

## WHITE PAPER

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### Dell PC Optimized Deployment Model

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### IDC OPINION

The costs associated with deploying PCs can significantly add to the total cost of owning and using them. IDC research shows that the average deployment cost is \$615 per PC, and costs exceeding \$700 are not uncommon. Further, by adopting a higher level of maturity, organizations can reduce IT costs by up to 55%. This translates to a saving of up to \$337 per PC. Recently, cost has become a major factor in the decision of many companies to delay technology refreshes. At the same time, cost-driven reductions within IT departments have left fewer disposable labor hours to handle IT needs, including deploying PCs. As the economy recovers, IDC believes that a major share of organizations will begin to upgrade their PC base.

To help companies efficiently deploy PCs, Dell has developed a series of offerings that optimize the PC deployment process. Known as the Dell Optimized Deployment Service Framework, the offering is delivered in four stages:

- ☒ **Assessment.** The Dell Client Deployment Assessment is an ROI-based discovery process that helps customers define their current mode of operations, as well as the hard- and soft-dollar value of transforming to an optimized deployment mode. Dell uses its PC Optimized Deployment Model to help customers define the maturity of their existing deployment practices and identify specific factors that can be improved.
- ☒ **Design and Planning.** Dell's Design and Planning service enables customers to implement automated deployment solutions that have been customized to meet their requirements. As part of that service, Dell leverages the experience that it has gained while deploying millions of PCs per year to create a unique deployment plan that is based on each customer's unique requirements.
- ☒ **Implementation.** Dell utilizes its service capabilities to execute the deployment plan created during Design and Planning. This includes the use of the Dell Automated Deployment (DAD) process for companies to fully implement best practices. Every implementation is led by a skilled project manager.
- ☒ **Management.** Dell provides ongoing implementation and continuous updating of best practices in PC deployment.

These services and tools are designed to reduce deployment costs and reduce network utilization during deployment and cycle times while mitigating the risks associated with PC deployments. Together, these factors can provide companies using the framework with significant competitive advantages.

## IN THIS WHITE PAPER

IDC examines the process of deploying PCs in medium-sized and large businesses and quantifies the costs for each part of the process. In addition, this White Paper provides insight into how deploying certain best practices can reduce these costs.

## SITUATION OVERVIEW

Over the past year, many enterprises have been going through a difficult period as the economic downturn has reduced overall enterprise profitability. As a result, organizations have responded by reducing costs in all areas of their operations. In terms of IT, this cost reduction has generally resulted in reduced internal and external resources and extended technology refresh cycles. The effect of this on the PC and end-user computing environment is pent-up demand for PC refresh.

In addition to the extended refresh cycles, several technology developments have impacted client PCs over the past several years, most notably the release of Windows 7. In addition, even though there is still a considerable installed base of Windows XP, Microsoft has announced that extended support for Windows XP will expire in the summer of 2014. Windows 7 offers significant usability, performance, stability, security, and manageability benefits to businesses, and most companies have at least started down the path toward a Windows 7 migration within their organization.

Despite this fact, IDC research shows that many follow less than optimal processes for deploying new operating systems and new PCs. This suggests that many organizations could significantly reduce the amount they spend on PC deployments. For companies to achieve these savings, they need a clear understanding of the maturity of their PC deployment processes. Only with this baseline established can they determine the policies, practices, and technologies needed to transition those processes into the more advanced levels. According to recent research, IDC has tracked the relationship between levels of maturity (optimization) and IT costs, service levels, and business agility. The model that shows this is outlined below.

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### Dell PC Optimized Deployment Model

Dell developed the Dell PC Optimized Deployment Model to help companies understand and evaluate the maturity of their PC deployment practices and learn how they can improve their practices. The six specific activities defined by the model are:

- ☒ **Deployment management**, which covers the planning and organization of deployments, including work instructions and scheduling
- ☒ **Staging and logistics**, which includes the purchase, shipping, storing, and staging of the PC
- ☒ **Image loading**, which includes the loading of images onto new PCs (While the creation of image files is not included as a direct deployment activity [or cost] in the model, it plays a critical role in determining a company's optimization level for the image loading task.)
- ☒ **Application loading**, which is the process of installing applications on the machines

☒ **User state migration**, which is the process of moving each user's individual data and settings from his/her old PC to the PC being deployed

☒ **Post-deployment support**, which is provided to the end user in the first few days after the receipt of the new PC, including help desk and onsite support (It specifically targets the number of calls to the help desk, the amount of time spent with the help desk, and other related metrics.)

