TBR

TECHNOLOGY BUSINESS RESEARCH, INC.

Corporate IT Buying Behavior & Customer Satisfaction Study:

x86-Based Servers

Executive Summary
First Calendar Quarter 2006

x86-BASED SERVER VENDOR	1Q06 TBR SCORE	1Q06 TBR RANK
HP	84.50	1
IBM	83.79	1
Dell	82.76	2
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x86-Based Server Customer Satisfaction

Executive Summary

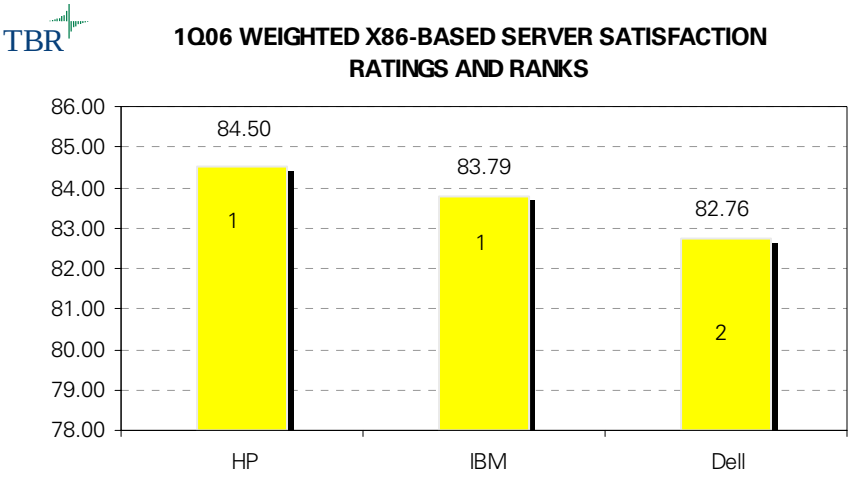
THE SCORE IN 1Q06

***Ranking Position Status**: Hewlett-Packard moves up from No. 2 position in 4Q05 to share the No. 1 position with IBM. Dell remains in subordinate position to the competition.*

As expected, the range from the highest to lowest weighted satisfaction index positions of the three principal x86-based server vendors continues to narrow. With Dell having moved away from the negating presence of the July through October 2005 interviews, which formed the first half of the 4Q05 reporting period, its progress is now more apparent. Dell's weighted satisfaction index position advanced moderately by 1.1% in 1Q06, driven by improving satisfaction across the areas identified as barring the vendor from a more prominent ranking position in the past two reporting periods. Across all four areas, Dell's mean satisfaction positions increased — phone support (up 3.1%), on-site support (up 2.75%), hardware reliability (up 2.1%) and server manageability (up 1.7%).

While Dell is clearly making progress in bringing in more positive performances, the competitive field has responded by lifting the bar of expectation. HP's index position, generally held in a pattern of stasis for the past year, uncharacteristically moved up by a margin of 1.4%, driven by the results of the interviews within 1Q06. HP's unexpected move was the result of improving performances across the areas TBR cited as most needing a lift in 4Q05: phone support (up 4.7%), on-site support (up 2.4%), server manageability (up 1.8%), and delivery time (up 1.3%). Meanwhile, IBM's index position remained constant, though we observed some key areas of improvement where IBM needed it most: server manageability (up 4.4%) and delivery time (up 2.1%).

In the end, HP has moved up from its No. 2 ranking position of 4Q05 to claim a shared No. 1 position with IBM. A marginal 0.8% gap separates the 1Q06 weighted satisfaction index positions, with the order having flipped from a slight IBM edge over HP in the preceding reporting period to HP at a marginal advantage over IBM in 1Q06. Paired comparisons between the two vendors yielded no performance differences of note, hence the shared leadership position. Dell's index rests at a 1.2% deficit to that of IBM. For this reason, along with its lagging positions relative to phone support, on-site support, and server manageability, Dell is ranked at a No. 2 ranking position.

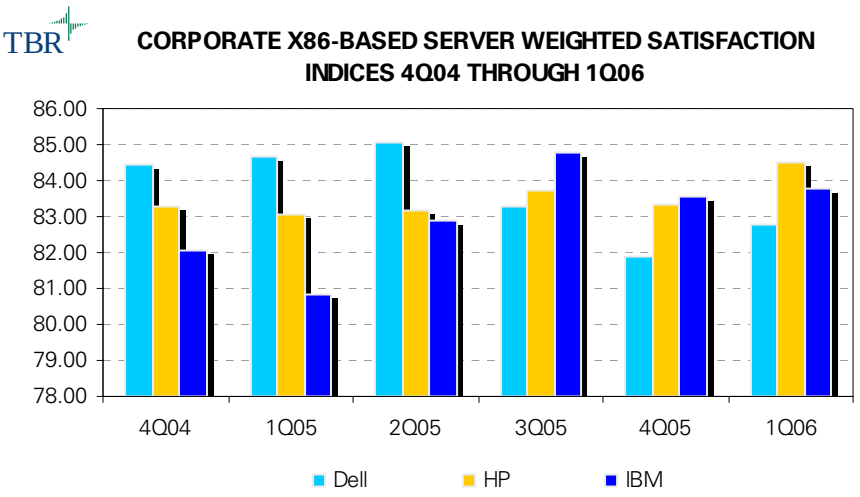


SOURCE: TBR.

Overall, we have observed disparate performance profiles from the players in 1Q06:

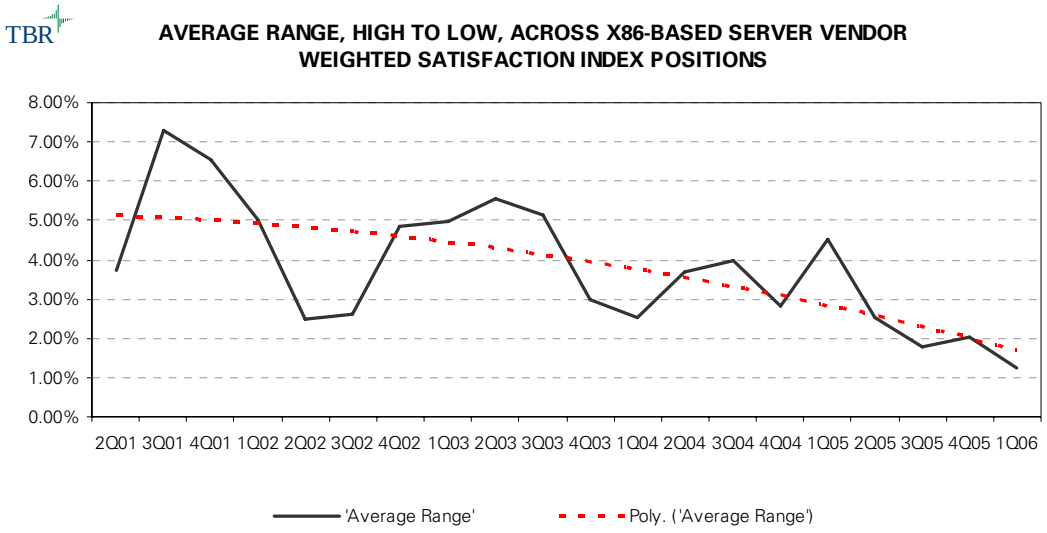
- Dell's performances show consistency between the two halves of the 1Q06 reporting period.
- HP's positions during the second half of the reporting period (January through March 2006) moved up sharply from those of the previous calendar quarter across a large number of areas, particularly with phone support and ease of doing business satisfaction.
- IBM's positions increased sharply during the second half of the reporting period across targeted areas, including delivery time and server management satisfaction as well as customer loyalty.

