1998

Proposed Model Rules Governing the Admissibility of Computer-Generated Evidence

Lynn McLain
University of Baltimore, lmclain@ubalt.edu

James E. Carbine
James E. Carbine, P.C.

Follow this and additional works at: http://scholarworks.law.ubalt.edu/all_fac
Part of the Computer Engineering Commons, and the Law Commons

Recommended Citation

This Article is brought to you for free and open access by the Faculty Scholarship at ScholarWorks@University of Baltimore School of Law. It has been accepted for inclusion in All Faculty Scholarship by an authorized administrator of ScholarWorks@University of Baltimore School of Law. For more information, please contact snolan@ubalt.edu.
ARTICLES

PROPOSED MODEL RULES GOVERNING THE ADMISSIBILITY OF COMPUTER-GENERATED EVIDENCE*

By James E. Carbine† and Lynn McLain‡

Pursuant to a grant from the State Justice Institute, the Court of Appeals of Maryland Standing Committee on Rules of Practice and Procedure drafted, and the Court of Appeals adopted, model rules regarding computer-generated animations and simulations. The rules address discovery, pretrial rulings, and preservation of the record for appeal.

TABLE OF CONTENTS

I. INTRODUCTION ................................................................. 3
II. BACKGROUND INFORMATION ON COMPUTER-GENERATED EVIDENCE ........................................... 8
III. THE EXISTING RULES OF EVIDENCE ARE SUFFICIENT TO ACCOMMODATE COMPUTER-GENERATED EVIDENCE ........................................... 9
   A. Substantive Evidence ..................................................... 9
   B. Non-Substantive Evidence ........................................... 11
   C. Rules 403 and 611 Apply, Regardless of Whether the Evidence is Substantive ........................................... 11

* Copyright © 1998 James E. Carbine and Lynn McLain
† James E. Carbine (J.D., University of Maryland, 1972) is a trial lawyer and a member of the Maryland bar. Mr. Carbine served as the American Bar Association liaison to the Court of Appeals of Maryland Standing Committee on Rules of Practice and Procedure.
‡ Lynn McLain (J.D., Duke Law School, 1974) is a Professor at the University of Baltimore School of Law and a member of the Maryland bar. She thanks Grace Lee, J.D., 1998, and Will Tress, Harvey Morrell, and Robin Klein of the University of Baltimore Law Library for their research assistance, and Sandra L. Haines, Reporter to the Rules Committee, for her drafting of the model rules in Appendix B, as changed from the Maryland Rules in Appendix A.

Mr. Carbine and Professor McLain served as special consultants to the Maryland Rules Committee during the drafting of its model rules governing the admissibility of computer-generated evidence. An earlier version of this article was developed under a grant from and submitted to the State Justice Institute. Points of view expressed herein are those of the authors and do not necessarily represent the official position or policies of the State Justice Institute.
D. Routine Business Records .......................................................... 12
   1. Traditional, Non-Computer-Generated Records .......... 12
   2. Computerized Business Records ................................. 14
      a. Alternative 1: Evidence Rule 803(6) with no change ........ 14
      b. Alternative 2: Evidence Rule 803(6) with no change in text,
         but a Note that the reference in the Rule’s final clause to ‘method’ of preparation requires a
         particular additional showing to be made when the record is computer-generated evidence. ....... 15
      c. Alternative 3: Designate the existing text of Rule 803(6) as
         part (a) and add part (b), as follows: .......................... 15
      d. Alternative 4: The English Rule ........................................... 16
      e. Alternative 5: The Australian Rule ................................. 17
      f. Alternative 6: The South African Rule ......................... 17
   4. Computer-Generated Records When Data was
      Generated by a Person Outside the Business .......... 18
   5. Maryland Rules Committee’s Conclusion .................... 18
E. Records Made in Anticipation of Litigation ................................. 19
F. Computer Animations and Simulations ........................................ 20
   1. Animations .................................................................. 20
   2. Simulations .................................................................. 21
   3. Narrations .................................................................. 21
G. The Validation of Scientific Evidence ....................................... 22
H. The Authentication of Computer-Generated Evidence ............ 22
I. The “Best Evidence” Rule ....................................................... 23
J. Rules of Evidence Adequate .................................................. 24
K. Models for Jury Instructions .................................................... 26
   1. Limited Purpose ........................................................... 26
   2. Weight ...................................................................... 26
      a. Assumptions ........................................................... 26
      b. Known Inaccuracies .................................................. 27
L. Consideration of Rule as to Which Exhibits Go to the Jury Room .................................................. 27
IV. COMPUTER-GENERATED EVIDENCE NARROWLY DEFINED IN
MODEL RULES ................................................................. 28
   A. Early Draft ............................................................ 28
      1. Revised Definition .............................................. 31
V. PRESERVATION OF THE RECORD ................................. 32
VI. PRETRIAL NOTICE, OBJECTION, AND HEARINGS IN CIVIL
PROCEEDINGS ............................................................... 33
   A. The Goal of Reliability ........................................... 34
   B. Notice and Objection .............................................. 35
      1. Notice Requirement ............................................ 35
      2. Discovery .......................................................... 37
      3. Objection ......................................................... 38
      4. Other Objections Optional at that Time .................... 40
   C. The Role of the Court ............................................ 40
   D. Possibility of Proponent's Motion In Limine ................. 41
VII. DISPARATE RESOURCES ............................................. 42
VIII. CRIMINAL PROCEEDINGS ......................................... 42
IX. CONCLUSION ............................................................ 43

APPENDIX A ........................................................................ 44
APPENDIX B ...................................................................... 54
APPENDIX C ..................................................................... 62
APPENDIX D ..................................................................... 65
APPENDIX E ..................................................................... 66
APPENDIX F ..................................................................... 69

I. INTRODUCTION

The members of the jury sit in rapt concentration, their eyes riveted on the “eyewitness” account of an airplane crash. The focus of the jurors’ attention, though, is not on the witness stand. It is on a computer monitor. The jurors are watching a computer-generated simulation of the crash. The story is being told in real time against the simultaneous voice-over of the cockpit crew. The jury watches the doomed airliner from a distance, then through the eyes of the pilot, then from a distance again as the plane crashes to earth in a fireball.

It is a chilling description of the final moments of Flight 162.1 Yet, all aboard the aircraft were killed. There are no surviving eyewitnesses. What the jury has seen is the product of a sophisticated piece

---

of computer software. The software has been fed digital information from a 'black box' retrieved from the crash site wreckage. The digital conclusions of this computer analysis were then scrupulously reproduced in the form of a simulation, using computer graphics software. The result is a highly realistic motion picture of how the crash occurred.

Expert opinion 'testimony' is being offered by computers. In the above example of an air crash, there was no expert witness taking the stand to testify as to how the final moments of Flight 162 looked. The computer itself was the expert. It told the jury, "given the information contained in the onboard flight recorder, this is how the crash must have happened."

Computer-generated evidence is not limited to simulations based on the output of a computer. A computer-generated animation can be made, based on the expert opinion or lay testimony of a human wit-
ness. The animation is used merely to illustrate the human witness’ testimony.5

Computer simulations and animations are exceptionally persuasive.6 Judges and jurors absorb information presented in a visual format much more readily than information presented only by the spoken word.7 They more easily give credibility to televised information.8 If Peter Jennings says it happened, it happened.

However, the inner workings of computer-generated evidence are not easily understood; and it has enormous potential for mischief. For these reasons, the fundamental issues affecting its admissibility should not be decided at the time of trial.9

Handing someone a computer disk-


6. See The Court of Appeals of Maryland Standing Committee on Rules of Practice and Procedure (“Rules Committee”), infra note 12, Meeting Minutes at 21 (Jan. 3, 1997). See also What Computes in Court: Technologically Sophisticated Court Exhibits Can Raise Some Interesting Evidentiary Issues, supra note 3 (“Courts should be apprehensive that jurors may be so forcefully impressed by sophisticated animations purporting to re-create a crime which are illustrative in nature that they will overlook substantive evidence that has been presented to them.”).


9. For example, Greg Joseph recommends:

To avoid unfair prejudice, pretrial discovery of computerized evidence, including the underlying computer program, is essential.

The Federal Judicial Center's Manual for Complex Litigation 2d provides (in § 21.446) that discovery into the reliability of computerized evidence, 'including inquiry into the accuracy of the underlying source materials, the procedures for storage and processing, and some testing of the reliability of the results obtained,' should be conducted 'well in advance of trial.'

The mandatory disclosure provisions of the 1993 amendments to the Federal Rules of Civil procedure are also important in this regard since they mandate pretrial exchange of exhibits to be used as "support for the opinions" of any expert, and animations are invariably offered in connection with expert testimony. As a practi-
ette the night before it is to be offered into evidence is comparable to asking a geologist to study an iceberg from a row boat. In each case, it is what lies below the surface that counts. A polished and seemingly flawless computer analysis could suffer from bad underlying data, erroneous data entry, inaccurate software code, or invalid software design. It might take weeks of intense study to examine the software’s documentation and the data gathering process.

Under a grant from the State Justice Institute, the Standing Committee on Rules of Practice and Procedure of the Court of Appeals of Maryland ("Rules Committee") studied whether new rules should be created to address computer-generated evidence. It concluded that the existing rules of evidence adequately deal with the admissibility of computer-generated evidence, but that new rules of procedure would

---

cal matter, pretrial exchange of computerized exhibits, and discovery into underlying programs, should be assured by provisions in the pretrial order.

Scope Of Discovery. The scope of discovery should: (1) extend into the foundational areas described in §§ II, III, and IV, above, and (2) expressly include any deleted excerpts, or outtakes, from any computer-generated video or exhibit, including any prior versions of any exhibit. If there ever was a viable work-product defense to production — which is dubious in light of the good cause that the opponent could always show — it cannot likely survive the 1993 amendment to Federal Rule of Civil Procedure 26(a)(2)(B), which requires disclosure of "the data or other information considered by the witness in forming the opinions."

E. Preview Prior to Introduction

If for any reason a computerized exhibit has not been disclosed to all counsel prior to trial and is not to be excluded for that reason, the exhibit should be disclosed prior to introduction outside the presence of the jury and the opponent afforded a reasonable opportunity to review it. The court, too, should review the exhibit before the jury is exposed to it, to preclude potential prejudice to either side.


10. Subtle manipulations are possible that may affect the jury but may not be noticed by an eyewitness. See What Computes in Court: Technologically Sophisticated Court Exhibits Can Raise Some Interesting Evidentiary Issues, supra note 3 ("Computer-generated exhibits give you more than meets the eye. They can be modified very subtly — perhaps so subtly that it could easily escape detection by even an eyewitness to an event. Additionally, these exhibits often re-create events as to which there is no eyewitness — which raises the risk that they may be taken by the jury to be representations of photo-like accuracy when they could be the product of a creative lawyer or expert's imagination."). See also Mark Hansen, A Failure of Analysis? Critics Blast Firm's Recreation of Menendez Shootings, A.B.A. J., Oct. 1996, at 18-20.


12. The Rules Committee’s address is 100 Community Place, Crownsville, MD 21032-2030.
be helpful. The new rules, adopted by the Maryland Court of Appeals by Rules Order of February 10, 1998, provide for pretrial notice of computer simulations and animations, so that objections may be made and ruled on pretrial. If the problem with the proposed evidence is curable, it may be corrected before trial. The rules also put the burden on the proponent of the evidence to preserve the computer evidence, as it was presented to the fact-finder, for the record. In the event that an opponent cannot afford to employ a necessary expert, or if the court requires expert assistance, the proposed rules provide that the court may appoint experts. The court may allocate these costs to the parties as it sees fit so that, in the event of vastly disparate resources, the wealthier party may – in effect – pay for its opponent’s expert.

This article will first provide background information on computer-generated evidence. It will then provide the legislative history of and discuss the reasoning for each of the following recommendations: (1) the decision not to amend the rules of evidence, and the consideration of recommending pertinent jury instructions; (2) the narrow definition of computer-generated evidence, for purposes of the model rules of civil procedure; (3) the provisions regarding preservation of the record; (4) the provisions regarding pretrial notice, objection, and hearing; (5) the provisions regarding the court’s appointment of experts and allocation of costs; and (6) the decision regarding discovery in criminal proceedings.

13. The Rules adopted by the Maryland Court of Appeals, by Rules Order of February 10, 1998 (over the dissent of Chasanow, J., joined by Cathell, J.), as a result of this project, are set forth in Appendix A. Maryland Rules 2-504, 2-504.1, and 2-504.3 for civil proceedings and Rules 4-263 and 4-322(b) for criminal proceedings are intended to serve as proposed model rules. Model Rules derived from the Maryland Rules are set forth in Appendix B. The Court of Appeals of Maryland and the Administrative Office of the Courts also have produced a videotape, the Trial of the Future, and are producing an interactive CD-ROM.

14. See Md. Rule 2-504.3(b)-(d) and Md. Rule 4-263(b)(5) and (d)(4). See also Md. Rule 2-504(b)(1)(C) (providing for scheduling order concerning dates by which notice is required) and Md. Rule 2-504.1(a)(2) (requiring scheduling conference, because of likelihood of complexities in such a case). Rule 2-504.3 was added and rules 4-263 and 2.504 were amended on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A. See generally Alice Whitfield, R.A. Whitfield, & Judith Gurney, Challenging Computer "Evidence," 127 N.J. L.J. 798, (1991) (TECHNOLOGY & RECORDS MANAGEMENT SUPP. at 74).

15. See Md. Rule 2-504.3(b)(1)(B) & 3(f) and Md. Rule 4-322(b). Rule 2-504.3 was added and rule 4-322 was amended on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

16. See Md. Rule 2-504.3(e). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

17. Id.
II. BACKGROUND INFORMATION ON COMPUTER-GENERATED EVIDENCE

In today’s trials, much documentary evidence is computer-generated. Even most small businesses keep their records on computers and use computers for their bookkeeping. Few documents are typed on typewriters. Rather, they are entered on computer word processors. Records or photographs preserved or captured in digital form are also considered “computer-generated.”

Most of these forms of evidence, with the exception of photographs that can be digitally manipulated and merged, have not caused the courts any lingering concern. Lawyers and judges have easily adapted the rules of evidence and procedure to such routine business records and correspondence.

However, two forms of computer-generated evidence pose significant concerns: (1) computer simulations and (2) computer animations. Computer simulations showing “computer opinions,” where the computer has been programmed with certain information and then compiles a simulation of how an event occurred (for example, an airplane crash, or an automobile collision) or would or could occur (for example, perfection of an invention) may be offered as (a) substantive evidence or (b) the basis for a testifying expert’s opinion. Such a computer simulation has reached a conclusion on how the event under study happened, and provides opinion evidence at trial. A computer-generated animation, on the other hand, is based on the opinion evidence of an expert witness or on the non-expert testi-


The conditions portrayed in the simulation must be shown to be substantially similar to those in the event at issue. See Four Corners Helicopters, Inc. v. Turbomeca S.A., 979 F.2d 1434, 1442 (10th Cir. 1992) (holding no abuse of discretion in excluding film); Gladhill v. Gen. Motors Corp., 743 F.2d 1049, 1051 (4th Cir. 1984).
mony of a lay witness. A witness on the stand would generate the conclusion, and then use the animation to illustrate that conclusion.\textsuperscript{22} Alternatively, the animation might simply illustrate factual testimony. Computer animations might illustrate, for example, certain scientific principles, an invention or a product, or how an event described by a witness would look.\textsuperscript{23}

An animation can be based on the output of a computer. When a computer simulation and animation are employed together, the product is simply called a "computer simulation." An example of this can be seen in the movie "Titanic,"\textsuperscript{24} as a computer screen depicts how the doomed vessel reacted to the inflow of water, broke apart, and sank.

