



***End User
Experience
Policies &
Standards***

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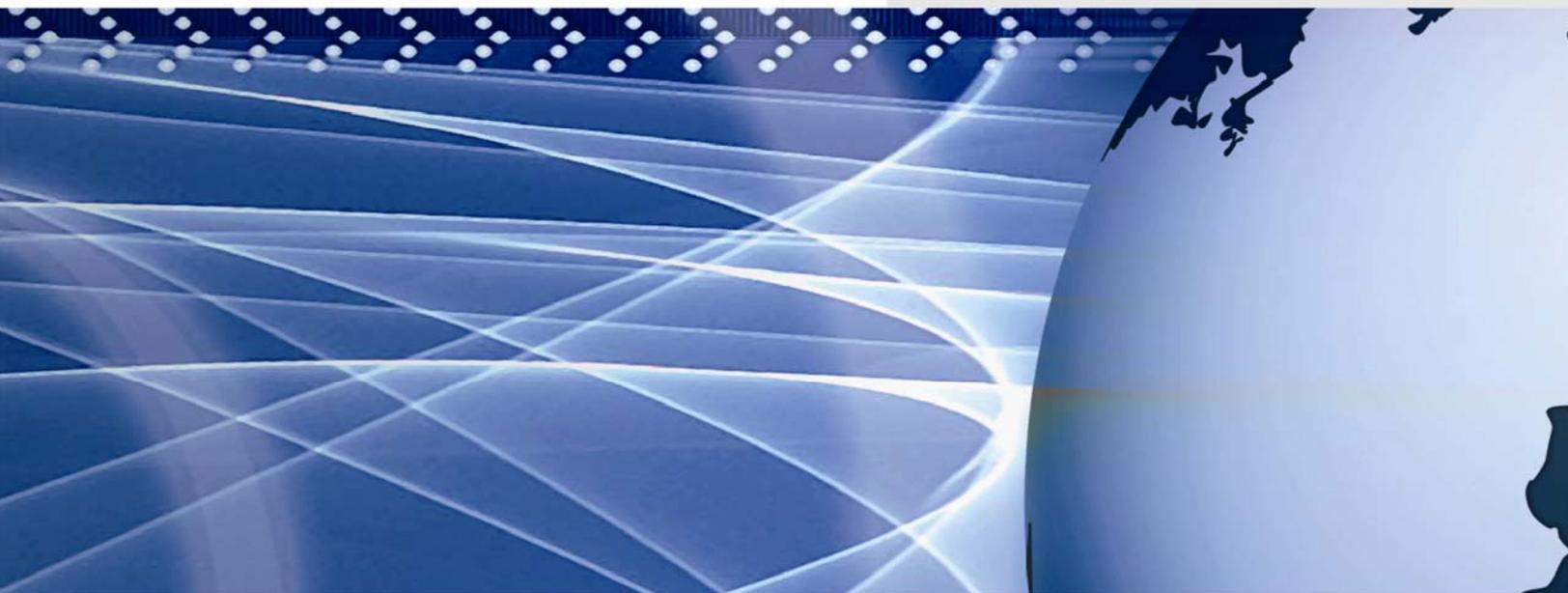


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I. Overview

This document establishes minimum standards for end user information technology (IT) needs, including, but not limited to, IT hardware, software, policies, procedures, end user training and support. It will define the computer hardware standards for desktops, laptops, tablets, PDAs/Smartphones, Broadband Access cards/chips, printers, projectors, wireless specs, surge protectors, label printers, barcode printers, and peripherals. Also defined will be the common use software standards for use on state issued computers. Policies and procedures will be written on the use of the standards, compliance, non-compliance, how to place orders for new equipment and service. New employees training for end users include information regarding software, IT policies, procedures, services and compliance. Additional end user training will be outlined from IT on common use software, drive mappings, etc. An IT Compliance statement will be written for signature of all employees using state issued IT equipment and software to ensure their understanding of the policies and procedures. It is a directive of the Governor's Office of Information Technology (OIT) that all Executive Branch state agencies utilize these standards when acquiring end user equipment in information technologies.

