CHAPTER 1

An Introduction To Modern Visual Evidence

Chapter Contents

§ 1.01 The Purposes, Uses and Types of Modern Visual Evidence

A trial is a contest in persuasion. There are many varieties of evidence, though, that resist effective, persuasive communication. Lengthy and convoluted descriptions, testimony or documents conveying complicated or foundational facts, and the reading of documents and depositions are all notorious courtroom sedatives. The underlying facts may be critical to a case, but no one can communicate them effectively to a nodding judge or juror.

Conventional wisdom teaches that the tedium may be regrettable but is unavoidable in order to make a record that will withstand attack. This conventional wisdom is largely wrong. Liberalized rules of evidence facilitate the use of various sorts of modern visual evidence that afford the opportunity to package much prolonged and tedious evidence into concise, visual (or audiovisual) formats far more agreeable to judge or jury, to pack more evidence into less courtroom time and to do so without excessive cost. The courts have spent several decades developing innovative techniques to enhance juror comprehension, and have come to embrace numerous types of modern visual evidence.[1]

"Modern visual evidence" encompasses a range of potential exhibits, including, for example: video-recorded testimony; demonstrative video-recorded evidence; computer-generated visual evidence; digital images; animations; and professionally prepared diagrams, charts and graphs of various types.

When modern technology is discussed, even in terms of evidence, trial lawyers frequently lose interest and patience, among other reasons because they are weary of being chided for their celebrated reluctance to rush headlong into the twentieth century, much less the twenty-first. However, even accepting that the nineteenth century has served the profession well for a full 200 years (and that it doubtless has many good years left in it), modern visual evidence is enticing and, for practical purposes, can be immensely valuable. Compressing

[1] See, e.g., *American Bar Association Civil Trial Practice Standards* (1998), which standardize and promote the use of several innovative trial techniques developed by the courts (Appendix O *infra*). See also, Munsterman, Hannaford & Whitehead, *Jury Trial Innovations* (Nat'l Ctr. St. Cts. 1997). See also, *American Bar Association Principles for Juries and Jury Trials* (2005) (available at http://www.abanet.org/jury/pdf/final%20commentary_july_1205.pdf).

a lot of data into a simple visual or audiovisual exhibit enhances the prospect of maintaining the interest of the judge and jury and assisting them to grasp the points being made. That in turn puts them in a position to be—and increases the likelihood that they will be—receptive to the position being urged.

There is nothing novel or radical about taking advantage of modern technology for courtroom use. It was done with photography, for example, in the nineteenth century,[2] and has been done repeatedly ever since. The pace of technological progress has accelerated rapidly, though. Consequently, this book has been designed to serve as a vehicle for keeping apace with technological changes that have immediate evidentiary impact. It has two aspects: (1) informational, describing types of modern visual evidence and how they are, or may be, put to use; and (2) educational, identifying and resolving attendant evidentiary issues raised by each.

It is the thesis of this book that, in many respects, the principal nemesis of any trial lawyer is not so much the adversary as boredom on the part of the factfinder. Ennui dulls or kills receptivity to information and argument. Modern visual evidence, in its various forms, is a potentially powerful courtroom stimulant for, and focus for the attention of, the finder of fact. In Chief Judge Posner's words:

"Physical exhibits ('demonstrative evidence') are a very powerful form of evidence, in some cases too powerful, as we learn in *Julius Caesar* from Antony's masterful demagogic use of Caesar's bloodstained toga and slashed body to arouse the Roman mob. . . . 'Seeing is believing,' as the misleading old saw goes. The trial judge must make sure that the jury is not misled concerning the actual meaning of the object in the context of the litigation."[3]

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[2] See, e.g., Church v. City of Milwaukee, 31 Wis. 512 (1872).

[3] Finley v. Marathon Oil Co., 75 F.3d 1225, 1231 (7th Cir. 1996).

§ 1.02 The Evidentiary Backdrop: Expansive Evidence Codes

Prior to the July 1, 1975, effective date of the Federal Rules of Evidence, with few exceptions, evidence was a matter of common law jurisprudence. Only four states had enacted evidence codes,[1] and they were largely based on the 1953 version of the Uniform Rules of Evidence.[2] The common law of evidence that then existed, moreover, was not uniform in tone or substance but more or less flexible or rigid depending upon the forum.

In stark contrast, evidence is today largely a codified area of law, and the prevailing codes are quite liberal in tone and substance. They are almost uniformly modeled on the Federal Rules of Evidence or the 1974 Uniform Rules of Evidence,[3] which are substantially identical. As of 2010, 42 states had evidence codes in effect patterned after—although not entirely identical to—the Federal Rules.[4] The remaining two older codes were based upon the predecessor 1953 Uniform Rules,[5-6] which had served as one of the sources for the Federal Rules.

