Strategic Technology Analysis: Macintosh and Windows as Publishing Platforms

In the past fifteen years, personal computer based publishing has gone from fascinating toy to industrial-strength tool. For most of these years, the only computer system to be considered for serious publishing tasks had been Apple's Macintosh computer and operating system. Historically, the most widely used professional publishing software originated on the Macintosh platform, and in key areas important to professional publishers, such as typographical refinement and color management, the Macintosh offered a more professional solution than the PC platform.

Today the situation is much less clear. On a superficial, feature-by-feature comparison, the Macintosh, Windows 98, and Windows NT platforms all provide very similar functionality. It is only when one looks below the surface that important differences emerge.

This report presents a technology analysis of the key aspects of the Macintosh and Windows operating environments from a professional publishing and design perspective, and also includes extensive benchmarks based on real-world publishing assignments. In order to produce reliable assessments of the productivity and performance, a Publishing Reference Configuration™ is defined, which allows a meaningful comparison between the Macintosh and Windows platforms.

Major findings of this report

Overall, the Macintosh platform is better adapted to the professional publishing and design process than the Windows platform.

- Productivity in real-world publishing applications is over 30% better on Macintosh platforms.
- The Macintosh platform requires significantly less intervention by specialist technical support staff, reducing maintenance costs and system downtime.
- The Macintosh platform has more mature font management and color management, and an end user scripting capability that is better suited to the workflow automation requirements encountered in a professional design and publishing environment.

The Windows platform has some technical limitations which adversely impact the professional publishing and design process for some applications.

- Character tables used in Windows do not support certain glyphs (such as ligatures) used in professional publishing.
- User testing shows that the Windows platform is less suited to precise positioning of the mouse, resulting in lower end user productivity, and increased error rates for precision oriented design tasks.

Information contained in this report

Strategic Technology analysis of Macintosh and Windows platforms for professional design and publishing :

- Operating System Services
- Font-handling and typographic differences
- Support and maintenance issues
- Color management issues
- Workflow automation and scripting
- Real-life productivity benchmarks using the Publishing Reference Configuration™

About Pfeiffer Consulting

- Pfeiffer Consulting is an independent technology research institute and consulting operation focused on the needs of publishing, digital content production, and new media professionals.
- Pfeiffer Consulting offers independent, high-level bench marking and analysis of products and technologies for the publishing and design industry.

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Key Findings at a glance ...

Operating System Services

- The Windows filing system is less user-friendly than the Macintosh, making it harder to identify which application to use to edit a given document in a publishing environment.
- Basic system configuration on the Macintosh and Windows platforms are similar, however device driver management is significantly more complex for a Windows platform.
- Windows 98 and Windows NT allocate application memory dynamically, while MacOS lets users configure preferred amount of memory for each application. There are advantages and disadvantages to each approach in a publishing environment.
- Currently, only Windows NT and MacOS X Server offer the benefits of true protected memory and pre-emptive multi-tasking.
- The Macintosh platform offers more flexible support for multiple-monitor configurations than the Windows platform.

Font-handling and typography

- MacOS offers a more complete character-set than the Windows platform. The Windows platform also lacks support for certain glyphs present in PostScript fonts, such as ligatures; and it is easier to access special glyphs (œ, ©,®) on the Macintosh platform.
- MacOS offers better integration of PostScript fonts than Windows 98 or Windows NT.
- Font-files are incompatible between MacOS and Windows due to the fact that the platforms use different character tables and encoding vectors.
- Neither the MacOS nor Windows currently support OpenType.

Color management

- ColorSync is a very mature technology which has already achieved the position of an industry standard.
- Windows NT does not support System-wide color-matching : ICM (Image Color Matching) 2.0 is currently only available on Windows 98.

Productivity issues

- Windows handles the mouse in a less precise and less fluid way than the Macintosh.
- Productivity as measured by “real-world” publishing tasks, is better on Macintosh than on Windows systems.

Support and maintenance issues

- The Macintosh platform has much lower overall support and maintenance requirements that the Windows platform.
- Comparable maintenance operations are at least two to three times faster on Macintosh than Windows.
- In similar situations, Macintosh system maintenance requires significantly less interventions by specially trained staff, resulting in a lower overall maintenance cost.
- On Macintosh, hardware configuration and device driver management can be undertaken by experienced publishing operators and do not always need the intervention of specialist technical support staff.
- On Windows, frequent installation and de-installation of application software significantly increases problems with stability.
- In a deadline-driven publishing operation, significantly increased maintenance times of Windows platforms have to be taken in account.

Workflow issues

- MacOS is the only operating system examined here which includes system wide, user-level workflow automation and scripting tools.
- AppleScript is well integrated in the MacOS and is supported by the major publishing and design applications.

Methodology of this study

Objective of this report

The objective of this report is to provide a detailed comparison of the Macintosh and Windows platforms as they relate to the requirements of the professional publishing and design market.

This report provides an analysis of technology differences, benchmarks real-world productivity in publishing assignments, examines the benefits of workflow automation, as well as providing a strategic assessment of expected evolution of the Macintosh and Windows platforms over the next 12 to 18 months.

Research methodology

Technology comparison is based on comparative analysis of functions available in the operating systems, backed by expert advice and comments on each segment of the report which is provided by an independent panel of experts.

Members of this expert panel of the report include researchers in major institutions such CNRS (Centre National de Recherche Scientifique) in Paris, independent PC hardware testing laboratories, prepress specialists, and experts in PC operating systems.

User interviews. Pfeiffer Consulting interviewed users in each major publishing and design market segment in order to better understand real-world requirements and user-trends. Users interviewed include advertising agencies, magazine and newspaper publishers, book-publishers, prepress-houses, service bureaux as well as independent graphic artists from Europe and the United States.

Real-World Publishing Benchmarks. Pfeiffer Consulting has devised a complete set of publishing specific benchmarks executed on the Publishing Reference Configuration™ for the Macintosh and Windows platforms (refer to page 18 for more details). Productivity tests were devised in a way to reflect real-world work situations in design and publishing, combining a set of tasks representative of the publishing and design workflows.

Operating System Services for Publishing : Comparative Overview

User Interface

There are few significant differences in user interface between MacOS, Windows 98, and Windows NT. Once the fundamental principles of interaction are understood, users can find their way around the Windows and MacOS environments in very similar manner.

The Macintosh has a unique menu-bar along the top edge of the display, which changes when one switches applications. Windows creates a new menu-bar in each application-window, and groups system-wide functions in the Start-menu accessible through the task bar at the bottom of the screen.

Windows based PCs, like most workstations feature a two-button mouse. As from MacOS 8.0, Apple now offers contextual menus, activated through a keyboard short-cut which offers a function similar to that provided by the second mouse-button on the Windows platform.

Configuration-options and driver management

Basic system configuration options for the Macintosh and Windows platforms are similar, and are handled through small applications, which allow users to change keyboard-layout, appearance of the desktop, and other general system settings.

However, device driver management is a more complex issue. Windows 98 does a reasonable job when installing a peripheral for the first time, but its way of managing (activating and de-activating) device drivers is considerably more complex and fragile than the Macintosh platform. The Macintosh platform offers more information on the function of a driver and its links to other necessary files. For example, all drivers necessary for QuickTime or Open Transport are grouped visually, making it easier for the non-technical user to find their way around.

File handling

The basic filing-system in Windows and Windows NT is still entrenched in DOS-conventions, limiting system-level application file-type identification to the classic 3-character file name extension. In this aspect, MacOS provides a more transparent filing-system, allowing the user to easily differentiate similar file types created by different applications.

For example, on Windows, any file carrying a ".eps" extension is identified as an Adobe Illustrator-file (or a file of another PostScript drawing program installed on a specific configuration), even if it was created by another application program, such as a scanned photograph. This can be quite confusing in a publishing environment, where operators need to be able to quickly and easily identify what kind of file they are dealing with and which application to use to edit it.

Keyboard management

Keyboard management is another area where the MacOS and Windows platforms differ considerably. While the alphanumeric keyboard-layout follows international conventions, special characters and symbols are more difficult to create on the Windows platform than the Macintosh platform. On the Macintosh platform, symbols and diacritical marks are mapped to similar characters. For example, <option-c> will create the copyright symbol.

The importance of this difference varies, depending on the language : for example, in Windows, creating the <œ> character, which is very important in the French language, requires multiple steps.

On the Windows platform there is a greater dependence on the application software to provide easier access to important special characters.

Memory management: Protected Memory

Memory management and multi-tasking are crucial aspects of any modern computing environment. Of the operating systems reviewed here, only Window NT and MacOS X Server offer true protected memory, meaning that one errant application is not able to crash the whole system.

MacOS and Windows 98 both offer some limited form of memory protection, but fatal crashes, which need to be resolved by rebooting the entire system, are not uncommon in complex application environments such as design and publishing.

Memory Management: Application Memory Allocation

On the Windows platform, it is up to the system to allocate memory dynamically, and the user has little or no way of influencing this process.

On the Macintosh, the operating system lets the user choose how much memory they want to give each application, and whether or not they want to use virtual memory.