As Figure 1 shows, the model defines the maturity of a company's deployment practices in four categories — Basic, Standardized, Rationalized, and Dynamic — with each level defining the practices that are employed by the six optimized deployment activities. For example, the Basic level is marked by very little automation of the deployment process, while at the more advanced levels, many tasks are either automated or tightly controlled with a single process.

**FIGURE 1**

Overview of the Dell PC Optimized Deployment Model

	<b>Basic</b> No documented or repeatable process	<b>Standardized</b> Documented manual process	<b>Rationalized</b> Documented and mostly automated	<b>Dynamic</b> Fully automated, end user could perform
<b>Deployment Management</b>	PCs deployed as "one-off", not project	Project managed. Deployment script for technicians	Deployment projects consolidated by locations. Formalized BPI Continuous Improvement	Central deployment management system linked to CMDB and technician dispatch
<b>Staging and Logistics</b>	Multiple legs for warehousing and staging	Central staging <2 week supply chain	Staging only for remote users	JIT ordering - product moves directly from OEM to user
<b>Imaging</b>	No central image standard	Centralized image, may be deleted on arrival	Centralized image with quarterly updates	Cross-platform image Dept overlays Load in factory
<b>Applications</b>	Load from CD or network share	ESD System covers <25% of apps	50-90% Packaged Departmental Apps	90%+ Packaged Integrated entitlement
<b>User State Migration</b>	Files copied manually	In house tool moves data, settings are manual	Off-the-shelf tool move data and settings	Simple enough for end user to run
<b>Day After User Support</b>	No proactive process	Onsite technician answers questions	User FAQ, augmented helpdesk, on call support	Remote issue resolution from command center

Note: Companies typically do not fall exclusively into a single maturity level for all of their deployment activities; instead, they tend to span two or three maturity levels for the various activities.

Source: Dell, 2012

## Costs Associated with PC Deployments

In our analysis of the research, we looked at the data from two different perspectives:

- ☒ Top down — On average, what does it cost a Dynamic company to deploy a PC compared with companies at lower levels of IT optimization?
- ☒ Bottom up — What are the incremental benefits (cost savings) of centralizing and integrating each activity of the deployment process?

In investigating the costs associated with deploying a new PC, IDC focused on three main components:

- ☒ IT Labor — Number of IT FTEs (full-time equivalents) directly involved in deployment activities times the average burdened salary of an FTE
- ☒ Logistics — Costs for the space required for PC staging plus shipping cost
- ☒ Lost Productivity — Number of hours during the deployment when the user cannot use his/her PC because he/she or IT is working on it for deployment activities — loading user state data, loading applications or settings, recovering lost settings, and planned and unplanned downtime (outages) — times the average user burdened salary

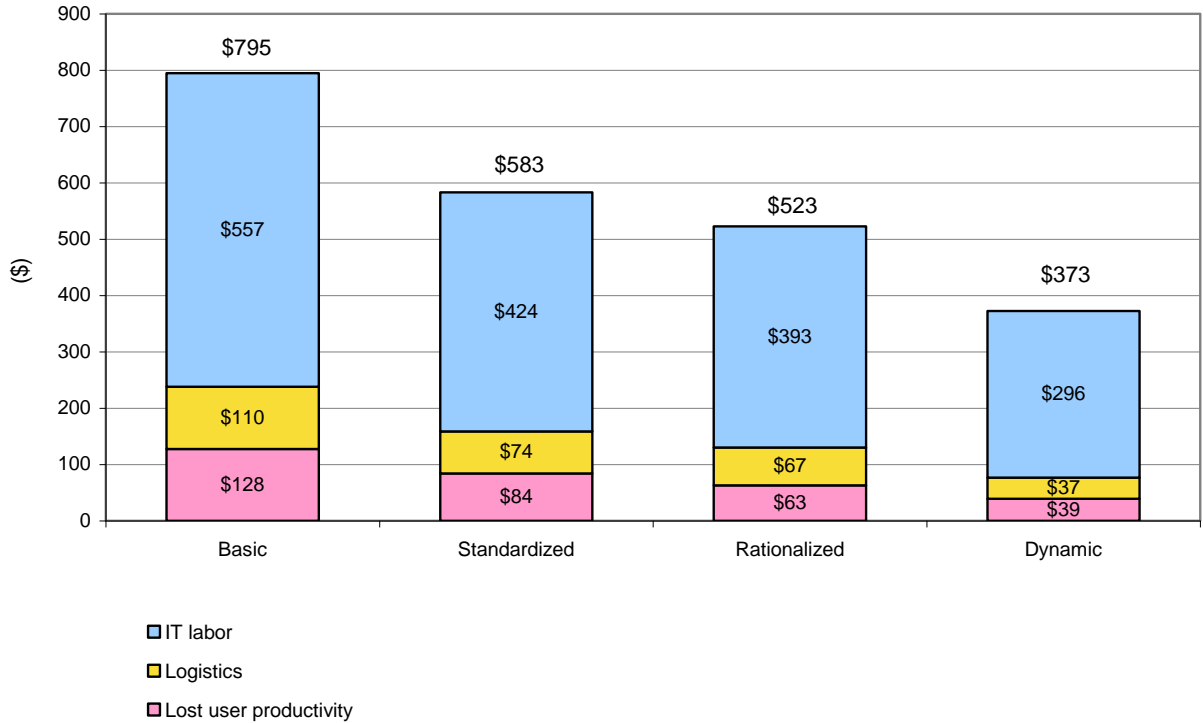
### ***Top Down — Becoming a Dynamic Environment***

