MacIT Conference P242
OS X Migration Case Study: After The Migration

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Agenda

- Introduction, agenda, & questions for you
- Thumbnail description of enterprise computing at Penn
- Operating system migration philosophies & strategies
- Operating system upgrade tactics
- Where are we now?
- Migration observations & lessons learned
- Issues that still keep me up at night
- Web sites, credits, & questions

Know Your Audience…

- How many of you are with for-profits?
- How many of you are with non-profits?
- Central IT, local IT, or ?
- How many of you are using Mac OS X as your primary operating system?
- How many of you are with an enterprise that has or had a Mac OS X migration strategy?

A Little Context – The Enterprise I Come From

- *Highly* decentralized computing environment since 1996
  - This decentralization is a reflection of the general University environment
  - Individual Schools & Centers make most of their own purchasing & support decisions under a theory developed by the Wharton School of Business called 'responsibility center management'
- Penn as a whole is aggressively multi-platform

A Little Context – The Enterprise I Come From

- Central IT works to enable individual Schools & Centers to achieve their specific information technology needs & goals
- Many of our vendors, including Apple, consider us to be a very 'corporate' higher education institution
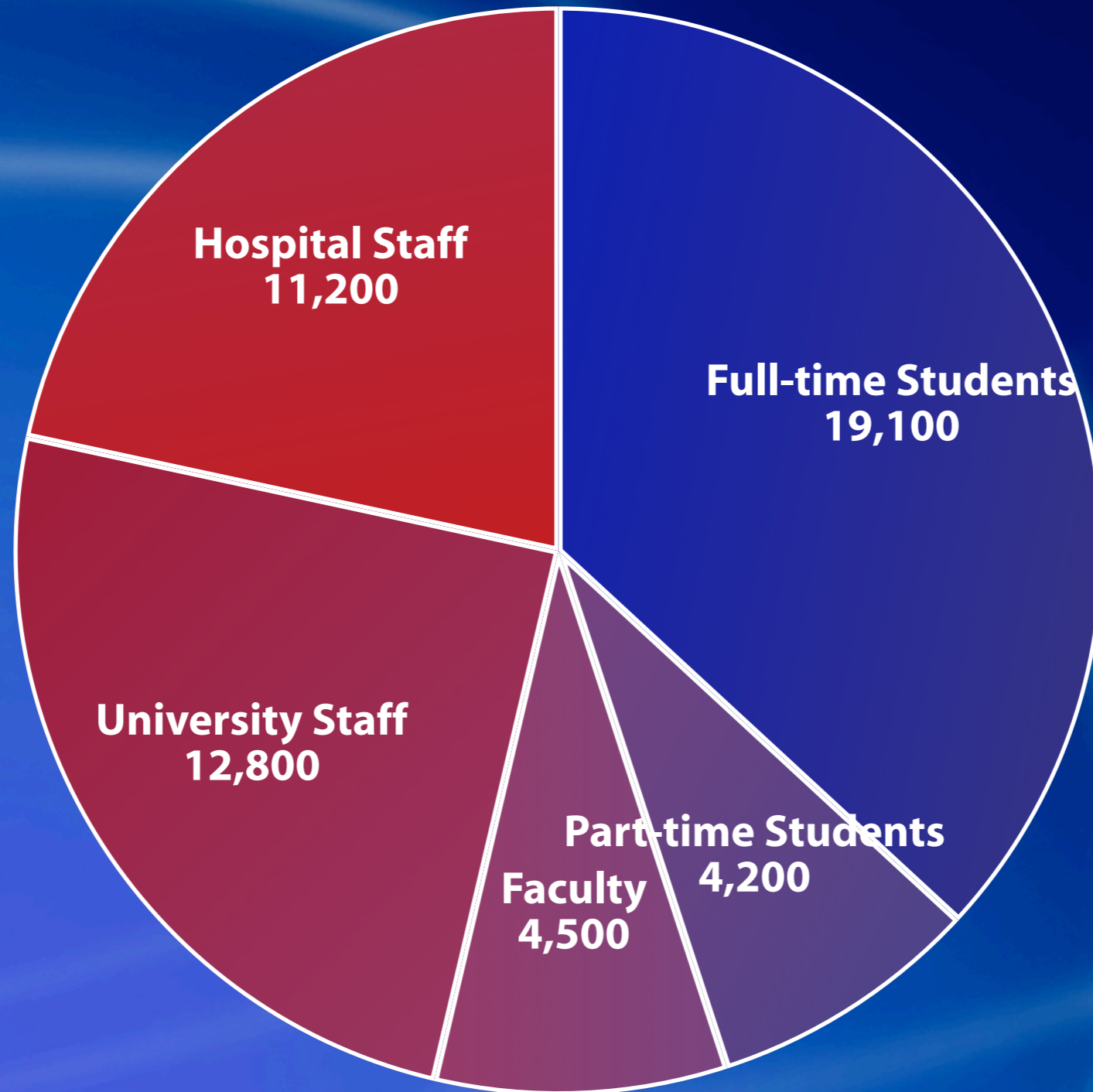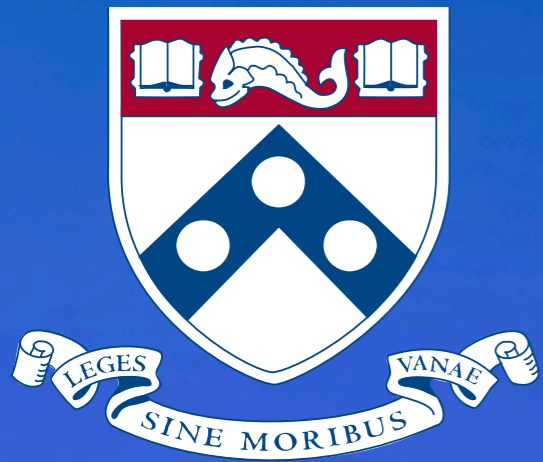
Yet More Context – Statistics

