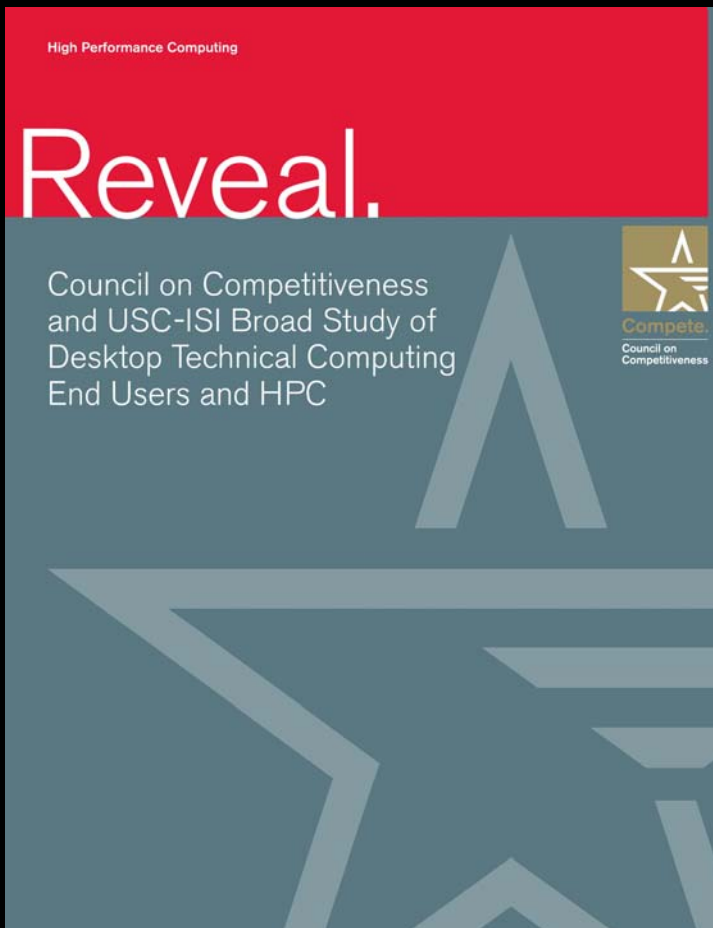


Compete.

Reveal: Council on Competitiveness and USC-ISI Broad Study of Desktop Technical Computing End Users and HPC



Compete.
Council on
Competitiveness



The Council on Competitiveness



- Founded in 1986 by John Young
- Non-profit, non-partisan
- 170+ members and affiliate organizations
- CEOs, University Presidents, Labor Leaders
- Set public policy action agenda to drive:
 - U.S. productivity growth
 - High living standards
 - Success in global markets

“Our agenda is at the nexus of necessity and opportunity—and we all have an obligation to serve the nation.”

–Duane Ackerman, CEO, BellSouth Corporation, Former Chairman, Council on Competitiveness



