



Document Cameras

by Leigh Kades

Executive Summary

Document cameras are vertically mounted television cameras that with appropriate display monitors or projectors permit the display of documents, photographs, books, small charts and other forms of “hard copy” materials as well as objects. Also known as video or visual presenters, or sometimes by company or product names such as “Elmo” or “DOAR Communicator,” document cameras are a basic and essential form of courtroom technology. They permit the instant display of images, especially paper-based information, and often transparencies, x-rays, and slides, without prior preparation. Not only does this permit counsel, or judge, to adjust to a changing trial, it also provides a potential back-up system in the event of the failure of a computer based display system. Document cameras have also been used for data display during video-conferencing. Improving technology is augmenting document camera capabilities; many are now capable of digital outputs. Some people find the primary drawback of document cameras to be their difficulty in displaying an easily readable entire 8x10 inch page. Many lawyers especially like document cameras, however, because of counsels’ ability to dramatically enlarge key portions of an exhibit, or to use electronic add-ons to annotate an exhibit.

White Paper Scope

This white paper reviews the use of document cameras in the courtroom. It addresses the possible advantages, disadvantages, problems, feasibility, and general usefulness of courtroom document cameras from the perspective of both litigators and court staff.

The Technology

Most document cameras consist of a vertically mounted color television camera aimed downwards at a horizontal base upon which a document or object can be placed. Some companies such as Videolabs manufacture ceiling mounted cameras that will focus on materials placed on horizontal furniture or millwork surfaces.

Most document cameras have at least a manual or autofocus control as well as the ability to zoom in or out so as to enlarge or diminish the area of the document or object to be displayed. Sophisticated document cameras increasingly tend to have hand-held remote controls.

Many document cameras provide overhead lighting of the base in order to enhance the visibility of the item to be displayed. In some cases this lighting is provided by bulbs that are mounted on moveable arms; the arms may take up significant vertical space.

Nearly all document cameras are designed so that they can show transparencies, x-rays, and slides. Some cameras come equipped with internally illuminated bases for this purpose; others have optional light boxes that can be placed on the base to provide similar functionality.

Most document cameras are at least potentially portable. Companies may market a range of products so the portability of one model cannot be considered representative of other models. WolfVision, for example, manufactures both one of the most portable units on the market as well as large high end models that cannot be considered portable at all.

Document cameras must be connected to some form of display device. Ordinarily this would be one or more televisions, monitors, or projection units. Many lawyers found document cameras to be especially desirable after seeing documents displayed by projectors on large screens. Most document cameras permit or require connection to display devices via composite video output, usually using "RCA" or NBC video connections. Newer units increasingly provide digital, computer-type, output. This form of output requires a computer VGA monitor display device. It has the advantage of potentially simplifying courtroom video wiring. However, some models may provide jerky video when counsel moves the original on the base. Although most document cameras connect to the courtroom controls or display devices with wires, some units are designed to permit wireless radio frequency connections instead.

With the move to digital output, a number of document cameras permit the electronic recording of multiple images so that they can be used later, even when the original is no longer on the base.

Some document cameras provide only video output from the camera. Others provide switching capabilities that allow connection of additional display devices such as VCR's. These models can be highly useful in courtrooms that have limited or no other video switching capabilities.

Some document cameras offer an additional camera as an option. The second camera is designed to focus on the human presenter, although in some cases the camera can be dismantled and relocated.

"Add-ons" for document cameras include video printers and electronic annotation devices. Via the use of a light pen or touch sensitive monitor, a user may be able to underline, circle, or even write electronically on the displayed image, using one of severable colors and line thicknesses. The video printer can print out a photographic image of the annotated display.

Vendors and Cost

Document cameras are manufactured or sold by a wide variety of electronics companies. These include:

Avermedia	www.avermedia.com
Barco	www.barco.com
Canon	www.usa.canon.com
DOAR Communications*	www.doar.com
Eiki	www.eiki.com
ELMO*	www.elmoussa.com
Epson	www.epson.com
Hitachi	www.hitachi.com
JVC	www.jvc.com
Lumens	www.lumens.com.tw
Panasonic	www.panasonic.com
Philips/Magnavox	www.philips.com
Polycom	www.polycom.com
Samsung*	www.samsungtechwin.com
Siemens	www.siemens.com
SONY	www.sony.com
Toshiba	www.toshiba.com
Videolabs	www.videolabs.com
Wolfvision*	www.wolfvision.com

Affiliates have commented on document cameras from these vendors. See the **Affiliate Comments section on page 7.*

The Courtroom 21 Project's McGlothlin Courtroom includes document cameras from DOAR Communications, Samsung, and WolfVision.

