



Supporting Mac

A Feasibility Study

1 Document Details

Title: Supporting Mac – A Feasibility Study

Client: Internal

Status: Final

2 Revision History

Date	Version	Author	Comments
13 Jan 2011	0.1	Adam Finden & Henry Singleton	

Table of Contents

1 Document Details	2
2 Revision History	2
3 Introduction.....	4
4 Maintenance and Support.....	5
5 Passing on of Hardware	6
6 Flexibility	7
7 Compatibility	8
8 Security.....	9
9 Mobile Application and Web Development.....	10
10 Pricing.....	11
10.1 Hardware cost	11
10.2 Additional cost	11
10.3 Value	12
11 Conclusion	14
12 Appendices	15
12.1 Appendix 1 – Detailed pricing breakdown	15
12.2 Appendix 2 – Display productivity benchmark.....	16

3 Introduction

With over a quarter of Brightlabs staff choosing to work on their own personal Macs, the issue of whether or not Mac is a suitable fit for Brightlabs is becoming more and more relevant. The purpose of this report is to present a case for Brightlabs to purchase iMacs for those staff who wish to use Mac machines as their work computer. This report tries to avoid a Mac vs PC view; instead a series of issues will be presented and addressed (such as pricing and support) in an effort to provide the basis to an argument that those staff members who prefer to work on Mac are supported to do so.

4 Maintenance and Support

Currently, we have 3 developers who present the skill set required to provide adequate hardware support when necessary for PC machines, as well as new machine setup. This is not ideal, as it takes valuable time away from developers doing what they are being paid to do. It also means we currently have a reliance on these staff members, and if they are predisposed it can have a serious on-flowing impact on productivity.

Brightlabs is currently not at a size where it is feasible to have full-time IT support personnel, which makes the time and cost of maintenance and support even more critical.

As an option when purchasing a new Mac, AppleCare can provide a very high level of support, with turnaround times comparable or better to having staff go to a local retailer and picking up replacement parts. It's also far better than the standard Dell hardware support (in my experience). If a machine requires replacement, a new one is typically available 24 hours after diagnosis. This fast turn-around, coupled with recent time-machine backups, means that a catastrophic hardware failure can result in very little lose of productivity.

5 Passing on of Hardware

Typically, when an existing PC is passed down to a different developer, or if we have a new staff member starting, the machine is formatted and set up anew. The cost for this is comparable to the new machine setup listed below (see 10 - Pricing). This results in either a senior developer having to sacrifice time working on projects to install the new OS, drivers, security patches and applications.

When a new user needs to be set-up on a Mac, all that needs to happen is for a new user account to be created. All user data, preferences, settings and files are kept completely separate per user, making the passing on of hardware a 5-minute affair.

6 Flexibility

While this may seem counter-intuitive at first, Macs can be quite flexible in the roles that they can perform in the business.

If a machine needs to be passed down to a user who is not comfortable using OSX, Windows can be quickly and easily installed under BootCamp. A fully supported driver pack is included, and any version of Windows can be installed. Windows and OSX can then be easily dual booted to ensure the machine can be used by the widest number of staff members.

The limited upgradability of an iMac can be seen as a disadvantage to its PC brethren, but this is less of a downside than it appears. In the past 12 months the only PC upgrades which have occurred have been memory. The latest iMacs come with 4 SO-DIMM slots easily accessible to be upgraded when necessary. The hard drive can also be upgraded, but it's not recommended. However, as the iMac comes standard with a 1tb hard drive, it is unlikely that a hard drive upgrade would be required before the machines end-of-life, if used in the typical office environment.

If an iMac does reach end-of-life, it can be repurposed as a high quality display only using the DisplayPort input on the rear.

7 Compatibility

Even though Apple products have been officially 'unsupported' at Brightlabs, there have been virtually no compatibility issues in the last 12 months at least from those using their own machines. If there were show-stopping issues involved supporting Apple hardware, we would have come across some by now. Also, the fact that there are no official hardware or software support personnel, just goes to show how little issues there have been.

8 Security

OS-level security is higher, with a default set of elevated privileges required to install system-altering new software, change significant system settings etc. Users can, of course, be set up as an Administrator-level account if full system access is routinely required.

The OSX operating system is built on a solid Unix foundation, and has very few known viruses in the wild, and virtually no spyware. While some will argue this is due to a lower install base, the level of spyware and viruses does not correlate with the market penetration of Apple products. This results in far less down-time due to infections, and a faster and more reliable software experience.

9 Mobile Application and Web Development

This is still an area of uncertainty for Brightlabs, as demand for web or native based apps from our clients has been relatively slow. The mobile space is an area that needs to be closely watched, and as a web solutions provider there will come a point where developing for the mobile web will be as important as developing for the desktop.

Research conducted by IDC Australia and published by the Australian, identified that in Q1 2010, iOS accounted for 40% of Australian smart phone devices (<http://www.theaustralian.com.au/australian-it/surging-iphone-hot-on-the-heels-of-nokia-as-australias-no-1-smartphone/story-e6frgakx-1225879621669>). This statistic is more relevant to Brightlabs than world wide market share (of which iOS holds a significant 17%, <http://www.gartner.com/it/page.jsp?id=1434613>) as the majority of Brightlabs clients are Australian based.

Developing for iOS devices, web or native, can only be done on OSX. Mac ships with the iPhone Simulator pre-installed making testing mobile web sites and web apps for iOS devices quick and easy. If Brightlabs wishes to provide mobile solutions, Mac is the only option. Certainly, other major mobile OS's such as Android, Windows mobile 7, Symbian and Research In Motion must also be considered, but the fact is Mac is the only machine capable of developing and testing for all mobile OS's as it can run OSX, Linux and Windows.

10 Pricing

Apple has long been renowned for charging premium prices for their products. Recently, Apple has started switching a number of the components in its Mac product range from internally produced to out-sourced specialists, most notable being Intel as the main supplier of CPU's. This has in-turn dramatically affected the pricing of Mac products.

10.1 Hardware cost

Below is a cost comparison of Mac and PC; this includes a custom build from uMart (Brightlabs current supplier) and custom builds from Dell for similar specced machines.

Hardware components only (see Appendix 1 for detailed breakdown):

Apple 27" iMac	\$2049
uMart (custom build)	\$2050.96
Dell (custom build)	\$2,388

Prices were recorded on 30/1/2011 from respective online stores. uMart prices are for internet order only, and do not include assembly.