Both systems have advantages and drawbacks: while the Windows-approach may be simpler for an inexperienced user who doesn't really want to bother about memory management, it tends to have drawbacks for the publishing professional, who generally is very precise about which configuration gives them optimum performance. Being able to allocate a pre-determined amount of memory to a program can provide a smoother operation: this is particularly true with memory-hungry programs such as Photoshop, but also applies to many page-layout applications.

The majority of Macintosh operators interviewed for this report have grown accustomed to managing the resources on the computer in a fairly sophisticated way, configuring memory allocation for each application according to the job at hand.

Multi-tasking

Only MacOS X Server and Windows NT offer true pre-emptive multi-tasking. Both Windows 98 and MacOS offer some form of non-pre-emptive multi-tasking, but the smooth functioning of this depends very much on how "well-behaved" the concurrently running applications are in sharing processor-resources. In other words, until these operating systems redistribute processor cycles in the way Unix-systems do, multi-tasking will be less predictable in the MacOS and Windows 98 environments.

System Services : Major Points

• The Windows filing system is less user-friendly than the Macintosh.

This is not in itself a functional problem, but makes differentiating similar files (i.e. EPS, TIFF files) from different applications difficult on Windows. This can negatively impact productivity in some publishing environments.

• It is easier to access special glyphs (œ, ©,®) on the Macintosh.

Handling special glyphs on Windows is dependent on application-support, which varies from one program to the next.

• Windows 98 and Windows NT allocate application memory dynamically.

This is more transparent for users, but not always optimal in specialized publishing environments.

• MacOS lets users configure preferred amount of memory for each application.

To use this feature, users need some basic understanding of memory usage. But in a publishing environment, it may help to make the system work more efficiently.

• Currently, only Windows NT and MacOS X Server offer true protected memory and pre-emptive multi-tasking.

MacOS X Server (which is based on a Unix kernel) and Windows NT 4.0 (which is close to Unix) have the most stable and most sophisticated memory-management.

Typography : Major Points

- MacOS offers a more complete character-set. Windows and Windows NT lack support for certain glyphs present in PostScript fonts.
- MacOS offers better integration of PostScript fonts than Windows and Windows NT.
- Font-files are incompatible between MacOS and Windows.
- Neither MacOS nor Windows currently support OpenType.

Implications

The compatibility problems of font-files and the differences in character tables have major implications for the publishing industry:

- There is no guarantee that a page-layout file moved from on platform to the other is identical in hyphenation and composition; and although PDF offers true cross-platform compatibility by embedding encoding vectors in the file, it is not yet a truly editable format.
- Therefore, page-layout-files should stay on the same platform from creation to output. This is a compelling reason for production departments to standardize on a single platform.

Font-handling and typographic management

The differences between Macintosh and Windows in font handling are profound, although both system use the same font types: TrueType and PostScript. On both platforms, TrueType is used as system font format, however, only on the PC did TrueType gain some market-presence, mainly for office and personal use.

While the Macintosh platform handles both font formats in the same way, the Windows platform requires a utility like ATM (Adobe Type Manager) in order to correctly handle or even install PostScript fonts. Without ATM, Windows NT requires PostScript fonts to be converted to TrueType format to be recognized. On the Macintosh platform, it is possible to install both TrueType and PostScript fonts simply by dragging them into the system folder. MacOS 8.5 ships with ATM 4.0 for screen rendering of PostScript fonts.

Font-related issues

Font files are incompatible between Macintosh and PC, making it necessary to acquire two versions of the same font if one wants to move a file from Macintosh to Windows or vice-versa. And even with the right files on both platforms, incompatibilities commonly occur because of the differences in mapping typographic attributes (bold, italic) to font variations.

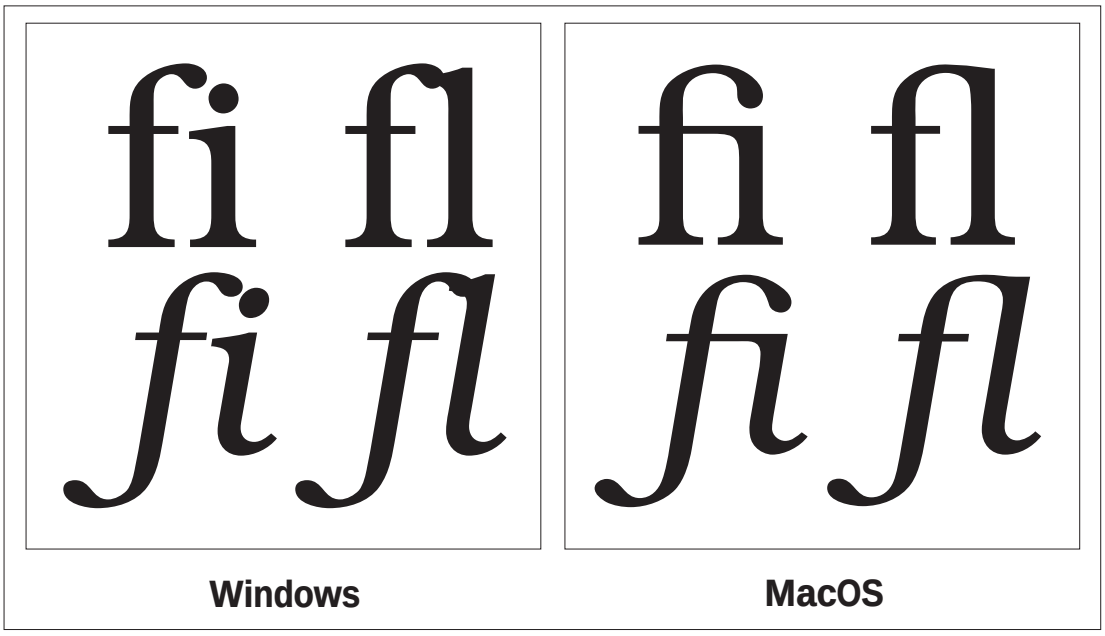
To make matters worse, Windows and Macintosh platforms use different character tables and encoding vectors. On a very basic level, this is the reason why file-translation between the Windows and Macintosh platforms is occasionally less than perfect. But beyond simple filtering there are other problems to be taken in account.

For one, Windows and Macintosh platforms do not offer exactly the same character set. Specifically, Windows and Windows NT do not support ligatures.

This may be of little concern in an office environment or in some technical publications, but in professional, type-conscious publishing environments, this is a major concern, and for certain typographically refined applications, this would effectively exclude the use of the Windows platform.

Typographic differences between Macintosh and Windows : Ligatures

Because of differences in character tables and encoding vectors used on Macintosh and Windows 98 and Windows NT, Windows systems can not access certain glyphs, even if they are present in a font.
*The most important implication for the publishing industry are **fi** and **fl** ligatures, which are only accessible on the Macintosh platform.*



PostScript Support

Because of Apple's long-standing presence in the PostScript printer market, MacOS offers good PostScript integration. In a standard system installation, the Macintosh is the only platform analyzed here which is PostScript compatible. A standard system-installation will provide the most recent version of PostScript printer drivers available. Generating PostScript files instead of hardcopy is part of driver functionality. PostScript fonts are recognized and supported by MacOS, and ATM 4.0 is provided with MacOS 8.5 for screen rendering and output to non-PostScript devices.

Windows, on the other hand, comes with PostScript drivers, but they are not part of the standard installation, and depend on the presence of a PostScript device at time of installation. Once drivers are installed, functionality is similar.

Portable Document Format (PDF)

PDF support is similar on Macintosh and Windows, using print-to-file commands for simple PDF-creation, and Acrobat Distiller for complex jobs. MacOS 8 allows users to print directly to Acrobat Distiller. MacOS X will support PDF-files as the main graphics format for the operating system.

Occasional difficulties with the PDF format can be linked to font handling on the two platforms : certain TrueType fonts from Windows will not display or print correctly on the Macintosh platform, despite similarly named files being available in the system.

Major Points

- In absolute terms, Windows and Windows NT are less PostScript-aware than MacOS:

PostScript and Postscript fonts have been part of the Macintosh environment from the very beginning of Desktop Publishing; still today, only low-end printers for the Mac-market ship without a PostScript interpreter, while on the PC-side, PostScript is only of concern for publishing professionals.

- PostScript fonts are supported by the Macintosh platform. Screen rasterization of PostScript fonts, as well as printing on non-PostScript devices is supported through ATM 4.0, which is shipped with MacOS 8.5.

Multiple Monitor support

While in most office computing environments support for multiple monitors is not a very important feature, the ability to create a multi-display working environment is very important in certain professional markets, such as graphic design, 3D modeling, animation, and multimedia production.

MacOS has provided multiple monitor support for over 10 years: all current Macintosh systems can share the desktop using as many monitors as there are video-cards that are physically installed in the system, irrespective of the display resolution of the monitor/video card combination.

By comparison, the Windows platform has only recently added standard support for multiple monitors: Windows 98 is the first version of Microsoft's operating system which offers this as a standard feature. However, the implementation on Windows 98 is more limited than on the Macintosh, since Windows 98 only supports multiple monitors for PCI graphics adapter cards.

