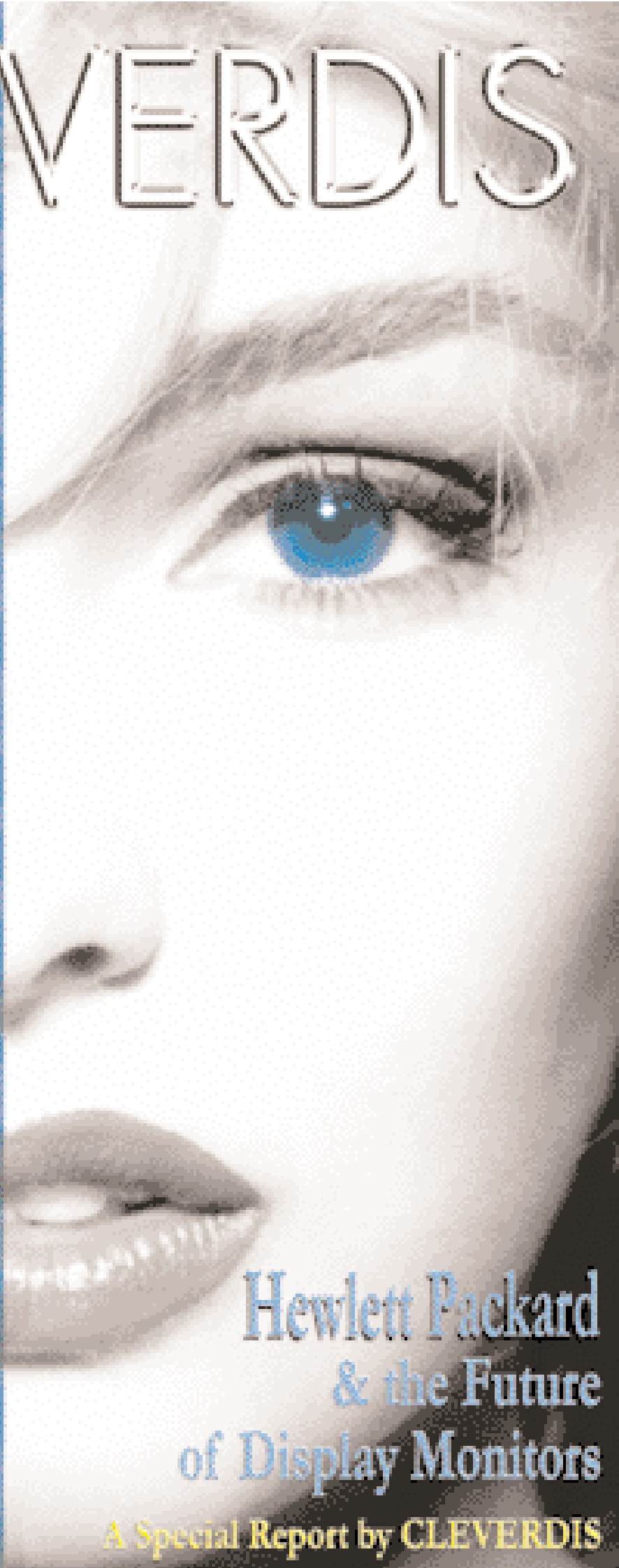
SPECIAL REPORT

CLEVERDIS



Hewlett Packard & the Future of Display Monitors

A Special Report by CLEVERDIS

Get the Big Picture

Now more than ever, HP Displays put you in the big picture.
In business, what makes the difference today is the creativity of your team.
HP is dedicated to empowering inventiveness, not only through being a top player in the IT world, but by ensuring the utmost quality when it comes to the visual interface.
That's why HP monitors are often a deciding factor in the purchasing process of the world's biggest corporations. Need we say more?

HP + You... Everything is possible.

Preface

When PCs first came into being, the monitor was a simple black and white interface between man and machine… fuzzy gray letters and numbers dancing on a dark flickering screen. Remember those days? They weren't too long ago.