II. Purpose

The objectives of these standards, policies and procedures are to:

1. enable easier maintenance of IT equipment by reducing fragmented configurations and improving an ability to troubleshoot that would otherwise increase the cost of ownership;
2. balance satisfying the business needs of the enterprise's employees with minimizing complexity and differentiation in technology assets;
3. decrease research required to acquire hardware and software;
4. eliminate the installation of non-approved applications;
5. improve compliance and better enforce software licensing;
6. facilitate communication and information transfers among the enterprise's employees;
7. improve technical support and training by reallocating funds saved at the initial purchase to these areas; and
8. facilitate aggregated procurement of communication and information technologies for one or more state agencies.

III. Methodology

Each department was asked to have volunteer representatives apply for the committee. The committee first met on June 11, 2009 and continues to meet on a regular basis every two weeks. Its membership consists of representatives from numerous statewide branches, departments and agencies of Colorado state government.

The committee gathers its information from the knowledge base and experience of its members; data gathered from a prior New Century Colorado (NCC) committee; prior End User Computing Standards Committee; journal articles, and sessions the committee holds with representatives from the Western States Contracting Alliance (WSCA) vendors, manufacturers, and other subject matter experts (SME) including vendors and non-vendors. The composite of all of this information leads the committee to its recommendations.

The committee, in recognition of the fluidity of the end user experience, meets to review these specifications as needed, and then produce reports of its latest findings to the Executive Leadership Team (ELT), and the Consolidation Advisory Team (CAT).

The committee works with the WSCA vendors, State award vendors and other SMEs to define the configurations of IT equipment contained in this document. The target standard

hardware configurations are based on a three-year replacement cycle (see Appendix C, item 2). Agencies who are working on a longer replacement cycle may need to adjust their minimum configuration to offer higher performance than what is outlined and/or purchase additional years of warranty service. This approach maintains the fundamental and helps ensure the State is buying at or near the price-for-performance "sweet spot" of the PC market on an ongoing basis.

Computer WSCA pricing information

HP/Compaq Corporation:

<http://www.hp.com/buy/colorado>

Dell Computers:

<http://www.dell.com/>

Lenovo Inc.

https://www.directlenovo.com/public/index.cfm?vcid=%27%29%3ECFT%3CT%20PO%20%20ccc_rrr&maxid=co&establish_cookie=true

IV. Exemptions

Agencies are discouraged from filing a request for exemption from these specifications. The Governor's Office of Information Technology (OIT) and State Planning & Budgeting (OSPB) may jointly approve exemptions on a case-by-case basis if the request is supported by extraordinary circumstances.

V. Maintenance

Upon completion of the full End user standards, policies and procedures, the OIT charges the committee specifications at least quarterly. All committee recommendations are to be submitted to the ELT, which coordinates with all state agency CIOs, for final approval by OIT

VI. Effective Date

This policy shall be effective from the date of approval by the Chief Information Officer of the State of Colorado or their designee.

VII. Appendices

A. Specifications – Hardware

1. End User Levels
2. Desktop
3. Laptop
4. Tablet PC
5. PDA
6. Network printer

B. Specifications – Software

1. Desktop operating system
2. Office productivity suite
3. Anti-virus
4. Other minimum software recommendations

C. Additional Observations, Recommendations, & Conclusions

1. Technology
2. Lifecycle
3. Leasing
4. Ordering
5. State supplied equipment
6. Conclusions

Appendix A: Standards – Hardware

SPECIAL NOTE: The committee recommends the use of security devices, such as locks and protective cases, for any computing equipment deemed to be at high risk of theft (i.e. small form factor desktop computers, laptop computers, portable scanners, portable printers, etc.).

1. End User Levels

The committee recognizes three levels of users based on the information described in Table I. Although each of these levels requires a different set of hardware specifications, the configuration is based on the needs of the Level II users as they represent the majority of the state workforce.

**Table I
 Definition of User Levels for Desktop Specifications**

Note on determining the level of user: This table is intended to be used as a guideline and will not fit each individual circumstance. Agencies are to use this table as a guide to look at the anticipated use of all applications and access needs of the user to determine the appropriate User Level based on the best judgment of each agency’s IT staff.

