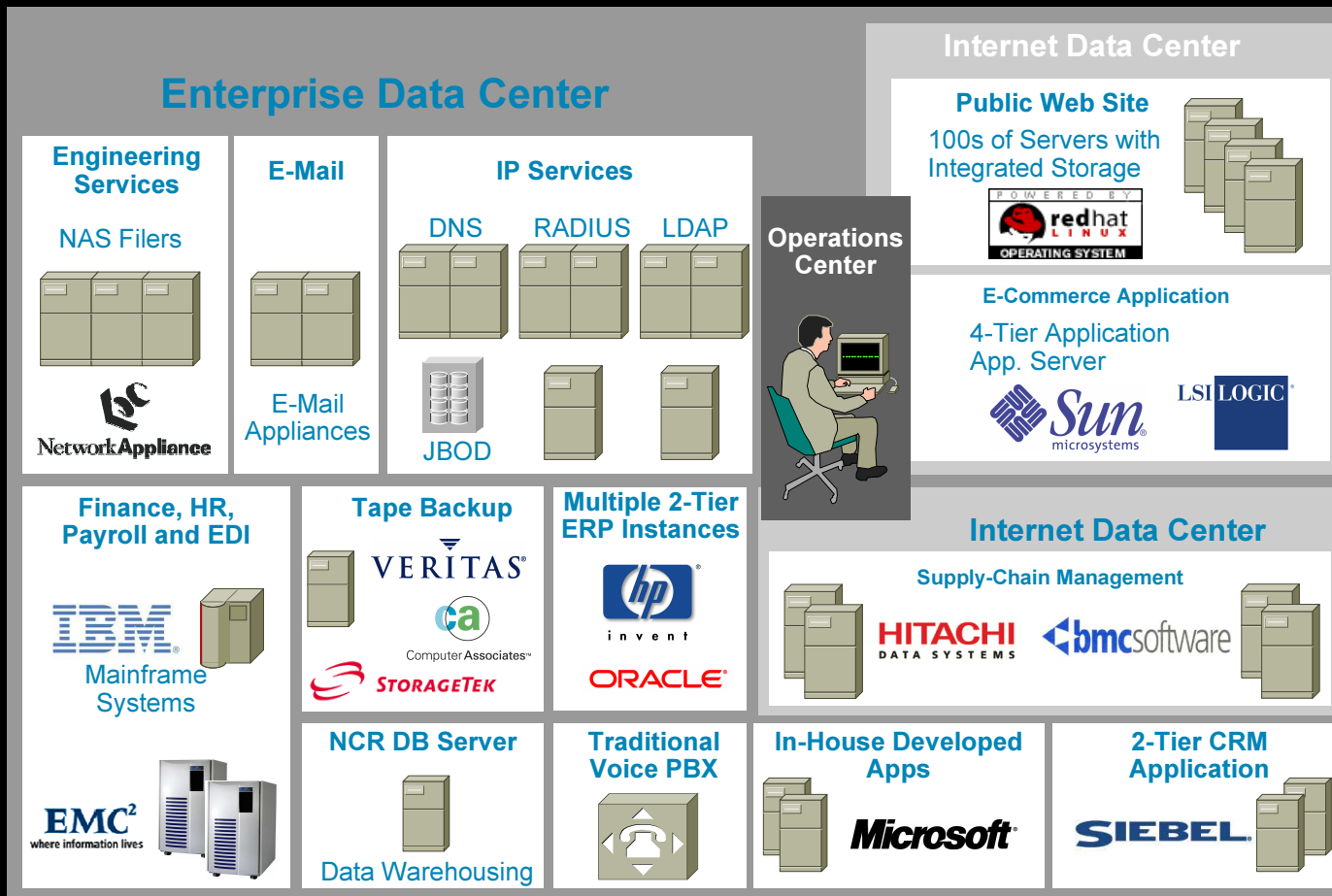
Tackling Business Challenges Where to Invest?

**70% of the IT Budget for *Maintenance*
30% Available for *Assets and Innovation****



***Source: Gartner - IT Infrastructure, And The Shift To “Real-Time” Feb, 2005**

The Typical Enterprise Data Center



Current Infrastructure

TCO
Under-utilized Resources
Operational Complexity and Inefficiency

RESILIENCE

Inconsistent Security


Inconsistent DR

AGILITY

Isolated Application Silos
Rigid Infrastructure Silos


Major IT Challenges Today

Resilience and Compliance



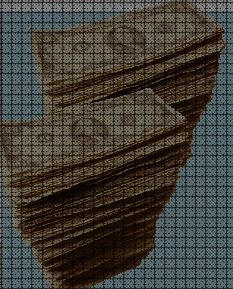
Conformance

Business Continuance



Security

Controlling Costs

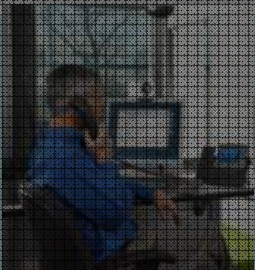


Automation

Virtualization

Consolidation

Information Management



Content Delivery

Data Classification

Tiered Storage

IT Infrastructures (including Data Centers) Need to Evolve to Meet Today's Business Priorities

