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# The Evolution of Grid Computing and the Emergence of Utility Model

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## Agenda

- What defines a Grid?
- What are the emerging categories for Grid?
- What are suppliers saying, customers demanding and what is the opportunity for both?
- What is the customer approach to adoption and what are the inhibitors?
- How does Grid relate to utility computing concepts and where will the end user “sweet spot”?

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## Some Quotes of Note

**"We want to lower cost, we want to shrink dollars out of our hardware, but we certainly don't want to jeopardize the service level"**

- Large Publishing House considering a grid

**"It was more sort of a grass roots movement than sort of a big bang, bring it in"**

- Independent Oil & Gas Producer having deployed a grid

**"We have identified a couple of applications that require compute power that has been heretofore too expensive to apply"**

- Large Financial Services Firm strongly considering a grid

**"[The grid] needs to be simple to administer in order to provide the value and I don't think the vendors have done a good enough job at demonstrating that"**

- Large Pharmaceuticals Company considering a grid

**"You need to be able to do more with less and the smarter way to do it is to have a piece of software that manages that environment for you"**

- Large Telecommunications Provider considering a grid

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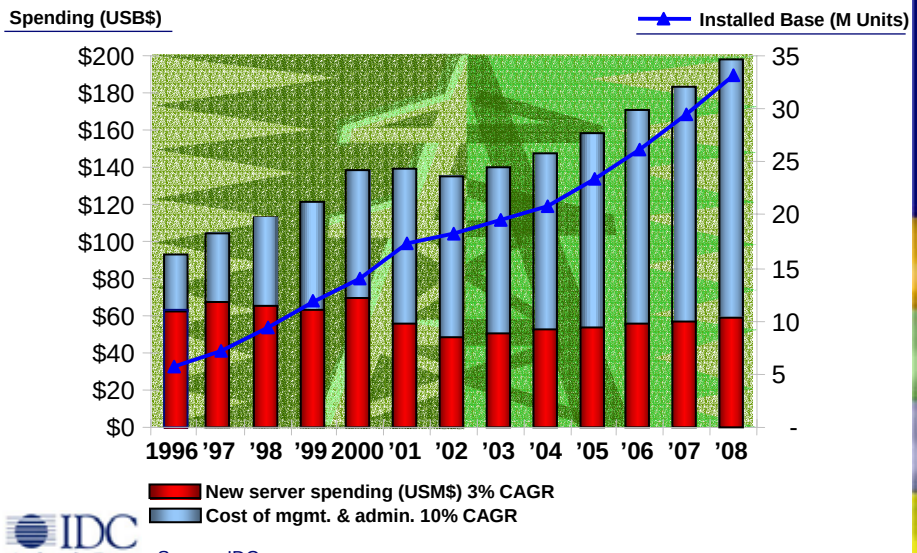
## What Is the Opportunity for Customers and Suppliers?

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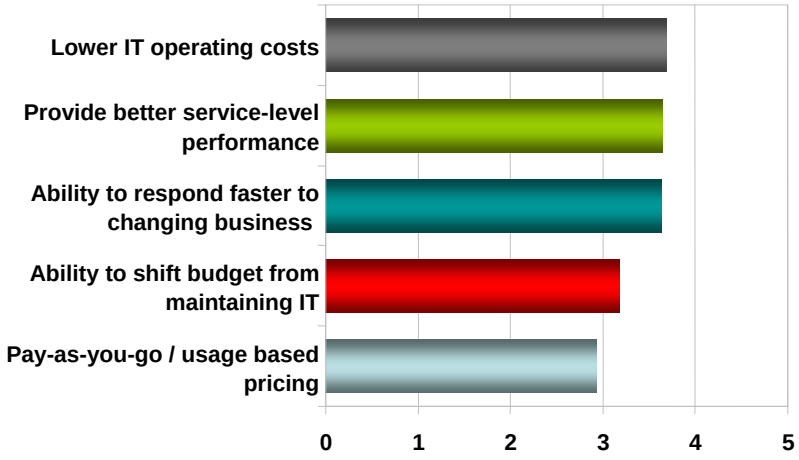
Source: IDC