This is a direct hardware comparison, of which puts Mac \$1 cheaper than the PC equivalent, and \$339 cheaper than the Dell build. However, there are still a range of other costs that must be considered when pricing equipment.

10.2 Additional cost

When performing a custom build, individual parts need to be researched to determine value and compatibility with the rest of the system. We have estimated this at a conservative 1 hour.

The custom machine also needs to be assembled. An experienced build could be reasonably assumed to have a running machine in 2 hours (this includes setup of OS and other software).

This additional 3 hours adds at least \$300 extra (3 hours at \$100 per hour) to the unit price of a custom built machine over an iMac equivalent.

The hardware setup of a Mac involves taking it out of the box, and plugging in a single cord (the power cord). An exercise of, at most, 5 minutes.

Total initial outlay, from planning, setup and configuration:

	Apple 27" iMac	uMart (custom build)	Dell (custom build)
Research	0	\$100	0
Purchase Price	\$2049	\$2050.96	\$2,388
Hardware Configuration	0	\$300	\$0
TOTAL	\$2049	\$2450.96	\$2,388

10.3 Value

It could be argued that a number of the components included in the iMac are unnecessary. This may not necessarily be true; the obvious extra expense is the large display. For the design team this is a required component; extra screen real-estate is key for improving efficiency and quality when dealing with any design program (the 2560-by-1440 resolution is rare among display manufacturers). For others, research conducted by independent technology research institute and consulting operation Pfeiffer Consulting identified that large displays (specifically 30" cinema display) can result in measurable productivity and efficiency gains (see appendix 2).

In addition to this, the argument can be made that a premium product is not necessary; you can purchase a perfectly good machine for \$1000 and it will do the same job. Looking closer, this is not the case. The speed, reliability and long term gains made when buying a higher end machine (whether PC or Mac) cannot be argued. Developers running multiple virtual machines will spend more time working than waiting with a faster machine, designers working on complex site designs will spend more time designing than waiting for Photoshop or other programs to catch up.

Furthermore, it is expected of Brightlabs staff to produce the highest quality product possible, so it stands to reason that staff be provided with high quality tools to produce these products.

11 Conclusion

The purpose of this report has been to address some of the primary concerns any business encounters when looking at investing in a technology; being pricing, support, future technological trends and impact on end product. It has been identified that pricing in most cases favours Mac with PC equivalent coming in more expensive. Support, with a quarter of Brightlabs staff running Mac machines for a significant amount of time with no adverse affects and the option for high grade manufacturer support available through Apple care, this issue seems to be of little concern. Future technological trends, with the mobile web becoming more and more prevalent and Mac being the best option to develop for this trend, it seems reasonable to support Mac now in preparation for future client requests. Ultimately however, it is the product Brightlabs produces that is most important, as this is the core of the business. With Mac already being widely used throughout the production process, and no evidence to support that it negatively impacts the final product we deliver to our clients, it seems reasonable to request Brightlabs to provide staff with the choice of Mac or PC, and to fully support their decision either way.

12 Appendices

12.1 Appendix 1 – Detailed pricing breakdown

Items in Your Cart



27-inch iMac

A\$ 1,862.73 1 **A\$ 1,862.73**

Ships: Within 24hrs
Part number: MC510X/A

Configuration

3.20GHz Intel Core i3	8x double-layer SuperDrive
4GB 1333MHz DDR3 SDRAM – 2x2GB	Apple Wireless Keyboard (International English) and User Guide (English)
1TB Serial ATA Drive	Magic Mouse
ATI Radeon HD 5670 512MB GDDR3 SDRAM	Country Kit

[Add Free Gift Message](#)

Cart subtotal A\$ 1,862.73
Free Shipping **A\$ 0.00**
GST A\$ 186.27

Order Total A\$ 2,049.00

Recommended for You

Get up to a \$130 mail-in-rebate when you buy any Mac and a qualifying printer

Select from your favourite HP or Canon printer models to go along with your new Mac. Depending on the printer you choose, it could even be free after rebate. To qualify for this offer, you must purchase your Mac and printer at the same time. See the online [Terms & Conditions](#) for further details.



HP Photosmart Wireless e-All-in-One Printer A\$ 129.95

HP Photosmart Premium e-All-in-One Printer A\$ 299.95



AppleCare Protection Plan for iMac – Auto-enroll
A\$ 268.00



Bose® Companion® 2 Series II Multimedia Speaker System
A\$ 149.95



HP ENVY 100 e-All-in-One
A\$ 399.95

Frequently Asked Questions

What payment methods can I use?

You can pay in a variety of ways, including credit and debit cards. You can also use a cashier's check, money order, direct debit, cash deposit, and Apple Financial Services—just call an Apple Representative at 133-622 for more information. Learn more about [Payment & Security](#).

What financing options are available?

[Apple Financial Services](#) offers a range of finance solutions to suit your needs.

When will I get my items?

The 'Delivers' timeframe is an estimate of when your items will be delivered to your shipping address. This includes warehouse processing, or 'Ships' timeframe, plus carrier delivery times. All delivery lead times are estimated and cover only the metropolitan areas. Major metropolitan areas include: Adelaide, Brisbane, Canberra, Darwin, Hobart, Melbourne, Perth and Sydney. Learn more about [Shipping & Delivery](#).

What is Apple's return and refunds policy?

If you're not satisfied with your purchase, you may be eligible to return the item. Learn more about [Returns & Refunds](#).

Does Apple offer an education discount?

Apple offers special pricing to students, teachers, administrators, and staff members. If you think you qualify, visit the Apple Store for Education to place your order and learn more about [Education](#) pricing.