Business Responsiveness

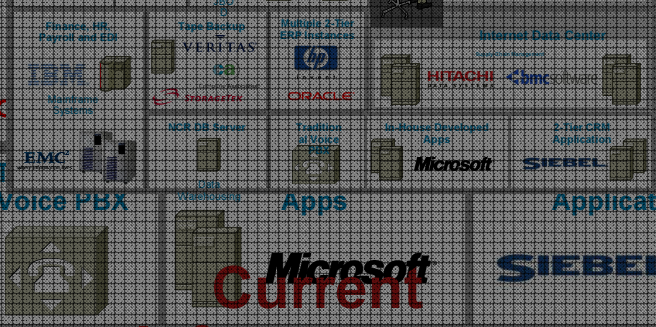


Agility

Application Integration

Growth

- Service Oriented Architecture



VERITAS

ORACLE

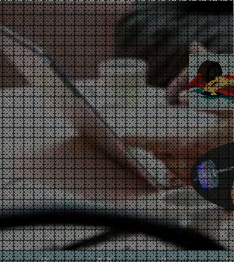
EMC

Microsoft

SIEBEL

Microsoft
Current Infrastructure

Application Service Levels



Performance

Availability

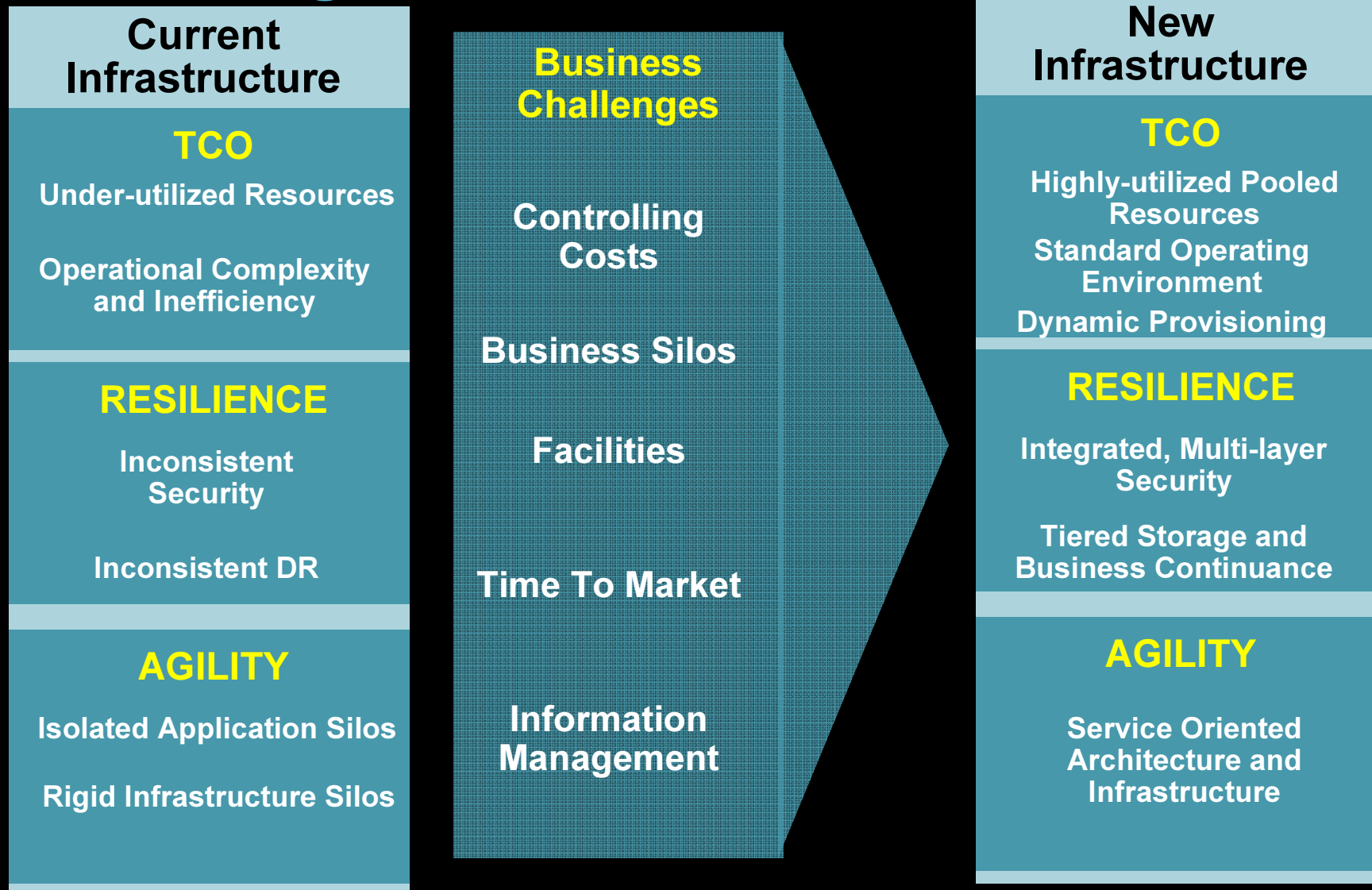
Application Awareness and Optimization

Data Center Challenges

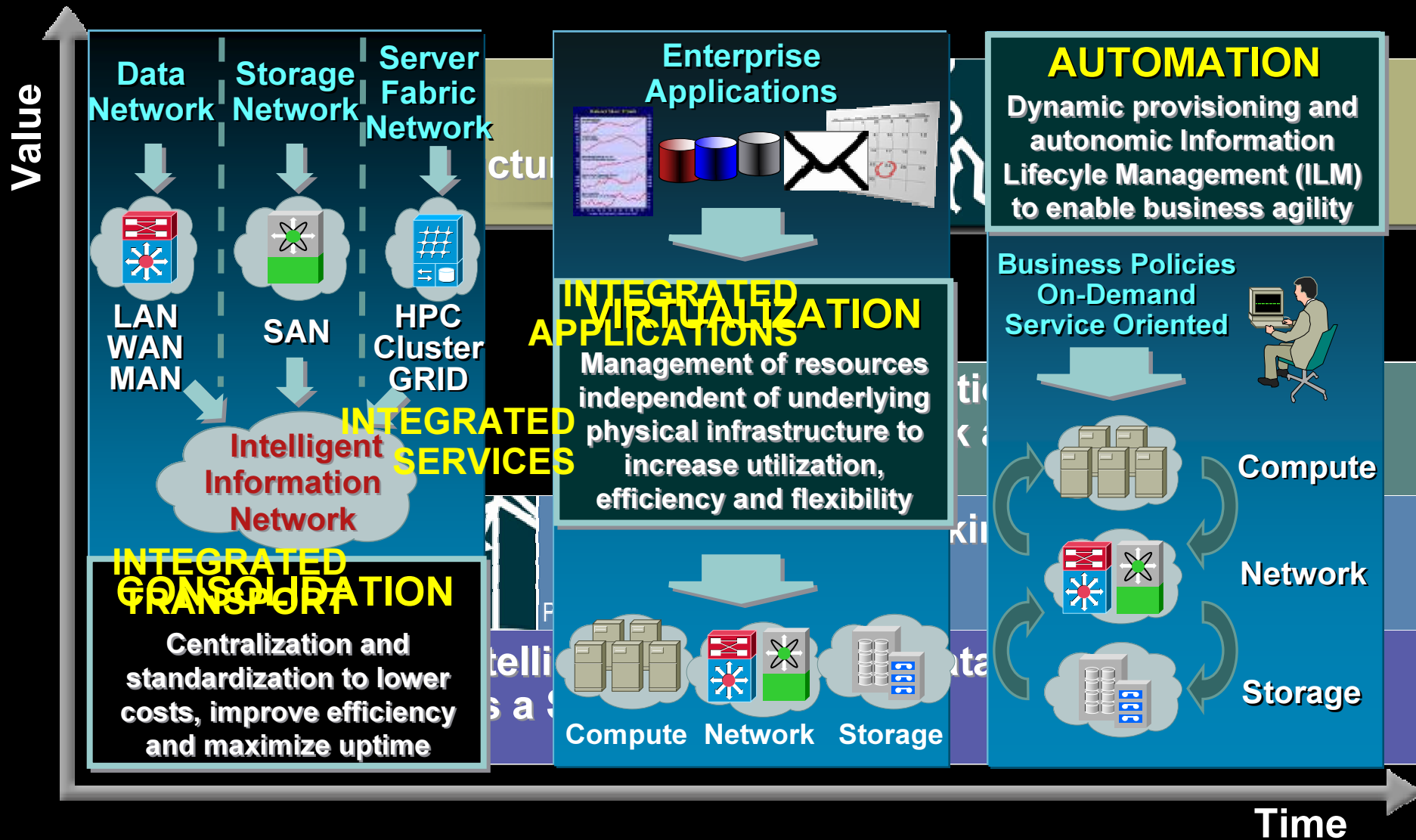
- Controlling costs
- Organizational structure (business silos)
- HECS (Heat Energy Cooling Space)
- Time to Market: how fast can I deploy new applications ?
- Information management: dealing with growth....