The following graph details the weighted satisfaction index positions of our three players for the past six reporting periods. Throughout this timeframe we have observed a considerable shake-up in what we had normally come to expect. Note that there were few divergences in pattern across the first two reporting periods in which Dell firmly held its No. 1 ranking position to HP's No. 2 and IBM's No. 3 position. This was, in fact, a pattern that had remained constant throughout most of the history of this study since 1Q02. In 2Q05, IBM moved up to a shared No. 2 ranking position with HP, an occurrence we had not observed since 3Q02. This was the first hint that these rankings might be on the verge of setting an entirely new tone. In 3Q05, IBM moved up to its first No. 1 ranking in this study and remained in place into 4Q05. The 1Q06 reporting period shows a strong forward momentum taking root for HP, resulting in a shared No. 1 ranking position with IBM.



SOURCE: TBR.

Nonetheless, TBR continues to describe this competition as particularly tight, with just 1.2% separating the index positions of the three players in 1Q06. As indicated in the following graph, stronger performance differences of the past have been gradually and consistently eroding over time. We will discuss the causes for this greater convergence of index position throughout this report. Largely it has been the result of the narrowing, and in many cases eradication, of once predictable Dell competitive advantages in this marketplace.



SOURCE: TBR.

THE MAIN EVENTS

The State of the Marketplace

Both the 4Q05 and 1Q06 calendar quarters showed sales of x86-based servers in the volume portion carrying the market. In 4Q05, Windows-based server revenue outpaced UNIX server revenue for the first time. Linux server sales represented year-to-year revenue growth of 20.8% with strong evidence that customers are using Linux in a greater variety of commercial and technical applications, according to IDC. Blade server revenue grew 49.3% year-to-year. Based on IBM's financial statements for 1Q06, similar trends continued, as the company reported revenue declines for all but x86-based servers due to the continuing shift to lower-end systems. These trends suggest that server consolidation efforts are driving this marketplace due to increasing pressures on IT budgets as well as on labor requirements to manage traditional datacenters.

According to a study conducted in 4Q05 by TheInfoPro (cited in tekrati.com, 3/28/06), more than 40% of users reported consolidation as their top priority and more than 75% reported it as very or extremely important as a benefit of virtualization. With blade server computing garnering most of the attention as a means to the consolidation end, there is more than one way to trim the fat from an overcrowded datacenter. Among them is the shift to dual-core processors from single-core in order to reduce the server room footprint. By stacking traditional 1U servers using these more powerful processors, the key to success will largely depend on the virtualization of these servers. According to another study, reported in February 2006 by Gartner Group, 26% of enterprises have already deployed virtualization, while 60% indicate they will increase their spending priorities in the virtualization direction during the next 12 months. Yet another study, by the Info-Tech Research group, suggests virtualized servers can reduce the number of physical servers by factors of 5:1, 10:1, or even 20:1. Customers' quick uptake of the technology is evidenced by VMware reporting it doubled its server virtualization customer base in 2005, and is working to further increase adoption through its VMware Server introduction (a free downloadable version) in February. VMware reports that it was downloaded approximately 100,000 times in the first week. On the hardware front, both Intel and AMD are working to present virtualization embedded into the BIOS. Intel's Virtualization Technology (VT) was included with its Paxville Xeon processors, yet systems manufacturers did not enable the feature. This picture is changing, however, in that Dell, HP and IBM are incorporating BIOS software in order to enable the feature at the factory. Support software for VT is now available in the new VMware Server. Customers will now be able to benefit from the combination of virtualization at the processor level and through the software.

On the blade server front, IBM led off the year with a major new announcement of its next generation of servers including a new chassis. We expect both HP and Dell will introduce new server systems this summer. While systems manufacturers initially posed one of the benefits of blade servers as representing significant reductions in heat generation and power consumption, some reports from the March time period are beginning to circulate and are calling that into question. In TheInfoPro's 4Q05 study, the company reported that "Ironically, spending on blade servers is expected to grow more than any other hardware technology, enabling consolidation but exacerbating the energy crisis." It is not illogical to expect that the increased density provided by blades stacked up within a chassis will create such ill effects. The study further found that power requirements were identified as the leading challenge to IT centers, where customers are "all focused on the tension between increased system density, decreased energy efficiency and the rise in the cost of energy to meet the needs of IT." With energy costs rising at their current rates, this likely represents the greatest challenge to IT managers, not to mention the environment. This matter has also come to the attention of the chip manufacturers. The danger suggests that utility bills could reach the cost of the servers (not just blade servers), according to an analysis of a Google engineer (ZDnet, 12/9/05) and corroborated by studies conducted by HP. While virtualization techniques on blade servers as well as standalone systems will solve some of these problems through consolidation, the energy issue is a matter on the front burner of both the chip manufacturers and the systems manufacturers.

Yet, in spite of these issues, customers are intent upon increasing their spending on blade servers during the next 12 months. Most analysts expect the uptake to continue to accelerate, with blade servers expected to represent one-third or more of shipments within three years. TheInfoPro study reports that 62% of respondents indicated they would spend more on blade servers in 2006. TBR's own studies suggest that one of the leading concerns is the cost of the initial implementation. Many customers believe blades cost more than 1U servers for the initial set-up as the bulk of the cost comes from implementation, training, and the replacement of outdated equipment. Early adopters, however, suggest the benefits have been clearly worth it when one considers the long-term cost savings. The systems manufacturers suggest customers need to refine their perspective based on the incremental costs incurred with a 1U server deployment, taking into consideration the costs of the cabling and infrastructure, as well as the high costs of management.

