Measuring the Benefits of Mobile PCs in the Enterprise

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Boston, Massachusetts

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Executive Summary

Of all the technical and economic developments that are reshaping today's workplace, few are proving more transformative than the advent of mobile computing. As more workers make the transition from deskbound systems to notebook PCs, wireless connectivity, and mobile work styles, CIOs are struggling to document the resulting costs and benefits, and to assess their implications for the enterprise.

This paper presents the results of a new study, sponsored by Intel and conducted by Wipro, which was designed to illuminate some of those issues. It extends and validates the work described in "New Insights on PC Management" which detailed the relationship between infrastructure complexity (defined as the diversity of PC hardware configurations in an enterprise environment,) and overall PC support costs. This investigation focuses more specifically on the relationship between PC replacement intervals and support costs, in desktop and mobile PC populations and in mobile and office-bound user groups. Our goal is to identify lifecycle management best practices that will optimize total ownership costs and enhance workforce productivity throughout the enterprise.

DEFINING PC PLATFORM AND USER TYPES

- **Desktop Users** – Referred to as "Desktop" throughout this document, these employees use a desktop PC during their working hours.
- **Office Warriors** – Or "Office" as they are referred to in this document, are employees who use a mobile PC (i.e. a laptop or notebook), and are physically present in the office at least 80 percent of their working hours.
- **Road Warriors** – Referred to as "Road" in the body of this document, these employees use a mobile PC (i.e. laptop or notebook), and are physically present in the office for, at most, 20 percent of their working hours.
- **Mobile** – Will be used throughout this survey to indicate the total population of laptop and notebook users, including both Office and Road Warriors.

OUR FINDINGS

Based on statistical analysis of PC management practices and cost information gathered during interviews with senior technology managers at 30 organizations, representing diverse industries and PC fleet sizes ranging from 1,500 to 150,000 systems, we have determined the following:

1. **Configuration-related support costs** for Desktop, Office and Road PCs all increase directly with the length of refresh intervals. While the primary cost drivers are software deployment failures and help desk calls, the rate of increase varies with both platform and user type.
   - Desktop PC management costs rise $71 between service years two and three, and $95 between service years three and four.
   - Office PC management costs jump $214 between service years two and three, and $284 between years three and four.
   - Road PC management costs rise $164 between service years two and three, and skyrocket by $366 between years three and four.
2. **The optimum lifecycle for each PC platform type** represents a balance between fixed cost amortization and the platform's specific rate of support cost increase.
   - For Desktop PCs, the optimum refresh interval is three years
   - For Office PCs, the optimum refresh interval is also three years
   - For Road PCs, the optimum refresh interval is two years.
3. **The overall cost profile of Office systems** is closer to that of Desktops than Road machines. While acquisition costs for the two classes of mobile systems are essentially identical, costs related to use and support are significantly lower for Office PCs compared to Road machines.
4. **The productivity benefits that increased mobility brings** to today's organizations far outweigh the cost of equipping additional workers with notebooks.
5. **By implementing a proactive client refresh**—retiring older Desktop machines, reducing the number of hardware configurations, and reducing aggregate support costs—companies can recoup the capital costs of replacing Desktop PCs with mobile Office machines that will increase user productivity.

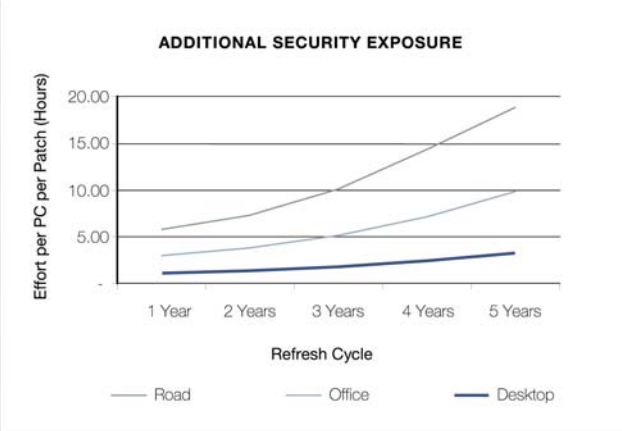

FIGURE 1. The time required to complete software security patch deployment increases for all platforms with infrastructure complexity related to longer refresh cycles.

6. **In all cases, greater complexity in the IT environment** correlates positively with higher maintenance and management costs. In addition, a complex PC population can impede the IT organization's ability to deliver critical routine software testing and deployment services, resulting in a significantly greater security risk exposure.

Introduction

This white paper explores the relationship between complexity in an organization's PC infrastructure—defined here as the diversity of hardware configurations across its Desktop, Office and Road PC fleet—and the associated levels of hardware-related support costs. In particular, we investigated the differing rates of support cost increase associated with each platform and use type at planned system lifecycles ranging from 2 to 5 years. Other topics included the benefits of migrating larger numbers of Office users from Desktop to Mobile PCs, and management scenarios that provide cost-justification for such a migration. But most importantly, this paper provides a quantitative analysis of the economic benefits of controlling hardware-related diversity.

INDUSTRIES REPRESENTED	
Construction	Media
Education	Oil and Gas
Engineering	Pharmaceuticals
Financial Services	Publishing
Insurance	Retail

FIGURE 2. The 30 companies surveyed represent a broad range of industries.

Methodology

In mid-2004, Wipro PSA analysts interviewed CIOs, IT directors, and senior IT managers at 30 companies headquartered in North America and Western Europe. We selected subject companies to represent a diversity of industries, management practices, and user distributions, with PC user populations ranging from 1,000 to 150,000. All interview subjects are actively involved in the planning and execution of the management processes discussed in the survey. On average, they are directly responsible for 57 percent of their organizations' total installed PC base.

IN-HOUSE OPERATIONS

All the companies surveyed conduct the IT business processes analyzed in this study in-house. Some use contract staff for certain roles, but retain final control and accountability within the organization. This ensured that all reporting reflected direct, hands-on experience with actual management practice.

PC LIFECYCLES

To facilitate cost comparison, the surveyed companies were grouped according to their PC lifecycle length, in two-, three-, four-, and five-year categories. Interestingly, firms refreshing on two- and three-year intervals tend to more proactively decommission Desktop and Mobile PCs. Conversely, firms with longer lifecycles tend to pass older machines down through the ranks, replacing them only after serious failure.

It is worth noting that since Wipro began measuring Desktop and Mobile lifecycle support costs in 2003[1], we have observed a steady decline in the practice of "cascading" 4- and 5 year-old PCs, accompanied by a definite move towards proactive elimination of the oldest and most costly configurations.

