

***DOCUMENT SCANNING IN
GENERAL PRACTICE***

**A guide for GPs, Practice Staff and IT Advocates
investigating the use of Scanning in General Practice.**

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BACKGROUND

Dandenong District Division of General Practice has an excellent uptake of computerisation amongst its 242 members. July 2000 figures show just over 80% of member clinics have computers on GPs desks. The next step for GPs who utilise computerised prescription writing is to advance to a paperless clinic and store all documents electronically. This requires a great deal of investigation, and with the lack of material/advice available on the issues of scanning in General Practice the Division sought to develop a guide for use by IT Officers and General Practice in the hope that clinics undertaking this transition could be more informed and aware of the issues surrounding scanning and adopting a paperless practice.

The study began in January 2001. A cross section of clinics were selected from the Division, the majority of whom already had scanning practices in place. A minority of clinics involved who were not scanning provided advice on the reservations of GPs and clinics to become paperless, and in one instance on why they had reverted back to a manual environment. It was important to get a variety of opinions in order to present an objective report. Each clinic was interviewed on site, and an extensive survey completed.

This report has been based on the discussion with GPs and Practice Staff during these interviews and the survey results.

This report is not intended as a technical guide on scanning equipment and required file format. The information provided on technical items is a compilation of survey information obtained from the participants in this study. This alone provides a guide as to the most widely used/preferred scanner/file format etc from within the study group, however should not be taken as a recommendation.

The Dandenong District Division of General Practice hopes you find this guide informative and useful when looking into the issues concerning scanning in general practice.

PARTICIPATING GENERAL PRACTICE CLINICS - STATISTICS

Number of Practices Surveyed:	10 GP Clinics & 1 Private Hospital Site (on site visits and interviews conducted)
Average Number of GPs per Clinic:	5.3 Full Time Equivalent
Average Number of Practice Staff per Clinic:	1.6 Full Time plus 7.4 part time
Average Number of Patients per week	1160 (approximated by clinic for 5-7 day period)

The Argument

Is scanning really more efficient than manual filing???
Will my staff have the extra time to incorporate scanning into their daily routine?

It was generally agreed by all clinics that the introduction of scanning had allowed the reception staff to spend more time with the patient. Staff and Practice Managers reported increased phone efficiency, improvements in patient interaction and time savings when comparing electronic filing to paper based processes.

Clinics reported that the efficiency levels had increased, with less time being wasted with staff away from desks, retrieving and depositing files and filing paper documents. Some of this time has been replaced with the scanning process, however nearly all clinics reported a time saving, or improvement in general efficiency with the application of scanning and recording of clinical notes. The incidence of misfiled documents had reduced (no clinic reported any problems with electronic misfiling – although there is still a risk, it seemed greater care was taken when matching a report to a patient record on computer) and in some cases, additional part time staff employed solely for manual filing were no longer required.

Of the clinics surveyed an average of two to three hours per day was spent on scanning. This obviously depends on the size of your clinic and the way in which scanning has been implemented into your practice. Some clinics employed part time staff twice a week for instance to complete all the scanning, and other staff picked up the task in between. In the majority of cases, the task of scanning was shared between all reception staff and was incorporated into the daily routine as a mandatory task that needed attention.

Most clinics had a dedicated area and computer for scanning. Located within the reception area, staff shared the duty and attended to scanning when necessary.

No clinics reported any problems with this procedure, such as certain staff not wanting to scan, and found that most staff were very keen.

The placement of the scanner was considered a crucial decision. For overall efficiency it is best placed on a separate desk within the front reception area – *not on the front Reception desk*. Some staff reported that scanning whilst answering reception calls was a recipe for disaster. If the scanner is placed in the general reception area staff are still present and can be called upon if required. Staff generally floated between tasks as time permitted. It was evident this worked best for all practices.

Although the majority of clinics did not have a dedicated staff member for scanning, two larger clinics did, with a secondary person trained up to cover staff leave etc. These clinics operated slightly differently to others whereby each staff member had specific tasks to attend to, rather than different duties being shared amongst staff.