# What Are Enterprise Customers Demanding?

**Q: How Valuable Are the Following Potential Benefits of Grid Computing?**

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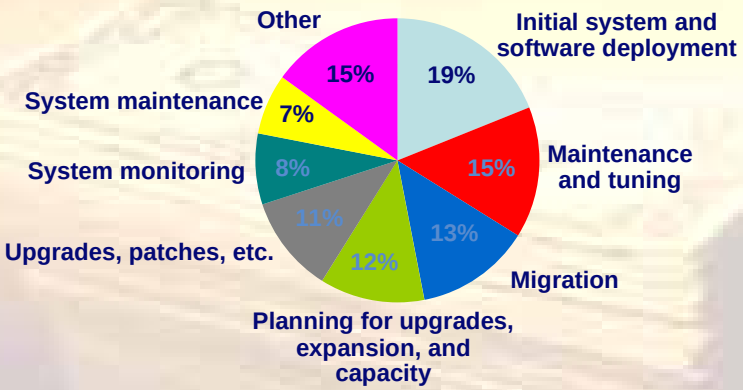
Source: Project Barometer II, IDC March, 2004
N = 414 Worldwide; 126 in the U.S.

# Where Are the Operational Costs Going?

**Server Management and Administration Costs**




**2004 Total = $95B**

Source: IDC Survey Data, 2002–2004

## Customer Demands: Driving Utility Computing

### Grid Infrastructure

Legacy infrastructure is costly to migrate — IT provides unique business value

Solution complexity — IT is costly to manage

### High Performance

- Cost reduction
- "IT" is a commodity
- Adopt standards & multiple sourcing

### Transactional

- Align with business unit priorities
- Adapt to business change
- Integrate with partners & suppliers

### Compute

- Add throughput to reduce the time to solution and minimize cost of the solution

### Data

- Integrate data sources in order to make better, more informed decisions

### Optimization

- Pool resources together for better economy of scale
- Provide methods to streamline mundane manual tasks of the Admin
- Provide means for provisioning and change management

## Compute Grids Remain Specialized, Incremental Opportunity is in Hardware

| Compute Conclusions | Key Assumptions |
|---|---|
| Compute grids are a specialized market – early adopters but limited growth opportunity | • Large projects attempt to harvest disparate compute cycles<br>• Specialized applications require access to specific services/resources<br>• Most deployments are HPC-related with R&D apps: Oil, Financial, Bio, Content Creation, etc. |
| Incremental revenue is almost all HW | • Custom software development and implementation largely done in-house (tight budgets, technically proficient early adopters, and few packaged solutions)<br>• Predominant services is training: small/cheap, up-front, and non-recurring |
| Primary opportunity is establishing credibility | • Prove technical merits, seed the market, establish foothold for the future<br>• Value is predominantly in buying an option for future |

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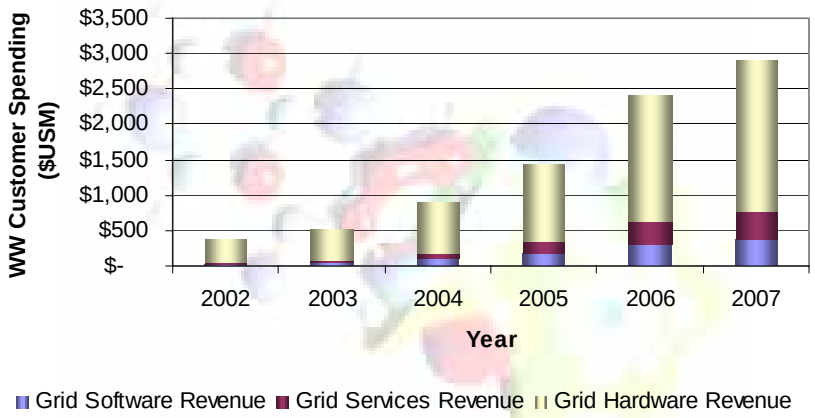
# WW Compute Grid Revenue Opportunity

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# Data Grids are a Necessary Niche Opportunity

| Data Conclusions | Key Assumptions |
|---|---|
| Data grids are a specialized market where information integration not efficiency or performance drive the market | • Large projects attempt to disparate information sources together<br>• Data integration applications are available for the grid and early adoption is underway<br>• Most deployments are R&D efforts: Bio, Financial, Computer/IT. |
| Spending will be more evenly spread across hardware software and services | • Complexity of bringing sources together translates to more services and software spending.<br>• Motivation is faster more informed decisions—hardware utilization less of an issue<br>• Predominant services is system integration: up-front and non-recurring but high dollar |
| Opportunity is a niche but an important one in bridging technical and commercial gap | • Prove technical merits, seed the market, establish foothold for the future<br>• Value is predominantly in buying an option for future |