View/Print Cart

[Print Page](#)

Description



Dell(TM) U2711 27" Ultrasharp Widescreen Flat Panel Monitor

Date & Time: 29-01-2011 03:15 PM

SYSTEM COMPONENTS

Dell(TM) U2711 27" Ultrasharp Widescreen Flat Panel Monitor

Qty 1

Dell(TM) U2711 27" Ultrasharp Wide Screen Monitor

Unit Price \$848.97

Catalog Number: 39101 T14U2711WAU

Module	Description	Show Details
Base	Dell(TM) U2711 27" Ultrasharp Wide Screen Monitor	
Bundle	T14U2711WAU	
Standard Warranty	# Technical Support	
Dell Services: Hardware Maintenance	3 Years Premium Panel Warranty, Advance Exchange (Next Business Day)	
Dell Services: Telephone Support	Standard Telephone Technical Support (Monday - Friday, 8am To 8pm, EST)	
Freight Charges	Monitor Handling and Insurance Charges REL(Australia)/27FP	
		TOTAL :\$848.97



Dell OptiPlex 980MT

Date & Time: 29-01-2011 03:14 PM

SYSTEM COMPONENTS

Dell OptiPlex 980MT

Qty 1

OptiPlex(TM) 980MT Base, Genuine Windows(R) 7 Professional 32bit (English)

Unit Price \$1,689.42

Get \$150 (Incl. GST) Cash Off**- \$150.00**

Expires on: Thursday, February 3, 2011

Catalog Number: 39101 T320327AU

Module	Description	Show Details
Base	OptiPlex(TM) 980MT Base	
Operating System	Genuine Windows(R) 7 Professional 32bit (English)	
Memory	4GB (2x2GB) NECC DDR3 1333MHz SDRAM Memory	
Keyboard	Dell(TM) QuietKey Keyboard (English)	

Monitor	No Monitor
SATA Hard Drives	1TB SATA (7200RPM) Hard Disk Drive
Floppy Drive and Card Reader	19-in-1 Media Card Reader for Mini-Tower
Mouse	Dell(TM) MS111 USB Optical Mouse
Optical Drive	16X Max DVD+/-RW MT/DT
Speakers	Internal Speaker For MT
Power Cord / Ship Mod Options	System Power Cord x1 (ANZ)
Gedis Reference Bundle	T320327AU - OptiPlex 980MT
Dell Backup and Recovery Manager (DBRM)	Dell Backup and Recovery Manager (DBRM) V1.3 for WIN7
Dell Services: Hardware Support	3Yr ProSupport: NBD Onsite Service
Diagnostic DVD	No Diagnostic/Recovery CD media
Packaging	Shipping MOD (MT)
Shipping Documentation	End User License Agreement (English)
Items included in the System	Computrace Disable Info Mod
Items included in the System	Reduction of Hazardous Substances
Items included in the System	Dell Data Protection Access
Items included in the System	Integrated Intel(R) Q57 Express Chipset
Items included in the System	Integrated RealTek ALC269 High Definition Audio
Items included in the System	Integrated Intel(R) Graphics Media Accelerator X4500HD
Items included in the System	Integrated Intel(R) 82578DM Gigabit Ethernet LAN 10/100/1000
Country Code	Mod Specs Info (Australia)
Security Software	Trend Micro Worry-Free Business Security Service,MUI,30 Days
DVD Software Decode	PowerDVD Software Ver 9.5 and Roxio Creator Starter (Factory Install and Media Kits)
BLACK TOP Reader	OPT - ON (BLACK TOP Reader)
Windows Live	Windows Live Essentials
Processor Options	Intel(R) Core(TM) i3-550 Processor (3.20GHz,4MB)
Shipping Document Label	Label - Countries Shipping with 220-240V
System Recovery	No OS Media Kit
Reference Guide	No Quick Reference Guide
Freight Charges	OptiPlex(TM) Handling and Insurance Charges(Australia)/Seaship
Delivery Charges	OptiPlex(TM) Delivery Charges(Australia)
Monitor Freight	NO-Monitor-Freight

PCI Card for MT Chassis	512MB ATI Radeon HD 4550, FH, 1 DP & 1 DVI, Full Height
Heatsink	OptiPlex(TM) MT Chassis Mainstream Heatsink
Remote Management Options	Intel Standard Manageability, Hardware Enabled Systems Management
Dell Services: Installations	No Installation Requested

TOTAL :\$1,539.42

Sub-total	\$2,171.26
GST- Australia (10%)	\$217.13
Total Price	\$2,388.39

[Laptops](#) | [Desktops](#) | [Business Laptops](#) | [Business Desktops](#) | [Workstations](#) | [Servers](#) | [Storage](#) | [Monitors](#) | [Printers](#) | [Electronics](#) | [Large Text](#)
 All rights reserved : [About Dell](#) | [Site Terms](#) | [Terms and Conditions](#) | [Unresolved Issues](#) | [Privacy](#) | [Returns](#)
[Policy](#) | [Site Map](#) | [Feedback](#)

IMPORTANT DELL DETAILS:

GOODS BY DELIVERY ONLY: Dell Australia Pty Limited (ABN 46 003 855 561) is located at Unit 3, 14 Aquatic Drive Frenchs Forest NSW 2086. While the products advertised here are delivered direct to the customer, certain pre-configured and build to order products are available at selected retail stores. See in store for further details.

ONLINE PRICING: Prices advertised online include delivery fees. Goods are supplied by delivery only.

MISTAKES: While all efforts are made to check pricing and other errors, inadvertent errors do occur from time to time and Dell reserves the right to decline orders arising from such errors.

FINANCIAL SERVICES: Dell financial services (DFS) provided by an independent supplier, BOQ Finance (Aust) Limited (or its subsidiary). Weekly lease rates quoted by BOQ. Payments are monthly based on a 36-month lease to BOQ approved customers. First payment may be due before delivery. Terms & Conditions available from BOQ.

ONSITE & ADVANCED EXCHANGE SERVICES: Technician, replacement part or unit (depending on service contract) will be dispatched if necessary following phone-based troubleshooting.

GENUINE WINDOWS VISTA®: Some Genuine Windows Vista® features - like the new Aero™ user interface - are only available in premium editions of Genuine Windows Vista® and require advanced or additional hardware. Check www.dell.com.au/vista for details.

PRODUCT PERFORMANCE: We often quote speeds and other performance data (such as printer speed or processor speeds). Please note that these quotes are only for comparative purposes and your actual speed or other performance can vary with a host of factors, including the other equipment or telephone line used.

TRADEMARKS: Celeron, Celeron Inside, Core Inside, Intel, Intel Logo, Intel Atom, Intel Atom Inside, Intel Core, Intel Inside, Intel Inside Logo, Intel Viiv, Intel vPro, Itanium, Itanium Inside, Pentium, Pentium Inside, Viiv Inside, vPro Inside, Xeon, and Xeon Inside are trademarks of Intel Corporation in the U.S. and other countries.

COPYRIGHT: © 2010 Dell Inc. All rights reserved.