- Over **720** information technology professionals, of which approximately **350** are providing local support, giving us an average direct support ratio of about **80:1** for faculty & staff
- On-campus undergraduate student support is provided by **8** information technology professionals, **25** student managers, & about **175** information technology advisors (ITAs)

Yet More Context – Statistics

- **65,300** affiliated personal computers (approximately **1.26** per user & rising)
- **15,300** affiliated Macintoshes (approximately **23.5%** of total & rising slowly)
- **3** to **4** year product life cycle
- Fiscal year begins July 1

Operating System Migration Philosophies & Strategies

- Some quick definitions
- Migration philosophies
- Migration strategies
- Training
- Targeted developer spending

Some Quick Definitions…

- Operating system migration
  - Major change in technology — i.e. from Mac OS 8.x/9.x to Mac OS X.x
- Operating system update
  - Relatively minor update in technology — i.e. from Mac OS X version 10.2.x to Mac OS X version 10.3.x
- Operating system patch
  - Minor update/bug fix — i.e. from Mac OS X version 10.3.6 to Mac OS X version 10.3.7
- This is often tough for non-Mac OS folks in the enterprise to parse, because Microsoft does it very differently…

Operating System Migration Philosophies

- Operating systems are just operating systems
  - *A* definition:
    - "Software that controls the operation of a computer and directs the processing of programs (as by assigning storage space in memory and controlling input and output functions)" - Webster's, 1961
- Doesn't sound that wild or new, does it?

Operating System Migration Philosophies

- Don't get caught up in either the glamorous features or the spectacular bugs
- In the end, it's the applications that matter
  - Nobody will care about Mac OS X version 10.3.x in several years, but they will care about Photoshop 9 & Word 12, & whether they work…

Operating System Migration Strategies

- Make it an easy decision to migrate
- Cover all supported applications
- Give relevant & useful advice on whether to upgrade from the current operating system or start from scratch

Training Is Part Of A Migration For Support Professionals

- We've sent about 35 local support providers to the various Apple courses for IT Professionals
- The most recent versions are:
  - Mac OS X Help Desk Essentials v10.3 (3 days)
  - Mac OS X Server Essentials v10.3 (4 days)
  - System Administration of Mac OS X Clients v10.3 (5 days)
- We find that these courses are not always a great fit for our highly varied environment

Training Is Part Of A Migration For Users

- For users, training has tended to be at the local level & somewhat informal
  - We've seen no push in our decentralized environment for centralized user training
- It's proven problematic to find application-specific Mac OS X training, even for very popular applications (i.e. Excel, Word)
- We maintain lists of books/manuals that have been found to be effective

Targeted Developer Spending, Part I

- Qualcomm Eudora 5.x/6.x
  - Contracted with Qualcomm to add Kerberos v.5 support
  - Slowly but steadily worked to implement effective parsing between SSL & Kerberos on mail servers that support both
- dataComet-Secure X
  - Contracted with dataBeast to add Kerberos v.5 support

Targeted Developer Spending, Part II

- Assignments 2.x
  - Kerberized & 'Cocoa-ized' internally written IP assignment application
  - Most IP addresses at the University are still manually assigned – one of the costs of being an early adopter!
- NewsWatcher was a two-step process
  - We hired Vanteon to Kerberize the classic version of NewsWatcher 2.2.2 to 2.2.2up
  - When 2.2.2 was sucessfully Kerberized, we helped Simon Fraser Kerberize MT-NewsWatcher 3.4