IDC's study did not find any companies with practices in each deployment activity that were at the same level of optimization. There were no "pure" *Standardized* companies, for example. Rather, each fell along a continuum of practices. Regardless, IDC was able to categorize all the companies in the study by their practices and place them into an optimization level that tightly corresponded to their best practices and their average deployment costs.

For companies at the Basic level of maturity, with little automation, the total costs associated with deploying a PC were found to be \$795 per PC. This reflects the intuitive finding that as we automate steps of the process, we lower the overall costs and time required for deployment. As companies move to the Standardized level, deployment costs fall to \$583 per PC. Deployment costs fall further at the Rationalized (\$523) and Dynamic (\$373) levels, respectively. Within overall deployment costs, IT labor accounts for a significant majority (see Figure 2).

**FIGURE 2**

**PC Deployment Costs by Company Optimization Level (\$ per PC) with Hybrid or Blended Maturity Factors**



Note: The figures utilized in this graphic are from a "hybrid" or blend of maturity factors within the PC Optimized Deployment model.

Source: IDC, 2012

Further, cost savings are not the only advantage enterprises stand to realize from advanced deployment practices. There also is a reduction in the time required to deploy a new PC. IDC research demonstrated that it takes on average 1.66 hours to deploy a new PC. However, this time requirement shows dramatic differences over the four deployment categories. At the Basic level, it takes 2.9 hours to deploy a new PC. This drops to 1.73 hours at the Standardized level, 1.29 hours at the Rationalized level, and 0.7 hours at the Dynamic level (see Table 1). Moving from Basic to Dynamic can result in a 76% reduction in IT time.

**TABLE 1**

## Time Required to Deploy a PC

PC Deployment Maturity Level	Hours	% Reduction Compared with Basic
Average	1.66	43%
Basic	2.90	NA
Standardized	1.73	40%
Rationalized	1.29	56%
Dynamic	0.70	76%

Source: IDC, 2012

Additionally, IDC investigated regional differences. Table 2 shows the differences in average total deployment costs per PC across the United States, EMEA, and Asia/Pacific (AP). This investigation showed that there were no significant differences. While deployment costs were highest in AP at \$690 per PC, this is not significantly higher than in the United States, where the average cost was \$546 per PC. IT labor costs per PC were highest in AP, which is a factor of much lower deployment numbers (fewer PCs per deployment) combined with less automation.

**TABLE 2**

## Regional Differences in Deployment Costs

	Worldwide	US	EMEA	AP
IT labor	\$436	\$394	\$523	\$575**
Logistics	\$91	\$97	\$70	\$90
Lost user productivity	\$51	\$54	\$66	\$26
Total	\$578	\$546	\$659	\$690

## Notes:

\*Logistics costs represent average mileage shipped per PC times a standard rate; and staging space times a standard rate. Standard rates are not adjusted by region.

\*\*A representative labor rate is used for Asia/Pacific given the variability of labor rates in the region. The research was conducted in Japan and China.