~ Estimated delivery date only and may vary subject to parts availability, your payment being received by us and delivery to metropolitan areas only. See www.dell.com.au/consumer/delivery_information for further details or call us on 1-800-812-393.

snCM04

- Products
 - Desktop Computers
 - Notebook Computers
 - Corporate Computers
 - Academic Computers
 - Accessories
 - IPOD Accessories
 - Barcode Scanners
 - Cable
 - Camera
 - Case & Power Supply
 - CD/CD-RW/DVD
 - Cooling
 - CPU
 - Digital Tablet
 - Digital Frame
 - External Enclosure
 - Floppy
 - Gaming
 - Hard Disk
 - HeadSet
 - Home Entertainment
 - Keyboard
 - Media(Blank CD/DVD)
 - Media Player/PRV
 - Memory
 - Modem
 - Monitor& LCD TV
 - Motherboard
 - Mouse
 - MP3 Player
 - Network
 - On Site warranty
 - PDA/GPS
 - Plasma Display
 - Printer
 - Printer Supplies
 - Projector
 - Scanner
 - SCSI Products
 - Software
 - SoundCard
 - Speakers
 - UPS
 - Video Card
 - Video Editing

location) **Check Out Step 2** (You are at Milton Pickup

Product	Quantity	Price	Gst	Total
USB2 Internal all in one Card Reader white	1	\$9.00	\$0.82	\$9.00
Asus Wireless BT21 mini USB Bluetooth Doogle	1	\$19.00	\$1.73	\$19.00
Logitech LS21 Stereo Speaker Black	1	\$25.00	\$2.27	\$25.00
Microsoft Windows 7 Pro 64bit OEM	1	\$148.00	\$13.45	\$148.00
Microsoft Wireless Comfort Desktop 5000 USB Blue Track	1	\$79.00	\$7.18	\$79.00
Kingston 4G(2x2G) DDR3 1600MHz CL8 HyperX	1	\$95.00	\$8.64	\$95.00
Seagate 1TB SV35 7200.5 SATA 32MB	1	\$91.00	\$8.27	\$91.00
CoolerMaster Centurion 5 II Black Tower Case W 500W PSU	1	\$112.00	\$10.18	\$112.00
ASUS PCE-N13 WLAN PCI-Express Low Profile	1	\$39.00	\$3.55	\$39.00
Gigabyte ATI HD5450 512MB OC PCI-E2.0 128-bit DDR3 DVI/HDMI DX11	1	\$48.00	\$4.36	\$48.00
Logitech C510 HD Webcam	1	\$50.00	\$4.55	\$50.00
Intel Core i3 560 Processor LGA1156 3.33GHz 4MB Cache CPU	1	\$157.00	\$14.27	\$157.00
Asus Xonar DG PCI Gaming soundcard	1	\$40.00	\$3.64	\$40.00
Asus DRW-24B3LT 24x DVD RW SATA	1	\$35.00	\$3.18	\$35.00
LightScribe Asus P8P67 EVO L1155 P67 4x DDR3 SATA3 SATA2 eSATA RAID USB3.0 Firewir	1	\$255.00	\$23.18	\$255.00
Total			\$109.27	\$1202.00



Buyer Information

Login Name

Password

Payment Method

☒ Pay by Cash,cheque or EFTPOS when you pickup or by BPAY/Direct Deposit

☐ Pay by Credit Card when you pickup or by Credit Card through BPAY. 3% will be added to the total cost

****Please allow 24 hours prior to pickup for BPAY or Direct Deposit payments to clear****

****Please allow 3 business days prior to pickup for Cheque payments to clear****

Next

Umart™ Online All rights reserved © 1999-2006. All prices are cash price in Australian Dollars and GST included. Prices and specifications can change without notice, All brands and names are trademarks of their respective companies.

[PC Setup/Repair](#)[My Order Status](#)[Contact Us](#)[Email Updates](#)[Feedback](#)

View/Print Cart

[Print Page](#)

Description



Dell(TM) U2711 27" Ultrasharp Widescreen Flat Panel Monitor

Date & Time: 30-01-2011 08:44 AM

SYSTEM COMPONENTS

Dell(TM) U2711 27" Ultrasharp Widescreen Flat Panel Monitor

Qty 1

Dell(TM) U2711 27" Ultrasharp Wide Screen Monitor Unit Price \$848.98

Catalog Number: 39102 T14U2711WAU

Module	Description	Show Details
Base	Dell(TM) U2711 27" Ultrasharp Wide Screen Monitor	
Bundle	T14U2711WAU	
Standard Warranty	# Technical Support	
Dell Services: Hardware Maintenance	3 Years Premium Panel Warranty, Advance Exchange (Next Business Day)	
Dell Services: Telephone Support	Standard Telephone Technical Support (Monday - Friday, 8am To 8pm, EST)	
Freight Charges	Monitor Handling and Insurance Charges REL(Australia)/27FP	
		TOTAL :\$848.98

Sub-total \$771.80

GST- Australia (10%) \$77.18

Total Price \$848.98

Laptops | Desktops | Business Laptops | Business Desktops | Workstations | Servers | Storage |
 Monitors | Printers | Electronics
 All rights reserved : About Dell | Site Terms | Terms and Conditions | Unresolved Issues | Privacy | Returns
 Policy | Site Map | Dell Recycling | Feedback | Screen Share

[Large Text](#)

*IMPORTANT DELL DETAILS:

GOODS BY DELIVERY ONLY: Dell Australia Pty Limited (ABN 46 003 855 561) is located at Unit 3, 14 Aquatic Drive Frenchs Forest NSW 2086. While the products advertised here are delivered direct to the customer, certain pre-configured and build to order products are available at selected retail stores. See in store for further details.

ONLINE PRICING: Prices advertised online include delivery fees. Goods are supplied by delivery only.

MISTAKES: While all efforts are made to check pricing and other errors, inadvertent errors do occur from time to time and Dell reserves the right to decline orders arising from such errors.

FINANCIAL SERVICES: Dell financial services (DFS) provided by an independent supplier, BOQ Finance (Aust) Limited (or its subsidiary). Weekly lease rates quoted by BOQ. Payments are monthly based on a 36-month lease to BOQ approved customers. First payment may be due before delivery. Terms & Conditions available from BOQ.

ONSITE & ADVANCED EXCHANGE SERVICES: Technician, replacement part or unit (depending on service contract) will be dispatched if necessary following phone-based troubleshooting.

GENUINE WINDOWS VISTA®: Some Genuine Windows Vista® features - like the new Aero™ user interface - are only available in premium editions of Genuine Windows Vista® and require advanced or additional hardware. Check www.dell.com.au/vista for details.