[1] "New Insights on PC Management", 2003

Process Focus

Many variables are involved in the measurement of Desktop and Mobile PC complexity. As expected in any sample of 30 firms, we found some variation in terminology, standards, tools, processes, networks, and systems. To keep our analysis consistent across the firms we interviewed, the study focused closely on common IT business processes related to PC hardware and software deployment and configuration-related lifecycle support, and on their associated costs.

HARDWARE AND SOFTWARE DEPLOYMENT PROCESSES INCLUDE:

1. Deploying new client computers
   - Hardware qualification – The standard process of qualifying new hardware configurations prior to deployment
2. Deploying new operating systems to existing PCs
   - OS qualification – Testing and qualifying an OS on existing Desktop and Mobile PC hardware configurations
   - OS deployment failure resolution – Resolving OS deployment failures resulting from hardware components or drivers
3. Deploying major application software and updates to existing PCs
   - Application and update qualification – Testing and qualifying an application or update on existing PC hardware configurations
   - Application and update deployment – Packaging an application for automated deployment
   - Application and update deployment failure resolution – Resolving application deployment failures resulting from hardware components or drivers

ACTIVITIES ANALYZED
Initial PC hardware qualification and deployment
Operating system deployment • Initial OS testing and qualification • Deployment failure resolution
Application software and update deployment • Qualification • Deployment • Deployment failure resolution
Lifecycle management and support • Help desk • Spares and replacements provisioning • Decommissioning • Documentation • Training • Relocation

FIGURE 3: This analysis examined only those tasks that pertain directly to managing desktop hardware configurations, which represent a subset of desktop management processes.

LIFECYCLE IT SUPPORT TASKS RELATED TO PC HARDWARE CONFIGURATIONS INCLUDE:

1. Help desk support – The IT workload associated with receiving, prioritizing, dispatching, and resolving help desk calls related to hardware components and drivers
2. Spares and replacements provisioning – Procuring and distributing spare batteries, power supplies, and miscellaneous accessories
3. Decommissioning tasks – Activities related to removing PCs from service, including data cleansing and used equipment sales
4. Documentation – Tracking and documenting hardware in the installed base
5. Training – Training IT staff and end-users on the use and maintenance of hardware in the installed base
6. User relocation support – Activities related to the movement of users and their PCs. For Desktops, this includes physical movement of the systems as well as reconfiguration and reconnection to the network. For Office and Road Warriors, this may include relocation of base stations and network, or system reconfiguration

THE SURVEY AND INTERVIEW

Respondents were given detailed surveys, which were distributed several days before scheduled follow-up telephone interviews. After respondents completed the survey, the telephone interviews provided an opportunity to clarify or expand upon their answers. The survey allowed us to obtain detailed labor cost data for our analysis. This data was generated by determining:

- The frequency of particular events (hardware qualifications, etc.)
- The typical time for accomplishing the tasks associated with each event
- The labor rates for employees performing the tasks

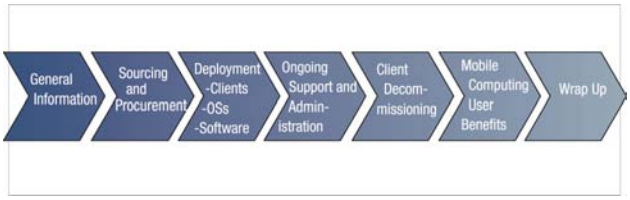

FIGURE 4. The structure of the interview guide.

The interview guide was structured to follow the lifecycle of Desktop and Mobile PC systems illustrated above. The sections of the guide focused on the following:

- Gathering general background on the respondent's company, such as number of employees, number of client systems, and IT staff hourly rates.
- Capturing the costs of system management across the lifecycle of Desktop and Mobile PC clients, including sourcing and procurement.
- Processes and costs related to the configuration, testing, and qualification of hardware and software.
- On-going support and administration costs
- Client decommissioning.

ASSUMPTIONS USED TO MODEL A REPRESENTATIVE ENVIRONMENT

After analyzing the data, we modeled a representative environment composed of 50,000 Desktop, Office, and Road PCs to assess the impact of environment complexity and lifecycle length on support costs while holding other variables constant. We believe that the 50,000 PC model also scales down to smaller organizations, because many of the larger enterprises surveyed do not centralize their client environment management. Many of these firms manage their client PCs either by line of business or geography, limiting their ability to achieve economies of scale in managing sizeable user populations.

Based on our analysis of the detailed data collected from the 30 enterprises interviewed for this study, the assumptions listed in Figure 5 were used to model typical Desktop management practices and to evaluate the impact of complexity and lifecycle variation on Desktop PC support costs. This survey gathered data from U.S. and Western European based firms, and used U.S. and European labor rates to associate Desktop PC support practices with labor costs.

Model Assumptions	Value
Number of PCs	50,000
Number of Vendors	3
Number of Models Deployed per Year	2
Number of PC Configurations Deployed per Year	6
Number of Applications Qualified per Year	7
Number of Applications Deployed per Year	11
Number of Minor Updates Qualified per Year	38
Number of Minor Updates Deployed per Year	38
Frequency of Operating System Deployments (Years)	2.5
Level 1 Resource Burdened Labor Rate (U.S. Dollars)	$42.48
Level 2 Resource Burdened Labor Rate (U.S. Dollars)	$59.93
Level 3 Resource Burdened Labor Rate (U.S. Dollars)	$82.41
Cost of New Desktop	$800
Cost of New Laptop	$1,750

FIGURE 5. Assumptions used to model a typical enterprise PC environment.