Source: IDC, 2012

As discussed above, IDC research shows that enterprises rarely fall into a single category across all six deployment activity areas, with most showing a variety of maturity levels. For instance, for the activity of user state migration, the largest group of companies fall under the Basic category, although only 13% of companies are categorized as Basic overall (i.e., for all activities). At the other end of the spectrum, while only 10% of companies were categorized as Dynamic overall, 33% were categorized as Dynamic for the activity of image loading, which is somewhat expected considering the maturity of most organizations with this factor. See Table 3 for additional information.

**TABLE 3**

**Company Maturity Distribution by Deployment Activity**

Factor	Basic	Standardized	Rationalized	Dynamic	Total
Deployment management	11%	49%	21%	19%	100%
Staging and logistics	18%	60%	13%	9%	100%
Image loading	9%	33%	25%	33%	100%
Application loading	22%	39%	26%	14%	100%
User state migration	40%	8%	29%	23%	100%
Post-deployment end-user support	9%	32%	32%	27%	100%
Overall distribution	13%	54%	23%	10%	100%

Source: IDC, 2012

***Image Creation, Loading, and Management***

The image loading activity in PC deployment includes some image creation that will occur at the centralized level in a Dynamic organization and in each department in a Basic organization. Although image loading accounts for only 19% of total IT time in deployment on average, it declines rapidly as one tracks the function from Basic to Dynamic (see Table 4), which explains why such a high proportion of organizations realize the value. Dynamic organizations account for 33% in this function, which is by far the largest portion in Dynamic compared with the other activities. The task of centralizing image creation and loading becomes more difficult with the recent growth of applications to include productivity, communications, and social networking applications. Companies may seek help in this task.

**TABLE 4**

## Image Creation, Loading, and Management

	Basic	Standardized	Rationalized	Dynamic
Definitions	Departments delete the standard image when the PC arrives — no central image at all	Scheduled block updates of the image — central image, not cross-platform	Standard, cross-platform image	Central image, cross-platform, <i>and</i> department overlays
Percent of organizations at each level	9%	33%	25%	33%
Percent of total labor costs for deployment	22%	20%	20%	17%
IT labor costs	\$142	\$106	\$85	\$57
IT labor savings from moving up to higher level		\$36	\$21	\$28

Source: IDC, 2012

***Bottom Up — The Value of Optimized Deployment Practices***

Figure 3 shows the IT labor costs associated with each deployment activity at each level of maturity. By using this data in combination with maturity assessments, IT managers can determine which activities represent the best opportunities to reduce the costs associated with PC deployment. A company with Dynamic practices in all deployment activities would spend \$337 less (55%) in IT labor per PC than a company executing each activity at the Basic level.



**FIGURE 3**

Costs to Deploy a PC by Activity from a Pure or Nonblended Mix of Optimized Deployment Factors



Note: The figures utilized in this graphic are from a "pure" or nonblended mix of maturity factors within the PC Optimized Deployment model.

