

Microsoft Desktop Optimization Pack for Software Assurance

Wipro Product Strategy and Architecture Practice's Analysis of Features, Cost Benefits, and Effects on IT Best Practices that Improve IT Infrastructure Optimization

Authors: Wipro Product Strategy and Architecture Practice

Date: March 2007

Sponsored by Microsoft



Wipro Product Strategy &
Architecture Practice
Boston, Massachusetts

Copyright © Wipro Ltd. 2007. All rights reserved. No portion of this study can be used or reproduced without permission of the authors. For additional reproduction rights and usage information, go to www.wipro.com. Information is based on best available resources. Opinions reflect judgment at the time and are subject to change.

© 2007 Product Strategy & Architecture Practice. All Rights Reserved.

Table of Contents

TABLE OF CONTENTS	2
EXECUTIVE SUMMARY	3
INTRODUCTION.....	4
MICROSOFT’S INFRASTRUCTURE OPTIMIZATION MODEL	5
PC TOTAL COST OF OWNERSHIP (TCO)	7
SOFTWARE ASSURANCE AND MDOP	9
MDOP PRODUCTS AND FEATURES.....	9
Overview	9
Microsoft SoftGrid Application Virtualization.....	10
Microsoft Advanced Group Policy Management.....	11
Microsoft Asset Inventory Service	12
Microsoft Diagnostics and Recovery Toolset.....	13
MDOP COST BENEFIT ANALYSIS	13
Overview of MDOP’s Value.....	13
Assumptions for the MDOP Value Model.....	14
Best Practice: Standard Desktop Strategy.....	14
Best Practice: Single System Management Tool	15
Best Practice: Automated Packaging Tools and Software Distribution.....	17
Best Practice: Centrally Managed PC Settings and Configurations.....	18
Best Practice: Comprehensive PC Security	19
Service Desk Benefits	20
MDOP and Infrastructure Optimization Examples	20
CONCLUSIONS AND RECOMMENDATIONS	21
APPENDIX A: IT PROCESS ASSUMPTIONS	22
NOTES	23

Executive Summary

PCs and their supporting infrastructure represent 30% to 45% of an organization's IT budget, making reducing this cost a high priority for CIOs. One of the most effective ways to reduce the cost of PC ownership is to optimize IT processes that will, in turn, reduce IT labor. Determining the level of IT process optimization is the first step towards reducing IT labor costs. To help companies determine their IT optimization level, Microsoft developed the infrastructure optimization (IO) framework, which is a guide to help organizations improve IT operations and thus reduce IT labor.

The Microsoft IO framework is based on seven IT best practices that were identified in research conducted by IDC in 2006 and sponsored by Microsoft. All seven best practices include activities that are enabled by a variety of different vendor products. Microsoft's Desktop Optimization Pack (MDOP) for Software Assurance is one of the offerings that will support these best practices. MDOP is a suite of tools that reduces the cost to implement and sustain these best practices.

Based on research gathered from 141 organizations, the seven best practices identified by IDC that generate IT cost reduction include:

- Standard Desktop Strategy
- Comprehensive Directory Solution
- Single System Management Tool
- Automated Packaging Tools and Software Distribution
- Centrally Managed PC Settings and Configurations
- Automated User Provisioning
- Comprehensive PC Security

Collectively, these best practices are capable of reducing IT Labor by up to \$830 per PC per year for organizations with a zero adoption rate of these best practices. Few, if any organizations will have none or all of the best practices. Therefore Wipro believes the savings will likely range from \$200 to \$500 per PC per year for the average organization. Implementing best practices requires an investment, which will vary greatly from organization to organization because of different IT infrastructures.

Depending on the best practice and the starting point, the cost for implementing a best practice can range from \$50 to \$500 per PC. These costs include a number of factors such as hardware, software, and IT labor. Wipro estimates that MDOP can reduce the cost of implementing a best practice by \$10 to \$150 per PC.

Once a best practice is implemented, there are on-going costs to support it. MDOP provides tools that reduce these costs by \$5 to \$50 per PC per year depending on the best practice.

MDOP is a product suite of four technologies that include:

- **SoftGrid Application Virtualization:** Microsoft SoftGrid Application Virtualization dynamically delivers applications to PCs reducing application deployment and support costs.
- **Asset Inventory Services:** Microsoft Asset Inventory Services provides intelligence about installed software on an organization's PCs.
- **Diagnostic and Recovery Toolset:** Microsoft Diagnostic and Recovery Toolset reduces the time it takes the service desk to diagnose and repair PCs.
- **Advanced Group Policy Management:** Microsoft Advanced Group Policy Management simplifies the management of Group Policy Objects in an organization.

MDOP provides technologies that are relevant to five of the seven best practices. The graphic below is based on an IDC presentation that shows MDOP's alignment to the best practices.

		Windows Vista	Active Directory	Group Policy Objects	Identity Integration Server	Systems Mgmt Server	Desktop Optimization Pack
PC Configuration & Standardization	Standard Desktop Strategy	●	●	●	●		●
	Centrally Managed PCs	●	●	●	●		●
Identity & Access Management (AD)	Comp. Directory Solution		●		●		
	Auto User Provision		●		●		
PC Security	Comp. PC Security	●	●	●		●	●
Systems Management	Single System Mgmt Tool		●	●		●	●
	Auto Software Dist.		●	●		●	●

Source: IDC 2006

This best practice framework is an excellent tool for building a roadmap for improving infrastructure optimization and reducing the cost of PC management. However, the model does not fully include the value of MDOP. MDOP includes functionality that delivers value beyond the best practices and further reduces costs by \$10 per PC, reduces security risks, and improves the ability to maintain regulatory compliance. These benefits are outside the scope of the IDC research but are covered in this paper.

When making a decision about MDOP, an IT decision maker should perform a Return on Investment (ROI) analysis. In an ROI analysis benefits over time are compared against implementation costs. Each organization will have its own unique ROI metric for MDOP since starting environments and end goals vary greatly from organization to organization.

This paper will assist organizations in building their own business cases for MDOP based on a common model that should be populated with an organization's specific metrics. The five relevant best practices identified by IDC are defined and discussed along with MDOP's capabilities to reduce both implementation and on-going support costs. This paper also describes potential value incremental to the best practices analyzed by IDC, and provides default values for an organization's business case. Finally, the paper covers MDOP's acquisition cost, which is needed to conduct an ROI calculation.

Introduction

Microsoft's Desktop Optimization Pack (MDOP) for Software Assurance is a new product created from technologies brought to Microsoft through acquisitions in 2006. While the individual products that make up MDOP have been available for years, there are very few organizations running the entire product suite. This situation required a different approach to business value modeling because of the limited number of available benchmarks. Like many consulting firms in similar situations, Wipro's Product Strategy and Architecture (PSA) Practice used a standard value model populated with assumptions. Wipro's PSA Practice leveraged the in-house Wipro knowledge and experience in deploying large scale, Microsoft solutions in order to create the model for the business value analysis in this paper.