Since the creation of Microsoft Windows™, that interface started becoming more important, and eventually someone came up with the bright idea that color screens would be even better still. The screen became a separate element, sitting on top of the CPU on the desk.

Today, the monitor is the only visible part of the iceberg. Not only that, with the growth of image-related applications, the importance of the screen in the overall package has grown to such an extent that it is now a primary concern when buying PCs. The market for monitors has also become more complicated. Before, one simply bought a PC, and the screen just "came with it". There was little choice as to what kind of monitor you may require. Today, however, the choice is mind boggling, with not only PC manufacturers selling the monitors to accompany the CPU, but also "stand alone" companies producing their own wares.

In this Special Report, compiled by Cleverdis, Hewlett Packard explains the technology and philosophy behind their monitors and what differentiates them in the marketplace.

Richard BARNES
Editor-in-Chief

Contents

CLEVERDIS SPECIAL REPORT

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513, Route de la Seds
13127 VITROLLES • FRANCE

Phone: +33 (0) 4 42 77 46 00
Fax: +33 (0) 4 42 77 46 01

E-mail: info@cleverdis.com

SARL capitalised at 8 000
VAT FR 95413604471 00024
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Carly FIORINA is Chairman and Chief Executive Officer for HP. Carly joined HP in 1999 and has steadily returned HP to its roots of innovation and inventiveness and is focused on delivering the best total customer experience. Prior to this, Carly spent nearly 20 years at AT&T and Lucent Technologies, where she held a number of senior leadership positions.

HEWLETT PACKARD COMPANY

Carleton S. (Carly) FIORINA

Chairman and Chief Executive Officer

Choosing to lead…reinventing the IT value proposition

CLEVERDIS: **What are the aims and focus of the new HP?**

CSF: At the new HP, we're focusing our energy on reducing the cost and complexity of infrastructure. We are aiming our collective resources and talent at reinventing the IT value proposition for our customers. We will stake our claim on being the company that offers the best return on IT.

CLEVERDIS: **So just how does HP fit into today's world?**

CSF: This is no longer a world driven solely by the development of technology. This is a world increasingly driven by the effective utilization of technology. Put another way, technology is not an end in itself. Technology is a means to an end. And that end is defined by the users of that technology, expressed by their objectives. HP's job is to make sure we meet the customer's objectives and serve their needs, with our products, our people, with our partners. Today, we are in a much better
position to serve them than we were a year ago. Today, we are a market leader in all the essential components of information
infrastructure, servers, storage, management software, imaging and printing, personal
systems, monitors and mobile devices. Make no mistake about it: We will lead. And in doing so, our promise to our customers is that we will provide them with better flexibility,
better interoperability, better reliability, better manageability, better utilisation and lower cost of ownership. We will be the company that reinvents the IT value proposition — and we will go the extra mile to serve the end users.

CLEVERDIS: **So that is where we find ourselves at the beginning of a new century, with a new HP... What is your philosophy at this very pivotal point in time?**

HP 2025

CSF: It's been written that at the beginning of another century, the 19th century, people thought nothing was possible. But at the end of a century that witnessed inventions like the locomotive, the telegraph, the steamship, and the electric light bulb — a century where man walked on the moon and set up a laboratory in space — all immense leaps, not only in commerce and transportation, but in human ingenuity — people believed that anything was possible. That's where we are today. The strides ahead. I have never been so confident of HP's future. Today, we really do believe that with your vision and our technology and capability, everything is possible.

CLEVERDIS ANALYSIS

Carly Fiorina now has the task of leading HP through increasing competition in the IT sector. Her forthright manner and solid leadership will no doubt stand the company in good stead in the face of many a storm to come.