The point to remember here is that this is personal choice. Each clinic operates in a way that best suits their environment.

The Reservations

What holds paper based practices back?

The clinics interviewed that were not currently scanning provided vital information on the reservations of moving from a paper based practice.

One of these clinics had in fact trialed scanning for several months and found it not suitable. Some of the factors that contributed to the cessation of this process at this clinic included:

- Location of the scanner
- Access to the scanner
- Time taken to scan (low end scanner)
- File space concerns

**The scanner was stored in a back office away from the front desk area. This office was often utilised by the GP which made the scanner inaccessible the majority of times.

Discussions with the clinics who were looking into scanning uncovered some common areas of concern.

- Medico legal issues – what do we do with the original document once scanned?
- Privacy issues – security of the data
- Misfiled reports
- Incorporation of scanning into an already busy practice
- Impact on staff
- GP enthusiasm – GPs concerned about their proficiency on PCs, additional time clinical records will take
- Implications of system down time
- Technical confusion – which, what, how and how much???

The Transition

Converting from paper based to electronic. To back scan or not to back scan.

When considering the transition from paper based to electronic records, there is concern over the method of incorporating prior histories.

Some clinics elect to back scan their entire collection of patient histories into the newly developed electronic record. This requires a great deal of time and resources. Outsourcing is a consideration, but costly and potential vulnerabilities exist with the confidentiality of patient information.

To incorporate the task of back scanning into a busy practice, currently juggling the transition from paper to electronic records is difficult.

So what is the answer?

The majority of clinics interviewed during the study had elected *not* to back scan their records into their computer systems when they went fully paperless.

A process was agreed upon by all staff and GPs involved. Generally a cut off date was made, and from that date all records were entered in electronically. Files were retrieved if necessary. Most clinics had been downloading pathology results etc electronically and writing scripts, therefore results and recent scripts were already stored in the electronic patient record.

Most GPs were keen to progress to clinical notes, those that were a little hesitant double entered for a period of time (writing both a manual note and an electronic note in the patient record) until they gained confidence in the electronic format.

All of these clinics indicated the transition had gone smoothly and they were happy with the process. The clinics that had elected to "back scan" were gradually scanning in the old files when time permitted, rather than employing a dedicated staff member to complete the task. This is a very time consuming task regardless of the method applied. The outsourcing of this task had been considered, however it was found to be very expensive, and the potential vulnerability of confidential data was a major concern.

Several organisations provide bulk scanning services. The Southern Tasmanian Division of General Practice prepared a submission for the Trials of IM/IT Clinical Integration Activities within the Health Sector late in 2000 entitled "Scanning Health Records – From Paper to PC". This proposal looked primarily at the scanning and storage of current paper based records into practice computer systems. In other words – bulk scanning or "back scanning". This document would make an excellent resource for anyone looking into bulk scanning. The process has been thoroughly investigated and documented. The STDGP are only too happy to provide a copy of this submission to any interested parties and they can be contacted on (03) 6278 9772 or email tcooper@southtasdgp.com.au.

Scanning

What to scan – what not to scan?

Almost all clinics indicated that every document received was scanned. Adding to that of course is the common sense approach of not scanning anything that has less than 20 words or is unclear, and folding under any detailed letterhead, so a file size is not blown out with unnecessary images. One example is the hospital admission and discharge summary that did not contain the reason for attendance. This was not scanned; a manual note was entered into the patient record. Most clinics report that it is merely a matter of common sense. Some reported problems with ECG's and were looking into an add on program that enabled these to be uploaded into the clinical programs.

This approach is completely sensible. Scan what needs to be scanned.

At the Medical Director User Group hands on workshop last October, which looked at the paperless practice, Dr. Andrew Magennis from HCN/MD provided the following comments on scanning:

- **Don't scan everything—be economical about it.**

Scan only the pieces of paper that you would read if in a manual file. Keep it in perspective and don't take it any further than it really needs to be.

- **Adjust Resolution on items you must scan.**

By adjusting the resolution of the image you scan you reduce the size considerably.