Multiple monitor support for Windows NT and for previous versions of Windows was only possible using specially designed video cards and proprietary device drivers, which usually only offered fixed display resolutions, and had limited 3rd party applications support.

Major Points

- All current Macintosh systems can share the desktop using as many monitors as there are video-cards that are physically installed in the system.

- On the Windows platform, only Windows 98 offers multiple monitor support as a standard feature.

- Windows NT needs specially designed display cards for this feature.

Major Points

- Windows handles the mouse in a less precise and less fluid way than the Macintosh; precision movements like those necessary to do page-layout or retouching take more time and require more concentration (and are therefore more tiring).
- Most publishing operators interviewed for this report quote mouse-handling as one of the major problems with Windows in their work.

Implications

- Tests prove that the same operators executing the same jobs on both platforms are faster and more accurate on the Macintosh.
- The problem is not linked to physical characteristics of the mouse, but rather due to the limitations of the mouse device driver interface.
- Users in an office-computing environment are less likely to notice the problem, since their work doesn't require precision-movements.
- Several productivity disparities between Macintosh and Windows platforms revealed in the productivity benchmarks can be traced back at least in part to this difference.

The impact of mouse precision on productivity

Most users of modern computers would assume that there is little or no difference between a mouse on a Windows systems or the one offered on the Macintosh platform, especially since both are built along the same basic principle (the movement of the hand is transmitted via a little rubber ball to small wheels, which in turn transmit relative coordinates to the computer) and both offer similar hardware resolution.

However, user interviews conducted for this report made it clear that this is not the case. The majority of professionals working on both environments state that the way in which the mouse reacts on Windows 98 and Windows NT makes it more difficult and slower to obtain precise results. Worse, it makes operators less productive, and most find using the mouse on Windows more tiring. This was also confirmed in user productivity tests, where the Windows-platform systematically came out slower than the Macintosh.

Benchmarks for mouse-related productivity.

A series of tests were devised (drawing geometric forms with single-pixel precision) in an attempt to better understand and quantify this user perception.

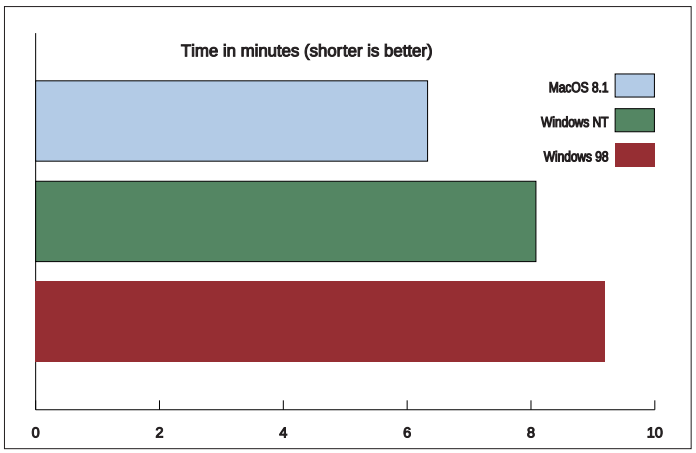
The test monitored both time needed for execution on all three platforms, as well as number of "misses". The results are revealing: Windows NT is almost 30% slower than the Macintosh, and Windows 98 almost 50%. At the same time, error-rate increases: according to our research, Windows 98 is up to three times more error-prone in this operation.

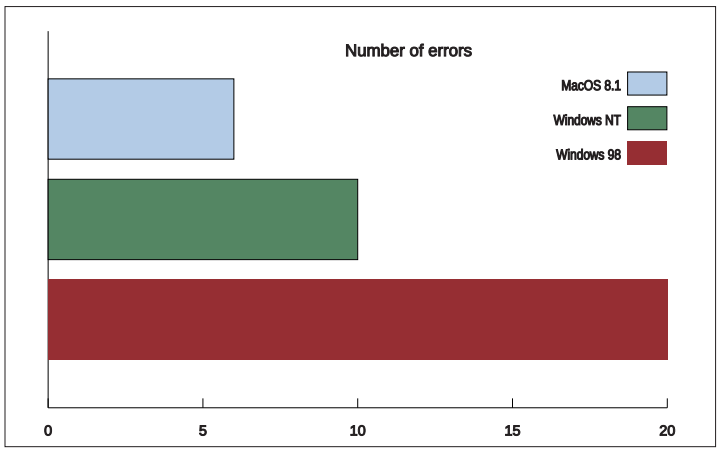
The explanation for this phenomenon is relatively simple: the mouse-driver in Windows interprets small mouse movements with less precision and more round-off-errors than under MacOS. A slight flickering appearance of the cursor contributes to the difficulty of precise positioning. The problem is most pronounced under Windows 98; on Windows NT running on the same hardware, the mouse movements are significantly more fluid, but still less precise than on MacOS.

Mouse Drivers and their Impact on Precision and Productivity

Repeated precision-tests run on all three platform show that the way the mouse is handled by system software has an important impact on productivity: completing the benchmark took 9 min. 20 on Windows 98 - almost 50% longer than on MacOS.

Time is not the only factor: the test on Windows 98 produced twice as many errors than on Windows NT - and more than three times the amount of MacOS. (For detailed test-descriptions, refer to "Macintosh vs PC in Professional Publishing").





Time necessary to complete the tests (left), and number of errors (right). (Shorter is better)

Major Points

- Productivity as measured by "real-world" publishing tasks, is better on Macintosh than on Windows systems. Executing the same publishing assignment on all three platforms took 38 minutes on a Macintosh platform against over 55 minutes on Windows NT.
- Based on the performance test results QuarkXPress runs more smoothly on Macintosh than on Windows platforms. The same applies to Adobe Photoshop, which appears to be visibly slowed down by Windows memory management.

Performance and Productivity Benchmarks: Methodology

Most of the benchmarks that are readily available in mainstream computer publications do not answer the questions of professional users working in a specialized field such as publishing and digital content creation.

To be relevant to the needs of publishing professionals, benchmarks and tests need to be as publishing-specific as possible, closely mimicking a typical publishing work environment .

This report addresses four key components which contribute to the overall productivity of the computing platform: System/Processor benchmarks; Publishing Application benchmarks, User Productivity measures, and Support and Maintenance metrics.

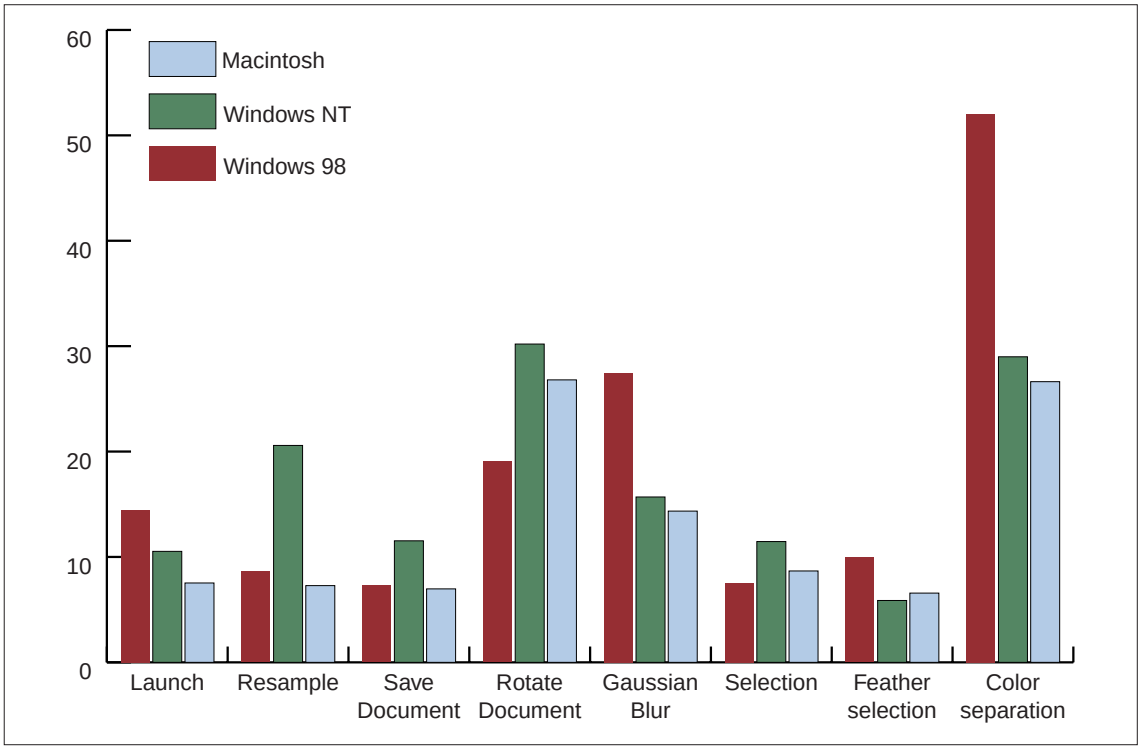
System/Processor benchmarks. These benchmarks examine one significant task in the system or in one of the application programs and times it in an isolated way. These benchmarks are good indicators of the pure processing speed of each one of the standard benchmark configurations.