Insights from Survey Responses and Data Analysis

Older Desktop PCs are more expensive to Support	■ Support costs jump from $270 to $365 per year as Desktop PCs age from three to four years—a 35 percent increase. ■ This is due to increased software deployment costs, including OS and major and minor application deployments. ■ Minor software deployment costs increase particularly fast, from an average of $108 at three years to $148 at four years and $188 at five—increases of 37 and 27 percent respectively. Respondents told us that this correlated with incompatibilities introduced by older hardware (often unsupported), as well as the fact that older PCs tend to run older OS versions. ■ Hardware-related help desk calls become more frequent as well as lengthier, leading to increased costs.
Office Warrior PCs follow a similar trend *"We see less difference between the client types, (desktop, notebook, etc.,) than we see with the age factor—all the older (3+ years on desktop, 2+ years on notebooks) systems start to suffer compared with new ones when we try to deploy patches or our thick client applications on them."* *- Survey respondent, utility industry*	■ Support costs jump from $700 to $984 per year as Office Warrior PCs age from three to four years—a 40 percent increase. ■ As with Desktops, this is due to increased software deployment costs, including OS and major and minor application deployments. ■ Minor software deployment costs increase at a similar rate to Desktops, from an average of $197 for a three-year old PC to $278 for a four- and $404 for a five-year old Road system—increases of 41 and 45 percent respectively. ■ More frequent and lengthier hardware-related help desk calls become a major cost contributor. Our analysis reveals that up to 20 percent of help desk costs will be incurred when the user is out of the office, and that wear-and-tear on laptops will be higher than on Desktop systems
Road Warrior PCs also become more expensive as they age	■ Support costs start relatively high and increase markedly, going from $674 to $1,040 per year as Road Warrior PCs age from two to three years—a 54 percent increase. ■ As with Desktop and Office systems, this is due to increased software deployment costs, including OS and major and minor application deployments, ■ Hardware-related help desk support is the major cost contributor right from the start, growing to 58 percent of total costs by year five. This is consistent with the trend we saw in Office systems, but rather more pronounced. ■ Interestingly, firms report that Road systems do not have significantly higher spares and replacement costs relative to Office systems ($35 compared to $47 at year three). ■ The lack of decommissioning costs points to two phenomena for which we have only qualitative evidence: - Road systems are commonly recycled or cascaded as Office systems - Many Road systems are not as thoroughly decommissioned as their Office and Desktop counterparts.

TO REDUCE COSTS, REDUCE THE NUMBER OF VENDORS

One result of our analysis has been to correlate the number of PC vendors used by an organization with the per-PC support costs incurred. Our data reveals that firms with four vendors spend 20 percent more in support costs, on average, than firms who use just two vendors. This is consistent with our earlier finding that the number of configurations directly influences support costs. So CIOs can further lower their support costs by carefully reducing the number of PC vendors they use, keeping in mind that some PC vendors excel at helping organizations manage costs. A best practice guide for PC vendor selection is available online from Intel at: http://www.intel.com/business/bss/products/client/stableplatform/.

Comparing Optimum Refresh Cycles

THE OPTIMUM DESKTOP PC REFRESH INTERVAL: THREE YEARS

Our analysis indicates that longer lifecycles result in higher support costs. This raises the question of how to determine the most cost-effective Desktop lifecycle overall, once all the costs of new PC acquisition, deployment, and support are factored in.

Figure 6 shows the sum of hardware and support costs given an initial cost of $800 for a Desktop PC (excluding keyboard, mouse, and monitor). A three-year refresh offers the lowest total yearly cost at $537 per Desktop PC[2], compared to $565 for a four-year lifecycle and $609 for a five-year lifecycle. For a firm with 50,000 Desktop PCs, this translates to a total yearly cost of $26.8 million for a three-year refresh, $28.3 million for a four-year refresh, and $30.4 million for a five-year refresh.

Firms on a three-year lifecycle invest an additional $67 per Desktop PC each year on hardware, deployment, and decommissioning costs compared to firms on a four-year cycle, but save $95 per Desktop PC each year in support costs. The result is a net savings of $28 per Desktop PC per year—a five percent return on the additional $67 per investment in new Desktop PCs. This points to three years as the most cost-effective refresh cycle for Desktop systems.

[2] This study varies from "New Insights in PC Management" in some constants and specific variables that were not material to this study, making this study's totals a large sub-set of the values presented in 'New Insights."

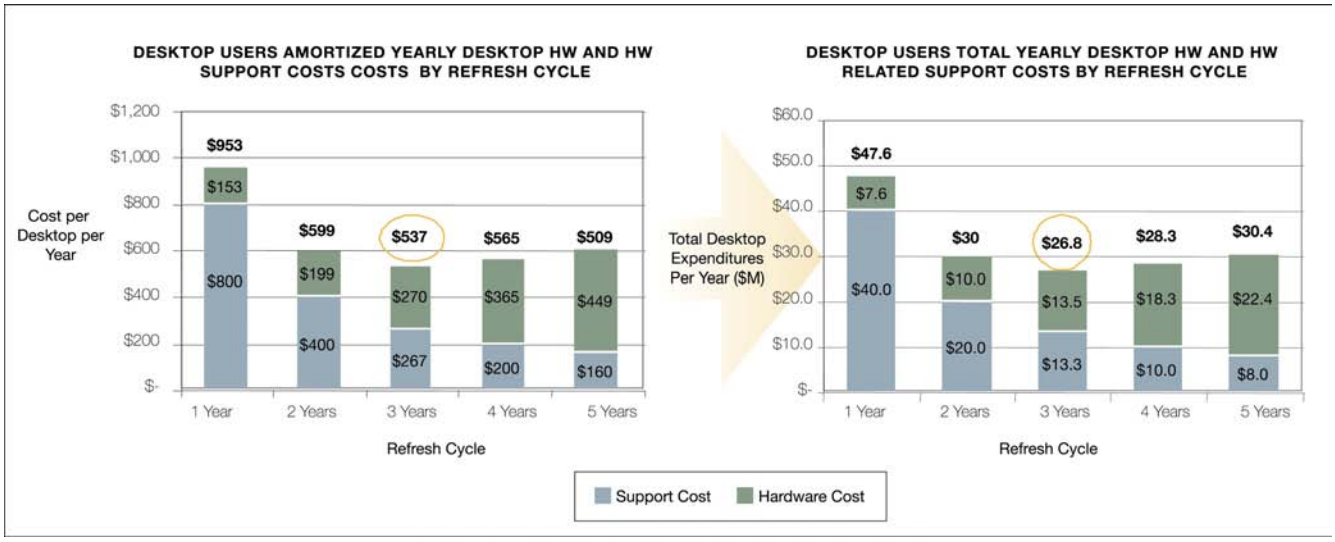

FIGURE 6. Cost optimizing the Desktop lifecycle

THE OPTIMUM OFFICE PC REFRESH INTERVAL: THREE YEARS

Using the same logic and similar core assumptions, we can also deduce the optimal refresh cycle for Office systems. Figure 7 shows the sum of hardware and support costs for an Office PC, given an initial cost of $1750 (excluding keyboard, mouse, monitor, and/or docking station). A three-year refresh offers the lowest total yearly cost at $1283 per Office PC, compared to $1421 for a four-year lifecycle and $1632 for a five-year lifecycle—increases of 11 and 15 percent respectively.