- **Save as low resolution jpeg to reduce the file size further.**

Lower resolution JPEG takes up much less space than a BMP with very little loss of quality.

- **Consider Bulk Scanning**

Some organisations provide a bulk scanning service, and provide you with a CD-ROM. Useful if archiving old patient files.

Medico-Legal Issues

*What to do with the original document once scanned?
Will a print out of a scanned document be admissible in Court?*

At present, there is no legislation detailing the admissibility of a scanned document in court, or the retention time of the original document after scanning.

Victorian Legislation:

Evidence Act 1958

Section 46 – in summary states that “effect of copies same as original” however – NO specific reference is made to that copy being a scanned image.

Commonwealth Legislation

Evidence Act 1995

Section 2.2 Documents

Unable to determine anything of use. No reference to copied computer produced documents.

The ‘best evidence rule’ states that the ‘original’ is the best evidence. It is possible to introduce a copy, but only if the original is no longer available, and only after appropriate explanations. However, the *Evidence Act* allows certain types of copies to be treated as originals (e.g. microfilm, photographs). The last revision of the current *Evidence Act* predates the widespread use of modern copying technology and the widespread use of computers.

(Source: Public Records Office Standard: PROS 99/007 – Management of Electronic Records, Appendix Two – Electronic Records and the Law)

Brenda LeGrande, Archival Services, Department of Human Services advises that currently there is no legislation that directly relates to scanning and sets retention times for the paper originals of Health Information records. The area of electronic records as evidence is legally problematic.

The Evidence Act 158 covers microfilmed (not scanned) documents but also alludes to computer-generated documents as being admissible as evidence provided the documents can be shown to be complete, accurate and unchanged from the original. This issue has not been tested in Victorian courts, but in the absence of an original an appropriate reproduction can be evidential.

For this to occur, it is necessary to prove that scanning is the normal procedure for storing patient information. There must be policy and procedure manuals which include standards for security, audit, and meta-data as well as documentation to verify equipment integrity, QA and adequate back-up procedures to protect against loss or corruption of data. Assuming the scanning process accomplishes this, the paper documents should be able to be destroyed (in a secure manner) when scanning is complete.

Of course, adequate time must be allowed for confirmation of data integrity. The scanned information must be accessible for as long as the record is required administratively or by legislation.

Medico-Legal Issues – *continued.*

The Public Records Office (PRO) advise adhering to the following guidelines when retaining your electronic copies:

If presenting an electronic document as evidence, you would need to be able to show the court:

1. When the document was created
2. Who created the document, that this person was capable and responsible.
3. The processes that produced it – i.e. by way of P&P Manual
4. The system that looked after it was not susceptible to tampering or hacking i.e. the document could not be edited.
5. Audit logs to track access.

The P.R.O. also stated that generally a problem would only be encountered when presenting an electronic document for evidence if either side disputed the document.

(Source: *Public Records Office, State Archival Authority*)

The following is an extract from the Public Records Office, Standard for Management of Electronic Records. Should you wish to view the full document visit www.prov.vic.gov.au/vers/standards.

In introducing records into evidence, Victorian courts make two decisions: admissibility and weight.

Admissibility is subject to a variety of rules built up over centuries. Of particular relevance to electronic records is the 'best evidence' rule. Among other things, this states that the 'original' is the best evidence. It is possible to introduce a copy, but only if the original is no longer available, and only after appropriate explanations. However the *Evidence Act* allows certain types of copies to be treated as originals (e.g. microfilm, photographs). The last revision of the current *Evidence Act* predates the widespread use of modern copying technology and widespread use of computers.

The legal community is moving from a paper based model to an electronic based model. Currently the legal situation is in a state of flux. The extension of current practice with paper records to electronic records has been difficult because of technology assumptions in statute law. Existing laws often mention or assume specific technology. The Evidence Act specifies a particular set of technologies that are defined to produce 'copies'. More abstractly, there is a common law question about whether digital signatures are signatures. The Commonwealth and Victorian Legislatures are dealing with this by changing various acts to be technologically neutral. This process has not yet been completed.