Publishing Application benchmarks. Application specific tests look at a whole set of functions in one of the major software products in the field, and establish performance and productivity ratios for these applications in a professional publishing environment.

User Productivity Measures. The basis of productivity testing is to see how systems perform in complete task-sets, performed on a variety of different files. The aim

Single-task Processing Performance : Adobe Photoshop

Photoshop running on the Macintosh Publishing Reference Configuration is almost always faster than running on the PC equivalent - on certain functions, the Macintosh is almost twice as fast as Windows 98. Tests were executed with a 38 MB file. Memory usage was set to 96 MB on the Macintosh, and to 95% under Windows.
One of the reasons for this speed difference is memory-handling under Windows 98 and Windows NT - Photoshop is clearly more optimized for the Macintosh than for the PC, using virtual memory less frequently.
(Times in seconds - shorter is better)



is to assess the real-life productivity one can expect from a system. This was particularly important for comparing two significantly different platforms, where interface-performance will significantly alter productivity.

Real-world publishing operations are used to assess the productivity that can be expected from a production-configuration. As an example, the Photoshop productivity-suite consisted of copying a folder of 15 images from a removable drive to the internal harddrive of the system, then perform a number of publishing-specific features on each image, color-separate it, to save it under another name, and, once every file is processed to transfer the folder of corrected files back to the removable cartridge.

Support and Maintenance metrics. Support and maintenance-timings are included in the benchmarks. While it is common knowledge that PCs are more difficult to maintain and configure than Macintosh-systems, this aspect has to be properly factored and quantified when giving an overall evaluation of a publishing configuration.

(For complete test results, and full documentation of the benchmark procedures please refer to Pfeiffer Consulting's study "Macintosh vs. PC in Professional Publishing")

The Publishing Reference Configuration ™

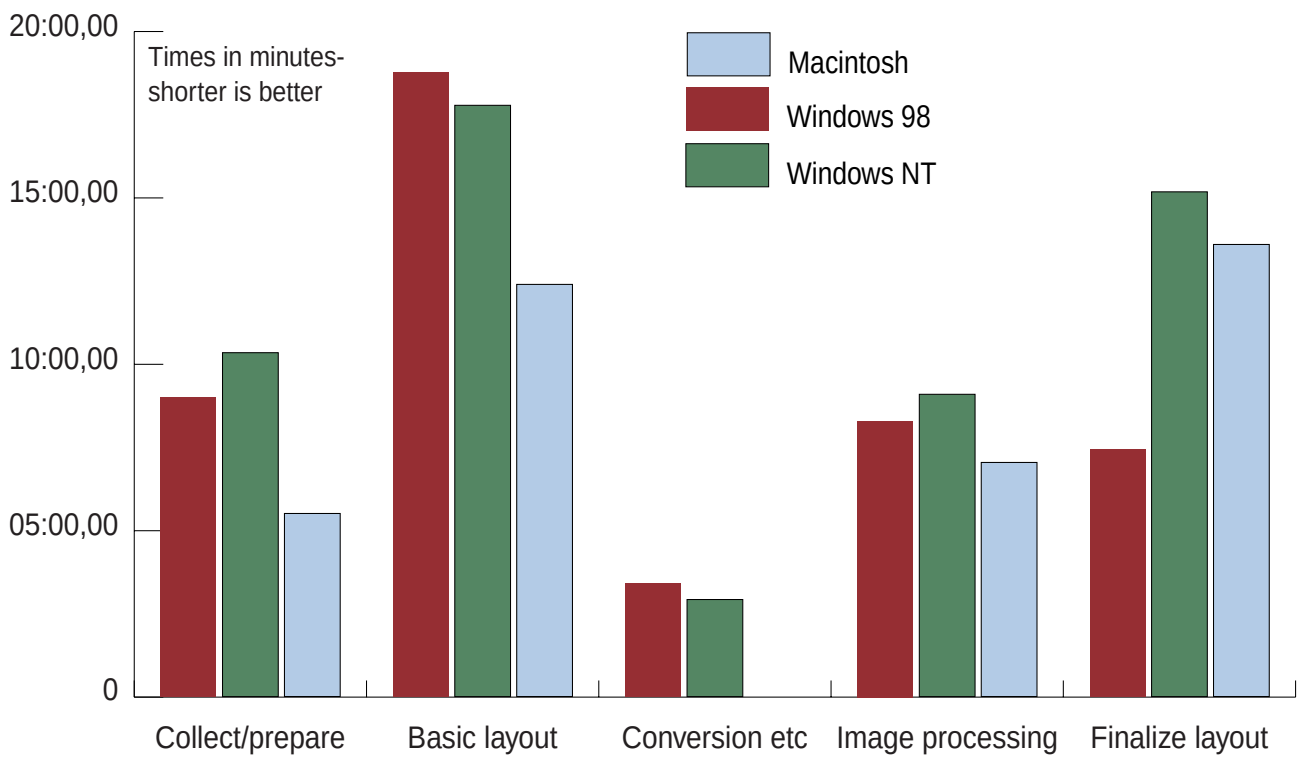
Pfeiffer Consulting has defined and documented the Publishing Reference Configuration™ in an attempt to define the state of the art in computer publishing. The Publishing Reference Configuration™ is not intended to be an absolute reference - such a thing would have no meaning in an industry where processing power doubles every 18 months It is defined to be a "best-of-breed" cross-platform standard configuration of hardware and software features, defined with the publishing professional in mind, and with the aim of comparing platforms at a given point in time, across a relatively broad range of publishing and design applications. All tests in this report were executed on the Publishing Reference Configuration 8/1998, documented in detail on www.pfeifferreport.com

See also related article on page 18

Real-world Productivity Benchmark: QuarkXPress in a Magazine Publishing Assignment

A real-world benchmark: the creation of a double-page spread for a magazine, combining page-layout tasks as well as basic image-processing and preparation of the files for output.

This test not only shows the comparative productivity, it also is an indicator of the differences between platforms.
Although the elements used in the test were identical on both platforms, the way the different platforms handled these elements was not… The same EPS file generated by FreeHand would not display correctly on the Windows-version of Xpress, meaning that it had to be converted. In addition, the automatically generated runaround for the silhouetted photographs were much less reliable on the Windows platform than on Macintosh platform, meaning that the operators had to manually fine-tune a runaround which worked as it should on the Macintosh platform.



Major Points

Support and Maintenance is a major issue for Publishing environments, which have a much greater need to continually adjust and reconfigure the software and hardware environment.

The Macintosh platform has much lower overall support and maintenance requirements that the Windows platform:

- Similar maintenance operations are at least two to three times faster on Macintosh than Windows.
- In similar situations, Macintosh system maintenance requires significantly less interventions by specially trained staff, resulting in lower maintenance cost.
- On the Macintosh platform, hardware configuration and device driver management can be undertaken by experienced publishing operators and does not always need the intervention of specialist technical support staff.

Support and Maintenance : The needs of the publishing industry

Support and maintenance represents a major area of difference between Macintosh and Windows platforms. As far as using system and application software are concerned, a properly configured Windows and Macintosh system work in a similar fashion. Windows based PCs represent support and maintenance problems especially for untrained (non-technical) users. Windows NT is difficult to configure and maintain except by experienced technicians. Windows 98 manages to hide many of the complexities of the PC environment, however, only very basic adjustments to the configuration of the system are within reach of an average user.

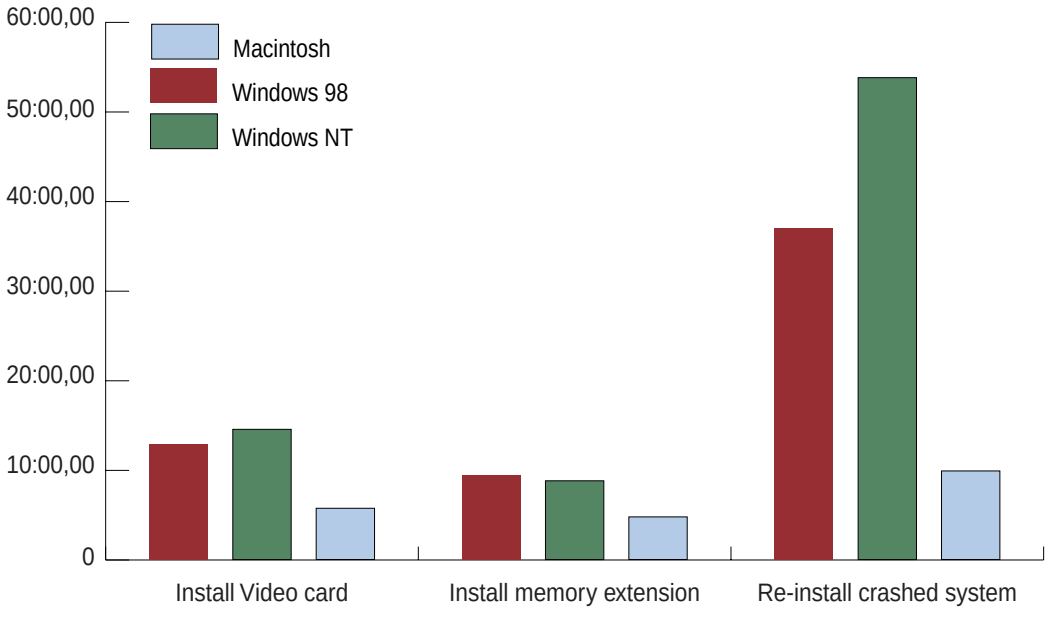
The world of professional publishing is unique in terms of computing needs. While in a general office environment, a computer system is set up in a configuration which does not usually change significantly over an extended period of time, computer systems in publishing environments have to be much more open to change and re-configuration.