The impact of this mass movement toward liberal evidence codes has not been limited to statues which have codified their evidence law. Even in states without codification, the courts frequently look to the Federal Rules for guidance,[7] occasionally going so far as to adopt

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[1] *California:* Cal. Evid. Code §§ 100 *et seq*. (eff. Jan. 1. 1966).

Kansas: Kan. Gen. Stat. Ann. §§ 60-401 *et seq*. (eff. Jan. 1. 1964).

New Jersey: N.J.R. Evid. 1. *et seq*.; N.J. Stat. Ann. §§ 2A:84A-1, *et seq*. (eff. July 1, 1960) (superseded by N.J.R. Evid. 101, *et seq*., July 1, 1993).

Utah: Utah R. Evid. 1, *et seq*. (eff. July 1, 1981; repealed eff. Sept. 1, 1983 [see § 1.02 N. 4 *infra* for the successor statute]).

[2] 9A U.L.A. 591, *et seq*. (1953; withdrawn 1974) (the "1953 Uniform Rules").

[3] 13 U.L.A. 209 *et seq*. (1974).

[4] 6 *Weinstein's Federal Evidence* T-1 - T-250 (2d ed. 2010).

[5-6] See the California and Kansas codes cited in N. 1 *supra*.

[7] See, e.g.:

Alabama: Volkswagen of America, Inc. v. Harrell, 431 So.2d 156, 162-163 (Ala. 1983).

Connecticut: State v. Stepney, 191 Conn. 233, 464 A.2d 758, 764, n. 14 (1983), *cert. denied* 465 U.S. 1084 (1984).

Georgia: Stone v. State, 250 Ga. 718, 300 S.E.2d 500, 502, n. 1 (1983).

Indiana: Fendley v. Ford, 458 N.E.2d 1167, 1171, n. 3 (Ind. App. 1984) (pre-Rules decision).

Kentucky: Thompson v. Commonwealth, 652 S.W.2d 78, 80 (Ky. 1983) (pre-Rules decision).

Louisiana: State v. Stokes, 433 So.2d 96, 101, n. 2 (La. 1983) (pre-Rules decision).

Maryland: Foster v. State, 297 Md. 191, 464 A.2d 986, 1008 (1983), *cert. denied* 104 S.Ct. 985 (1984).

particular rules as a matter of decisional law.[8] The Federal Rules of Evidence have thus come to set the standard of evidence law nationally, in the state as well as the federal courts.

That standard is very receptive toward new and emerging forms of evidence. It expressly contemplates the admission of evidence derived from new technology (1) in forms that are now known, such as video-recorded[9] and computer-generated evidence,[10] and (2) in forms that remain yet to be developed.[11] In this hospitable atmosphere, the use of various sorts of modern visual evidence is flourishing.[12]

The *American Bar Association's Civil Trial Practice Standards,* which were adopted in 1998, reflect this hospitality toward demonstrative evidence and high-tech exhibits.[13] Standard 15, for example, is entitled "Demonstrative Evidence," and it specifically provides that: "Voluminous, complicated or other information that cannot conveniently be examined in court should be presented, when practicable, in the form of a chart, diagram, graph or other demonstrative

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Massachusetts: Commonwealth v. Wiechell, 390 Mass. 62, 453 N.E.2d 1038, 1044 (1983), *cert. denied* 465 U.S. 1032 (1984).

Missouri: State v. Laws, 661 S.W.2d 526, 530, n. 5 (Mo. 1983).

Pennsylvania: Commonwealth v. Henderson, No. 823-82 (Pa. Super. Jan. 27, 1984).

Rhode Island: State v. Acquisto, 463 A.2d 122, 125 (R.I. 1983) (pre-rules decision).

Tennessee: State v. Burchfield, 664 S.W.2d 284, 286 (Tenn. 1984) (pre-Rules decision).

West Virginia: State v. Kopa, 311 S.E.2d 412, 423-424 (W.Va. 1983) (pre-Rules decision).

[8] See, e.g.:

Alabama: Ex parte State, 585 So.2d 137, 139 (Ala. 1990).

Illinois: Wilson v. Clark, 84 Ill.2d 186, 417 N.E.2d 1322, 1327, *cert. denied* 454 U.S. 836 (1981).

Rhode Island: State v. Ferreira, 463 A.2d 129, 131 (R.I. 1983) (pre-Rules decision).

[9] See, e.g., Fed. R. Evid. 1001(2), and parallel state provisions, which are discussed in § 4.02[2] Ns. 3-4 *infra* and accompanying text.

[10] See, e.g., Fed. R. Evid. 803(6), and parallel state provisions, cited and discussed, *inter alia*, § 7.03[1][a] Ns. 5-6 *infra* and accompanying text.

[11] See, e.g., Fed. R. Evid. 803(6), (7), (8), and 902(4) (containing references to "data compilation[s] in any form" (emphasis added). In 2006, the Advisory Committee on the Federal Rules of Evidence is considering a new Rule 107 that would generically encompass electronic evidence. Similarly, the 2006 amendments to the Federal Rules of Civil Procedure primarily focus on electronically stored information.