The state of the x86-based server marketplace is in a transitory state en route to becoming more energy efficient in consolidated, high-density environments without giving up performance. TBR has observed the uncertainty this transition has created by means of arguably volatile customer reactions throughout our interviews. We have observed customer satisfaction positions that have been quick to move significantly in either direction, seemingly inexplicably (see "The Season of Uncertainty" in the *4Q05 Corporate IT Buying Behaviors & Customer Satisfaction: x86-based Servers*). It would seem customers are becoming frustrated with the fallout from increasing performance and desperately want to be convinced that the systems and chip manufacturers will be solving power consumption and heat generation issues in the near term

Most Noteworthy Events

- **Most Influential Performance:** While HP's performance in our Strength & Weakness Analysis remains an entirely neutral one, it has been the influence of HP that has significantly changed the character of the competition in 1Q06**.**

  By significantly improving its satisfaction performances across both aspects of server support, HP achieved parity with IBM. With the bar of expectation having been so lifted, IBM lost control of its competitive strengths in these areas, while Dell (in spite of improving performances) retained its competitive warnings.

- **Marketplace Differentiation Settling Into Three Key Areas:** Across all of TBR's statistical tests, the 1Q06 results pointed to just three specific areas where customers perceive performance differences.

  ***Phone Support*:** Exemplary performances from both HP and IBM; Dell, while improved, continues to lag the *new* industry average**.**

On-site Support: Exemplary performances from both HP and IBM; Dell, while improved, continues to lag the *new* industry average.

Server Management Features: Sudden improvement on the part of IBM leads to a marginally superior performance; HP remains neutral while Dell (improved) continues to lag the *new* industry average.

- **Buying Behavior Shifting:** While hardware reliability continues to present a critical component of buying decisions and satisfaction at a direct level, the marketplace is shifting to a greater emphasis on total cost of ownership, support services and tools.

  Changing market forces, driven by the need to consolidate resources under centrally managed processes, are leading customers to take a harder look at value, followed by the associated technical support requirements and systems management capabilities.

  The advent of the blade server has contributed to the increasing need for support services.

  Customers are looking for more proactive involvement from their vendors in planning infrastructure transitions while promoting provable cost savings.

  Relationships that evolve into true partnerships are becoming key.

1Q06 Event Summary

DELL CONTINUES TO IMPROVE AT A RELIABLE PACE

- By bringing in consistently strong performances throughout the 1Q06 reporting period, Dell's weighted satisfaction index position increased by 1.1%, driven by satisfaction gains across the areas of phone and on-site support, hardware reliability, and server manageability.
- The 1.1% increase in Dell's weighted satisfaction index position in 1Q06 is the most significant improvement TBR has observed since 3Q04.
- Dell's 1Q06 satisfaction positions now reside between its high points of 2Q05 and its low points of 4Q05. There remains ground to make up, particularly since competitors are not standing still.
- By significantly improving its ability to meet customer expectations, Dell's previous full competitive weakness for phone support has been softened to a warning.
- Dell retains its competitive warning for on-site support while gaining a new one for server management features, due to marketplace shifts.
- Due to increased satisfaction with hardware reliability, Dell is now placed in parity with the competition.
- Dell's customer loyalty rating improved following three consecutive reporting periods of declining positions.

WHILE HP SUDDENLY MAKES ITS MOVE

- The 1.4% increase in HP's weighted satisfaction index position in 1Q06 represents the first break from a traditional pattern of stasis observed during the past 12 to 18 months.
- HP's reclamation of the No. 1 ranking position was driven predominantly by a considerable improvement in phone support satisfaction, as well as such secondary contributors as on-site support, server manageability and delivery time.
- HP has now achieved a parity performance against IBM in the areas of phone and on-site support while retaining strong competitive advantages over Dell.
- HP's 1Q06 satisfaction positions are at or above their high points of the year across all areas except ease of doing business.
- HP's ease of doing business ratings increased substantially during 1Q06 and, if sustained, will represent a recovery from recent challenges in the area of relationships.

- HP's customer loyalty ratings have trended higher than the marketplace for three consecutive reporting periods.
- IBM's server manageability satisfaction rating moved marginally ahead of HP's, suggesting this remains an area of challenge for HP to restore its previous domination in this space.

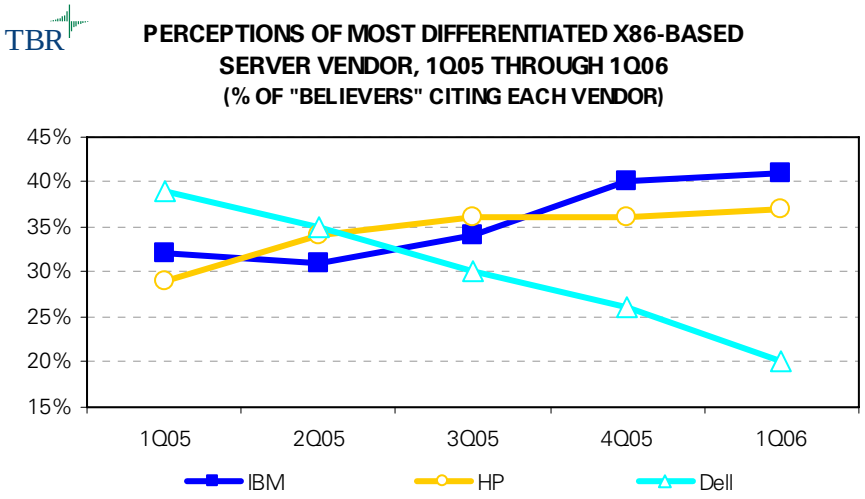
AND IBM PROVES ITS SUSTAINABILITY

- The positive character of IBM's satisfaction positions in 1Q06 averted a possible ranking-position drop as 4Q05 positions were significantly lower.
- Following 12 months of dramatically rising satisfaction positions, IBM appears to be in a hiatus.
- While IBM's weighted satisfaction index position remained stagnant, we observed two areas where satisfaction improved significantly: server manageability and delivery time.
- IBM has successfully addressed a previous glitch in its delivery/product availability mechanism.
- Due to HP's influence, IBM lost its previous competitive strengths for phone support and on-site support.
- Yet, because its mean rating exceeded that of the marketplace overall (and Dell specifically), IBM gained a new, albeit marginal, competitive strength for server manageability.
- With customer loyalty strengthening, IBM continues to gain new accounts, beating Dell in net new account wins in 1Q06.