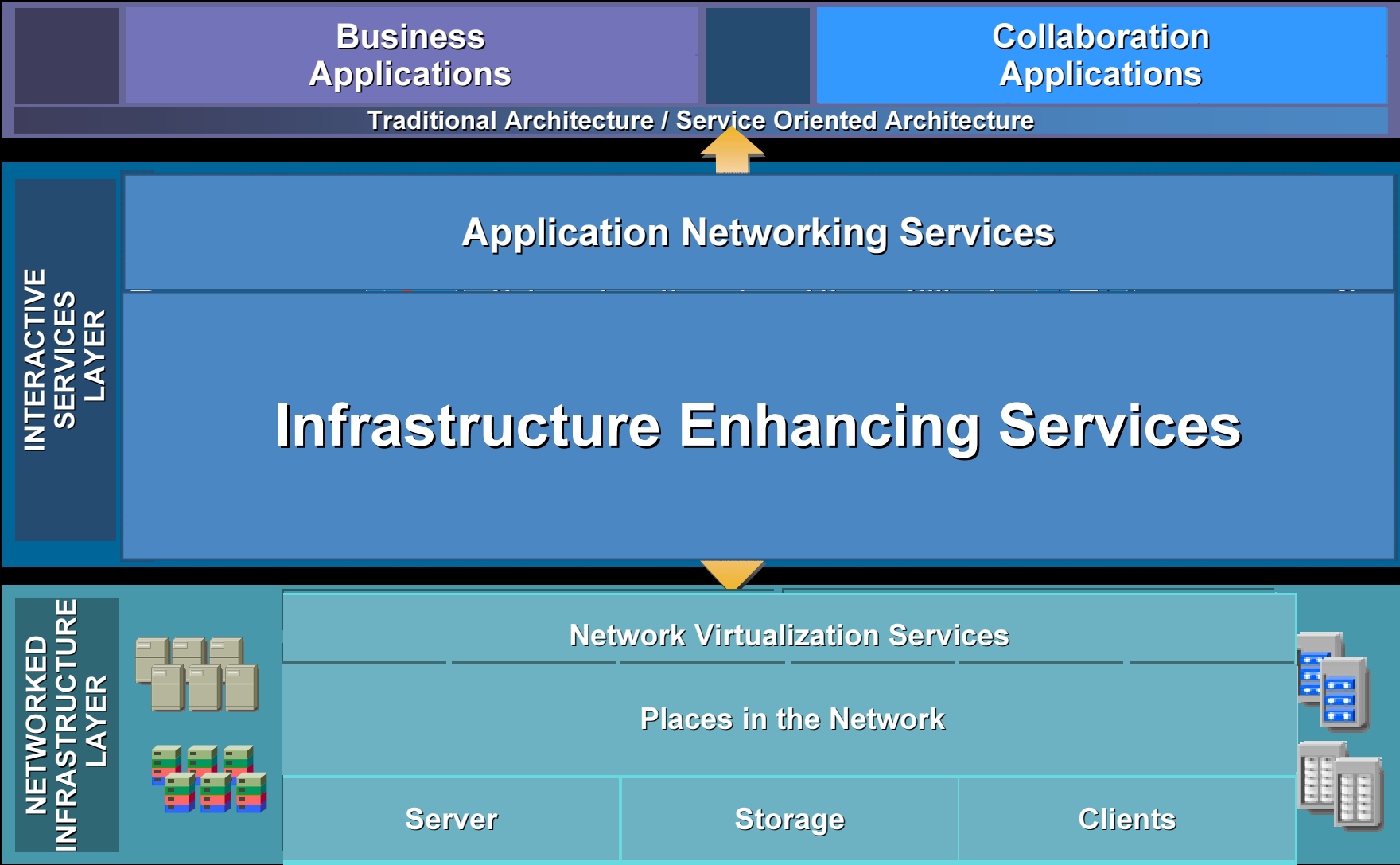
Key Data Center Infrastructure Challenges and Trends



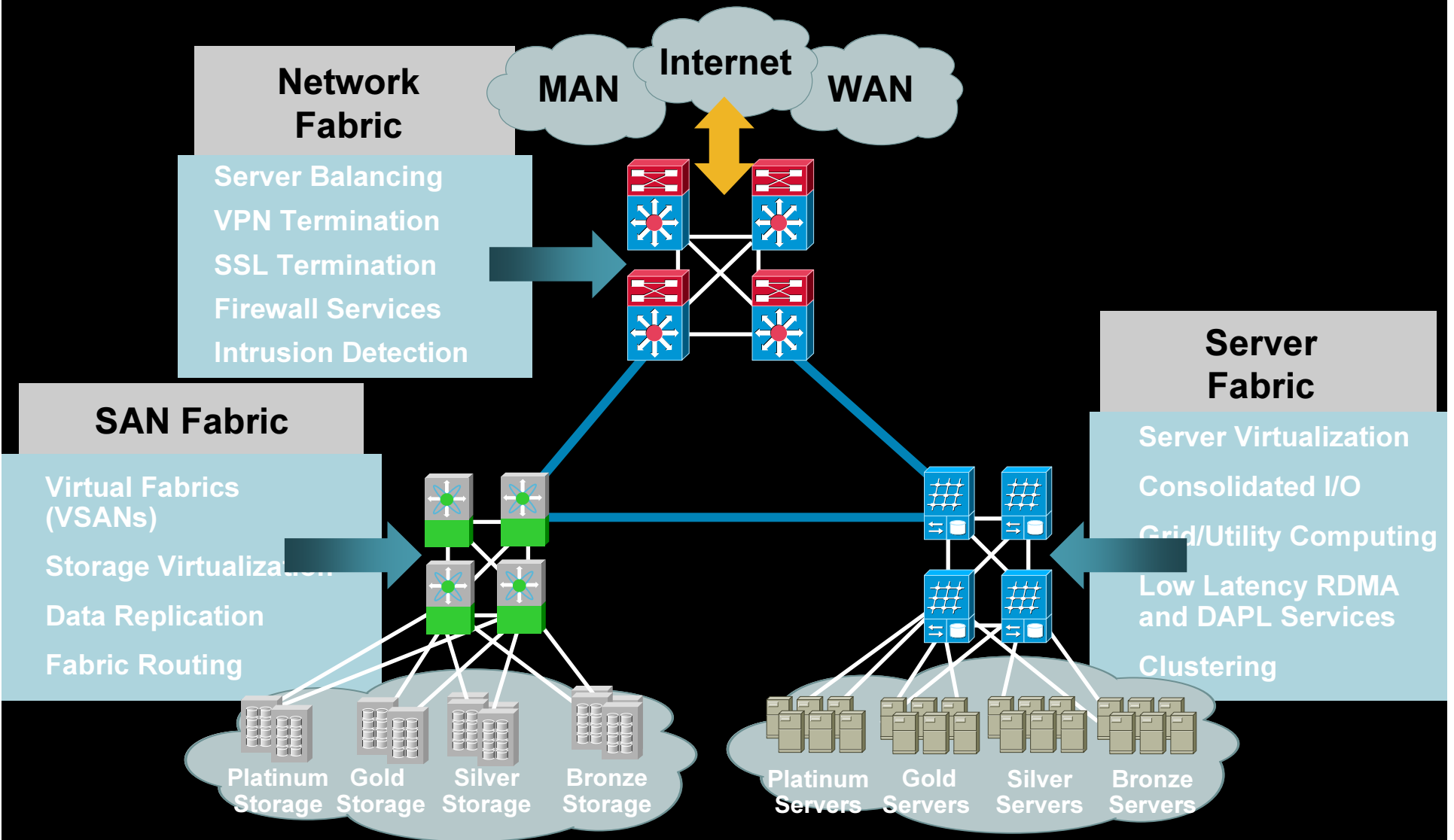
The Evolution of the Data Center In The Intelligent Information Network