Adding and changing removable drives, video-cards or scanner-drivers is part of the routine for publishing operators, as is to add new fonts to the system or to de-activate others. The ease with which a user can do this is an important aspect of publishing functionality, and should be assessed when analyzing operating systems for publishing.

Problems in continuously changing environments are manifold: Windows-applications tend to install shared resources in many different places on the hard-drive. Even for a very experienced Windows user, it is difficult to keep track of what is going on without the aid of specialized "un-installer" utilities.

In several respects, maintenance of Windows based computers is both simpler and more complicated than Macintosh computers. Simpler because of industry-wide standards: it is usually quite easy to find outside help in case of technical problems.

Maintenance Benchmarks for MacOS, Windows 98 and Windows NT



The basic maintenance operations, as obtained by qualified technicians, were timed both on Macintosh and on Windows platforms.

The most significant time-differences are linked to system installation, which, especially for Windows NT, can take several hours to fine-tune driver installation. In general, installation of system software on Windows requires more operator assistance than on Macintosh.

More difficult because many operations which can be achieved by a non-expert on the Macintosh need trained maintenance staff on Windows, and particularly on Windows NT. For this reason, simply comparing maintenance times does not necessarily give a clear picture of the issues involved.

There are several important implications in this observation. First of all, on the Macintosh platform, untrained users can understand more of what is happening in the computer, and can therefore perform a much broader range of maintenance operations themselves.

Because of complexities in the general structure of the operating systems, Windows NT and, to a lesser degree Windows 98-based systems take much longer to reconfigure after, for instance, a crashed hard-drive, than a Macintosh. In a system test, booting from the internal CD-ROM, initializing the main hard drive and re-installing the complete operating system software was achieved in less than 10 minutes on the Macintosh platform, and could have been executed by an average user.

By comparison, on a PC, the same operation requires relatively detailed knowledge of MS-DOS, to load drivers and format the hard drive.

Microsoft has gone a long way in trying to make Windows 98 easier to use and to configure. For example, Windows 98 does a good job in assisting installation of a new hardware driver. However, if one wants to change what has already been configured, things can become much more complicated and time consuming. For any maintenance and configuration operation other than very basic operations, the Windows platform often requires specially trained technical support staff.

One support and maintenance advantage that the Windows platform has over the Macintosh platform is that it is an industry-wide standard: it is usually easier to find outside help in case of technical problems.

Implications

- It is not feasible to use Windows based PCs in a production environment without the appropriate technical support staff at hand.
- In a deadline-driven publishing operation, significantly increased maintenance times of Windows platforms have to be taken in account.
- On Windows, frequent software installation and de-installation significantly increases the likelihood of problems with stability.

Required User-Competence Chart for Common Maintenance and Configuration Tasks

One of the key-differences between Macintosh and Windows platforms is the question of expertise necessary to accomplish different maintenance tasks. One of the great advantages of the Macintosh (which has made it popular with small operations, especially in the graphic design and publishing market) is the fact that the vast majority of maintenance operations can be completed by an untrained, but motivated individual. On the PC side, the layer of end-user comprehensible settings is much thinner. On the Macintosh platform, configuring and administering a server can be achieved with comparatively minimal training; however, on the Windows platform anything which goes beyond adjusting simple settings requires specialist skills. Even re-installing a basic system on a crashed hard drive necessitates some knowledge of MS-DOS - not something with which the average publishing operator is particularly comfortable with. (Chart based on interviews with users and maintenance experts)

Maintenance operation	MacOS	Windows 98	Windows NT 4.0
Software Installation			
Font Installation			
Connect to network			
Configure individual network use			
Configure Server			
Configure Filesharing			
Configure hardware drivers			
Change hardware drivers			
Configure Virtual Memory usage			
Manage generic system resources			
Manage specialized system resources			
Reconfigure malfunctioning drivers			
Trouble-shoot crashing system			
Re-install OS on bootable system			
Re-install OS on crashed harddrive			
Manage changes in hardware configuration			
Reconfigure a crashed system			

Task can be completed by an average user

Task can be completed by an average user with training

Task requires a trained technician

Color management: Major Points

- ColorSync, which has been introduced over five years ago, is a very mature technology which has already achieved the position of an industry standard and has excellent application support and a strong international user base.
- ICM (Image Color Matching) 2.0 is currently only available on Windows 98. It is supported by some application programs, but it is still very rarely used, and there is little or no practical know-how on the subject in the market.
- The fact that it is currently totally color-agnostic excludes Windows NT as a publishing platform where system-wide color management is important - or at least it means that users will have to wait for the availability of Windows 2000 or ColorSync for Windows.

Color Management on the desktop : ColorSync 2.5 vs ICM 2.0

As most forms of content production move rapidly to the digital realm, system-wide color management is becoming a crucial feature for computers.

While the printing industry was the first to experiment with color management, all other fields of vidual content creation and management are beginning to feel the need for reliable, predictable color reproduction : in e-commerce for instance, many consumer-goods such as cloths or other fashion items will only become a compelling proposition for consumers if the representation that a web-site may offer them is as reliable as a reproduction in a printed catalogue.

Even video-production will benefit immensely from color management to compensate for changing color-spaces, for instance when moving from NTSC to PAL.

MacOS

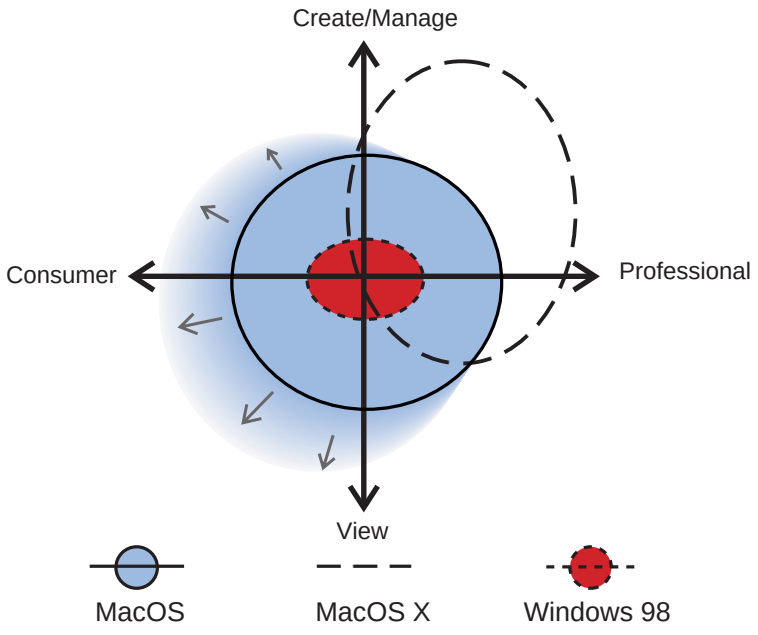
Color management is another key area where operating systems differ considerably. Apple has invested in color management technologies for many years, and ColorSync, currently at version 2.5, is a mature technology.

ColorSync is a robust, ICC (International Color Consortium) compliant color management system which is well integrated with the MacOS. ColorSync acts as an integrator which is open to the different calibration technologies and Color Management Modules available on the market, from Agfa, Heidelberg CPS, Kodak, and so on. Application support for ColorSync is excellent, both in relation to creating and managing profiles and characterization-files, and in terms of the level of support from the major publishing and design applications, which all support ColorSync in their most recent versions.

Operating System Positioning : Color Management Technology

Usage of color management is likely to evolve extensively over the next few years, to become a pervasive part of the computing experience. Positioning of operating systems in this emerging market will be double : as a viewing client of color-calibrated content, such as web-sites or digital video, and purely on a management/creation side, which will itself move into the mainstream market. In this trend, both MacOS and Windows 98 will progressively move towards the end-user/viewer, while MacOS X is likely to have a strong presence in the professional color management market.

The emerging market for digital video managed on desktop systems will also benefit from color management tools, which are bound to trickle down into less professional areas as technology becomes easier to use and as non-specialized computer users become more color management savvy.



This includes even web-design packages such as CyberStudio, as well as VideoPrism video-effects software.

Windows 98

On the Windows-side, the situation is more complex. Microsoft included a very incomplete first version of its color management system ICM (Image Color Matching) with Windows 95, which remained practically unnoticed: it only supported the RGB color space and did not offer the full color transformations necessary for professional applications .