X86-based Server Vendor Differentiation: IBM and HP Viewed as Separate but (Largely) Equal

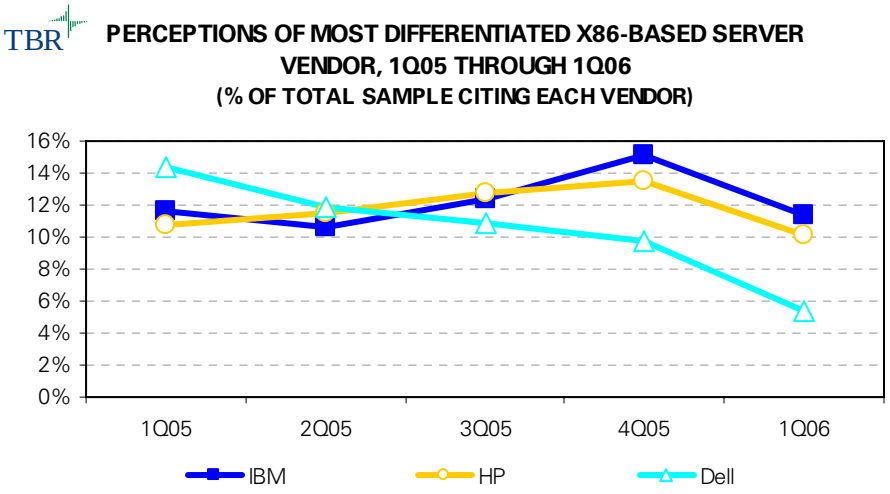
TBR has always maintained that there is more room for differentiation in the x86-based server marketplace than in any other technical area. This was certainly the case one to two years ago, when customers were as equally likely to see each of the three major players as differentiated in their own ways. It was a time when the marketplace was more open to three quite different approaches: Dell with the strictly scale-out strategy; IBM with the scale-up preference; and HP as the purveyor of choice. TBR believes a shift in customers' prime objectives changed the tone as we moved down the timeline of 2005. To coin a new HP phrase (paraphrased from Richard Marcello, senior vice president and general manager, Business Critical Servers): *The argument is no longer about whether to scale up or out, but about meeting the imperative for scaling* ***in***. In response, we now see a plethora of new solutions introductions (hardware, software, services) that diverge significantly from past solutions. Thus, it may be surprising to find that fewer customers told our interviewers they see brand differentiation in this marketplace in 1Q06. It is not all that surprising, however, to see significant changes concerning which vendors are identified as most differentiated, and the reasons cited for those beliefs. This would tend to be the case at the beginning of a disruptive technology phase.

As evidenced in the following graph, among the "believers" (customers who indicated they believe an x86-based server vendor has differentiated itself from the competition), the proportions of those naming HP or IBM have increased by a rate of 28% in the past year, while citations of Dell as most differentiated have declined by nearly 50%. Perhaps because we are at the beginning of a new era in server computing, customers may be more likely to go with vendors they perceive as leading in that revolution, or the ones with the heftiest R&D budgets or, more likely, the ones with the loudest voices. While Dell may drive some technology changes, arguably the focus on improving standards, customers may not readily perceive that influence until it takes on a greater, more obvious, mass appeal.



SOURCE: TBR.

To be fair, the pure number of respondents stating differentiation exists did decline in 1Q06. The graph below details the adjusted figures for name identification based on the total sample of respondents. Nonetheless, it is clear from the graphic that the trend has shifted from near-equal identifications of the three vendors as differentiated to a greater likelihood of naming IBM or HP over Dell.



SOURCE: TBR.

In understanding the reasons customers name a specific vendor as most differentiated, we have also noted some changing attitudes from past studies. The overall list of attributes defining differentiation (regardless of vendor) has remained relatively unchanged, however there has been a doubling of mentions of systems or server management tools as a differentiating force, led by the HP customers.

By vendor mentions, some distinct differences have emerged in 1Q06:

- **Reasons for selecting Dell**: Overwhelmingly due to quality; secondary mentions include support and customer service.
- **Reasons for selecting HP**: Primarily reliability, support, customer service and design as secondary factors.

- **Reasons for selecting IBM**: Reliability and support equally as primary; customer service and product design as secondary factors.

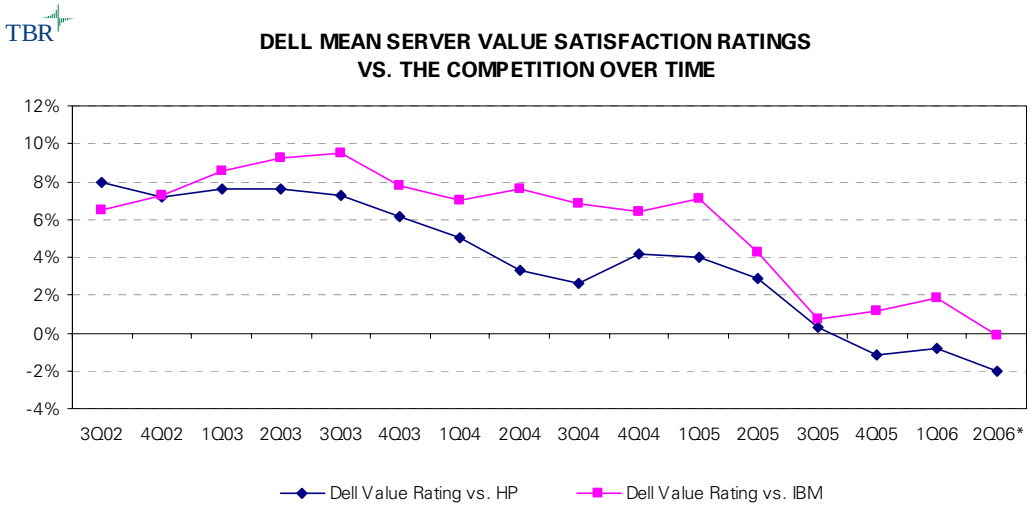
By shifting focus away from the services and toward hardware quality, Dell customers appear to be telling us they no longer see Dell as the services differentiator they once did. While HP and IBM customers were less likely than average to cite hardware reliability as a differentiator, this does not suggest they are less cognizant of the hardware, but rather that they see this as a "given"– an area of high demand where no exceptions or excuses could be entertained. Both HP and IBM customers have shifted their areas of focus away from the hardware alone and more toward the services, the product design, and in the case of HP, the management tools.

TBR x86-based Server Brand Differentiation Characteristics

VENDOR	MORE LIKEY TO CITE	LESS LIKELY TO CITE	COMMENTS
Dell	Quality, delivery/availability	Technical support, customer service, product design, tools	Customers shifting away from service and support focus; emphasis on hardware elements may be associated with rapid dual-core introductions.
HP	Technical support, customer service, product design, tools	Delivery/availability	Clearly identified as differentiated through management tools
IBM	Technical support, product design, performance	Customer service, delivery/availability, tools	Very strongly identified for technical support.

The Value Proposition Revisited

TBR last reported on the ongoing battle relative to how customers perceive the systems manufacturers' value propositions in 3Q05, when the mean satisfaction positions of the three players first merged. Previous to 3Q05, Dell had commanded an average 6.5% advantage over competitors relative to mean satisfaction positions for server value. At one point, Dell had achieved an 8.5% average advantage over the competition. The following graph details the gradually eroding Dell advantage over time, updated to include the results of the past two reporting periods. It shows that this new condition has remained intact. The percentages in the graph represent the gaps between the mean scores of Dell versus both its competitors. Clearly, it would seem that the trend first observed in 3Q05 was not an anomaly, but the beginning of a new set of conditions that have significantly affected customers' perceptions of value. At this particular time, when the importance of total cost of ownership appears to be increasingly influencing purchasing decisions and loyalty, it would seem that all vendors are now perceived as equal and that they have been for three, going on four, consecutive reporting periods.