Targeted Developer Spending, Part III

- When in doubt, ask the developer!
  - Symantec didn't have a corporate installer for Norton AntiVirus 9.0.x
  - This caused the incredibly annoying 'you must subscribe' message after a year
  - Our users have use as long as they are affiliated with us
  - We made our feelings known — now there is a corporate installer, & it didn't cost us any extra

An Operating System Update Triad

- 1) Affected support providers should investigate the update on release
- 2) Updated enterprise-specific installers should be provided as soon as possible
  - Updated application & security installers for Panther were provided the week of release
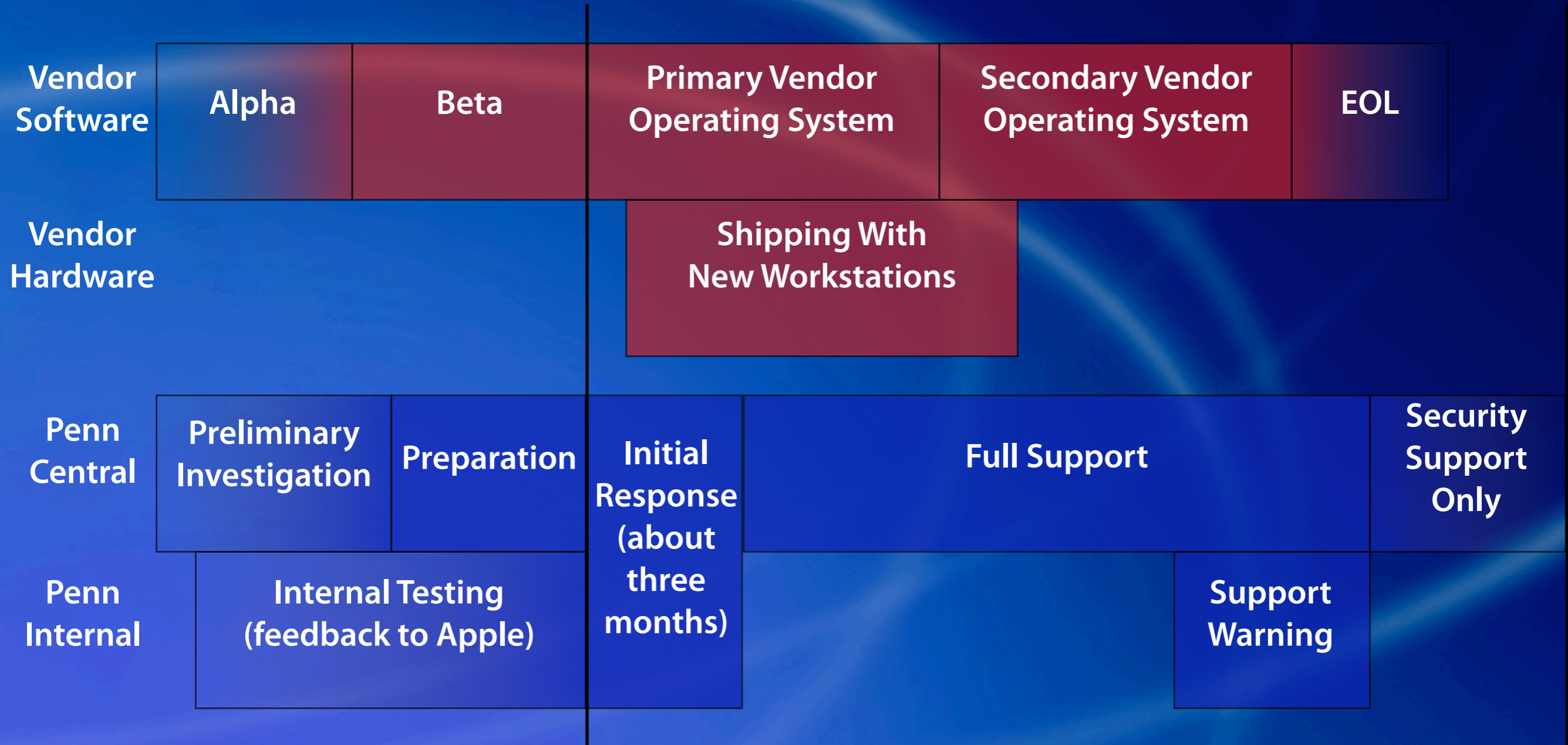
An Operating System Update Triad

- 3) 'Normal' users should wait for an approximately three month 'cooling off' period
  - This was our statement for Panther on the day of release:

    "Information Systems & Computing (ISC) will support Mac OS X version 10.3 for its clients only on new Macintoshes that ship with Mac OS X version 10.3 pre-installed. ISC strongly recommends that all other users adopt a 'wait and see' approach, continuing to use previous versions of the Mac OS (including Mac OS X versions 10.1.5 and 10.2.x) until the initial bugs in Mac OS X version 10.3 are identified and fixed."