PRODUCT PERFORMANCE: We often quote speeds and other performance data (such as printer speed or processor speeds). Please note that these quotes are only for comparative purposes and your actual speed or other performance can vary with a host of factors, including the other equipment or telephone line used.

TRADEMARKS: Celeron, Celeron Inside, Centrino, Centrino Inside, Core Inside, Intel, Intel Logo, Intel Atom, Intel Atom Inside, Intel Core, Intel Inside, Intel Inside Logo, Intel vPro, Itanium, Itanium Inside, Pentium, Pentium Inside, vPro Inside, Xeon, and Xeon Inside are trademarks of Intel Corporation in the U.S. and other countries.

©2010 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, ATI, the ATI logo, AMD Athlon, AMD Turion, Radeon and combinations thereof are trademarks of Advanced Micro Devices, Inc. Other trademarks are for informational purposes only and may be trademarks of their respective owners.

COPYRIGHT: © 2010 Dell Inc. All rights reserved.

~ Estimated delivery date only and may vary subject to parts availability, your payment being received by us and delivery to metropolitan areas only. See www.dell.com/au/consumer/delivery_information for further details or call us on 1-800-812-393.

snCM05

12.2 Appendix 2 – Display productivity benchmark

The 30-inch Apple Cinema HD Display Productivity Benchmark

Measuring the impact of screen size on real-world productivity

High-quality, high-resolution displays have always been among the most expensive peripherals one could add to a personal computer. The first 21-inch CRT displays capable of displaying millions of colors were two or three times as expensive as 30-inch Apple Cinema HD Display, yet offered lower resolution than a modern 15-inch laptop computer.

Today, prices of flat-panel displays have dropped, and high-resolution displays have become much more common, even at the consumer level. Yet larger displays, such as Apple's 30-inch Cinema HD Display, have retained an aura of exclusivity and the perception that their usefulness is limited solely to high-end applications such as video production or professional image editing.

What is far less widely known, however, is that increasing the "screen real estate" might be a very good way to **boost overall productivity, even in very common tasks that have little or nothing to do with highly specialized professional applications**. Most of us will find a larger screen more comfortable to work with than a smaller one. We instinctively feel more at ease with more screen space, just as we prefer to have a larger work table rather than a small one that forces us to move things around constantly. **The salient question is, of course: Does this added comfort translate into higher productivity? To provide clear, activity-based data to answer this question was the aim of this research project.**

About this Report

This report presents key findings and benchmark data comparing Apple's 30-inch Cinema HD Display with smaller flat-panel displays. The productivity benchmarks conducted for this project **compared real-world productivity in a number of common operations, ranging from general productivity with office applications to digital imaging, as well as design and publishing**. Some of the test procedures were defined to measure productivity impact in simple operations such as editing text, formatting spreadsheets, or retouching images; others focused on interapplication integration, measuring the impact of a large display on work involving two individual programs.

This report presents key benchmark data and some return on investment (ROI) analysis based on the cumulative effect of small, incremental productivity gains over time. For more information on the benchmarks and the methodology, please see the Methodology sidebar on page 3. For the complete results, as well as a detailed discussion of the methodology and the benchmark procedures, please download the benchmark report at www.pfeifferreport.com.

Major Findings

- High-resolution displays such as the 30-inch Apple Cinema HD Display can result in **measurable productivity and efficiency gains**.
- Productivity gains were present in not only **professional design and publishing, digital imaging, and digital video**, but **also in general productivity and office applications** such as word processors and spreadsheets.
- Cumulated productivity gains linked to a large, high-resolution display **can lead to a return on investment (ROI) of several thousand dollars per year**.

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.
- Download the complete **30-inch Apple Cinema HD Display Benchmark Report** at www.pfeifferreport.com.

Pfeiffer
Consulting
01001011

Productivity Strategies for Large-Format Displays

Major Points

- Computer displays are a **widely overlooked productivity factor** of the personal computer, and they can contribute significantly to productivity, efficiency, and overall throughput.
- Productivity and efficiency gains documented in these productivity measures are present in not only digital imaging and design applications, but also in **office applications as well as in personal productivity** of the computing environment.
- A larger display area **often results in new productivity strategies** that make best use of the display in ways that one cannot easily imagine when working on a smaller display.

Taking Displays at Face Value

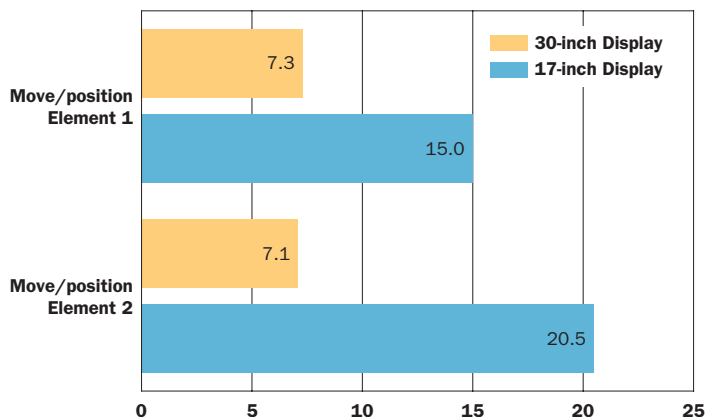
Computer displays are probably the most widely overlooked component of the modern computer. Not only is there a huge difference between a good-quality display and a lesser one, **the impact a display has on the work we do with a computer is frequently underestimated.** Most of us probably do not think of the display as a tool, yet when one compares different types and sizes of displays, the effect they can have on our way of working becomes immediately apparent. Once we have worked with a particular display for some time, we realize that we tend to adapt our way of working to its particularities.

The most important aspects of a display are, of course, the actual size and resolution; we will discuss their impact in detail below. Other aspects become apparent only over time, yet can have a strong influence on our way of working. This is the case for the overall type of illumination. Compared with TV-style cathode ray tube (CRT) displays, liquid crystal display (LCD) panels show a crisper, more stable image. **As a result, we can sit closer to an LCD screen without experiencing visual fatigue, and we tend to interact with the screen more directly.** Likewise, reading on screen tends to be more comfortable on an LCD panel than on a CRT display.