Percentages listed with the access or application type level are percentages of users categorized for that level, based on actual data received from agencies represented in the committee.

Access or Application Type	Level I 3.77%	Level II 90.04%	Level III 6.19%
Information Management System			
Query	H	H	H
Data Entry	H	H	H
Programming	H	H	H
Archiving	M	M	M
Document Imaging	L	M	H
E-Mail	L	H	H
Intranet/Internet	L	M	H
Word Processing	L	M	H
Spreadsheet	O	M	H
PC Database (Suite Based)	O	M	H
Presentation Software	O	M	H
Project Management Software	O	M	H
CAD Programs	O	L	H
Network Design/Flow Charting	O	L	H
Automated Legal Research	O	L	H
Scanning/Imaging/etc	O	L	H
Video/Audio Applications	O	O	M
Database Client (non-suite)	O	M	M
GIS	O	O	M
WEB Development	O	O	M
Database Administrative Software	O	O	H

Legend:
 No Anticipated Use O
 Low Use L

Average Use M (Average or Medium Use)
 High Use H

2. Desktop

The committee recommends the following specifications for desktop configurations.

The committee works with the WSCA vendors to define the configuration for desktops that would satisfy the user needs outlined above. The minimum configurations are outlined below.

**Table II
 Minimum Desktop PC Standard Configuration**

Specification	Desktop PC	
Chipset: Motherboards must be the same per order (DMI compliant)	Intel: Current "Q43" chipset	AMD: Current Radeon
Processor	Intel Core 2 Duo E8400	Athlon 64 AMD 5400B
RAM	2 GB DDR	
Monitor Size	19" LCD	
Monitor Resolution	1024 x 768 .26mm	
Media Reader	DVD	
Hard Drive	80 Gb; Serial ATA 150, 7200 RPM	
Network Adapter	Ethernet 10/100/1000, DMI; Wake on LAN	
Video Standard	Integrated	
Sound Standard	Sound Blaster compatible	
Operating System	See Software Standards Section (appendix B)	
Mouse	Optical w/scroll	
Keyboard	Standard 104+	
Ports	USB required v. 2.0	
Energy Compliance	Energy Star 4.0 (85% efficient power supply) or better	
Desktop Management	DMI Software	
Shipping	Included	
Tech Support	3-yr. on-site next business day: Parts & Labor. Consistent for all 3 yr. for CPU, monitor and all factory installed peripherals.	

Although this specification should accommodate the needs of most end users in State government, the committee recognizes the need for specialized hardware requirements. In some circumstances, there will be very good rationales supporting additional hardware, and those items should be considered for funding based on justifications presented by each budget request. The vendors have agreed to provide these exceptions on the pricing configurations provided on their Internet pricing pages. Even the listed exceptions, however, may not cover very specialized workstations that need to be accommodated. The exceptions may include:

1. Monitor upgrades (i.e. Widescreen LCD monitor, larger size, higher resolution)
2. V-Pro management chipset (requires desktop management software in order to utilize)
3. Trackballs
4. Other ADA peripherals
5. Disk imaging

6. Installation costs
7. Backup options: tape drive/CD-RW/DVD-RW/Additional internal hard drive/RAID
8. Training
9. Hardware to support specialized software (e.g. microphones required for voice recognition software)
10. Higher speed/dual processor with upgraded chipset
11. Hard drive upgrades (i.e. SAS, SCSI Ultra III)
12. RAM upgrades
13. USB memory key
14. 1.44 floppy disk drive
15. Wireless LAN card (to be reviewed with networking committee)
16. Wireless peripherals (i.e. keyboard, mouse)
17. Higher level sound cards
18. Higher level video cards
19. Higher level or extended duration of support
20. Security/Biometrics/Smartcard (authentication enhancement)

3. Laptop

All portable computers must comply with all state security policies, rules, and procedures, including [P-CCSP-018 Mobile Computing R01](#).

The committee recommends the following specifications for laptop configurations. Under many circumstances, individuals may need a docking station and will not have a desktop.