Our Operating System Life-Cycle
(not to time scale)

Vendor Software	Alpha	Beta	**Primary Vendor Operating System**	**Secondary Vendor Operating System**	EOL
Vendor Hardware			**Shipping With New Workstations**		
Penn Central	**Preliminary Investigation**	**Preparation**	**Initial Response (about three months)**	**Full Support**	**Security Support Only**
Penn Internal		**Internal Testing (feedback to Apple)**		**Support Warning**	

Enterprise Support Of Mac OS X Releases

	Mac OS X version 10.0.x	Mac OS X version 10.1.x	Mac OS X version 10.2.x Jaguar	Mac OS X version 10.3.x Panther	Mac OS X version 10.4.x Tiger
Apple Released	March 2001	September 2001	August 2002	October 2003	April 2005
Penn Supported	July 2001	January 2002	November 2002	January 2004	July 2005
Penn Recommended	**never**	July 2002	July 2003	July 2004	July 2005
Penn Retired	July 2002	July 2004	*July 2006*	?	?

OS X Migration Case Study: We've Made It - Now What?

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Controlling Costs:
Site-Licensed Software Upgrades

- Worked with Apple to implement a version of the Apple Maintenance Program for Penn for Mac OS X version 10.2.x/10.3.x
  - Departments purchasing licenses have the right to the Mac OS during the three year term of the agreement & will exit the program with the perpetual rights to whatever version of the Mac OS happens to be shipping at that time
  - Our minimum system requirements (not Apple's) for 10.2.x are G4 or G3 400 MHz & above, 256 MB RAM

Controlling Costs:
Software Usage Management

- Sassafras KeyServer is in use at many Schools & Centers throughout the University, but not centrally deployed
- Sassafras recently announced an update to K2 (version 6.1, available in February) which includes significantly upgraded reporting capabilities

Ensuring Enterprise-Wide Compatibility

- Test, test, & test again
- To help with consistent, repeatable testing, we have what we call a Standards Lab with representative workstations & operating systems from the last four years
- The Standards Lab has five Power Macintoshes (G4s & G5s), each one loading multiple representative versions of the Mac OS ranging from 9.1 to 10.3.7
- Standards Lab resources can be requested by any IT professional at the University

Dealing With 'Laggard' Applications...

- When you roll new hardware or software, make sure that it works with your aging but essential application software
  - Virtual PC 6.x on the PowerMac G5 is a recent & painful example that comes to mind
- When an application begins breaking, develop a plan of action to deal with it until it is either replaced or revised