For a firm with 50,000 Office PCs this translates to a total yearly cost of $64 million for a three-year refresh, $71 million for a four-year refresh, and $82 million for a five-year refresh. Firms on a three-year lifecycle thus invest an additional $145 per Office PC each year on hardware, deployment, and decommissioning costs compared to firms on a four-year cycle, but save $284 per machine in support costs each year. The result is a net savings of $139 per Office system per year—a ten percent return on the additional $145 per system investment in new PCs. Three years is the most cost-effective refresh cycle for Office systems.

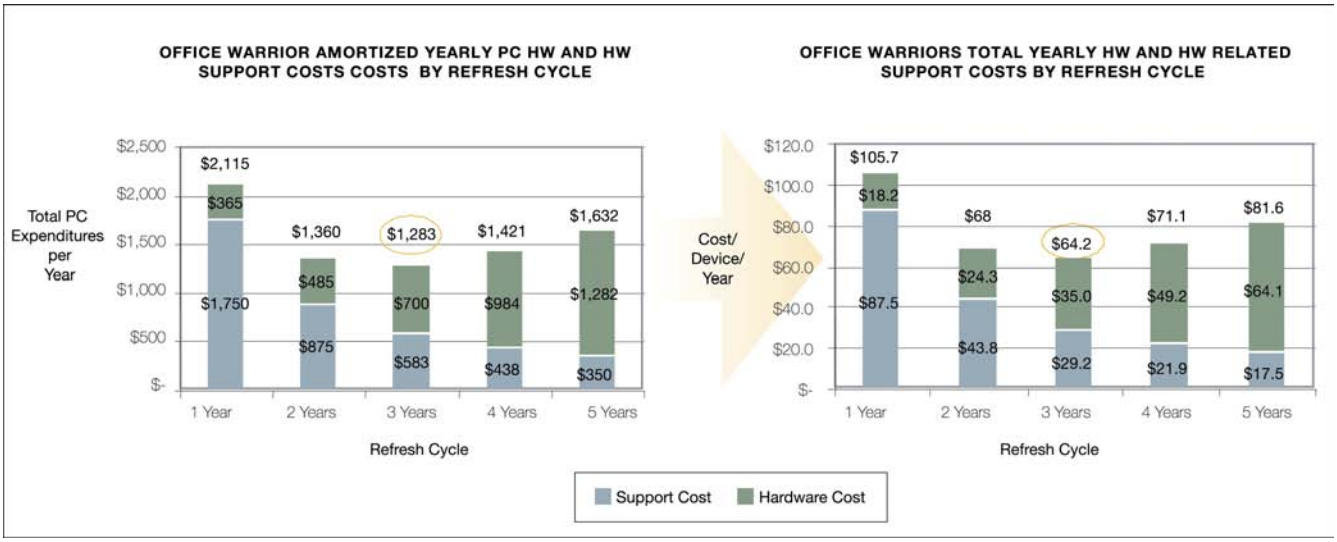

FIGURE 7. Cost optimizing the Office PC lifecycle

THE OPTIMUM ROAD PC REFRESH INTERVAL: TWO YEARS

Finally, we can use survey data to determine the most cost-effective refresh cycle for Road systems. Figure 8 shows the sum of hardware and support costs given an initial cost of $1750 for a Road PC (excluding keyboard, mouse, monitor, and/or docking station). A two-year refresh offers the lowest total yearly cost at $1549 per Road PC, versus $1623 for a three-year lifecycle, $2013 for a four-year lifecycle, and $2270 for a five-year lifecycle.

For a firm with 50,000 Road PCs this translates to a total yearly cost of $78 million for a two -year refresh, $81 million for a three-year refresh, $101 million for a four-year refresh, and $114 million for a five-year refresh.

Firms on a three-year lifecycle will invest an additional $292 per Road PC each year on hardware, deployment, and decommissioning costs compared to firms on a four-year cycle, but save $366 per machine in annual support costs. The result is a net saving of $75 per Road system PC per year—a four percent return on the additional $292 investment in each new PC. Two years is the most cost-effective refresh cycle for Road systems.

"Centrino has been a big influence on our decision to increase the number of wireless, and yes, mobile PC users in general. Centrino was a helping factor; it gave us (IT) an extra weapon in our arsenal for justification to the business. Knowing that we could depend on Centrino's compatibility and performance gave us the confidence to move to a two-year refresh for laptops, and we've seen the benefits of doing that, with lower support costs."