The committee recognizes the need for specialized platforms, such as ruggedized models. The specifications for ruggedized equipment will not meet the minimum specifications and need to be defined by the specialized application requirements of the agency.

The committee works with the WSCA vendors to define the configuration for laptops that would satisfy the user needs outlined above. The minimum configurations are outlined below.

Table III
Minimum Laptop PC Standard Configurations

Specification	Ultra Light		Standard	
	Intel	AMD	Intel	AMD
Chipset	Mobile Intel GS45		Mobile Intel GM45	Turion
Processor	*Core 2 Duo SU9400 or SP9300		Core 2 Duo P8600	Mobile Turion RM-70
RAM	2 GB		2 GB	
Monitor Size	12"		14"	
Monitor Resolution	Active Matrix; 1024 Native		Active Matrix; 1024 Native	
Media Reader	see exception list		See exception list	
Floppy	see exception list		See exception list	
Spindle	1		2	
Hard Drive	Vendor standard size or above: Smart IDE		Vendor standard size or above: Serial ATA, 5400 RPM	

Express Card Slots	1	1
Network Adapter	Integrated Ethernet 10/100/1000	Integrated Ethernet 10/100/1000
Wireless Connectivity	802.11bg	802.11bg
USB Port v. 2.0	1+	1+
Operating System	See Software Standards Section (Appendix B)	See Software Standards Section (Appendix B)
Keyboard	80% of full size or better	Full Size
Battery	Trickle Charge: Holds for 2 hrs	Trickle Charge: Holds for 2 hrs
Energy Compliance	Energy Star 4.0	Energy Star 4.0
Carrying Case	Standard	Standard
Shipping	Included	Included
Tech Support	3-yr. on-site next business day: Parts & Labor. Consistent for all factory installed peripherals. (Batteries excluded after 1 year)	3-yr. on-site next business day: Parts & Labor. Consistent for all factory installed peripherals. (Batteries excluded after 1 year)
Notebook Management	DMI Software	DMI Software

****SU processor is for longer battery life, SP is standard performance on battery life.***

Although these configurations should accommodate the needs of most end users in State government, the committee recognizes the need for specialized hardware attached to some laptops. In some circumstances there will be very good rationales supporting additional hardware, and those items should be considered for funding based on justifications presented by each budget request. The vendors have agreed to provide these exceptions on the pricing configurations provided on their Internet pricing pages. Even the listed exceptions, however, may not cover very specialized workstations that need to be accommodated. The exceptions may include:

1. Docking Station/Port Replicator (some circumstances will warrant more than one for a user)
2. FireWire
3. External mouse
4. External monitor
5. No fault Insurance
6. Hardware encryption
7. Solid state hard drive
8. Spare or high capacity battery
9. CD-RW/DVD-RW or DVD/CD-RW combo
10. External keyboard
11. RAM upgrade
12. Training
13. Three spindle system
14. Media reader and floppy for ultra-light
15. Wireless LAN adapters / wireless broadband connection
16. Bluetooth
17. Wireless peripherals (i.e. mouse, keyboard)
18. Screen upgrade
19. Portable USB hub

- 20. USB memory key
- 21. Upgraded carrying case
- 22. Higher level or extended duration of support
- 23. Security/Biometrics/Smartcard (authentication enhancement)
- 24. For ultra light – an ultra low voltage processor of 1.2 GHz
- 25. Integrated fax/modem v.92 56K
- 26. V-Pro management chipset (requires desktop management software in order to utilize)

4. Tablet PC

All portable computers must comply with all state security policies, rules, and procedures, including [P-CCSP-018 Mobile Computing R01](#).

The committee recommends the following specifications for tablet configurations. Under some circumstances, individuals may need a docking station and will not have a desktop.

The committee recognizes the need for specialized platforms, such as ruggedized models. The specifications for ruggedized equipment will not meet the minimum specifications and need to be defined by the specialized application requirements of the agency.

The committee works with the WSCA vendors to define the configuration for tablets that would satisfy the user needs outlined above. The minimum configurations are outlined below.