Clearly, a computer-generated product will be unreliable if either (1) the computer relies on unreliable data (2) through some "glitch" in the computer software or hardware, the computer manipulates the data incorrectly.

III. THE EXISTING RULES OF EVIDENCE ARE SUFFICIENT TO ACCOMMODATE COMPUTER-GENERATED EVIDENCE

Computer-generated evidence may be offered either as substantive proof or for another purpose.

A. Substantive Evidence

The question of reliability intersects the rules of evidence in three concrete areas when computer-generated evidence is offered as substantive evidence: (1) hearsay, when the computer-generated evidence is offered as substantive evidence,\textsuperscript{25} the out-of-court statement of a

\begin{itemize}
\item \textsuperscript{24} TITANIC (Paramount Pictures 1997).
\item \textsuperscript{25} Hearsay exceptions that might apply to computer-generated evidence include, e.g., UNIF. R. EVID. 803(6), business records; 803(8), public records; 803(7) and (10), absence of entry in business or public records; 803(9), records of vital statistics; 803(14), records of documents affecting an interest in property; 803(15), statements in documents affecting an interest in property; and 803(16), statements in documents that are more than twenty years old.
\end{itemize}
person\textsuperscript{26} for the truth of the matter asserted by that person;\textsuperscript{27} (2) the validation of scientific evidence; and (3) the authentication of computer-generated evidence offered as substantive evidence.

These three independent areas remain of concern when a computer-generated evidence summary is offered as substantive evidence in place of voluminous evidence that would be admissible substantively if offered, or when a computer printout is offered as an original under the “best evidence rule.”

The question also arises as to whether exhibits of computer-generated evidence, admitted as substantive proof, should be taken to the jury room for consultation during deliberations.\textsuperscript{28}

\textsuperscript{26} The statement of a machine (not the transmission by a machine of a statement of a person), for example, automatic recording of weather data or performance of intoxilizer test, will not be hearsay. See \textit{Joseph, Simplified}, supra note 9 (“Purely computer-generated output includes, e.g., automated telephone call records, computer-enhanced photographic images, computerized test-scoring – generally, output not reiterating human declarations but simply performing programmed tasks on non-assertions.”); David A. Schlueter, \textit{Hearsay – When Machines Talk}, \textit{Tex. B.J.}, Oct. 1990, at 1135 (“The mere fact that the same data was ultimately printed in hard copy would not convert it into hearsay.”). \textit{But cf.} \textit{United States v. Linn}, 880 F.2d 209, 216 (9th Cir. 1989) (holding no error in admitting computer printout of telephone calls from defendant’s hotel room; the record was generated automatically and retained in the course of business) (court overlooks question whether the record was a statement of a person).

Of course, authentication will be required, under \textit{Unif. R. Evid.} 901(b)(9) and \textit{Fed. R. Evid.} 901(b)(9), and the underlying principles, etc. must be shown to be valid, \textit{Unif. R. Evid.} 702 and \textit{Fed. R. Evid.} 702. See \textit{Linda L. Addison, Admitting Computer Records: Multiple Bytes at the Apple}, \textit{Tex. B.J.}, Oct. 1985, at 1095 (“If the computer is performing analyses that in another era would have been performed by an expert, such as an accountant, physicist, or engineer, the proponent of such analyses should lay the same predicate as he would for an expert’s analysis. Additionally, the proponent should meet authentication requirements of Rule 901(b)(9) as a condition precedent to admissibility.”).

\textsuperscript{27} An out-of-court statement may also be offered for a nonhearsay purpose, for example, as a verbal act, such as an offer or acceptance; or to show effect on or notice to the reader. See \textit{Unif. R. Evid.} 801(c) and \textit{Fed. R. Evid.} 801(c).

B. Non-Substantive Evidence

The same questions of reliability persist, although they may be evaluated less strictly, when the computer-generated evidence is offered not as substantive evidence, rather as the basis of a testifying expert’s opinion or as demonstrative evidence, merely illustrating lay or expert witnesses’ testimony, or for purposes of impeachment. When evidence is offered for these non-substantive purposes, the question of the necessity for a limiting jury instruction arises.

Computer-generated material also could be used not as evidence at all, but as a tool for presenting a party’s theory of the case in closing argument.

C. Rules 403 and 611 Apply, Regardless of Whether the Evidence is Substantive

Regardless of whether computer-generated evidence is admitted as substantive evidence or for another purpose, the trial court retains discretion to exclude or curtail it under Federal or Uniform Rule of Evidence 403, because it is misleading, confusing, otherwise unfairly prejudicial, too time-consuming, or cumulative. The trial court can also exclude or curtail evidence in order to “exercise reasonable control over the mode and order of . . . presenting evidence” under Federal or Uniform Rule of Evidence 611(a)(1) and (2).

Different types of computer-generated evidence, including (1) routine business records, (2) data specially prepared in anticipation of litigation, and (3) computer animations and simulations, may raise different evidentiary concerns. The Maryland Rules Committee considered the application of the rules of evidence to each of these three areas separately.

29. The opinion itself is the substantive evidence. The basis of the opinion is inadmissible substantively, because it is excluded by the hearsay rule. For the opinion to be admissible, the basis must be of a type reasonably relied on by experts in the particular field. See Fed. R. Evid. 703; Unif. R. Evid. 703.


32. See Fed. R. Evid. 403; Unif. R. Evid. 403.

33. See Fed. R. Evid. 611; Unif. R. Evid. 611. Rule 611 empowers the court to exercise its discretion so as to make the “presentation effective for the ascertainment of the truth” and to “avoid needless consumption of time.”
D. Routine Business Records

To evaluate the adequacy of the rules of evidence with regard to computer-generated routine business records, the Rules Committee considered how the existing rules apply to the following four illustrative examples. The Rules Committee also considered possible alternate approaches from other common law countries.

1. Traditional, Non-Computer-Generated Records

**ILLUSTRATION #1.** IN THE TELEPHONE COMPANY’S SUIT AGAINST A CUSTOMER FOR UNPAID TELEPHONE BILLS, THE TELEPHONE COMPANY OFFERS ITS PAPER LEDGER, WITH HANDWRITTEN ENTRIES, TO PROVE THE AMOUNTS BILLED TO THE CUSTOMER AND THE NONRECEIPT OF PAYMENT.

In Illustration #1, the evidence is offered by the Telephone Company as its business record, to show the truth both of its entries and the lack of payment, due to the absence of entries. The writing is relevant and will be admissible, as long as it is authenticated under Federal and Uniform Rules of Evidence 901-902; the “best evidence rule” is complied with under Federal and Uniform Rules of Evidence 1001-1004; and the hearsay rule does not exclude the writing.

Under Federal and Uniform Rules of Evidence 803(6) and 803(7), the Telephone Company’s records are not excluded by the

---

34. FED. R. EVID. 901-902; UNIF. R. EVID. 901-902. Such a record is typically authenticated by producing a witness with first-hand knowledge or by offering the exhibit as a certified record under UNIF. R. EVID. 902(11). See United States v. Linn, 880 F.2d 209, 216 (9th Cir. 1989) (holding hotel’s director of communications was a “qualified witness” to lay foundation for computer printout of telephone calls from defendant’s room, although she was not a computer programmer). Case law also permits the foundation to be laid by means other than the testimony of a live witness. See In re Japanese Elec. Prods. Antitrust Litig., 723 F.2d 238, 288 (3d Cir. 1983), rev’d on other grounds, 475 U.S. 574 (1986).

35. FED. R. EVID. 803(6) provides:

"(6)Records of Regularly Conducted Activity. A memorandum, report, record, or data compilation, in any form, of acts, events, conditions, opinions, or diagnoses, made at or near the time by, or from information transmitted by, a person with knowledge, if kept in the course of a regularly conducted business activity, and if it was the regular practice of that business activity to make the memorandum, report, record, or data compilation, all as shown by the testimony of the custodian or other qualified witness, unless the source of information or the method or circumstances of preparation indicate lack of trustworthiness. The term “business” as used in this paragraph includes business, institution, association, profession, occupation, and calling of every kind, whether or not conducted for profit.”

hearsay rule, even though the declarant is available as a witness. Once the foundation is laid and the court is satisfied that the record was regularly and timely made "by, or from information transmitted by, a person with [first-hand] knowledge," the writing comes in, "unless the source of information or the method or circumstances of preparation indicate lack of trustworthiness."38

That last clause has been read to codify two important doctrines. The first is the doctrine of Johnson v. Lutz.39 Under this doctrine, each declarant must be a part of the business, since the theory of reliability is that the business wants to rely on accurate records.40 If a declarant is not a part of the business, a nonhearsay purpose or another hearsay exception must be found.41 The second is the doctrine of Palmer v. Hoffman.42 Under this doctrine, self-serving records made in anticipation of litigation are untrustworthy and thus inadmissible under the business records exception.43 Unless such unreliability is shown, the writing comes in as a business record. The record keeping processes' lesser foibles may be shown by the opponent and influence the weight given to the evidence.44

36. FED. R. EVID. 803(7) provides:
(7) Absence of Entry in Records Kept in Accordance With the Provisions in Paragraph (6). Evidence that a matter is not included in the memoranda, reports, records, or data compilations, in any form, kept in accordance with the provisions of paragraph (6), to prove the nonoccurrence or nonexistence of the matter, if the matter was of a kind of which a memorandum, report, record, or data compilation was regularly made and preserved, unless the sources of information or other circumstances indicate lack of trustworthiness.

The wording of UNIF. R. EVID. 803(6) is slightly different, but the rule is substantially the same.


38. FED. R. EVID. 803(6).
40. See id. at 518.
41. See FED. R. EVID. 805 and UNIF. R. EVID. 805.
43. See id. at 113-15.
44. See, e.g., United States v. Saint Prix, 672 F.2d 1077, 1083-84 (2d Cir. 1981); United States v. Licavoli, 604 F.2d 613, 622 (9th Cir. 1979); Paul Ivan Birzon & Aubrey Diane Birzon, Tackling Hearsay's Business Records Exception, 13 FAIRSHARE 4, at 11-12 (1993); James A.
2. Computerized Business Records

**ILLUSTRATION #2.** In the Telephone Company's suit against a customer for unpaid telephone bills, Telephone Company offers a printout from its computers showing the outstanding balance.

The question arises whether the same foundation that sufficed for the paper ledger in Illustration #1 suffices for the computer printout in Illustration #2. One way of approaching this question is to treat it as one of authentication\(^\text{45}\) under Uniform Rule of Evidence 901(a) and (b)(9), which provide:

(a) General Provision. The requirement of authentication or identification as a condition precedent to admissibility is satisfied by evidence sufficient to support a finding that the matter in question is what its proponent claims.

(b) Illustrations. By way of illustration only, and not by way of limitation, the following are examples of authentication or identification conforming with the requirements of this rule:

* * *

(9) Process or System. Evidence describing a process or system used to produce a result and showing that the process or system produces an accurate result.

Although a threshold authentication is obviously required,\(^\text{46}\) for purposes of discussion at this juncture and in order to best focus on whether requiring a more detailed foundation for computer generated evidence is desirable, the alternatives below are presented as if Rule 803(6) were the only operative rule.

a. **Alternative 1: Evidence Rule 803(6) with no change**

Under Alternative 1, the Telephone Company's printout would come in if the traditional foundation were laid under Uniform Rule of

\(^\text{George, Hearsay: Recognizing It and Handling the Objection, 10 AM. J. TRIAL ADVOC. 489, 504-06 (1987); Peritz, supra note 9, at 958. See also United States v. Panza, 750 F.2d 1141, 1151 (2d Cir. 1984); United States v. Dreer, 740 F.2d 18, 19-20 (11th Cir. 1984).}

\(^\text{45. Most commentators treat the reliability of computer generated evidence as a question of authentication, rather than as one of hearsay. See Joseph, supra note 9; Peritz, supra note 9.}

\(^\text{46. Self authentication, by virtue of certification under UNIF. R. EVID. 902(11), is also possible. However, this Rule has been adopted in only three states: Maryland, Alaska, and Texas. See ALASKA R. EVID. 902; MD. R. EVID. 5-902(a)(11); TEX. R. CIV. EVID. 902(10); TEX. R. CRIM. EVID. 902(10).}
Evidence 803(6). The burden would be on the one to show that the evidence should be excluded under the final clause of 803(6), and the mere fact that the evidence is computer-generated would not meet that burden. Possible problems arising because the evidence is computer-generated would merely go to the weight of the evidence. This appears to be the majority view under the case law, and was the one ultimately followed by the Maryland Rules Committee.

As long as the data entry was timely, the print-out offered need not have been made at or near the time of the events recorded and should not be excluded, nor should it be excluded if the printout — rather than the data entry — was made for trial. But double or multiple hearsay questions must not be overlooked.

b. Alternative 2:
Evidence Rule 803(6) with no change in text, but a Note that the reference in the Rule's final clause to 'method' of preparation requires a particular additional showing to be made when the record is computer-generated evidence.

Alternative 2 represents a possible reading of the existing Uniform Rule of Evidence 803(6) but, unlike the case law, would shift the burden of proof to the proponent of the evidence to show prima facie reliability of the computer process. What the additional foundation might be is exemplified in Alternative 3, below.

c. Alternative 3:
Designate the existing text of Rule 803(6) as part (a) and add part (b), as follows:

(b) If a record offered under subsection (a) of this Rule is computer generated, the court also must be satisfied under Rule 104(a).

47. See, e.g., United States v. Vela, 673 F.2d 86, 90 (5th Cir. 1982) ("Arguments for a level of authentication greater than that regularly practiced by the company in its own business activities go beyond the rule and its reasonable purpose to admit truthful evidence."); United States v. Gentry, 4 CCH Computer Cases ¶ 46,935 at 65,654 (E.D. Tenn. 1993) (holding there is nothing unique about computer data that makes it less of a public record under Fed. R. Evid. 803(8) than other public records). But see, e.g., United States v. Scholle, 553 F.2d 1109, 1123-25 (8th Cir. 1976).


49. See UNIF. R. EVID. 805.

as to: (i) the reliability of the computer equipment used; (ii) the reliability of the systems and application processing program(s) used, including the security of the system; (iii) the reliability of the input process, including the relevance and reliability of the underlying data, the integrity and completeness of the input data, and the accuracy of the input method; (iv) the reliability of the output, including the propriety of the request, the absence of transmission errors, and the security of the output.