Currently the only version of Windows supporting fully-fledged color management is Windows 98. It contains ICM 2.0 , Microsoft's revised color management engine, which uses LinoColor from Heidelberg CPS as the default Color Management Module (CMM).

Like ColorSync, ICM 2.0 also supports ICC profiles and the different vendor's calibration technologies, but since Windows 98 has only been on the market for less than a year, it is too early to reliably assess its qualities and shortcomings or the future level of integration with the major publishing and design applications.

Windows NT

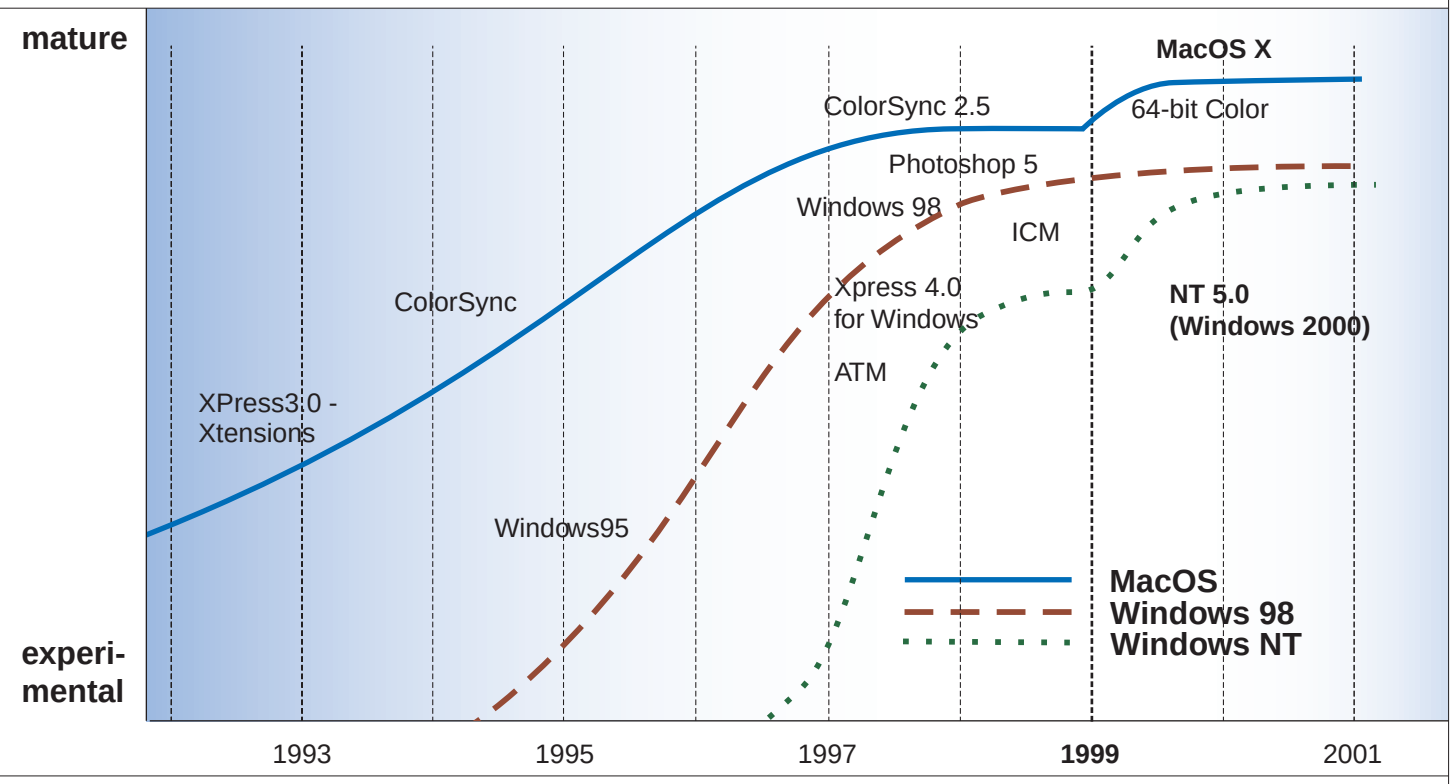
Windows NT 4.0 has no support whatsoever for color management at the system level. (Apple has announced that it is planning to make ColorSync 2.5 available for the PC in the near future, but no release-date has been announced yet.) However, Microsoft has announced support for ICM 2.0 for Windows 2000, which is expected to be available by the end of 1999.

Market support

- Due to its longstanding presence in the market, ColorSync is used in a growing number of professional applications from printing to web-design and even video.
- ColorSync has been adopted as standard for color management in newspaper production by IFRA, the world's leading association for newspaper and media technology.
- Stock photography suppliers like PhotoDisc use ColorSync to provide customers with the highest possible quality images.

Evolution of Color Technology in Desktop Operating Systems

On both the Macintosh and Windows platforms, the color publishing and prepress segments of the market are expected to see strong developments in color technology in the next twelve to eighteen months.
Apple has been leading in this field thanks to a head-start in both in terms of application software and in color management. Windows 98 has started offering similar functionality, and Windows NT won't become fully color aware until Windows 2000 is available.
On the Macintosh platform, things are also likely to speed up. If Apple keeps to its time-table for the delivery of MacOS X, the Macintosh platform will maintain it's competitive edge in publishing functionality, especially in relation to support for 64bit color, which is expected to provide a signifcant boost to the evolution of professional imaging applications.



Major Points

- MacOS is the only operating system examined which includes system wide, user-lever workflow automation and scripting tools.
- AppleScript is well integrated in the operating system and is supported by a majority of applications for the publishing and design market.
- Windows offers users access to programmable functions in the operating system through DOS commands, which need programming skill and are inappropriate for user-level workflow automation.
- Visual Basic is not shipped with Windows and has to be purchased separately.
- Visual Basic is an object-oriented programming environment for vertical applications which is targeting the professional programmer

Code examples

AppleScript

```
tell application "Finder" to duplicate
(every file of the startup disk
   whose name contains "Smith Project")
  to the folder named "Daily Backup"
```

Windows (DOS commands)

```
@echo off
Cls
@if exist C:\WINDOWS\tmpcpyis.bat
del C:\WINDOWS\tmpcpyis.bat
@if exist C:\WINDOWS\winstart.bat
C:\WINDOWS\winstart.bat
```

Windows (Visual Basic)

```
If CGI_RequestMethod = "GET" Then
  SendPickQueryForm
  Exit Sub
End If
Filename = GetSmallField("filename")
Itemname = GetSmallField("itemname")
PickRequestFile = FreeFile
On Error Resume Next
```

Workflow issues :

Automating publishing tasks under Macintosh and Windows Operating Systems

Workflow automation in publishing and design has become a major productivity issue in many high-level applications. The ever-increasing number of image-files linked to web-design, the very specific needs of catalogue-publishers, the highly complex data-management problems linked to classified ads, to name but a few, bring with them computing needs which have more or less nothing to do with general office computing. Literally every segment of the rapidly expanding market for digital content creation and management has very specialized needs for scripting tasks, which in most cases have to work on a system level, and must be able to link several applications, which, in many cases, were never developed to function together.

Current operating systems' approach to automating tasks.

The only operating system examined here which ships with a user level scripting tool is MacOS, which has included AppleScript for many years. Microsoft handles user-level programming through two separate tools : MS-DOS commands, through a programming console which is part of Windows and can be brought up at any given time, and through Visual Basic, which has to be bought and installed separately, either as part of Microsoft Office, or as a stand-alone product.

The way in which Windows an MacOS handle user-level programming is a good illustration of the difference of those platforms : MacOS, through AppleScript, is targeting the non-technical user, with tools which are within the reach of a motivated, experienced user and do not need formal training. Windows, on the other hand, offers system-level programming through DOS commands, and vertical application development through Visual Basic, but lacks a tool which lets users do simple scripting. This is, however, a serious shortcoming of the Windows platform for the publishing professional: digital content creation's needs for workflow automation have little to do with genuine programming, and would not support the development cost associated with fully-fledged application programming. Essentially, just like macros of a spreadsheet, workflow automation needs to be controlled by a person heavily involved in the information processing in order to be efficient. Only a natural-language scripting tool capable of recording users actions instead of relying on hand-coded program segments can offer that sort of functionality, especially since workflows in the publishing industry tend to evolve considerably over time. Pre-canned vertical applications can not offer the necessary adaptability.

Technical details : MacOS/AppleScript

AppleScript is completely integrated in the Macintosh operating system, and offers access to a multitude of system tasks as well as inter-application information exchange. Scripts can be generated through a scripting console, but a record-mode allows users to execute a number of operation he wants to automate, and to rework the resulting script later. In this respect, AppleScript is closer to a macro-language which is comprehensible to the vast majority of users.

Another important aspect of AppleScript is that it uses natural language terms (clean up, get, tell...) and can therefore be displayed in a number of lan-

guages ranging from English to French or even Japanese.

AppleScript is based on AppleEvents, which allow information-exchange between programs (for instance, copying an image, launching a second application, and pasting the image into a given document.). AppleEvents, in turn, rely on the Open Scripting Architecture (OSA) which defines the minimum scripting functionality which has to be provided by any scriptable application.