Installer Development

- When you roll new hardware or software, make sure that it works with your aging but essential application software
  - Virtual PC 6.x on the PowerMac G5 is a recent & painful example that comes to mind
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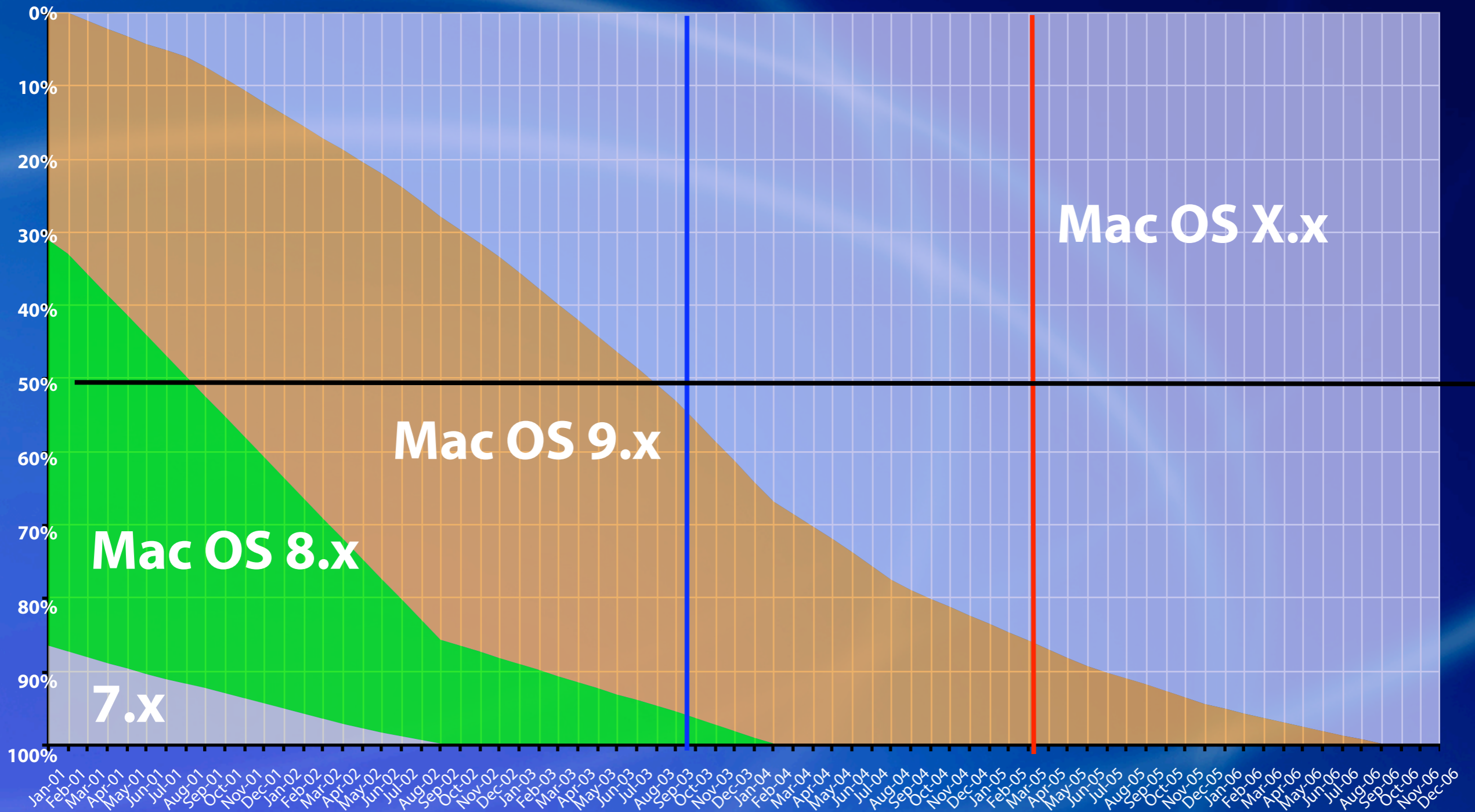# Our History Of Mac OS X Installers

	Carbon Installers	Mac OS X.x-Specific Installers
FY 2002	Mindvision InstallerVISE **7.3** (NAI Carbon, Fetch, etc.)	
FY 2003	Mindvision InstallerVISE **8.0.2** (NAI Carbon, Fetch, etc.)	
Jaguar Release		Mindvision InstallerVISE **8.0.2** (NAI X)
FY 2004	Mindvision InstallerVISE **8.2** (Eudora, Fetch, Kerberos, etc.)	Mindvision InstallerVISE **8.2** (NAI X, NAV 9.x, etc.)
Panther Release	Mindvision InstallerVISE **8.3** (Fetch, Kerberos)	Mindvision InstallerVISE **8.3** (NAI X, Eudora)
FY 2005	Mindvision InstallerVISE **8.4** (Fetch, Kerberos)	Mindvision VISE X **1.2.1** (NAI X, Eudora, Mozilla, etc.)
FY 2006		*Mindvision VISE X **1.5.x** (NAI X, Eudora, Mozilla, etc.)*

So, Where Are We Now?

- Enterprise desktop operating system migrations are slow on any platform
- That said, we feel pretty good about where we are…
- …about 92% of our Mac OS installed base is currently running some version of Mac OS X
- 84% are running Jaguar or better
- Peak of change was in Q4/2003 & Q1/2004, when we were migrating about 350 users a month

Five Years Of Mac OS Percentages At Penn

Mac OS X.x

Mac OS 9.x

Mac OS 8.x

7.x

OS X Migration Case Study: We've Made It - Now What?

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Question: How Do We Know Our Numbers?

- Our data comes from:
    - Apple
    - Surveys
    - Port scans/download counts (useful port scans are now less frequent due to security concerns)
    - University computer store (Computer Connection)
    - University purchasing department (Purchasing Services)

Question: How Reliable Are Our Numbers?