*Preliminary 2Q06 data, based on one-half of the intended sample size.
SOURCE: TBR.

Where the Players Need to Focus

TBR has identified the areas where each competitor most needs to focus its efforts moving forward in order to improve its overall performance in this study. *(Note: These are not tactical recommendations.)* The identified areas are not necessarily restricted to an area where a vendor's position is behind that of one or more competitors, but may also include the places where the vendor's once dominant position has been encroached upon.

DELL

- **Technical support.** Even with the improvements noted throughout the 1Q06 reporting period, Dell's technical support satisfaction positions remain at a competitive disadvantage to marketplace averages. As we have observed, this condition persists because the marketplace continues to up the ante (as in 1Q06 with HP, through vastly improving satisfaction positions). Phone support was specified as the number one area requiring improvement efforts via the Improvements GAP Analysis. This finding is backed up by a –7% GAP position, compared to IBM's –5% and HP's –2%. On-site support was specified as a secondary area of concern according to the Improvements GAP Analysis. As regards both aspects of server support, all of TBR's statistical significance tests as well as the Competitive GAP Analysis confirmed these areas as running significantly behind the marketplace in terms of both performance against the competition and expectations. Recent progress has been duly noted, and has shown substantial gains in satisfaction positions for both of these areas. Marketplace conditions at this particular time represent considerable challenges for Dell (as well as any x86-based server vendor) as customer requirements for support are increasing. We have observed this in both the stated and derived importance of phone and on-site server support relative to other covered attributes. TBR expects this will be a continuing journey as Dell learns how to best manage such high levels of demand.
- **Server management tools.** Dell's satisfaction position for server management tools improved in 1Q06; however, IBM's higher position (Dell's mean satisfaction position up 1.7%; IBM's up 4.4%) changed the yardstick and, consequently, Dell's position remains well below that of the marketplace. Server management was specified as a secondary area of concern for Dell according to the Improvements GAP Analysis. All statistical significance tests and the Competitive GAP Analysis confirmed this. Utilization rates are up, but some customers may be using a third party of homegrown tools. There appears to

be a market perception that Dell's tools are running behind the industry. Justified or not, TBR figures show the perception exists and must be dealt with in a marketplace where software capabilities are potentially becoming brand differentiators. To address this, Dell has been focusing on communicating the benefits of its partnership approach and to answer questions regarding its ability to provide true integration. From TBR's perspective, Dell must also consistently build on its base of partnerships and toolkit enhancements. Should a next generation of OpenManage come onto the scene at the expected timing of the next generation of PowerEdge servers, Dell should look for opportunities to aggressively communicate the advancements and advantages of the tools.

- **Value.** Note that Dell's server value GAP rating dropped down to –4.7% in 1Q06, within a relatively small competitive range (HP = –4.2%; IBM = –7.9%). The current GAP rating for Dell is at its lowest in history where averages of 0% were generally the norm. Customers' understanding of the true meaning of server value is changing. In 3Q05, Dell lost its competitive advantage for the first time. This new pattern has held firm now for three consecutive reporting periods. Competitors' messages are getting through. Dell needs to clarify its own messaging and articulate its view of the connection between support, solutions and the complete view of server value in a changing marketplace. Customers are paying more attention to manageability and tools functionality in order to cut costs by reducing the number of operators required. This shift appears to be playing to the advantage of IBM and HP, and against Dell.
- **Delivery Time**. While both HP and IBM have struggled with their supply chains, ordering mechanisms and/or product backlog in the past, both vendors have significantly improved their performances relative to delivery time satisfaction. In 1Q06, IBM's mean satisfaction position increased by 2.1% and HP's increased by 1.3%. Dell's competitive advantage in this arena has been absent for the past three consecutive reporting periods. Perhaps the new manufacturing facility(ies) will improve Dell's ability to meet delivery time commitments and expectations in the near future. For now, the competitive environment is considerable.

HP

- **Relationship issues**. During 4Q05, HP's ease-of-doing-business satisfaction positions declined precipitously. At the time, we observed that this was likely a temporary glitch due to the reorganization. Our premise has been corroborated in discussions with HP executives, who indicated that with the dissolution of CSG, there was some reshuffling of sales reps for a short time. The re-architecting of HP's sales organization was executed quickly, and its overall intent is to flatten the organization so sales reps will be in more direct contact with customers. In the old method, one had to wade through up to 12 layers of personnel to reach the head of sales. Under the new plan, this has been reduced to four, and the redistribution of sales reps has been quickly administered. HP's satisfaction positions have rebounded during 1Q06, suggesting those issues that were present in the recent past have been successfully addressed. From what we have seen of HP during 1Q06, the company is working hard to communicate product and solutions roadmaps and the new management style may be contributing to changing customers' perceptions of the company's image.
- **Phone support**. While phone support was included in the list of needed improvements for HP in 4Q05, we are essentially removing it in 1Q06 with one word of caution: sustainability. HP's satisfaction positions increased substantially in 1Q06 (by nearly 5%), driven in particular by a 10% increase between 4Q05 and 1Q06. Any time we observe such phenomenal progress in a relatively short period of time, we have to wonder if this progress can be sustained. With such rapidly rising satisfaction levels, customers' expectations are bound to rise as well, leading to a greater challenge for any vendor to maintain order.

- **Server management.** We reiterate: the time has come for HP to reclaim its leadership position in this increasingly critical area, particularly since HP customers continue to place a far greater emphasis on management than do either of the competitors' customers. This heightened demand level has consistently placed a greater onus on HP to perform at an exceptional level versus competing vendors. The demand level has been influenced by HP's historically strong and innovative role in management tools. HP has lost its competitive advantage for server management tools because IBM has encroached upon its traditional territory. This has only progressed further into 1Q06, where a 4.4% increase in IBM's mean satisfaction position places it at an advantage, albeit a tenuous one. HP needs to convince its customers that it remains an industry leader and to shore up its very strong loyalty and high utilization rates, the highest in the industry. (TBR's study results for 1Q06 show HP's utilization rate at 87% versus averages of 68% among its competitors.) HP's new SIM version 5.0 must be marketed effectively and users' experiences monitored closely. Most importantly, relative to the relationship issues described above, HP must clearly communicate with customers what it has done in this critical area for both traditional server management and blade server management. *One very positive note as a new development in 1Q06: Customers citing HP as the most differentiated brand were far more likely to attribute this to management tools (28%) versus customers of IBM or Dell (averaging 6%).*
- **Continuity & Sustainability.** HP has had substantial success in entirely closing performance gaps between itself and Dell in areas where Dell had historically been viewed as having impregnable leadership positions. These areas include server value, delivery time and replacement parts availability.