HEWLETT PACKARD COMPANY

Benoît FAGART

Vice President for Worldwide Displays - Business Unit, Personal Systems Group

Benoît FAGART has been with HP for over 17 years. For the past year he has held the role of Vice President for the WW Displays Business Unit, Personal Systems Group. His responsibilities include procurement, marketing, engineering and quality. Prior to this, he was the controller for HP's Business Desktop Division for three years. Mr Fagart works out of Houston, USA. He joined HP in 1985.

CLEVERDIS: **What is HP's vision for the Displays business?**

BF: One of HP's overall corporate objectives is to become the leading company in the PC market in terms of market share, profitability and customer satisfaction. Our primary
target is to sell a monitor with every HP PC and workstation platform. We aim to be seen by our customers as the natural choice for monitors every time they purchase an HP PC or workstation solution.

CLEVERDIS: **Why should corporate or institutional buyers opt for an HP display rather than getting a stand alone solution offered by another brand?**

BF: As an industry-leading, single-source provider of complete IT solutions, when you buy an HP monitor as part of a total HP solution, you are guaranteed end-to-end product serviceability and support with just one call. HP is one of the few global organisations able to deliver a full range of monitor solutions and to make it easy to conduct business in every part of the world. HP is present on a global scale for sales, support and services and guarantees investment protection. HP's world-famous quality and reliability extends to its displays, helping reduce maintenance, repair, and support costs throughout the product's life cycle. HP TFT and CRT products meet the industry's most demanding performance specifications. We offer superior front-of-screen performance across the entire line of monitors, all of which are fully tested and qualified to assure interoperability and seamless compatibility with HP's lineup of industry leading PC's and workstations. The monitors undergo rigorous testing and control procedures to ensure that they will perform to the highest possible standards in any environment. HP displays are backward and forward compatible with existing, legacy, and future products.
In summary, HP has a solid reputation for delivering high-quality, reliable products, and the strong HP market share reflects increased awareness and preference for its full line of innovative, high-quality, and competitively priced monitors, as well as strong customer
loyalty to the HP brand.

HP S9500

CLEVERDIS: **In a sentence, what would you say is HP's value-added in the Corporate and Institutional monitor markets?**

BF: Supported by the award-winning HP reputation for quality, reliability, compatibility, and service, HP continues to deliver on its promise to bring to the market easy-to-use, innovative monitor products that provide the best overall display solutions for the corporate and institutional markets.

CLEVERDIS ANALYSIS

HP have a very strong dedication to the development of their monitors as part of the overall solution. The movement by HP to capitalize on the growth in the LCD desktop monitor market is reflected in their efforts to demonstrate clear benefits in Return on Investment through ease of calculating TCO.

TECHNOLOGICAL ASPECTS

Understanding the Basics of LCD Technology

An LCD device, or cell, is composed of two layers of very fine glass material (substrates) that form a "sandwich" around a thin layer of rod-shaped molecules (liquid crystals) that flow like liquid. When an electric current or charge passes through the layer of crystals, they align or twist with respect to two conductive arrays: a matrix of columns on the front substrate, and a matrix of row on the back substrate. By varying the charge sent to a cell, it is possible to orient the crystals so as to prevent or allow light, from a backlight source, to pass through them to create the image on the screen. Each cell corresponds to a single dot on the screen. In color systems, three dots, corresponding to the three primary colors of red, green and blue, combine to form a pixel (picture element).

Characteristics of TFT LCD Monitors

The following are just a few of the more important characteristics of LCD monitors to keep in mind when deciding your next purchase:

1. Image quality: crisp, sharp, and no distortion. Flat panel technology displays sharp, easily readable characters, and enhanced color rendering. LCD also features significantly higher brightness and contrast ratio than traditional CRTs, considerably improving text legibility at high resolutions. In CRT monitors, heavily leaded glass used to screen harmful rays from the user can considerably reduce visible light transmissions. Finally, the image displayed by a flat panel monitor shows no distortion or movement. With the curved screen of the conventional CRT monitor in particular, the image becomes distorted near the edges and corners of the screen.