Costs vary by model and capability. In general a purchaser may expect to pay from \$800 for a very basic model to \$7000 for a deluxe model. Monitors, stands, ceiling mounts and bulbs will be additional.

Use

Document cameras were the key component of early technology augmented courtrooms and remain crucial components in today's courtrooms. Document cameras permitted lawyers to visually display information to judge and jury before the large scale adoption of computer technology. Because most people better remember what they see and hear, rather than just hear, visually based evidence and argument are highly useful. The document camera remains a key method of presenting such information.

Initial experimental work at Courtroom 21 shows that electronic display of evidence is widely accepted by jurors. Experimental trials at Courtroom 21 suggest that jurors would like to see

information presented visually as much as possible. Individual monitors further enhance jurors' satisfaction.

Document cameras can be used in a courtroom to display most any item to the entire courtroom through large, strategically placed monitors or screens, or to multiple smaller monitors placed throughout the courtroom or in front of each juror. Images displayed on a document camera are virtually unchanged from the original: what is placed on the document camera is what the courtroom audience sees. The document camera simply enables the evidence or information to be more easily viewed. Document cameras can be used in the following ways:

- High-resolution zooming enables focusing on certain features of the object or document.
- 3-dimensional objects can be viewed from different angles and close-up without having to be passed around the courtroom.
- The enlarging feature enables small text in an original document to be made more readable; this feature can be used to aid the visually impaired as well. Counsel often use enlargement as a means of emphasizing the material to be displayed.
- Multiple images sometimes can be stored (either in the document camera's memory or on a computer storage device) and then displayed in sequence without having to remove one object and replace it with another.
- Images can be sent instantly to those at remote sites who have joined the courtroom through video conferencing.
- Images displayed on the document camera sometimes can be saved to a connected computer for later viewing. Images can also be recorded onto video recorders or video printers.

Counsel often use document cameras during opening statements, presentation of evidence, and closing arguments. Judges may use document cameras to display hard copy law or documents to counsel. Judges can also visually display Jury instructions to the jury.

SJI funded Courtroom 21 experiments have shown document cameras to be highly useful in jury deliberations.

Document cameras are most useful for displaying photographs and portions of documents. Because it is usually difficult to read easily the text of a displayed full page, users given the option of formatting a page for later document camera use should use large margins to permit useful enlargement and display.

Many practical issues support using document cameras in the courtroom. Through the use of individual monitors, jurors are able to read documents at their own speed, without feeling pressured to maintain the reading speed of other jurors. This surely enhances comprehension and retention of the information presented.

Jurors may also decide which display in the courtroom best suits their individual needs. For example, a juror with near-sightedness may prefer using his individual monitor to view the information presented. However, a far-sighted juror would undoubtedly prefer one of the large wall-mounted monitors in the courtroom.

Location

The primary courtroom location for a single document camera is on or near counsel's

lectern or podium. Courts that use Courtroom 21 Litigator Podia or DOAR DEPS (Digital Evidence Presentation System) ordinarily mount the document camera on either the left or right “wing” of the unit.

Additional document camera locations include the witness stand and the bench. A witness stand document camera permits the witness to personally point out key features of an exhibit, using either a pen or pencil or even a finger. Some courts prefer a ceiling mounted camera for this purpose. A bench camera permits the judge to display to counsel court rules or documents without the use of a computer.

An additional document camera location is the jury room. When coupled to a plasma display or a projector with screen, document cameras permit jurors to discuss key pieces of evidence with each other while concurrently viewing it.