Productivity Benchmarks: Major Results

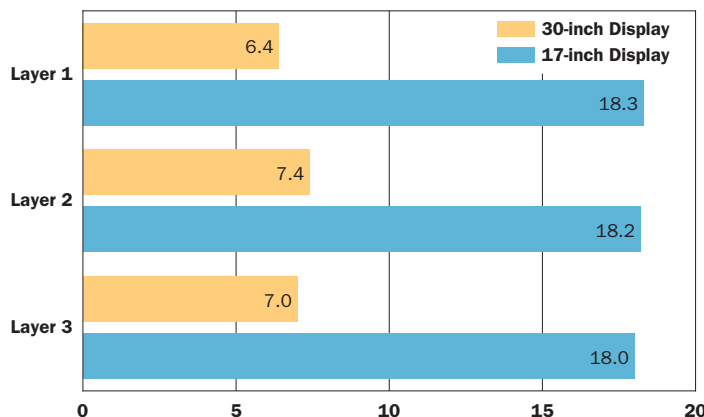
Full-Page Editing (InDesign)

Time scale in seconds. Shorter is better.



Drag and Drop Editing between Multiple Images (Photoshop)

Time scale in seconds. Shorter is better.



Professional design and publishing, as well as digital imaging, are applications that make use of every square inch of even the largest display. For a designer, the ability to view a full double-page spread at a zoom level that allows detailed, precise editing, without the need to zoom in and out provides

immediate productivity gains (chart on the left). This productivity gain also applies to creative work in Photoshop: The productivity measures on the right show the time necessary to combine and position elements from two different, multi-layered Photoshop images.

Methodology

This benchmark project was conducted by Pfeiffer Consulting for Apple Computer. It analyzes the productivity impact of large format displays such as the 30-inch Apple Cinema HD Display, when compared with smaller displays.

The productivity measures covered several application areas: **digital imaging, design and publishing**, as well as **general productivity**.

Productivity benchmarks were conducted using a set of specifically defined productivity measures, executed with Adobe InDesign CS2, Photoshop CS2, Illustrator CS2, Microsoft Office 2004, and QuarkXPress 6.5.

Hardware and configurations

The following displays were used for the benchmarks:

17-inch Samsung SyncMaster Display 172x, with an optimal resolution of 1280 x 1024 pixels

30-inch Apple Cinema HD Display, with an optimal resolution of 2560 x 1600 pixels

Selected benchmarks were also conducted using a **20-inch Apple Cinema Display**, with an optimal resolution of 1680 x 1050 pixels.

Benchmarks were conducted on a standard 2.7GHz Power Mac G5 equipped with 2GB of RAM.

All benchmarks were run on a **standard, unmodified installation of Mac OS X 10.4.2 Tiger**.

For complete results and descriptions of the benchmark methodology, as well as a detailed system configuration, please download the complete benchmark report from <http://www.pfeifferreport.com>.

For more information, please contact research@pfeifferreport.com.

Size Matters

The first thing one notices when working with a high-definition display is **how important it is to be able to see more information**. A writer will be more efficient just because he or she can see more of the text. A translator will work faster if he or she can see a full page of both the original text and of the translation next to each other, without having to shuffle document windows around.

Some of these benefits are hard to measure: Being able to see the content of three full-size web pages next to each other makes researching and comparing information much faster, yet the direct benefit would be hard to quantify.

Other aspects can be more easily measured. For instance, **in the productivity benchmarks conducted for this project, it took twice as long to combine information from a spreadsheet with a word processing document on the 17-inch display than on Apple's 30-inch Cinema Display HD**. Combining and positioning image elements in Photoshop was even faster on the large display, taking almost three times longer on the 17-inch display. The smaller screen required zooming and panning the picture, while the large display could show both pictures next to each other at 100%.

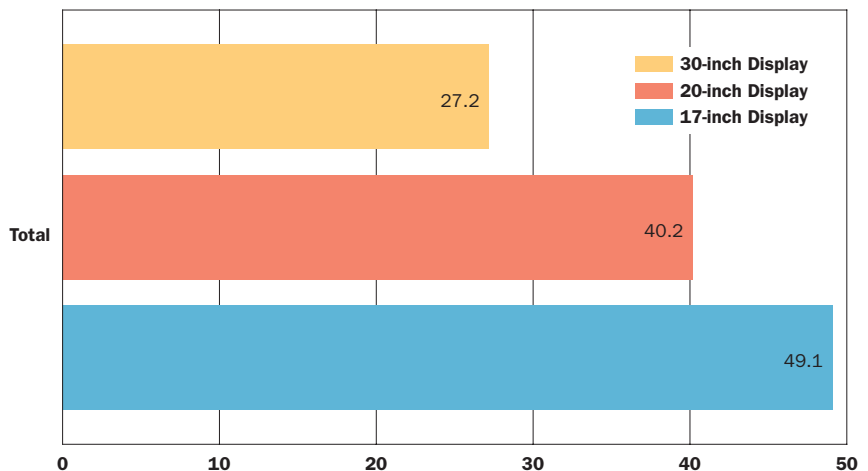
Developing Productivity Strategies for Large Displays

Large displays such as the 30-inch Apple Cinema HD Display are in fact very conducive to adapting our work methods. One example: Most modern design applications allow the user to open several windows showing different parts of the same document. On a standard display, the usefulness of this functionality is limited, since it usually means having to swap between windows that are partially hidden, thus reducing the potential productivity gains. On a 30-inch display, however, **a designer can display a double-page spread at 100% next to a full page displayed at a higher zoom level for detailed editing without any overlap**, and still have room for many open palettes. Other efficiency gains of a large display are linked to working with several applications.

With a 30-inch display, one can easily work on a large Excel spreadsheet while having a web page and an email client all open and visible at the same time. **The productivity measures presented in this report document some of these productivity gains. With the right productivity strategies, these increases in efficiency can be even more significant.**

Productivity Measures: Excel

Apply Selective Formatting in Large Spreadsheet (Excel)
Time scale in seconds. Shorter is better.



Spreadsheets are among the programs that immediately benefit from a larger screen, as this chart shows. Beyond these productivity gains, just showing more information is an essential benefit of a larger display—working with a complex spreadsheet can be very difficult on a small screen.

This report was created by Pfeiffer Consulting (<http://www.pfeifferconsulting.com>). Charts: Fischer Design. Reproduction prohibited without prior written permission. For further information, please contact research@pfeifferreport.com.

Adobe, Acrobat, Illustrator, InDesign, and Photoshop are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries. Apple, the Apple logo, Apple Cinema Display, Mac, Macintosh, Mac OS, and Power Mac are trademarks of Apple Computer, Inc., registered in the United States and other countries. Finder, and Tiger are trademarks of Apple Computer, Inc. All other trademarks are the property of their respective owners.