2. Large viewable image. The viewable image is the diagonal dimension of the maximum size image the user can see on the screen. While a 15.0 " flat panel display has a 15.0 " viewable image area, the CRT monitor's viewable image size is smaller than it's bezel size, since the edge of the display is covered with bulky housing to hold and protect the tube.

3. Front-of-screen comfort. The image on a CRT display fades and must be continually refreshed by the electron beam. If the refresh rate is not fast enough for the phosphor coating on which the image is displayed, then it will appear to flicker and move. This is very tiring and distracting, especially to the nearby user who sees the screen out of the corner of their eye (the peripheral vision is much more sensitive to flicker than the central field of vision). TFT technology used in the active matrix LCD does not have this problem and delivers an excellent flicker-free image, thus minimizing eyestrain.

4. Space saving, easy to handle. A typical 15-inch flat panel monitor requires one-fifth of the space needed to accommodate a 17-inch CRT.

LCDs are easy to move, swivel and carry, facilitating installation and support. Users also have the possibility of removing the stand, allowing even greater space economy. Another attractive feature of the LCD flat panel display is that the screen can be rotated to provide a portrait or landscape orientation.

Compaq 1501

5. No emissions. Due to their technology base, LCDs emit very little electromagnetic radiation or heat compared with CRTs. CRTs cannot function without producing

HP S7500

radiation, since the scanning guns emit stream of electrons (beta radiation) at tens of thousands of volts of potential energy.

6. Energy efficient. Flat panel monitors are very energy-efficient. They have very low levels of power consumption, which are typically one-fifth of an equivalent sized CRT. This translates into lower electricity and cooling needs, reducing considerably the overall cost of ownership while optimizing performance. For instance, a 17" CRT consumes around 130W whereas the HP1510's energy consumption is only 36W. And if you compare a 19" CRT with the HP1810, the latter consumes 80W less.

7. Total cost of ownership. The Total Cost of Ownership (TCO) is defined as the total cost (acquisition cost, operating costs, administration, training, repairs, etc.) of owning a product over its life cycle. An LCD monitor generally provides a fast return on investment, since apart from being much more energy-efficient than CRTs, LCDs require far less space to operate. And whether you're buying or renting, office space is money. Finally, LCDs can contribute to a working environment which is much less stressful (no emissions, precise colors, exactness of geometry), resulting in less fatigue and improved worker efficiency.

TCO Certification

HP takes pride in working closely with TCO - recognized as the world standards organization covering display products in order that all HP products live up to the stringent standards laid down by TCO.

The newly launched TCO'03 standard puts even more onus on the manufacturer with regard to the four E's - Ecology, Ergonomics, Energy and Emissions.

Further information on TCO standards can be found at: http://www.tco.se

Hewlett Packard CRT

Two types of technology are used: Diamondtron® and Trinitron® flat-faced CRT screens, with resolutions up to 2048 x 1536. These screens meet Energy Star, MPRII and TCO'99 guidelines.

Understanding aperture grill technology

The aperture grill uses wires as a mask, which allows more light to reach the phosphor screen. This improves clarity and gives flicker-free performance and produces brighter, sharper images.

APPLICATIONS

LCD and CRT - Double pronged attack

Finding the Right Monitor for Your Needs

Displays are a fundamental element of any computer system and a reliable, high quality monitor is essential to maximizing your efficiency in the workplace. HP has a fully dedicated monitor organization focused solely on ensuring the ongoing development and marketing of a complete line of CRT and LCD products.
HP's aims in the market are clear: "Our primary target is to sell a monitor with every HP PC and workstation platform. We aim to be seen by our customers as the natural choice for monitors every time they purchase an HP PC or workstation solution," says HP's worldwide product manager, Benoit Fagart.

HP are working on this goal with a "trident" approach, targeting three market sectors. Their CRT and LCD lines are thus divided into three classifications:

- 1. Essential - Basic product features at the most competitive prices
- 2. Advantage - Upgraded features, ergonomic designs
- 3. Performance - Highest performance, most advanced technologies.