[12] See, e.g., Federal Judicial Center, *Manual for Complex Litigation Third* §§ 21.492, 21.64, 22.31-32 & 34.32 (1995).

[13] The *ABA Civil Trial Practice Standards* are set forth in Appendix O *infra*.

evidence."[14] Similarly, Civil Trial Practice Standard 23 (entitled "Courtroom Technology"), urges judges to "be receptive to using technology in managing the trial and the presentation of evidence."[15]

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[14] *ABA Civil Trial Practice Standard* 15(b) (1998). See the accompanying Official Comment set forth in Appendix O *infra*.

[15] *ABA Civil Trial Practice Standard* 23(a) (1998). See the accompanying Official Comment set forth in Appendix O *infra*.

§ 1.03 Video-Recorded Evidence

In several types of modern visual evidence, video-recording is the key component. The major types of video-recorded evidence are: (1) prerecorded testimony, and exhibits derived therefrom,[1] and (2) motion pictures and animations of various sorts, and related exhibits.[2] It is unnecessary to become expert in the technical aspects of video-recording to appreciate how such exhibits should look, how they can best be prepared and even how to do the taping simply and inexpensively. A brief exposure to the medium is sufficient to provide a basic grasp of the practical and evidentiary issues involved.

[1]—Video-Recording vs. Film

[a]—The Contrast Between the Media

Like film, videotape is used to record events through motion pictures. Unlike film, however, a video-recorded motion picture is recorded electronically rather than photographically, and often is thereafter transferred to a DVD or CD rom. The differences between video-recording and film, as much as the similarities, have both practical and evidentiary ramifications.

Videotape images are electronically recorded on magnetic tape, in a manner akin to the instantaneous electronic recording of voices on audiotape. As with audiotape, and unlike film, the videotaped image is instantly recorded, can be easily indexed and may be instantly replayed. There is no need to develop videotape as one develops film and, therefore, not the same opportunity to tamper with the image in the development process. Just as with film, video-recorded images and sound can be altered.

Video editing is possible, and the audio and/or video components on a tape may be deleted or replaced with others. If well done, editing is not necessarily detectable readily. Moreover, with the advent of sophisticated digital imagery, videoed images may be distorted in imperceptible ways. However, this is not a problem isolated to visual evidence; the same sort of digital distortion may be worked on any computer-generated documents, including virtually all business records and emails. Moreover, the "outtakes" of a tape—unused portions that have been deleted in editing—are not left on the cutting room floor. They remain on the master tape, which is unaltered by the editing process, and remains subject to discovery demands. Needless

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[1] See generally, Chapters 2-3 *infra*.
[2] See generally, Chapters 4-6 *infra*.

to say, if any misconduct of this sort occurs, the court is vested with the power to sanction the offender quite seriously, including by entering the ultimate sanction of dismissal with prejudice or a default judgment.[3]

[b]—Practical Differences

A convenient way to keep in mind the practical differences between video and film is to consider the differences between the respective entertainment media that utilize them. Videotape is television tape. It records instantaneously and permits instant replays. Whether it remains on tape or is created on, or transferred to, other electronic media like a hard drive, DVD or CD rom, the video image is played on monitors—or large projection screens—in ordinary indoor light. Film, on the other hand, is the stuff of motion pictures. It must be developed and is not immediately available for replay purposes. When displayed, film is projected onto a screen in darkness or depressed light.

For a number of practical reasons, these differences in many respects augur in favor of using video instead of film in litigation. First, the ability to replay easily and instantly is often valuable in court—for example, when interruptions disrupt continuity or external noise drowns out portions of the soundtrack. Second, the almost immediate access to any segment of a video recording afforded by an easily prepared log index[4] can be extremely useful in motion practice,[5] during direct[6] and cross-examination[7] as well as on final argument.[8]

Third, most judges and jurors are accustomed to receiving large doses of information from television daily. People are attuned to being receptive to what the medium conveys. Fourth, playing a video in a lighted room (as opposed to displaying a film in darkness) gives the viewer—judge or juror—the option to relieve fleeting tedium by glancing briefly away and then turning back to the video. That may prevent the viewer from feeling uncomfortably constrained to continue watching, without respite, because there is no alternative (as when the rest of the room is dark). Fifth, it is said to be physiologically less comfortable to watch a film than a video in court because the

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[3] See generally Gregory P. Joseph, *Sanctions: The Federal Law of Litigation Abuse* (4th ed. 2008; Supp. 2011).

[4] See § 2.05 *infra*.

[5] See §§ 2.02[3][a], 5.09[1] and 6.02[6] *infra*.

[6] See §§ 3.03[2][c], 6.03[1] and 6.03[4]-[5] *infra*.