Cisco Data Center Network Architecture



Data Center Networking Architecture



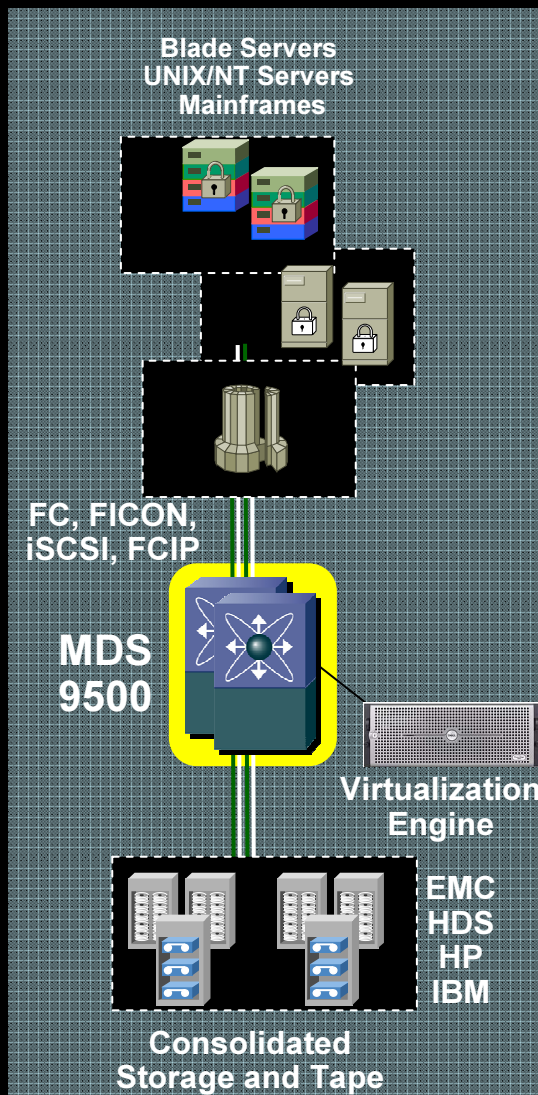


Addressing Top of Mind Technology Issues



Storage and SAN Proliferation

SAN Consolidation and Virtualization



Scalability and Availability

- Non-disruptive software upgrades, stateful failover
- VSANs and Inter-VSAN Routing (IVR)
- 1.44 Tbps switching bandwidth
- 224 FC ports in 14RU (MDS 9509)

Virtualization Platform

- Hosts 3rd party virtualization engines via standard API
- Enhances reliability, performance and transparency

Troubleshooting

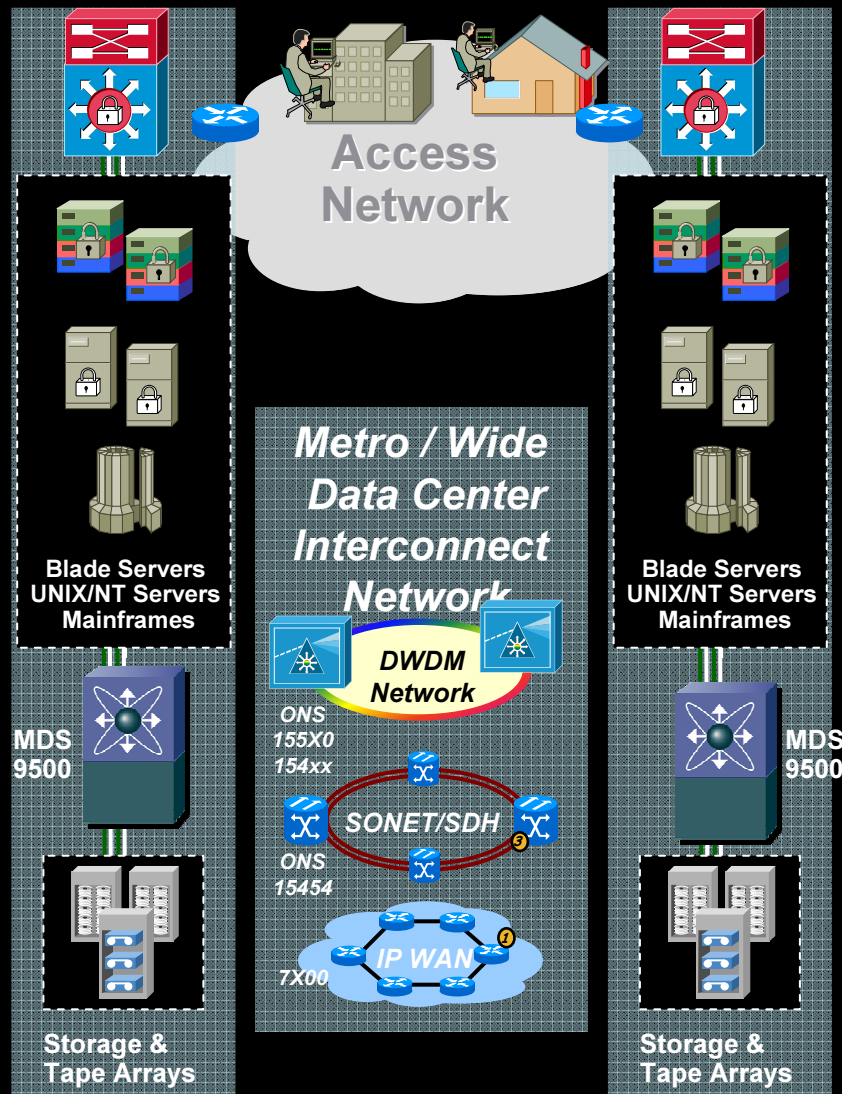
- Embedded FC Analyzer
- FC Ping and FC Traceroute
- Remote SPAN (RSPAN)
- Hot-spot analysis

