



How To Select the Right Imaging Technology

Once, film was the universal solution to all imaging needs in law enforcement. Now film is just one choice among many.

Today, officials can apply film, video, writable and Photo CD technology and digital cameras to law enforcement applications. Each technology offers specific strengths. To select which imaging technology is best for a particular application, you need to ask common sense questions. What are you trying to document? How much control will you have over lighting and other environmental factors during image capture? How much detail do you need to capture in the image? What constraints do you face when it comes to managing and storing the images?

You also need a basic understanding of the characteristics of each imaging technology.

Image capture options

Today, there are three types of technology for image capture from three-dimensional objects: video, silver halide film and digital cameras. Each of these offers important advantages in law enforcement applications.

- **Video** Video is an ideal low-cost medium for documenting movement. This makes it ideal for surveillance. It provides sufficient dynamic range (the ratio of the lightest to the darkest scene intensities that can be recorded) and has enough sensitivity to support low light conditions. With video, images are also available immediately after capture—you can play back a videotape without intermediate processing. Video records are difficult to store, however, and have limited resolution.
- **Silver halide film** Film is a time-tested image capture tool. It is highly sensitive, and can record detail at very low light levels. Film provides very high resolution images with a wide dynamic range.

For these reasons, film is ideally suited for crime scene documentation. It allows you to capture scenes in great detail, recording things the photographer might have overlooked. Film lets you "revisit the crime scene" if you need to search for new evidence or assemble materials to support a witness' testimony in court. Film images are relatively easy to store. One limitation of traditional film images is that they are not available immediately after capture.

- **Digital Cameras** Digital cameras let you preview images as soon as they are captured. You therefore have immediate feedback about whether you have captured an adequate image. Digital camera technology is improving dramatically, so you can now capture electronic images of unprecedented resolution and dynamic range. The Kodak Professional DCS 460 digital camera, or the Canon EOS/6 camera, for example, can capture images with resolutions of six million pixels.

Digital cameras are ideal tools for forensic lab applications. If you have a piece of evidence you need to document to support court testimony, for example, or if you have a latent print you wish to prepare for submission to an AFIS search, you can use a digital camera to capture a series of high-quality images. You can then preview the images to see if the lighting and focus is correct, and if the artifact you meant to show is well displayed. You print only those images that meet your standards and erase all others from the reusable medium.

Digital cameras allow you to save on production costs because you don't pay for repetitive images. You also eliminate any uncertainty about whether you have a clear image with sufficient detail to accomplish your objectives.



Digital imaging technology allows law enforcement agents to analyze photographs in real time using computers. The reflection of the figures in this child's eye are undetectable until the photograph is enlarged. by using a computer imaging software to "zoom and roam" around the photograph, an agent could identify which portions of the image are relevant and need to be printed as enlargements.

Managing image records

Once you have captured an image, you need to store it so it will be easy to retrieve and will not place unreasonable demands on your agency's resources.

Silver halide film is a straightforward medium for image records management. It is readable by the human eye and easily attached to paper documentation.

Digital imaging technologies, however, offer fast and flexible image retrieval options. Digital files do not occupy physical space, which makes them ideal for cataloging images such as mug shots. Off-the-shelf image data base tools then let you display images by entering names or identification numbers. The chance that images will be "misfiled" is minimized because the computer tracks image locations.

Digital technology can also make it easier to manage video images. If you need discrete clips of video footage to corroborate a witness' court testimony, for example, you can transfer the clips to writable CD. You can then play back the scenes at any time without having to rewind and cue a videotape.

Writable CD allows law enforcement to store images both reliably and inexpensively. A single disc holds 680 megabytes of data, or the equivalent of 500 high density floppy disks. Per megabyte, it costs about three cents to store documents or images on writable CD, as compared to about \$1.07 for floppy disks or \$0.80 on a hard drive.

Writable CDs can be read with any standard CD drive. Any type of data can be stored on CDs, including video, still images, text and data.

Writable CD's Write Once, Read Many (WORM) technology assures that a file on disc can be appended but never erased. These files can by no means be tampered with. Kodak writable CDs also have embedded serial numbers that are both man- and machine-readable. Files stored on each CD can be tracked by its serial number. Keeping that index in a separate location provides an extra level of security, protecting the integrity of your records.

Resolving the pixel issue

In some cases, you can use your image storage resources more efficiently if you make informed decisions about what resolution is required for certain images. This can be important in large systems such as mug shot files. Image resolution of electronic files is usually expressed in terms of pixels per image. A pixel, or "picture element," is a point that can be displayed as a certain color. The more pixels you use to render an image, the more detail you can show. But to a computer, a pixel is also data. High-resolution images, which require more pixels, create large files which take up more system memory when you display them, more storage space when you write them to your hard drive, CD or floppy disk, take longer to print, and so on.

Image file management therefore requires you to balance your need for high resolution with storage constraints. You may find, for example, that you do not need extremely high-resolution images to create identifiable mug shots. Medium-resolution images might be adequate and better suited for your image storage strategy.

In some cases, you may want to keep multiple versions of images at various resolution. One way to do this is by using Kodak Photo CD technology. Photo CD discs come with specialized tools for storing and displaying still image files. These images can be displayed on either television screens or computer monitors.

Photo CD technology stores images at five resolutions, presenting a range of choices. If you want to produce extreme close-ups of an image, for example, you can work with near-photographic versions of the image. However, if you need to browse images quickly, or send them over a network, you may prefer lower resolution versions. That flexibility makes Photo CD technology ideal for managing crime scene photography.

Photo CD technology has also become a de facto standard for image file management. Many software tools and operating systems support the use of Photo CD files. The technology is also platform-independent. You can read Photo CD images on IBM compatible PC's, Macintosh computers and UNIX workstations.

Images are essential to virtually every aspect of law enforcement, from surveillance to gathering evidence to courtroom testimony. New imaging technologies complement the proven capabilities of silver halide film. They provide powerful new tools for capturing, managing, analyzing and storing images. But these new options require that users make decisions and choices.

To do this well, it is important to understand each imaging technology and its strengths. Do so, and you can make your job easier by setting new standards for effective law enforcement- while keeping an eye on costs.

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