[7] See §§ 3.03[2][d] and 4.07[2][c]-[d] *infra*.

[8] See §§ 3.03[2][f] and 6.03[7] *infra*.

viewers' pupils must contract and dilate to accommodate to the attendant changes in the (none too subtle) lighting. Finally, it is often difficult—and it is never easy—to get courtrooms dark, or dark enough, to facilitate a clear viewing of a film.

[c]—Evidentiary Ramifications

Historically, the practical differences between videotape and film have had rather significant evidentiary implications. Because videotape records and plays in real time, videotape exhibits are less subject to exclusion—than films are—(1) on the objection that they portray the depicted events at a different speed than that at which they actually occurred and are therefore distorted or (2) because of a foundational failure to establish the speed at which the camera was operating when the exhibit was short.[9] Advances in electronic modification through computers, however, suggest that these differences may be of more historical than current interest. Further, because videotape, unlike film, need not be processed, it is not subject to attack on grounds of poor processing quality, tampering or inadvertent distortion (as by a left-right reversal),[10] although the absence of modification if the images are transferred to other electronic media must be established.

As of the early 21st Century, digital nonlinear video editing equipment, which is available to the mass market, permits image manipulation. In this process, the video footage is dumped into a computer, digitized and stored on the hard drive. The video can then be edited in the computer (*e.g.*, erased, accelerated, decelerated) and put back onto a videotape, with only slight degradation and compression. It may very well not be detectable, even to a relatively sophisticated viewer, than any editing has occurred. Technology is pushing us toward the undetectable, manipulable videography of Michael Crichton's novel, *Rising Sun*.

[2]—Basic Video Equipment

[a]—Hardware

Videotape, and videotape recording equipment, have become increasingly familiar as a result of the popularity of home videocassette recorders. A basic videotape recording system is essentially no different for office than it is for home use. It includes: (1) a camera to record the images; (2) microphones, preferably of the lavaliere (or

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[9] See generally, § 4.02[3][d] Ns. 21 and 23 *infra* and accompanying text.
[10] See generally, § 4.02[3][d] Ns. 24-26 *infra* and accompanying text.

small, clip-on) variety, to record the sound; (3) a videocassette recorder (a) to record on the videotape the audiovisual signals transmitted from the camera and microphones and (b) to play them back; (4) a television monitor to display that which has been, or is being, recorded; (5) miscellaneous connecting cables and connectors; and (6) videotape.

[b]—Using Video Efficiently

Video equipment is inexpensive and very simple to use. To learn to operate it takes little time. Rudimentary video demonstrative evidence—such as simple views—can be prepared and offered much as photographs are without any outside assistance or a special authenticating witness.

Under liberal rules of practice such as the Federal Rules of Civil Procedure, moreover, depositions can be recorded in-house on video without incurring the cost of a professional videographer or an attendant court reporter.[11] The audio can thereafter be transcribed by a secretary and the transcript served upon adversary counsel with a request for admission as to its accuracy. Indeed, the monies saved by the video-recording of very few depositions in-house, as opposed to professionally, can easily finance the basic components of a video system.

When video evidence of any complexity is to be generated, however, professional services are almost invariably required. It should be noted that, in this context, the reference to "professional" services can be somewhat ambiguous. There are any number of persons who offer, for example, the service of recording video depositions or motion pictures and charge for their services, and in that sense may be considered "professional." However, there will not necessarily be any correlation between the price paid and the quality of the service rendered. Frequently all that results is a visually unstimulating recording—e.g., a "talking head" deposition in which the camera is fixed immobilely on the head and bust of the deponent throughout the examination. "Professionalism" of this sort is doubly expensive, not only monetarily but also in the cost of judge and juror inattentiveness.

In the final analysis, the determination whether to video record a deposition or prepare another sort of video evidence and, if so, the extent of professional assistance to be used in doing so, requires consideration of several factors.[12] Most important among them are the

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[11] See generally, §§ 2.03[1][c]-[d] and 2.04 *infra*.
[12] See generally, §§ 2.02[1]-[5], 4.07 and 6.02-6.03 *infra*.

size and nature of the case, the proportionate or potential significance of the evidence to the case and the discoverability of the tape and outtakes.

[3]—Evidential Uses of Video

[a]—Video-Recorded Depositions[13]

There is an adage that "depositions" are deadly," and key points can easily be lost in the torpor induced by the reading of lengthy testimony into the record.[14] Trial lawyers long ago recognized this truism as well as the potential value that videotape offered as a counter to it. It was not until July 1, 1970, however, that the Federal Rules of Civil Procedure were amended to permit depositions to be recorded by videotape, and only thereafter did the states follow suit.[15] As of Dec. 1, 1993, video-recorded depositions may be taken as of right in federal court.[16]

(Text continued on page 1-11)

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[13] See generally, Chapters 2-3 *infra*.