Wipro's PSA Practice has more than 10 years experience in researching, analyzing, and documenting the business value of technology solutions. From a deep understanding of technology, Wipro PSA has built proven cost benefit analysis capabilities for a range of Microsoft products and has helped numerous organizations successfully execute strategies for deploying Microsoft technology and realizing the

financial benefits of the deployment. Wipro PSA collaborates with the engineering and implementation experts within Wipro Technologies to offer clients the value of hands-on technology experience and business acumen. Wipro Technologies has 40+ 'Centers of Excellence' that create solutions around specific needs of industries. It is the World's first CMMI Level 5 certified software services company and the first outside the USA to receive the IEEE Software Process Award. Wipro Technologies is

- The largest independent R&D Services provider in the world
- Among the top 3 offshore BPO services providers in the world
- The only Indian company to be ranked among the top 10 global outsourcing providers in IAOP's 2006 Global Outsourcing 100 listing

Microsoft's Infrastructure Optimization Model

To help organizations reduce the cost of supporting their IT environment, Microsoft created the Infrastructure Optimization (IO) Model. This model groups organizations into four categories, Basic, Standardized, Rationalized, and Dynamic. These categories are based on organization's IT processes and deployed technology. Basic organizations have the least efficient processes, oldest technology, and are the most expensive to operate. At the other end of the scale are Dynamic organizations that use highly refined processes and cutting-edge technologies. Some of the Dynamic organizations may experience high IT costs because of very complex business processes, but generally, these organizations spend less on IT while providing better service to the business. The IO model is used to help organizations develop a roadmap for improving their Infrastructure Optimization level in order to reduce support costs and improve the quality of IT services.

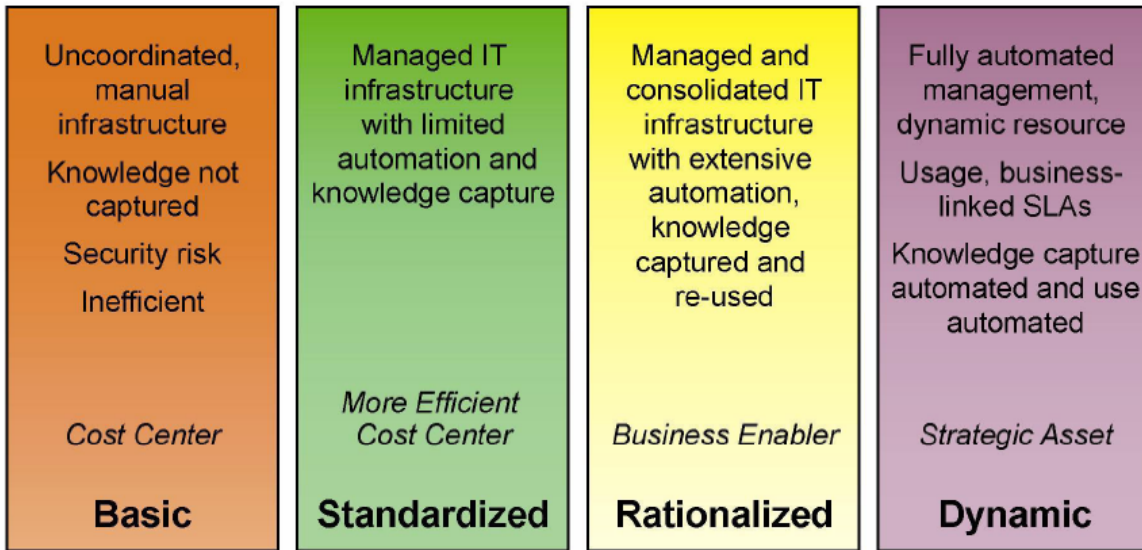
Microsoft has three models for Infrastructure Optimization – each with a different focus.

The three IO models are:

- **Core Infrastructure Optimization Model (Core IO):** The focus is on enabling IT to provide a more secure, well managed, and responsive infrastructure environment, which includes PCs, mobile devices, servers, and applications.
- **Business Productivity Infrastructure Optimization Model (BPIO):** Helps IT decision makers provide appropriate technologies and services to support information availability, visibility, and access in an environment that enables seamless Information Worker collaboration.
- **Application Platform Infrastructure Optimization Model (APIO):** Provides business users a unified data and business intelligence foundation that enables interoperability among internal and external applications and enhances IT capabilities to build, deploy, and manage business supporting applications.

MDOP is best aligned to the Core IO model, and this is the model that is used in this paper. The graphic below provides additional information on the Core IO model by level.

Microsoft's Infrastructure Optimization Model



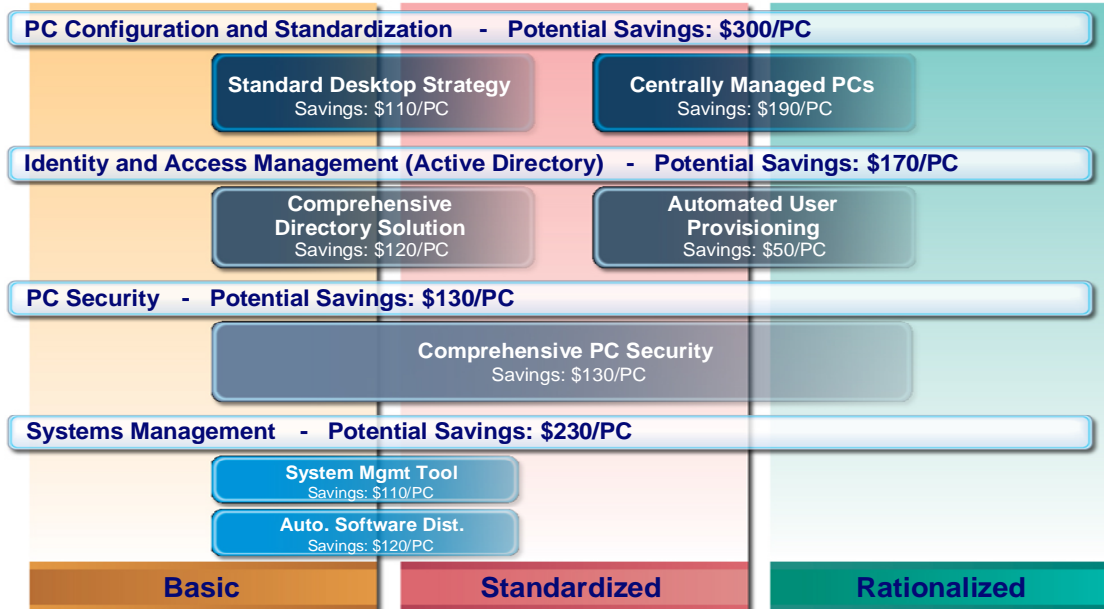
Source: Microsoft, 2006

Microsoft engaged IDC to research Core IO, identify key practices that impact cost and agility, and establish IT labor cost benchmarks for organizations at each of the four levels. IDC also investigated IT process behavior in order to establish trends at the four levels. IT processes that were used consistently at the higher levels in the model were identified as best practices. For PC management IDC identified seven best practices for PC management. The exhibit below summarizes the best practices.