As a side note, introduction of printouts of digital information (e.g. financial records) are routinely introduced into evidence. This is achieved by the person introducing the printouts swearing that they were, in fact, produced from the computer in question, and that the records were created under the normal course of business. This is an example of the development of case law in practice.

It is clear that there may be a legal problem with the admissibility of electronic records as the current Victorian Evidence Act was not written with electronic evidence in mind. The proposed new Victorian Evidence Act will follow the new Commonwealth Evidence Act.

Medico-Legal Issues – *continued.*

The new Commonwealth Act removed the requirement that the 'best evidence' is the original. A copy is acceptable, and a copy is defined to be anything produced by a process which produces a copy.

In summary, the legal situation on electronic records is in a state of flux. Because of the need to develop common law interpretations, this uncertainty can be expected to last for a significant period (possibly decades may pass before the legal questions of electronic records are completely resolved).

(Source: Public Record Office Standard, PROS 99/007, Standard for Management of Electronic Records - Appendix Two: Electronic Records and the Law)

A specific question to resolve during this study was the OCR vs image debate. OCR is the least space consuming method of retaining scanned documents, however posed the greatest legal threat as it could be edited.

Most practices have ceased scanning in OCR format and are crunching up disk space by saving images. Point four of the PRO's guidelines –states "The system that looked after it was not susceptible to tampering or hacking – i.e. edited". We know that an OCR document can be altered. Some will argue that a scanned image could also be altered by someone with the motive and expertise.

With the lack of case law regarding the presentation of such documents in court, we can only be guided by the current standards and outdated legislation concerning electronic records, and proceed with caution.

Basically, individual practitioners need to decide on their own level of comfort based on the information available, and act accordingly.

The Processes

From arriving in the post to being scanned - and then what??

All clinics have their own procedures when it comes to document handling. Steps have to be taken to ensure all documents are viewed by the GP. How clinics do this is their own decision. Overall it seems the simplest things work best in this scenario.

All of the clinics after receiving the document via the post, ensure the GP has viewed the report prior to scanning. Most clinics merely had a method of the GP initialling the document and returning it to a "TO BE SCANNED" tray. This method is simple and effective and ensures all documentation is viewed by the GP prior to being scanned.

The major observation made during this study is that each clinic has a unique method of carrying out the task of scanning, and rightly so. Each clinic is different, has different staff, different office procedures and software programs.

This does however make it difficult to present a definitive step by step guide for those looking into the processes of scanning.

Whilst some clinics scan their documents in batches, referencing each page and file name as they go, then import into patient records, others call up the patient record first and individually scan the document in.

Some scan using their scanner software, then open their medical package, and select the import document option, others open up the record and use the scan utility within the medical package. Your process here would also depend on the length of time you are keeping the document after scanning.

All clinics interviewed disposed of the original document immediately after scanning - the exceptions here were Workcover documents and solicitors letters (the disposal method is obviously significant – all of the clinics shredded the documents). One clinic retained the documents for one day should any system faults occur throughout the day. All clinics were comfortable with this process.

Most clinical packages have a scanning utility of some sort (this enables documents to be imported from an external location directly into the electronic health record). If your package doesn't, lobby your software provider to get this incorporated.

One clinic had purchased an additional scanning database component to enable them to catalogue their paper histories being "back scanned"; other than that no clinics throughout this study had any enhancements to their medical programs or scanning software to facilitate scanning into their clinic.

Whatever the process – it didn't seem to change the time taken to scan a document. At each interview the time was measured from the placement of the document into the scanner to the time the electronic record had received and referenced the scanned document (i.e. it had been filed). The average time taken was approximately 40 seconds for each document.

The Processes - *continued.*

Clinics that usually scan in bulk or batches, carried out an individual scan for comparison. Although the throughput when bulk scanning would be more efficient, individual patient records still need to be accessed and the scanned document filed.

Now – how long would it take for someone to leave their chair, access the manual files, locate the appropriate file, insert the paper document, and replace that file?