Constraints

Although document cameras present few difficulties, the following may prove troublesome:

- Most documents cannot usefully display the content of an entire 8 ½ x 11 inch page. Instead, the user can show the page and then enlarge specific content.
- Document cameras are only as good as the display device(s) used. Both the size and the resolution of the display device can be crucial.
- Lawyers who use colored markers to annotate exhibits on the base of a document camera may leave long-lasting marks on the camera base.
- Use can be problematical. Basic document cameras are *very* easy to use; most lawyers and court staff can learn how to use one adequately in seconds. More sophisticated cameras can present both training and use concerns. This can apply especially to the use of electronic memory features and to those cameras that are wired so that a camera control can toggle between the camera’s output and that of an attached device such as a computer.
- In order to permit digital data display, some newer cameras do not permit smooth movement of the document or item on the base. Instead, such movement, or of a hand or pointer, is slow and jerky on the display(s).
- Once a document camera is installed in the courtroom, it will, obviously, have to be maintained. Personnel will be necessary to ensure that the document camera is functioning properly and set-up before the trial. This will usually be a minor issue, as document cameras require little maintenance and usually operate with a simple switch of the “on” button. Monitors also must be maintained and checked frequently to ensure that images are transmitting clearly.
- Courtrooms offering the use of a document camera may need to provide basic documentation on its use. One affiliate court, the U.S. District Court of Minnesota, provides availability information and documentation on-line for attorneys.
- Problems may arise when an attorney is planning to use a document camera and, for whatever reason, it is not functioning. Judges and jurors may become irritated by delays caused by malfunctioning equipment.

Legal Considerations

When evidence is displayed by counsel at trial, ordinarily it is the “hard copy” or object that is formally offered into evidence and received. The fact that a document camera is used to display an image of the evidence does not present a problem under the usual evidentiary rules. Whether

viewed under common law or variations of the Federal Rules of Evidence, now used by most states, the “best evidence rule” governs the admission into evidence of documents or their equivalents, rather than how that evidence is displayed.

Should counsel offer into evidence the images as produced by a document camera, rather than the hard copy placed on the document camera, the best evidence rule does come into play. Under Federal Rule of Evidence 1001 a document camera image would constitute a “duplicate” of the material on the base and under Federal Rule of Evidence 1003 a “duplicate is admissible to the same extent as an original unless (1) a genuine question is raised as to the authenticity of the original or (2) in the circumstances it would be unfair to admit the duplicate

When best evidence objections are raised to document camera images, judges should insist that objecting counsel state their objections with great specificity. If counsel is complaining that an aspect of the original, *that is relevant to the case* is not being accurately reproduced by the document camera, the objection may have merit. This would be true, for example, if the color of the original document were important: the combination of document camera and display device almost always results in a display color slightly different from that of the original. Similarly, a physical feature such as a crease or the weight or quality of paper would not reproduce well or at all via document camera image. Ordinarily, however, counsel are concerned only about the text or other informational aspects of an exhibit and these are reproducible without alteration. *See generally, Fredric Lederer, The New Courtroom: the Intersection of Evidence and Technology: Some Thoughts On the Evidentiary Aspects of Technologically Produced or Presented Evidence, 28 S.W. U.L. Rev. 389 (1999).*

Purchase Considerations

When buying a document camera, in addition to cost and warranty, the following should be considered:

- Ease of operation;
- Size - especially with respect to the intent location;
- Portability - especially if the intent is to move the camera from one courtroom or location to another;
- Resolution;
- Type of output - composite video, digital, or both;
- Transparency and slide capability;
- Ability to adequately display a full page;
- Manual/autofocusing capability;
- Availability of electronic image memory;
- Special features of importance to the user, including a secondary camera, switching capability, wireless operation, and the like.

Affiliate Comments

From Harry Taguchi at the Los Angeles Superior Court:

Model(s) Used	Use	Vendor Support	Maintenance	Successes/Failures
1) Elmo-EV-6000AF 2) Doar Communicator 3) Samsung SVP-6000 <i>“All have performed admirably but the Samsung SVP-6000 is truly outstanding.”</i>	<ul style="list-style-type: none"> Used to display 3-D objects, negatives, original documents. PowerPoint presentations and photographs at SXGA resolution. Used in conjunction with a Mitsubishi X490 projector, evidence is projected onto a 110" screen without the need to dim courtroom lighting. Performed by dedicated staff assigned to the eCourtroom & Multi-media Unit. This staff schedules, sets up, and instructs litigants. Staff can also be paged if the need arises (rare). 	N/A	Dedicated staff assigned to the eCourtroom & Multi-media Unit schedules, sets up and instructs litigants. Staff can also be paged if the need arises (rare).	<ul style="list-style-type: none"> Juries are the greatest benefactor of this equipment. The Court benefits by shortening the length of exhibit-intensive trials. Space required to store exhibits is also reduced. Problems may be encountered when non-PC literate attorneys bring in laptops that they are not familiar with. Staff will assist attorneys but are very hesitant to configure non-court owned equipment.