IDC Best Practice	Best Practice Description
Standard Desktop Strategy	Deploying a standardized desktop by minimizing hardware and software configurations.
Centrally Managed PC Settings & Configurations	Keeping deployed PCs standardized by preventing users from making changes that compromise security, reliability of the PC and variability of the application portfolio.
Comprehensive PC Security	Proactively addressing security with antivirus, anti-spyware, patching, and quarantine.
Comprehensive Directory Solution	Requires a single directory for authentication, single sign on capability for all computing resources, and automated password reset.
Automated User Provisioning	Requires single directory or synchronized directories with a meta directory service, and IT processes for automated user provisioning. Users are provisioned (including adds, removes and changes) once in a primary directory and the changes are propagated to all related directories.
Single System Management Tool	Use of a single software tool for managing software inventory, hardware inventory, and automated software distribution.
Automated Software Distribution	The best practice involves packaging software and targeting those packages for different user groups, images, and configurations. It also includes using a standardized process for managing software installation failures.

The best practices also appeared at different levels of infrastructure optimization, and IDC used this fact to model the overall impact of the best practices on the IO model, as shown in the graphic below.

Best Practices by Capability



Source: IDC 2006

The research conducted by IDC also estimated the cost savings associated with each best practice in terms of IT labor per year. In the graphic above, the best practices are the shorter bars under the longer section headers. IDC found that infrastructure optimization was the strongest predictor of IT labor costs with costs ranging from \$230 per PC per year for Rationalized organizations to \$1320 per PC per year for Basic organizations.

PC Total Cost Of Ownership (TCO)

IT labor is one component of a much larger TCO concept. There are many TCO definitions used by analyst firms, consulting firms, and hardware/software vendors, but most of the definitions for the PC are similar. All are made up of direct and indirect components. Direct costs are those that can be budgeted for and are typically hardware, software and IT labor. Indirect costs are areas that cannot be budgeted for and typically occur at the user level. The exhibit below is from Microsoft and shows a typical cost breakdown for a Windows XP PC.










Cost Category	Category includes costs for...	Annual Cost per PC	Percentage Annual TCO
Direct Costs (IT Budget)			
Hardware and Software	PC hardware, operating systems, and applications. Hardware and software costs are amortized over a period of 3 years.	\$1,418	30%
IT Labor	IT labor used to manage desktops either through direct interaction with users and PCs or through management servers.	\$630	15%
Indirect Cost (Unbudgeted costs incurred outside of IT)			
User Labor	Primarily user self-support and time spent learning to use IT systems. Microsoft research shows that a typical user spends between 60 and 120 hours per year in self-support activities.	\$2,357	50%
Downtime	Lost user productivity caused by an IT system failure. Because users can often remain productive without their PC, this metric is discounted by 80 percent.	\$95	5%

Source: Microsoft

Since TCO cost is primarily a function of infrastructure optimization level and best practice adoption rates, the version of the PC operating system makes little difference on the surface. The technology comes into play by providing features or capabilities that make it easier to implement a best practice or sustain it over time. This is true for both the Windows version and MDOP.

Improving Infrastructure Optimization and TCO with MDOP

MDOP is an enabler of the best practices discussed here by providing features and technologies that reduce the cost to implement the best practices and to sustain them over time. The exhibit below shows the alignment of MDOP technologies to the five best practices identified by IDC.

Best Practice	SoftGrid	Advanced Group Policy Management	Asset Inventory Services	Diagnostic & Recovery Toolset
Standard Desktop Strategy				
Single System Management Tool				
Automated Software Distribution				
Centrally Managed PC Settings & Configurations				
Comprehensive PC Security				

Major Impact  Minor Impact 

As mentioned earlier in the paper, Wipro believes that IDC identified many – but not all – of the potential best practices for reducing PC management costs. One that was not explored is a best practice associated with service desk operations.

This is where MDOP's Diagnostic and Recovery toolset will provide the greatest value. Softgrid is also aligned to service desk operations since its ability to virtualize applications eliminates many service calls

resulting from application conflicts. Asset Inventory Services provides detailed asset information that can assist service desk personnel in quickly understanding the environment.

To account for this potential best practice area, Wipro has created an additional value area called “Service Desk.” This is not being designated as a best practice since a best practice would be far more comprehensive than just deploying two technologies. The best practice framework acknowledges that IDC has not defined every possible best practice and has left a buffer in the model for additional value areas like this one.

Value Areas Not Covered in IDC Best Practice Framework				
Value Area	SoftGrid	AGPM	AIS	DaRT
Service Desk				

The next two sections of this paper cover MDOP licensing and the technology capabilities of MDOP in order to provide a foundation for understanding the financial benefits of MDOP, which is covered in detail in the last sections of the paper.

Software Assurance and MDOP

Microsoft Software Assurance is a maintenance offer that helps organizations get the most from Microsoft software through a broad range of benefits. These include deployment planning, staff training, product support, and software upgrades. Software Assurance was designed to increase worker productivity, accelerate organizational performance, and help companies realize a larger return on an investment in Microsoft software.

With Software Assurance, an organization can:

- **Stay current:** Software Assurance benefits help you keep up with the ever-changing IT landscape.
- **Manage costs and operational efficiencies:** You select the benefits that add value to your organization so that you can budget more predictably, manage costs, and improve operational efficiencies.
- **Increase productivity:** With phone support available 24 hours a day, 7 days a week, and Web support available during business hours, your IT staff can quickly address business-critical issues to minimize downtime.

Software assurance provides benefits above and beyond the scope of this paper and should be considered a separate but related business case to the business case discussed in this paper. Depending on an organization's existing licensing strategy there are different ways for acquiring Software Assurance and MDOP.

Software Assurance is available on both Microsoft's Select and Enterprise Agreement licensing programs and costs between \$35 and \$55 per PC, depending on the specific license each organization has with Microsoft. MDOP is an add-on service available to Software Assurance and is available to organizations with select A licensing for \$10 per PC per year. Other licensing agreements are available that may increase or decrease the cost to add MDOP to a Software Assurance subscription.

MDOP Products and Features

Overview

Managing desktops across an enterprise can be incredibly time-consuming and costly. The Microsoft Desktop Optimization Pack for Software Assurance changes all this by transforming the way customers manage enterprise desktop environments. It renders many labor-intensive and complex processes

obsolete. Now, desktop management and support are simple, automated and fast—and very cost-effective.

The Microsoft Desktop Optimization Pack includes four key technologies: Microsoft SoftGrid Application Virtualization, which dynamically streams software as a centrally managed service; Microsoft Asset Inventory Service, which translates software inventory into business intelligence; Microsoft Diagnostics and Recovery Toolset, which are powerful tools to accelerate desktop repair, recovery, and troubleshooting of unbootable Windows machines; and Microsoft Advanced Group Policy Management, which enhances group policy through change management tools.