Adding these additional requirements to Rule 803 would make them Rule 104(a) questions for the judge\(^5\) (to be decided by the judge, so that the judge would admit the evidence only if she or he was satisfied by a preponderance of the evidence that these requirements would be met).\(^5\) Adding the requirements, but placing them in Uniform Rule of Evidence 901(b)(9), on the other hand, would make them Rule 104(b) questions for the jury.\(^5\) Rule 104(b) is a more liberal standard, under which the evidence would be admissible if the judge finds that a reasonable jury could find the authenticating factors met.\(^5\)

d. Alternative 4:
The English Rule.

England has largely done away with the hearsay rule in civil cases, which are all non-jury.\(^5\) Its statutory provision,\(^5\) regarding computer-generated evidence offered in civil cases\(^5\) to prove the truth of the facts asserted in it, is broader than Rule 803(6) both as to the Johnson v. Lutz principle (regarding statements made by declarants

\(^5\) See id.
\(^5\) See FED. R. EVID. 901(a) and UNIF. R. EVID. 901(a), which employ the same test as is set forth in FED. R. EVID. 104(b).
\(^5\) Id.
\(^5\) Civil Evidence Act, 1968, 16 & 17 Eliz. 2, ch. 64 (Eng.) (now codified as Civil Evidence Act 1995, ch. 38, § 1 (Eng.)), set forth in Appendix C. See R. v. Minors, R. v. Harper, 2 All E.R. 208, (C.A. 1989); 1 W.L.R. 441, (1989); 1989 Crim.L.R. 360 (requiring a trial within a trial to determine, on the criminal burden of proof, that the offered computer printout is admissible); R. v. Governor of Pentonville Prison, ex parte Osman 3 All E.R. 701 (1989); 1988 Crim L.R. 611 (stating where a lengthy computer print-out contains no internal evidence of malfunction, and is retained, for example, by a bank, as part of its records, it may be legitimate to infer that the computer that made the record was functioning correctly).
\(^5\) The United Kingdom has taken a different approach in criminal cases. See Police and Criminal Evid. Act, 1984, § 69 (Eng.), set forth in App. D.
not in the business) and as to the *Palmer v. Hoffman* principle (regarding self-serving statements made in anticipation of litigation).58

The Act also extends to an individual’s computer.59

e. **Alternative 5:**
   **The Australian Rule.**

   The South Australia Evidence Act60 is consistent with *Johnson v. Lutz*61 and *Palmer v. Hoffman*,62 but puts the ball in an opponent’s court to generate “reasonable cause to suspect” unreliability.63

f. **Alternative 6:**
   **The South African Rule.**

   South Africa’s Computer Evidence statute, which became effective in 1983, provides for the certification of computer records, but permits any party to require the affiant or another witness to testify at the proceeding.64

3. Computer-Generated Evidence Created By Machine

**ILLUSTRATION #3.** IN THE STATE’S PROSECUTION OF A DEFENDANT FOR MAKING THREATENING TELEPHONE CALLS TO A VICTIM, THE STATE OFFERS THE TELEPHONE COMPANY’S COMPUTER PRINTOUT TO SHOW THAT CALLS WERE MADE AT CERTAIN TIMES AND DATES FROM THE DEFENDANT’S HOME TELEPHONE TO THE VICTIM’S HOME TELEPHONE.

Illustration #3 clearly demonstrates the need for the requirement of authenticating the printout, by proof of the mechanical process involved, under Federal and Uniform Rules of Evidence 901(b)(9).65 No person in the business would have had first-hand knowledge of the facts recorded.

---

58. Compare App. C, § 5(2)(b) and (d), with *supra* text accompanying notes 39-44.
60. S. AUSTL. EVID. ACT, Part VIA, § 59b, set forth in App. E.
61. See *supra* notes 39-41 and accompanying text.
62. See *supra* notes 42-44 and accompanying text.
63. S. AUSTL. EVID. ACT, § 59(b)(2)(8).
64. The Act is set forth in App. F.
65. Fed. R. Evid. 901(b)(9); UNIF. R. EVID. 901(b)(9). See United States v. Linn, 880 F.2d 209, 216 (9th Cir. 1989) (holding there was no error in admitting computer printout of telephone calls from defendant’s hotel room as the record was generated automatically and retained in the course of business).
4. Computer-Generated Records When Data was Generated by a Person Outside the Business

**ILLUSTRATION #4.** IN THE STATE'S PROSECUTION OF THE DEFENDANT FOR MAKING THREATENING TELEPHONE CALLS TO THE VICTIM, THE STATE OFFERS THE TELEPHONE COMPANY'S COMPUTER PRINTOUT TO SHOW THAT CALLS WERE MADE TO THE VICTIM'S HOME TELEPHONE FROM AN OUT-OF-STATE TELEPHONE, BUT CHARGED TO THE DEFENDANT'S HOME NUMBER.

In Illustration #4, the fact that the person placing the long distance calls was not in the Telephone Company's business is obvious. The record would be offered only to show that someone made the call and charged it to the defendant's home number. If this record were offered in Telephone Company's suit against the defendant for the charges for the call, it should be admissible for the same purpose. The defendant then could testify that he made no such call. If the evidence's opponent establishes a serious question as to the reliability of the computer records, additional foundation testimony might be required. In that case, the burden of proof would be on the opponent of the evidence to prove its unreliability.66

5. Maryland Rules Committee's Conclusion

The Maryland Rules Committee concluded that the existing rules of evidence adequately covered the evidentiary problems arising with computer-generated business records.67 Once the traditional business record foundation is laid under Federal and Uniform Rule of Evidence 803(b)(6) or the public record foundation is laid under 803(b)(8), and the record is authenticated under 901(b)(7) or is self-authenticated by virtue of 902(a)(1)-(5), the record should come in, unless the opponent of the evidence meets his or her burden of showing lack of trustworthiness, under the second sentence of 803(b)(6) or 803(b)(8)(B). The mere fact that the evidence is computer generated will not meet that burden. A showing of possible problems arising because it is computer-generated evidence merely will go to the weight of the evidence.68

---

66. See R. v. Governor of Pentonville Prison [1989] 3 All E.R. 701, 1988 CRIM. L. REV. 611 (holding a lengthy computer printout that contains no internal evidence of malfunction, and is retained, e.g., by a bank, as part of its records may legitimately give rise to the inference that the computer that made the record was functioning properly).
68. "[I]f the hard copy of the output is used by the enterprise in ordinary course, the objections generally go to weight, not admissibility." What Computes in Court: Technologically So-
As long as the data entry was timely, the printout offered need not have been made at or near the time of the events recorded. It should not be excluded if the printout – rather than the data entry – was made for trial.69

Double or multiple hearsay questions, however, must not be overlooked.70

E. Records Made in Anticipation of Litigation

Under Uniform Rule of Evidence 803(6) and (7), business records will not be excluded by the hearsay rule, unless the opposing party persuades the court, under Rule 104(a),71 that the records lack trustworthiness. Under the doctrine of Palmer v. Hoffman,72 a show-
ing that the records are self-serving and were made in anticipation of litigation suffices to meet this burden, and such records will be excluded. A non-routine printout of information prepared for litigation, but by a business that is not a party to the litigation, might not suffer from the same lack of reliability.73

F. Computer Animations and Simulations

1. Animations

A computer-generated animation is not offered as substantive evidence, but is illustrative of a witness' testimony.74

When a witness has first-hand knowledge of a relevant subject, such as an accident scene or a crime scene, the witness testifies that the photo is a fair and accurate depiction of that subject.75 With that foundation, the photo is admitted into evidence. The same is true with a computer illustration. For example, one court admitted into evidence a computer animation showing how a shooting victim had moved in a threatening way, prior to being shot.76

Similarly, a computer animation can be used to illustrate or explain the opinion testimony of an expert witness. For example, a computer animation, showing how, when a car was rear-ended, a passenger's head and body moved, causing whiplash, has been admitted to accompany the expert's testimony on the subject. In order to be admitted, this type of demonstrative evidence must be a fair and accurate portrayal of the principles it is intended to depict and must be used to illustrate the expert's opinion.78

74. See MD. RULE 2-504(a)(1).
78. See Strock v. Southern Farm Bureau Cas. Ins. Co., 998 F.2d 1010, No. 92-2357, 1993 WL 279069, at *1 (4th Cir. July 12, 1993) (holding there was no abuse of discretion in admitting plaintiff's computer simulation of Hurricane Hugo's effect on house); Nachtsheim v. Beech Aircraft Corp., 847 F.2d 1261, 1278 (7th Cir. 1988) (noting strict adherence to facts of accident not required because videotape was offered only to illustrate principles informing expert's opinion); Zurzolo v. General Motors Corp., 69 F.R.D. 469, 473 (E.D. Pa. 1975) (holding no error in admitting film that did not accurately represent accident because film was offered only to demonstrate principles of physics, not as an exact representation of the accident);
2. Simulations

On the other hand, for a computer simulation, which itself provides the expert opinion, the foundation requirements are much higher. The Federal Judicial Center's Manual for Complex Litigation recommends that the proponent must establish, to the court's satisfaction under Uniform Rule of Evidence 104(a), the reliability of the computer equipment used and the data processing techniques applied. This foundation would include expert testimony that the processing programs accurately process the information in the business record database.

Foundation testimony is also required to establish (1) the integrity of the data underlying the simulation, (2) the scientific integrity of the computer equipment and the principles used in the software program, under Frye or Daubert, (3) the integrity and security of the computer system, and (4) the security of the output. To survive exclusion under Uniform Rule of Evidence 403, the conditions must be shown to be substantially similar to those in the event at issue.

3. Narrations

Zealous advocates may attempt to enhance the persuasive impact of computer animations or simulations by the use of voice-over narrations.


79. See, e.g., Jochims v. Isuzu Motors, Ltd., 4 CCH Computer Cases ¶ 46,934 at 65,651-2 (S.D. Iowa 1992) (discussing defendant's request that plaintiff turn over computer simulation validation materials, which consisted of at least 100 experimental runs).

80. MANUAL FOR COMPLEX LITIGATION § 34.32 at 398 (3d ed. 1995).

81. See United States v. Russo, 480 F.2d 1228, 1241 (6th Cir. 1973) (holding no error in admitting results of computer statistical run because "[n]o evidence was introduced which put in question the mechanical or electronic capabilities of the equipment and the reliability of its output was verified."); United States v. De Georgia, 420 F.2d 889, 895 (9th Cir. 1969) (Ely, J., concurring).


83. Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).


85. See Young v. Illinois Cent. Gulf R.R., 618 F.2d 332, 338 (5th Cir. 1980) (holding error to exclude film); Perma Research & Dev. v. Singer Co., 542 F.2d 111, 115 (2d Cir. 1976) (holding no error in admission of simulation showing that perfection of a patented device was achievable).

86. See Four Corners Helicopters, Inc. v. Turbomeca, S.A., 979 F.2d 1434, 1440-2 (10th Cir. 1992) (holding no abuse of discretion in excluding film); Gladhill v. General Motors Corp., 743 F.2d 1049, 1053 (4th Cir. 1984).
tion. These narrations are normally excluded under the hearsay rule, unless the narrator testifies and is subject to cross examination. 87

G. The Validation of Scientific Evidence

The lack of soundness of scientific principles underlying a particular computer program, software, or hardware clearly would make the computer output unreliable. If novel principles or techniques are employed, they must satisfy the applicable foundation requirement 88 in the particular jurisdiction: Daubert's 89 evidence rules 401-702-403 test in federal court 90 and some state courts, 91 or Frye's 92 test in some state courts. 93

H. The Authentication of Computer-Generated Evidence

Computer-generated records could be authenticated like any others. For example, computer-generated public records could be authenticated under Uniform Rule of Evidence 901(b)(7) or 902(1)-(4). 94

88. For sample foundations see, for example, GRAHAM, STEIGMANN, BRANDT & IMPWINKELREID, ILLINOIS EVIDENTIARY FOUNDATIONS 26-36 (Supp. 1996).
94. See Joseph, supra note 9, at 331. But see Mark A. Johnson, Computer Printouts as Evidence: Stricter Foundation or Presumption of Reliability?, 75 MARQ. L. REV. 439, 453-54 (1992) ("The current procedure for authenticating computer printouts has been criticized. . . Rule
Other computer-generated documents could be authenticated under Uniform Rule of Evidence 901(b)(1)-(4), except when the accuracy of the inner workings of the computer are essential to showing that the exhibit is what its proponent is offering it as (e.g., the complete billing records as to defendant), the underlying process must be shown to produce a reliable result under Uniform Rule of Evidence 901(b)(9).  

I. The “Best Evidence” Rule

A computer printout, shown to accurately reflect stored data, is an “original” for purposes of the “best evidence rule.”

---

902(4), which treats public records as self-authenticating, should not apply to certified computer-generated public records because the accuracy of public records, like that of business records, depends on the system that produces them.

95. See Peritz, supra note 9, at 980-82.

96. See, e.g., Joseph, supra note 9 (“There is a specific illustration of sufficient authentication for computer evidence tucked into Rule 901(b)(9), and it requires only ‘evidence . . . showing that the process or system produces an accurate result.’”); Gregory P. Joseph, Computer Evidence, 22 LITIG. 13, 13 (1995).

97. See UNIF. R. EVID. 1001(3) and FED. R. EVID. 1001(3), which provide: “If data are stored in a computer or similar device, any printout or other output readable by sight, shown to reflect the data accurately, is an ‘original.’”

The updated version of the Uniform Photographic Copies of Business and Public Records as Evidence Act, e.g., WIS. STAT. § 889.29 (1996), similarly provides in pertinent part:

(1) If any business, institution or member of a profession or calling in the regular course of business or activity has kept or recorded any memorandum, writing, entry, print, representation or combination thereof, of any act, transaction, occurrence or event, and in the regular course of business has caused any or all of the same to be recorded, copied or reproduced by any photographic, photostatic, microfilm, microcard, miniature photographic, or other process which accurately reproduces or forms a durable medium for so reproducing the original, or to be recorded on an optical disk or in electronic format, the original may be destroyed in the regular course of business, unless its preservation is required by law. Such reproduction or optical disk records, when reduced to comprehensible format and when satisfactorily identified, is as admissible in evidence as the original itself in any judicial or administrative proceeding whether the original is in existence or not and an enlargement or facsimile of such reproduction of a record or an enlarged copy of a record generated from an original record stored in optical disk or electronic format is likewise admissible in evidence if the original reproduction is in existence and available for inspection under direction of court. The introduction of a reproduced record, enlargement or facsimile, does not preclude admission of the original.

(2) This section does not apply to public records.

(3) This section shall be so interpreted and construed as to effectuate its general purpose of making uniform the law of those states which enact it.

Electronically imaged documents would be "duplicates," and are equally admissible as the originals, absent a showing of unfairness under the circumstances or the raising of a genuine question as to the authenticity of the original. Such electronically imaged "duplicates," if they are of public records, are as equally admissible as the originals. A computer-generated summary of otherwise admissible evidence also could be offered into evidence.