Table IV
Minimum Tablet PC Standard Configurations

Specification	Convertible	
Chipset	Mobile GS45	AMD: None available
Processor	Core 2 Duo SU9300	
RAM	2 GB	
Monitor Size	12.1"	
Monitor Resolution	Active Matrix; 1024 Native	
Media Reader	See exception list	
Floppy	See exception list	
Spindle	1	
Hard Drive	Vendor standard size or above: Serial ATA, 5400 RPM	
Network Adapter	Integrated Ethernet 10/100/1000	
Wireless connectivity	802.11bg	
USB Port v. 2.0	2+	
Operating System	XP Tablet PC	
Keyboard	80% of full size keyboard	
Battery	Trickle Charge: Holds for 2 hrs	
Energy Compliance	Energy Star 4.0	
Carrying Case	Standard	
Shipping	Included	
Tech Support	3-yr. on-site next business day: Parts & Labor. Consistent for all factory installed peripherals. (Batteries excluded after 1 year)	

Specification	Convertible
Notebook Management	DMI Software

Although these configurations should accommodate the needs of most end users in State government, the committee recognizes the need for specialized hardware attached to some tablet PCs. In some circumstances there will be very good rationales supporting additional hardware, and those items should be considered for funding based on justifications presented by each budget request. The vendors have agreed to provide these exceptions on the pricing configurations provided on their Internet pricing pages. Even the listed exceptions, however, may not cover very specialized workstations that need to be accommodated. The exceptions may include:

1. Docking station/port replicator (some circumstances will warrant more than one for a user)
2. Processor upgrade
3. Solid state hard drive
4. FireWire
5. External mouse
6. External monitor
7. No fault insurance
8. Spare or high capacity battery
9. USB media drives (e.g. CD-RW/DVD-RW, DVD/CD-RW combo, floppy, etc.)
10. External keyboard
11. Training
12. RAM upgrade
13. Wireless 802.11g or better / embedded wireless broadband connection
14. Bluetooth
15. Wireless peripherals (i.e. mouse, keyboard)
16. Screen upgrade
17. Portable USB hub
18. Upgraded carrying case
19. Higher level or extended duration of support
20. Security/Biometrics/Smartcard (authentication enhancement)
21. Integrated fax/modem v.92 56K
22. V-Pro management chipset (requires desktop management software in order to utilize)

5. PDA

All portable computers must comply with all state security policies, rules, and procedures, including [P-CCSP-018 Mobile Computing R01](#).

The state recognizes the need for PDA systems and the benefits they bring to the users. The basic functions of all PDA systems include synchronization of calendar, contacts and tasks with the end user's current software. Be aware the typical PDA lifecycle is not expected to be more than two years, based on the current rate of change in PDA technology.

Business uses for PDAs include synchronizing calendar and contacts, using e-mail, ability to dial-in to access e-mail, specialized programs for inspections or other reporting features, and various wireless options. We recommend each agency set their own standards for PDA configurations based on the anticipated usage and their individual agency's needs.

6. Printers

The committee limits its recommendations to network printers, and generally recommends against the proliferation of desktop printers except in circumstances where security issues may be a factor (e.g., in the area of human resources and executive offices dealing with personnel and budget issues, or mobile users). Otherwise desktop printers are not cost effective to purchase and maintain compared to their network counterparts. The fact remains, however, that it will be a difficult business task to convince users of the need to migrate from their own personal printers to network printers. Clear advantages are the quality of the output and the overall speed of printing. This committee recommends that departments move away from individual desktop printers and gradually implement all network printers. New printers should have a greening component, for energy, toner and paper consumption.