Some would argue that 40 seconds per document is a long time. If a clinic was to spend tens of thousands of dollars on their scanning equipment, investing in industrial type bulk scanning equipment, this time may indeed improve. However, it is worth noting that there would still be a minimum time taken to process the scanned document into the clinical record.

While there are software vendors offering “bolt on” products to improve the efficiency of this process, the clinics interviewed were more than happy with their current procedures, and did not think the time taken was a concern.

As the technologies of scanning, and the demands of the paperless practice progress, software providers would indeed be encouraged to improve and streamline the processes of incorporating scanned documents into a clinical record, and we may in the near future see improved features within medical software to make this task more efficient.

The Tech File

Technical details of scanners utilised by practices, the software and file formats.

HARDWARE

The aim of this study is not to provide a detailed specification listing of all makes and models of scanners, but merely to show what participants in this study are using. GPs and clinics may use this as a guide but please investigate the specifications of each unit thoroughly to ensure it will cater for your requirements. i.e. some units will not offer double sided, or multi page document functions and only process a single page at a time, whilst the larger more expensive units with automatic document feeders generally provide all of this functionality.

The choice of scanners and scanning software is vast. Of the clinics interviewed for this study – the cost of scanners ranged from \$150.00 to \$8000.00. However, please note that the \$150.00 scanner was proving completely inefficient. Technical opinions obtained during this study indicate that the more expensive models (over \$4000) give the best results – i.e. quicker to scan, improved software updates. Automatic Document Feeders (ADF) are recommended however will require regular maintenance such as cleaning rollers and removing dust.

Below is a listing of the Scanners used, and approximate pricing, the practice volume of scanning and practice opinion of the hardware.

MODEL	PRICE PAID BY CLINIC	VOLUME / EFFICIENCY	PRAC. OPINION
CANON DR-3020	\$6500.00	High Vol. Automatic Doc. Feeder (ADF) used.	Bulk scanning and very happy with efficiency and reliability. Fast document processing.
HP Scanjet 6300 Series	\$1000.00	Low to Med Vol. ADF used.	Relatively happy with efficiency.
HP Scanjet 6300 Series	\$1000.00	ADF bulk scanning. Med – High Vol.	Happy with efficiency and reliability.
FUJITSU M309xDC	\$1000.00	Single feed. Med Vol.	Happy with efficiency and reliability.
UMAX 56E (scsi)	\$1000.00 (6 YRS OLD)	Single sheet – flat bed. Med – High Vol.	Happy with efficiency and reliability.
CANON FB 630P	Unknown	Single sheet – flat bed Med Vol.	Relatively happy with efficiency and reliability.
CANON DR-3020	\$8000.00	High Vol. ADF Used. Allows for Dbl side and multi page docs.	Bulk scanning and back scanning. Very happy with efficiency and reliability.
AGFA Snap Scan 1236	Unknown	Single sheet - Flat Bed	Not currently being used.
CANON FB 630U	\$150.00	Single sheet – Flat Bed Low volume	Not happy with speed of scanner. Have discontinued scanning.

The Tech File – *continued.*

SCANNING SOFTWARE

The majority of clinics were utilising the existing scanning software that was bundled with the scanner. The newer scanners are offering improved software allowing for better compression rates and additional preferences when scanning a document (i.e. saving a multi page document as one file, rather than having to save each page as one file). If your current software is not meeting your needs the manufacturer may have released improved software that allows for greater functionality and efficiency. Contact your supplier or the manufacturer of your scanner to obtain further information on this. This may be particularly relevant if you have moved from OCR scanning to Image scanning, and need to further reduce the image size to reduce disk consumption problems.

FILE FORMATS

As the scanners and scanning software varied, so did the file formats. Most clinics had experimented and found the best possible solution for them.

The formats available are governed by the software with the scanner. Some software will offer compressed tiff for instance others will prompt for the rate of compression to use. A word of warning. A tiff file is generally considered the "least" compatible in terms of imaging programs used to view it. The imaging program that comes standard with Windows in most cases will open a bitmap or jpeg file without problems. Tiff on the other hand can be problematic.

Bitmap (.bmp) files offer better quality than jpeg files because they represent each and every pixel, however are larger files.