Differentiation

One of the first questions one asks when selecting a monitor is "what makes it different from someone else's?"... Here, we outline some of the special features claimed by HP:

LCD Screens

On-Screen Controls (All Models)

A special auto-adjust feature on some models controls the horizontal and vertical position, clock and phase without changing the brightness or contrast. Direct access keys on the front of the monitor let the user quickly set, reset, or auto-configure the unit.

Flexible Pivot Operation (TFT1520 and TFT1720)

Unlike most TFT monitors, you can rotate the entire screen of a Compaq TFT1520 or TFT1720 flat panel monitor at a 90-degree angle for easy portrait or landscape viewing of any sized document. This feature works especially well with everything from complex spreadsheets to graphic design layouts as well as detailed schematics and engineering drawings.

Compaq 1720

VESA Mounting and Tiling Capabilities (All Models)

VESA-mounting compatibility gives you the flexibility to mount the display on the wall or on an optional swivel arm. Most Compaq flat panel monitors can be detached from their bases easily for mounting in the best position for easy viewing or space saving.

This feature is especially important for "tiling" of monitors in applications requiring large combined data displays. For

instance, in many financial trading environments, each workstation may have up to four monitors tiled in a pattern, with two above and two below. Engineering and scientific workstations often use a "double-headed" setup, where two monitors are placed side-by-side and application windows can be easily moved from one display to the next. The tiling effect works best when you purchase monitors with
exceptionally thin bezels, such as the Compaq TFT1825. The thin bezel reduces the amount of separation between data displays, producing a nearly continuous panorama of displayed data.

Height Adjustable Bases (All Models except TFT1501 and 1701)

Most Compaq flat panel monitors now come with a height-adjustable base that allows you to select the optimum height level by simply sliding the panel up or down the column.

Special Base Configuration Options (TFT1520 and 1720)

Both the Compaq TFT1520 and TFT1720 flat panel monitors come with a stand that is specially designed to accommodate other accessories and options. The stand allows either one of two types of bases (with or without integrated multimedia capabilities) to be connected to either one of two columns (with or without height adjustment),
providing users with great flexibility in optimizing feature/price combination.

CRT Screens

The HP line of Professional CRT monitors offers a number of features and benefits for professional users in corporate and institutional environments.

Image Quality - Using both Diamondtron NF(r) (Natural Flat) and FD Trinitron(r) flat screen technology, these models provide very precise viewing on a broad field of vision at resolutions of up to 2048 x 1536.
Ergonomics - User comfort is kept in mind, with a range of mechanical adjustments and front panel electronic controls that activate easy-to-read on-screen displays.

HP S7500

Technical compatibility - Each model is fully tested and
qualified to assure backward and forward interoperability and compatibility with all legacy, current, and in-development HP desktops, workstations, and other products. Each model is also tested for compatibility with Microsoft Windows and a wide range of third-party hardware and software.

Design compatibility - The new carbon and silver cabinet colors exactly match the color and style of HP desktops and workstations for a visually integrated office environment.

Easier management - Support for current VESA standards makes them compatible with all Desktop Management Interface (DMI) compliant device management applications, including the Compaq Insight Manager application.

Approximately 70% of HP's monitor products have been "refreshed" in the months since the closing of their merger with Compaq. On the CRT side, they have introduced the HP p930 and p1130, 19" and 21" aperture grill products. On the LCD side, they have introduced the TFT1501, TFT1701, TFT1520, TFT1720, TFT 1825 and TFT2025, their first 20.1" LCD monitor.

Which HP Monitor is right for me?