Source: IDC, 2012

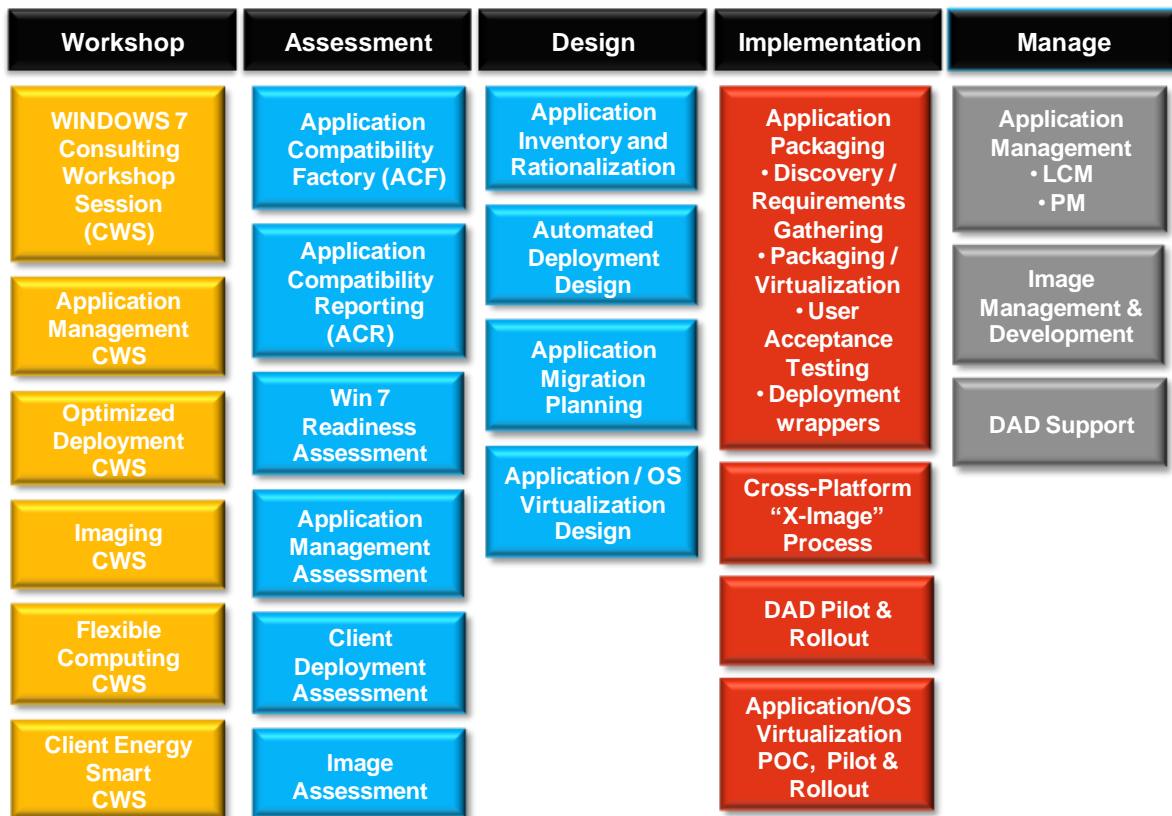
### Dell's Approach to PC Deployments

To help companies realize the benefits of deployment optimization, Dell developed a suite of services spanning the entire deployment life cycle (shown in Figure 4). As a rule, the first step for customers that are not familiar with all aspects of complex deployments or that are interested in best practices of an optimized deployment is to participate in a comprehensive *workshop* covering all key areas of the deployment process. The second step is to conduct a Client Deployment Assessment (CDA) where the primary objective is to map the customer's maturity and calculate the customer's costs for the six key deployment activities with recommendations to achieve hard-dollar ROI savings associated with PC deployment.

Finally, Dell analyzes both the technical and business process challenges associated with migrating to a higher deployment optimization level and the expected cost savings associated with the migration. While a fully Dynamic customer will typically realize the most cost savings, moving to a fully Dynamic level of maturity doesn't always make sense — this is a reflection of the unique challenges and requirements each organization faces. Once these factors are considered, some companies may find that the cost savings from moving to a fully Dynamic model don't justify the difficulty of getting there but may be a prerequisite to capture savings in an associated factor.

**FIGURE 4**

Dell's Framework



Source: Dell, 2012

Once the CDA has been completed, Dell designs an approach that optimizes the customer's deployment strategy relative to the recommended end state for each aspect of the deployment model. This approach could consist of building a single image that meets the customer's needs, preparing applications such that they can be incorporated into optimized processes, and training the IT staff on how to best utilize the new deployment services.

The next phase of the deployment services — implementation — consists of a suite of services that range from loading and customizing the image over the network to loading the image in the factory and customizing it anywhere in the customer's environment using the DAD solution. The final phase of the deployment services — management — consists of a suite of services focused on the day-to-day management of the PC assets in an organization's environment. The complete benefits of this offering are (see Figure 5):