**Table V
 Network Printer Specifications**

Spec Description	Printer Class I	Printer Class II
Pages per minute	32-45	32-50+
RAM	32	64
DPI	600x600	FastRes1200 (1200dpi quality)
Network Ready	Ethernet 10/100-TX	10/100-TX
Printer Control Language	PCL 5/6	PCL 5/6
Warranty	One year on site	One year on site

Although these two classes of printers should accommodate the needs of most end users in State government, the committee recognizes the need for specialized printers. In some circumstances, there will be very good rationales supporting additional hardware, and those items should be considered for funding based on justifications presented by each budget request and in accordance with departmental guidelines. The exceptions may include:

1. Postscript or other capabilities (i.e., IPDS capabilities)
2. Multiple trays
3. Impact printers
4. 2000 sheet paper tray
5. Memory upgrades
6. Color network ready laser printers
7. Plotters
8. Duplexing capabilities
9. Combining system printing with other functions like: scanning, copying and faxing
10. Security features
11. Extended warranty beyond manufacturer's standard warranty
12. Envelope feeders

Other printer standard recommendations:

1. Shared networked device with 1 printer per 1-12 users for Class I printer
2. Shared networked device with 1 printer per 12-24 users. The choice between class I & II printer should be based on the layout of the physical office area and the production needs of user group. Higher production needs would justify a class II printer and lower production needs would justify a Class I printer.
3. Shared networked device with 1 printer per 24-36 users for Class II printer

4. Use of non-OEM toner cartridges should be avoided. Several departments have reported significant maintenance issues that have developed from using these cartridges that essentially negate any benefits derived from a cheaper up-front cost.

SPECIAL NOTE: Check the manufacturer's warranty specifications on the brand and type of toner that must be used. Some manufacturer's warranties are void if off-brand or recycled cartridges are used.

The committee recommends that each department target a single manufacturer for printers. Recognizing that departments may change manufacturer from time to time based on pricing, specs, and support, departments should nevertheless try to standardize on one manufacturer for printers. Standardization allows better control of support, training, and supply costs, including technical staff time.

The committee recommends the use of print management software to help each department monitor the use and consumption of paper, toner and when available power. We recommend each agency check with their vendor, and or manufacturer for any available software they can use for free.

Appendix B: Standards – Software

1. Desktop Operating System

The committee recommends that the operating system standard for new purchases be Microsoft Windows XP Professional with Service Pack 3. This will allow a phased transition from legacy operating systems. Whenever practical, departments should consider whether upgrade of legacy operating systems will extend the useful life of existing PCs.

The committee will review alternative operating systems at the request of the CIO Forum.

2. Office Productivity Suite

The principal challenge with office productivity software is an inability to easily share documents, spreadsheets, databases, etc. across various vendor packages and sometimes across different releases or versions within a vendor’s package. For a large organization to run effectively and efficiently, everything possible needs to be done to facilitate the work product. Time is wasted when files can’t be shared and have to be continually converted, re-edited, or recreated.

The committee therefore recommends that Microsoft Office 2003 be established as the minimum Statewide standard. Any department submitting a budget request to convert from their current suite should also include a training plan for support staff and the end users. This may need to be expedited based on lifecycle changes by the manufacturer.

The committee recognizes the different versions of the Microsoft Office Suites and the applications available per suite as shown in Table VI. Based on each Department’s needs, they may have one specific suite as a standard, or a combination.

**Table VI
 Microsoft Office Suites**

Application	Office 2003 Standard	Office 2003 Professional	Office 2003 Premium
Word	X	X	X
Excel	X	X	X
Power Point	X	X	X
Outlook	X	X	X
Access		X	X
Publisher		X	X
InfoPath		X	X
OneNote			X

Cost is a major issue in selecting a standard office productivity suite. There is both the purchase cost and the ongoing licensing, or maintenance cost. Although licensing and maintenance costs are high for Microsoft Office Suite, it is currently the “de facto” standard for internal and external customers of the state. This fact plays a significant role in the committee’s decision to recommend the Microsoft Office Suite as the state standard. Another significant factor is reduced training costs for a state workforce already familiar with Microsoft Office Suite.

3. Anti-Virus and Spyware Protection

The committee reviewed what the different departments were doing to protect against viruses and spyware. It became clear there are a variety of hardware platforms and software packages being used. The best approach at this time is to define a list of requirements and functions that need to be considered, rather than naming a product standard.