J. Rules of Evidence Adequate

The Rules Committee concluded that the existing rules of evidence are sufficiently flexible to provide appropriate control over the admissibility of computer animations and simulations. It also consid-

99. See UNIF. R. EVID. 1001(4); FED. R. EVID. 1001(4).
100. See UNIF. R. EVID. 1003; FED. R. EVID. 1003; Lynch & Brenson, supra note 69, at 931 (noting computer record and simultaneously generated receipt for gasoline purchase are both originals).
101. UNIF. R. EVID. 1005; FED. R. EVID. 1005.
102. UNIF. R. EVID. 1005; FED. R. EVID. 1005.
103. The Evidence Subcommittee had reviewed, and did not recommend, adopting the following recommendations made by Paula Noyes Singer and by a student author. Memorandum from Lynn McLain to James Carbine, Esq., Sandra F. Haines, Esq., Richard Herrmann, Esq., and Robert D. Klein, Esq., (May 6, 1996) (on file with Rules Committee, supra note 12).

Singer, in her article, Paula Noyes Singer, Proposed Changes to the Federal Rules of Evidence as Applied to Computer-Generated Evidence, 7 RUTGERS COMPUTER & TECH. LJ. 157, 174-89 (1979), proposes the following Federal Rules of Evidence changes regarding admissibility:

1. Excluding computer programs from 901(b) and adding a Rule 901(c):
   (c) Computer Program or System. Evidence describing a computer program or system of computer programs used to produce a result and showing, by a description of the computer hardware, programming method, stored database, operation of the system, system security, and specific application controls, that the program or system produces an accurate result, satisfies the authentication requirement for a computer programmer [sic] or system. Voluminous testimony should not be required to lay a foundation for the computer system or process. For instance, the explanation of the computer hardware need not be more than an overview by the manufacturer of the central processing unit and of the types of input/output devices used by the system.

2. Adding to Rule 803(6):
   The evidence described in this paragraph does not include evidence which has been created by a program or programs if it was not the regular practice of the business to translate the computer-stored information into the form in which it is introduced with that program or programs. A computer printout or summary of otherwise admissible computer stored evidence is admissible through Rule 1006(b).
3. Adding a Rule 803(25):

Public records or the record of a public official as referred to in the exception categories for the hearsay rule are not to be interpreted to apply to records which have as their source a computer system. These records are not excluded by the hearsay rule so long as they meet the requirements of Rule 803(6) or Rule 803(7).

4. Adding to Rule 1003:

provided that, in the case of a duplicate of data stored in a computer or similar device, the proponent of the evidence satisfies the requirement of Rule 1006(b).

5. Adding Rule 1006(b):

(b) Computer Stored Data. If admissible data are stored in a computer or similar device, and a printout of that data, or other output which is readable by sight, is presented, both the process which created the computer stored data and the process which translated the data must satisfy the requirements of Rule 901(c). The following shall be made available for examination or copying, or both, by other parties at a reasonable time and place: 1. The original computer stored data being translated. 2. The program or programs used to translate the data. 3. Documentation for the computer stored data and programs. The court may order that they be produced in court. The process used to translate the data shall be shown by the testimony of a qualified witness.

The student author of the Note, Appropriate Foundation Requirements for Admitting Computer Printouts into Evidence, 1977 WASH. U. L.Q. 59, 91-2 (1977), proposes the following language regarding business records:

Section 1. A computer printout recording a business act, event, or transaction shall be admissible into evidence to prove the truth of the matters asserted therein provided that the offering party shows:

1) that the input procedures conform to standard practices in the industry; and, the entries are made in the regular course of business, and
2) that he relied on the data in the database in making a business decision(s), within a reasonably short period of time before or after producing the printout sought to be introduced at trial, and
3) by expert testimony that the processing program reliably and accurately processes the data in the database.

Section 2. Definitions.

1) A computer is any electronic machine that processes information through high-speed calculations.
2) A computer printout is a writing in readable form of the contents of a machine readable medium such as a disk, drum or magnetic tape.
3) The data base is the information stored in the memory of the computer or in an external storage medium and processed by the processing program.
4) A processing program processes the information in the data base through a series of logical operations to solve a user's problems.

Opponents of requiring more detailed foundations for computer-generated business records cite the costs in court time and expert fees and argue that laypersons understand that computers err.

ered the availability of, but did not make a recommendation with re­
gard to, helpful jury instructions. 104

K. Models for Jury Instructions

The Rules Committee also had before it105 the following proposed
pattern jury instructions regarding computer animations or simula­
tions. The first addresses animations or simulations that are either
admitted only for a limited purpose – as, for example, demonstrative
evidence, or as the non-substantively offered basis of an expert’s
opinion. The second and third concern animations or simulations that
assume the truth of facts that are in dispute or which contain known
errors:

1. Limited Purpose

You [are about to see] [have seen] a computer [animation]
[simulation] that is being offered by the [party]. This [animation]
[simulation] is being admitted only for the limited purpose of [il­
lustrating [witness’s] testimony] [illustrating [the party’s] theory
of the case] [demonstrating scientific principles] [showing results
of experiments or tests conducted by or on behalf of [the party]]
[showing the basis of [an expert witness’ opinion]]. The com­
puter [animation] [simulation] is not itself evidence.

2. Weight

a. Assumptions

In evaluating what weight, if any, to give to the testimony that
relies on the computer [animation] [simulation], bear in mind [the
principal assumptions underlying the exhibit, e.g., that it is predi­
cated on [the party’s] version of the facts; that the facts are in dis­
pute; that the exhibit is no better than the assumptions on which it

104. Memorandum from Lynn McLain to Rules Committee’s Subcommittee on Model Rules
Committee, supra note 12).

105. Memorandum from Lynn McLain to Rules Committee’s Subcommittee on Model Rules
Committee, supra note 12). The proposed language is derived from a proposal by Joseph, Simpli­
fied, supra note 9, at 335-36. Note that one commentator urges that such a jury instruction be
given before such computer evidence is presented to the jury. See John Selbak, Digital Litigation:
The Prejudicial Effects of Computer-Generated Animation in the Courtroom, 9 HIGH TECH. LJ.
337, 365 (1994).
It is for you to decide whether those assumptions are warranted.

b. Known Inaccuracies

Bear in mind also [any noteworthy differences between the exhibit and facts at issue - for example, that the exhibit does not purport to be drawn to scale or to include all (or certain specific) variables.]

The Committee did not take action on these instructions, which were beyond the specific mandate of the grant project. But giving these or similar instructions might prove helpful in preventing jurors’ over-reliance on computer-generated evidence.106

L. Consideration of Rule as to Which Exhibits Go to the Jury Room

The Committee also had before it a proposed rule of civil and criminal procedure to address whether computer simulations and animations may be taken to the jury room.107 The proposed rule would have left the question to the trial judge’s discretion,108 as follows:

Upon retiring for deliberation the jurors shall take with them:

***

such tangible evidence, as the court in its discretion shall direct, except that the jurors may not take with them depositions or other testimonial evidence109 unless permitted by [Uniform Rule of Evidence 803(5)].

The Committee did not make a recommendation on this question, which was beyond the specific mandate of the grant project. But per-
mitting the jurors to view an exhibit for which they need conter­
aneous expert commentary would be at odds with the policy resolution
codified in Uniform Rule of Evidence 803(18) and Federal Rule of
Evidence 803(18), which provides that learned treatises may be read to
the jury when an expert is testifying, but may not be taken to the jury
room.\textsuperscript{110}

\section*{IV. Computer-Generated Evidence Narrowly Defined In Model
Rules}

The model rule is limited in its reach to forms of computer-
generated evidence known as computer animations and computer
simulations, as well as photographs produced by non-conventional
digital cameras.\textsuperscript{111}

The limited definition of what constitutes computer-generated
evidence reflects a concern that a broader definition might capture
much more than was necessary, such as routine word processing
documents, spread sheets, digitally preserved records, routine video-
tapes and audiotapes, and other forms of evidence to which the courts
have easily adapted.

\subsection*{A. Early Draft}

The model rule's definition of computer-generated evidence is the
product of a lengthy and difficult winnowing process. Each prior draft
was examined in the context of the practical problems that would oc­
cur in realistic civil practice situations. Time and time again this proc­
ess of critique and discussion exposed weaknesses in the definition
stemming from its overbreadth.\textsuperscript{112}

\textsuperscript{110} See UNIF. R. EVID. 803(18); FED. R. EVID. 803(18).

\textsuperscript{111} At the public hearing held by the Court of Appeals of Maryland on February 10, 1998,
the judges expressed concern that, because many cameras contain computers, much like many
automobiles do, the rule should be clear that photographs produced by conventional cameras were
not to be considered "computer-generated evidence" within the rule. Audiotape of Computer-
Generated Evidence Hearing, held by Court of Appeals of Maryland (February 10, 1998) (on file
with Rules Committee, \textit{supra} note 12).

\textsuperscript{112} See Rules Committee, \textit{supra} note 12, Meeting Agenda (Sept. 6, 1996); Rules Commit­
tee, \textit{supra} note 12, Meeting Minutes, (Sept. 6, 1996) (containing Draft Rule 2-504.3 and Re­
porter's Note); Letter from James Carbine to Robert Klein, Richard Herrmann, and Lynn McLain,
(June 20, 1996) (on file with authors); Memorandum from Sandra Haines to Lynn McLain (June
28, 1996) (on file with author McLain); Letter from James Carbine to Robert Klein, Richard
Herrmann, Sandra Haines, and Lynn McLain, (July 9, 1996) (on file with authors); Letter from
Robert Klein to James Carbine, Sandra Haines, Richard Herrmann, and Lynn McLain, (July 15,
1996) (on file with authors); Memorandum from Robert Klein to James Carbine, Sandra Haines,
An easier path would have been to follow the advice of Colin Tapper of Oxford, who criticizes the U.K.'s Civil Evidence Act's pertinent definitions and opines: "It may be better to eschew altogether any attempt at a definition, and rather accept that 'computer' is now an ordinary word in the English language which a judge is perfectly capable of construing." Colin Tapper, *Discovery in Modern Times: A Voyage Around the Common Law World*, 67 CHI.-KENT L. REV. 217, 247-48 (1991).

The September 1996 draft of Maryland Rule 2-504.3(b)(3) contained the following definitions and committee note:

(3) Computer Generated Evidence

"Computer generated evidence" means computer generated data, computer generated demonstrative evidence, a computer simulation, and electronically imaged documentary evidence, as those terms are defined in this subsection. With respect to section (f) of this Rule and Rule 4-322(b) [regarding preservation of the record], "computer generated evidence" also means a computer generated depiction, animation, or other presentation used solely for argument.

Committee note: The definition of "computer generated evidence" is not intended to encompass routine videotapes or audiotapes; however "computer generated evidence" purposefully has been defined broadly, however, to allow for future technological changes.

(A) "Computer generated data" means any evidence, prepared in anticipation of litigation or for trial, that is stored electronically or is generated from information that is stored electronically, other than computer generated demonstrative evidence, a computer simulation, or electronically imaged documentary evidence. Computer generated data may be used as substantive evidence or as a basis for opinion testimony of an expert in accordance with Rule 5-703.

(B) "Computer generated demonstrative evidence" means a computer generated audio, visual, or other sensory aid, including a computer generated depiction or animation of an event or thing, that is used to assist a witness by illustrating the witness' testimony and is not used as substantive evidence.

(C) "Computer simulation" means a mathematical program or model that, when provided with a set of assumptions and parameters, will formulate a conclusion. A computer simulation may be used as substantive evidence or as a basis for opinion testimony of an expert in accordance with Rule 5-703.

Committee note: A conclusion formulated by a computer simulation may be in numeric, graphic, or some other form.

(D) "Electronically imaged documentary evidence" means the image of any document that has been electronically imaged for purposes of presentation at trial, other than computer generated data, computer generated demonstrative evidence, or a computer simulation. Electronically imaged documentary evidence may be used as substantive evidence or as a basis for opinion testimony of an expert in accordance with Rule 4-703.

Cross reference: For the meaning of "document," see Rule 2-422(a).

Rules Committee, *supra* note 12, Meeting Minutes (Sept. 6, 1996). The Reporter's Note explained, in pertinent part:

The Subcommittee debated at length the issue of what CGE [computer generated evidence] should comprise. Under subsection (b)(3), CGE means "computer generated data, computer generated demonstrative evidence, a computer simulation, and electronically imaged documentary evidence," as those terms are defined in subsections (b)(3)(A), (B), (C), and (D), respectively. If a party intends to use any of the four types of CGE at trial, the notice requirement of subsection (c)(1) and the evidence preservation requirements of section (f) are triggered. In order to trigger the
In an early draft of the model rule, computer-generated evidence embraced four subcategories that provided the definition for its reach: computer-generated data, computer-generated illustrations, computer-generated simulations, and electronically-imaged documentary evidence. It was broadly defined in order to accommodate future technological advances. But, because of this flexibility, the draft rule threatened to capture routine data that did not require the rule’s special treatment.

The greatest imprecision was found in the definition of "computer-generated data." This definition captured evidence that was "stored electronically or generated from information that is stored electronically." A routine audiotape is stored electronically. A word processing data file is stored electronically. An accountant’s spreadsheet is captured by the definition. Rather than attempt to filter out this kind of routine evidence by a description of the evidence itself, the Rules Committee first elected to screen evidence on the basis of its origin and intended use. In order to fall within the scope of this earlier draft of the rule, the electronically stored information would have had to have been prepared in anticipation of litigation and intended for use as substantive evidence at trial.

This approach had as its premise the fact that the model rule contemplates a process that is triggered by both notice and objection. The absence of an objection over non-controversial computer-generated data, the Rules Committee felt, would avoid the need for the pretrial hearing required by the rule. On the other hand, trial court

---

113. See Rules Committee, supra note 12, Meeting Minutes (Sept. 6, 1996), supra note 112, (containing draft of Rule 2-504.3(b)(3)(A)).

114. See Rules Committee, supra note 12, Meeting Minutes (Sept. 6, 1996), supra note 112, (containing draft of Rule 2-504.3(b)(3)(A)).

115. See Rules Committee, supra note 12, Meeting Minutes, (Sept. 6, 1996) (containing Reporter’s Note to draft of Rule 2-504.3: “The filing of an objection pursuant to subsection (c)(3)
judges, who observe the contentiousness of modern civil litigation on a daily basis, saw that the broad definition carried with it a risk of procedural sparring that unnecessarily complicated the pretrial process for non-controversial computer-generated data and outweighed any advantage flowing from the broader definition. In response to these objections, the Committee narrowed the rule.

Similarly, the category of "electronically imaged documentary evidence" was intended to embrace impressive new types of presentations, but could have been read to include photocopies. Consequently, the category was omitted.

1. Revised Definition

In the end, the drafters of the model rule chose to focus on computer animations and simulations. These are digitally created and manipulated images that convey the advocate's message with realism and persuasive power. It is that where the need for reliability is greatest and the trial process is best served by the rule's mandatory procedures.

Even the scaled back definition was not without controversy. Before it adopted the current text of the model rule, the Maryland Court of Appeals debated whether the definition should capture images created by digital cameras. The Court came to the conclusion that it should, but that the rule should make clear that its definition did not encompass photographs taken by a conventional camera, just because the camera's mechanisms were controlled by a computer.