AppleScript is used in a number of ways in the publishing community, to the point that there are special applications for scripting programs, such as PhotoScripter, which lets users fully automate Adobe's program in a more complete way than the built-in scripting facility.

Technical details : Windows

The only tool for system level programming provided as standard with Windows are DOS commands, which are entered through a special programming console. DOS commands use programming conventions and are very distant from natural language. (See example in sidebar). Also, while DOS commands are a powerful (and potentially dangerous) tool for controlling low-level aspects of the system, they are not appropriate for workflow automation. Visual Basic, on the other hand, is not part of the operating system. It can be purchased separately, or installed as part of Microsoft Office. However, Visual Basic is not system wide: in order to support inter-application workflows, it is necessary to incorporate OLE.

Visual Basic was initially developed for use with Microsoft Office to enhance Excel's macro-capability and to help developers create vertical applications based on Microsoft's spreadsheet. It has since developed considerably, to become a fully fledged object-oriented application-development system. As such, it is closer to C++ than to AppleScript, and it is clearly targeting professional programmers.

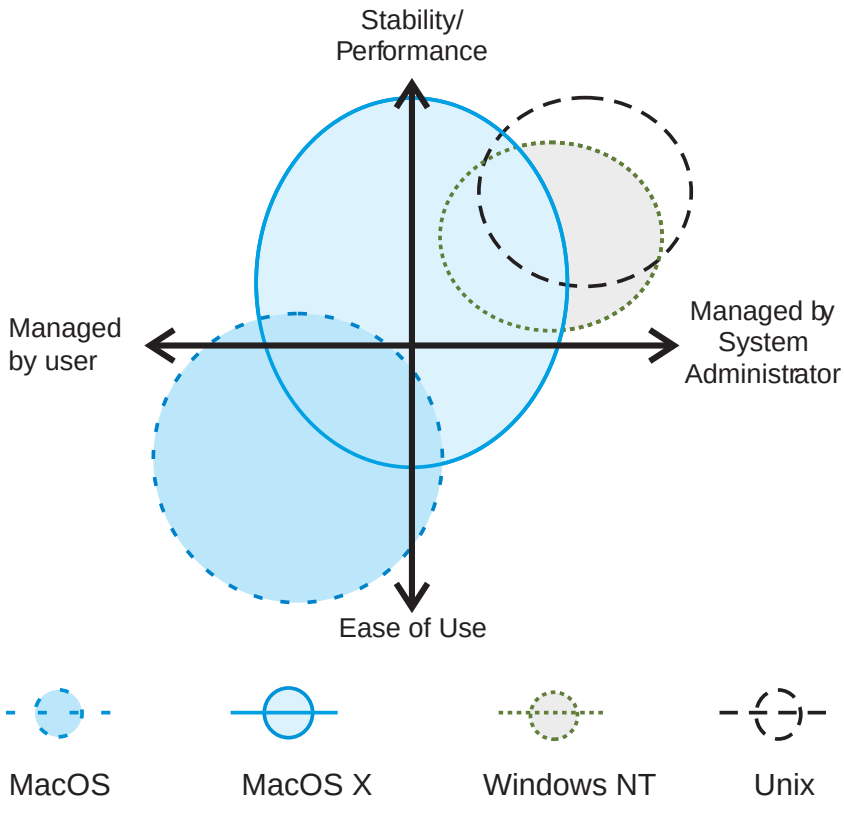
Windows 2000 is expected to offer system wide scripting using Visual Basic or JavaScript.

Implications

- AppleScript is used extensively by publishing professionals to automate even complex tasks.
- The tools developed for a specific market-place always reflect user's needs in this segment. The programming tools for Windows are excellent for creating vertical applications - but are not adapted to the needs of workflow automation in the publishing Marketplace.
- On the Macintosh platform, specialized tools and know-how exist for creating flexible workflow solutions that can easily be customized by non-programmers.

Server System Positioning: MacOS X Server vs. MacOS, Windows NT 4.0 and Unix

The arrival of MacOS X Server is likely to redefine the positioning of server operating systems in the prepress and publishing market. Based on a Unix kernel, MacOS X Server offers all the bells and whistles of a full-fledged server environment : protected memory, pre-emptive multi-tasking and so forth, as well as excellent hardware performance. Technically speaking, MacOS X Server is much closer to Unix-based offerings like those from Sun than to Windows NT, but offering ease of use inhabitual for professional server software. In other words, MacOS X Server will cover a much more central portion of the server market than either Windows NT or Unix. Finally, the capacity of net-booting Macintosh computers from a MacOS X Server will offer a very attractive proposition for the management of editorial workgroups and newsrooms, by significantly reducing the maintenance and administration workload.



The Publishing Market :

Technology trends in a multi-platform environment

The professional publishing market is still very clearly committed to the Macintosh platform, and the Macintosh is still the most widely used system in professional design and publishing environments. A study conducted by the French industry magazine Caractères in late 1998* showed that print-professionals in France still overwhelmingly choose Macintosh-based systems, and intend to continue for the next few years. Research conducted with users on all levels confirm this trend for the publishing and graphic arts market.

Software publishers do not see a trend towards cross-platform migration. At the period of Apple's financial and management problems 12-18 months ago, the publishing industry was in a state of shock, thinking for the first time seriously about moving to the Windows platform. Despite strong sales on the PC, neither Quark nor Adobe have recorded any significant erosion of the installed base.

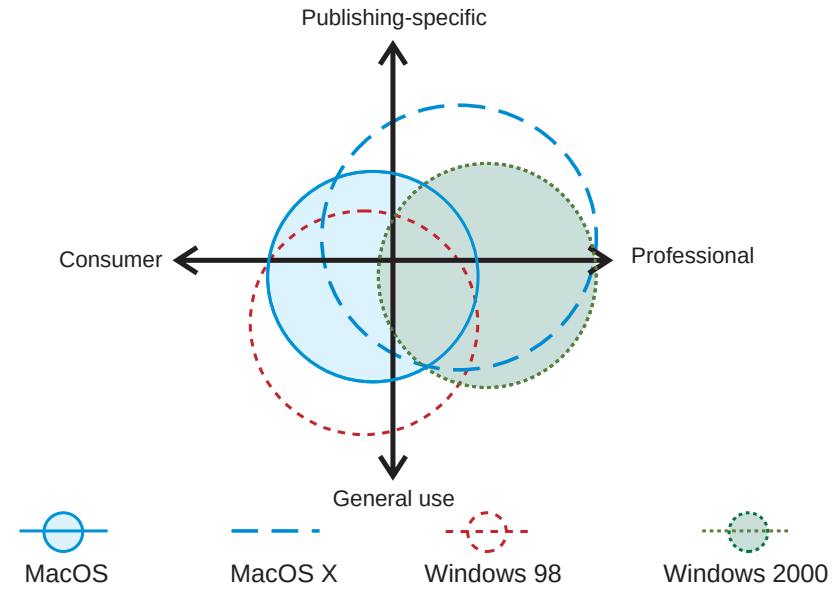
So far, cross-platform migration is more a preoccupying thought than a market reality. Quark XPress remains mainly a Macintosh product, despite improved cross-platform capabilities in XPress 4.0. Adobe sees strong sales for its products on the Windows-side, but does not detect any significant cross-platform migration. According to our research, sales of PC-based publishing equipment go mainly to communication-departments in companies which have standardized around the Windows platform. The major boost for Windows' presence in publishing has been from companies which previously outsourced this capability, starting to produce print-products as well as web-sites on Wintel systems. The professional publishing market is still very clearly committed to the Macintosh.

** Caractères N°486, October 27, 1998*

Major Points

- The Macintosh platform has remained the clear standard in the professional design and publishing market internationally.
- Cross-platform migration from Macintosh to Windows or Windows NT is minimal.
- Increased sales of design and publishing software on the Windows platform go mostly into the corporate (non-professional) marketplace.

Operating System Futures : Impact of MacOS X and Windows 2000 on Publishing & Design



The arrival of MacOS X and Windows 2000, which is expected to occur towards the end of 1999, will have a profound, long-term impact on the publishing market. On the Macintosh side, MacOS X will provide professional users with the high-end features of a modern operating system, such as true pre-emptive multi-tasking, and protected memory, which will considerably change the positioning of the platform.
For publishing professionals, MacOS X will offer an extended set of graphics capabilities, such as: system-wide alpha channels, 64-bit color, and PDF-support on the system level. This will provide software developers with extended capabilities which will enable them to develop the next generation of professional publishing and imaging applications.
Windows NT 5/Windows 2000 will mark Microsoft's push towards a unified operating system for both desktop and professional users. For the publishing professional, the main aspects of Windows 2000 will be system-level PostScript and OpenType support, as well as integrated color management through ICM 2.0

Platform Migration:

Evaluating the full cost of migrating from the Macintosh platform to the Windows platform

Major Points

- While the major application software packages for publishing run both on Macintosh and Windows, migration to a unified Windows environment creates considerable cost in training, and maintenance as well as in upgrading software licenses.
- The loss in productivity linked to cross-platform migration can create extra cost in a deadline driven operation.