Microsoft SoftGrid Application Virtualization

Maintaining an often complex PC fleet requires significant labor from IT personnel. IT must install and support multiple applications across a diverse user population and keep the entire fleet up and running. This reality requires IT to conduct extensive compatibility and regression testing to ensure applications do not conflict and crash; thorough testing keeps the user community productive. Also, part of this reality is the fact that IT must support unique user groups across the organization – each requiring a specialized set of applications to conduct key business processes. Meeting the unique application needs of specific user groups, eliminating application conflicts, and updating and securing applications on each of the PCs in the fleet is a challenging task, requiring significant time and effort.

Microsoft SoftGrid Application Virtualization offers a solution that introduces lower costs, greater flexibility, and improved manageability into the corporate PC fleet. Microsoft SoftGrid Application Virtualization enables IT to deliver applications to the individual desktop as virtualized, centrally managed network services that never need to be installed. No longer does IT have to test applications on each corporate desktop. Instead, with Microsoft SoftGrid Application Virtualization, IT can deliver applications to any authorized user on-demand on any licensed PC, without ever visiting the desktop. A separately available version of SoftGrid Application Virtualization runs on Microsoft Terminal Services.

Microsoft SoftGrid Application Virtualization components include:

- Application virtualization
- Dynamic application streaming delivery
- Centralized, policy-based management

Application virtualization: Microsoft SoftGrid Application Virtualization virtualizes all of the key application components and Microsoft Windows Services for each user and for each application instance so that the application can run without local installation on the desktop. Virtualization creates applications that run as network services and can be delivered securely to any PC, whether or not it is currently connected to the network. SoftGrid virtualizes applications—without changing source code—so that applications can execute without installation, conflicts, or changes to the host computer. With Microsoft SoftGrid virtualized applications are available by users, on-demand, anywhere.

Dynamic streaming delivery: Microsoft SoftGrid Application Virtualization enables on-demand streaming of virtualized applications. This means that as users require applications on their individual PCs, the SoftGrid Application Virtualization client requests the code required to instantly start the program from the central server. Rather than “pushing” down and installing entire applications, the first time an application is requested, the client rapidly “pulls” only the code necessary to start the program from a central Server—typically 20–40% of the total code. When the session terminates, application settings and profiles are saved in a non-volatile cache, providing instant access for subsequent use. The cached code enables applications to run locally with full functionality, even without a network connection. Users have full application functionality at their disposal without degradation in response time.

Centralized, policy-based management

Application management tasks for all users—including mobile, branch office, and disconnected users—are easily administered. IT simply sets policies for users, applications, and delivery, and then turns daily management over to the system itself. Active Directory integration reduces application assignment and change management to a few clicks. To terminate the application or the rights, just disable the application in the management console, and it is gone.

Benefits: Microsoft SoftGrid Application Virtualization transforms desktop administration from a complex series of time-consuming steps that consume resources, into a simpler, automated process for deploying, patching, updating, and terminating applications, which requires minimal resources. With Microsoft SoftGrid Application Virtualization, IT can rapidly deliver applications to a broad user community without the labor of installing and testing. This minimizes application conflicts, multi-platform packaging, and regression testing, accelerates application management, and reduces helpdesk support volume and call time. In addition, authorized users can instantly access their applications on any machine, adding new flexibility into the organization. The end result is a PC fleet that is much more cost-effective to maintain.

Microsoft Advanced Group Policy Management

Windows Group Policy is a key feature of Microsoft's Active Directory infrastructure management toolset allowing IT administrators to manage desktop security settings IT Policies and control software deployment to enterprise desktops. Group Policy Management Console (GPMC) provides IT administrator with an automated approach to define and deploy Group Policy Objects throughout the enterprise.

Microsoft Advanced Group Policy Management extends the benefits of Group Policy, producing greater desktop availability and less downtime from conflicting or improperly configured GPOs. Microsoft Advanced Group Policy Management provides IT Administrators with a Group Policy management environment to develop, review and modify Group Policy Objects without the risk of adversely affecting the production enterprise desktop environment.

Major components of Microsoft Advanced Group Policy Management include:

- Group Policy change control
- Offline editing
- Role-based delegation

Group Policy Change Control: Modifying production data objects in a production environment requires careful planning and execution and is never free of risk. Microsoft Advanced Group Policy Management provides a secure archive and a means for controlling changes to GPOs. To change a GPO, an administrator "checks out" the GPO from the vault. When changes are complete, the GPO is "checked in" to the vault. Differences between archived versions and live versions are reviewed using Group Policy Management Console (GPMC)-style reports. When a GPO is ready for deployment, it can be transferred to the live environment. At any time, one or more live GPOs can be "rolled back" to an archived version.

This change control environment provides IT Administrators with many of the same 'code' controls used by application developers to control and increase the quality of the numerous objects required in complex IT applications.

Offline editing: Group Policy is the centerpiece of security and configuration management on Active Directory networks and, as such, configuration changes can affect a large number of computers. Offline editing enables IT to configure and test changes without impacting live operations and to deploy those changes with the knowledge that they can be quickly reverted if there are unexpected consequences.

Role-based delegation: With Group Policy Objects playing such an important role in enterprise desktop management, the ability to delegate granular levels of administrative responsibility for Group Policy Objects ensures that desktop policies are defined and deployed properly. Microsoft Advanced Group Policy Management provides an optional workflow process that includes functional delegation such as implement editor, approver, and reviewer as well as domain and individual Group Policy Object delegation before deployment to a live environment. At the same time, it preserves the granular delegation inherent in native Group Policy.

Microsoft Advanced Group Policy Management functions and features are integrated into the existing Group Policy Management Console; therefore additional consoles or applications are not necessary for IT Administrators to use the Group Policy management tool.

Benefits: Microsoft Advanced Group Policy Management eliminates the need to create and manage Group Policy Objects in a production environment by providing an off-line edit and store toolset. The offline capability and the role-based administration delegation accelerate overall Group Policy Object management tasks, improve quality of desktop standards definition and adherence to IT defined policies, and reduce the risk of desktop problems due to poorly defined Group Policy Objects.

Microsoft Asset Inventory Service

Enterprise PC software environments are complex, in a constant state of change, and often times manipulated by users without the knowledge or consent of IT. Microsoft Asset Inventory Service provides IT Administrators with an intelligent and comprehensive view of the enterprise desktop software environment. It helps reduce total cost of ownership of your application management lifecycle through advanced software inventory scanning and by translating inventory data into useful, actionable information.