Heterogeneous Fabrics

- Heterogeneous environments – NT, UNIX, MF, multi-vendor
- Multi-protocol FC, FICON, iSCSI, FCIP
- Interoperability with legacy switches

Business Continuity and Compliance

Enhanced Business Continuity



Broad Application Support

- Asynch / Synch Replication, Backup, Point in Time Copy
- Multi-vendor Support: EMC, HP, HDS, IBM, Appliances
- 3rd Party Appliance Support: SANTap

Optimized SAN Extension

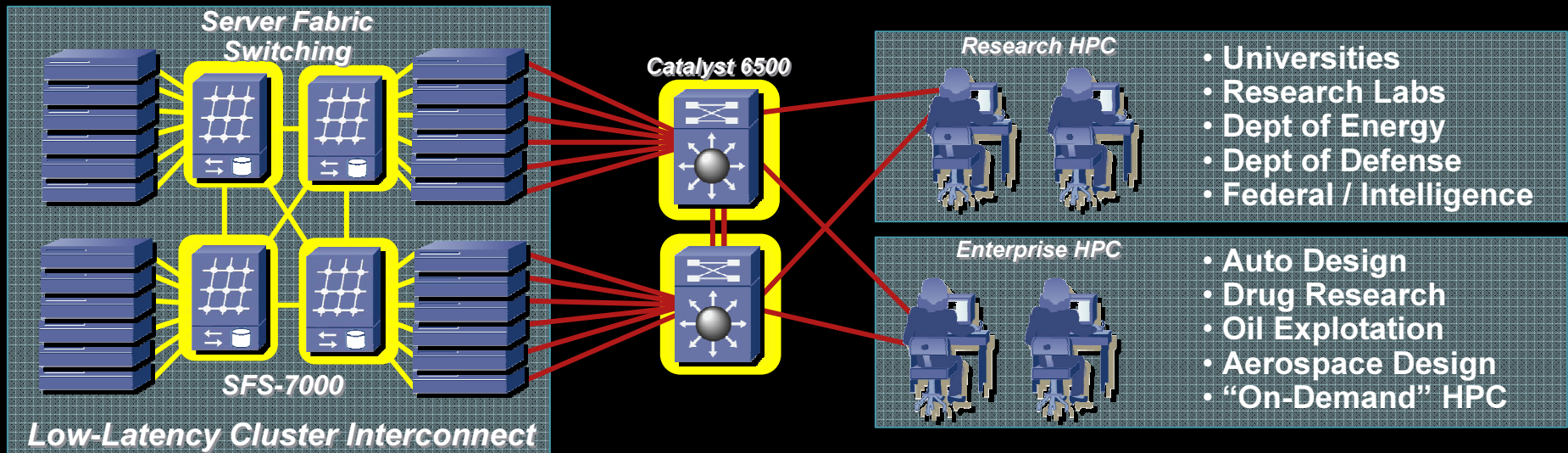
- Multi-protocol Transport: FCIP, DWDM, Sonet/SDH
- Distance / Application Optimization: Write and Tape Acceleration
- Security: FCIP Encryption and FC-SP Auth
- WAN Utilization: Compression and Large B2B Credits
- Availability: VSANs and Inter VSAN Routing

Continuous Access

- Global Site Selector
- VPN – IPsec, SSL, MPLS
- Optimized Exit Routing

Cost Effective High Performance Computing

Standards-based High Performance Computing



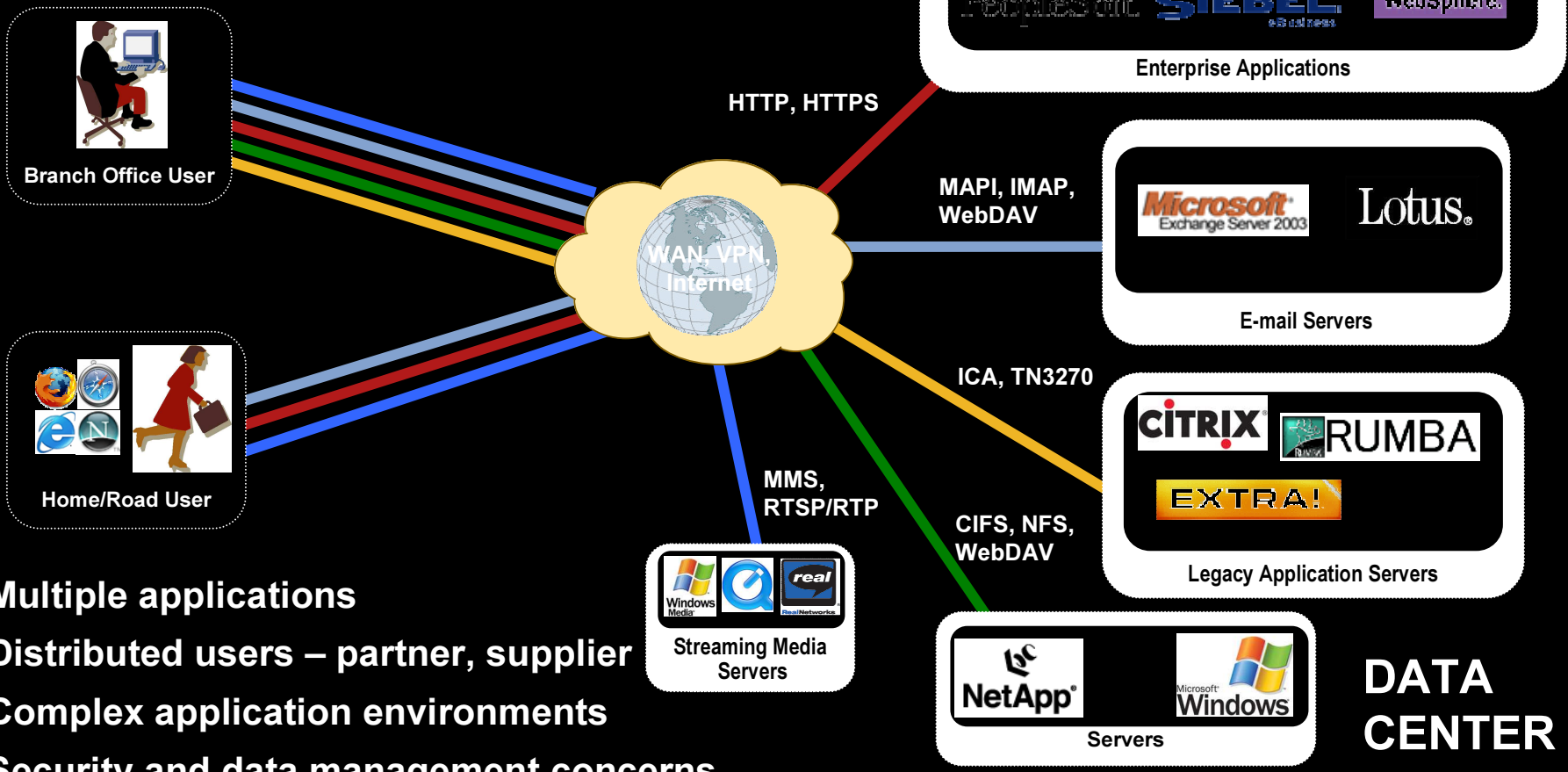
Lower Cost High Performance Computing

- High performance, low latency, low cost interconnect - Infiniband and/or Gigabit Ethernet
- Proven scalability to 4000 nodes
- Standards-based
- Servers transparently replaced for continuous operation
- Prove interoperability with major server vendors