—VP of Technology, retail industry

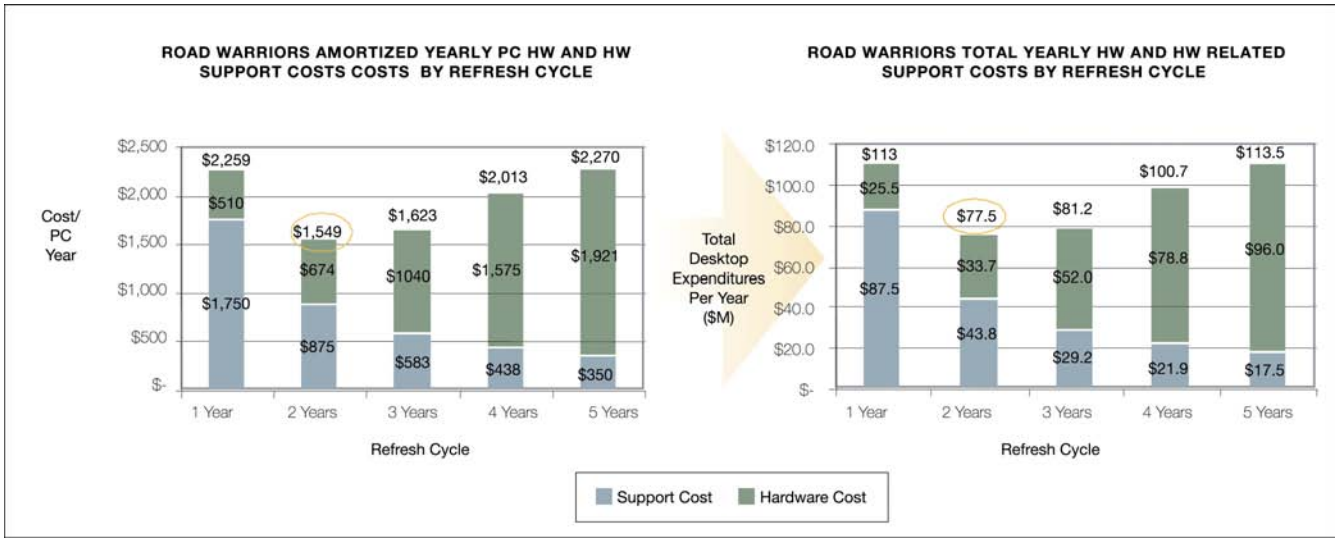

FIGURE 8. Cost optimizing the Road PC lifecycle

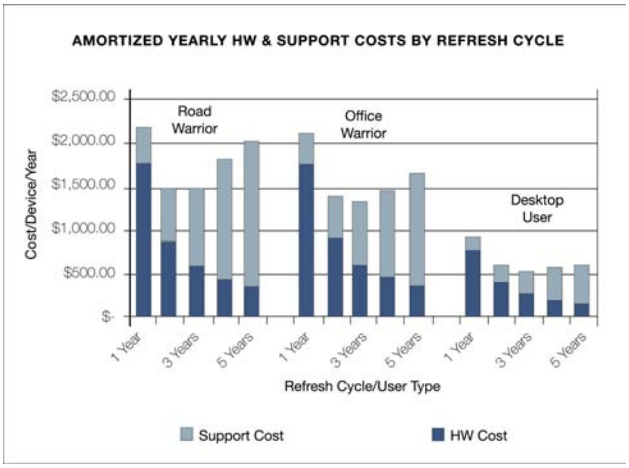

FIGURE 9. Side-by-side cost comparison of Road, Office and Desktop PCs for various lifecycles.

COMPARING OPTIMUM REFRESH CYCLES

Figure 9 presents the relative cost profiles for Road, Office and Desktop PCs at one-year lifecycle intervals up to five years. As expected, for any given refresh cycle, Desktop systems are least expensive and Road Warrior most expensive. Aggregate costs for Road systems are markedly higher than Desktop and Office machines, even when factoring in the recommended two-year refresh rate ($746 per PC per year or $37.3 million per year for a fleet of 50,000 machines).

"If you are a road worker, you already have a laptop, you just do. For office people, the number of laptops increases as laptops get cheaper. For us, 2.5 times the cost of the desktop in question is the tipping point. A laptop that costs less than 2.5 times the cost of a new desktop will be what we buy instead of that desktop, due to the benefits of mobility in general. That's been our guideline."

— Survey respondent, oil services industry

Factoring in the Business Benefits of Mobility: the Choice is Clear

"Moving to mobile PCs enables many things. It allows for major savings on office space since mobile PC systems can be used just about anywhere. They have a much smaller 'footprint', which allows IT to provide "follow the sun" support coverage. Also, and this is less tangible, they provide a perk for employees, who seem to like their laptops, while they don't really have an opinion about their desktops. And mobile PCs make it possible for employees to work flexible hours.

– Survey respondent, financial services firm

The business benefits enabled by mobile PCs are impressive. Here is a sampling of the feedback we got from the thirty firms we spoke with. It is easy to see how benefits like these justify the extra $430 per year per Office Warrior PC.

THE BENEFITS OF MOBILE PC COMPUTING FOR INDIVIDUAL WORKERS

Increasingly, a firm's sales force is called on to be on line wherever a customer is. As a retail CIO told us, "Mobile PCs—and wireless—are really a requirement for our traveling business units."

This demand for productivity on the move is not just limited to people on the road; more and more workers find themselves with spare moments, and mobility gives them the opportunity to capitalize on this "found" time:

- *"Users can utilize previously unproductive moments, such as time waiting for client meetings or in airplanes."* — CIO, pharma industry
- *"People can now work on their commute, which means they can leave the office earlier and still achieve the same amount of work in a day. This is good, as the employee is obviously a happier employee."* — VP of Technology, insurance industry
- *"Some users report that they can be more productive during their commutes, riding the train. They say they*

feel like they 'hit the office running' rather than coming in cold." — Survey respondent, engineering firm

Mobile PC users have ability to work from home, while traveling, and to access all files and corporate resources regardless of where they are via VPN.

- *"Of course travel doesn't have to be far to be travel; they are also able to move around the campus and at other corporate locations very easily."* — Survey respondent, media company

And being mobile doesn't always mean having to be online or buzzing with activity.

- *"Workers can 'get away', even when they're at work. They tell us that this allows them to produce work free from distractions and meetings, and to accomplish more."* — Survey respondent, pharma industry

THE BENEFITS OF MOBILE PC COMPUTING FOR GROUP ACTIVITIES

Today's organizations know that collaboration is an important way to get the most out of their people, and that mobility is the glue that makes group activities and collaboration possible. As our interviewees noted:

- *"Teams are able to discuss documents in real time, to decrease the requirement for face-to-face meetings, and are always available to review information."* — *Survey respondent, financial services industry*
- *"Mobile PCs and wireless technology mean that there are NO obstacles to meetings. Employees can contribute anytime, any place and are always contactable. There are effectively no time delays or latency from other worldwide offices."* – Survey respondent, financial services/brokerage
- *"Groups can be disparate and be located globally whilst still able to function correctly."* — Survey respondent, financial services industry

THE BENEFITS OF MOBILE PC COMPUTING FOR FACE-TO-FACE AND REMOTE MEETINGS

For workers with Mobile PCs, being able to check email and show product catalogs to customers is considered a bare minimum. With live access to important company data and business processes during meetings, entirely new levels of effectiveness are being born.

- *"[Mobility means] always having the latest data. We've seen a marked change in work output, since the accuracy of information gives groups the ability to discuss and make changes to things like forecasts and orders once, live, rather than tentatively agreeing and then having to follow-up later*." — Survey respondent, pharma industry
- *"I guess the net-net is that mobile PC computing enables better decision making. Deals take less time, with fewer corrections."* — Survey respondent, publishing industry

Many respondents agreed that mobile computing is no longer a luxury capability reserved for a minority of users in a few bleeding-edge firms, but an increasingly mainstream phenomenon.

- *"Meetings can now take place via video-conferencing from any location, assuming you have the correct hardware. We're deploying all that is needed with the users today."* — Survey respondent, banking/financial services
- *"Users are able to work on-site a lot more, which keeps them in front of our customers. Being in front of customers is the only way they make money."* — Survey respondent, construction industry

For some, its more than mainstream, it's mandatory.

- *"As our business is so dependent on electronic data, the kind of remote meetings we've come to expect would be very difficult without mobile PC computing and wireless. It's a must-have."* — Survey respondent, retail industry

THE BENEFITS OF MOBILE PC COMPUTING FOR EMAIL

It would be difficult to find an organization today that doesn't rely on email for its day-to-day communication. Our IT executives told us that because of mobility, email has become more real-time and critical to operations. As one financial services vice-president explained, "Because of mobile PC computing, email has gained primary importance as a means of communications in our organization. Phone and voicemail is a distant second."