This kind of analysis led to a rule containing a one-sentence definition, followed by a lengthy series of examples of evidence that do not triggers an obligation on the part of the court to make a pretrial determination of the authenticity and accuracy of the CGE in accordance with section (d).

116. See Letter from Hon. Dennis L. Sweeney, supra note 112.

117. See, e.g., United States v. Labovitz, No. CR 95-30011-MAP, 1996 WL 417113 *1 (D. Mass. July 24, 1996) (setting forth conditions applicable to government's conducting a "paperless trial"). Md. Rule 2-422(a), which was cross referenced in the Proposed Rule, defines "document" broadly, as including "writings, drawings, graphs, charts, photographs, recordings, and other data compilations from which information can be obtained, translated, if necessary ... through detection devices into reasonably usable form." Md. Rule 2-422(a).

118. See Md. Rule 2-504.3(a). Rule 2-504.3 was added on Feb. 10, 1998 by a Rules Order of the Court of Appeals of Maryland. See App. A.

119. See Md. Rule 2-504.3(a). Rule 2-504.3 was added on Feb. 10, 1998 by a Rules Order of the Court of Appeals of Maryland. See App. A.


121. See Audiotape of Hearing, supra note 111.
constitute computer-generated evidence, even though the process of creating this evidence may fall within the plain wording of the text of the definition. Routine business records, word processing documents, or spreadsheets are not "computer-generated evidence" merely because they were generated by a computer.122

V. PRESERVATION OF THE RECORD

Parties' and vendors' equipment may fast outstrip what the courts have.123 For that reason, the model rule provides that, as a condition of admissibility, the proponent of computer-generated evidence must preserve the evidence offered in a manner suitable for transmittal as a part of the record of appeal.124

First, the proponent is responsible for securing the equipment and personnel needed to capture that moment in time that is the product of the computer's work, which may be a fleeting image shown to the jury.125 As the Committee Note states, "Ordinarily, the use of standard VHS videotape or equivalent technology available to the general public at the time of the hearing or trial will suffice."

Next, the proponent must actually preserve the moment in time.127 Third, the proponent must give the media that records the moment in time to the clerk so that it can physically be made a part of the record.128 Finally, the proponent must make sure the appeals court has

122. See Md. Rule 2-504.3(a). Rule 2-504.3 was added on Feb. 10, 1998 by a Rules Order of the Court of Appeals of Maryland. See App. A.

123. See, e.g., Rules Committee, supra note 12, Meeting Minutes at 3-8 (Oct. 8, 1993). See also A.B.A. Section of Litigation, Civil Trial Practice Standards 23.b (Feb. 1998) ("The parties should be encouraged to agree on common courtroom hardware [for the presentation of evidence], consistent with their rights to confidentiality of, and exclusive access to, work product and privileged information.").

124. Md. Rule 2-504.3(b)(1)(B) & (f). Rule 2-504.3 was added on Feb. 10, 1998 by a Rules Order of the Court of Appeals of Maryland. See App. A.

125. Md. Rule 2-504.3(b)(1)(B) & (f). Rule 2-504.3 was added on Feb. 10, 1998 by a Rules Order of the Court of Appeals of Maryland. See App. A.

126. Md. Rule 2-504.3(b)(1)(B) & (f), Committee Note. Rule 2-504.3 was added on Feb. 10, 1998 by a Rules Order of the Court of Appeals of Maryland. See App. A.

127. See Md. Rule 2-504.3(b)(1)(B). Rule 2-504.3 was added on Feb. 10, 1998 by a Rules Order of the Court of Appeals of Maryland. See App. A.

128. See Md. Rule 2-504.3(b)(1)(B). Rule 2-504.3 was added on Feb. 10, 1998 by a Rules Order of the Court of Appeals of Maryland. See App. A. See also Cal. R. Ct. 503.5 ("Unless otherwise ordered by the trial judge, a party offering into evidence an electronic sound or sound-and-video recording shall tender to the court and to opposing parties a typewritten transcript of the electronic recording."); Ill. S. Ct. R. 608(a)(10) ("Physical and demonstrative evidence, other than photographs, which do not fit on a standard size record page shall not be included in the record on appeal unless ordered by a court upon motion of a party or upon the court's own motion"); Los
the technology and know-how to view the moment in time and, if necessary, comply with an appellate court request to present the computer-generated evidence to it.\textsuperscript{129} The drafters' belief was that, in response to the adoption of the model rule, the vendors of computer simulations and animations will include preservation as part of the package they market.\textsuperscript{130}

Sanctions are not addressed by the model rule. It is contemplated that the trial judge may prohibit use of the computer-generated evidence if the ability to preserve it is not shown.\textsuperscript{131} On appeal, the appellate court may order appropriate consequences.\textsuperscript{132}

VI. PRETRIAL NOTICE, OBJECTION, AND HEARINGS IN CIVIL PROCEEDINGS

The Rules Committee established a process that is triggered by both pretrial notice and objection to computer animations and simula-
tion. The absence of an objection to noncontroversial computer-generated material will avoid the need for the pretrial hearing required by the rule.

A. The Goal of Reliability

The pretrial consideration has as its mandatory focus the reliability of the computer-generated evidence. Borrowing its policy underpinning from case law that has developed a qualifying framework for scientific testimony, the model rule seeks to ensure that the machinery producing this powerfully persuasive evidence is itself reliable. "Reliability," though, is neither easily nor simply defined.

Questions concerning the reliability of computer-generated evidence arise for a number of reasons, including the reliability and integrity of the information keyed in or encoded into the computer, and the possibility of "computer error," whether mathematical, mechanical, or human.

Some of these pitfalls can be found in the following example. In the Dupont Plaza Hotel case, arising from a tragic fire in Puerto Rico that killed 97 people, the spread of the fire was recreated by the use of a fluid dynamics computer simulation. The simulation software required data input of various types in order to assume the conditions that existed at the site of the fire. Overall, 26,000 data points were collected. Once the data was collected, organized, and entered into the software, the fluid dynamics models used by the software calculated the intensification and spread of the fire from the point of ignition to the final conflagration. These conclusions were then brought to life by use of a computer animation that used different colors to depict temperature changes and an amoeba-like mass to show how the air at various temperatures moved throughout the building. In the actual case, the simulation showed that the client’s materials had not ignited until long after the fire had spread to the location of the fire victims.

133. See Md. Rule 2-504.3(b)-(d). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

134. See Md. Rule 2-504.3(d). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.


136. For example, the records could have been modified by an employee to be more helpful to the business or by a hacker to disrupt the business.

137. David Aden, Imagination Meets the World of Evidence, L. & TECHNOLOGY (on file with author McLain).
Assume, however, that a pretrial hearing uncovered the fact that the 26,000 data points varied in credibility from the measurements made by the fire investigator and the reports of chemical lab analysts to estimated distances sketched on a match book cover and best guesses as to what furniture had what material composition. The hearing also disclosed that some of the numerical data points had been accidentally inverted by the technicians, so that a distance of 21 feet was entered as 12 feet. Finally, the deposition of the programmer who created the fluid dynamics software disclosed errors in the program's algorithms.

Under the model rule, opposing counsel is given the opportunity to identify the flaws in the computer-generated evidence. If flaws are found, the court may either exclude the evidence altogether, excise the offending portions, or send the plaintiff back to the drawing board in an effort to correct the deficiencies. In the foregoing example, the data entry error is easily remedied. The potential inadmissibility of the underlying data, however, may prove to be an insurmountable obstacle at trial; and the flawed software probably would doom the evidence in its entirety.

B. Notice and Objection

The Court's pretrial consideration of computer-generated simulations or animations is triggered by a notice and objection procedure.

1. Notice Requirement

Any party intending to offer such computer-generated animations or simulations at trial in a court other than small claims court is required to give written notice to the court and the other parties in the case well in advance of trial. Written notice must be filed according

---

138. See Md. Rule 2-504.3(d). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.
139. See Md. Rule 2-504.3(e). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. App. A.
140. Small claims courts were excepted, due to the large volume of cases heard, the time constraints on trials, the absence of jury trials, and the restrictions on discovery. Although the cost of computer simulations and animations discourages their use in small claims cases, that situation may change as technology improves and the cost comes down. "Canned" animations might soon become available at a low cost.
141. Written notice under Md. Rule 2-504.3(b)(1)(A) includes a descriptive summary of the computer-generated evidence, its subject matter, and what it purports to prove or illustrate, as well as identification by Md. Rule 2-504.3(a)(1) or (2) of which kind of computer-generated evidence
to the scheduling order\textsuperscript{142} or, if there is no scheduling order, no later than 90 days before trial.\textsuperscript{143}

Disclosure is not required if the computer-generated material is to be used only for argument.\textsuperscript{144} This result was reached because of concerns as to attorney work product,\textsuperscript{145} and also due to the changing nature of any animation or depiction to be used in closing, depending on what evidence was admitted or excluded at trial and on tactical decisions. Whether computer graphics could be shown during opening statements\textsuperscript{146} or, although not having been admitted in evidence, during closing arguments, would be determined by the trial court in its discretion, under Uniform and Federal Rule of Evidence 611(a).

In an attempt to prevent sandbagging, disclosure is required, "whenever practicable" of computer-generated evidence that a party

\textsuperscript{142} See MD. RULE 2-504(b)(1)(C); see also MD. RULE 2-504.1(a)(2) (scheduling conference is required if an objection is made to computer-generated evidence, under 2-504.3(d)). Rule 2-504.3 was added and Rule 2-504 was amended on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

\textsuperscript{143} See MD. RULE 2-504.3(b)(1). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

\textsuperscript{144} See MD. RULE 2-504.3(b)(2). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

\textsuperscript{145} See, e.g., Joseph M. Howie, Jr. & Deborah Solomon Miller, \textit{Electronic Media Discovery: Hunting for Treasure}, TRIAL, Mar. 1994, at 54, 59-60 (citing In re IBM Peripherals EDP Devices Antitrust Litigation, MDL No. 163-RM (N.D. Cal. Feb. 10, 1975), which held that underlying data is discoverable; but trial support system is not). See generally Alan Aldous, \textit{Disclosure of Expert Computer Simulations}, 8 COMPUTER L.J. 51 (1987); Haley J. Fromholz, \textit{Discovery, Evidence, Confidentiality and Security Problems Associated with the Use of Computer-Based Litigation Support Systems}, 1977 WASH. U.L.Q. 445, 456, 458-59 (FED. R. CIV. P. 26(b)(3) provides protection for materials prepared in anticipation of litigation, rendering them discoverable "only upon a showing that the party seeking discovery has substantial need of the materials in the preparation of his case and that he is unable without undue hardship to obtain the substantial equivalent of the materials by other means." The rule also recognizes a second level of materials which contain the "mental impressions, conclusions, opinions, or legal theories of an attorney or other representative of a party concerning the litigation," and provides that "the court shall protect against disclosure . . . of such second level information." \textit{**} Rule 26(b)(3) "provides protection for materials prepared in anticipation of litigation or for trial by another party or by the party's representative, including his attorney, consultant, surety, indemnitor, insurer, or agent . . . if the index or program contains the mental impressions, theories, or opinions of the attorney, it will receive the more stringent, second level, protection provided by [the Rule] . . . Even if the full text system were prepared in anticipation of litigation, however, the moving party would still have to show that it had a substantial need for the information and that it could not, without substantial hardship, obtain the materials by other means.").

\textsuperscript{146} At least one judge requires that, if counsel intends to use computerized demonstrations during opening statement, counsel must provide copies four weeks before trial. \textit{See What Computers in Court: Technologically Sophisticated Court Exhibits Can Raise Some Interesting Evidentiary Issues, supra note 3.}
intends to use for impeachment or rebuttal. The court will decide whether disclosure would have been practicable. For example, if the computer-generated evidence becomes available only during trial, or if its relevance could not reasonably have been anticipated before trial, pretrial disclosure would seem to be impracticable. The Rule is intended, however, to prevent "ambush" under the guise of rebuttal.

2. Discovery

Once the notice is given, the opponent of the evidence is automatically entitled to take discovery on the computer-generated evidence. From this discovery, the opponent can decide whether to object to the evidence being offered and prepare for a pretrial hearing at which the Court will rule on the objection.

147. See Md. Rule 2-504.3(c). Within five days after service of the notice described in a., the proponent must make the computer-generated evidence available to all other parties. Id. Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

The appropriate kind of availability may differ, depending on the type of computer-generated evidence involved. For example, the proponent may need to permit another party to view the computer-generated evidence in the proponent's office. See generally Federal Judicial Center's Manual for Complex Litigation § 21.446 (3d ed. 1995) (regarding discovery of computerized data: "[I]nquiry into the accuracy of the underlying source materials, the procedures for storage and processing, and some testing of the reliability of the results obtained," should be conducted "well in advance of trial."). See generally Francis J. Burke, Jr. & Laurence J. DeRspino, From the War Room to the Court Room: The Discoverability of Computerized Information, 1993 A.B.A. Sec. Litig. 1 (on file with authors); Kenneth Shear, To Comply With Disclosure Rules, Electronic Data Must Be Accessible, N.Y. L.J., Oct. 18, 1994, at 5 (regarding structuring a plan for discovery of opponents' electronic data in federal civil cases).


In the issue of whether the work is the intellectual property of the expert, see Perma Research & Dev. v. Singer Co., 542 F.2d 111, 115 (2d Cir. 1976) (holding no error in admitting computer simulation, despite nondisclosure of programming information); Commonwealth v. Klinghofer, 564 A.2d 1240, 1240 (Pa. 1989) (semblé); Aldous, supra note 145, at 53-61 (noting, absent disclosure, expert should not be able to use in forming opinion to which expert will testify).

3. Objection

The opponent has 60 days to object. An objection that the computer-generated evidence cannot be authenticated under Uniform and Federal Rules of Evidence 901(b)(9) – that the process used did not render reliable results – must be made within the 60-day period or it is waived. Objections under 5-901(b)(9) would include, for example,

a. An attack on the reliability of scientific theories or principles underlying a computer simulation or animation offered as substantive evidence.

b. An attack on the accuracy of the result shown in the computer-generated evidence because of:
   i. Improper data input;
   ii. Mechanical error or failure; or
   iii. Inadequate security.

The proponent of the evidence then must present sufficient evidence to support a finding of:
   i. Reliability of the computer equipment used;

---

148. See Md. Rule 2-504.3(d). The Rule makes a cross-reference to Md. Rule 1-204 regarding shortening or extension of time periods, for cause shown. Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

149. Fed. R. Evid. 901 provides in pertinent part:
   (a) General Provision
   The requirement of authentication or identification as a condition precedent to admissibility is satisfied by evidence sufficient to support a finding that the matter in question is what its proponent claims.
   (b) Illustrations
   By way of illustration only, and not by way of limitation, the following are examples of authentication or identification conforming with the requirements of this Rule:
   ***
   (9) Process or System
   Evidence describing a process or system used to produce the proffered exhibit or testimony and showing that the process or system produces an accurate result.
   See Addison, supra note 26, at 1095; Bain & King, supra note 69, at 954-58. As to the reliability of computer programming, including use of tests to maintain accuracy of the hardware and software, see also, for example, Robert Simmons & J. Daniel Lounsbery, Admissibility of Computer-Animated Reenactments in Federal Courts, TRIAL, Sept. 1994, at 78, 80; Lynch & Brenson, supra note 69, at 920-23.