  Through its successful Factory Express customization program, HP reports delivery lead times as short as five days and a 165% year-to-year rate of growth in the program. For overnight delivery and off-the-shelf, low-price, pre-configured HP brands, the company claims they are now faster than Dell.

  In the area of server value, HP has effectively closed, and consistently maintained, the satisfaction gap between its own performance and that of Dell, from a 4% differential in 1Q05 to a small 1% HP advantage over Dell for the past three consecutive reporting periods. Also, HP continued to keep pace against Dell through the current reporting period. Despite these remarkable achievements, HP must continue to work with its channel partners to keep its pricing aggressive, while maintaining a strong and believable value proposition message. TBR believes HP's success in the blade server segment also contributed to its improved position relative to value. Server and systems management pricing should also be reviewed as part of an overall solutions value message.
- In addition to achieving continuity in its competitive performances against Dell, HP must also keep an eye at the other door.

  HP has only just recently closed performance gaps against IBM in the areas of phone and on-site support. And because the catch-up came on with such force and in such a short period of time, it becomes critical that HP sustain these newfound gains. Server support represents particularly complex challenges for any x86-based server vendor in this dynamic marketplace where customers are working to transition their datacenters into more cost-effective, energy efficient organisms.

  IBM has moved slightly ahead of HP in the area of server management tool satisfaction. HP is continually enhancing the breadth and integration of its tool sets and will need to successfully communicate these marketplace advantages in order to gain a competitive advantage over IBM.

- **Delivery time.** IBM continues to be in recovery mode from its previous record of competitive weakness citations. In the past five reporting periods, IBM has been cited with a competitive warning just once. Satisfaction continued to improve in 1Q06, where the mean satisfaction position increased by 2.1%. Nonetheless, our analyses continue to suggest IBM's position consistently runs *marginally* behind industry averages. Delivery time was implicated as the primary area requiring improvement based on our Improvements GAP Analysis for 1Q06. IBM's standard GAP measurement of –7% runs marginally behind that of HP (–5%) and considerably behind that of Dell (–2%). In 1Q06, IBM reported significant improvement programs were implemented within its global supply chain and that backlogs with specific models have been rectified. Note, however, that our study results show IBM continues to win a number of new accounts, primarily at the expense of HP, and at a faster rate (currently) than Dell. High demand will continue to burden IBM's supply chain for effectively meeting delivery time commitments. Consequently, this item remains on the watch list.
- **Value.** IBM has essentially closed and maintained the performance gap between itself and Dell for server value satisfaction for the past three consecutive reporting periods. Where the satisfaction gap averaged 7% to Dell's advantage in 1Q05, and ran as high as 10% in 3Q03, the differential has remained at less than 2% for the past three reporting periods. TBR's Improvements GAP Analysis in 1Q06, however, continued to point to server value as a secondary area of concern for IBM, behind delivery time. IBM's standard GAP rating of –8% was nearly twice that of the average between its competitors (–4.5%). IBM's satisfaction position remained constant in 1Q06, and, because the vendor is not meeting customer expectations as well as its competitors, TBR retains this item on the watch list. Recently, customers have expressed many concerns about the upfront costs of transitioning to blade servers, where the cost savings may not present themselves until a year or more down the road. IBM needs to provide a believable migration path and TCO analysis for blade servers and to communicate it effectively.
- **Technical support.** While IBM remains in strong form relative to satisfaction with both phone and on-site server support, the 1Q06 results showed HP entirely closing the performance gaps. TBR's Improvements GAP Analysis cited on-site support as a secondary area requiring improvement efforts. IBM lost its full competitive strength for phone support and a marginal strength for on-site support in 1Q06, directly due to HP's improving position, thus altering the competitive landscape. IBM's standard GAP measurement of –5% for phone support is a strong number, yet HP did a better job of meeting expectations, as evidenced by its –2% GAP position. TBR believes a greater part of the battle between the x86-based server vendors will be based on technical support quality and value in the months to come. Thus, with HP making such a strong comeback in 1Q06, this item remains on the watch list for IBM.
- **Sustainability.** When we observed IBM's 4Q05 satisfaction positions we noted the vendor was in danger of losing its No. 1 ranking position for x86-based server satisfaction. This might have been a great disappointment for a company that had made such substantial progress during the past year. Fortunately for the company, IBM customer interviews during 1Q06 were quite positive, thus allowing IBM to retain ownership of its No. 1 ranking position. Yet sole possession of that position was not upheld due to HP's rising performance. It might have been unexpected that HP's index position would uncharacteristically advance after an extended period of stasis. The rivalry between HP and IBM is becoming more interesting with each successive quarter of interviewing TBR completes.

Historical Perspective

TBR likes to continue reminding its readers that what occurs within a single quarter (three-month timeframe) or reporting period (six-month timeframe) does not form a trend. We track satisfaction

on a quarterly moving timeline. It is the picture of consistency evolving from these timelines that determines a vendor's overall strength or weakness in this competition. The following table highlights some of the most critical trends identified by these study results over time. The tracking begins with 1Q98, when we started citing strengths and weaknesses.

Dell's leadership position had most consistently been defined by a combination of a strong value proposition with an efficient delivery mechanism. At times this also included its replacement parts availability delivery efficiencies. Yet 3Q05 represented the first time Dell had not been awarded a value competitive strength, and that trend has remained in effect for the past two consecutive reporting periods.

HP's position has largely been defined through its server management solutions, a loyalty builder according to the company. Yet, competition from IBM has recently changed the profile of this competition. HP has achieved a competitive strength for server management features in just four of the past nine reporting periods, but none in the past three. Before 3Q04, an HP strength for management tools was almost always a certainty.

Historically, IBM's position had primarily been defined through its competitive weaknesses, most notably with regard to delivery time issues. In 3Q05, IBM fully recovered from its prior competitive weaknesses or warnings (primarily in the areas of delivery time and value). These have remained absent for the past three consecutive reporting periods.

TBR Highlights of x86-based Server Vendors' Historical Competitive Performances

VENDOR	ATTRIBUTE	RECORD	COMMENTS
Dell	Overall value competitive strength	30 of 33 reporting periods	Absolute until 3Q05. Lead had been softening throughout 2005.
	Delivery time competitive strength	20 of 33 reporting periods	Was running constant for two years, between 1Q02 and 4Q03. More sporadic since 1Q04. Awarded in only four of the last nine reporting periods.
	Ease of doing business competitive strength	7 of 18 reporting periods	Competitive profile has changed; all vendors meeting customers' expectations. Dell gained competitive strength only once in the past nine reporting periods.
HP	Server management competitive strength	23 of 33 reporting periods	Constant for 15 consecutive reporting periods, between 4Q00 and 2Q04; returned for first two reporting periods of 2005, yet has been rescinded in past three. Marketplace changing as all vendors focus on management capabilities.
IBM	Delivery time competitive weakness or warning	24 of 33 reporting periods	Constant for 23 consecutive reporting periods (1Q99 through 3Q04); absent in 4Q04 and 1Q05; returned in 2Q05, yet only as a warning.

