

affordability by amateurs. The colour inkjet printer made colour affordable for the masses, whilst the Apple Color LaserWriter and other colour printing technologies satisfied the need for professional high quality colour output.

As the imaging revolution progressed, so computing hardware evolved to support the need to display colour images and the increased computing power required to manipulate and store them. Apple again led the hardware industry with widespread implementation of the technology needed to support colour monitors, printers and scanners. Meanwhile Adobe again led the software industry in 1993 with the invention of PDF (portable document format) a file format enabling documents, including images, to be sent to a printery and reproduced without plate manufacture.

The next step in the imaging revolution was to by-pass the scanner and capture an image directly in digital form. In January 1994 Apple again led the industry with the introduction of the QuickTake 100 digital camera and software that made it easy to capture and transfer digital images directly from camera to the computer for further manipulation and printing. This is a revolution still evolving today with the accuracy of digital cameras now displacing film and video, the fourth revolution.

Video

The invention of video tape recording and lightweight video cameras soon resulted in the displacement of 8mm film as the primary

means for amateurs to capture video, that is to say images and sound. But editing video tape recordings was difficult.

In 1989 Avid introduced the ability to convert video tape (and film) to digital format by use of plug in cards for the Macintosh. At first this innovation was confined to high end production studios because of the cost. But in 1991 Apple introduced Quicktime, which supported time dependent software that allowed the Macintosh to create, edit and display real time video.

Before long the top end of the Macintosh family, the Quadra, came with the necessary cards to capture analog video recordings in digital format and after editing, output them back onto analog tape. The video revolution had arrived for amateurs, albeit well heeled amateurs. Soon this spread to more reasonably priced models and making movies became as simple as using a Kodak Box Brownie. Well almost.

Today video tape has been replaced by fully digital to disk video recording and every Macintosh includes iMovie software which supports video acquisition, editing and output, usually by burning straight to DVD. For professionals, Apple's Final Cut Studio supports high-end video editing in High Definition along with companion applications that support sound editing and animation.

Audio

In 1983 a group of musicians and music merchants agreed to standardise an interface

by which new instruments could communicate control instructions with other instruments and microcomputers. This standard was dubbed MIDI (musical instrument digital interface) and Apple narrowly beat Atari to become the first manufacturer to adopt it with the Apple II and then the Macintosh.

The electronic composer could now use a relatively inexpensive instrument, such as an electronic keyboard, controlled by a personal computer, such as the Apple II or Macintosh.

Soon software enabled note sequences played on a keyboard or other MIDI capable instrument to be digitally recorded and played back by the computer. The logical progression was that a single keystroke from the Macintosh could activate every device in the studio remotely and in synchrony.

This led to compositional software and most importantly MAX, developed specifically for the Macintosh, so that musicians with no programming experience could create an infinite variety of output routines using simple on-screen graphic displays. The composer could now invent a studio full of phantom hardware at will, limited only by the imagination.

The final result of the computer compositional revolution is the ability of the computer to participate in live performance.

What of managing digital music files?

The first Macs onwards have had the ability to record and play sound. Software quickly

emerged to edit and manipulate these recordings.

When Apple again pushed forward with the widespread introduction of CD drives, Macs were able to play commercial CDs as well as CD ROMs. The advent of CD burners allowed users to transfer rare vinyl recordings to digital format.

In 2000 Apple introduced iTunes, software that made it easy to manage these digital music files and to convert recorded sound files into the appropriate format for burning to a CD.

It seemed to be a natural progression for Apple the following year to release a small firewire external hard drive, called the iPod, to which selected digital music files could be downloaded. What was revolutionary was that the iPod also contained the necessary controls and software to enable it to function as a music playback device in its own right.

In 2003 Apple started its own digital music shop, the iTunes Store, selling online music downloads, creating the first legal music download service to catch on with consumers. The iTunes Store fully integrates with iTunes software and the iPod to create an easily managed music and video collection. Over 1 billion songs have now been sold.

With the addition of a colour screen, the iPod has now morphed into a means of storing and playing video and the iTunes Store leads a dramatic shift in sales of digital content from bricks and mortar stores to the internet.

Podcasting has taken the audio revolution to a new level, allowing individuals to create and publish their own radio-style shows to a global audience. Although the first podcasts appeared in 2003, it took popular MTV veejay Adam Curry and technical guru Dave Winer to create an easy way to publish and find podcasts.

In mid 2005, Apple joined the podcasting revolution by integrating support for retrieval and publishing of podcasts into iTunes. Today, there are over 2,000,000 podcast subscribers and tens of thousands of publishers.

By extension, the desire to publish video came about, and using the same publishing tools as podcasting, video casting was born. Coupled with the YouTube boom, budding video producers and movie stars can now show off their talents to millions of people at almost no cost.

The Apple Effect

5 Apple Revolutions:

Personal Computing

Publishing

Imaging

Video

Audio

Once upon a time there was a time when computers were complex, rare and expensive machines that companies—and even countries—struggled to afford to build, buy or use.

The story here is one of how two guys in a garage precipitated a shift in our universe to one where computers are commonplace and simple to use, yet more powerful than many dreamed possible.

The company they started, Apple Computer Inc, has consistently led the way in personal computing innovations and in developing many of the tools and technologies we take for granted.

Let’s look at how the Apple Effect has changed our work, and our life, in ways that would have seemed improbable only fifty years ago.