Microsoft Asset Inventory Service includes components that will enable IT Administrators to perform:

- Advanced inventory scanning
- Comprehensive asset inventory reporting and analysis
- Enterprise-wide software license management

Advanced inventory scanning: Software asset data is collected in a single “pulse” that takes just seconds per system—and is transparent to end users—via the AssetAgent residing on each enterprise PC; the asset data is then sent to a central asset inventory repository maintained by Microsoft. The AssetAgent is a light-weight process that performs data collection activities in response to requests, AssetPulses, from the central repository. Only software asset data is collected. It identifies all installed software by name, ISV, family, and category, and scans systems for software through Add/Remove Programs, .EXEs, chases referral links, PIDs, MSI history, and much more. All information exchange between the central repository and the PC, AssetPulse & asset inventory data, is sent via encrypted email attachments eliminating the need for direct internet connectivity and firewall port allocations

Comprehensive asset inventory reporting and analysis: All software inventory data is housed in a central data repository that is managed by Microsoft. All data in the repository is encrypted. The repository data center is a ‘Class A’ data warehouse using advanced methodologies and technologies to ensure data integrity, including an Iris Scanners biometric identification system for those needing physical access to the data warehouse. Enterprise IT Administrator access is via SSL-encrypted Active Server Pages (ASP) provided by VeriSign. Inventory reporting and analysis leverages the Microsoft Asset Inventory Service Application Knowledgebase, containing information on more than 430,000 software titles, to provide IT Administrators with meaningful application information for understanding quantities, versions and releases of software present on enterprise PCs. This information can be transformed into actionable, browser-based reports that can be securely viewed online, anytime. Reports can be from an organization-wide perspective or at an individual workstations/users level.

Software license management: Microsoft Asset Inventory Service also includes the ability to compare an enterprise’s current software inventory with data from volume license agreements and purchase orders specifying actual licenses purchased. Existing license data can be imported and incorporated into a variety of reports allowing IT Administrators to review compliance with existing contracts, ensure volume license agreements have been correctly deployed, and analyze true-ups, renewals, and license reallocation.

Benefits: Microsoft Asset Inventory Service provides IT Administrators with a thorough view of enterprise software inventory and an automated means to compile enterprise software asset information that can be updated continuously or on an as needed basis. Asset analysis reconciles enterprise data with the Microsoft Asset Inventory Service Application Knowledgebase to provide IT Administrators an in-depth understanding of their software inventory. As a service that can be enabled in just a few hours, inventory data is securely hosted by Microsoft, so there are no servers for IT to maintain.

Accurate software asset knowledge empowers IT Administrators to ensure enterprise software license compliance, maintain user productivity by eliminating disallowed or unapproved software on the PC, and more accurately forecast future software asset license requirements.

Microsoft Diagnostics and Recovery Toolset

Because of the intensive requirements to keep users up and running, IT needs powerful tools to diagnose and repair desktop problems as they occur. The Microsoft Diagnostics and Recovery Toolset is a set of intuitive tools that help administrators recover PCs that have become unusable and easily identify root causes of system and network issues, enabling IT to be responsive and effective when troubleshooting and fixing desktop problems. The collection contains tools for administration, network, and system diagnosis and recovery. The capabilities are accessed through a common environment – the ERD Commander.

The administration tools are:

- Service & Driver Manager – access the services and drivers of the unbootable system
- Regedit – access the registry of an unbootable system.
- Event Log – access the down systems event viewer for aid in diagnosing OS issues.
- System Info – gain comprehensive driver, file, and OS version information of the down system.
- Disk Management – access the down systems disk management tools to manipulate partitions and drive mounts
- Search – search the down system for files
- Computer Management – utilize the computer management tools of the down system

The network tools are:

- File Sharing – enable sharing to transfer files needed for PC recovery via the network
- Map Network Drive – map a network drive to another PC to gain access to files.

The system tools are:

- Locksmith – change or reset the administrator password on a machine
- FileRestore - restore lost or deleted files
- Hotfix Uninstall – remove hot-fixes
- Crash Analyzer Wizard – pinpoint the likely cause of a Windows crash for quick resolution
- Disk Commander – recover deleted or damaged data
- Disk Wipe – wipe all data off of hard drive

Benefits: With the capabilities in the Microsoft Diagnostics and Recovery Toolset, IT can minimize the recovery timeframe needed to troubleshoot and repair desktop problems. This accelerated responsiveness translates into greater user uptime thus keeping the business responsive and productive. Instead of gathering and learning multiple, different tools to fix common PC problems, IT gets the benefits of a unified toolset that covers a diverse set of issues and simplifies recovery process. By using the toolset, IT managers can ensure they will recover failed systems whenever the need arises, and end-users will realize faster, more accurate resolutions with minimal downtime.

MDOP Cost Benefit Analysis

Overview of MDOP's Value

Organizations will receive value from MDOP by using it to reduce the cost to implement the best practices discussed here, by using it to reduce the cost of sustaining these best practices, and through other value areas that Wipro has identified.

Since the value MDOP brings to an organization is directly related to the current infrastructure in place, infrastructure optimization level, and desired best practices, there is no single value proposition that will fit every organization. Recognizing this, Wipro has chosen to walk the reader through one scenario to show demonstrate a repeatable technique for estimating the value of MDOP in all organizations. The reader should use this approach in building his own MDOP value proposition and replace the assumptions in this paper with data from his own organization.

Assumptions for the MDOP Value Model

This section provides the assumptions used to generate the metrics used in the models in the remainder of this paper. These assumptions will likely match few organizations and the reader should replace assumptions with data from his own organization. Wipro used the following assumption in the cost model.

Assumptions	
• 2,500 PCs	• Infrastructure Optimization Level is Basic
• 20% PCs are notebooks	• Organization is in the United States
• 3-year hardware refresh cycle	• IT Fully burdened labor rate is \$53/hour
• 2 desktop, 3 notebook hardware configurations	• All users have administrative rights
• 10 Operating System images	• Enterprise Agreement with Software Assurance
• 90% of PC use Windows XP SP2	• Active Directory is deployed to 100% of PCs
• No Systems Management Software in use	• Group Policies are not widely used

Approach to improving Infrastructure Optimization

- The organization plans to implement all five best practices related to MDOP as a single project.
- There is no cost for implementing Active Directory in the model
- The cost of the Systems Management Server (SMS) implementation is distributed across all five best practices equally
- The cost to implement Group Policies is entirely allocated to the *Centrally Managed PC Settings and Configurations* best practice.
- The organization adopts the best practices in the following order:
 - § Standard Desktop Strategy
 - § Systems Management Tool
 - § Automated Software Distribution
 - § Centrally Managed PC Settings and Configurations
 - § Comprehensive PC Security
- For this study Wipro used IT labor and service desk data from previous Wipro studies to estimate implementation and sustain costs for each of the best practices.

Appendix A provides additional assumptions about the tasks that must be completed in order to implement and sustain the best practices.

The following sections will evaluate each of the five best practices and the additional service desk value beyond the IDC model using these assumptions.