- Our data is still not nearly as complete or as accurate as we'd like it to be (*hopefully* most of you have more complete data)
- Hindsight tells us that we've rarely been off by more than 2%

Migration Observations & Lessons Learned

- Privileges for 'normal' users
- Implementing Mac OS-centric technologies
- Enterprise-level Apple & third-party tools
- Hardware recommendations

Security Actually Exists In Mac OS X…

- Basic security (real login passwords for "normal" users) is an issue for the first time in the Mac OS
  - If they flat out forget the password, it's often a real problem
  - The same issues we've had first with Windows NT Workstation, and then with Windows 2000 Professional & Windows XP (Professional & Home) users for several years

What Kind Of Privileges For 'Normal' Users? Part I

- Two schools of thought…
- 1) Lock 'em down!
  - Keeps users from blowing away their workstations, most of the time
  - In many cases, doesn't let users install, configure, or update
- 2) The workstation is 'wide open'
  - Lets users do such wonderful things as throwing out various acutely relevant folders
  - Of course, they also have the freedom to install software as needed

What Kind of Privileges For 'Normal' Users? Part II

- Some local support providers deploy laptops with full administrative access, while locking down the desktops
- Again, past painful enterprise experience with Windows NT Workstation, Windows 2000 Professional, & Windows XP (Professional & Home) is often valuable here

Implementing Mac OS-Centric Technologies: ColorSync

- Tough to implement accurate color across the cross-platform enterprise except in the most basic way
- On the departmental level there are higher returns with significant cost savings when what people print actually resembles what they see on their displays
  - Quicker finished projects
  - Less (expensive) reprints
- A quick & dirty return: do your users have the appropriate factory display profile selected is System Preferences? It usually helps…

Implementing Mac OS-Centric Technologies: Rendezvous

- Newer printers like the Hewlett-Packard LaserJet 42x0 & 43x0 support Rendezvous…
- …which yields to problems like many printers showing up in the same Rendezvous list when you've got a large local zone
  - hp LaserJet 4300 (00:…:47)
  - hp LaserJet 4200 (00:…:33)
  - hp LaserJet 4300 (00:…:65)
- You mean you don't know all your printer's MAC addresses by heart?

Enterprise-Level Apple Tools & Paid Support

- Apple Remote Desktop 2.1
  - Slowly but surely getting there…2.x is a *significant* upgrade from 1.x
  - Scalability issues do exist, especially when working in large subnets
- Apple OS X Server Admin Tools 10.3
  - Note that these tools work fine on Jaguar Server
- AppleCare Help Desk Support
  - Can be a gateway to better support, but is not necessarily an end-all, be-all
  - Far superior to what it was several years ago

Enterprise-Level Third-Party Tools

- LANDesk Management Suite 8.5
  - At the show, booth 721
  - Being separated from Intel continues to do wonders for their Mac OS support…
- Netopia Timbuktu Pro 7.0.3 for Mac OS
  - At the show, booth 749
  - Still the most flexible of the remote control applications
  - Often used to support remotely located senior administrators
  - Timbuktu Pro 8.0 is on its way (February), will include SSH tunneling & Rendezvous support

Third-Party Tools For Windows Integration

- Thursby ADmitMac 2.0.2
  - At the show, booth 2211
  - Allows realistic (as opposed to theoretical) Active Directory integration
  - Doesn't require a schema change on the Windows side
  - Implemented successfully in several of our units
- Microsoft Remote Desktop Connection 1.0.3
  - At the show, booth 1117
  - Basic, but surprisingly good

Writing Hardware Recommendations

- At Penn, I write yearly hardware & OS recommendations for both Mac OS & Windows, with quarterly addenda
- These recommendations are for new desktop workstations to meet our 4 year life cycle

Hardware Recommendations
Current & Proposed

	FY 2005	FY 2006
Processor	1.8 GHz PowerPC G5	*1.8 GHz or 2.0 GHz* PowerPC G5
Memory (RAM)	1.0 GB	1.0 GB
Hard Disk	80 GB	*80 GB* or *120 GB*
Monitor & Video	17-inch CRT or 17-inch LCD 64 MB discrete	17-inch CRT or *17/19-inch LCD* 64 MB discrete
Optical Drive	CD-RW/DVD-ROM 'combo'	CD-RW/DVD-ROM 'combo'

Issues That *Still* Keep Me Up At Night

- Apple & the enterprise are still an uncomfortable fit
- Constant change with web browsers
- Oracle financials are still not native
- Current state of backup, anti-virus, & design/desktop publishing
- High-end desktop hardware pricing
- Increasing mobile population & associated issues
- Rapid aging of early Mac OS X releases

Apple & The Enterprise Are Still An Uncomfortable Fit, Part I

- Disclaimer: I'm not interested in turning this into a gripe session
- Moreover, all of these conditions can be fixed!