[14] See generally: *Federal Judicial Center, Manual for Complex Litigation Fourth* § 12.333 (2004); *Federal Judicial Center, Manual for Complex Litigation Third,* § 22.333 (1995); Vinson, "Litigation: An Introduction to the Application of Behavioral Science," 15 Conn.L.Rev. 767, 769-770 (1983), and Vinson, "Juries: Perception & the Decision-Making Process," 18 Trial No. 3 at 52 (March 1982).

[15] See generally, § 2.03 *infra*.

[16] Fed. R. Cir. P. 30(b)(2).

Video-recorded depositions are now commonly taken and introduced, if only rarely well done. They are not a panacea for ridding the courtroom of boredom, of course, even when technically well produced. The mere use of video to record testimony is no guarantee of a lively examination. At its worst, however, videoed testimony is more enlightening to the factfinder than the transcript-reading alternative because video record captures important visual and auditory indicators of testimonial trustworthiness that are not captured by a transcript. (Indeed, for that very reason, the decision whether to video record any given witness's deposition involves consideration of several competing factors.)[17] When recorded in a technically proficient style[18] and offered at an appropriate point in the proceedings,[19] moreover, the introduction of a properly prepared[20] video-recorded deposition testimony can help to maintain judge or jury alertness and receptivity and generally have a variety of positive, if measured, influences.

In some jurisdictions, it should be noted, courts have imposed the requirement that all testimony be offered on video in certain kinds of cases.[21] The merits or demerits of such prerecorded trials aside, they have furnished valuable insights into important, less drastic refinements that prevailing rules and statutes could profit from.[22]

[b]—Real and Demonstrative Video Evidence

Due to its functional equivalence to film, which has a long and settled acceptance as a medium of real and demonstrative evidence, video recordings have been quite warmly received when offered for other than testimony-recording purposes.[23] Because of the basic admissibility of video recordings are not subject to serious dispute, lawyers have focused their efforts on developing effective forms of video evidence.

In civil practice, videos are commonly used: (1) to provide an alternative to a jury or court view of places or objects that cannot, at least feasibly, be brought into court;[24] (2) to depict material evidence of various background matters, including methods, processes or techniques at issue in the litigation;[25] (3) to show the operative events whose legal consequences are in dispute;[26] (4) to capture scene-based demonstrations and tests;[27] (5) to demonstrate litigation theories for judge and

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[17] See generally, § 2.02 *infra.*
[18] See generally, § 2.04 *infra.*
[19] See generally, §§ 3.03[2][c][i] and 6.03[1] *infra.*
[20] See generally, §§ 2.05 and 3.02 *infra.*
[21] See generally, § 3.04 *infra.*
[22] See generally, § 3.05 *infra.*
[23] See generally, §§ 4.02 and 5.02 *infra.*
[24] See generally, § 4.03[1][a] *infra.*
[25] See generally, § 4.03[1][b]-[c] *infra.*
[26] See generally, § 4.03[1][d] *infra.*
[27] See generally, § 4.04[1] *infra.*

jury;[28] (6) to illustrate relevant scientific principles;[29] (7) to test objects for particular probative properties;[30] (8) to summarize matters;[31] and (9) to create more advanced documentary videos, such as reconstructions, recreations and reenactments[32] and day-in-the-life videos.[33]

In criminal practice, video-recorded demonstrative evidence has been principally used by prosecutors, although astute defense lawyers are fond of using prosecution recordings for defensive purposes and several have generated and offered defense tapes. As in civil cases, video-recorded views, both of crime scenes and of crime sequelae, are widely used and accepted.[34] More recently, governmental investigatory agencies and private parties have used surveillance cameras to video record crimes in progress, often the result of "sting" operations but not exclusively so.[35] They have also expanded the use of recorded or live-televised testimony of child crime victims and witnesses.[36] Prosecutors have seized the opportunity to use video to record confessions,[37] identification procedures[38] and, where appropriate, the accused's physical or psychological condition.[39] As is civil cases, moreover, the prosecutors and defense lawyers have with varying degrees of success used video to record experiments, reenactments, and recreations of the events in issue.[40] Necessarily, however, the use of video for all of the foregoing purposes raises attendant constitutional issues which the courts have dealt with rather thoroughly.[41]

The widespread use and well accepted utility of video recording has led many lawyers to draft their discovery requests in such a fashion as to encompass any discoverable taped matter. The discoverability of real and demonstrative video exhibits is an important consideration, consequently, for both the proponent and the opponent of the evidence.[42] Further, even in the absence of a discovery request, or an enforceable right by opposing counsel to see a video exhibit before trial, it may be in the proponent's best interests to make pretrial disclosure.[43] In any event, the opponent has the right to preview a video before a jury has seen it, at trial if not before.[44]