Best Practice: Standard Desktop Strategy

This best practice involves deploying a standardized desktop by utilizing a regular hardware refresh cycle, standardizing PC procurement processes to minimize the number of hardware configurations, and maximizing the use of a thin image strategy where the PC image contains the OS and only those configuration settings and applications that are common to all deployed PCs. Domain specific configuration settings and user specific applications are deployed thru automated processes such as Active Directory, Group Policies, and SMS. A complete definition of the best practice comes from the IDC White Paper sponsored by Microsoft, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Managing the Windows Desktop."¹

To implement this best practice and carry out these common requirements, Wipro estimates that organizations will spend between \$100 to \$500 per PC using a non-MDOP solution. For the hypothetical

organization modeled, the cost is \$300 per PC. IDC found the IT labor savings benefit of this best practice is \$110 per PC year.

Using MDOP to Achieve a Standard Desktop Strategy

Companies that use MDOP will reduce the cost of both implementing and supporting the best practice. SoftGrid Application Virtualization and Advanced Group Policy Management are the MDOP components aligned to the Standard Desktop Strategy best practice.

Best Practice	SoftGrid	Advanced Group Policy Management	Asset Inventory Services	Diagnostic & Recovery Toolset
Standard Desktop Strategy				

Advanced Group Policy Management will allow IT staff to more easily define, deploy, and manage the Group Policy Objects (GPOs) required to configure a new PC once deployed. This is a critical part of a “thin image” strategy where a common image is deployed to all PCs and then customized with policies and automated software distribution. Without AGPM, GPOs are often difficult to configure and manage. SoftGrid Application Virtualization further reduces costs by providing a more efficient method of deploying applications to the new PCs. Instead of installing each application individually, the SoftGrid Application Virtualization client is installed on the PC, and the software application code is cached on the client. The user then runs the applications through the client software. This process is more efficient since it reduces the time spent to package applications, test the applications, and troubleshoot conflicts.

Standard Desktop Strategy	Per PC \$		
	Without MDOP	Using MDOP	Benefit from MDOP
Implementation Cost	\$300	\$235	\$65 one time benefit
Sustain Savings per year	\$110	\$115	\$5 yearly benefit

Using MDOP for implementing a *Standard Desktop Strategy* best practice will reduce the overall cost to implement in the range of \$25 to \$185 per PC. For the hypothetical organization the cost reduction was \$65 per PC, resulting in a final cost to implementing the best practice using MDOP at \$235 per PC.

These savings result from:

- Simpler management of GPOs
- Reduced effort to package and deploy applications
- Reduced service desk costs from fewer application conflicts and corrupted registry entries

Once the best practice is deployed, Wipro believes that MDOP will reduce the cost to support the best practice by \$5 to \$10 per PC per year. The hypothetical organization realized an annual savings of \$5 per PC per year. This extends the \$110 savings in IT labor per year from the IDC's finding to \$115 per PC per year. The support savings come from:

- OS images are less complex and expensive to support
- GPOs are easier to maintain
- Reduced service desk costs from fewer application conflicts and corrupted registry entries

Best Practice: Single System Management Tool

The value from this best practice comes from systems management tool strategy that eliminates the duplication of IT tasks, improves integration, and provides an architecture that can quickly and inexpensively be extended to add new functionality. IDC defines this best practice as a single systems management tool and provides additional details in its Microsoft sponsored White Paper titled “Optimizing

Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Systems Management Server,"².

Wipro estimates that the cost to implement this best practice is in the range of \$35 to \$145 per PC. Organizations that have many legacy systems management tools and have to consolidate them will spend the most to achieve this best practice. For the hypothetical organization with no existing systems management tools Wipro estimates deployment costs to be \$65 per PC. According to IDC, the value of the Single System Management Tool best practice is \$110 in IT labor savings per PC per year.

Using MDOP to Deploy and Sustain Single Systems Management Tool Best Practice

MDOP components will help companies reduce both implementation and operational costs of the *Single System Management Tool* best practice. The graphic below shows the MDOP components that impact this best practice.

Best Practice	SoftGrid	Advanced Group Policy Management	Asset Inventory Services	Diagnostic & Recovery Toolset
Single System Management Tool				

SoftGrid Application Virtualization and Asset Inventory Services will reduce the complexity of implementing a new Microsoft Systems Management Server (SMS) 2003 infrastructure and therefore reduce costs. By using SoftGrid to virtualize applications organizations will spend less time implementing a packaging and have a regimented testing process for new applications. Asset Inventory Services can seamlessly extend SMS 2003 to provide additional information about the applications already being inventoried by SMS. Providing this capability without Asset Inventory Services would have required integrating a non-native product into the new infrastructure.

Single System Management Tool	Per PC \$		
	Without MDOP	Using MDOP	Benefit from MDOP
Implementation Cost	\$65	\$50	\$15 one time benefit
Sustain Savings per year	\$110	\$120	\$10 yearly benefit

Wipro estimates that MDOP will reduce the cost to implement the *Single System Management Tool* best practice by \$10 to \$70 per PC in most organizations. The cost for the hypothetical organization with no existing infrastructure is reduced by \$15 per PC. These savings result from:

- 3rd Party Application Packaging Tools are not required
- The role of testing in the automated software distribution is significantly reduced

Once implemented, MDOP keeps things simple and reduces on-going costs. Additional operational savings is estimated at \$5 to \$15 per PC per year. For the hypothetical organization the benefit was \$10 per PC per year. The additional operational sustaining benefits are due to:

- 90% reduction in the time to package applications for deployment
- More efficient access to application information from the SMS software inventory database
- Fewer service desk incidents due to fewer application problems on individual PCs

Best Practice: Automated Packaging Tools and Software Distribution

IDC's Automated Packaging Tools and Software Distribution best practice provides guidance to organizations on IT processes that improve the effectiveness of automated software distribution. Areas covered include packaging, hardware inventories, software inventories, testing and well defined processes for installation failures. Additional details can be found in the Microsoft sponsored IDC White Paper, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Systems Management Server,"³

Wipro estimates the cost to implement this best practice is in the range of \$40 to \$170 per PC. The hypothetical organization's implementation cost is \$50 per PC. IDC has valued this best practice at \$120 in IT labor savings per PC per year.

Using MDOP to Deploy and Sustain the Automated Packaging Tools and Software Distribution Process Best Practice

Application packaging and testing is significant cost of this best practice. When implementing the best practice the organization must purchase packaging tools, build processes around the tools and train personnel. With SoftGrid Application Virtualization much of this is no longer necessary, and costs go down.

Best Practice	SoftGrid	Advanced Group Policy Management	Asset Inventory Services	Diagnostic Recovery Toolset
Automated Software Distribution				

Wipro estimates that the cost of implementing this best practice at the average organization will be between \$15 and \$110 per PC. For the hypothetical organization, the cost is \$50 per PC without MDOP.