This is happening even as workers move from project room to boardroom to meeting room.

- *"Users love the fact that there's no need to be physically at a desk, with the ability for 'hotdesk' communications with anyone, at any time. Our users are in a very time-sensitive business, and this has made email seamless for them."* — Survey respondent, financial services/brokerage

THE BENEFITS OF MOBILE PC COMPUTING FOR OTHER COMMUNICATIONS

Several CIOs reported that the use of collaboration tools such as Lotus SameTime, Microsoft SharePoint, and Groove Networks Virtual Office has taken off along with mobile PC technology. They believe the next wave of innovation is just around the corner, extending to ad-hoc use of Voice over IP.

- *"With built-in wireless technology and the ability to VPN into the network from hot-spots, it has positively increased productivity in workers and increased revenue for the company. Users are better prepared, since they have data available at all times and can schedule video meetings for remote users. We've even rolled out IP-based telephone software on the laptops to provide our users with follow-me-anywhere technology."* — CIO, manufacturing industry

As you can see, the examples and quotes from the IT executives we surveyed for this study underline the business benefits of mobility. Sometimes there simply is no choice but to mobilize your workforce.

INCREASED USE OF MOBILE PC TECHNOLOGY REDUCES THE IT BURDEN OF EMPLOYEE RELOCATION

Mobile PC systems impose a lower cost to the IT organization with respect to employee relocation. Our study shows that in addition to the other benefits that mobile workers enjoy, they also have quicker, less costly relocation of their PCs.

RELOCATION ANALYSIS			
User Type	**# of Moves per Year***	**Effort per Move**	**IT Cost per Move**
Desktop Users	19,712	2.5 Hours	$152
Office Warriors	7,360	1.5 Hours	$93
Road Warriors	2,928	.5 Hours	$34

FIGURE 10. Relocation cost analysis for Desktop and Mobile PC platforms

For a typical company, Office Warrior systems require an average of $35 less per PC per year in IT relocation costs than Desktop systems, freeing up IT resources to do more value-added work. This measurement of IT workload reflects a wide range of tasks related to employee relocation, including altering rights and privileges, re-configuring network and security settings, and assisting with the re-location of physical assets—PCs, monitors, keyboards and base-stations, etc.

Combining Proactive Refresh with Increased Deployment of Office Systems

By implementing a proactive client strategy—retiring the four- and five-year-old Desktop configurations under a proactive refresh program—companies can actually pay for the cost of new Office Warrior hardware. Here is a scenario for how just such a transition can be implemented cost-effectively.

A firm with 35,000 Desktops on a five-year refresh cycle, 10,000 Office systems on a four-year cycle, and 5,000 Road systems refreshed on four-year intervals can move 34 percent of its Desktop workers to Office systems, and reduce its annual

total spend (PC hardware + support costs) by more than $15,000.

This is made possible simply by the reduction of the Desktop, Office and Road refresh cycles from five years to three, four years to three, and four years to two respectively. It should be noted that this analysis omits transition and migration costs, and reflects only the 'stable state' cost structures that result from the altered mix of client types and refresh rates.

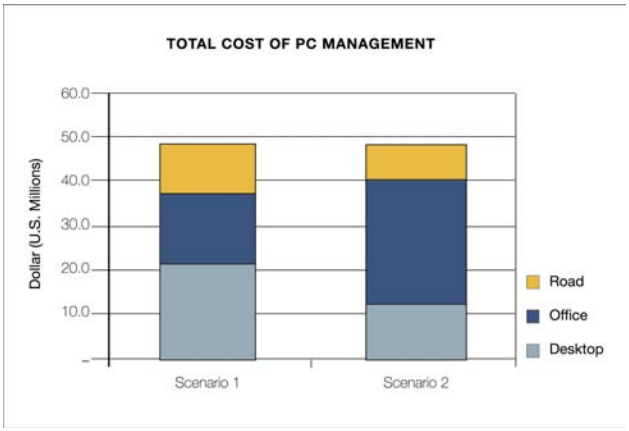

FIGURE 11. Optimizing mobility and productivity at essentially constant infrastructure cost.

The Impact of Complexity on IT Responsiveness

In all cases, more complex environments are more expensive to maintain, and impede the IT organization's ability to deliver critical services. This is true for Desktop, Office and Road PCs, and our analysis shows the following:

- Following the refresh cycle recommendations for Desktop, Office and Road PCs outlined above makes a significant difference in IT responsiveness.
- For many key IT processes, the costs associated with Desktop and Office systems are effectively identical

Several notable examples are given here.

REFRESH CYCLE IMPACT ON SOFTWARE DEPLOYMENT FAILURE RATES

Our analysis has already established that software deployment costs rise with longer refresh cycles. One important consequence is that longer refresh cycles mean markedly higher failure rates for OS and both major and minor application deployments. IT personnel assigned to resolve failed software deployments are effectively unable to engage in other value-added activities.