From Keri Collins at the Ventura Superior Court:

Model(s) Used	Use	Vendor Support	Maintenance	Successes/Failures
<p>1) Elmo EV-400AF</p> <p><i>“To my knowledge, the cameras have performed well and we have not had any problems with that component of the system.”</i></p>	<ul style="list-style-type: none"> The camera is configured as part of a mobile presentation system which includes the camera, a VCR, a connection for a laptop computer, and a projector. The court has a total of six of these systems. The primary use of the camera is by attorneys as they present evidence during proceedings. I don't believe that any judges are using them for presentation of jury instructions or any other purpose. The court has also found that the presentation system, including the cameras, are very useful for training on a variety of topics or displaying informational items during meetings and training sessions. 	<p>Our vendor for this project is Exhibit One located in Chandler, AZ (888) 572-3265. Their support for this project has been more than adequate. They were helpful and professional during the design and installation of the system and have continued to be responsive to questions and support issues as we continue using the product.</p>	<p>The Automation and Technology Unit is currently handling the setup and requests for support. I believe this could easily be handled by a job classification that is not as specialized or paid as much as the IT department but there is not any other department or position currently that it would make sense to assign this to.</p>	<ul style="list-style-type: none"> Attorneys need to be trained to use the equipment properly. The Bar Association, Public Defenders office, and District Attorneys office all offered training but there were still attorneys that wanted to use the equipment without proper training and expected court staff to assist and answer questions. Some of our judges do not like having the equipment in the courtroom. We have had situations where once the attorney is done using the equipment the judge has asked the bailiff to disconnect all of the cables and move it out of the courtroom. Other times we will get a call that asks us to immediately remove the equipment because it is no longer needed. These types of requests are challenging for a small, busy IT department. The clerks that work in the courtroom need to 'buy-in' on the project and realize how important it is that they understand the process. Training and information was offered during implementation but the majority of the courtroom clerks were not interested until an attorney in their courtroom requests the equipment. At that point, they do not have time to familiarize themselves with the proper procedures or the equipment.

From Houston Bolles, United States District Court, Oregon:

Model(s) Used	Use	Vendor Support	Maintenance	Successes/Failures
<p>17 Total:</p> <p>3 Elmo EV-500AF</p> <p>6 Elmo 6000AF</p> <p>1 Samsung SVP 6000</p> <p>1 Wolfvision VZ-17</p> <p>6 Wolfvision VZ-57</p> <p><i>“We plan to buy several of Elmo’s HV5000XG to run at XGA rates”</i></p>	<ul style="list-style-type: none"> ● Display photographs and documents. ● Courtroom deputies use the document cameras to present lists of questions for prospective jurors. 	<p>Samsung’s service was excellent. We have not work with Wolfvision service yet.</p>	<p>Courtroom deputies turn them on/off.</p> <p>A courtroom tech trouble-shoots problems and arranges for repairs.</p>	<ul style="list-style-type: none"> ● The only document camera failures we have had to date are a failed power supply on the Samsung, and a broken gear on the mirror head of one of the VZ-57s. ● The main performance issue we have had with our document cameras is one of low resolution. Our 9 DOAR systems were designed for the camera to display using a composite video signal. The images seen by our juries and parties at this rate are muddy and poor. We are in the process of rectifying this problem. ● The video resolution of the systems using the Wolfvision and Samsung cameras is excellent. Like night and day compared to the DOAR systems. ● The Samsung is an experiment. It is loud. It sometimes gets switched inadvertently to SXGA resolution, which won’t drive one of the monitors it feeds (the Judge’s, of course), so we have to switch back to XGA. <p><i>“Why do people feel the need to grab the arms of those beautiful WolfVision cameras?”</i></p>

Other References

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