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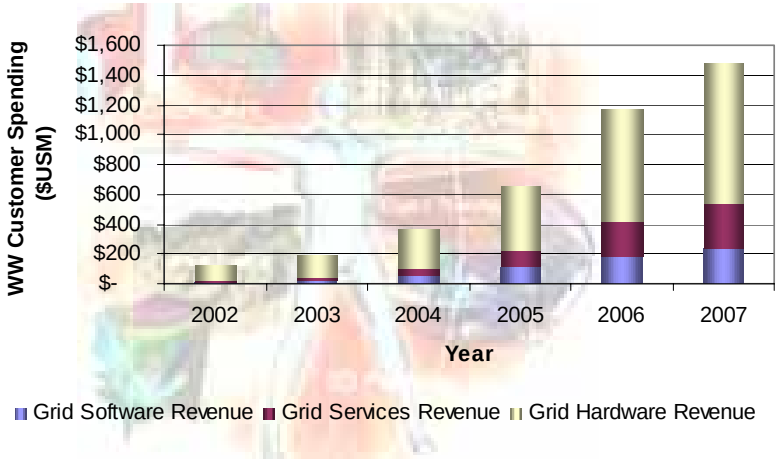
# WW Data Grid Revenue Opportunity

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# Optimization Grid Opportunity Fragmented, Constrained by ISV Business Model

| Optimization Conclusions | Key Assumptions |
|---|---|
| Optimization opportunity is the most balanced | • Spread across HW, SW, Services<br>• The largest vertical (Fin Svcs) is only ~20%<br>• Early adoption starts with non mission critical applications |
| Large-scale adoption depends on key applications becoming grid-enabled… | • Few high-volume packaged applications are grid-enabled<br>• Many commercial deployments use custom apps with no license fees; the need for custom software development limits commercial appeal<br>• ISV migration to grid platform likely to be slower than expected (e.g. 64-bit computing) |
| But ISV migration constrained by business model (pricing) more than technical | • Current licensing models incongruent with grid usage patterns—homegrown apps and Linux early<br>• ISV licensing models will need to migrate: from Box to CPU to User; eventually pay as you go<br>• Grid-enabling by ISVs will ultimately depend on customer pull from HW and operational savings and lost software opportunity |

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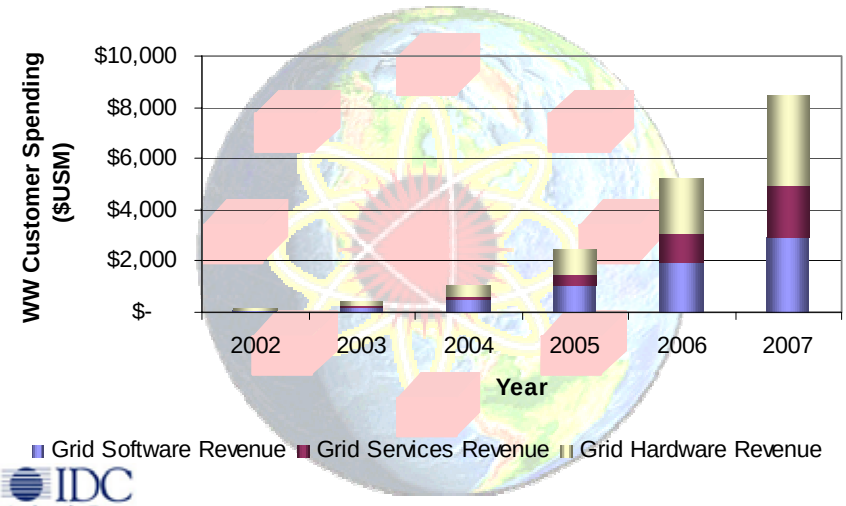
## WW Optimization Grid Revenue Opportunity