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[28] See generally, § 4.04[2] *infra.*
[29] See generally, § 4.04[3] *infra.*
[30] See generally, § 4.04[4] *infra.*
[31] See generally, § 6.03[6] *infra.*
[32] See generally, § 4.05 *infra.*
[33] See generally, § 4.06 *infra.*
[34] See generally, § 5.03 *infra.*
[35] See generally, § 5.04 *infra.*
[36] See generally, § 5.09[3] *infra.*
[37] See generally, § 5.05 *infra.*
[38] See generally, § 5.06 *infra.*
[39] See generally, § 5.07 *infra.*
[40] See generally, § 5.08 *infra.*
[41] See generally, §§ 5.02[3], 5.05[1][b], 5.06[2], 5.07[2] and 5.09[3] *infra.*
[42] See generally, §§ 4.07, 6.02[1][b], 6.02[2][b] and 6.02[3][b].
[43] See generally, §§ 4.02[6], 4.07[1][a]-[b], 4.07[2][a] and 6.02[c] *infra.*
[44] See §§ 4.07[1][a] and 6.03[3].

§ 1.04 Computer-Generated Evidence

Computers have become increasingly familiar as a result of their emergent popularity in the home and office. They, too, are the source of several types of visual evidence, running a wide gamut from simple personal computer graphics to complex reconstructions and animations.[1-2] While it is not necessary to become a computer expert to be able to appreciate a potent exhibit and the attendant evidentiary issues that it raises, a basic understanding of the process by which such exhibit is generated is necessary and helpful.

[1]—Forms of Computer Graphic Output

There are primarily three forms that graphic output can take on a computer.[3] First, the graphic may be displayed on the computer monitor. There are various types of computer monitors, some with high resolution screens that are specifically designed to display graphics in many colors, others not so designed and with limited graphic display capability. For use at trial, the practical problem historically with producing graphics on a monitor has been the inconvenience associated with carting the monitor into the courtroom. The proliferation of electronic courtrooms has alleviated many of these problems.[4] However, graphics shown on monitors are fleeting images. For the record and for consultation by the factfinder, the images should be preserved. Some method of obtaining hard copy output is thus necessary. This can be done with some success by photographing the graphic as displayed on screen.

The more common method is to use a printer to produce a rendition of the graphic. Printers are of variable quality, but high-end laser color printers produce first-rate graphics ready for enlargement and courtroom use.

Third, computer-generated animation, as discussed in detail in Chapters 7-8, may be transferred directly to videotape, a DVD or CD rom from the hard drive for use at trial and introduction into evidence, or displayed on the computer screen for the judge or jury from the hard drive, either for illustrative or substantive purposes.

[2]—Admissibility Issues

Computer generated evidence, when first introduced, presented the courts with largely unparalleled admissibility issues. Without a great deal of difficulty, however, the courts adapted longstanding evidentiary

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[1-2] See generally, Chapter 8 *infra*. See also, the case-specific examples contained in Chapter 11 *infra*.

[3] See generally, § 8.02[1][b] *infra*.

[4] See generally Chapter 14, *infra*.

principles to accommodate the admission of trustworthy computerized evidence, assisted in this endeavor by the advent of modern evidence codes, such as the Federal Rules of Evidence, that expressly contemplate such admission.[5]

There are, for purposes of evidentiary analysis, primarily two types of computer generated evidence.[6] The first is hearsay in nature because it reiterates computer-stored human declarations—e.g., a computer generated invoice or a graphic depicting information retrieved from such invoices (or their underlying data bank). The second is non-hearsay demonstrative evidence on the order of a scientific test or experiment, which is generated automatically by a computer program without reiterating declaratory human input—e.g., a computer enhanced photograph. The admissibility of each of these types of evidence hinges upon satisfaction of different criteria.

[a]—Computer Generated Hearsay Evidence

Computer generated hearsay evidence must, as a threshold matter, satisfy an accepted hearsay exception or exemption.[7] While the business or public records exception is most commonly applicable,[8] any recognized exception or exemption may be appropriate in a given case and will suffice.[9] Application of the hearsay rule to computerized evidence is not, in theory, any different than is its application to more traditional sorts of evidence. The wrinkles added by the element of computerization have been ironed out rather thoroughly by the courts with the assistance of the modern evidence codes.

In addition to satisfying the hearsay rule, computer generated hearsay evidence must also be properly authenticated.[10] To satisfy authentication requirements, the quantum of evidence that need be introduced—and the credentials of the person through whom it need be offered—will vary depending upon the type of exhibit offered. Courts have, for example, been receptive to routine computerized records but wary of data manipulated and run for purposes of litigation. The latter therefore require a firmer and more extensive foundation than the former. Where detailed authentication is appropriate or necessary, all three stages of information processing—input, processing and output—should be covered.[11] The degree of detail to be covered in making the authentication showing will dictate who the appropriate authenticating witness will be.