Application Delivery

Cisco Application Optimization

Majority of Users are Remote



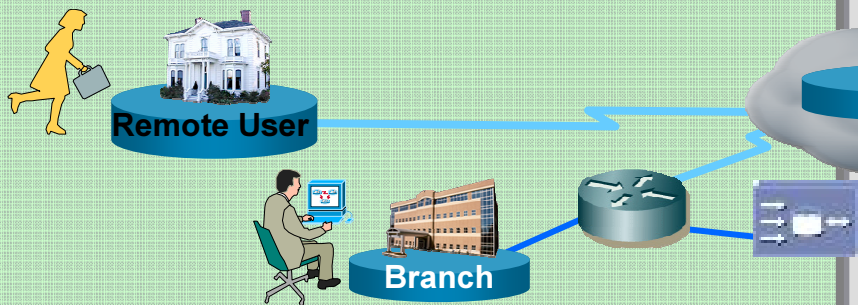
- Multiple applications
- Distributed users – partner, supplier
- Complex application environments
- Security and data management concerns

Cisco Application Networking Services

Branch/WAN Services

WAN Optimization

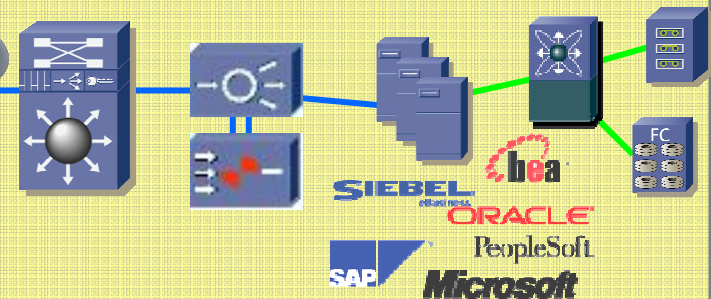
- *LAN-like application performance over the WAN*
- *Consolidate branch, server and storage infrastructure*
- *Increased data protection, compliance, and cost savings*



Data Center

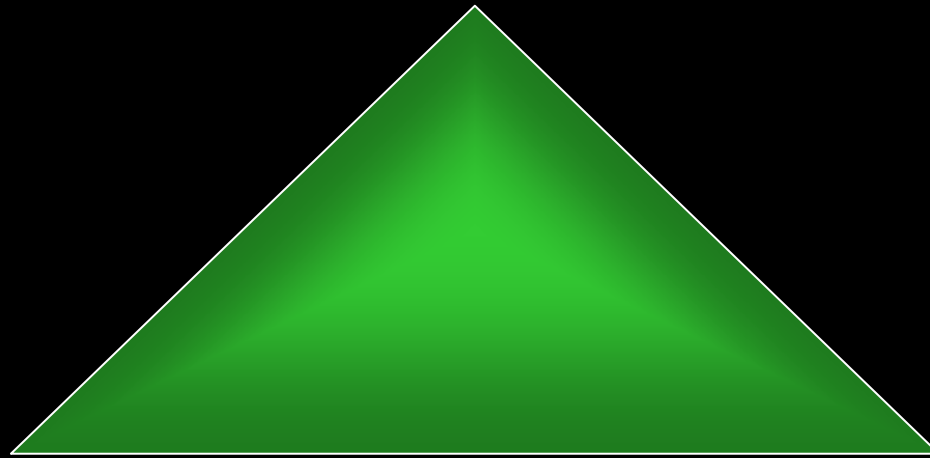
Application Services

- *IT responsiveness*
- *Business alignment*
- *Streamlined topologies*
- *Lower OPEX and CAPEX*
- *Improved App'n Security*



Data Center Automation VFrame Key Benefits

**End to End
Service Orientation**

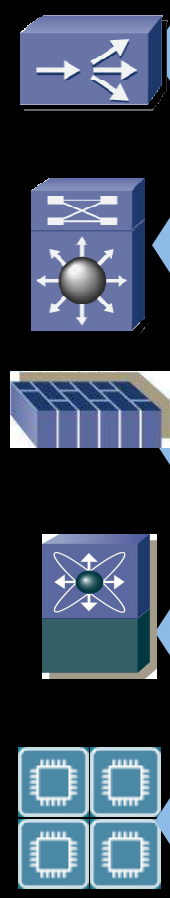
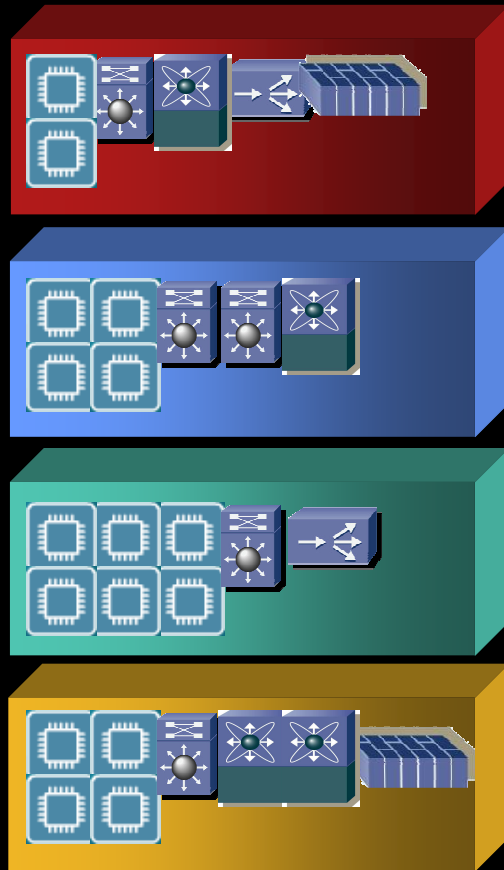