Apple & The Enterprise
Are Still An Uncomfortable Fit, Part II

- Dealing with other enterprise vendors does not always place Apple in a beneficial light:
  - No road maps to retirement of support for an operating system
  - Training is sparse & rarely free, even when making it easily available would benefit Apple
  - 3-year AppleCare should be standard on all professional workstations
  - In general, Apple is not willing to expend the resources that other R&D heavy vendors are willing to

Apple & The Enterprise
Are Still An Uncomfortable Fit, Part III

- Sometimes, Apple's concept of what enterprise means seems to be restricted to server software & hardware
- This is not a full enterprise story!
- The number six result when you search for 'enterprise' on the Apple site *still* relates to Star Trek icons…

Constant Change With Web Browsers

- Microsoft has announced that they will no longer do functional revisions of Internet Explorer for the Mac OS
- Little noticed among Mac users who are convinced that Microsoft is *always* out to get them is that Microsoft has also announced that there will also be no new independent version of Internet Explorer for Windows
- In other words, there will be no executable installer that will work for multiple versions of Windows
- You can see this with the version of Internet Explorer that is integrated into Windows XP Service Pack 2

More Constant Change With Web Browsers

- As of July 1st, 2004, Safari 1.x became our supported & recommended web browser for Mac OS X.
- We also support Mozilla 1.7.3
- We *will* be doing a cross-campus evaluation of web browsers this spring
- It is likely that there will be some kind of approval for the Gecko engine, & thus some kind of support for Firefox
- It is also likely that there will be an explicit statement that a standard University desktop should have more than one web browser installed

Oracle Financials Are Still Not Native

- Making the Oracle Financials work on Mac OS X with SSL requires an instance of the 11i Financials deployed with the Forms Listener Servlet

- Unfortunately, the Forms Listener Servlet can not be used as the Developer version we are using for our forms/reports is patch set 6 while the level that is required for the Servlet to work is patch set 7

- We anticipate moving to patch level 7 (or further) at some point, but do not have any concrete plans for when this will happen

Current Functionality With Oracle Financials

- Tested & validated Virtual PC 6.x for G4s & Virtual PC 7.x for G5s as an interim solution
- Working with native Java in Mac OS X
  - High hopes remain for a native implementation
- Explored & rejected Citrix middleware solution
  - Costs associated with our back-end server configuration were prohibitive

Oracle Financials On Mac OS X

| Firefox 1.0 | Internet Explorer 5.2.3 | Mozilla 1.7.5 | Safari 1.2.4 |

JDK 1.4.2

Forms Listener Servlet

Forms Designer

Oracle11i Financials

Oracle9i Database

Backup

- For years it was Dantz, and only Dantz
- Now, higher-end vendors like BakBone are making an appearance with products like NetVault
- It will be interesting to see how this growing market shakes out – certainly EMC's purchase of Dantz give them capabilities they did not previously have

Anti-Virus

- We're a cross-platform Symantec/Norton AntiVirus shop
- We've had multiple issues with them over the last year including a particularly nasty bug involving symlinks to another partition
- Now, the decision: Sophos looks quite attractive, but is it worth the trouble of switching all those users?

Design & Desktop Publishing

- Most Adobe-centric (Photoshop, InDesign, Illustrator, etc.) & Macromedia-centric (Dreamweaver, Flash, FreeHand, etc.) folks have already migrated
  - Some of these applications (InDesign, Photoshop, etc.) have had several major Mac OS X revisions
- Quark XPress 6.x is not exactly setting the relevant portions of the enterprise (or the rest of the world) on fire
  - Many Quark-centric portions of enterprises didn't migrate until late 2004 at the earliest