150. See Md. Rule 2-504.3(d). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

151. See, e.g., Livingston v. Isuzu Motors, Ltd., 910 F. Supp. 1473, 1494-95 (D. Mont. 1995) (holding computer simulation of accident, based on generally accepted physical laws and equations, was admissible); Joseph, supra note 9, at 332-34.

152. Joseph, Simplified, supra note 9, at 332-34.
ii. Reliability of the systems and application program(s) used, including the security of the system;

iii. Reliability of the input process, including the relevance and reliability of the underlying data, the integrity and completeness of the input data, and the accuracy of the input method;

iv. Reliability of the output, including the propriety of the request, the absence of transmission errors, and the security of the output. 153

It may be that in the case of widely available software, the court could judicially notice its general reliability.154

Because the question of sufficient evidence of authentication for admissibility is a Rule 104(b) question, that evidence is sufficient if it would support a finding of authentication by a reasonable jury.155 The Committee was of the view that a pretrial hearing need not, therefore, look into the credibility of the underlying information, for example, whether a witness who purported to have first-hand knowledge of an item under 901(b)(1), e.g., of a crashed plane’s black box, was telling

---

153. See, e.g., GRAHAM, STEIGMAN, BRANDT & IMWINKELREID, ILLINOIS EVIDENTIARY FOUNDATIONS 26-36 (Supp. 1996); Joseph, Simplified, supra note 9. Cf. proposal by the United Nations Commission on International Trade Law ("UNCITRAL") of seven statements to be given to a common law court to evaluate the reliability of computerized records:

Statement One should deal with the qualifications and experience of the person in charge of the computer system. . . . Statement Two should consist of a description of the computer system with reference to each of the components in the system by brand and model numbers. . . . Statement Three, a long statement, should deal with the quality of the individual components by reference to the development time involved in their creation. . . . Statement Four should deal with the testing and documentation standard applied to any custom written software. . . . Statement Five should deal with the procedures for logging updates to the software and the qualifications of the subordinate staff involved in the computer system. Statement Six should deal with the physical and electronic security features of the installation. Finally, Statement Seven should indicate how the particular computer printout came into existence and what it purports to show.


154. See Johnson, supra note 94, at 7 (proposing that courts take judicial notice of the reliability of packaged computer programs used by many customers, as well as of programs used "with accurate results over a long period of time"). Cf. FED. R. EVID. 201; UNIF. R. EVID. 201 (addressing judicial notice of adjudicative facts in case at hand, rather than of preliminary facts relevant to admissibility questions).

155. See, e.g., UNIF. R. EVID. 104(b); FED. R. EVID. 104(b); UNIF. R. EVID. 901(a); FED. R. EVID. 901(a); LYNN MCLAIN, MARYLAND EVIDENCE: STATE AND FEDERAL § 104.4 at 76 n.6, § 901.12 at nn.2-3 and accompanying text (West 1987 & Supp. 1995).
Assuming compliance with other rules of evidence, the item will be admitted, and the jury ultimately will decide whether it finds the item of evidence reliable.

Although the Rule does not address the question of computer-generated evidence that is offered as an admission by a party-opponent, common sense would seem to make clear the inappropriateness of the proponent’s proving the authenticity, under Rule 901(b)(9), of an opponent’s statement.

4. Other Objections Optional at that Time

Though not required, other objections — such as under Uniform Rule of Evidence 401, relevance, or Uniform Rule of Evidence 403, that the evidence’s probative value is substantially outweighed by the risks of unfair prejudice, confusion of the jury, or undue consumption of trial time — may be raised by the model rule’s pretrial objection procedure. If an optional objection is made at this time, an outrageously prejudicial computer animation need not await a mid-trial relevancy ruling. The objection contemplated by section (d) of the model rule may be employed as a means of focusing the court’s attention on issues of admissibility that can prevent faulty computer-generated evidence from ever being introduced. This pretrial consideration, however, is not designed to mandate pretrial rulings in typical fact disputes over the truth of the underlying evidence.

C. The Role of the Court

Once an objection is filed, the court must hold a hearing to rule on the objection. For all but the most routine issues, the hearing probably will be an evidentiary hearing. In that event, the model rule gives the trial court the resources to satisfy itself that the proposed computer-generated evidence is reliable. If the opponent is unable to afford the scientific experts to rigorously examine the computer-

---

156. See Rules Committee, supra note 12, Meeting Minutes at 28-29 (Jan. 3, 1997).
158. See Borough v. Duluth, Missabe & Iron Range R.R. Co., 762 F.2d 66, 70 (8th Cir. 1985) (upholding exclusion on ground that evidence was cumulative).
159. MD. RULE 2-504.3(d). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.
160. See MD. RULE 2-504.3(e). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.
161. See MD. RULE 2-504.3 (e). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.
generated evidence, the court may hire its own experts and assess the
cost to the party most able to pay.\textsuperscript{162}

The model rule enables the court to make this pretrial consideration
more than an all-or-nothing proposition. If the court finds some of
the offered material cannot be admitted into evidence, the court has the
power to order the modification or removal of the offending portions,
leaving the remaining portions available for use at trial.\textsuperscript{163}

Like other portions of a pretrial order, the court’s ruling controls
the subsequent course of the action. A finding that the evidence is
authentic under Rule 901(b)(9) means that part of the foundation proof
need not be repeated at trial, unless the proponent wants to revisit
some of the testimony for persuasive purposes. Likewise, the oppo­
nent is not required to restate any objection that was resolved pretrial.
The record of the objection for appeal purposes has been made during
the pretrial hearing.\textsuperscript{164} Common sense seems to dictate, however, that
an objection that the underlying data of computer-generated evidence
were not supported by the evidence at trial, should be made at trial.\textsuperscript{165}

If the evidence is excluded pretrial, the trial proceeds without
considering it, but the proponent has made its record for appeal.\textsuperscript{166}

\textbf{D. Possibility of Proponent’s Motion In Limine}

The model rule is not intended to preclude the proponent of com­
puter-generated evidence from filing a motion \textit{in limine} seeking pretrial
approval, as far as practicable, of computer-generated evidence it in­
tends to offer.\textsuperscript{167}

\begin{itemize}
\item \textsuperscript{162} See Md. Rule 2-504.3 (e). Rule 2-504.3 was added on February 10, 1998 by a Rules
Order of the Maryland Court of Appeals. \textit{See} App. A. Often it will be the proponent of the evidence who pays for the court appointed expert. Sometimes, however, a successful plaintiff could end up paying for the expertise it could not afford before trial.
\item \textsuperscript{163} See Md. Rule 2-504.3(e). Rule 2-504.3 was added on February 10, 1998 by a Rules
Order of the Maryland Court of Appeals. \textit{See} App. A.
\item \textsuperscript{164} See Md. Rule 2-504.3(e). Rule 2-504.3 was added on February 10, 1998 by a Rules
Order of the Maryland Court of Appeals. \textit{See} App. A.
\item \textsuperscript{165} Cf. Guillory \textit{v. Domtar Indus., Inc.}, 95 F.3d 1320, 1329-32 (5th Cir. 1996) (holding
district court did not abuse its discretion when, despite having denied plaintiff’s pretrial motion \textit{in limine}, at trial the court excluded a videotape prepared by the product liability defendant-manufacturer’s expert, as the videotape’s factual premises were insufficiently supported by evidence at trial).
\item \textsuperscript{166} See Md. Rule 2-504.3(e). Rule 2-504.3 was amended on February 10, 1998 by a Rules
Order of the Maryland Court of Appeals. \textit{See} App. A.
\item \textsuperscript{167} Rules Committee, supra note 12, Meeting Minutes (Nov. 15, 1996). \textit{See}, \textit{e}g., Byrd \textit{v.
Guess}, 137 F.3d 1126, 1134 (9th Cir. 1998), \textit{petition for cert. filed,} 67 U.S.L.W. 3149 (U.S. Aug.
7, 1998) (No. 98-260) (affirming admission of police officers’ computer animation of shooting,
VII. DISPARATE RESOURCES

In the event that an opponent cannot afford to employ a necessary expert, or if the court itself needs expert assistance, the proposed rule provides that the court may appoint experts. The court may use its discretion in allocating these costs, so that in the event of vastly disparate resources, the wealthier party may, in effect, pay for its opponent’s expert.

VIII. CRIMINAL PROCEEDINGS

For several reasons, the model rules that generally require pretrial disclosure, objection, and hearing do not apply to criminal cases. First, the defendant’s constitutional right to a speedy trial imposes strict time limitations in criminal cases. Second, discovery in criminal proceedings is not as great as in civil proceedings. Finally, the drafters were concerned about possible constitutional issues regarding mandating disclosure from an accused.

Upon the request of the defendant, however, the State’s Attorney shall produce the consulted experts’ written reports or statements, including the results of any computer simulation or animation. Upon the trial court granted officers’ motion in limine to admit it, subject to the court’s order to remove facial expressions and to not be unduly prejudicial. See generally Thomas M. Goutman & Robert Toland, III, The In Limine Process: Lessons from In Re Paoli Railroad Yard PCB Litigation, 1996 A.B.A. Sec. Trial Evid. 2-7.

168. See MD. RULE 2-504.3(e). Rule 2-504.3 was added on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.


170. See MD. RULE 4-263, Reporter’s Note. Rule 4-263 was amended on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

171. See generally, e.g., Nancy Nowlin Kerr, Constitutional Law “Speedy Trial” Sixth Amendment Right to Speedy Trial Does Not Apply During Interim Between Dismissal of Charges and Subsequent Indictment by Same Sovereign, 14 ST. MARY’S L.J. 113 (1982).


173. See id. § 20.4.

174. See MD. RULE 4-263(b)(4). Rule 4-263 was amended on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.
the request of the State, the defendant must produce written reports, including the results of any computer simulation or animation, by the experts whom the defendant intends to call as a witness.\textsuperscript{175} The rule imposes a duty on the proffering party. A party that seeks to proffer or use the animation or simulation at any criminal pretrial proceeding or trial must preserve the computer-generated evidence and furnish it to the clerk in a manner suitable for transmittal as a part of the record on appeal.\textsuperscript{176}

IX. CONCLUSION

Often, weeks of intense study are needed by the opponent of computer simulations or animations in order to examine the computer software, the underlying data, and the data entry process. The fundamental issues affecting the admissibility of computer-generated simulations and animations should not be confronted for the first time at trial. The proposed model rules, adopted by the Maryland Court of Appeals, push the process upstream to a pretrial notice, objection, and hearing procedure in which a civil court is given both the resources and flexibility to ensure that a product ultimately admitted into evidence is reliable. In criminal cases, discovery provisions are applied to computer simulations and animations. In both civil and criminal proceedings, the proponent of computer simulations, animations, or digital photographs, must undertake to preserve the record for appeal.

It is hoped that the model rules will provide a basis for experimentation with regard to these issues posed by computer-generated evidence.\textsuperscript{177}

\textsuperscript{175} See Md. Rule 4-263(d)(2). Rule 4-263 was amended on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

\textsuperscript{176} See Md. Rule 4-322(b). Rule 4-322 was amended on February 10, 1998 by a Rules Order of the Maryland Court of Appeals. See App. A.

\textsuperscript{177} Rules Committee, supra note 12, Meeting Minutes at 29, 35 (Nov. 15, 1996).
APPENDIX A
IN THE COURT OF APPEALS OF MARYLAND
RULES ORDER

This Court's Standing Committee on Rules of Practice and Procedure having submitted its One Hundred Thirty-Sixth Report to the Court recommending adoption of proposed new Rule 2-504.3 and other proposed rules changes as set forth in that Report published in the Maryland Register, Vol. 24, Issue 6, pages 471-478 (March 14, 1997); and

This Court by Rules Order dated June 10, 1997, and published in the Maryland Register, Vol. 24, Issue 14, pages 1010-1011 (July 3, 1997), having adopted certain amendments to Rules 2-504, 2-504.1, 2-532, 11-501, and 16-607 and Form No. 2 of the Form Interrogatories in the Appendix of Forms and having recommitted to the Rules Committee for further study proposed new Rule 2-504.3, the proposed amendments to Rules 4-263 and 4-322, and the proposed additional amendments to Rules 2-504 and 2-504.1; and

The Rules Committee having submitted to the Court a Supplement to the One Hundred Thirty-Sixth Report containing revisions to the proposed rules changes recommitted to it and recommending adoption of the proposed rules changes as revised, as set forth in that Supplement published in the Maryland Register, Vol. 24, Issue 23, pages 1603-1607 (November 7, 1997);

This Court having considered at an open meeting, notice of which was posted as prescribed by law, all those proposed rules changes, together with comments received, it is this 10th day of February, 1998,

ORDERED, by the Court of Appeals of Maryland, that new Rule 2-504.3 be, and it is hereby, adopted in the form attached to this Order; and it is further

ORDERED that amendments to Rules 2-504, 2-504.1, 4-263, and 4-322, be, and they are hereby, adopted in the form attached to this Order; and it is further

ORDERED that the rules changes hereby adopted by this Court shall govern the courts of this State and all parties and their attorneys in all actions and proceedings, and shall take effect and apply to all actions commenced on or after July 1, 1998, and insofar as practicable, to all actions then pending; and it is further

ORDERED that a copy of this Order be published in the next issue of the Maryland Register.
Court of Appeals of Maryland

Chasanow, J., dissenting:

Rule 2-504.3 is an unnecessary and unduly complicated pretrial notice rule that creates special hazards for the party offering even the most benign form of computer-generated evidence. The rule also fails to deal with difficult issues involving admissibility of computer-generated evidence. The admissibility of computer-generated evidence is the area where trial judges need the most guidance. Existing pretrial discovery rules are adequate to deal with all forms of evidence including computer-generated evidence.

The rule also assumes computer-generated evidence can easily be divided into categories. This assumption may prove false since many forms of computer-generated evidence such as digital camera photographs are not easily categorized and there seems to be no discretion in the trial judge to excuse mistakes in giving notice based on mistakes in categorizing the computer-generated evidence.

Perhaps the most worthwhile portion of the rule is the reminder to judges and attorneys that they must preserve computer-generated exhibits for appeal. This, however, does not alone justify the rule. I respectfully dissent from the adoption of this rule.

Judge Cathell joins in the dissent.
ADD new Rule 2-504.3, as follows:

**Rule 2-504.3. COMPUTER-GENERATED EVIDENCE**

(a) Definition — Computer-Generated Evidence

"Computer-generated evidence" means (1) a computer-generated aural, visual, or other sensory depiction of an event or thing and (2) a conclusion in aural, visual, or other sensory form formulated by a computer program or model. The term does not encompass photographs merely because they were taken by a camera that contains a computer; documents merely because they were generated on a word or text processor; business, personal, or other records or documents admissible under Rule 5-803 (b) merely because they were generated by computer; or summary evidence admissible under Rule 5-1006, spreadsheets, or other documents merely presenting or graphically depicting data taken directly from business, public, or other records admissible under Rules 5-802.1 through 5-804.