**Data Center
Virtualization**

**Vertical
Provisioning**

Service Orientation and Virtualization

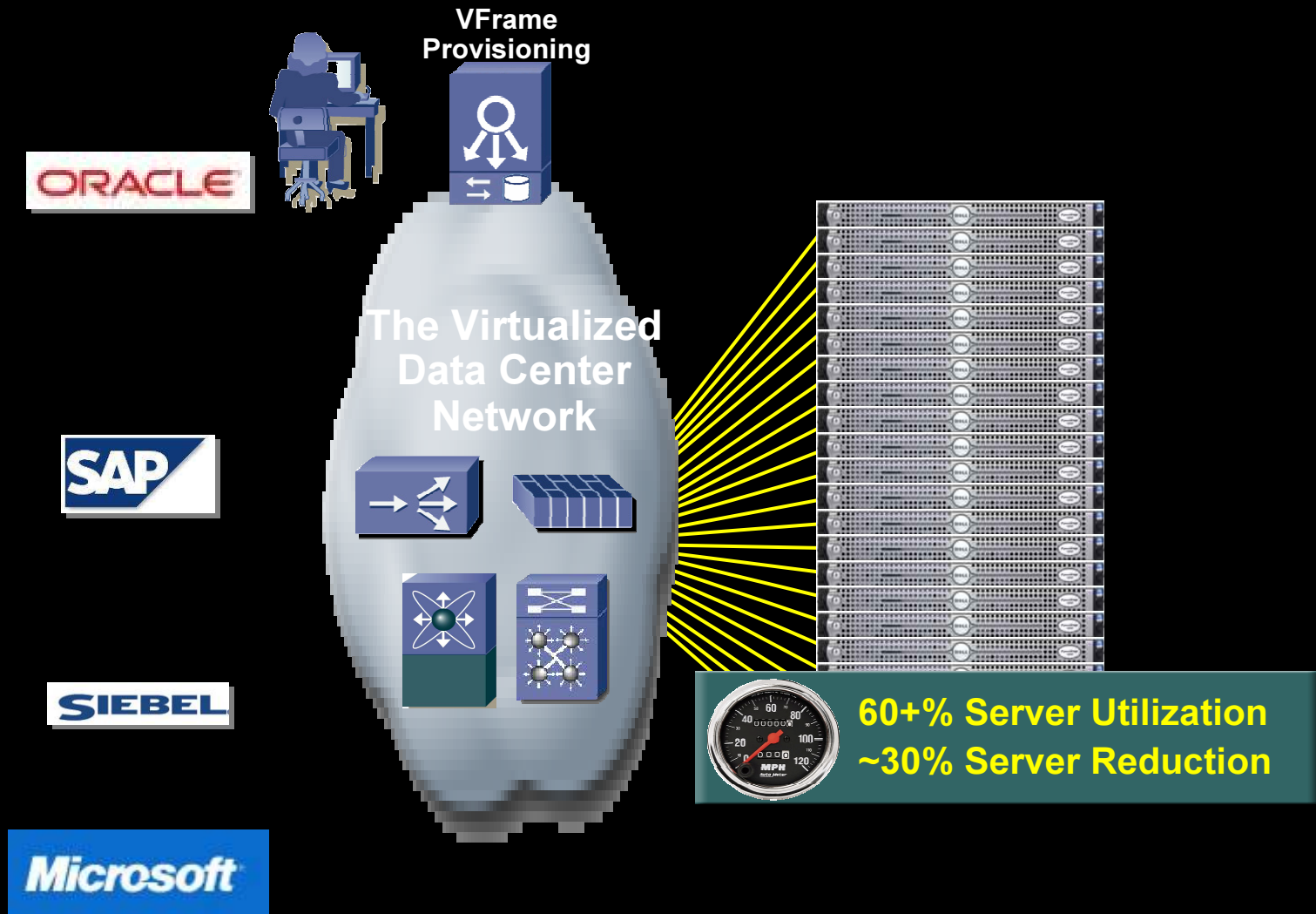
Service Template



- Load balancing configured as needed per application
- Virtualized resources and instances
- LAN, WAN, Internet Access
- Networked application services
- Integrated security
- Security policies per application class
- Virtual Firewalling
- Storage Virtualization
- Fabric-assisted Applications
- Data Replication Services
- Compute power via “utility computing”
- Golden Image and Boot OS

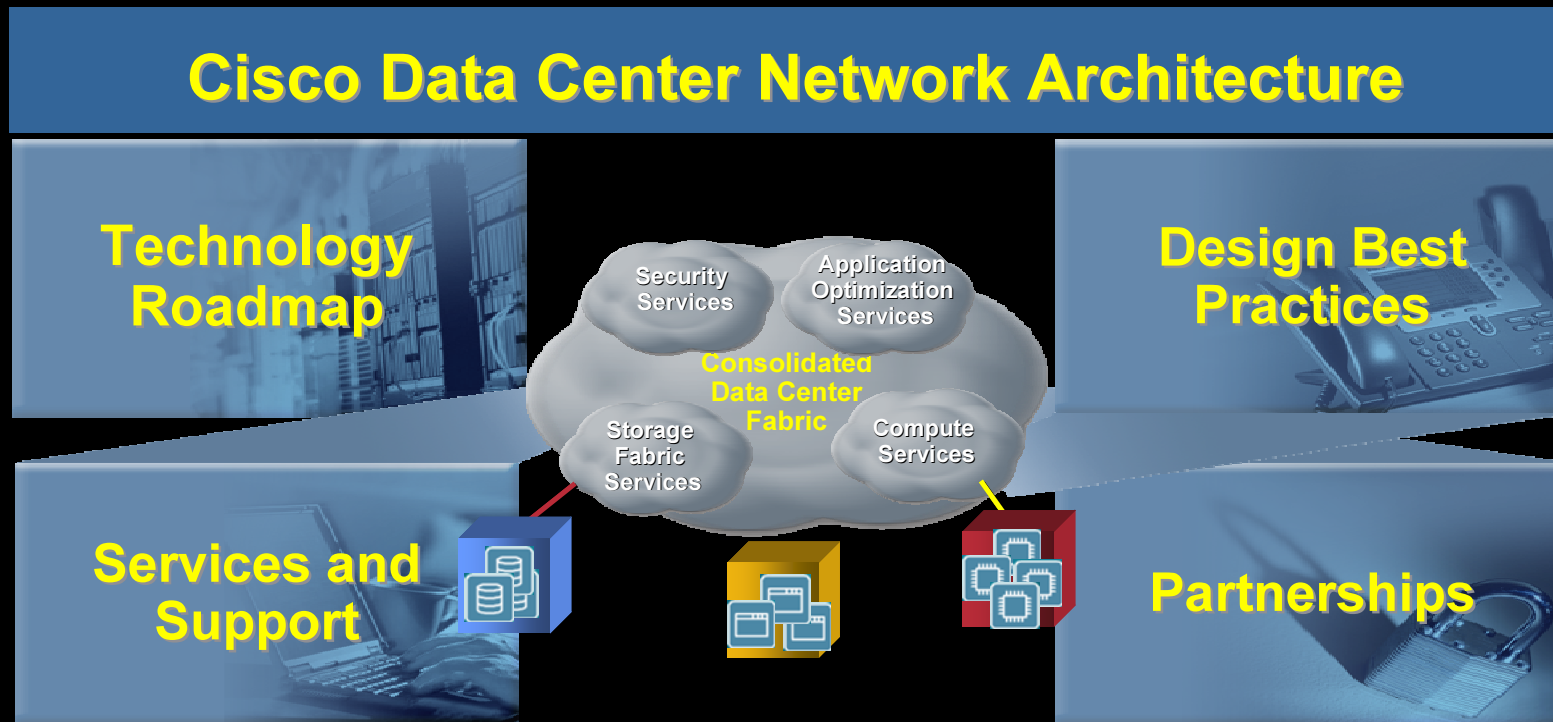
Physical devices abstracted in the data center – pooled per defined service