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[5] See discussion in § 7.01, *infra*
[6] See generally, § 7.01 *infra*.
[7] See generally, § 7.02[1]-[4] *infra*.
[8] See generally, § 7.02[1]-[3] *infra*.
[9] See generally, § 7.02[4] *infra*.
[10] See generally, § 7.03 *infra*.
[11] See generally, § 7.03[c][i]-[iii] *infra*.

Finally, computer generated hearsay evidence must also satisfy best evidence requirements.[12] Under the Federal Rules of Evidence[13] and virtually all state codes,[14] computer output which has been adequately authenticated is an "original" for best evidence purposes.[15] Further, satisfaction of certain hearsay exceptions[16]—e.g., those governing business or public records—and other codified and uncodified criteria,[17] operate to render the output primary, rather than secondary, evidence. Consequently, best evidence objections to computer evidence are rarely well taken.

[b]—Computer Generated Demonstrative Evidence

The admissibility of computer generated demonstrative evidence, in contrast, is judged by the criteria generally applied to demonstrative evidence of scientific tests, experiments and processes.[18] The fundamental concern is with reliability and trustworthiness. Consequently, authentication—proof that the evidence is, or shows, what it purports to be or show—is the key to admissibility. Simply stated, admissibility is a function of (1) the validity of the underlying scientific or technical theory incorporated in the program and (2) the reliability of the information process system in applying the program to produce relevant evidence.[19]

To establish the former—the validity of the underlying scientific theories—expert testimony is essential.[20] Generally, the courts liberally receive expert testimony and proof of scientific tests, experiments and processes authenticated by experts. However, because most computerized demonstrative evidence involves novel scientific or technological processes, admissibility in some jurisdictions—including in some federal courts—will be conditioned on satisfaction of the *Daubert, Frye* or other governing test of general scientific acceptance.[21] Where it is, and depending upon how the test is interpreted and applied, admissibility may be problematic.[22]

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[12] See generally, § 7.04 *infra.*
[13] Fed. R. Evid. 1001(3). See § 7.04[1] N. 3 *infra* and accompanying text.
[14] See §§ 4.02[5] N. 44 and 7.04[1] N. 3 *infra.*
[15] See generally, § 7.04[1] *infra.*
[16] See generally, § 7.04[2] *infra.*
[17] See generally, § 7.04[3]-[5] *infra.*
[18] See generally, §§ 7.01, 7.05 *infra.*
[19] See generally, §§ 7.01[3], 7.05[3][d] *infra.*
[20] See generally, § 7.05[1]-[2] *infra.*
[21] Frye v. United States, 293 Fed. 1013, 1014 (D.C. Cir. 1923) (holding that, as a prerequisite to its admissibility, a scientific or technological process must be shown to "be sufficiently established to have gained general acceptance in the particular field in which it belongs"). The *Frye* standard was abandoned as a pre-condition to admissibility in the Federal courts in Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 113 S.Ct. 2786 (1993), which was codified in Federal Rule of Evidence 702, as amended effective December 1, 2000. The *Frye* test is, however, still applied in many state courts, such as California (People v. Leahy, 8 Cal.4th 587, 34 Cal. Rptr.2d 663, 882 P.2d 321 (1994) and New York (People v. Wesley, 83 N.Y.2d 417, 633 N.E.2d 451, 611 N.Y.S.2d 97 (1994)).

To prove the latter criterion—the reliability of the information processing system—detailed authentication of the input, processing and output stages is necessary.[23] It should be noted that the expert who testifies to these matters may or may not be the same as the expert who validates the underlying scientific theory.

[c]—Pretrial Disclosure

If the proponent of computer generated evidence has not provided his adversary with pretrial notice of, or access to, the exhibit (and underlying computer runs and programs), the exhibit may, for that reason, be excluded.[24] Moreover, under liberal discovery rules such as Federal Rules of Civil Procedure 26-34, computer generated evidence can be a proper object of discovery.[25] The fact that pretrial disclosure is the norm, rather than the exception, for computer based exhibits is, accordingly, a matter to be weighed in determining whether, and how best, to generate desired evidence by computer.

[3]—Computer Generated Visual Evidence

[a]—Personal Computer Graphics[26]

A large number of graphics producible by personal computers are well suited for use as trial exhibits. Off-the-shelf business graphics programs, for example, generate line graphs, bar graphs, pie charts, flowcharts, and combinations of these. Exhibits of this sort are not difficult to create, and authentication of them is facilitated by the fact that they are generated by means of standard programs that are routinely used by business in ordinary course.