Study Goals

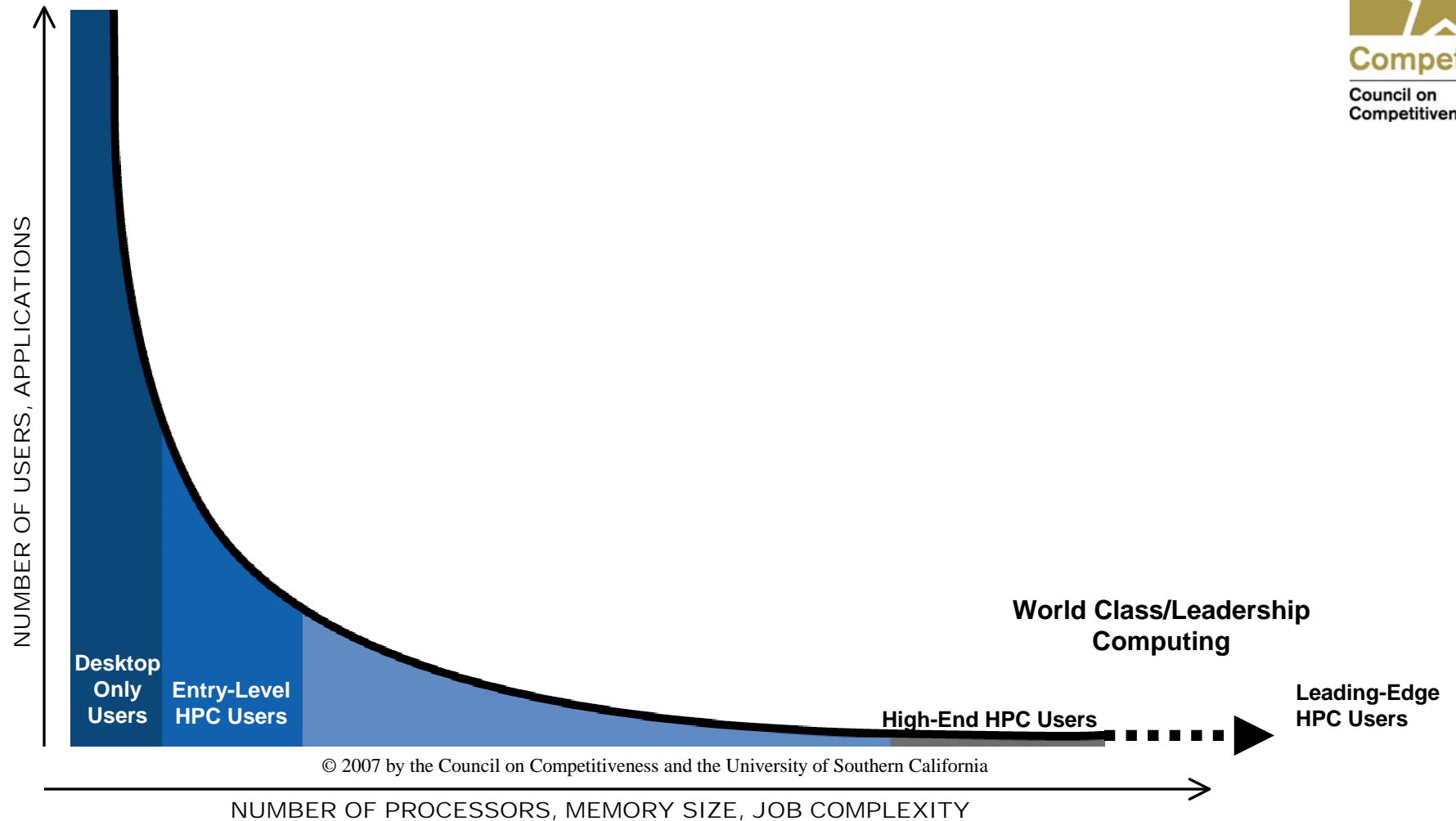
- To understand the business rational that drive companies to start using HPC
- To determine what are the barriers that are limiting scientists, engineers and analysts in their use of technical servers
- To investigate what can be done to expand the use of HPC technical computing

Why are companies “stuck at the desktop?”

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Competitiveness Transformation Challenge