4-Year Desktop Pricing

- Apple builds the Power Macintosh G5 as a workstation-class or near workstation-class computer
- Because they build them like this, they tend to cost as much or more than Windows workstations (Dell Precisions, IBM IntelliStations, etc.)
- This leaves a hole in the 4-year desktop area which is only partially filled by the iMac/G5 17-inch
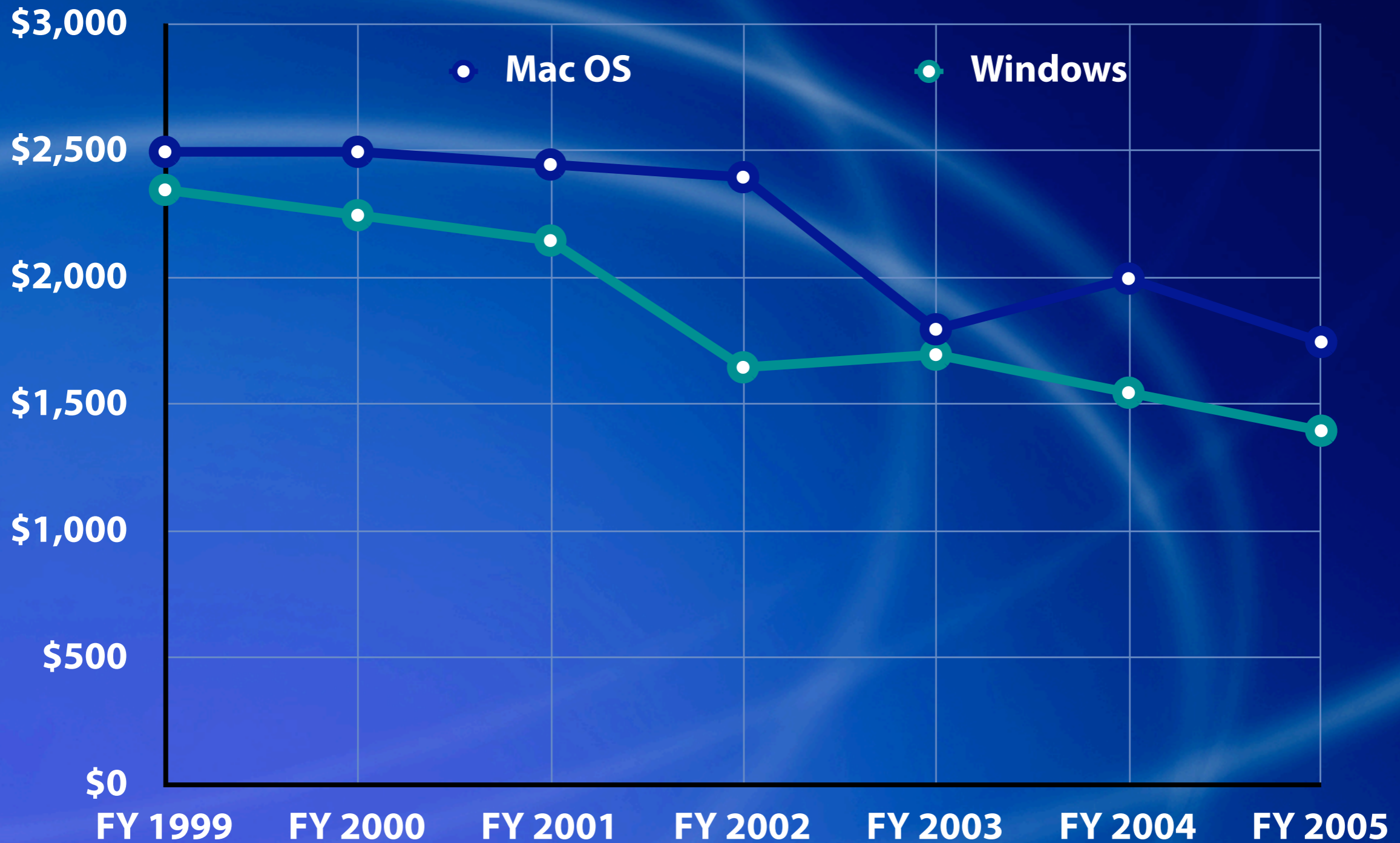
Increasingly Mobile Population & Associated Issues

- We're in an era where laptops have become real 'desktop equivalents' for 80% or more of our user base
- We've seen almost a complete flip in our desktop versus laptop populations in the last 4 years

Rapid Aging Of Early Mac OS X Releases

- About 8% of our users are still running 10.1.x, mostly because of the upgrade cost
  - We expect this percentage to fall to 0% by the end of this fiscal year
- 10.1.x has proven problematic to support
  - As of July 1, 2004, we discontinued centralized support of 10.1.x for everything except antivirus (Norton AntiVirus Corporate Edition) & secure sign-on (Kerberos)
  - In September, 2004, we discontinued support for Kerberos on 10.1.x when MIT announced two security exploits that they were not going to fix

Some Apple Web Sites

www.apple.com/macosx/
www.apple.com/itpro/
www.apple.com/server/
www.apple.com/server/resources/
www.apple.com/support/products/helpdesk.html
train.apple.com/

Some Other Web Sites

web.mit.edu/ist/topics/macos/index.html

www.macenterprise.org

www.macosxlabs.org

www.macwindows.com

www.microsoft.com/mac/

www.versiontracker.com/macosx/

Some Penn Web Sites

www.upenn.edu/computing/arch/standards/
www.upenn.edu/computing/help/doc/os/macosx/
www.upenn.edu/computing/penngetsit/
www.upenn.edu/computing/product/
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Helen Mulhern, KPMG

Kevin O'Connor, MakeColorBehave

Amy Phillips, Penn

Alexander Reynolds, Penn

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