[b]—Reconstructions/Simulations[27]

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[22] See generally, § 7.05[3][a]-[c] *infra.*
[23] See § 7.01[3][c] *infra.*
[24] See generally, § 7.06[1] and Ch. 13 *infra.*
[25] See generally, § 7.06[2] and § 13.03[2] *infra.*
[26] See generally, §§ 7.01[1], 8.02 *infra.* See also, Chapter 11 *infra.*

Computers can be programmed to simulate past, present or future physical events in order to generate graphic reconstructions, recreations and predictions. The programs involved are necessarily quite sophisticated and complex and therefore inherently suspect. Both the validity of the underlying scientific theories and the trustworthiness of the model must be thoroughly established. Properly authenticated simulations have effectively been used for several graphic purposes—e.g., to reconstruct accidents, to recreate the operations of markets and market power, to predict future damages or the environmental impact of certain pollutants.

[c]—Computer Enhanced Photographs and Digital Images[28]

The quality of photographic images that are blurred, grainy or otherwise poor can frequently be enhanced through the use of certain digital computer techniques developed in connection with the space program. Although the process is costly, it is often the only alternative with film of poor quality where mere enlargement will exacerbate any optical flaw. A properly programmed digital image processing system can correct a blur, bring out the detail in under- or overexposed film, enlarge an image without losing definition and otherwise enhance brightness, color and definition. It is possible by this means to locate details and draw out images not readily discernible—if discernible at all—by the unaided eye. As digital photography becomes cheaper and more widely used, computer enhancement is likely to become more common and more economical.

[d]—Animations[29]

Animations, computer generated or manually produced, are frequently used in conjunction with reconstructions and computer enhanced films. Familiar from their cartoon originals, animations are sequences of illustrations that create the illusion of motion when replayed on film or a video recording. They have been introduced in a variety of actions, not uncommonly, for example, to recreate all or part of aircraft and automobile accidents.

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[27] See generally, §§ 7.01[4], 8.03 *infra.*
[28] See generally, § 8.04 *infra.*
[29] See generally, §§ 7.01[4], 8.05 *infra.*

§ 1.05 Diagrams, Charts and Graphs

Lawyers have for decades relied on diagrams, charts and graphs to convey information to jurors, and the law authorizing this procedure is well settled.[1] Ranging from flowcharts to transliterations to schematic diagrams,[2] exhibits prepared by skilled professionals offer the capability of condensing large amounts of data into a single visual exhibit to permit assimilation by the factfinder. As in other fields, the graphic art of creative effective, evidence-compacting exhibits has developed rapidly and in several directions.

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[1] See generally, § 9.02 *infra.*
[2] See generally, § 9.03 *infra.*

§ 1.06 In-Court Exhibitions, Demonstrations and Experiments

An in court presentation may be the most effective visual evidence available. The presentation may be as familiar and relatively safe as a display or exhibition of a bodily condition or piece of physical evidence.[1] It may instead be more complicated and a relatively risky demonstration, experiment or test performed in front of the jury.[2] The permissibility of the presentation will depend on several factors,[3] notably including the stage of the proceedings at which the presentation is offered.

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[1] See generally, § 10.02 *infra.*
[2] See generally, § 10.03 *infra.*
[3] See Chapter 10 *infra.*

§ 1.07 Using Modern Visual Evidence Effectively

Prospective exhibits, visual or otherwise, not only must satisfy evidentiary rules, which are addressed throughout this book, but also governing procedural rules. The 1993 amendments to the Federal Rules of Civil Procedure—especially, Rule 26(a)(2) concerning expert reports and expert testimony—have spawned a plethora of requirements that, if ignored, risk the preclusion of visual evidence used in conjunction with expert testimony.[1] These requirements, which are addressed at length in Chapter 13, are most important in connection with complicated visual evidence, such as video-recorded experiments, tests, or reconstructions—and any computer-generated animations—because all of these, by their nature, are almost always used in conjunction with expert testimony.

In addition, courtrooms throughout the country are being fitted with special electronic capabilities, and special technological hardware, in order to facilitate the use of modern visual evidence. These electronic courtrooms, sometimes denominated "Courtrooms of the Future," are very much a present-day phenomenon, with the Administrative Office of the United States Courts and various states creating more of them, with new funding, each year. The particular manner in which they are fitted affects the type and style of exhibits counsel will want to use.[2]

Whether or when, or to what end, to use the various types of exhibits discussed in this book is inescapably a matter of judgment.[3] The novelty and diversity that they offer, as alternatives to having their contents read into or described for the record, puts an edge on the information they convey, but that is an edge that can be dulled or lost by overuse. Every case should be thoughtfully structured to include periodic variations between appropriate types of evidence—oral, video, graphic, photographic, documentary, or some combination thereof—sufficiently to maintain a modicum of interest and to permit accentuation of specific data, yet not so often as to appear contrived.[4] It is likely that in no trial will all of the sorts of evidence described in this book be appropriate, but in almost all trials one sort or more will be.[5]

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[1] See generally, Chapter 13 *infra.*
[2] See generally, Chapter 14 *infra.*
[3] See generally, § 10.02 *infra.*
[4] See generally, § 10.03 *infra.*
[5] See Chapter 10 *infra.*