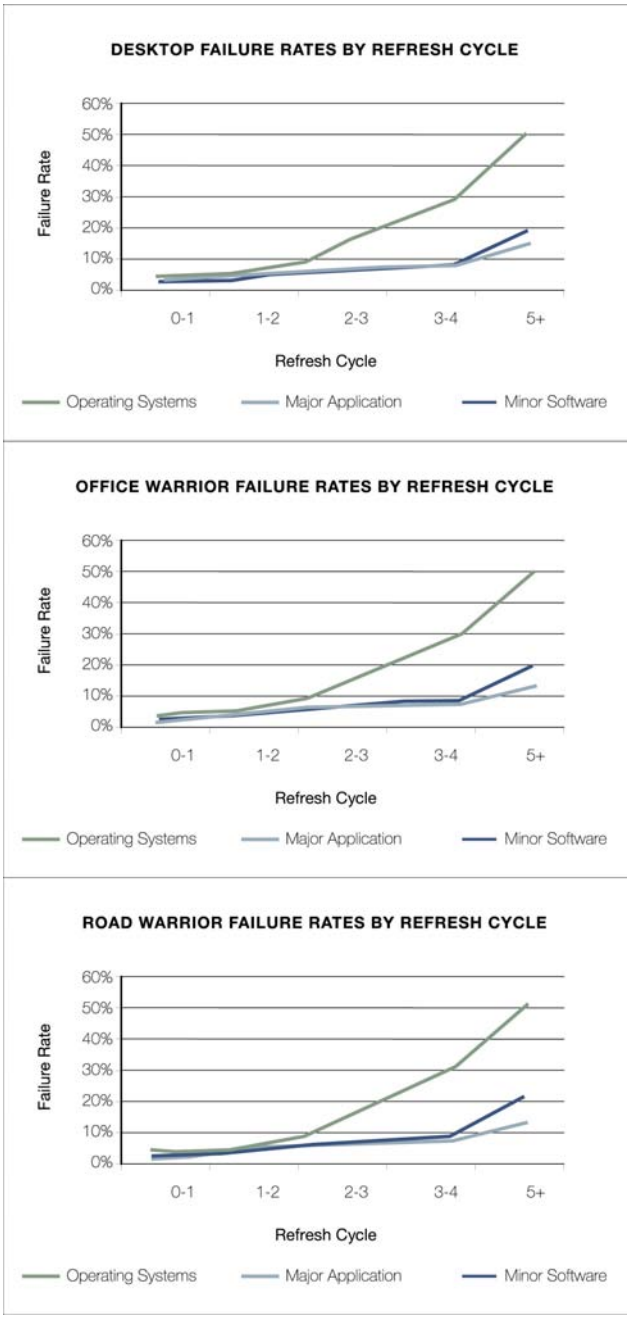

FIGURE 12. Software deployment failures increase rapidly with longer refresh intervals.

Two important trends are evident in the data charted in Figure 12. The first is that OS deployments suffer the steepest rise in failure frequency, becoming prohibitively inefficient and expensive for all client types after just 3.5 years. The second is the fact that failure rates for Desktop, Office and Road systems are effectively identical. This is interesting, as it dispels the myth that successful software distribution is only possible when client PCs are on local LANs or enterprise networks.

Many respondents confirm that the complexity of software distribution is not a function of client type:

- *"When it comes to deployment and support, we no longer make a distinction between PC types. The systems are just more similar than they are different. Our IT department really doesn't see much of a material difference, except maybe in remote support [for road users].* — CIO, oil services industry

THE IMPACT OF REFRESH CYCLE ON HELP DESK OPERATIONS

Another consequence of longer refresh cycles and the implied increase in the installed base complexity is additional load on the IT Help Desk. It is easy to see this as having a double-impact on firms, since:

1. IT employees are occupied longer working through help desk issues, and
2. Help Desk staff are busier, a problem that is exacerbated by the recent trend to reduce help desk staffing to the bare minimum.

There is also a hidden burden borne by Help Desk staff—older systems typically run older OS versions, and have hardware sub-systems that require specialist knowledge—all of which add to the training, documentation, and knowledgebase required.

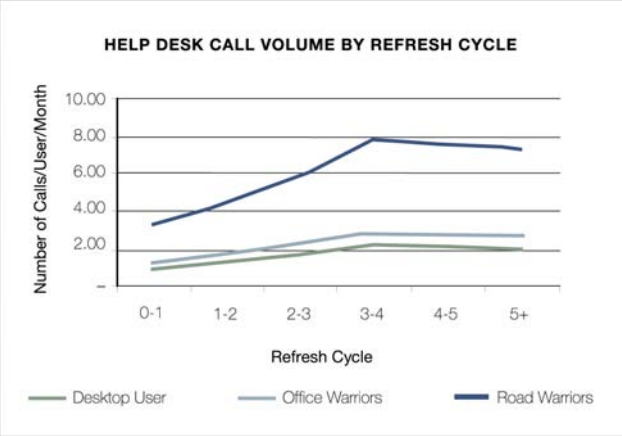

FIGURE 13. Help Deck call volumes rise with the length of PC lifecycles

In analyzing the Help Desk call volume data collected in our survey and displayed in Figure 13, two additional facts become evident:

- The number of calls from Office and Desktop users are strikingly similar and grow at almost the same rate as the installed base ages.
- Road system call volume is dramatically affected by the refresh cycle length, emphasizing the need to proactively refresh PCs as described earlier in this report. A single four-year-old Road machine averages four calls per user per month, the same as two, two-and-a-half-year old Road machines, or more than three two-year-old Office or Desktop systems. Firms should see dramatic, measurable differences in their Help Desk load as they modernize their Road PC systems.

[3] Source: CAIDA.org

ADDITIONAL REFRESH-RELATED SECURITY RISKS

Longer refresh cycles directly increase the time it takes for firms to successfully test and deploy software patches. Every un-patched system increases an organization's risk of compromise from attack, and many analysts[3] agree that firms have not effectively patched their networks until greater than 95 percent of candidate systems are covered. This interval of heightened risk exposure is called "days at risk", and reducing it is a top priority for almost all the IT executives we spoke with.

- A four-year Desktop refresh cycle adds an average of .7 hours of effort per PC per patch when compared with those on a three-year refresh. For 10,000 systems this would mean an additional 7,000 hours per patching event.
- A four-year Office refresh cycle adds an average of 1.4 hours of effort per PC per patch when compared with systems on a three-year refresh. For 10,000 systems this would mean 14,000 additional hours per patching event.

A three-year Road refresh cycle adds an average of .6 hours of effort per PC per patch when compared with those on a two-year refresh. For 10,000 systems, this would mean 6,000 additional hours per patching event. This is the largest effect, and an organization with a four-year Road refresh rate can expect to spend double the patch time required by Road systems on a two-year refresh interval.

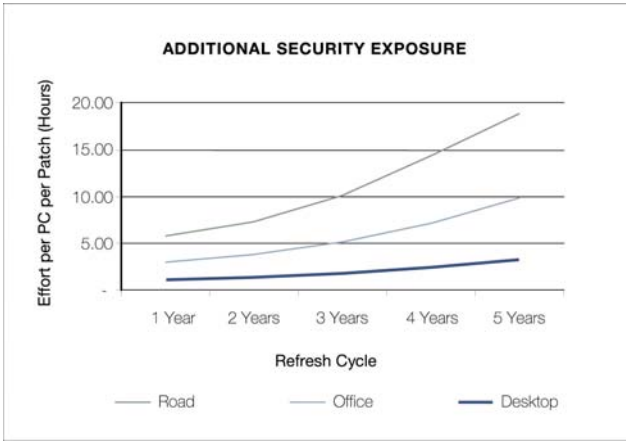

FIGURE 14. Patch distribution workloads increase with PC refresh cycle length.

The values shown in Figure 14 reflect the average additional time required to test and successfully deploy software patches to an installed base of 50,000 PCs. The efforts measured and included in this display include:

- Patch testing
- Resolution of hardware-related failures during deployment

Efforts not measured include:

- Initial patch deployment (manual or automated). This cost is dependent on several IT systems such as patch management and systems management software that are not within the scope of this analysis.