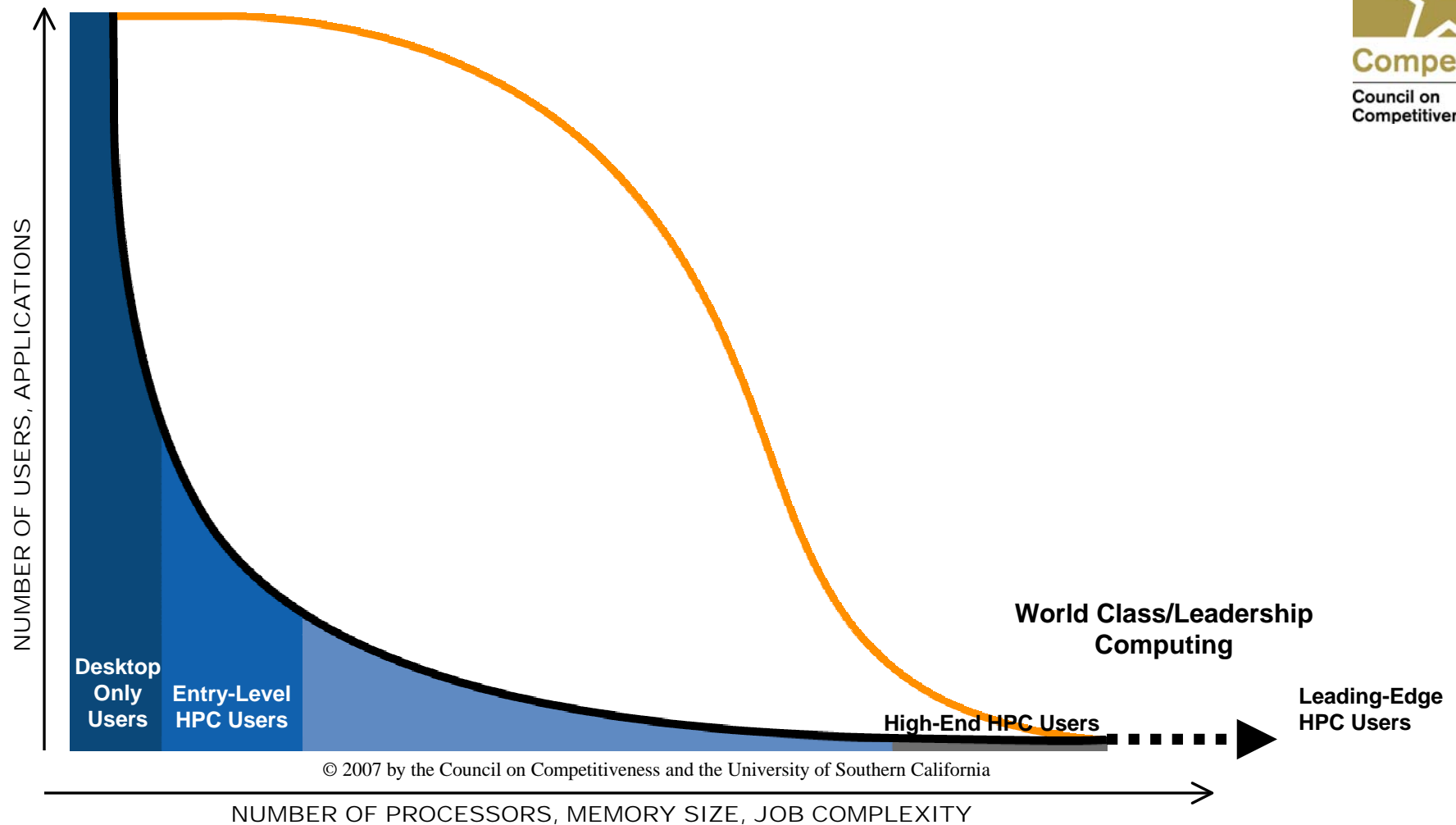


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Competitiveness Transformation Challenge