- ☒ **Flexible Logistics.** Direct shipping eliminates the need to stage and configure the PCs at a centralized location, thus accelerating the deployment of the PCs and eliminating costs associated with extra shipping legs.
- ☒ **Minimal User Disruption.** Deploying a new PC often results in some disruption to the end user as the user waits for the new PC to have the image and the application loaded and then needs to spend time migrating personal settings to the new PC. With the Dell solution, this is not the case because the process runs at the speed of the PC's hard drive and is fully automated so that all tasks are completed seamlessly without user intervention.
- ☒ **Minimal Infrastructure.** Because the DAD solution loads the self-contained automated process in the factory rather than a server- and network-based approach, the customer does not have to invest in deploying additional IT infrastructure to deploy PCs.
- ☒ **Highly Scalable.** By using the Dell factory to load the deployment container, the offering is highly scalable, so customers don't need to worry about spikes in PC deployment needs.
- ☒ **Minimal Network Impact.** Loading the deployment container at the Dell factory reduces the impact on the customer's data network, minimizing performance degradation.
- ☒ **Remote and Branch User Support.** Factory loading makes it easier for customers to support both remote and branch users. In addition, automated processes facilitate PC domain join and other key post-OS configuration steps so that the remote user does not need the technical skills to accomplish these tasks.
- ☒ **Support for Last Minute Changes.** Because the deployment container, when activated, has dynamic update capabilities, last minute changes to the image, security updates, applications, or updates to deployment tasks can be incorporated in real time as DAD runs on the new PC.
- ☒ **Real Time Exception Management.** The DAD solution provides customers with the ability to manage exceptions in real time, thus reducing the difficulty in managing these exceptions. Should a PC deployment require attention, the DAD local console allows technicians to remotely connect to the PC and fix the problem or handle exceptions if they occur.
- ☒ **Reporting.** The DAD solution offers robust reporting based on near-real-time logging that occurs both locally to the PC during the deployment and to a DAD local console hosted inside an organization's firewall.

**FIGURE 5**

Dell Offering and Associated Benefits

	Load and Customize Over Network <i>Server-based approach</i>	Load and Customize in Staging Center <i>Staging approach</i>	Load and Customize in Factory <i>Factory integration approach</i>	Load in Factory Customize Anywhere <i>Dell Automated Deployment</i>
Flexible Logistics	✓	✗	✗	✓
Minimal User Disruption	✗	✓	✓	✓
Minimal Infrastructure	✗	✗	✓	✓
Highly Scalable	✗	✗	✓	✓
Minimal Network Impact	✗	✓	✓	✓
Supports Remote Users	✗	✓	✓	✓
Supports Branch Users	✗	✓	✓	✓
Supports Last Minute Changes	✓	✗	✗	✓
Real Time Exception Management	✓	✗	✗	✓

Source: IDC, 2012

**Features of the Dell Automated Deployment Solution**

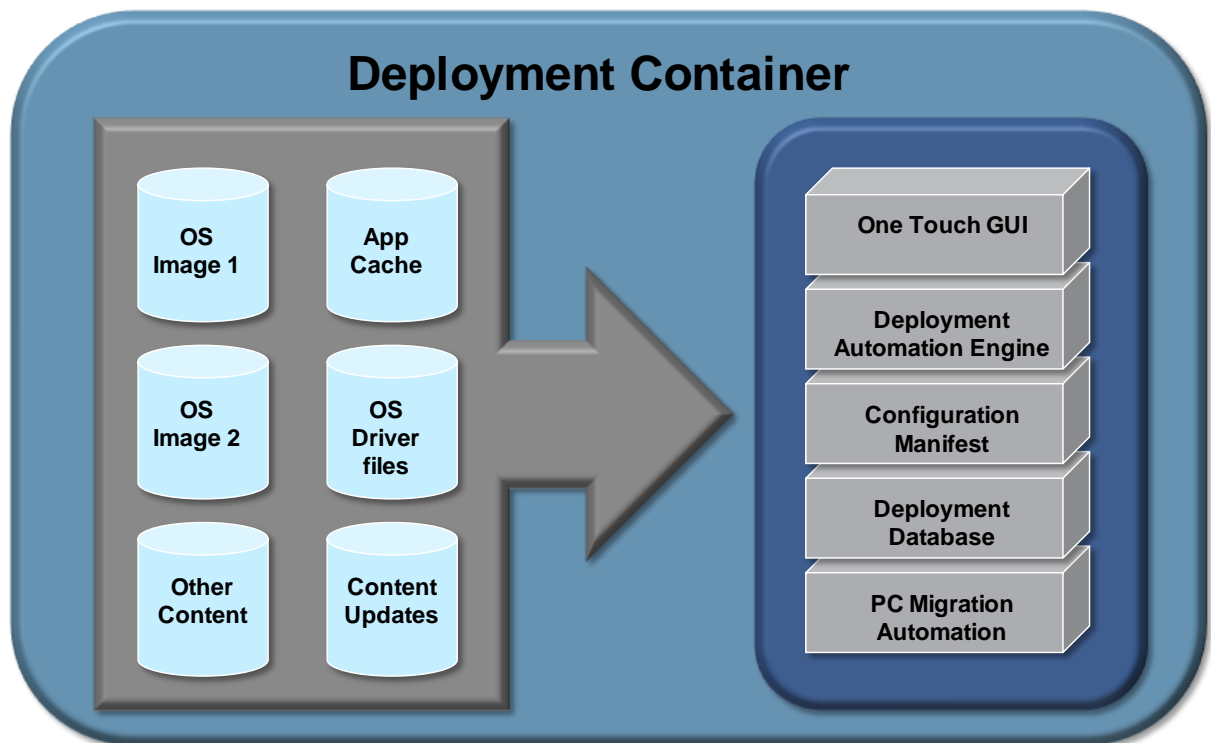
To support these offerings, Dell has developed the Dell Automated Deployment solution to support the deployment process. This turnkey process begins with Dell preloading content onto the new PC at the Dell factory. This storage location on the local hard drive is referred to as the DAD deployment container. The following is a typical description of content stored in the container: an image, OS security patches that are not included within the image, common applications, data migration rules, and the DAD solution set. Once the new PC is shipped to the customer's site, there is an opportunity to dynamically synchronize the newly shipped system to the customer's environment and to bring down updated content to the hard drive. The aim of this two-stage deployment process is to reduce the impact on the customer's network. As Figure 6 shows, Dell Deployment Containers, an integral portion of this process, provide users with five key benefits:

- ☒ **One Touch GUI** allows customers to configure a new PC by selecting the characteristics of the PC from a customizable menu. This means customers can develop drop-down menus for the end user's LOB, location, and operating system or establish defined text entry for fields like username and email address.
- ☒ **Deployment Automation Engine** enables the technician to enter all the information that will be needed over the course of the deployment in one step, start the deployment, and move on to the next PC and minimize wasted time.

- ☒ **Configuration Manifest** provides customers with configuration information, facilitating ongoing PC support.
- ☒ **Deployment Database** contains the information on PCs for a variety of LOBs, locations, and configurations.
- ☒ **PC Migration Automation** enables the technician to automatically migrate the end-user state to the new PC.

**FIGURE 6**

Overview of the Dell Deployment Containers



Source: Dell, 2012

### ***Image Loading Capabilities***

The creation and loading of new images onto PCs is one of the most important aspects of the deployment process, but it's also the part of the process that requires the most flexibility. For example, some organizations want to incorporate more standard application offerings, such as Microsoft Office 2010, into this step, so that newly deployed PCs already have both the latest operating system and the latest version of productivity tools. In addition, some organizations may prefer to store and deploy the images onsite, giving them the flexibility to make changes at a moment's notice.

To accommodate these kinds of needs, Dell recently added two new capabilities to its Optimized Deployment Model: the Microsoft Deployment Toolkit (MDT) and Dell KACE support. The Microsoft Deployment Toolkit allows organizations that have large investments in Microsoft software and tools to leverage those investments. With MDT, organizations can automate and streamline even more portions of the deployment process by leveraging Microsoft tools. In addition, MDT allows the imaging process to be run at the Dell factory before the PC is shipped to a user, saving 30–60 minutes per PC deployment.

Dell's KACE devices are infrastructure appliances that can store and deploy PC images from within a company's datacenter. Dell offers a management console for the KACE appliances that allows IT to easily create, edit, and manage PC images, which can then be deployed whenever the organization needs to add a new employee, upgrade a department, or fit a customized requirement.

## FUTURE OUTLOOK

IDC's research shows that many organizations can improve their PC deployment processes substantially and that these improvements will generate immediate benefits. This is especially timely because the need for deployment services is likely to increase over the next year due to a wave of new PC deployments. The drivers behind this wave are:

- ☒ **Delayed Technology Refresh.** In an effort to minimize spending, many organizations delayed or extended their traditional PC refresh cycle. Now that there are initial signs of an economic recovery, many of these organizations have decided that they will need to selectively begin to refresh technology.
- ☒ **Migration to Windows 7.** Large-scale migrations to Windows 7 have already begun in most organizations, but they are far from complete. This migration, if not handled incorrectly, could cause significant disruption both in IT departments and among end users, not to mention tight IT budgets.

These economic and technology factors will combine over the next year to present organizations with a significant challenge in that they will need to migrate from XP despite remaining under considerable cost pressure and limited personnel resources.