OCR is by far the smallest way to store a scanned document. However, legal implications are associated with this (*refer medico-legal issues – page 8). One clinic interviewed was scanning OCR images which stored the average document at around 2kb. This nearest comparison came in at 30kb – a compressed tiff file, black & white at 300dpi. The remainder ranged from 80 – 160kb. A true colour jpeg file scanned at 200dpi weighed in at 160kb. This was generally the average and not bad for colour with very little sacrifice in quality. A compressed bitmap file scanned in black & white at 300dpi was 100kb.

DISK SPACE

If using the above example, each scanned document was approximately 100kb, 10 documents will chew up 1mb of your disk space. An average of 50 documents per day = 5mb of disk space per day x 6 days per week = 30mb per week x 52 weeks per year = 1.56Gigabytes. Basically you are looking at about 1.5GB of disk space per year – assuming you can get your files down to 100kb.

At the other end of the scale, if you can't get your images down below 500kb – the same sum works out to a consumption of 7.5GB of disk space per year. **Ouch...**this of course then throws in the debate of archiving. When, what, where to store etc.

The Tech File – *continued.*

DISK SPACE – continued..

Not only is physical disk space a consideration, but also the available space on your backup drives and tapes. You will need to accommodate extra data until such time as archiving is carried out. Disk drive space is relatively inexpensive when compared to the cost of upgrading your backup media.

VIEWING THE IMAGE

Your computer screen resolution is only 75 dpi. Therefore when *viewing* an image, you will only ever see that image at 75 dpi on the computer screen regardless of its scanned resolution (i.e. if the document was scanned in at 300 dpi you would still only be viewing it at 75 dpi).

PRINTING A SCANNED IMAGE

The average bubblejet or small laser printer prints out at 300 dpi. Some larger printers print at 600 dpi.

If we were to *print out* an image that had been scanned in at 75 dpi you would notice a considerable reduction in the quality of the printed document. This is to be considered should the document ever be required in court. A medical record would not hold much weight if it was barely readable.

Scanning images at 300 dpi is probably an overkill, as it will consume extra space. Although when printing it you would get the best possible quality. A compromise is to perhaps scan in at 150 dpi. This resolution would still offer quality and improve on the file size.

(Some scanners when scanning will prompt for the printer you are using. If you select a printer that prints at 300 dpi – the scanner will select a rating of 150 dpi. Or 600 dpi printer – 300 dpi scanning resolution.)

It would be wise to thoroughly investigate your scanner model and software options at the vendors prior to purchasing, and test out the file formats and sizes by scanning a document there and then. Pick something with letterhead if possible, to get a true indication, as most documents you scan will contain letterhead. If you have already purchased your unit and are struggling to reduce file size any further contact the manufacturer i.e. Canon to see if they have released additional software to compress images. One of our clinics did just this and have been thrilled with the results.

The Disaster

Disaster recover & system setup. What happens when my system crashes??

There are two scenarios to consider when looking at disaster recovery.

- 1: System failure and the integrity of data
- 2: System failure and the continued operation of the clinic, access to records etc.

SYSTEM FAILURE AND DATA INTEGRITY

In addressing the first point clinics have adopted a 'better safe than sorry' attitude and are well organised with regard to disaster recovery.

Those truly paperless clinics operated with the following safeguards in place:

- mirrored or RAID drives in Server units,
- nightly backups which are stored in either a backup safe or off site
- routine archiving of backups
- regular testing of backup tapes through restore procedures
- uninterruptible power supply (UPS) systems
- *two clinics also operated with backup generators in place.*

Thankfully, none reported having to put their plans into practice to date, but felt confident with their strategies.

SYSTEM FAILURE AND CONTINUED OPERATION

The second scenario creates a bigger headache. One clinic had implemented a ticket system in case of system downtime. Each patient was allocated a ticket. GPs then hand wrote notes which were later keyed into the patient record when the system was restored. This doesn't address the issue of not having access to their current record, but previous manual histories could be retrieved if necessary.

Each clinic would need to review their processes in regard to scenario number two and devise their own plan of attack based on what would work best for them.