SOURCE: TBR.

In 3Q05, TBR noted the Strength and Weakness determinations represented a sudden break with tradition, described as "either the beginning of a new trend, a reflection of these unsettled times, or something else." As we consider the results for the two succeeding reporting periods (4Q05 and 1Q06), we find the pattern has essentially remained intact, though it continues to shuffle around. Dell's new (in 3Q05) phone support weakness remained in effect into 4Q05, and then softened to a warning in 1Q06. Dell has been cited with a competitive warning for on-site support for the past two reporting periods. IBM retained its new (in 3Q05) distinctions for server support into 4Q05, yet lost them due to HP's improving position in 1Q06. HP, ever the voice of reason in this capricious marketplace, remains neutral across the board.

For now, these "trends" have been in evidence for three consecutive reporting periods. If they continue to make themselves evident, we will need to begin tracking their presence, as we have done with the historical patterns described in the table above. Otherwise, we might expect to observe

further fluctuations across the vendors' performances, making it difficult to maintain a sensible tally.

TBR 1Q06 x86-based Server Strength & Weakness Analysis

VENDOR	DELL	HP	IBM
On-time, Reliable Delivery	○	○	○
Hardware Quality/Reliability	○	○	○
On-site Support	ⓘ	○	○
Phone Support	ⓘ	○	○
Replacement Parts Availability	○	○	○
Server Management Features	ⓘ	○	●*
Overall Value	○	○	○
Overall Ease of Doing Business	○	○	○
Numeric Value	**-3**	**0**	**1**

Key: ⊙Weakness; ● Strength; ○ Neutral. ⓘ Warning area for weakness, but insufficient data to substantiate at this time. *The determination was marginal.

SOURCE: TBR.

Finally, continuing our discussion of historical perspectives while taking our analysis outside the Strength & Weakness Analyses, the table below summarizes the new patterns we have been observing for the past three or more reporting periods. Of particular note, and reflected in the convergence of the weighted index positions of our three players, is the large number of areas where customers' perceptions have essentially merged. In every case, these are areas where Dell dominated the competition in past studies. Today, we find views of vendor differentiation essentially limited to three areas: one that has largely been in a state of constancy (server manageability) and two of recent incidence (phone support, on-site support). *Refer to Appendix G for graph representing mean satisfaction historical trends.*

TBR 2005 SATISFACTION PERCEPTION CHANGES OVER PRIOR TIME PERIODS (2003, 2004)

ATTRIBUTE	CONVERGING	STABLE	SEPARATING	DIFFERENTIATION	NOTES ON CUSTOMER PERCEPTIONS
Delivery Time	☑			NO	Dell competitive advantage diminished
Value	☑			NO	Dell competitive advantage diminished
Ease of Doing Business	☑			NO	Dell competitive advantage diminished
Parts Availability	☑			NO	Dell competitive advantage diminished
Overall Satisfaction	☑			NO	Dell competitive advantage diminished
Hardware Reliability		☑		NO	Quite variable; currently all relatively on par

TBR 2005 SATISFACTION PERCEPTION CHANGES OVER PRIOR TIME PERIODS (2003, 2004)

ATTRIBUTE	CONVERGING	STABLE	SEPARATING	DIFFERENTIATION	NOTES ON CUSTOMER PERCEPTIONS
Server Management Tools		☑		YES	Typically led by HP with Dell trailing; IBM recently improved substantially, on parity with HP
Phone Support			☑	YES	HP and IBM bringing in strong performances; Dell trailing
On-site Support			☑	YES	HP and IBM bringing in strong performances; Dell trailing

SOURCE: TBR.

Of one thing we might be certain – Dell has been experiencing significant server support challenges for the past year while losing some of its previous luster relative to how customers perceive server value and delivery time commitments. The results of the past three reporting periods seem to be trying to tell us something else - that this competition has changed in that customers are looking for more than hardware reliability and price. They need more informed value propositions that encompass enhanced support and services, management tools, and other features that will help them make the transition to a more efficient, consolidated server infrastructure. And above all, they need a strong and proactive partner that will take them through these uncertain times.

Behind the Numbers

The purpose of this section is to provide high-level background information on the competitors' activities of the quarter focused on improving customer satisfaction. It is not TBR's objective to promote or endorse any specific product, solution, service or strategy. This section simply provides a quick backdrop of what vendors have been doing behind the scenes that may explain some of the trends we are observing in the current reporting period.

DELL

TBR expects that Dell will introduce its ninth generation of PowerEdge servers late this summer, roughly a year after the company's last major generational introduction. We would expect to see the next version of OpenManage make its appearance around the same time. With Dell's renowned emphasis on driving industry standards, the pending next version of OpenManage server management suite will possibly emphasize broadened integration with major systems tools available on the market as well as greater integration with Linux OS. This would be in keeping with Dell's emphasis on providing customers more flexible choices in their server environments. Dell's CTO Kevin Kettler, speaking at the recent LinuxWorld Expo, mentioned virtualization as a natural expansion of Dell's scale-out approach to server computing. Kettler suggested that virtualization currently lacks standardization in some aspects, such as the input-output hardware leading to networking systems. This will likely be among Dell's areas of influence within the industry as greater standardization of virtualization software will contribute to improved interoperability of systems. In TBR's *4Q05 Corporate IT Buying Behavior and Customer Satisfaction Study: x86-based Servers* report, in reference to the behind-the-scenes activity at Dell relating to the PowerEdge customer experience, we noted the company has placed significant investment into managing the unique needs of Linux customers. Thus, we would not only expect to see a continuation of greater integration of Linux into future versions of OpenManage, but support services to match it. At the same LinuxWorld event, Kettler also talked about Dell's own internal use of Linux, something many of us may not have been aware of. Apparently, Dell runs its colossal

set of customized orders and inventory management with its 500 suppliers on Linux-based PowerEdge servers. In further news relating to Dell's intensified focus on Linux, in March the company announced Novell ZENworks 7 Linux Management Dell Edition for integrated hardware/software management of Dell PowerEdge servers running Linux. A special tool allows the IT manager to centrally deploy, manage and maintain hardware, OS and applications. The joint development was based on a direct response to customer requirements for simplified Linux environments through consolidation and automation of management functions.