The protection of the State's data must be a priority. A line of defense must exist at the server and desktop to protect the equipment from receiving malware and potentially forwarding them. The cost of lost data can be extreme. The committee recommends the following business practices:

1. Protection software must reside on desktop/ laptop, servers and firewall
2. Protection software must be updated automatically
3. Protection software should protect inbound and outbound E-mail and Server traffic, including attachments
4. Procedures must be in place to scan diskettes and CD ROMs
5. Protection software must be managed centrally within departments
6. Departments should secure a department wide protection software license and ongoing maintenance funding
7. Protection software must be covered for the telecommuter
8. Protection software is recommended for the home user

4. Other minimum software recommendations

All agencies should define approved application standards for use in their agency. The definition should include policies and procedures regarding loading of any non-approved applications (including applications downloaded from the Internet).

Appendix C: Additional Observations, Recommendations, & Conclusions

1. Technology

The prevailing issue in establishing a standard configuration for end user technology is the rapidly changing rate of technology. Many hours of discussion occurred among the committee members, as well as during a focus group meeting with the State's primary PC vendors. The conclusion of those discussions was that the end user specifications outlined above should be reviewed quarterly. Two of the quarterly meetings (one every 6 months) will be dedicated to meeting with the WSCA vendors to make changes to the hardware configurations. At the other two quarterly meetings per year, the committee's efforts will be focused on changing the document, including software and printer configurations.

2. Lifecycle

The committee bases its recommendation on a three-year lifecycle, using the findings and experiences of the committee member departments. The nature of an exponentially expanding personal computer hardware and software market mandates that personal computer hardware be upgraded every three years; accordingly, there should be a three-year replacement cycle. The committee reconsidered this recommendation at a meeting in early 2002. The committee strongly re-endorses the three-year replacement cycle for the following reasons:

1. Changes in the software industry are happening with such frequency that they require upgrades in the hardware in order to perform effectively;
2. The applications that State employees are encouraged to develop are requiring upgrades in PC hardware consistent with this replacement cycle. Such applications include Web enabled software, other Internet research software, and, most importantly, document imaging which enables the State to reduce expenses associated with paper document storage and improve customer service;
3. The per year cost of extending warranties on existing machines beyond three years is about a third of the cost of a new machine;
4. Manually maintaining hardware beyond the original 3-year warranty period incurs additional costs in the hardware maintenance line and additional costs in personnel lines stemming from increased support requests; and
5. Finally, it is very difficult to quantify the compatibility problems associated with maintaining both new and old equipment. These compatibility problems revolve around the network, the operating systems, acquiring old parts, training issues for the users, etc.

It is the committee's understanding, at this time, that only a few departments are actually funded for a three-year replacement cycle. This shortfall between budget requests and actual funds provided has resulted in a 4-5 year replacement cycle for some departments. However, this committee feels it is inadvisable to adjust a technical standard for budgetary reasons. Changing this technical replacement cycle to exceed three years could place the State's technical infrastructure in jeopardy, and therefore also compromises the State's goals of ensuring public safety, providing customer service to its citizens, and effectively/efficiently running State government.

3. Leasing

The actual contract or recommendation of leasing does not fall under the guidelines of this sub-committee. Leasing should be handled by the agency in compliance with the recommendations of the State Controller's office. In any case, leased equipment should meet the minimum hardware specifications of this document.

4. Ordering

An additional way for the State to reduce PC costs is to “piggy-back” orders Statewide. This would allow the enterprise to negotiate further discounts when a purchase involves a higher volume. The Office of Information and Technology statutorily reviews all IT purchase orders over \$100,000. An effort should be made to flag purchases, aggregate totals, leverage increases to the purchase volume, and then negotiate a significant discount. The prices quoted by the vendors and listed in their price matrices are “single-unit” based. All of the vendors were abundantly clear that this “piggybacking” effort would gain additional savings.

5. State Supplied Equipment

It is recommended that the State will not provide more than one computer per user. We recommend the use of a portable computing solution with a docking station/port replicator for users who need a computer outside of their primary working location.

6. Conclusions

The committee intends that the recommendations outlined above will be reviewed quarterly, and will position the Statewide governmental enterprise to satisfy the objectives mentioned early in this report. All of those objectives can be summarized as the general need to provide State employees with the most cost-effective end user computing configurations to meet the needs of their customers.