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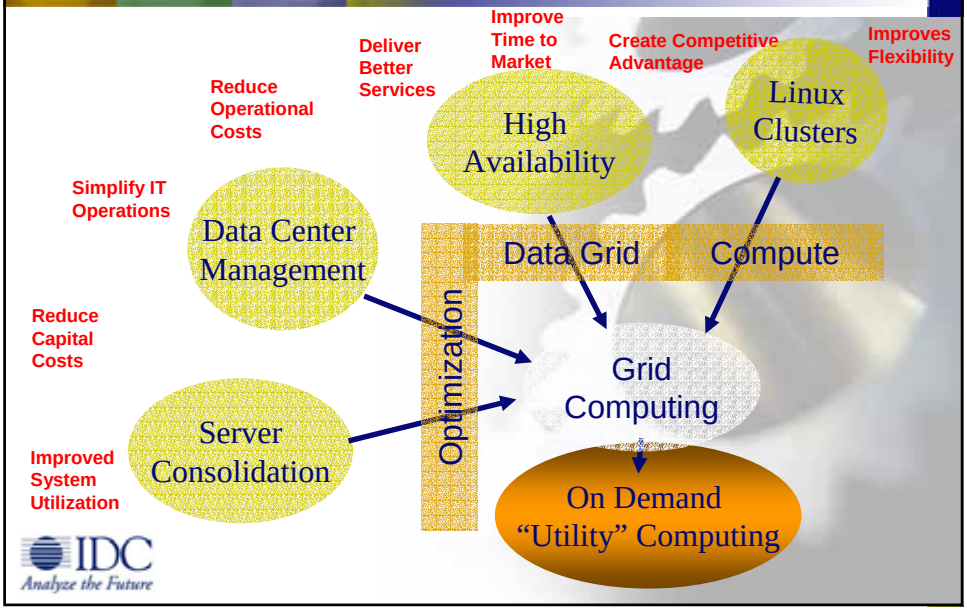
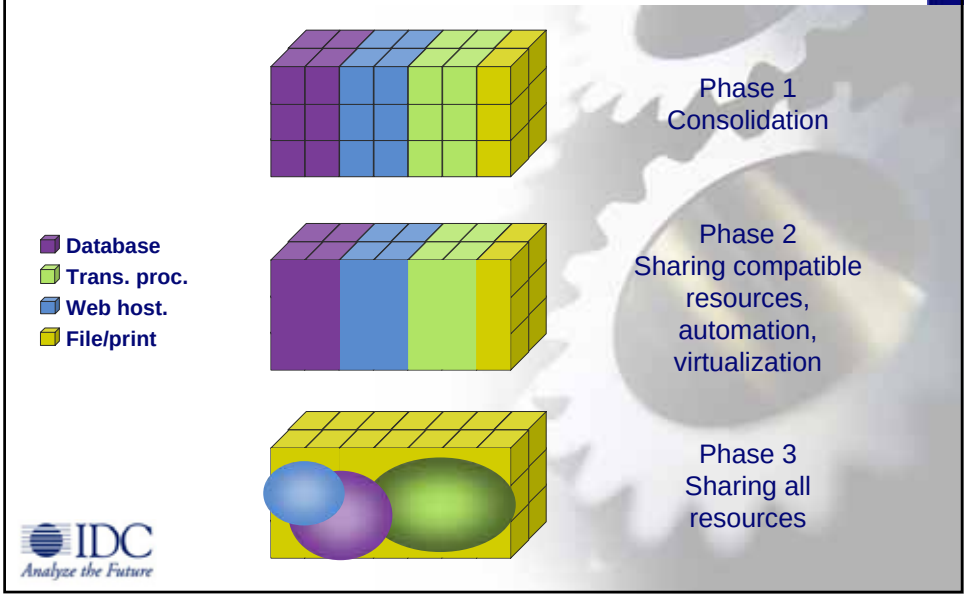
## User Challenges & Constraints for Grid

- **Cultural, Economic, and Technical**
  - **Grids require a different way of thinking about how to deliver cycles – normal resistance to changing behavior is always the toughest hurdle to overcome in technology adoption**
  - **Lack of Software Tools—lack of good management tools for the grid, lack of standards**
  - **Lack of tools means its going to be hard to implement and deploy applications**
  - **Lack of vendor support**