Automated Software Distribution	Per PC \$		
	Without MDOP	Using MDOP	Benefit from MDOP
Implementation Cost	\$50	\$20	\$30 one time benefit
Sustain Savings per year	\$120	\$155	\$35 yearly benefit

Wipro estimates that by using the SoftGrid Application Virtualization technologies, the cost of implementing this best practice in the hypothetical organization will be reduced from \$50 per PC to \$20 per PC, as savings of \$30 per PC. The savings result from:

- Eliminate the need for 3rd Party application packaging tools
- Reduced effort required for building an application packaging process
- Reduce training costs for IT personnel

Once this best practice is in place the cost to sustain it with MDOP will decrease by \$35 per PC per year for the following reasons:

- 90% of application packaging costs are eliminated
- Fewer application deployment failures reduces stress on the service desk


Best Practice: Centrally Managed PC Settings and Configurations

IDC's Standardized Desktop Strategy will help organizations deploy a standard desktop. Centrally Managed PC Settings and Configuration will ensure that once a standardized desktop is deployed it stays standardized. This is done by controlling the types of settings users can change and the types of software that can be installed. A complete definition comes from IDC's White Paper, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Managing the Windows Desktop,"⁴ sponsored by Microsoft.

To implement this best practice Wipro estimates that organizations will spend between \$70 and \$350 per PC. The hypothetical organization's implementation costs are \$165 per PC. IDC values this best practice at \$190 of IT labor cost savings per PC per year.

Using MDOP to Achieve Centrally Managed PC Settings and Configuration

This best practice is dependent on Group Policy Objects (GPOs) and Automated Software Distribution. GPOs are used to configure the PCs and automated software distribution is a requirement if a user's is no longer able to install software at will. Advanced Group Policy Management and SoftGrid Application Virtualization play a significant role in reducing both the cost to implement and sustain this best practice.

Best Practice	SoftGrid	Advanced Group Policy Management	Asset Inventory Services	Diagnostic Recovery Toolset
Centrally Managed PC Settings & Configurations				

Microsoft GPOs are very difficult to implement and sustain without supporting tools. Prior to MDOP organizations were forced to purchase tools from 3rd parties to manage GPOs in a large organization. While Microsoft Systems Management Server (SMS) provided all the functionality needed for this best practice, SoftGrid Application Virtualization reduced the cost to both implement and operate SMS.

Centrally Managed PC Settings & Configurations	Per PC \$		
	Without MDOP	Using MDOP	Benefit from MDOP
Implementation Cost	\$165	\$100	\$65 one time benefit
Sustain Savings per year	\$190	\$225	\$35 yearly benefit

Wipro estimates that by using these MDOP components, the cost to implement *Centrally Managed PC Settings & Configurations* best practice will be reduced by \$20 to \$180 per PC. The hypothetical organization in the model was able to reduce its implementation cost by \$65 per PC, thus lowering the cost to \$100 per PC. These implementation savings result from:

- Lower cost to deploy a complicated GPO solution
- Reduced costs to create a push/pull automated software distribution system

Once the best practice is implemented, MDOP will reduce the cost of supporting it by \$35 per PC per year. MDOP accomplishes this by:

- Reducing the cost of GPO management
- Reducing the cost of automated software distribution
- Reducing service desk costs resulting from failed installations and application conflicts

Best Practice: Comprehensive PC Security

This best practice involves proactively addressing security issues with anti-virus, anti-spyware, patching, PC firewalls and quarantine technology. A complete definition of the best practice comes from IDC's White Paper, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Managing the Windows Desktop,"⁵ sponsored by Microsoft.

Wipro estimates that implementing this best practice will cost an organization between \$50 and \$290 per PC. The hypothetical organization's implementation cost is \$165 per PC. IDC values this best practice at \$130 of IT labor savings per PC per year.

Using MDOP to Implement and Sustain Comprehensive PC Security Best Practice

Many of the technologies involved in this best practice require configuration with GPOs. MDOP's Advanced Group Policy Management tool simplifies the administration of GPOs. This best practice also requires automated patching of the operating system and applications. When applications are virtualized, they get patched once centrally and then are available to the all users. MDOP reduces the cost to both implement and operate this best practice.

Best Practice	SoftGrid	Advanced Group Policy Management	Asset Inventory Services	Diagnostic & Recovery Toolset
Comprehensive PC Security				

PC firewalls, anti-spyware, and PC quarantine are all managed with Microsoft GPOs. GPOs are difficult to implement and manage without tools such as Advanced Group Policy Management. While not as critical as operating system patching, application patching is still necessary and is simplified through application virtualization.

Comprehensive PC Security	Per PC \$		
	Without MDOP	Using MDOP	Benefit from MDOP
Implementation Cost	\$165	\$140	\$25 one time benefit
Sustain Savings per year	\$130	\$150	\$20 yearly benefit

Wipro estimates that by using MDOP the cost to implement this best practiced will be reduced by \$15 to \$95 per PC. The savings in the hypothetical organization was \$25 per PC. These implementation savings result from:

- Reduced cost to implement GPOs
- Significant reduction in the cost to implement an application patching solution

Once implemented, the cost to sustain the security best practice is also reduced by \$20 per PC in the hypothetical organization. The savings are due to:

- Reduced costs of maintaining GPOs
- Reduced cost of patching applications
- Fewer service desk calls from failed application patches




Additional Benefits

Asset Inventory Services provides additional value above and beyond the best practice identified by IDC because it extends System Management Server's ability to manage the PC application portfolio by providing specific information on applications that are gathered by software inventories. This allows IT

personnel to quickly identify software applications that are threats and to take appropriate action. This reduces organizational risk and helps IT proactively deal with a problem before it becomes expensive to fix.

Service Desk Benefits

The best practice framework discussed here is an excellent tool for optimizing infrastructure and reducing costs. But the framework used by IDC did not provide a finding potential related to service desk labor savings. Wipro believes that MDOP provides additional value not captured in the existing IDC study data.

Value Areas Not Covered in IDC Best Practice Framework				
Value Area	SoftGrid	AGPM	AIS	DaRT
Service Desk				

SoftGrid Application Virtualization eliminates the need for applications to write to the Windows registry and virtually eliminates application conflicts. This will reduce the number of calls to the service desk and reduce troubleshooting times.

Microsoft Asset Inventory Services provides detailed information about applications. This information can be used by the service desk to more quickly diagnose problems thus reducing costs.

The Microsoft Diagnostic and Recovery Toolkit provides tools that quickly isolate the root cause of application and OS failures. This will reduce the amount of time required by the service desk to resolve issues.

Based on experience providing global help desk support and research into studies conducted on help desk activities, Wipro estimates that the average help desk cost per user is \$150. Approximately 20% of the help desk time and effort is spent on OS-related calls. Wipro estimates that MDOP will be valuable in just over 50% of OS-related help desk calls – making problems easier to resolve. Wipro estimates that the resolution time will decrease by approximately 50%. This translates into a \$10 savings per PC per year.

MDOP and Infrastructure Optimization Examples

The examples covered in the previous section were for an organization that is “Basic” and is moving to “Rationalized” by implementing all of the best practices found by IDC. This is one scenario, but there are many others. Wipro developed two ROI analysis examples to illustrate the types of financial benefits MDOP provides IT. The first example estimates the potential ROI when moving from Basic to Standardized. The second example illustrates moving from Standardized to Rationalized.