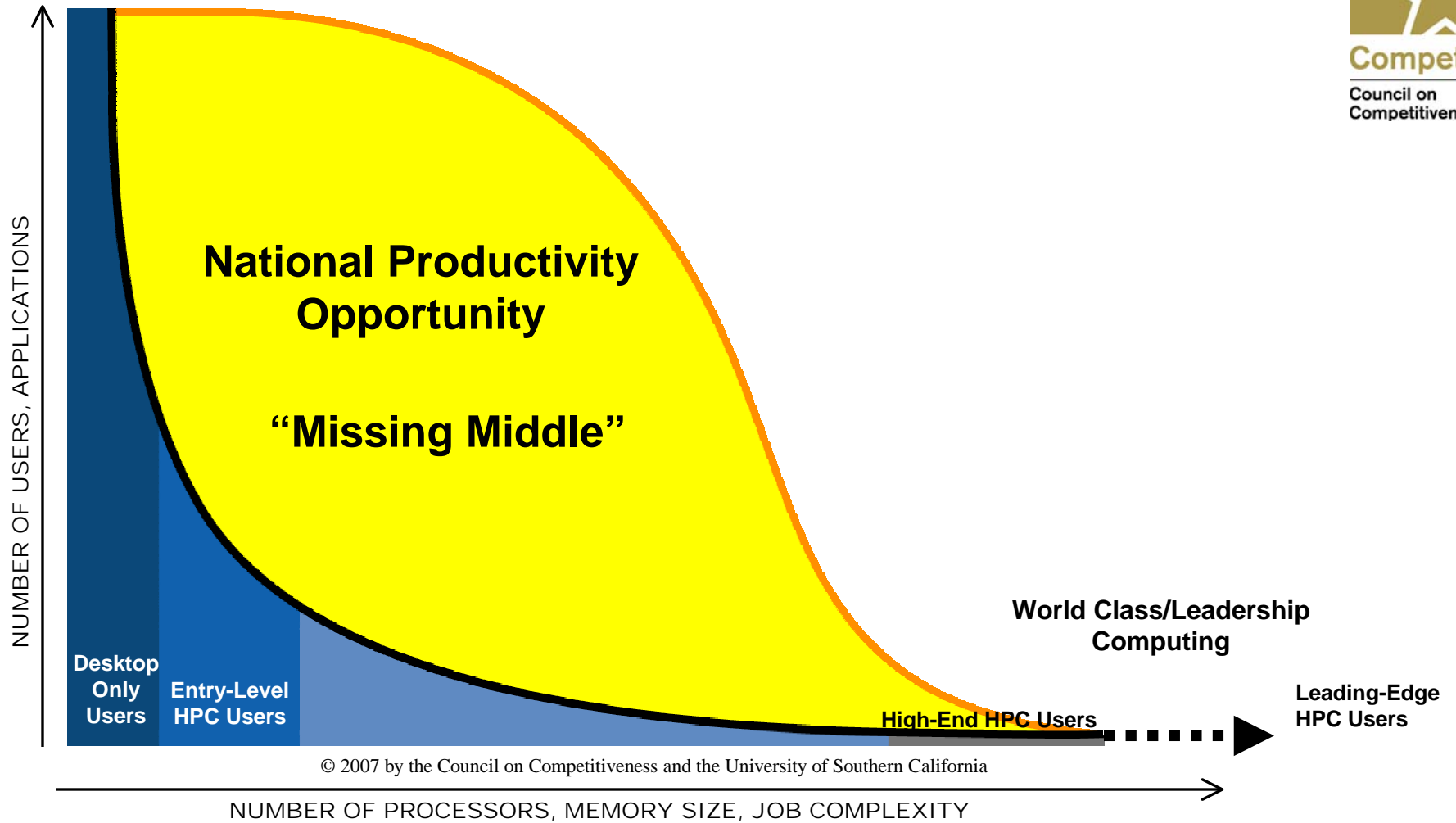


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Competitiveness Transformation Challenge



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Study Approach

- Only survey those that are already doing technical computing on their desktop, workstation, or PC
- Only survey those that have never used / have limited use of HPC servers in their current job
- Survey a broad set of scientists, engineers and analysts across a variety of industries

Survey Sample Mix: 77 End User Sites



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What type of business or industry is your company/department primarily		
	N	%Noting
IT and electronics	17	22.1%
Aerospace	11	14.3%
General Manufacturing	11	14.3%
Telecommunications	7	9.1%
Petroleum, oil and gas	6	7.8%
Chemical	6	7.8%
Test, measurement, and control	6	7.8%
Pharmaceutical, life sciences & biomedical	5	6.5%
Automotive	4	5.2%
Transportation and logistics	1	1.3%
Entertainment	1	1.3%
Financial services and economic modeling	0	0.0%
Other	8	10.4%
Total	83	
N	77	
Multiple responses allowed		

Source: IDC 2007

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Main Applications of Firm's Desktop Technical Computers



Most frequently cited:

- CAD/Autocad/3D Modeling
- Other Data and Analysis/Simulation
- CAE Engineering Design/Modeling
- EDA/Electromagnetics
- Software/Firmware development
- Instrument Control/Data Acquisition
- Signal Image Processing
- Spreadsheets



Survey Findings

Finding 1



“Desktop Only” users
represent large firms as well
as small, many with years of
desktop technical computing
experience

“Desktop Only” Users

“Desktop Only” companies do not present a simple picture

- They come from a broad spectrum of industries
- Under 100 to over 10,000 employees
- Annual revenues from below \$1 million to, in many cases, more than \$1 billion
- They average 16 years of experience with technical computing
- ***97% link technical computing the competitive success***