(b) Notice

(1) Except as provided in subsection (b)(2) of this Rule, any party who intends to use computer-generated evidence at trial for any purpose shall file a written notice within the time provided in the scheduling order or no later than 90 days before trial if there is no scheduling order that:

(A) contains a descriptive summary of the computer-generated evidence the party intends to use, including (i) a statement as to whether the computer-generated evidence intended to be used is in the category described in subsection (a)(1) or subsection (a)(2) of this Rule, (ii) a description of the subject matter of the computer-generated evidence, and (iii) a statement of what the computer-generated evidence purports to prove or illustrate; and

(B) is accompanied by a written undertaking that the party will take all steps necessary to (i) make available any equipment or other facility needed to present the evidence in court, (ii) preserve the computer-generated evidence and furnish it to the clerk in a manner suitable for transmittal as a part of the record on appeal, and (iii) comply
with any request by an appellate court for presentation of the computer-generated evidence to that court.

(2) Any party who intends to use computer-generated evidence at trial for purposes of impeachment or rebuttal shall file, as soon as practicable, the notice required by subsection (b)(1) of this Rule, except that the notice is not required if computer-generated evidence prepared by or on behalf of a party-opponent will be used by a party only for impeachment of other evidence introduced by that party-opponent. In addition, the notice is not required if computer-generated evidence prepared by or on behalf of a party-opponent will be used only as a statement by a party-opponent admissible under Rule 5-803 (a).

(c) Required Disclosure; Additional Discovery

Within five days after service of a notice under section (b) of this Rule, the proponent shall make the computer-generated evidence available to any party. Notwithstanding any provision of the scheduling order to the contrary, the filing of a notice of intention to use computer-generated evidence entitles any other party to a reasonable period of time to discover any relevant information needed to oppose the use of the computer-generated evidence before the court holds the hearing provided for in section (e) of this Rule.

(d) Objection

Not later than 60 days after service of a notice under section (b) of this Rule, a party may file any then-available objection that the party has to the use at trial of the computer-generated evidence and shall file any objection that is based upon an assertion that the computer-generated evidence does not meet the requirements of Rule 5-901 (b)(9). An objection based on the alleged failure to meet the requirements of Rule 5-901 (b)(9) is waived if not so filed, unless the court for good cause orders otherwise.

(e) Hearing and Order

If an objection is filed under section (d) of this Rule, the court shall hold a pretrial hearing on the objection. If the hearing is an evidentiary hearing, the court may appoint an expert to assist the court in ruling on the objection and may assess against one or more parties the reasonable fees and expenses of the expert. In ruling on the objection, the court may require modification of the computer-generated evidence and may impose conditions relating to its use at trial. The court’s ruling on the objection shall control the subsequent course of the action.
If the court rules that the computer-generated evidence may be used at trial, when it is used, (1) any party may, but need not, present any admissible evidence that was presented at the hearing on the objection, and (2) the party objecting to the evidence is not required to re-state an objection made in writing or at the hearing in order to preserve that objection for appeal. If the court excludes or restricts the use of computer-generated evidence, the proponent need not make a subsequent offer of proof in order to preserve that ruling for appeal.

(f) Preservation of Computer-Generated Evidence

The party offering computer-generated evidence at any proceeding shall preserve the computer-generated evidence, furnish it to the clerk in a manner suitable for transmittal as a part of the record on appeal, and present the computer-generated evidence to an appellate court if the court so requests.

Committee note: This section requires the proponent of computer-generated evidence to reduce the computer-generated evidence to a medium that allows review on appeal. The medium used will depend upon the nature of the computer-generated evidence and the technology available for preservation of that computer-generated evidence. No special arrangements are needed for preservation of computer-generated evidence that is presented on paper or through spoken words. Ordinarily, the use of standard VHS videotape or equivalent technology that is in common use by the general public at the time of the hearing or trial will suffice for preservation of other computer-generated evidence. However, when the computer-generated evidence involves the creation of a three-dimensional image or is perceived through a sense other than sight or hearing, the proponent of the computer-generated evidence must make other arrangements for preservation of the computer-generated evidence and any subsequent presentation of it that may be required by an appellate court.

Cross reference: For the shortening or extension of time periods set forth in this Rule, see Rule 1-204.

Source: This Rule is new.
AMEND Rule 2-504 to add a certain provision concerning computer-generated evidence to the required contents of a scheduling order, as follows:

Rule 2-504. SCHEDULING ORDER

...  
(b) Contents of Scheduling Order

(1) Required

A scheduling order shall contain:

(A) an assignment of the action to an appropriate scheduling category of a differentiated case management system established pursuant to Rule 16-202;

(B) one or more dates by which each party shall identify each person whom the party expects to call as an expert witness at trial, including all information specified in Rule 2-402(e)(1)(A);

(C) one or more dates by which each party shall file the notice required by Rule 2-504.3(b) concerning computer-generated evidence:

   (i) a date by which all discovery must be completed;

   (ii) a date by which all dispositive motions must be filed; and

   (iii) any other matter resolved at a scheduling conference held pursuant to Rule 2-504.1.
MARYLAND RULES OF PROCEDURE
TITLE 2 — CIVIL PROCEDURE — CIRCUIT COURT
CHAPTER 500 — TRIAL

AMEND Rule 2-504.1 to require a scheduling conference in any action in which an objection to the use of computer-generated evidence is filed under Rule 2-504.3 (d), as follows:

Rule 2-504.1. SCHEDULING CONFERENCE

(a) When Required

The court shall issue an order requiring the parties to attend a scheduling conference:

(1) in any action placed or likely to be placed in a scheduling category for which the case management plan adopted pursuant to Rule 16-202 b requires a scheduling conference; or

(2) in any action in which an objection to computer-generated evidence is filed under Rule 2-504.3 (d); or

(2) (3) in any action, upon request of a party stating that, despite a good faith effort, the parties have been unable to reach an agreement (i) on a plan for the scheduling and completion of discovery, (ii) on the proposal of any party to pursue an available and appropriate form of alternative dispute resolution, or (iii) on any other matter eligible for inclusion in a scheduling order under Rule 2-504.

...
AMEND Rule 4-263 to add certain disclosure requirements concerning computer-generated evidence, as follows:

Rule 4-263. DISCOVERY IN CIRCUIT COURT
Discovery and inspection in circuit court shall be as follows:

... (b) Disclosure Upon Request
Upon request of the defendant, the State's Attorney shall:

... (5) Evidence for Use at Trial
Produce and permit the defendant to inspect, copy, and photograph any documents, computer-generated evidence as defined in Rule 2-504.3 (a), recordings, photographs, or other tangible things that the State intends to use at the hearing or trial;

... (d) Discovery by the State
Upon the request of the State, the defendant shall:

... (4) Computer-generated Evidence
Produce and permit the State to inspect and copy any computer-generated evidence as defined in Rule 2-504.3 (a) that the defendant intends to use at the hearing or trial.

... Source: This Rule is derived as follows:
Section (a) is derived from former Rule 741 (a)(1) and (2).
Section (b) is derived from former Rule 741 (b).
Section (c) is derived from former Rule 741 (c).
Section (d) is derived in part from former Rule 741 (d) and is in part new.
AMEND Rule 4-322 to add certain provisions concerning the preservation of computer-generated evidence, as follows:

Rule 4-322. EXHIBITS

(a) Generally

All exhibits marked for identification, whether or not offered in evidence and, if offered, whether or not admitted, shall form part of the record and, unless the court orders otherwise, shall remain in the custody of the clerk. With leave of court, a party may substitute a photograph or copy of any exhibit.


(b) Preservation of Computer-Generated Evidence

The party offering computer-generated evidence at any proceeding shall preserve the computer-generated evidence, furnish it to the clerk in a manner suitable for transmittal as a part of the record on appeal, and present the computer-generated evidence to an appellate court if the court so requests.

Cross reference: For the definition of “computer-generated evidence,” see Rule 2-504.3.

Committee note: This section requires the proponent of computer-generated evidence to reduce the computer-generated evidence to a medium that allows review on appeal. The medium used will depend upon the nature of the computer-generated evidence and the technology available for preservation of that computer-generated evidence. No special arrangements are needed for preservation of computer-generated evidence that is presented on paper or through spoken words. Ordinarily, the use of standard VHS videotape or equivalent technology that is in common use by the general public at the time of the hearing or trial will suffice for preservation of other computer-generated evidence. However, when the computer-generated evidence involves the creation of a three-dimensional image or is perceived through a sense other than sight or hearing, the proponent of the computer-generated evidence must make other arrangements for preservation.
tion of the computer-generated evidence and any subsequent presenta-
tion of it that may be required by an appellate court.

Source: This Rule is new.
APPENDIX B
MODEL RULES
COMPUTER-GENERATED EVIDENCE
(Civil Procedure)

Add New rule XXX to Civil Procedure Rules applicable in trial courts of general jurisdiction:

Rule XXX. COMPUTER-GENERATED EVIDENCE

(a) Definition – Computer-Generated Evidence

“Computer-generated evidence” means (1) a computer-generated aural, visual, or other sensory depiction of an event or thing and (2) a conclusion in aural, pictorial, or other sensory form formulated by a computer program or model. The term does not encompass documents merely because they were generated on a word or text processor; business, personal, or other records or documents admissible under Fed. R. Evid. 801(d)(2), 803, or 804 merely because they were generated by computer; or summary evidence admissible under Fed. R. Evid. 1006, spread sheets, or other documents merely presenting or graphically depicting data taken directly from business, public, or other records admissible under Fed. R. Evid. 801(d), 803, 804, or 807.

(b) Notice

(1) Except as provided in subsection (b)(2) of this Rule, any party who intends to use computer-generated evidence at trial for any purpose shall file a written notice within the time provided in the schedu-

---

1. For ease of reference, all citations are to the Federal Rules of Evidence. The applicable comparable rule of the jurisdiction should be substituted for the federal rule.
2. Rule 801(d)(2) is added (a change from the Maryland Rule), because statements of party-opponents may be computer-generated.
3. Rule 804 is added by the authors (a change from the Maryland Rule) because evidence falling within some of these exceptions, such as statements against interest or family records, may be documentary.
4. Rule 801(d)(1) embraces certain prior statements of a witness who testifies at trial and is subject to cross-examination.
5. Rule 807 is added (a change from the Maryland Rule) because it is the new rule, to which prior Fed. R. Evid. 803(24) and 804(b)(5), the residual hearsay exceptions, have been moved.
ing order or no later than 90 days before trial if there is no scheduling order that:

(A) contains a descriptive summary of the computer-generated evidence the party intends to use, including (i) a statement as to whether the computer-generated evidence intended to be used is in the category described in subsection (a)(1) or subsection (a)(2) of this Rule, (ii) a description of the subject matter of the computer-generated evidence, and (iii) a statement of what the computer-generated evidence purports to prove or illustrate; and

(B) is accompanied by a written undertaking that the party will take all steps necessary to (i) make available any equipment or other facility needed to present the evidence in court, (ii) preserve the computer-generated evidence and furnish it to the clerk in a manner suitable for transmittal as a part of the record on appeal, and (iii) comply with any request by an appellate court for presentation of the computer-generated evidence to that court.

(2) Any party who intends to use computer-generated evidence at trial for purposes of impeachment or rebuttal shall file, whenever practicable, the notice required by subsection (b)(1) of this Rule, except that the notice is not required if computer-generated evidence prepared by or on behalf of a party-opponent will be used only for impeachment of evidence introduced by that party-opponent. In addition, the notice is not required if computer-generated evidence prepared by or on behalf of a party-opponent will be used only as a statement by a party-opponent admissible under Fed. R. Evid. 801(d)(2).

(c) Required Disclosure; Additional Discovery

Within five days after service of a notice under section (b) of this Rule, the proponent shall make the computer-generated evidence available to any party. Notwithstanding any provision of the scheduling order to the contrary, the filing of a notice of intention to use computer-generated evidence entitles any other party to a reasonable period of time to discover any relevant information needed to oppose the use of the computer-generated evidence before the court holds the hearing provided for in section (e) of this Rule.

6. See the conforming amendment to (Civil) Rule ___ Scheduling Order. If scheduling orders are not automatically entered at the outset of civil litigation, the jurisdiction may wish to use a time requirement of "no later than 90 days before trial" in subsection (b)(2) of Model Rule XXX.
(d) Objection
Not later than 60 days after service of a notice under section (b) of this Rule, a party may file any then-available objection that the party has to the use at trial of the computer-generated evidence and shall file any objection that is based upon an assertion that the computer-generated evidence does not meet the requirements of Fed. R. Evid. 901(b)(9). An objection based on the alleged failure to meet the requirements of Fed. R. Evid. 901(b)(9) is waived if not so filed, unless the court for good cause orders otherwise.

(e) Hearing and Order
If an objection is filed under section (d) of this Rule, the court shall hold a pretrial hearing on the objection. If the hearing is an evidentiary hearing, the court may appoint an expert to assist the court in ruling on the objection and may assess against one or more parties the reasonable fees and expenses of the expert. In ruling on the objection, the court may require modification of the computer-generated evidence and may impose conditions relating to its use at trial. The court's ruling on the objection shall control the subsequent course of the action. If the court rules that the computer-generated evidence may be used at trial, when it is used, (1) any party may, but need not, present any admissible evidence that was presented at the hearing on the objection, and (2) the party objecting to the evidence is not required to re-state an objection made in writing or at the hearing in order to preserve that objection for appeal. If the court excludes or restricts the use of computer-generated evidence, the proponent need not make a subsequent offer of proof in order to preserve that ruling for appeal.

(f) Preservation of Computer-Generated Evidence
The party offering computer-generated evidence at any proceeding shall preserve the computer-generated evidence, furnish it to the clerk in a manner suitable for transmittal as a part of the record on appeal, and present the computer-generated evidence to an appellate court if the court so requests.

Committee note: This section requires the proponent of computer-generated evidence to reduce the computer-generated evidence to a medium that allows review on appeal. The medium used will depend upon the nature of the computer-generated evidence and the technology

---

7. See the conforming amendment to (Civil) Rule ___, Scheduling Conference.
available for preservation of that computer-generated evidence. No special arrangements are needed for preservation of computer-generated evidence that is presented on paper or through spoken words. Ordinarily, the use of standard VHS videotape or equivalent technology that is in common use by the general public at the time of the hearing or trial will suffice for preservation of other computer-generated evidence. However, when the computer-generated evidence involves the creation of a three-dimensional image or is perceived through a sense other than sight or hearing, the proponent of the computer-generated evidence must make other arrangements for preservation of the computer-generated evidence and any subsequent presentation of it that may be required by an appellate court.

Cross reference: For the shortening or extension of time periods set forth in this Rule, see Rule [insert applicable rule of the jurisdiction].
MODEL RULES
COMPUTER-GENERATED EVIDENCE
(Civil Procedure)

ADD to Civil Procedure Rules applicable in trial courts of general jurisdiction:

(Civil) Rule ____. SCHEDULING ORDER

... A scheduling order shall contain one or more dates by which each party shall file the notice required by Rule XXX (b) concerning computer-generated evidence. ...
ADD to Civil Procedure Rules applicable in trial courts of general jurisdiction:

(Civil) Rule ___. SCHEDULING CONFERENCE

The court shall issue an order requiring the parties to attend a scheduling conference in any action in which an objection to computer-generated evidence is filed under Rule XXX (d).