Hint: Make sure your disaster recovery plans are well documented and form part of your P & P Manuals. All staff should know what to do should the system fail.

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Public Records Office Victoria – 1999

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Section 46
(Victorian Legislation)

The Evidence Act 1995
Section 2.2
(Commonwealth Legislation)

Scanning Health Records: From Paper to PC
Southern Tasmanian Division of General Practice – 2000

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Dr. Bialylew's Surgery
Heatherton Road, Dandenong

Access Medical Centre
Princes Highway, Hallam

McKinley Medical Centre
Police Road, Mulgrave

Eastern Medical Centre
Cleeland Street, Dandenong

Berwick Medical Centre
Clyde Road, Berwick

References & Acknowledgements - *continued.*

Raymond McMahon Medical Centre
Merryn Close, Endeavour Hills

Fountain Gate Medical Centre
151 Kurrajong Road, Narre Warren

Casey Medical Centre
High Street, Cranbourne

Langton Medical Centre
Langhorne Street, Dandenong

Endeavour Hills Medical Centre
Heatherton Road, Endeavour Hills

Glossary of Terms

TERM	DEFINITION
BITMAP	A bit map (often spelled "bitmap") is an image file format that defines a display space and the color for each pixel or "bit" in the display space, thus producing a very good quality image. The image cannot be immediately rescaled by a user without losing definition.
DPI	Dots Per Inch 1) In computers, dots per inch (dpi) is a measure of the sharpness on a display screen. The dots per inch for a given picture resolution will differ based on the overall screen size since the same number of pixels are being spread out over a different space. 2) In printing, dots per inch (dpi) is the usual measure of printed image quality on the paper. The average personal computer printer today provides 300 dpi or 600 dpi. Choosing the higher print quality usually reduces the speed of printing each page.
JPEG	A JPEG (pronounced JAY-peg) is a graphic image created by choosing from a range of compression qualities. When you create a JPEG or convert an image from another format to a JPEG, you are asked to specify the quality of image you want. Since the highest quality results in the largest file, you can make a trade-off between image quality and file size. Formally, the JPEG file format is ISO standard 10918. JPEG is an acronym for Joint Photographic Experts Group.
OCR	OCR (optical character recognition) is the recognition of printed or written text character by a computer. This involves photo scanning of the text character-by-character. OCR used in document scanning produces a considerably smaller file than image file formats, however there are medico-legal implications as an OCR scanned document can be altered.
RESOLUTION	Resolution is the number of pixel (individual points of color) contained on a display monitor. The sharpness of the image on a display depends on the resolution and the size of the monitor. The same pixel resolution will be sharper on a smaller monitor and gradually lose sharpness on larger monitors because the same number of pixels are being spread out over a larger number of inches.

Glossary of Terms

TERM	DEFINITION
<p>R.A.I.D. (Mirrored drives)</p>	<p>RAID (redundant array of independent disks) is a way of storing the same data in different places (thus, redundantly) on multiple hard disk. Since multiple disks increases the mean time between failure (MTBF), storing data redundantly also increases fault-tolerance. A RAID appears to the operating system to be a single logical hard disk.</p> <p>RAID employs the technique of <i>striping</i>, which involves partitioning each drive's storage space into units ranging from a sector (512 bytes) up to several megabytes.</p> <p>There are at least nine types of RAID plus a non-redundant array (RAID-0):</p> <ul style="list-style-type: none"> • RAID-1. This type is also known as disk mirroring and consists of at least two drives that duplicate the storage of data. There is no striping. Read performance is improved since either disk can be read at the same time. Write performance is the same as for single disk storage. RAID-1 provides the best performance and the best fault-tolerance in a multi-user system.
<p>TIFF</p>	<p>TIFF (Tag Image File Format) is a common format for exchanging images between application programs, including those used for scanner images. A TIFF file can be identified as a file with a ".tiff" or ".tif" file name suffix. One of the most common graphic image formats, TIFF files are commonly used in desktop publishing, faxing, 3-D applications, and medical imaging applications.</p>