Scenario 1: Basic to Standardized

In this example we assume that three best practices are implemented: Standard Desktop Strategy, Single System Management Tool, and Automated Packaging Tools and Software Distribution. By implementing these three best practices a typical IT environment will move from the Basic maturity level to the Standardized maturity. As described above, MDOP tools will reduce best practice implementation costs and reduce ongoing operational costs to sustain these best practices. Using the figures cited above Wipro estimates that this investment will produce an ROI of 213%.

Scenario 2: Standardized to Rationalized

In Example 2 we assume that two best practices are implemented to move an IT environment from the Standardized level to the Rationalized maturity level: Centrally Managed PC Settings & Configurations and Comprehensive PC Security. By implementing these best practices using MDOP tools, Wipro estimates companies will realize an ROI of 226%.

The table below summarizes the costs and benefits for each of the examples.

ROI Analysis using MDOP		Basic to Standardized \$/PC	Standardized to Rationalized \$/PC
Benefits	BP Implementation savings	\$120	\$70
	Lower sustain costs (3 years)	\$225	\$240
	Total 3 year Benefits	\$345	\$310
Costs	License (3 years)	\$(30)	\$(30)
	MDOP deployment	\$(80)	\$(65)
	Total 3 year Costs	\$(110)	\$(95)
3 Year Net Benefit per PC		\$235	\$215
ROI		213%	226%

Conclusions and Recommendations

Wipro recommends that organizations implement IDC's best practices to manage their PCs. Organizations will significantly reduce IT labor costs and the quality of service to the business will improve. If all of IDC's best practices are implemented, the potential cost savings is \$830 per PC per year. But implementing these best practices does require an investment.

Microsoft's Desktop Optimization Pack (MDOP) will reduce the cost to implement many of the best practices by tens to hundreds of dollars per PC. The actual cost will depend on the current environment and desired best practices. Once implemented, MDOP also extends or makes many of the best practices cited by IDC more efficient, resulting in additional savings. MDOP will also improve service desk operations. IDC has not published a best practice for the service desk.

MDOP is inexpensive to license if an organization already has Software Assurance. The additional cost is \$10 per PC per year. Organizations that do not have Software Assurance will need to subscribe to it as well, and the costs for SA range from \$35 to \$55 per PC per year.

The best practice ROI will vary significantly from organization to organization, but if the organization plans to implement even a few of the best practices found by IDC, Wipro believes that MDOP will significantly improve the ROI on the project. The more best practices involved, the greater the ROI.

The average MDOP savings from a population of organizations is not a useful metrics since each organization is unique and the benefits and ROI will vary significantly from organization to organization. For this reason Wipro modeled a single scenario, out of a pool of potentially hundreds of scenarios.

Organizations that want to estimate the value MDOP should determine which best practices they already have, determine which ones they want, and then use the techniques in this paper to estimate the ROI of an MDOP investment.

Appendix A: IT Process Assumptions

Assumptions for Best Practice Implementation Cost Calculations	
Best Practice	Implementation Activities/Costs Assumptions
Standard Desktop Strategy	<ul style="list-style-type: none"> • Develop desktop standards • Consolidate/reduce software versions & vendors • Perform OS upgrades where necessary • Perform PC hardware upgrades where necessary
Single System Management Tool	<ul style="list-style-type: none"> • Consolidate/standardize systems management tools and processes by implementing SMS • Develop/deploy administrative delegation capabilities
Automated Software Distribution	<ul style="list-style-type: none"> • Review SMS configuration for support of packaging and distribution tools • Install and configure software packaging and distribution tools • Review network bandwidth requirements
Centrally Managed PC Settings & Configurations	<ul style="list-style-type: none"> • Develop GPO design, deploy and manage processes to enable centralized PC configuration control • Implement Windows Software Restriction Policies (GPOs), including ability to de-install software • Upgrade/modify application to enable executing with Standard User rights • Implement software inventory reporting capability for auditing • Anticipate temporary increase in help desk service requests due to implementing Standard User rights • Address potential cultural/agility issues related to loss of administration rights (e.g. on-demand self-installed applications)
Comprehensive PC Security	<ul style="list-style-type: none"> • Review current PC security software & subscriptions for currency and coverage • Review current NAC infrastructure • Insure automated system/application patch distribution is in place
Assumptions for Best Practice On-going Support Calculations	
Best Practice	Sustain Activities/Costs Assumptions
Standard Desktop Strategy	<ul style="list-style-type: none"> • Insure PC procurement process and hardware refresh strategy are synchronized with standards • Maintain a minimal number of images • Maintain a single version of Windows OS
Single System Management Tool	<ul style="list-style-type: none"> • Maintain organization-wide standards • Minimize duplicative functionality between tools • Use administrative delegation for systems management
Automated Software Distribution	<ul style="list-style-type: none"> • Utilize software packaging tools • Maintain hardware and software inventories • Maximize the use of group membership for software distribution
Centrally Managed PC Settings & Configurations	<ul style="list-style-type: none"> • Restrict administrative rights for users • Configure operating systems with Group Policies • Prevent users from changing key systems settings • Utilize a push/pull automated software distribution model
Comprehensive PC Security	<ul style="list-style-type: none"> • Keep anti-virus, anti-spyware, and anti-malware up-to-date • Centrally manage the PC firewall • Maintain NAC infrastructure • Maximize use of automated patch distribution

Notes

1. IDC White Paper sponsored by Microsoft, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Managing the Windows Desktop," Doc #203482, October 2006, IDC.
2. IDC White Paper sponsored by Microsoft, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Systems Management Server," Doc #205110, January 2007, IDC.
3. IDC White Paper sponsored by Microsoft, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Systems Management Server," Doc #205110, January 2007, IDC.
4. IDC White Paper sponsored by Microsoft, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Managing the Windows Desktop," Doc #203482, October 2006, IDC.
5. IDC White Paper sponsored by Microsoft, "Optimizing Infrastructure: The Relationship Between IT Labor Costs and Best Practices for Managing the Windows Desktop," Doc #203482, October 2006, IDC.

About Wipro Product Strategy & Architecture Practice

The Wipro Product Strategy & Architecture (PSA) Practice is a division of Wipro Technologies, a global technology services division of Wipro Ltd. (NYSE-WIT). Wipro's PSA Practice has more than 10 years experience in researching, analyzing, and documenting the business value of technology solutions. Wipro's PSA practice helps enterprises and technology vendors develop innovative and effective product and IT strategies that enable them to expand their market opportunities, extend their competitive advantage and economize their business operations.

In addition to consulting to technology vendors, practice consultants and technologists work with global enterprises and service providers in architecting and implementing large-scale systems. This practical hands-on experience gives Wipro's PSA Practice consultants and technical architects first-hand knowledge that informs their business analysis work.

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