Finding 2



Nearly Every Firm Uses Digital
Virtual Prototyping and/or Large
Scale Data Modeling
(A Prerequisite For HPC)
And In Many Firms
These Activities Are Increasing

Digital Virtual Prototyping/Modeling

- Testing/prototyping mix within firms:
 - 1/3 digital modeling and simulation
 - 2/3 physical experimentation/prototypes
- 41% indicate virtual prototyping is increasing on average 12% a year

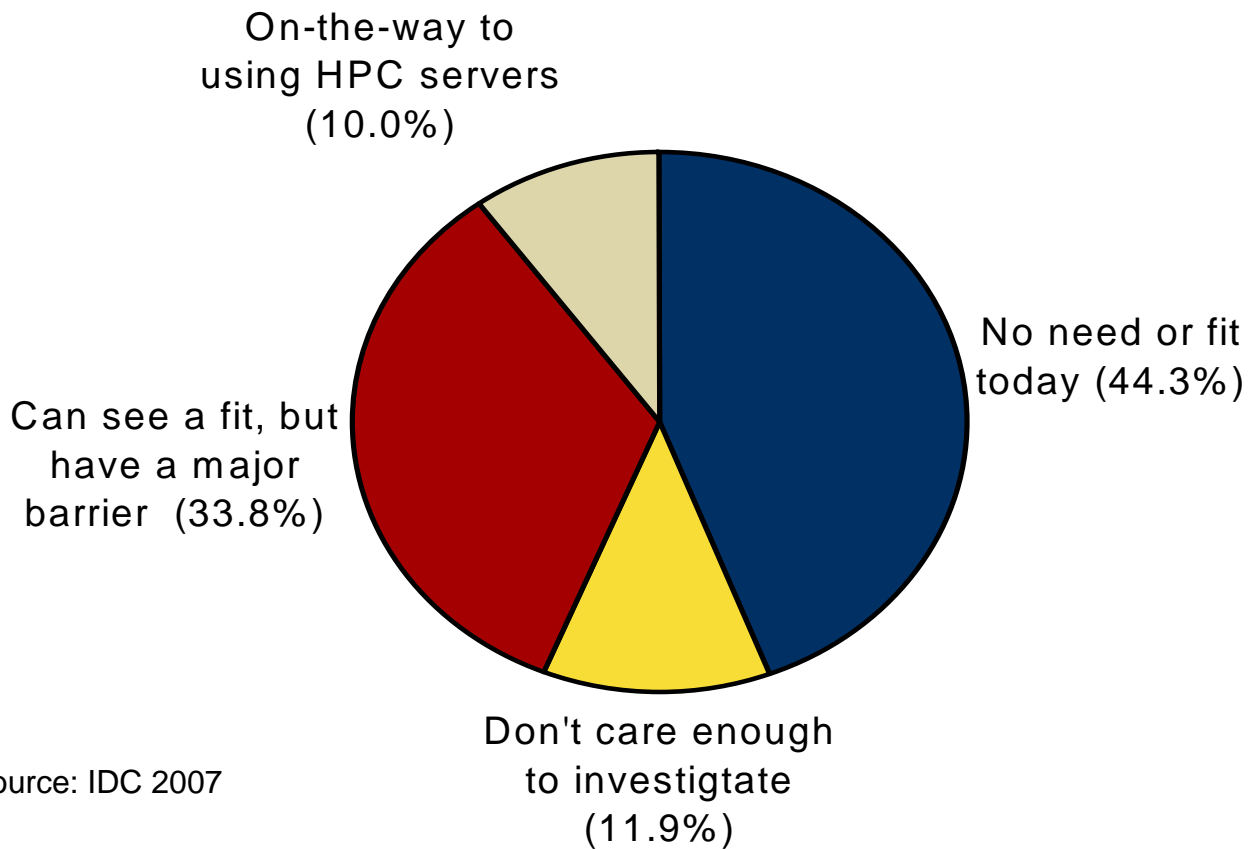
"It is a necessity — We can't design and build testable parts without it"

"We could not compete without it"

"It has not proven itself useful in our situation"