## CHALLENGES/OPPORTUNITIES

Dell faces two challenges with its PC Optimized Deployment Model offering. The first is convincing customers of the value of the offering. The majority of the offering's benefits are cost savings resulting from reduced time demands on IT staff, which customers tend to value less than "hard" cost savings. The fact that the recession has made companies put an increased emphasis on ROI and bottom-line measures of value exacerbates this. However, IDC believes that as economic conditions improve, companies will take a broader view of value when considering the benefits of upgrading technology. This means Dell will need to continue to emphasize the IT resource efficiency benefits of its offering, especially given the lack of IT support available internally due to workforce downsizing. In short, lost IT time may be more significant than more traditional concrete measures of cost.

Dell's second challenge is continuing to meet and exceed customer expectations. With all services offerings, if customer demand dramatically increases, providers face the risk of not being able to deliver to expectations due to a shortage of resources. Dell has positioned itself well to be able to meet this challenge by automating much of the process. This automation should be valuable if Dell can convince a wide range of customers to adopt this offering.

## **CONCLUSION**

In deploying new PCs, organizations face technical challenges as well as significant costs, many which are not readily apparent. By enabling companies to upgrade to Windows 7 or other Microsoft operating systems with less technician time invested and lower costs overall, this Dell solution helps improve the chances of a successful deployment and ensures that companies make the most of their scarce resources while adopting a new operating system.

This Dell solution is predicated on the idea that having a robust deployment strategy — backed by highly automated processes — can help organizations dramatically reduce their deployment costs. This is exemplified by the Dell Automated Deployment process, through which customers can reduce the amount of time required to successfully deploy new PCs and use less skilled labor to conduct the deployment activity. More specifically, the Dell Optimized Deployment can save up to 55% of the costs for deploying PCs. Further, since the process is based on robust, standardized tools, customer deployments are more consistent and are more likely to succeed.

## **METHODOLOGY**

The research provided in this paper is based on interviews conducted in the spring of 2010 with 247 large enterprises (median = 4,500 PCs) from the United States, EMEA, and Asia/Pacific. Companies were asked for information specific to their deployment of PCs. The research was designed to test Dell's IT optimization model for PC deployment to determine if optimized practices lower the cost of deployment.

*Note: All numbers in this document may not be exact due to rounding.*

## APPENDIX

IDC's interviews with 247 companies covered the following PC deployment activities.

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### **Deployment Management**

For deployment management, survey respondents were asked whether sites were managed independently or as a project, whether there were defined processes and procedures for managing deployments, whether deployments were managed as a program with continual process improvements, and whether there was a central deployment system in place that managed assets, users, schedules, technicians, and issues.

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### **Staging and Logistics**

For staging and logistics, survey respondents were asked whether or not they had a centralized staging location, how many times PCs were reshipped from the PC vendor to the user's desk, and whether they used a just-in-time ordering system. In addition, they were asked about the amount of time that IT managers and staff spent on these activities, the space needed for storage, and the shipping charges per PC.

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### **Image Loading**

For image loading, survey respondents were asked whether or not the company had a centralized image, whether departments and business units could delete that image on arrival, whether the centralized image had scheduled block updates, and whether or not the company also offered department overlays. In addition, respondents were asked how many images the company had, where the images were created, and how much time was spent deploying the images.

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### **Application Loading**

The research on this activity asked about applications (other than those included in a centralized image) that were loaded onto the PCs at the time of deployment and the manner in which applications were loaded: via CD, network share, electronic software distribution (ESD) system pushes, or user self-installs. Those using ESD were asked what percentage of applications were deployed. In addition, the research asked IT managers how many applications their organization used and tracked how much time was spent managing application distribution at both the IT management level and the IT worker level.

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### **User State Migration**

For user state migration, survey respondents were asked about the techniques used to move user data and settings to the new PC, from manually copying data and settings, to tool-based data copying and manual settings copying, to tool-based copying of most data and settings, and finally to automated migration of all data and settings. IDC also covered how much time was spent performing these tasks, the amount of data moved per PC, and the amount of time spent by users needing to change settings or move data after the fact.



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## **Post-Deployment Support**

IDC asked about companies' systems for supporting newly deployed PCs, including whether they had a process at all; whether an onsite technician was available for the first day or two; whether additional aids such as FAQs, augmented help desk, or on-call support were available; and, finally, whether remote issue resolution from a command center was available. As with the other sections, the amount of time spent on these activities was also tracked for both IT managers and IT users.

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