Talking about Return on Investment

Major Points

- **Return on investment of displays needs to be considered in a different way from other computer hardware**, because of different redundancy patterns and the longer lifespans of displays compared with other computing equipment.
- Seemingly small productivity gains on frequently repeated operations **can result in a significant return on investment over time**.
- The combined productivity gains from frequently repeated operations **can lead to an ROI of several thousand dollars per year for a 30-inch display**.

A Complex Notion

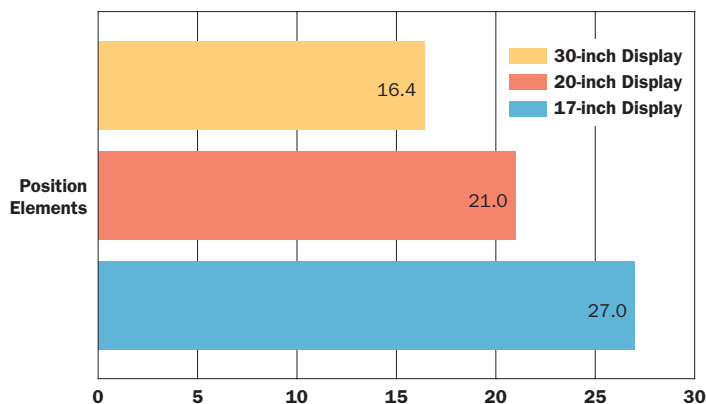
How can we evaluate the return on investment (ROI) of a peripheral such as a high-definition display? Isn't spending several thousand dollars on a peripheral extravagant, if smaller and cheaper displays can get the same job done for a significantly lower price? Can such a purchase even be justified? **Displays are difficult to judge as investments, since the payback they offer is significantly different from, say, a faster computer.** The average lifespan of a personal workstation is between three and four years. A high-quality display, on the other hand, can be used much longer, making it more reasonable to invest in a higher-quality model. LCD displays have some additional advantages over CRT monitors, since they do not show color degradation over time, which is inevitable in classic display tubes. **Even the smaller footprint of LCD displays can result in savings, particularly in larger cities where office space comes at a premium. Lower power consumption is also a cost-saver of LCD displays.**

Calculating the ROI of Productivity

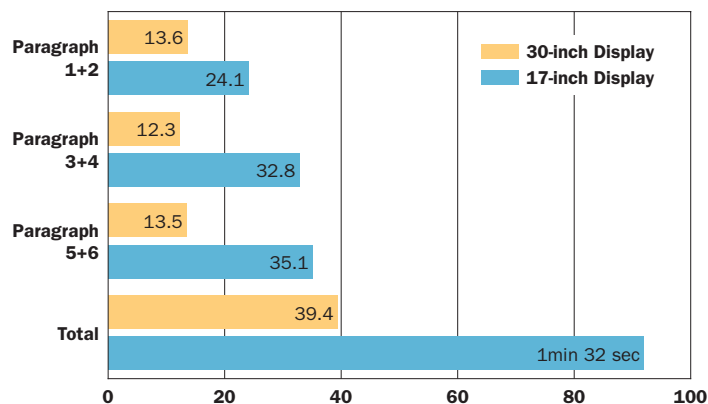
If there is one lesson to take away from the years of productivity benchmarking and ROI analysis that Pfeiffer Consulting has conducted, it is that **the biggest**

Productivity Benchmarks: Major Results

Fine-tuning Page Layout in QuarkXPress
Time scale in seconds. Shorter is better.



Combine Text from Multiple Documents (Word Processor)
Time scale in seconds. Shorter is better.



On a smaller display, the tasks involved in fine-tuning a page layout include repetitive scrolling and panning of the document, slowing down the design process. The chart on the left shows the time necessary to move two graphic elements on a double-page spread from one page to the other and position them precisely. On the 30-inch display, it is possible to produce the same result in

almost half the time required on the smaller display. The chart on the right shows details from a productivity measure comparing the time required to combine text elements from two files in a new word processing document. The whole process, which required more than one and a half minutes on a 17-inch display, could be completed in less than 40 seconds on the 30-inch display.

overall productivity gains result from sometimes seemingly imperceptible productivity increases in frequently repeated operations. A good example is the necessity on smaller displays to repeatedly display and hide palettes in graphics applications such as Photoshop or InDesign. In the efficiency measures for this project, the 30-inch display allowed for a productivity gain of almost 10 seconds over a 17-inch display in this operation. Repeated 100 times, this operation alone has saved a designer more than \$26, based on an hourly rate of \$100. For a creative director charging \$300 per hour, the savings for this operation alone would be close to \$80.

Return on Investment—and Beyond

The table below simulates the return on investment of some of the operations measured in this project. Individually, the productivity gains may seem almost imperceptible. **Cumulated over time they can result in an ROI of thousands of dollars per year.** Yet these figures do not cover one of the most notable benefits of high-definition displays: The more we see, the more productive we are.

The most important lesson from these productivity measures is not how much faster we work using a big display, but to what extent smaller displays slow us down. **The question is: Can we afford to be slowed down in our work?**

ROI Simulations: Can a 30-inch Display Pay for Itself?