“Desktop-Only” Users

End User Views Of HPC Server Fit



Source: IDC 2007

“Desktop-Only” Users



Typical Comments

- *“PCs fill our needs at this point”*
- *“Customers are not requiring it”*
- *“If our budget allowed, I would definitely use HPC servers”*
- *“HPC is an excellent tool for determining the viability of an idea”*
- *“HPC is very powerful if used properly”*

Finding 3



Many Companies Have
Advanced Problems That
They Can't Solve On Their
Desktop Computers

Companies Have Important Advanced Problems They Can't Solve



- 57% have problems that they can't solve today
- 53% scale down their advanced problems to fit their desktop computers.
- 53% increased the amount of slower, more-expensive physical prototyping.
- Others are choosing to ignore their advanced problems, with more dire consequences.

Companies Have Important Advanced Problems They Can't Solve



Result:

- Loss of insight
- Reduced innovation
- Reduced competitiveness

“We can't do advanced analysis”

“We can't do full chip simulations of larger chips”

“3D modeling is something we can't do today”

“We cannot simulate product shipping”

Finding 4



Three Systemic Barriers Are Stalling HPC Adoption

Three Systemic Barriers Are Stalling HPC Adoption



- Lack of Application Software
 - "We need software that will do the task, and management vision to see the value"*
 - "HPC would not be effective due to software unavailability."*
- Lack of Sufficient Talent
 - "Lack of in-house expertise is a problem for us"*
- Cost Constraints
 - "The problem is price and the need for a dedicated technical person"*
 - "If our budget allowed, I would definitely use HPC servers"*
 - "Substantiating ROI is the problem"*

Drivers That Would Motivate Use Of HPC



- Technical Motivators
 - “Strategic fit” software/models **(Even more motivating than free hardware or expertise)**

“No one has written simple or useful programs for our field”

“HPC would not be effective due to software unavailability”

- Business Motivators

- Meet current/future customer requirements

- Create competitive advantage/close competitive gap

“The potential is limited unless customers start to require it”

BUT...

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Motivators to HPC Adoption



Customer mandates or competitive threats will not eliminate systemic software, cost and talent barriers

Finding 5



An "Enabling Function" Is Needed To Help Firms Overcome Barriers To Adopting HPC

An Enabling Function Is Needed For Change



Partnerships ...with universities, vendor/service organizations, national laboratories... may be best suited to provide the requisite enabling function

Finding 6



A Substantial Minority of the
Companies Are Open to Paying
An Outside Consulting
Organization to Help Them
Explore the Benefits of HPC

Openness To Using Outside Help



- Nearly one-third (29%) willing to pay an outside organization for help.
- Amounts range from \$25,000 to \$200,000 (depending on the size of the firm)
- Most popular choices:
 - large and small systems vendors,
 - engineering services companies,
 - major universities
 - local technical experts

Typical Comments

- *"We have a lack of knowledge of what software would be required"*
- *"Someone needs to explain to benefit for our company"*
- *"I don't know what's available and how much resources and time would be required initially to develop software solutions"*