	Essential CRT's			Advantage CRT's	Performance CRT's		Essential LCD's		Advantage LCD's		Performance LCD's	
Monitors	S5500	S7500	S9500	V7550	P930	P1130	TFT 1501	TFT 1701	TFT 1520	TFT 1720	TFT 1825	TFT 2025
Applications												
I need high performance for digital content creation.					●	●				●	●	●
I need a low-emissions, lightweight monitor for use in medical							●	●	●	●	●	●
I need a larger display with advanced screen controls for			●		●	●					●	●
I need a versatile monitor for financial modeling applications.			●		●	●	●		●	●	●	●
I need an all-purpose monitor for general business applications.	●	●	●	●			●	●	●	●		●
Performance												
I want a monitor based on aperture grill technology					●	●						
I want a monitor with a flat screen to minimize reflected light and provide				●	●	●	●	●	●	●	●	●
I want the smallest dot pitch for easy to-read text in high resolution			●	●	●	●		●		●	●	●
I need to see the maximum amount of data on screen			●		●	●					●	●
I need to match my color printer's output to my display color.	●	●	●	●	●	●	●	●	●	●	●	●
Space Constraints												
I need the most compact monitor for the display size.	●	●		●			●	●	●	●	●	●
I want a cable management design that lets me place my monitor flush	●	●	●		●	●			●	●	●	●
I need a monitor I can hang on the wall or attach to a desk arm							●	●	●	●	●	●
Price												
I need the most in screen size for the dollar.		●	●	●	●		●	●	●	●		
I want the most advanced features for the dollar.		●	●	●	●	●	●	●	●	●	●	●

Best ●
Good ●

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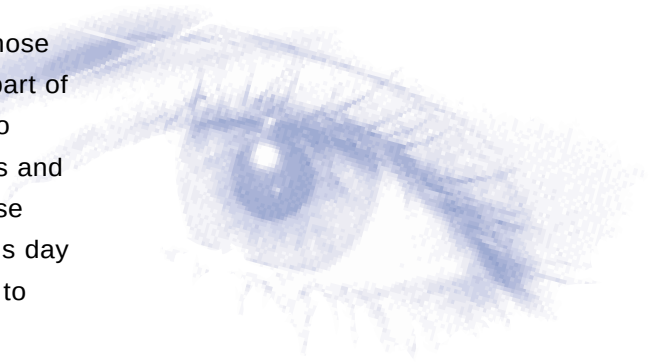
CONCLUSION

Having seen Carly Fiorina underlining the aims and philosophy of the New HP during her keynote address at Comdex Fall 2002, it became evident to me that HP was truly prepared to launch into this decade with a new impetus following the successful merger with Compaq, creating a new force to be reckoned with in the industry. HP's understanding of the importance of the Display in the overall PC solution is made all the more apparent by their commitment to this Special Report, overseen by Cleverdis Editor-in-Chief, Richard Barnes as a true "in-depth" report into the whys and wherefores of monitors as put forward by HP. This is part of their new commitment to the education of the market. Many companies are now producing display equipment. Some good, some… well… not quite so good. Deciding what kind of display to use is therefore an increasing headache for the buyer. Our role at Cleverdis (CLEVER DISplay) is to "add intelligence" to the marketplace – in both senses of the word. People are bombarded with information today, and finding impartial information is very difficult indeed, if not impossible at times. By presenting information to buyers in an impartial manner, Cleverdis aims to enrich the market and help it grow. If we can help you understand that when you use the right kind of display, you can actually increase turnover and profitability through increased efficiency and decreased worker fatigue, enabling you to achieve a great step forward.

Gérard LEFEBVRE
Cleverdis President

The aim of this document is one of education and information. We therefore salute HP and indeed all those in the industry who understand that as leaders, it is part of their obligation not simply to sell their products, but to educate the end user about application developments and how best to deal with them in order to obtain maximise efficiency and Return on Investment. Especially in this day and age. Those companies who take this philosophy to heart will no doubt flourish in years to come.



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As the principal sponsor of the BMW WilliamsF1 Team, hp's participation goes beyond painting a logo on the wings. The car is designed, and thousands of race simulations are conducted, by an hp supercomputer; and hp servers and notebooks analyze real-time data, letting the team make adjustments even during a race. This is mission-critical computing for fast-moving enterprises, and then some.
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