The birth of personal computing

Before the personal computer revolution began, computers occupied a large cabinet or even room, accepted input from punch cards, recorded data on magnetic tape, output to a line printer and required serious looking technicians in white coats to operate. Museum Victoria even has one such beast.

Progress in miniaturisation of electronic components in the early 1970s soon resulted in computers getting smaller, accepting input from a keyboard and having a screen display, but they

were still expensive and technically difficult to operate.

However it became possible for electronics enthusiasts to assemble components to make their own rudimentary computer. Altair was the first to market components together in kit form, but two guys named Steve Jobs and Steve Wozniak, operating from a garage in California, were not far behind with a kit that is now known as the Apple I.

Although only about 200 were produced, it convinced the two Steves to found Apple Computer Inc and work on a computer that did not require electronics knowledge to assemble and use. It was the release of this model in 1977, the Apple II, which heralded the widespread leap of electronics from the mainframe to personal computing.

The Apple II was affordable, easy to use and therefore did not require specialist technical support. Suddenly business, home and schools had access to computing power previously available only with mainframes.

The evolution of software

Although mainframe computers at first had to be programmed by methods which amounted to rewiring the circuits, the personal computer used a programming language, albeit at first still technically difficult. Soon lines of code, or programs, when compiled into machine readable form, became known as software.

The invention of the floppy disk provided a readily available means of distributing pre-compiled software and saw the creation of the software industry, producing shrink wrapped boxes containing the disks and instructions needed to load and perform specific tasks with an easy to use interface.

The Apple II had versions of three really useful software tools which we now take for granted - the word processor, the spreadsheet and the database. These tools provided a widespread reason to acquire a personal computer and then the weight of numbers to enable the desktop publishing revolution. More on this later.

Programming also allowed users to create games with the computer, which has today evolved into a sophisticated gaming software industry.

The internet

Perhaps the most profound change has evolved from an obscure piece of hardware called the ‘modem’ which appeared at this time and enabled communication between computers over telephone lines. Academics in the USA (not Apple) devised standard protocols to facilitate such communication regardless of operating system, marking the birth of the internet, a worldwide computer network, today offering access to the world wide web and email, which are now both compelling reasons to buy a personal computer.

Desktop publishing

Just as the Apple II made widespread the leap of electronics from mainframe to desktop, two more Apple innovations took publishing from the printing press to the desktop.

These products were the Macintosh (with its brief forerunner the Lisa) in 1984 and the LaserWriter in 1985.

The Macintosh was revolutionary in that a paper white display showed on screen exactly what would be printed (WYSIWYG or What You See is What You Get). Other computers showed green print on a black screen in a mono typeface with complex codes indicating formatting.

Furthermore the Macintosh made a huge leap forward with the introduction of the graphical user interface we now take for granted. Instead of a command line, the graphical interface used windows, icons, a mouse and pull down menus. The mouse made it possible to easily address the screen, just as a pencil draws on paper, leading to graphics and hence the imaging revolution. More on this in the next section.

Reports, essays, brochures, newsletters and all manner of other printed works could now be produced on the desktop with combined text and graphics. But the output using dot matrix printers, although impressive, lacked the sharpness of the printing press.

The Apple LaserWriter completed the leap forward by providing a means of printing text and graphics at a quality comparable with that

of the professional printing press. In technical terms, this was accomplished by use of a page description language called Adobe Postscript, which supported printing of scalable text and graphics at high resolution.

Initially Postscript laser printing was expensive because it required huge processing power. Over 8 million dots had to be mapped in full and fed in a continuous uninterrupted stream during the laser part of the printing process. A host computer could not be used to process the data because, at the time, there was no way to move that amount of data fast enough or without interruption through an external port. The solution was to build another more powerful Macintosh into the laser printer, with enough RAM to remember the map of the dots.

The expense of laser printing was more acceptable on the Mac because networking was built in from the start, enabling one printer to be shared easily between Macs, using simple to implement AppleTalk networking.

Specialist desktop publishing software such as PageMaker (1985) made it easy to combine text and graphics for printing.

This software was made possible because the Macintosh had the hardware to support it. With the Macintosh, Apple made a bold move from 5.25 inch floppy disks to 3.5 inch floppies. A second or external floppy drive was a lower cost storage option offered by Apple until hard drives became affordable. It enabled printers to access material supplied by clients directly in digital form on floppy disk.

Imaging

The mouse made it possible to address any point on the screen, opening up exciting possibilities of scalable image manipulation, but trying to draw with a mouse was like trying to draw with a brick shaped pencil.

This problem was solved by a combination of hardware and software innovation. The hardware innovation was the graphics tablet, a pressure sensitive pad with electronic touch pencil in place of the mouse. The software innovation was a drawing program introduced in 1987 called Adobe Illustrator, which used bezier curves to provide the smoothness required when drawing lines, circles and arcs.

In 1988 Apple introduced the scanner, which enabled hand drawn art to be quickly input onto the screen, where it could be digitally manipulated by Adobe Illustrator and other graphics software.

Adobe quickly realised that scanners could also input photographic images and in 1990 produced Adobe Photoshop, graphics software that revolutionised the art of photo retouching and processing. Instead of the time consuming process of manually changing images, it introduced digital manipulation of scanned images, which had the additional advantages of being non-destructive and therefore easily reversible.

Desktop colour printing was the next hardware innovation which propelled the imaging revolution firmly forward into the realm of