Implications From The Study

Implications From The Study



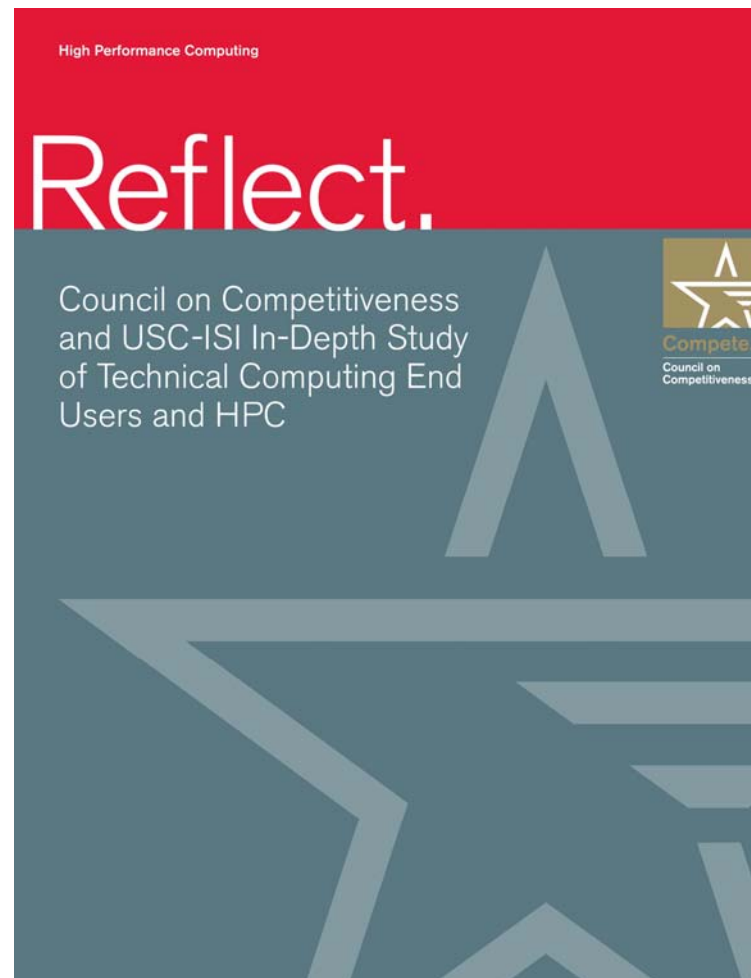
- HPC Is a Game-Changing Technology and Desktop-Only Computing Users That Fail to Adopt It May Be At Significant Competitive Risk
- Critical Supply Chains and The Leadership of Many U.S. Industries May Be At Risk If Larger Numbers of Desktop-Only Firms Do Not Advance To HPC-Based Modeling and Simulation
- Unless The Academic Community Responds More Aggressively, the U.S. Will Continue to Suffer from a Substantial HPC Talent Deficit²

Implications From The Study (continued)



- Independent Software Vendors Could Benefit By Helping Their Desktop Computer Users Transition to Entry-Level HPC Servers
- New Partnership Programs May Be Needed to Bring Desktop-Only Technical Computing Users into the HPC Fold

Reflect: Council on Competitiveness and USC-ISI In-Depth Study of Technical Computing End Users and HPC



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Follow-On Study



Focus on a predefined group of desktop and entry-level HPC users.

- Customers of the Edison Welding Institute (EWI), Columbus, Ohio
- Service organization focused materials joining (i.e. welding) in R&D, consulting and training
- 250 members in auto, aero, government, energy, chemical, heavy manufacturing, medical, electronics

Key Differences with *Reveal*



- 20% of the surveyed EWI member firms were already using HPC servers and nearly half have tried.
- And another 24% were outsourcing HPC server-based work to EWI or similar services.
- *Versus Reveal...* where the most advanced users (10%) *were only about to try* HPC but had not done so yet

Key Similarities with *Reveal*



- Similar mix of virtual prototyping and physical prototyping
- No discernable correlation between a company's size/number of technical employees and use of HPC
- Most companies have problems they can't solve on their current computers and resort to similar "fixes" (ignore; scale down, etc.)

Key Similarities with *Reveal*

- Costs/lack of talent also seen as barriers to adoption (includes cost of talent if it can be located)
- Primary technical driver/motivator is availability of strategic fit software (models and applications)
- Primary market driver/motivator is current and future customer requirements and then competition
- Many companies willing to pay an outside organization for assistance (prefer to pay on a monthly basis)

Typical Comments



- *“We can’t justify the cost for the outcome.”*
- *“Proving the ROI to management [is an important barrier to HPC use].”*
- *“Lack of inexpensive application software.”*
- *“Awareness, and having access to software that will meet our needs.”*
- *“We don’t have experienced personnel to model welding processes.”*
- *“We don’t have the expertise to analyze what we need to provide to our industry.”*
- *“The barrier to expanding current use would be in a lack of human resources and capital.”*



Reinforced Implications

- Desktop -only firms that have not yet adopted HPC may need broad-based education about it.
- Desktop-Only firms may also need guidance in making an ROI case for HPC
- New pricing models may be needed
- An enabling function such as partnerships is needed to help desktop-only firms embrace HPC and entry-level users to exploit HPC more fully for competitive advantage
 - OSC-EWI partnership formed

Conclusion



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August 20, 2007

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that help innovators
leapfrog the competition.



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