Incremental Productivity Gains (Return on Investment generated by individual operation)	Productivity on 17-inch display (Time in seconds)	Productivity on 30-inch display (Time in seconds)	Time saved using a 30-inch display (seconds)	Prod. gain (%)	ROI generated (1 hour@\$100)	ROI generated (1 hour@\$200)	ROI generated (1 hour@\$300)	ROI generated (1 hour@\$400)
Moving Files Between Folders (Finder)	29.3	15.7	13.63	46.45%	\$0.38	\$0.76	\$1.14	\$1.51
Cleaning Up Digital Pictures	52.3	25.8	26.53	50.73%	\$0.74	\$1.47	\$2.21	\$2.95
Check High-Res Image for Sharpness	27.2	7.2	19.99	73.58%	\$0.56	\$1.11	\$1.67	\$2.22
Drag and Drop Between Images	18.3	6.4	11.93	65.09%	\$0.33	\$0.66	\$0.99	\$1.33
Fine-tuning Page Layout (QuarkXPress)	27.0	16.4	10.63	39.38%	\$0.30	\$0.59	\$0.89	\$1.18
Switching Palettes (InDesign)	23.7	14.2	9.50	40.08%	\$0.26	\$0.53	\$0.79	\$1.06
Full-Page Editing (InDesign)	20.5	7.1	13.37	65.20%	\$0.37	\$0.74	\$1.11	\$1.49
Application Integration (Word/Excel)	34.5	17.0	17.48	50.65%	\$0.49	\$0.97	\$1.46	\$1.94
Combine Cells from Spreadsheets	42.6	20.7	21.85	51.31%	\$0.61	\$1.21	\$1.82	\$2.43
Cut/Paste Cells in Large Spreadsheet	24.9	10.9	13.96	56.05%	\$0.39	\$0.78	\$1.16	\$1.55
ROI projections based on incremental productivity gains	Time saved (seconds)	Number of occurrences/week			ROI gener. (1 hour @\$100)	ROI gener. (1 hour @\$200)	ROI gener. (1 hour @\$300)	ROI gener. (1 hour @\$400)
Moving Files Between Folders (Finder)	13.63	50			\$18.93	\$37.85	\$56.78	\$75.70
Cleaning Up Digital Pictures	26.53	10			\$7.37	\$14.74	\$22.11	\$29.48
Check High-Res Image for Sharpness	19.99	20			\$11.11	\$22.21	\$33.32	\$44.42
Drag and Drop Between Images	11.93	50			\$16.57	\$33.15	\$49.72	\$66.30
Fine-tuning Page Layout (QuarkXPress)	10.63	30			\$8.86	\$17.72	\$26.58	\$35.44
Switching Palettes (InDesign)	9.50	100			\$26.39	\$52.78	\$79.17	\$105.56
Full-Page Editing (InDesign)	13.37	50			\$18.56	\$37.13	\$55.69	\$74.26
Application Integration (Word/Excel)	17.48	20			\$9.71	\$19.43	\$29.14	\$38.85
Combine Cells from Spreadsheets	21.85	20			\$12.14	\$24.28	\$36.42	\$48.56
Cut/Paste Cells in Large Spreadsheet	13.96	10			\$3.88	\$7.75	\$11.63	\$15.51
	Total ROI generated/week				\$133.52	\$267.04	\$400.56	\$534.09
	Total ROI generated/month				\$534.09	\$1,068.17	\$1,602.26	\$2,136.34
	Total ROI generated/year				\$5,874.94	\$11,749.87	\$17,624.81	\$23,499.75

The 30-inch Apple Cinema HD Display Productivity Benchmark

5

Do Productivity Gains Scale with the Size of the Display?

Major Points

- The Productivity Measures conducted for this project show that **productivity gains increase with the size of the display.**
- Efficiency gains are present in **general office applications** such as spreadsheets and word processors as well as **digital imaging and design applications.**
- **Being able to see much more information simultaneously is a considerable perceived advantage** of larger displays in most areas of personal productivity.

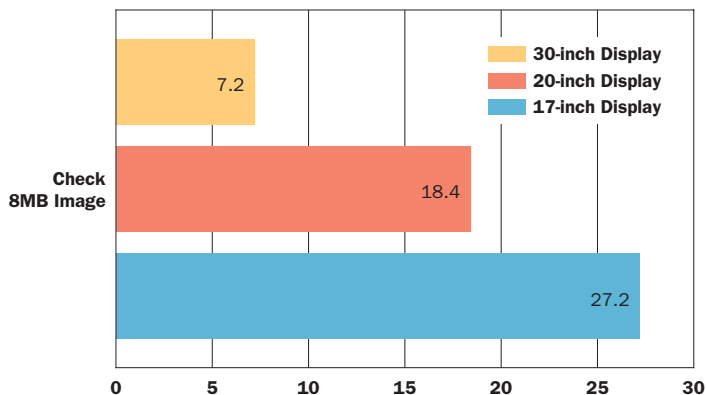
Is Bigger Better?

Some of the productivity measures for this research project were conducted not only on the 17-inch and the 30-inch display, but also on a 20-inch Apple Cinema Display offering an optimal resolution of 1680 x 1050 pixels. The conclusion of these tests is clear: a 20-inch display offers clear productivity advantages over the smaller model, yet lags behind the 30-inch display. This conclusion is confirmed in practically all the tests conducted on all three displays. (Please refer to the **30-inch Apple Cinema HD Display Benchmark Report** for more results).

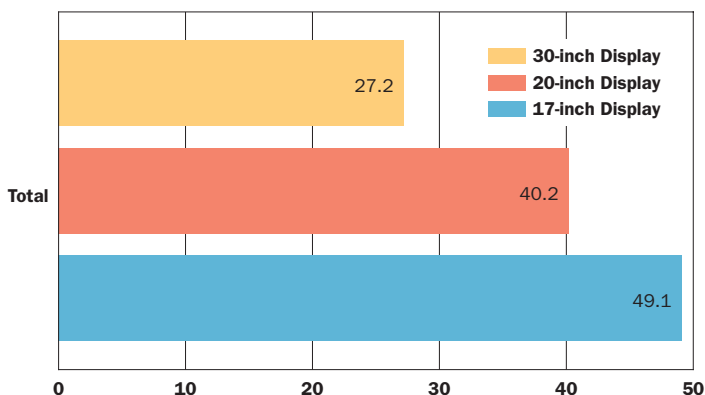
The reason why the 30-inch display increases productivity over both smaller displays is simple: **When working on a computer, we lose much more time than we realize through user-interface manipulations.** Not unlike the need for a large surface when we are organizing papers, a display that eliminates the need to shuffle windows, to open and close palettes, or to zoom in and out in order to switch between detail and overview will increase our productivity. A 20-inch display, therefore, has an advantage over the smaller display, yet cannot compete with the 30-inch display in terms of productivity. Interestingly, these productivity gains concern not only graphic designers and photographers: Anybody who has tried to work with a large spreadsheet on a laptop computer will realize **how important it is to be able to see and access as much information as possible at one time.**

Productivity Comparison of 17-inch, 20-inch, and 30-inch Displays

Check High-Resolution Image for Sharpness
Time scale in seconds. Shorter is better.



Apply Selective Formatting in Large Spreadsheet (Excel)
Time scale in seconds. Shorter is better.



Productivity gains scale as one increases the size of the display. These charts show the results of productivity measures comparing a 17-inch, a 20-inch, and a 30-inch display. On the left are the results from a test measuring the time necessary to check a high-resolution digital image for sharpness. The task

took almost four times longer on the 17-inch display than on the largest one; the 20-inch display also showed a clear productivity increase. The chart on the right presents the time required to select and format cells in a large spreadsheet. Productivity clearly increases with display size and resolution.