Of course, the monetary value of business risk will vary by firm and industry, but more proactive refresh cycles can have a direct, dramatic risk-mitigating effect regardless of whether you are patching Desktop, Office, or Road systems.

Conclusions

Real-world data gathered from 30 firms in a variety of industries shows that, when it comes to PC fleet management, limiting environmental complexity by reducing and cost-optimizing platform refresh cycles lowers overall ownership expense substantially.

Because the ongoing support and administrative costs for Desktop, Office and Road PCs all rise steeply over time, the cost-optimized lifecycle for each platform is a balance between initial cost amortization and continuing cost minimization. And because the rate of management cost increase varies by platform and type of use, the most cost-effective refresh cycle also varies.

- For Desktop PCs, the optimum refresh interval is three years
- For Office PCs, the optimum refresh interval is also three years
- For Road PCs, the optimum refresh interval is two years.

By implementing a proactive refresh strategy for their PC fleets, tailored to these lifecycle intervals, companies can greatly reduce their total spend on PC infrastructure while improving enterprise operating efficiency and security. But even more significant is the finding that companies can use the savings from a cost-optimized refresh strategy to increase the distribution of Office machines in the Mobile PC fleet, leveraging the productivity benefits of mobile computing to drive new efficiencies and business opportunities. Companies should closely evaluate these finding and aggressively implement proactive refresh strategies across their PC environments.

Appendices

APPENDIX A: A GLOSSARY OF TERMS USED IN THIS SURVEY

■ Office Warrior	Employees who use a mobile PC (i.e. a laptop or notebook) and are physically present in the office for at least 80% of their working hours.
■ Road Warrior	Employees who use a mobile PC (i.e. a laptop or notebook) and are physically present in the office for at a maximum of 20% of their working hours.
■ Deployment	The process of placing an application in a distributed environment and making the application available for use. Deployment can include such tasks as installation, configuration, and administration of various parts of the application.
■ Desktop/Laptop Mix	The proportion of PCs in an enterprise that are desktop models vs. laptop models (e.g., a 70 percent / 30 percent mix).
■ Hardware Configuration	A collection of PCs that use the same hardware driver stack.
■ Installed Base	The PCs already installed and in use in an organization.
■ Operational Costs	The ongoing costs of managing an installed base of PCs, such as deploying software updates, answering user queries, fixing broken hardware or software, etc. Typically, most, if not all, of the costs are labor-related. May also be called support costs, or management costs.
■ Proactive Refresh Cycle	A plan to replace PCs on a regular basis, not just when they break or performance falters. With a three-year proactive refresh cycle, about 1/3 of the PCs would be replaced each year.
■ Refresh Cycle	The planned length of time from when PCs are deployed to when they are decommissioned and replaced by new PCs.
■ Software Image	The “master copy” of an enterprise’s operating system, tools, drivers, and applications that is cloned to end-user PCs. There may be one or multiple software images. “Image engineering” is the creation and testing of a software image.
■ Total Cost of Ownership (TCO)	TCO accounts for all of the costs associated with procuring, deploying and owning IT systems. TCO includes purchase, lease and maintenance costs for hardware and software. It also includes labor costs associated with planning, purchasing, testing, configuration, deployment, software updates, training and technical support. Some TCO models, such as Gartner’s, also include end-user costs such as downtime and peer support; others do not. TCO models do NOT take into account the end-user benefits that flow from a technology, such as increased productivity.
■ Software Updates	Changes to an existing deployed application or operating system, such as hotfixes, patches, and point releases, as well as updated and new versions.

APPENDIX B: SELECTED DEMOGRAPHICS OF SURVEY RESPONDENTS

Industry	Number of Office Warrior PCs	Number of Road Warrior PCs	Number of Desktops	Number of Desktop Configurations	Number of Office Configurations	Number of Road Configurations
Financial Services	30,000	10,000	110,000	9	6	6
Education	15,000	6,000	15,000	25	10	10
Pharmaceuticals	15,000	15,000	50,000	28	18	30
Pharmaceuticals	15,000	5,000	60,000	6	6	6
Manufacturing	10,000	3,000	2,000	12	15	30
Media	6,500	500	10,000	150	50	20
Financial Services	6,000	4,000	10,000	10	18	12
Publishing	4,000	2,000	9,000	65	30	10
Financial Services	4,000	4,000	12,000	54	40	12
Financial Services	3,750	1,250	4,500	23	58	38
Manufacturing	2,500	500	4,000	18	8	5
Utility	2,200	1,200	10,400	6	10	9
Engineering	2,000	1,000	6,500	6	9	9
Financial Services	1,800	800	3,200	18	9	6
Publishing	1,500	800	1,500	6	6	6
Construction	1,500	2,000	2,000	5	3	3
Retail	1,500	1,000	8,000	40	6	9
Retail	1,200	300	4,000	20	5	1
Oil & Gas	1,000	1,000	4,000	20	10	10
Financial Services	1,000	1,000	4,500	20	20	12
Financial Services	800	350	2,400	14	3	3
Pharmaceuticals	700	300	3,500	20	28	12
Financial Services	650	180	100	8	8	8
Pharmaceuticals	600	3,700	300	2	2	1
Publishing	600	400	2,500	8	8	6
Financial Services	400	600	6,000	20	20	20
Manufacturing	400	2,200	11,400	4	2	6
Insurance	350	100	400	12	12	12
Financial Services	120	430	1,850	8	2	1
Retail	100	900	500	12	8	65

The firms in this survey vary from those in "New Insights in PC Management" in two ways:

- The mean refresh rate of the new group is lower by approximately one year
- The overall number of configurations in the installed base of the new group is lower.

The implication of these facts is that base costs should be somewhat lower.

APPENDIX C: OVERVIEW OF WIPRO PSA

Wipro's Product Strategy and Architecture Practice (PSA) focuses on the strategic intersection of business, information technology, and globalization. Wipro's PSA Practice combines deep technology expertise in IT and embedded systems, broad strategic planning skills, proficiency in global sourcing strategies, and familiarity with high-growth emerging countries. Wipro's Product Strategy and Architecture Practice uses senior teams of technical architects and management consultants to help vendors, service providers and large enterprises document the business value of technology and global sourcing, and to develop product strategy and market entry strategies.

For further information, contact Theodore.forbath@wipro.com or visit http://www.wipro.com/prodesign/focusareas/productstrategy/