Recommendations

- Pfeiffer Consulting's research shows that well-integrated cross-platform environments which intelligently combine PCs and Macs create the most cost-effective, and the most productive professional publishing environment.
- If there is a strong strategical pressure within a company to migrate publishing tasks from Macintosh to PC, it is technically possible to migrate production to the PC platform if one accepts increased running costs, higher maintenance, and a less mature publishing environment.
- Pfeiffer Consulting recommends studying carefully the real friction points of integration in your organization and to invest in the appropriate compatibility options, rather than changing the basic structure in a far-reaching way.

Over the past twelve to eighteen months, the migration of publishing users from the Macintosh to the Wintel-platform has been a heavily debated topic which has pre-occupied publishing professionals and industry observers alike.

The question of the ideal platform for publishing is indeed a complex one, and was triggered both by the arrival of Windows versions of major publishing applications and concern about the future of Macintosh.

The outlook today is considerably more positive for the Macintosh platform. Almost none of the professionals we interviewed for this report seemed to question seriously that the Macintosh still is the best platform for publishing – although practically all had given the idea of cross-platform some serious consideration.

Migration for management reasons

Unification of platforms is based on the desire to lower cost and management problems globally by sacrificing some efficiency on a local level. In the case of the publishing industry, this is a move with far-reaching implications. Pfeiffer Consulting recommends a very carefully analysis of the hidden costs and the ripple-effects which can be associated with a move towards cross-platform migration.

At a systems management level, having a single computing platform is much easier than dealing with different operating systems, which usually requires different device drivers, peripherals, and technical skill sets. Standardizing on a single platform make the MIS manager's life easier. That's why many large corporations are thinking about phasing out the Macintosh-system in their design- and communication departments in order to replace them with Intel-based hardware.

Making a decision on this level basically means weighing the gain in ease of management against a potential loss in efficiency and productivity on a local level. For the communication department in a medium to big organization, this may not be of concern. In a dead-line driven industry where product-excellence always influences market-position, this concern is more serious.

Pfeiffer Consulting recommends looking closely, and if necessary audit, efficiency and productivity-related issues in the production-department before making a decision on platform-change.

Migration for financial reasons

It is difficult to make a good case for cross-platform migration on purely financial grounds: while low-end PCs tend to be cheaper than low-end Macintosh systems, the increased maintenance and training costs associated with supporting the Windows platform significantly outweighs the lower initial cost of purchasing hardware and peripherals.

Pfeiffer Consulting recommends analyzing migration costs closely in order to establish the financial impact. Training costs alone can account for several thousand dollars in the case of a cross-platform migration, and only a very large organization with large-scale maintenance staff will be able to absorb the increased support requirements that are associated with the Windows platform.

Major Points

• The Publishing Reference Configuration™ has been defined by Pfeiffer Digital Technology Assessment Labs as a means to compare and test performance and productivity on different operating system environments in a meaningful way for professionals of the field.

• The Publishing Reference Configuration™ is a complete definition of hardware and software features and configuration settings to insure reproduceable comparison of the Macintosh and Windows as publishing and design platforms, as measured by system throughput benchmarks, single-task application performance benchmarks, and "real-world" productivity-tests.

• Pfeiffer DTA Labs will update the Publishing Reference Configuration™ on a regular basis as new developments in the market become available. Benchmark results are continually updated in order to provide reliable technology assessment at any given point in time.

• Other Reference Configurations defined by Pfeiffer DTA Labs :

Digital Imaging Reference Configuration™

Digital Video Reference Configuration™

Web Design Reference Configuration™

About the Publishing Reference Configuration™

The Publishing Reference Configuration™ has been defined with the aim of providing platform-evaluation and comparison of Macintosh and Windows platforms in respect to professional publishing at one given point in time. Obviously, due to the constantly evolving nature of technology, defining an non-evolutionary reference configuration would be pointless. To take in account evolutions in hard- and software (new processors, new versions of software, new I/O technologies, etc.), Pfeiffer Consulting has decided to update the Publishing Reference Configuration™ on a regular basis, as new developments become available. At each new installment, the reference benchmarks are re-executed to insure accurate platform comparison. This allows not only to provide accurate platform comparison at any given time, but also to compare performance evolutions within one given platform.

Great attention has been paid to insuring comparable features which will allow meaningful test-results and realistic assessment of system performance and productivity. Therefore, whenever possible, identical or at least similar hardware features and software options were respected : only UltraSCSI hard drives are used, instead of standard equipment. Display units required are 21 inch monitors as well as a video card with at least 8MB of memory (Apple is an exception to this requirement, since all currently shipping G3 models are feature a 16MB video card). The same screen resolution is used for all configurations as well as similar bit-depth. For complete details on the Publishing Reference Configuration™ and related information, please refer to www.pfeifferreport.com.

The Publishing Reference Configuration ™ 1/1999 - Technical Details

Macintosh

Hardware

- Power Macintosh G3/400
- 21 inch monitor w/ 16MB video-card*
- 128 MB RAM
- 9 GB UltraWide SCSI hard drive
- 10/100baseT Ethernet

Software

- MacOS 8.5.1
- ColorSync 2.5
- ATM (Adobe Type Manager) Deluxe
- ATR (Adobe Type Reunion) Deluxe
- minimum of 25 PostScript type families active in system
- Quark XPress 4.0.4
- Adobe Photoshop 5.0.2
- Adobe Illustrator 8.0
- MacroMedia FreeHand 8

**Memory requirement for video-cards is 8MB; Apple currently only ships 16 MB cards in recent models.*

Windows NT 4.0

Hardware

- Intel Pentium II/450
- 21 inch monitor w/ 8MB video-card*
- 128 MB RAM
- 9 GB UltraWide SCSI hard drive
- 10/100baseT Ethernet

Software

- Windows NT 4.0 (Workstation)
- ATM (Adobe Type Manager) Deluxe
- minimum of 25 PostScript type families active in system
- Quark XPress 4.0.4
- Adobe Photoshop 5.0.2
- Adobe Illustrator 8.0
- MacroMedia FreeHand 8

Required features currently not available in Windows NT:

System-wide color management (ICM or ColorSync), ATR (Adobe Type Reunion) Deluxe

Windows 98

Hardware

- Intel Pentium II/450
- 21 inch monitor w/ 8MB video-card*
- 128 MB RAM
- 9 GB UltraWide SCSI hard drive
- 10/100baseT Ethernet

Software

- Windows 98
- ICM 2.0
- ATM (Adobe Type Manager) Deluxe
- minimum of 25 PostScript type families active in system
- Quark XPress 4.0.4
- Adobe Photoshop 5.0.2
- Adobe Illustrator 8.0
- MacroMedia FreeHand 8

Required features currently not available in Windows 98:

ATR (Adobe Type Reunion) Deluxe

About Pfeiffer DTA Labs™

Digital Technology Assessment (DTA)™ has become a major issue in an industry with explosive growth covering extremely complex professional market-segments. Pfeiffer Consulting has created Pfeiffer DTA Labs™ in order to provide high-level, independent technology testing specific to the digital content creation market. Pfeiffer DTA Labs™ offers market specific tests and benchmarks to help professional users and technology managers assess competing technologies.

Methodology

Configurations. Prior to executing benchmarks on a particular sector of technology, Pfeiffer DTA Labs™ works closely with a panel of publishing and technology professionals to establish a reference configuration.

Reference configurations are documented in detail, and accessible on our Web sites. (www.pfeifferreport.com).

Test procedures: Pfeiffer DTA Labs™ defines a complete set of operations and assignments which are executed in a controlled and documented way. Once tests are completed, results are analyzed and weighted, in order to provide clear performance assessment which is both scientifically accurate and meaningful to design and publishing professionals.

Publication of results. Key results of DTA Benchmarks™ are accessible on our web-site (www.pfeifferreport.com). The complete set of benchmark documentation, result listings, and analysis are published by Pfeiffer Consulting, and can be purchased via our web-site or through mail-order.

For more information, please contact research@pfeifferreport.com

Pfeiffer Consulting: Background Information

Pfeiffer Consulting is an independent technology research institute and consulting operation focussed on the needs of publishing, digital content production, and new media professionals.

Pfeiffer Consulting offers independent, high-level benchtesting and analysis of products and technologies for both professionals and the industry.

Pfeiffer Consulting was founded 1998 by Andreas Pfeiffer. Expert in computer-based publishing and new media for over 15 years, Andreas Pfeiffer has worked as a publishing consultant for publishers and advertising agencies in the early days of computer based publishing, establishing the first magazines in France produced with desktop technology, before spending several years as editorial director and technology advisor of a major European industry periodical.

Company Mission

- To provide independent and unbiased hardware and software benchmarking geared towards the needs of professionals of design and publishing professionals.
- To offer in-depth technical and strategic analysis to corporate decision-makers and technology managers.
- To create an independent, unbiased knowledge base about strategic technologies for the Publishing and Content Creation industry.
- To provide hardware and software suppliers with strategic information on the needs and concerns of design and publishing professionals.

www.pfeifferreport.com

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