...
MODEL RULES
COMPUTER-GENERATED EVIDENCE
(Criminal Causes)

ADD to Criminal Procedure pre-trial discovery rules applicable in trial courts with jurisdiction in felony cases:

(Criminal) Rule ___. DISCOVERY

... Upon the request of the defendant, the State’s Attorney shall produce and permit the defendant to inspect and copy any computer-generated evidence as defined in Rule XXX (a) that the State intends to use at the hearing or trial.

... Upon the request of the State, the defendant shall produce and permit the State to inspect and copy any computer-generated evidence as defined in Rule XXX (a) that the defendant intends to use at the hearing or trial.

...
MODEL RULES
COMPUTER-GENERATED EVIDENCE
(Criminal Causes)

ADD to Criminal Procedure pre-trial discovery rules applicable in trial courts with jurisdiction in felony cases:

(Criminal) Rule ___. PRESERVATION OF COMPUTER-GENERATED EVIDENCE

The party offering computer-generated evidence at any proceeding shall preserve the computer-generated evidence, furnish it to the clerk in a manner suitable for transmittal as a part of the record on appeal, and present the computer-generated evidence to an appellate court if the court so requests.

Cross reference: For the definition of “computer-generated evidence,” see Rule XXX.

Committee note: This section requires the proponent of computer-generated evidence to reduce the computer-generated evidence to a medium that allows review on appeal. The medium used will depend upon the nature of the computer-generated evidence and the technology available for preservation of that computer-generated evidence. No special arrangements are needed for preservation of computer-generated evidence that is presented on paper or through spoken words. Ordinarily, the use of standard VHS videotape or equivalent technology that is in common use by the general public at the time of the hearing or trial will suffice for preservation of other computer-generated evidence. However, when the computer-generated evidence involves the creation of a three-dimensional image or is perceived through a sense other than sight or hearing, the proponent of the computer-generated evidence must make other arrangements for preservation of the computer-generated evidence and any subsequent presentation of it that may be required by an appellate court.
APPENDIX C

England’s Civil Evidence Act, 1968, ch. 64, § 5.

Admissibility of statements produced by computers.

5. (1) In any civil proceedings a statement contained in a document produced by a computer shall, subject to rules of court, be admissible as evidence of any fact stated therein of which direct oral evidence would be admissible, if it is shown that the conditions mentioned in subsection (2) below are satisfied in relation to the statement and computer in question.

(2) The said conditions are —

(a) that the document containing the statement was produced by the computer during a period over which the computer was used regularly to store or process information for the purposes of any activities regularly carried on over that period, whether for profit or not, by any body, whether corporate or not, or by any individual;

(b) that over that period there was regularly supplied to the computer in the ordinary course of those activities information of the kind contained in the statement or of the kind from which the information so contained is derived;

(c) that throughout the material part of that period the computer was operating properly or, if not, that any respect in which it was not operating properly or was out of operation during that part of that period was not such as to affect the production of the document or the accuracy of its contents; and

(d) that the information contained in the statement reproduces or is derived from information supplied to the computer in the ordinary course of those activities.

(3) Where over a period the function of storing or processing information for the purposes of any activities regularly carried on over that period is mentioned in subsection (2)(a) above was regularly performed by computers, whether —

(a) by a combination of computers operating over that period; or

(b) by different computers operating in succession over that period; or
(c) by different combinations of computers operating in succession over that period; or

(d) in any other manner involving the successive operation over that period in whatever order, of one or more computers and one or more combinations of computers, all the computers used for that purpose during that period shall be treated for the purposes of this Part of this Act as constituting a single computer; and references in this Part of this Act to a computer shall be construed accordingly.

(4) In any civil proceedings where it is desired to give a statement in evidence by virtue of this section, a certificate doing any of the following things, that is to say —

(a) identifying the document containing the statement and describing the manner in which it was produced;

(b) giving such particulars of any device involved in the production of that document as may be appropriate for the purpose of showing that the document was produced by a computer;

(c) dealing with any of the matters to which the conditions mentioned in subsection (2) above relate, and purporting to be signed by a person occupying a responsible position in relation to the operation of the relevant device or the management of the relevant activities (whichever is appropriate) shall be evidence of any matter stated in the certificate; and for the purposes of this subsection it shall be sufficient for a matter to be stated to the best of the knowledge and belief of the person stating it.

(5) For the purposes of this Part of this Act —

(a) information shall be taken to be supplied to a computer if it is supplied thereto in any appropriate form and whether it is so supplied directly or (with or without human intervention) by means of any appropriate equipment;

(b) where, in the course of activities carried on by any individual or body, information is supplied with a view to its being stored or processed for the purposes of those activities by a computer operated otherwise than in the course of those activities, that information, if duly supplied to that computer, shall be taken to be supplied to it in the course of those activities;

(c) a document shall be taken to have been produced by a computer whether it was produced by it directly or (with or without human intervention) by means of any appropriate equipment.
(6) Subject to subsection (3) above, in this Part of this Act, "computer" means any device for storing and processing information, and any reference to information being derived from other information is a reference to its being derived therefrom by calculation, comparison or any other process.
The United Kingdom’s POLICE AND CRIMINAL EVIDENCE ACT 1984 § 69

69 Evidence from computer records

(1) In any proceedings, a statement in a document produced by a computer shall be admissible as evidence of any fact stated therein unless it is shown —

(a) that there are no reasonable grounds for believing that the statement is inaccurate because of improper use of the computer;

(b) that at all material times the computer was operating properly, or if not, that any respect in which it was not operating properly or was out of operation was not such as to affect the production of the document or the accuracy of its contents; and

(c) that any relevant conditions specified in rules of court under subsection (2) below are satisfied.

(2) Provision may be made by rules of court requiring that in any proceedings where it is desired to give a statement in evidence by virtue of this section such information concerning the statement as may be required by the rules shall be provided in such form and at such time as may be so required.
South Australia Evidence Act, Part VIA, § 59b

59b.

(1) Subject to this section, computer output shall be admissible as evidence in any civil proceedings.

(2) The court must be satisfied —
   (a) that the computer is correctly programmed and regularly used to produce output of the same kind as that tendered in evidence pursuant to this section;
   (b) that the data from which the output is produced by the computer is systematically prepared upon the basis of information that would normally be acceptable in a court of law as evidence of the statements or representations contained in or constituted by the output;
   (c) that, in the case of the output tendered in evidence, there is, upon the evidence before the court, no reasonable cause to suspect any departure from the system, or any error in the preparation of the data;
   (d) that the computer has not, during a period extending from the time of the introduction of the data to that of the production of the output, been subject to a malfunction that might reasonably be expected to affect the accuracy of the output;
   (e) that during that period there have been no alterations to the mechanism or processes of the computer that might reasonably be expected adversely to affect the accuracy of the output;
   (f) that records have been kept by a responsible person in charge of the computer of alterations to the mechanism and processes of the computer during that period; and
   (g) that there is no reasonable cause to believe that the accuracy or validity of the output has been adversely affected by the use of any improper process or procedure or by inadequate safeguards in the use of the computer.

(3) Where two or more computers have been involved, in combination or succession, in the recording of data and the production of output derived therefrom and tendered in evidence under this section, the court must be satisfied that the requirements of subsection (2) of
this section have been satisfied in relation to each computer so far as those requirements are relevant in relation to that computer to the accuracy or validity of the output, and that the use of more than one computer has not introduced any factor that might reasonably be expected adversely to affect the accuracy or validity of the output.

(4) A certificate under the hand of a person having prescribed qualifications in computer system analysis and operation or a person responsible for the management or operation of the computer system as to all or any of the matters referred to in subsection (2) or (3) of this section shall, subject to subsection (6) of this section, be accepted in any legal proceedings, in the absence of contrary evidence, as proof of the matters certified.

(5) An apparently genuine document purporting to be a record kept in accordance with subsection (2) of this section, or purporting to be a certificate under subsection (4) of this section shall, in any legal proceedings, be accepted as such in the absence of contrary evidence.

(6) The court may, if it thinks fit, require that oral evidence be given of any matters comprised in a certificate under this section, or that a person by whom such a certificate has been given attend for examination or cross-examination upon any of the matters comprised in the certificate.

59c. The Governor may make such regulations as he deems necessary or expedient for the purposes of this Part, and without limiting the generality of the foregoing those regulations may —

(a) make any provision for the purposes of this Part with respect to the preparation, auditing or verification of data, or the methods by which it is prepared; and

(b) prescribe the qualifications of a person by whom a certificate may be given, or a translation made, under this Part.

The pertinent part of section 59A of Part VI.A. (Computer Evidence) of the South Australian Evidence Act, 1929-1983, contains the following definitions:
In this Part, unless the contrary intention appears —

"computer" means a device that is by electronic, electro-mechanical, mechanical or other means capable of recording and processing data according to mathematical and logical rules and or reproducing that data or mathematical or logical consequences thereof:

"computer output" or "output" means a statement or representation (whether in written, pictorial, graphical or other form) purporting to be a statement or representation of fact —

(a) produced by a computer; or

(b) accurately translated from a statement or representation so produced:

"data" means a statement or representation of fact that has been transcribed by methods, the accuracy of which is verifiable, into the form appropriate to the computer into which it is, or is to be, introduced.

APPENDIX F

South Africa's Computer Evidence statute (reprinted in Bender, supra note 18, at n. 373).

Authentication of computer printouts.

2.(1) Subject to the other provisions of this section, a computer print-out may be authenticated for the purposes of this Act by means of an affidavit which shall—

(a) identify the computer print-out in question and confirm that it is a computer print-out as defined in this Act which has been produced by a computer as likewise defined;

(b) identify such copy, reproduction, transcription, translation or interpretation of information produced by the computer as the computer print-out may comprise or contain, and confirm that it is a true copy, reproduction, transcription, translation or interpretation of such information;

(c) describe in general terms the nature, extent and sources of the data and instructions supplied to the computer, and the purpose and effect of the processing of the data by the computer;

(d) certify that the computer was—

(i) correctly and completely supplied with data and instructions appropriate to and sufficient for the purpose for which the information recorded in the computer print-out was produced;

(ii) unaffected in its operation by an malfunction, interference, disturbance or interruption which might have had a bearing on such information or its reliability;

(e) certify that no reason exists to doubt or suspect the truth or reliability of any information recorded in or result reflected by the computer print-out.

(2) It shall suffice for the purposes of subsection (1) if the descriptions required by paragraph (c) and the certifications required by paragraphs (d) and (e) are given to the best of the knowledge and belief of the deponent to the authenticating affidavit.

(3) The deponent to an authenticating affidavit shall be some person who is qualified to give the testimony it contains by reason of—
(a) his knowledge and experience of computers and of the particular system by which the computer in question was operated at all relevant times; and

(b) his examination of all relevant records and facts which are to be had concerning the operation of the computer and the data and instructions supplied to it.

(4) The records and facts examined by the deponent to an authenticating affidavit in order to qualify himself for the testimony it contains shall—

(a) be verified in such affidavit by him if, at the time when he so examined them, he had control of or access to them in the ordinary course of his business, employment, duties or activities;

(b) if he did not have such control or access, be verified in a supplementary affidavit by some other person who, at such time, had control of or access to them in the ordinary course of his business, employment, duties or activities.

(5) The records and facts referred to in subsection (4) shall be sufficiently verified for the purposes of that subsection if—

(a) the affidavit verifying them testifies that, to the best of the deponent’s knowledge and belief, they comprise all the relevant records and facts which are to be had concerning the operation of the computer in question and the data and instructions supplied to it; and

(b) in the event provided for in paragraph (b) of that subsection, the supplementary affidavit establishes that they were all made available to the deponent to the authenticating affidavit for his examination.

(6) Subsections (3), (4) and (5) do not apply to an authenticating affidavit which—

(a) relates to a computer print-out of a public institution produced in the ordinary and regular course of the public institution’s business or activities from data and instructions supplied to the computer in the ordinary and regular course of such business or activities; and

(b) is deposed to be an official or employee of the public institution who is qualified to and does certify that the computer print-out was so produced.

(7) An authenticating affidavit shall be supplemented by —
(a) such further affidavits as are necessary for substantial compliance with subsections (1) to (6) when that is not achieved without them;
(b) any additional affidavits the circumstances may require.

Admissibility of authenticated computer printouts.
3.(1) In any civil proceedings an authenticated computer printout shall be admissible on its production as evidence of any fact recorded in it of which direct oral evidence would be admissible.
(2) It shall suffice for the purposes of subsection (1) if an affidavit which accompanies the computer print-out in question as contemplated in the definition of "authenticated computer print-out in section 1(1), on the face of it complies with the provisions of section 2 which apply to an affidavit of the nature in question.

Evidential weight of authenticated computer print-outs.
4.(1) An authenticated computer print-out shall have the evidential weight which the court in all the circumstances of the case attaches to it.
(2) In order to assess the evidential weight of an authenticated computer print-out, the court may —
(a) take account of anything contained in the authenticating affidavit or a supplementary affidavit;
(b) on the application of any party to the proceedings require the deponent to the authenticating affidavit or a supplementary affidavit or any other person to testify orally on any topic relevant to such question, whether or any such affidavit covered it.

Penalties for false or misleading testimony in affidavits.
5. Any person deposing to an affidavit intended as an authenticating affidavit or a supplementary affidavit who gives testimony in it which is false or misleading in any material respect shall be —
(a) guilty of an offence, unless he proves that he gave such testimony honestly believing it to be true and having made such enquiries and undertaken such investigations as were possible and reasonably necessary in order to satisfy himself of its truth or, as the circumstances may require, that he gave such testimony without any intention to mislead and could not reasonably have foreseen that it would be misleading;
(b) liable on conviction to a fine not exceeding R4 000, or to imprisonment.

The pertinent part of subsection 1(1) of the South African Computer Evidence Act of 1983 contains the following definitions:

"COMPUTER" means any device or apparatus, whether commonly called a computer or not, which by electronic, electromechanical, mechanical or other means is capable of receiving or absorbing data and instructions supplied to it, of processing such data according to mathematical or logical rules and in compliance with such instructions, of storing such data before or after such processing, and of producing information derived from such data as a result of such processing;

"COMPUTER PRINT-OUT" means the documentary form in which information is produced by a computer or a copy or reproduction of it, and includes, whenever any information needs to be transcribed, translated or interpreted after its production by the computer in order that it may take a documentary form and be intelligible to the court, a transcription, translation or interpretation of it which is calculated to have that effect;

"INFORMATION" includes any information expressed in or conveyed by letters, figures, characters, symbols, marks, perforations, patterns, pictures, diagrams, sounds or any other visible, audible or perceptible signals;

"PROCESSING" includes treating or, as the context may require, treatment by calculation, compilation, arrangement, sorting, comparison, analysis, synthesis, classification, selection, summarizing or consolidation . . . .