Result: Application-based Services



Cisco Data Center Network Architecture

Enabling Data Center Evolution



Data Center Networking Action Plan

- **Decide on the end-state data center:**
What should the data center be in five years?
- **Identify main immediate challenges and initiatives:**
Consolidation, business continuance, virtualization, on-demand, etc.
- **Develop data center networking strategy:**
Data center and network stakeholders engage
Supports data center short- to long-term goals and initiatives
- **Engage with Cisco and partners:**
Plan, design, deploy, implement, operate and optimize



Data Center Networking Lifecycle Services

Delivering a Technology Vision and Consultancy Services to **optimize current resources and plan for future network growth**

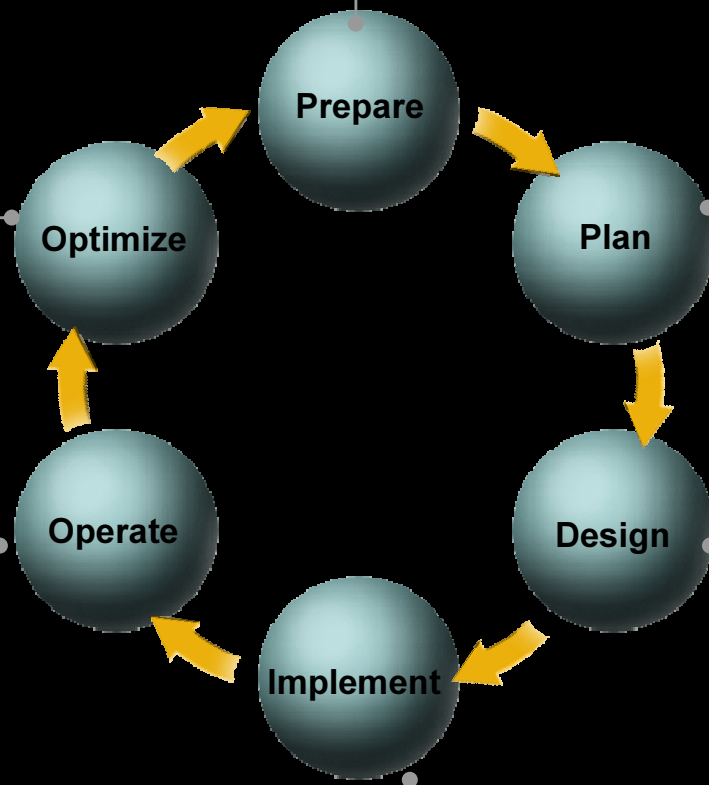
Planning for Peak Network Performance to **protect mission-critical application traffic**

Performance Evaluation, Architecture Planning, and Skills Assessments to **reduce cost and complexity**

Delivering Network Investment Protection to **maximize ROI**

Designing agile, resilient, scalable, and highly available networks for **greater service velocity and minimal impact of outages**

Deploying best practice configurations for **easier manageability of networks**



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Figure 1. Magic Quadrant for Storage Area Network (SAN) FC Switches, 1H04

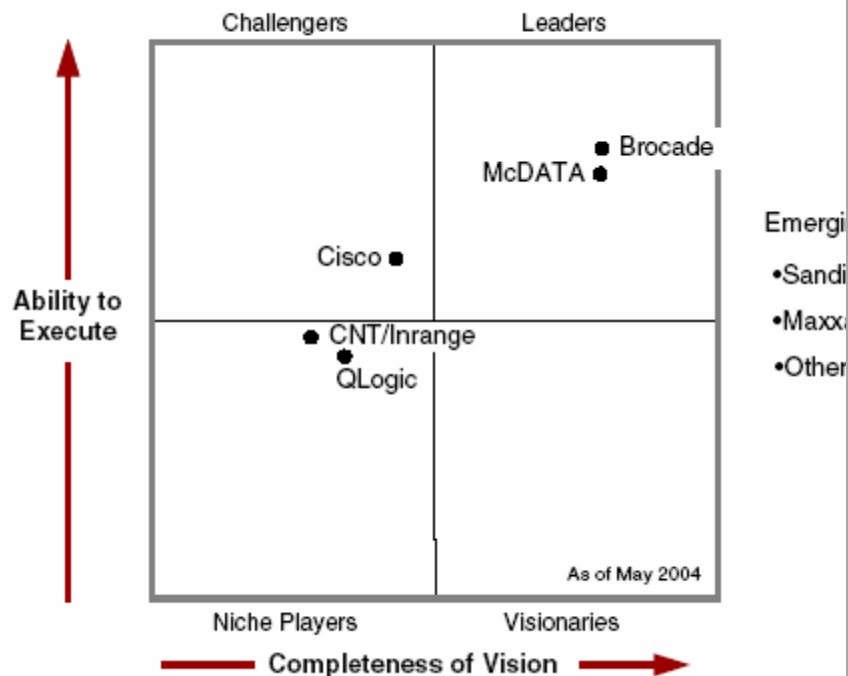


Figure 1. Magic Quadrant for SAN Fibre Channel Switches, 2005



The Network is Ready for the Journey

Consolidation

**Virtualization, Integration,
Automation**



Server



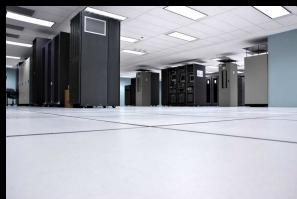
Virtual Machines



Storage



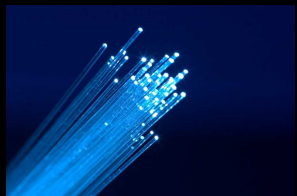
Virtual SANs
Storage Volume Virtualization
Virtualized Fabric Services



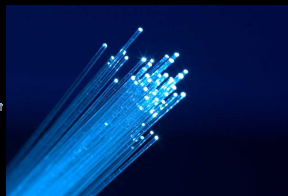
Data Center
Facilities



Active-Active Online Facilities
Service Transparency



Network



DC-Class Systems
Unified Network Fabric – Core/Edge
Dynamic Network Server/Service Provisioning

In closing Data Center Strategic Initiatives



Extend the Value of the Current Operational Model

- Lower Operating Costs
- Infrastructure Resilience
- Power and Cooling
- Application Delivery
- Holistic Security
- Compliance

Enabled by: Consolidation, Virtualization



Improve IT Effectiveness in the New Environment

- Event- and Policy-Driven Real-Time Infrastructure
- Unification of Components, Networks, Communications
- Streamlined Business Processes, IT as a Service

Enabled by: Integration, Automation

Questions?