## Connecting Motivations to Grid Computing




## The Vision of On Demand Computing—Thinking Globally



# What Are the Process and Technology Solutions?

**Customer Adoption for IT Utility Infrastructure**

**Service Level Automation**
(SLA for departments / customers, resource priorities, billing)

**Infrastructure Virtualization**
(Pooling scale–out infrastructure to meet workload demand)

**Application Provisioning**
(Deployment of software above the OS)

**Infrastructure Provisioning**
(Bare metal through OS)

Platform Management and Control
(Remote Group Management)

Platform Monitoring
(Remote Group Monitoring)

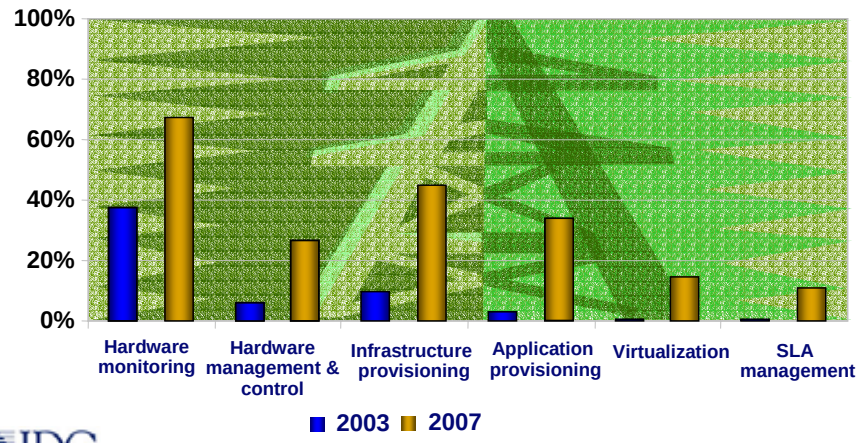
**Adoption Inhibitors**

- Full Virtualization Model Assumes Solid Security
- Segment Growth Relies on Wide Industry Standards
- Software Vendors Resist to Preserve License Revenue
- Solutions are Complex – Not Easy to Implement
- Customer LOB and Departments Fight for Ownership & Control

Co-Location  System Consolidation  Application Consolidation

# Do Customers Need a Utility-Like Environment?

End-User Adoption: Share of Total Server Shipments

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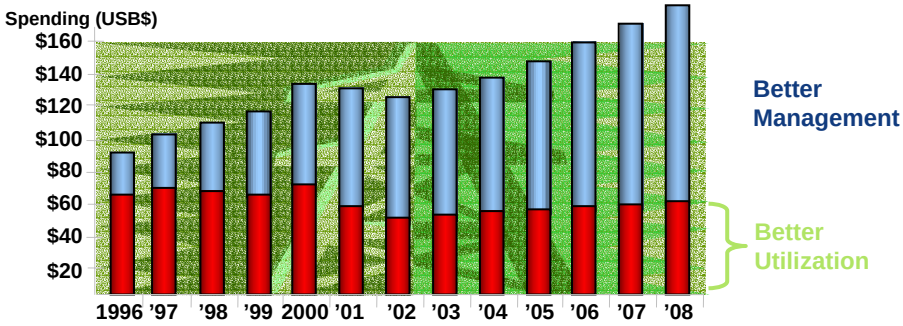
Source: IDC Document # 30426

## Is the Utility Computing Vision What Customers Will Adopt?




Service-Level Automation
Infrastructure Virtualization

Better Utilization: Reduce Capital Costs

Application Provisioning
Infrastructure Provisioning
Platform Management and Control
Platform Monitoring

Better Management: Reduce Operational Costs

*Analyze the Future* Source: IDC, 2004

## Grid Market Futures

- Grids today largely connote technical applications in the users minds, but increasingly interest is emerging in the commercial market
- Licensing issues and the lack of applications for the commercial market holds back adoption
- Only through addressing the needs of a broader market will Gird technology reach critical mass
- Users will need to see Grid as a means to provide cost benefits, productivity and business policy improvements to both batch and transactional workloads

## Essential Guidance

- Grid and utility computing are becoming synonymous—though open versus proprietary approaches are impacting the time to market
- Address customer pain points directly — slowing the velocity of operational expense growth
- Market and introduce incremental solutions that reduce operational costs
- Realize the market for virtualization and service-level automation will be some time in maturing
- Remember — When customers internalize "Utility Computing", expect many to deploy something different

## Contact Info

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