Another key focus area for Dell relates to its commitment to continued systematic improvements to its services and protecting the customer's investment in server solutions. Dell and other vendor customers are concerned with stability across the generations of hardware and server management software as well as operating systems stability, particularly as Microsoft Vista rolls out. Customers have a desire to understand Dell's product/solutions roadmap as it relates to industrywide technology transitions. Dell meets these needs by actively engaging customers early and working with them to identify and manage key image-impacting changes and continuing to sell previous generation servers as the new generation servers are ramped up. Dell is working with its customers to help them orchestrate these transitions as they prepare themselves to manage product/solution lifecycles. Dell believes few competitors can do what it has accomplished in terms of assuring its customers smooth transitions and investment protection. An example would be Dell's commitment to protecting the customer's investment in the blade server chassis, assuring that customers may continue to buy current or next-generation blades while keeping the original chassis. Dell also has made a major commitment to helping customers remove outdated systems while working with those customers throughout their consolidation plans.

HP

It is TBR's view that HP's new management team has done an exceptional job of transitioning the company's persona into a clearer, more tightly integrated communication of its goals in the x86-based server space. In order for this to happen, HP needed to first acknowledge that while the company was strong relative to its product line and customer loyalty, there was somewhat of a disconnect with customers that needed to be better cemented. Through its revamped direct sales model, aided by an improved customer information database under the direction of Randy Mott, along with new programs targeted at improving channel relationships, HP has been intent on improving relationships from both sides. Out of this has come a new company message that connects with customers throughout its tightly integrated products, software and services, and is based on a much better understanding of HP's customer and partnership bases.

At its early spring Annual Analysts' Conference, HP's ProLiant server group had a great deal to say about what they view as the single greatest challenge to datacenter customers: uncontrolled power consumption and heat generation due to the increasing density of these environments. HP presenters brought out a startling set of their own numbers suggesting this issue has already reached a critical stage in its development. For example, datacenter power density has increased 10 times in the last 10 years while rising utility costs have pushed energy to the status of being the major part of overall IT costs. Three-year energy costs already equal the systems acquisition cost in the United States. HP also did not make any excuses for blade servers, as they are more part of the power-density problem than the solution.

The leading question customers ask HP at nearly every meeting relative to the datacenter is "What are you going to do about it?" HP sees the energy situation as precipitated by the tendency to overprovision servers and the datacenter infrastructure supporting them, leading to underutilization as a casualty of the attempt to meet SLA requirements. To continue to take advantage of advances in technology, the infrastructure customers implement will need to be infinitely more efficient before it can scale. HP believes an energy-efficient datacenter must be addressed at multiple levels and through common goals across the players — including improved design and control of chips, hard drives and other components, server consolidation, virtualization and automation and, most importantly, through power and cooling solutions and management. For the next few years, HP will

be approaching the power and cooling management issue almost as a consulting practice, while working closely with the channel to assure their goals are synchronized. Since IBM's next-generation blade server introduction in February, we have been expecting to hear a response from HP. It is likely that the focus of HP's response, in its next generation blade server solutions, will be intently aimed at addressing the heating issue. For the present, HP announced in January the Modular Cooling System, which is based on cooling server racks with the facility's chilled water. HP's Systems Insight Manager software can respond to alerts from the system and future versions of SIM are expected to include extensions that more proactively manage the power and cooling aspects of servers. HP also announced a Power Distribution Unit Management Module – a power monitoring tool and new power assessment services. This new solution is a good example of HP's approach to new introductions that include the hardware, software and services united in a common cause.

TBR will likely discuss HP's technical support accomplishments, specifically its phone support mechanism, in the *1Q06 Service & Support Customer Satisfaction Study*. We have observed significant improvement in HP's support satisfaction ratings across all of our studies for the reporting period. As indicated in our report for 4Q05, HP has invested in new diagnostic and automation tools and has implemented a mandate that all support partners share these same tools. The company sees blades as bringing back more of the traditional support model and is bringing in resellers to work with them on meeting these needs. HP sees more and more support resolutions coming about through a remote model and has achieved a 6% increase in its remote resolution rate (over on-site dispatch) while achieving significant cost savings within its call centers.

IBM

Riding a wave of reasonable success in the blade server market (where IBM leads in market share), the company conducted a major media event on Feb. 9 and announced its next-generation blade servers. Among these was the much anticipated new chassis, the BladeCenter H. The BladeCenter H increases the available bandwidth by 10 times (to 40 gigabits per second) from previous generations. The unit includes faster InfiniBand and Ethernet networking and self-management features. While the chassis can accommodate up to as many as 14 blades, most industry experts agree that filling the chassis to capacity would create significant heat generation and weight problems for datacenters. The BladeCenter H Management Tools include automated management tools and new power management tools. The Advanced Management Module allows integration with IBM's Director and Tivoli systems, allowing deployment from a single, centralized location. The chassis will also allow interchangeable blades (Opteron, PowerPC, Intel) within the same unit. The event in New York included an update on IBM's partnership initiatives, including Blade.org, which by mid-April had grown to a 60-company membership. IBM also announced two new packaged solutions for enhanced security within BladeCenter systems. As part of the company's response to power and cooling issues, the announcement included a lower power consumption dual-core Intel Xeon-based blade (BladeCenter HS20). IBM reports a power savings of nearly 63% with the new system.

With the significant increase in satisfaction with server management tools from IBM customers in our 1Q06 reporting timeframe, we need to consider what might be driving this. In past reports, TBR has commented on IBM's drive to increase utilization rates of IBM Director while focusing on increased ease of use. There has likely been sufficient time for customers to have experienced these improvements during the past six months, since the introduction of IBM Director 5.1 (September 2005). Recently, IBM has continued to push toward its vision of improving systems management capabilities in an open-source environment while not sacrificing ease of use. Most recently, as part of its Virtualization Engine technologies, IBM introduced software that works to identify underutilization cases and points out how systems may be better consolidated and virtualized, which translates into significant IT cost savings for the customer. The CDAT tool has reportedly helped IBM Business Partners accelerate customers' uptake of virtualization, and IBM reports more than 65% of its virtualization client engagements come through its business partners.

In the world of Linux, where TBR continues to observe increasing demand for Linux-based server solutions on the x86 platform, IBM continues to spread the word of its commitment to Linux and open source at a broader level. IBM currently employs 15,000 engineers dedicated to Linux and 10,000 services people. In April, IBM announced new integrated software and services for running Linux and additional open-source software on multiple models of IBM servers. The company also announced plans to expand the availability of Linux-based services outside of the United States and Canada.

Like HP, TBR believes IBM has become much more of a communicator in the x86-based server space. While IBM has not abandoned its OnDemand messaging campaign, there has recently been a transition to a new marketing theme, called "Innovation That Matters." Interestingly, this is the very same marketing message adopted earlier by the Lenovo Group relative to the ThinkPad brand. At any rate, the message is intended to communicate a commitment that goes beyond the products themselves. Much of IBM's marketing materials include the clause "We are an innovator's innovator," with the first innovator reference here representing the customer. Therefore, IBM's role is to help the innovative business customer achieve goals through IBM's innovative offerings. It speaks to a total solutions focus on the part of IBM as well as the significance of the relationship between IBM and the customer.